



APR 2012

DIGITAL ARCHIVE
EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

04

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

MACHINED STOCKS IN CLASSIC CUSTOM RIFLES, PART 2

SHOOTING COMPETITIONS HELP GUNSMITHS • RUGER SPEED STRIP • APPLYING ULTRA BORE COAT TO DEFEAT COPPER ...

ORIGINAL METHODS. MODERN ACCESS.

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AMERICAN GUNSMITH

DIGITAL ARCHIVE EDITION • APRIL 2012

ISSUE RECORD

ORIGINAL DATE	April 2012
VOLUME	Archive volume not stated
ISSUE NUMBER	04
SOURCE ID	ag-de89d2457c6352379ec01a03

DIGITAL EDITION

PUBLICATION	American Gunsmith
EDITION	Digital Archive Edition
ARCHIVE STEWARD	Innovation Network LLC
CONTACT	editor@gunsmithmag.com

Editorial fidelity. Article titles, author attribution, issue relationships, source-page references, and article text remain bound to the archive corpus. Layout, covers, navigation, and conversion notes are newly produced for this edition. Historical statements remain part of the original editorial record.

IN THIS ISSUE

Contents

A complete guide to the searchable editorial work preserved from April 2012.

2 Shooting Competitions Help Gunsmiths

AMERICAN GUNSMITH EDITORS • ORIGINAL PAGES 2

3 Ruger Speed Strip

CHICK BLOOD • ORIGINAL PAGES 3-7

8 Machined Stocks In Classic Custom Rifles, Part 2

DOMINIC PISANO • ORIGINAL PAGES 8-12

13 Applying Ultra Bore Coat To Defeat Copper Fouling

WENDELL DEANER • ORIGINAL PAGES 13-16

17 Working Guns For Working Guys

PAUL MAZAN • ORIGINAL PAGES 17-19

20 Headspacing 101

NORMAN E. JOHNSON • ORIGINAL PAGES 20-22

23 Reader Forum

AMERICAN GUNSMITH EDITORS • ORIGINAL PAGES 23-24

FROM THE ARCHIVE

Shooting Competitions Help Gunsmiths

BY AMERICAN GUNSMITH EDITORS APRIL 2012

ORIGINAL PP. 2

Shooting competitions happen throughout the year but season heats up as the weather does. Trap, Skeet, Sporting Clays, IDPA, USPSA, Three-Gun, Sensible Shooter, Cowboy Action, High Power, Bullseye, Benchrest, F-Class, Hunter Shooter and many more events are in full swing out at your local range and even on some temporary ranges being set up. Lots of places to see what's going on, too.

Besides the magazines and dedicated web sites, just putting "Shooting Competitions" into Google yields some 236,000 results to explore. While regular participation in organized shooting events is still only popular among a minority of gun owners (the NRA reports that only two percent of its members have attended an event in the past three years) competitions have enjoyed growth.

Given the huge surge in firearm sales in 2009, along with the fact that people will be looking to enjoy outdoor sports at the range this summer, shooting is popular. Given an estimated 80 million gun owners and rising even a minority of a group this large is a pile of folks! For the sake of gun ownership, and your business bottom line, help the growth of this trend in your locality.

As Bob Brownell used to say, "Show me a town without a gunsmith and I'll show you a town without guns!" We can add to that with, "Show me a town without good

organized shooting range events and I'll show you a town without good shooters." Organized marksmanship competitions are the genesis of marksmanship skill and the roots of where everyone ultimately learned how to shoot. Increase the participation of responsible firearm activities in your area by getting involved.

If you don't yet have a discipline of choice, find one. It's impossible to claim participation in the shooting sports when you don't personally have a sport to shoot. Help at an event or run your own. As a gunsmith it makes good business sense to further the shooting sports in your area. As a shooter, hosting organized events shows that gun owners are responsible and open with their activities.

Unlike plinking and other unorganized activity, an organized event is potentially newsworthy and gives local media something positive to talk about gun ownership. Every new person attracted to shooting events is a potential customer for your shop. And by "new person" I include decades-long gun owners as well. Consider how many gunsmithing services an enthusiastic marksman needs or wants compared to a box-a-year hunter. The critical thing is to get involved. Crying about anti-gun politicians or media solves nothing.

Be the counter example to the negative gun image by serving as a positive example!

PEOPLE & COMPANIES

Ruger Speed Strip

How to field strip Ruger pistols. Fast. A useful modification to the handgun that made Sturm-Ruger happen.

BY CHICK BLOOD APRIL 2012

ORIGINAL PP. 3-7

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Compared to his Yale classmates, the lifestyle of Alexander Mc- Cormick Sturm was an anachronism. He dined handsomely at the finest hotel in town while they chowed down in the student dining room. Alex's father, a former Yale football star, was patriarch of one of Connecticut's most prominent family. All the clothes Alex wore were tailor-made. While still enrolled, Alex became a successful writer, actor, artist, neophyte film producer and polo player.

Though much preferring dimly lit indoor after hour surroundings to the great outdoors, Alex had an enthusiastic interest in firearms, going so far as to add a large number of them to his sword, cane, and heraldry collection. On the other hand, William Bannerman Ruger was born in Brooklyn, NY. His father, Adolf, was the grandson of a drummer boy at Waterloo in 1815 and a fairly successful trial lawyer. His mother, May, was a daughter in a wealthy family of department store owners.

Unlike Alexander Sturm, William Ruger had an absolute passion for hunting that advanced his interest in guns by quantum leaps. While still in high school he read

clear through the firearms stacks at the New York Public Library and made himself welcomed at a Flatbush machine shop before returning to the library to devour engineering texts.

By the time he graduated from Alexander Hamilton High he'd worked up designs for a light machine gun and the conversion of the Savage 99 from lever to gas operated, semi automatic action. I hope what you've read so far has whet your appetites to know more about "Mr. Bill" Ruger. Assuming it has I highly recommend reading Ruger and His Guns by R. L. Wilson. Published by Simon and Schuster you can probably purchase a copy via Amazon.com but give Brownells a try first.

At any rate, Alexander Sturm met with William Ruger at a low point in Ruger's life. Savage had expressed no interest in the Model 99 conversion.

The Army had rejected his machine gun considering its rate of fire too high. (Army Ordnance Officers might have thought otherwise if aware of the developing German M42 design which hurled lead at American troops from Omaha Beach to the interior of

the Third Reich.) Ruger designed and built a system for his LMG allowing the operator to select between two rates of fire, one higher than the other. The Army again rejected his gun, this time because the highest rate of fire was too low!

The bank account of the Ruger Corporation was close to zero when Alex Sturm learned that its owner had designed anew .22 caliber pistol having Luger overtones in appearance to compete with the Colt Woodsman and Hamden-made Hi Standards. It would cost \$50,000.00 get the handgun into production. Alex had the money. He loaned it to Bill. The resulting partnership was christened Sturm-Ruger. The Standard and MK I models hit the shooting market like monster asteroids and the rest, as they say, is history.

I'll add that Sturm's interest in heraldry and artistic talents combined to create the stylized red eagle that adorned the MK I grip panels until his premature death. Since then, the eagle has been either black or silver against a black background on all Ruger firearms. The pistol pictured here began life as a pure Standard Model. It was

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the first Ruger I owned. It doesn't resemble a Luger anymore and no longer performs like one. A Clark barrel has replaced the original tapered tube and its trigger pull was reduced to a smooth pound and a half by yours truly. My old friend consistently prints inside the 10 ring at twenty five yards. It still competes successfully in local matches though it is held these days in a younger hand than mine. My "X-ring wobble" abandoned me along time ago.

In all the years I fired my MK I only one thing about it bugged me. Specifically, the .22 rimfire cartridge. Even the best of it is fundamentally dirty. It could and did build up residue on the bolt housed within the receiver and, when sufficiently accumulated, created a hitch in the action. I have been handed MK I pistols so badly fouled the bolt was very close to being immovable. The resolution: Field strip the gun, clean the bolt plus the interior of the receiver, lightly lubricate and reassemble.

It isn't as simple as it sounds and couldn't be accomplished during a two to five minute prep period on the firing line. How so? It's the way the pistol is built and tools, fundamental as they may be, are needed. The mainspring housing latch has to be pried fully open with a blade screwdriver. The housing has to be swung outward, pivoted upward, grasped firmly and pulled down hard to disengage the bolt stop pin from the receiver.

More often than not, the pin is so tightly fit in the receiver a 1/4-inch brass, aluminum or nylon drift and a 2-4 ounce plastic-head hammer are needed to dislodge it downward. The housing assembly can then be completely removed from the grip frame, the bolt withdrawn and the receiver with barrel attached drifted forward off the frame. Attempts, mostly unsuccessful, were made by owners and some gunsmiths to make field stripping the MK I less problematic.

These included highly polishing the The MK III kit contains additional parts related to the magazine disconnect. bolt stop pin and chamfering the underside of the pin opening in the receiver. Frequently, these attempts had a negative effect on tolerances because excessive material was removed. A year ago, I was among those who discovered The Speed Strip Kit applicable to all Ruger .22 Auto pistols at the SHOT Show.

It includes anew, two piece stainless steel When fully reinstalled, the pin ends should be flush with both sides of the frame. bolt stop pin, anew hammer and a 5/32nd Allen key. That's it for the MK I. The MK III kit contains additional instructions and components related to the pistol's magazine disconnect. I suppose Brownells saw them too, spoke with its inventor who was manning the Majestic Arms Ltd. Booth, added the kits to their catalog and provided the MK I kit for this article. The Speed Strip A

RUGER SPEED STRIP CONTINUED

ORIGINAL PAGE 5

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is patented, #5,666,755. Here's how to make it work. Everything goes the same up to and including removal of the receiver assembly from the frame. Now take off both grip panels. With a Both are on the left side of the hammer. 3/32" or 1/8" punch—pay attention, please—

push the hammer pin (33) from right to left just enough to free up the existing hammer (30) and lift it out. Set the frame assembly aside. With your fingers, remove the ham-



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Ruger MK I (Specifications subject to change without notice) 1 Frame 2 Disconnecter 3 Trigger 4 Trigger Pin 5 Trigger Pin Lock Washer 6 Trigger Stop Screw (MK I) 7 Trigger Spring Plunger 8 Trigger Spring 9 Sear 10 Sear Spring 11 Sear Pivot Pin 12 Sear Spring Stop Pin 13 Magazine Catch Stop Pin 14 Magazine Catch Pivot Pin 15 Grip (2) 16 Grip Screws (4) 17 Mainspring Housing 18 Bolt Stop 19 Bolt Stop Pivot Pin 20 Magazine Catch Spring 21 Housing Latch Pivot Pin 22 Magazine Catch 23 Housing Latch 24 Mainspring Plunger 25

Mainspring 26 Detent Ball 27 Magazine Assembly 28 Safety Catch 29 Hammer Bushing 30 Hammer 31 Hammer Strut 32 Hammer Strut Pin 33 Hammer Pivot Pin 34 Recoil Spring Guide 35 Recoil Spring 36 Bolt 37 Firing Pin Stop 38 Rebound Spring 39 Rebound Spring Support 40 Recoil Spring Support 41 Firing Pin 42 Extractor 43 Extractor Plunger 44 Extractor Spring 45 Receiver 46 Rear Sight (Standard) 47 Micro Rear Sight (MK I) 48 Barrel (MK I) 49 Front Sight Blade (MK I) 50 Front Sight Pin (MK I) 51 Barrel Assembly (Standard)

mer pivot bushing (29) from the old hammer. Use a out the mainspring strut retaining pin (32). Install the bushing, strut and its retaining pin in the replacement hammer. The bushing goes in from right to left; the retaining pin from left to right. To replace the modified hammer assembly in the frame, hold the frame in one hand. Place the hammer bushing into the cut out in the disconnecter (2). Push the hammer and disconnecter down into the frame.

Look through the hammer pivot pin hole and align the hammer with the hole. Push the pin back through from the left side of the grip frame until the pin is flush with the right side of the frame. Remount the grip panels and the work to be done on the frame is a thing of the past. Reinstall the upper receiver (45) on the frame. With most pistols you'll have to tap the muzzle to the rear with your plastic-head hammer to fully seat the receiver. Now ex- Complete your American Gunsmith collection.

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HISTORY

Machined Stocks In Classic Custom Rifles, Part 2

Finishing up a machined stock into a custom, classic style.

BY DOMINIC PISANO APRIL 2012

ORIGINAL PP. 8-12

In part one of this series I explained how I shortened the cheek piece in order to have the stock conform to my idea of an ideal stock in the American custom classic style. If you don't recall, the original cheek piece was way too long for my taste, measuring something in excess of 12 inches from the trigger. I prefer the edge the cheek piece to be 10 inches from the trigger. With that addressed, it's time to shape the rest of the machined stock to conform to this classic ideal. A quick note on pre-inletted stocks.

Many firms advertise 95% inletted stocks, which sounds like it might be a snap to fit a barreled action in them. WRONG. The last 5% of the work involved in inletting a barreled action can be the most trying and frustrating—not to mention that's exactly when any mistakes will show in the finished product. The first thing we'll do is to attach an ebony tip to the forend of the stock. Experience tells me that the ideal forend length is ten inches, give or take.

I cut the forend off at eight inches in front of where the receiver will be fitted. Next, I cut my ebony to two or more inches in length. There are two types of ebony commonly available to use: Gabon, which is very black in appearance, and Macassar, which has a sprinkling of brown streaking throughout the wood. I prefer Macassar because Gabon looks too much like plastic when the stock is fully finished.

I begin by drilling a hole in the ebony using the drill press, making certain everything is square and being careful to drill it in the correct location. I use either a 1/4 or 3/8 inch dowel, whichever is available,

about one inch deep. Once drilled, I drip a bit of glue in the hole and tap the dowel in place and wipe off any excess glue that oozes out. With that complete, I drill a hole in the corresponding forend of the stock using the next larger sized bit.

Because this hole is drilled using a hand held drill it is impossible to be perfectly squared up, use the next larger size bit (e.g. a 3/8 inch bit for 1/4 inch dowel) and Brownells Acraglas epoxy to fill in any slop of the dowel-to-forend fit. The only thing left is to clamp up the ebony and forend, being sure to squeeze out any excess epoxy. Drill relief holes in the ebony tip and stock forend to relieve any trapped air and glue. I prefer to use dowel that is striated for this purpose.

Everything is set aside to cure overnight. It's important not to rush and to plan ahead. I do a bit of dry fitting to calculate how much work is involved. Most machined stocks are machine inletted, so a certain amount of wood must be removed in order to fit the barreled action. I don't have any particular carving or wood working skill that allows me to stand out except one—patience. The rule is take your time.

If the barreled action has a one piece bottom metal unit (trigger guard and floor plate assembly) most of the experts call for inletting this first. I agree with that approach as it helps you to properly align the top metal (barrel and receiver) later. In the event you have a barreled action with two piece bottom metal you have no choice but to inlet the top metal first. Pre 64 Winchester 70's are in this classification. This is where I depart from the experts.

Experience has taught me that I can inlet the two piece bottom metal found on the Winchester M-70 model as well as if I had a one piece unit to work with. I find it's most helpful to acquire several tools to enable you to accomplish this. Inletting pins area must for me as well as Tee handles, available from Brownells or other gun tool supplier.

The inletting pins are useful for aligning the barreled action with the machined stock and the Tee handles during the later stages of inletting as they allow you to pull the bottom metal and top metal together quickly and easily. You can, of course, use the forward and rear tang screws, but as many times as you'll need to "try and fit" they are bound to be seriously damaged. Initial Fitting I begin by fitting the bottom metal.

Insert the Tee handles in the forward and rear tangs and fit them into the screw holes in the machined stock to correctly align the parts. Likely the bottom metal will be a bit over sized compared to the machined inletting. I take a sharp scribe and carefully scribe an outline of the tangs. This is my starting point. Remove the bottom metal and begin to cut away excess wood, staying inside the lines just scribed.

I use a Dremel tool with a medium course burr and begin to remove excess wood from the curved ends of the tang recesses. Then I coat the bottom metal with a marking agent, either lipstick or one of the commercial

MACHINED STOCKS IN CLASSIC CUSTOM RIFLES, PART 2 CONTINUED

ORIGINAL PAGE 9

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The majority of this work can be done with sharp chisels, spotting agents, and refit the bottom metal continuing the use of the Tee handles for correct alignment. Give the bottom metal a light tap with a plastic or rawhide hammer to impart marking agent to the wood. Remove the bottom metal and note where the spotting agent has left marks. These are high spots and indicate where wood must be removed. Once again pare away the excess wood. Repeat several times till the bottom metal begins to slip into place about in.

Now it's time to work with the top metal (the barreled receiver.) First, remove any excess wood from the top of the ebony tip to make it even with the plane of the top of the forend. If the machined stock has a starter

barrel channel, you will not be able to get much of an impression using the spotting agent. Here's what I do. Turn the barreled receiver upside down and place it on the stock carefully aligning it to be centered.

Then I take a sharp scribe and outline the barrel being careful to stay inside of the barrel contour. Remove the barreled receiver and use a sharp pencil to trace the scribe marks to make them more visible. Next I go to the drill press and use appropriately-sized Forstner bits to hog out the barrel channel from the recoil lug area to 1/2 inch short of the end of the forend tip, being careful to stay inside of the pencil scribed mark.

I use my largest bit to remove wood from the recoil area, drilling down to the bottom of the recoil lug and then surpass it. This area

will be filled with epoxy mixed with anodized aluminum which when cured becomes a solid block of aluminum. The last half inch of the barrel channel shall be carefully opened up using rat tail rasps and half round chisels in order to make the barrel channel fit the barrel and not have a square bottom visible once the barreled receiver is fully fitted.

Use Forstner bits to open up the recoil lug area as necessary in order to allow the recoil lug to drop in without any interference. The barreled receiver should now drop partially into place in the stock. I like to use Forstner bits because they have flat bottoms and drill true holes with clean straight sides. I then remove the triangular pieces between the holes drilled by the Forstner bits to open up the barrel channel even further.

MACHINED STOCKS IN CLASSIC CUSTOM RIFLES, PART 2 CONTINUED

ORIGINAL PAGE 10

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If I haven't done so already I remove all extraneous parts from the receiver, such as the trigger assembly, bolt stop assembly and the like. These parts will be inletted after the barreled receiver is fully inletted and bedded. With spotting agent liberally coating the barrel and receiver I begin paring away excess wood using the stock pins to align the top metal. Use whatever tools you are comfortable with. I prefer to use several Dremel tools, each fitted with a different bit. I take it slow and easy.

Remember you can not replace wood that has been removed. Once the barreled receiver is approximately half inletted into place I use

the Tee handles to more perfectly align and slowly draw the bottom metal and top metal together. Now is the time to complete the fitting of the bottom metal by the try and fit method. I take as many fittings as necessary to achieve a perfect fit. The fit should be tight, but not so tight that the part is difficult to remove.

Remember as the part becomes fully inletted the marking agent will appear as it slides down into the inletting. Be careful about removing these marks as you will likely open the inletting too much ending in a case of "gapisis." The same thing applies to inletting the barreled receiver. This area will be filled

with atomized aluminum creating a solid block of aluminum when it sets. The top metal should be inletted to one half of the barrel diameter.

Use a pencil to scribe the sides of the barrel to the tip of the forend to check your progress. Then go a fraction of an inch deeper so you will have a bit of wood to play with when you complete your finish sanding. Tap the barreled receiver with a plastic or rawhide hammer to reenforce the marks left by the marking agent just as you did on the bottom metal. Use chisels, the Dremel tool, and abrasive paper

MACHINED STOCKS IN CLASSIC CUSTOM RIFLES, PART 2 CONTINUED

ORIGINAL PAGE 11

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wrapped around variously sized dowels to remove the high spots left by the marking agent. From time to time I step away from the project to take a look at the progress. When I'm satisfied that the barreled action is fully inletted—top and bottom metal—I can begin preparation for bedding the barreled action with epoxy. It is important to remember that the epoxy is not to be used to fill in mistakes but to reinforce and waterproof the wood.

I am convinced that the best way to get a perfect bedding job is to do it in stages with the recoil lug area and rear tang, the barrel channel and the receiver. Coat the entire barreled receiver with release agent or wax, being cer-

tain that every part is covered. I use children's modeling clay to fill in any opening in the metal to prevent epoxy from flowing into these areas making it difficult, or impossible, to separate the wood from the metal.

If the cartridge being used is larger and more powerful than a 30-06 I always reinforce the previously hogged out recoil area with atomized aluminum. For magnum cartridges I also use recoil cross bolts with plugs to cover the holes in the sides of the stock. One can't be too careful! Bedding Now that we are ready for bedding here's how I do it. The previously hogged out area of the recoil lug and The first step is to bed the recoil area and the second step is to bed the remainder of the channel.

Note how smooth and clean the task turns out when care is used in the process. Again note use of tee handles. rear tang are first. Drill out the rear tang screw hole from the top with a 3/8 inch bit from the top. Go down about half way. You don't want to drill that hole all the way through because you want the smaller lower portion of the hole as a guide for the Tee handle. Also too large a hole will allow the epoxy to run out before it sets.

I use generous portions of modeling clay at those places where I don't want epoxy, like the trigger assem-

MACHINED STOCKS IN CLASSIC CUSTOM RIFLES, PART 2 CONTINUED

ORIGINAL PAGE 12

bly inlet and magazine cut out behind the recoil lug. If it's a magnum cartridge, mix up enough Acraglas to fill in the recoil lug area with a little left over for the upper rear tang and add in a generous portion of atomized aluminum, which will form a solid block of aluminum when it sets. I also use a bit of black dye to color the mixture. For any standard cartridge up to 30-06 I use Acraglas Gel as it is easier to work with due to it's butter-like consistency.

No additives are necessary with Acraglas Gel except coloring. With the stock set firmly in the vise I pour the epoxy mixture into the recoil lug opening and the rear tang inlet and carefully set the top metal in place. Insert the Tee handles through their respective openings and slowly tighten up the forward Tee handle. Do not tighten the rear tang Tee handle as it is used to keep the epoxy from running out. I want the action/receiver to settle in place without any stress on it.

This will become clear with the second step. Once I'm satisfied that the forward Tee handle is tight I wipe away excess epoxy that has oozed out and set the entire assembly aside for twenty four hours to properly cure. The next day I remove the barreled receiver from the stock and carefully clean up any excess. Examine the work. If you followed the instructions carefully the atomized aluminum epoxy should be hard and without major voids. On to step two.

Ire-coat the barreled receiver and bottom metal with release agent to prepare them for additional epoxy. Coat both Tee handles as well. Drill out the remainder of the rear tang screw hole from the bottom and forward tang with the same 3/8 inch drill you used before. The result is a variation of the pillar bedding system as the epoxy will form a solid pillar, promoting accuracy. I coat both lower tang inlets with Acraglas Gel and carefully set the bottom metal in place.

Use masking tape to hold it in place and turn the stock right side up. I generously coat the barrel channel with Gel and carefully set the top metal in place. This time I use both Tee handles to tighten the top metal and bottom metal in place using first one than the other. Since the recoil lug area and rear tang have been previously epoxy bedded the top metal should slide precisely into position without too much trouble. I make certain the barrel is fully seated to the end of the forend to get an exact fit.

Wipe off any excess epoxy to make removal of the metal work easier. Wait 24 hours and then remove the metal. I prefer to remove the bottom metal first, then the top metal. Step three in bedding is to bed the sides of the receiver. Some experts think this step is not necessary as the amount of bedding compound is slight. I like to do it as it gives the bedding a finished look and also waterproofs the receiver area.

Coat the receiver with release agent then mix up the Acraglas Gel as before and apply it to the sides of the receiver and the wood. Fit the top metal into the inletting and tighten as before using the Tee handles. When the Gel sets the bedding job is complete except for clean up. I reassemble the trigger and bolt stop assemblies to the action and inlet them into the stock. If the machining job was well done it's likely all that must be done is to cut grooves for the various pins in the trigger assembly.

On Mauser actions the bolt stop assembly must also be fit to clear the wood without a large gap. Let's not forget the bolt notch. This is also inletted into the stock by the try and fit method. I prefer the Dremel tool with various sized burrs for this task. Be certain the rear of the bolt handle clears the wood or it will chip wood out of the notch if there is the slightest set back upon firing. Reassemble the rifle and check out that all is in working order. Now, examine the results.

If I followed instructions carefully the results will be nearly perfect. If I discover voids in the epoxy which I consider to be excessive I might want to consider adding a "paint" coat of Acraglas epoxy. A paint coat implies what it is, with Acraglas epoxy spread in a thin layer to fill any voids. With the barreled action fully inlet and bedded I now move onto shaping the rest of the stock. Depending on who did the machining this may be simple to do or a task requiring some thought and work.

This stock was rather full on the outside so I plan to slenderize it to make it more attractive in keeping my thoughts of a custom classic rifle. I first turn my attention the ebony tip. It was a 2 x 2 x 2-1/8 inch block of wood and must now be brought down to size of the adjacent forend. I use chisels to hog off much of the excess wood paying close attention to the grain flow. Take as much of the excess wood from the tip using chisels as you can. Then I use rasps and files of every size to get the joint flush.

I also use my hand held belt sander with 40 grit abrasive paper and sand off as much wood as I am comfortable doing,. The 40 grit really eats up the wood so I'm very careful to keep it on the ebony as it will seriously gouge the much softer walnut. The final step is to use my largest surform file to get the joint dead smooth and flush I draw lines on top of the forend for use as a guide to thinning the forend to a more appropriate size.

I like about 1/8 inch flat on the top of the forend and fair it down to the stock itself in graceful, smooth, flowing lines. I step back occasionally to check the work. The last step is to cut the loading port down to the top of the rail and then to taper the sides of this cut. That will give the stock a classic look. Who said you can't make a truly custom classic stock from a machined stock? All it takes is a lot patience, a good eye and a sense of style. AG

FINISHING

Applying Ultra Bore Coat To Defeat Copper Fouling

Copper removal is an issue in the proper maintenance of centerfire rifle bores and Ultra Bore from Dyna-Tek Coatings is a solution.

BY WENDELL DEANER APRIL 2012

ORIGINAL PP. 13-16

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Webster's New Twentieth Century Unabridged Second Edition Dictionary describes bane as "The cause of mischief, injury, or destruction." If anything is the bane of all riflemen copper fouling comes closest to being the classic definition. I recently picked up a product called Ultra Bore Coat from Dyna-Tek Coatings (dynamicfinishes.com, that claims to reduce copper fouling in a rifle between 80 and 100%. It does this without affecting accuracy or velocity to any discernible degree.

Quite a big claim and certainly worth checking out. Thinking that this product could be a Godsend to some of my customers—and saving me a lot of cleaning time with a bore brush—I decided to test it on another recent development: Savage's new rifle that comes fitted with their Accu Stock. This is an aluminum bedding block with a unique way of locking the action in that helps increase stability and accuracy. I decided I could test both the rifle and the Ultra Bore Coat. First, I am a big fan of Savage rifles.

Even the basic models are known for delivering more than adequate accuracy right out of the box. Compared to some on the market they are relatively inexpensive but shoot inversely to their price. The 110 action that is the basis for these rifles is strong, safe and locks up solidly as any bank vault. As we all know the headspace is set by a locknut on the barrel giving superior potential for accuracy.

The later models have This product, when applied properly, will protect the outside parts of your gun from rust and make it easier to clean. With the bore and outside coated your whole gun will be protected from the elements. A light coating of oil can still be used. a more streamlined nut, so your old wrenches will not fit but the lockup is the same as it's always been. My rifle is chambered in .250- 3000 Savage.

It is of the Weather Warrior series and sports a twentytwo inch stainless barrel and a black synthetic Accu Stock and Accu Trigger. I suffered a torn rotator cuff injury a few years ago in my shoulder and try to

limit my range time with the big kickers. This gun also comes with a really effective synthetic recoil pad that Savage brands the P. A. D., or Personal Anti-Recoil Device.

I've had other rifles with these new types of super-forgiving recoil pads installed and I heartily recommend them, especially for old guys like me who don't feel like being beat to death anymore. That being said, I just had a range session with my favorite .300 Winchester mag in an eight-pound rifle the other day. I survived and man, that rifle shoots, but that's another story. My little Savage is a pussycat.

That's not to say you can shoot with impunity, since recoil is cumulative and will wear out even the hardest of us by the end of the day. However, thirty or forty rounds of full-power loads can be handled by anyone. One of the factors that help is the eight and one-half pound weight of the rifle including a Leupold VX-2 3-9 power optic in Weaver rings. When I bought the gun I was hoping for a

APPLYING ULTRA BORE COAT TO DEFEAT COPPER FOULING CONTINUED

ORIGINAL PAGE 14

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Ultra Bore Coat cannot be applied over copper, powder, plastic, or lead fouling. Believe me, this bore was thoroughly clean when the Ultra Bore Coat was applied. field-ready, seven pound rifle that was more scaled to the .250-3000 caliber. Oh well, I'm still searching, but I like this rifle's balance albeit the additional weight. I measured the barrel diameter at the muzzle at a nominal 0.585 inch.

That's a little smaller diameter than a standard weight sporter, but with just a .25 caliber hole in the middle there's still a lot of meat around it. At the range it performs wonderfully, aided by the great proprietary Accu Trigger that can be set as low as two pounds on this model. In the field the gun is steady as a best friend and, as long as I don't

have to tote it up a sheep mountain, it is well within specs for a deer-hunting rifle that will mostly be used from a stand.

Some of us are a bit obsessive/ compulsive about cleaning our rifles. How many shots it takes to degrade accuracy from copper fouling depends on the quality of the barrel itself and the type of bullet used, among other things. Some of the all copper homogenous bullets that have recently become popular, like the Barnes, will usually—but not always—foul a bore more rapidly than a standard cup and core number.

The new Barnes Triple Shock was developed with three bands that have largely ended this problem but any hard bullet, be it a Nosler Partition or some of the so-called premium bullets, can sometimes deposit copper rapidly

in a rough barrel. Normally I don't clean my personal hunting rifles until accuracy actually falls off or until I start to feel guilty. This May I have another? A clean patch is a wonderful thing. can take at least fifty shots or more.

A quick wipe down with a lightly oiled cloth is all that's needed, usually for the whole season, and you don't have to worry about zero shifting, although there is some controversy in this statement. That being said, sometimes I think my whole life is concentrated around cleaning copper out of rifles. I have dreams (nightmares) about scrubbing a bore like Sisyphus rolling that rock up the hill, endlessly repeating the same task with no results.

There has got to be a better way than this to wear out our brass brushes.

APPLYING ULTRA BORE COAT TO DEFEAT COPPER FOULING CONTINUED

ORIGINAL PAGE 15

I tried the Outers Foul Out as soon as it was available. It works pretty well if you follow directions. You can see the barrel fouling actually deposit itself on the rod running through the bore. This process takes the lead or copper fouling molecule by molecule from the bore and puts it on the stainless rod running through the bore bathed in a special solution to aid the transfer. If there is a more thorough way than an electrochemical process to get your rifle clean I'd wonder what it is.

The problem is, as with any known way to remove copper, the process can be slow and cumbersome. You still have to scrub the bore with a brass brush. It's almost the same as your wife dusting and scrubbing and picking up the house before the cleaning lady gets there.

The use of copper-eating solvents like Hoppe's Bench Rest formula or Butch's Bore Shine attacks the fouling like piranha at cattle-crossing time but I personally don't like the smell of ammonia in my shop and having to run a fan to ventilate the area is not good for my asthma. Ultra Coat promises relief from this misery. It claims to stop copper fouling from being deposited in the bore in the first place, making removal unnecessary. Let's see how well it worked for me.

John Barsness advocates the use of Ultra Coat and his directions for cleaning a bore to be CLEAN are included with the instructions. If the bore is not perfectly clean down to bare, dry steel, the coating will be sticking to powder, lead, or copper fouling instead of the bore. I am a fan of John Barsness. He is a no-nonsense gunwriter and I think you can take his instructions to the bank.

He recommends starting with Hoppe's No. 9 then moving to JB Bore compound, billed by the company as a "non-embedding bore cleaning compound for the removal of lead, metal, and powder fouling from rifles, pistols, and shotguns." In practice, the compound is used on a tight fitting patch wrapped around a wire brush to scrub the bore. Rubbing a little bit of this

stuff between your fingers lets you feel the grit but it is very mild and will not harm the bore.

After using Hoppe's again to clean out the JB Compound use a chemical copper solvent (any and all are probably OK) and repeat as directed by the manufacturer at least three times. Finally, degrease the bore with isopropyl alcohol or acetone. I went John one step further and set up my Foul Out machine. I can't really say I beat him because the machine registered clean when I started. I let it run for an hour for good measure and then degreased before applying the Ultra Coat.

The application instructions for applying the Ultra Bore Coat are specific and clearly written so anyone can understand them. The kit comes with a degreaser which is used first. With the muzzle pointed down the Ultra Coat is then applied with a bore mop working with short two to four inch strokes. This step is repeated three times, and then repeated again three times.

Next, with the muzzle pointed up, this process is repeated. We are supposed to wait at least 6 hours—and preferably overnight—before shooting 10-20 rounds of jacketed bullets to use the heat and pressure to "set and center" the coating. After this is all done the company recommends using solvent and patches only to clean the bore. If you feel you must, they also recommend only using a nylon brush to scrub the bore. So how are we to measure this supposedly 80 to 100 percent improvement over an uncoated bore?

Good question. If you do not have access to a bore scope I recommend using empirical data such as the color of cleaning patches and how many it takes to end up with a clean patch. This really isn't that imprecise if you know your rifle in the first place. The company notes that ten patches may be required for the first cleaning and by the third or fourth cleaning only 4-6 patches will be needed. For this article I inspected my Savage's bore with a Hawkeye bore scope.

The scope proved the barrel was clean, showing no traces of copper or any other fouling. Some tool marks were evident but for a factory barrel this one looked pretty good. I think it will shoot when I get the right load developed. The chamber was not too rough and the leade showed smooth sailing into the rifling. I had shot this rifle about one-hundred times to break it in and establish a base line.

Twenty shots would definitely deposit copper in the barrel, forty would have some serious problems as defined by the blue-green color of my patches when copper solvent was used. Accuracy was not affected as the rifle shot three to four-inch groups at two hundred yards, clean or not. That is disappointing for a rifle of this type, but it is what it is. I'm sure it will do better when I have a chance to play with it. For now, I was more interested in the Ultra Bore Coat project.

I removed the action from the stock to check out the Accu Stock and adjust the Accu Trigger to my satisfaction. It came with about a three-pound pull, which was more than adequate, but I wanted to play with it from a gunsmith's point of view. The Accu Stock has its own quirks. Make sure the rifle is unloaded and close the bolt. Dry fire the trigger. The bolt must remain closed and the action uncocked throughout the entire procedure of removing the stock and then reinstalling the action.

For a detachable magazine rifle push the bolt release forward as far as it will go to gain access to the rear action screw. For the hinged floorplate model, like mine, open the plate to get to the rear and front action screws. Use a 5/32 Allen wrench to loosen and remove them. When removing the stock loosen the wedge screw located in front of the front action screw one turn counter clockwise only or else the wedge may come off the screw.

With the stock removed the Accu Trigger may now be adjusted using the tool provided. Insert the tool into

APPLYING ULTRA BORE COAT TO DEFEAT COPPER FOULING CONTINUED

ORIGINAL PAGE 16

the bottom of the trigger return spring and adjust towards the higher range of pull by turning clockwise. The maximum trigger pull is at the point where the spring "clicks" when rotated. To adjust towards the lower range of pull, turn the tool counter clockwise. The minimum trigger pull is at the point where the large coil contacts the top portion of the trigger and you detect resistance. Do not force the spring beyond these limits.

I set my trigger to a two and onehalf pound pull as measured by my RCBS trigger-pull gauge. It has no creep nor discernible over travel, in other words, it's a great trigger. After taking the rifle apart from the stock the fixed recoil lug and bedding block that make up the Accu Stock can readily be examined.

Our friend and colleague, Chick Blood, has already given us a good overview of the Accustock in the October 2009 edition of this magazine with, "Take an Insider's Look at the Savage Accustock." He also enlightened us with very good pictures of the Accustock concept. I would add that the tricky part of putting this action back in the stock is to make sure the wedge and wedge screw are positioned correctly.

Make sure the recoil lug is tight by putting the recoil pad on the floor, pull down on the barrel and lightly tighten the front action screw first and then the rear. After all the screws and lugs and wedge are in place tighten the front action screw to 40-inch pounds followed by the rear action screw to 40-inch pounds finishing with the wedge screw by the same amount. After I had played around dismantling and re-assembling my new toy I got down to the serious business of applying the Ultra Coat to the bore.

As I said, the barrel had been cleaned as well as I could do it and degreased with the degreaser supplied in the kit. I can see where the average hunter may not have the necessary components needed to clean a barrel clear to the bone, so to speak, so

this is a job we probably should do. At any rate, while I also can see that almost any serious hobbyist gunsmith could do this, I believe we professionals can pick up some work recommending and completing this procedure. The kit supplied is supposed to do 5-6 firearms.

The cleaning and application of a few jobs could amortize the cost of the kit quickly. Using a twenty-five caliber sized bore mop I applied the Bore Coat as directed, left the gun sit overnight, and then went to the range to shoot and cure the coating. The instructions caution against shooting anything but jacketed bullets. However, I assume that is just for the curing process since later it states that it makes leading easier to clean in handgun and rifle bores.

Ten to twenty shots are supposed to be all it takes to finish this process. I loaded some .250-3000 rounds with plain-jane Remington 100 grain Core Lokts over some H4895 powder. Ten to twenty shots were recommended, so I fired twelve shots to cure without unduly heating the barrel and took the gun back to the shop to inspect it. The instructions do not say how long to wait after curing before firing regularly. Since I was not under a deadline I decided to give it twenty-four hours.

After running a patch soaked with Hoppe's Number 9 though the bore followed by a couple of dry patches, I cheated a little by checking out the bore with my bore scope. I didn't see any copper. It might not have been fair, but I decided to fire another twenty five rounds without any more cleaning to see what would happen. When I got back from the range I repeated the Hoppe's Number 9 patch and a couple of dry patches.

I wasn't trying to clean out copper at that point, only get any powder fouling and crud like that out of the bore so I could get my bore scope in without dirtying its lens and optical mirror. I found copper, but not a lot. It was concentrated more towards the chamber end of the barrel than the

muzzle, which is as it should be and is to be expected. Was there a lot? No there wasn't and I was impressed.

Several of the lands had small streaks of copper but the deposits were a lot less than I had come to see with the same type of shooting and before coating with Ultra Bore Coat. Surprisingly, before the coating I thought the bore was a little rough, but not much rougher than most factory barrels. As a matter of fact the lands looked like little railroad tracks. After the coating they were smoothed out considerably and I think it will help this rifle shoot better.

Cleaning the rifle was attempted with patches soaked in Hoppe's Bench Rest solvent and left to sit for 30 minutes. This is a pretty good copper remover but not as harsh as Butch's Bore Shine and some others. After a follow up with dry patches this process was repeated until no traces of copper remained on the patches. I didn't use a brush of any kind. After a short period of wet and dry patches the bore scope revealed that the bore was clean as when I started to apply the Ultra Bore Coating in the first place.

I have to conclude that this stuff works and the company claims that it gets easier to clean after the first several times. I'm preparing my personal hunting rifles for coating. Here are a few facts about Ultra Bore Coat provided by the company: This product will allow longer shot strings without cleaning from a center-fire rifle, faster and easier reloads with a muzzle loader (no crud ring), leading cleans from your revolvers easier, and plastic is a non-issue in shotgun bores.

Bore Coat has no impact on velocity, point of impact, or group size. They claim no one has yet shot it out and if you're the first, just reapply. The coating once cured is 0.25 microns thick (1/99th the thickness of a human hair) and has no effect on pressure. It will protect your bore from rust. A small amount of oil will not hurt. AG

FROM THE ARCHIVE

Working Guns For Working Guys

Top end equipment is nice but not readily affordable for those of us with kids and a mortgage. Here's how to get the most out of pedestrian gear.

BY PAUL MAZAN APRIL 2012

ORIGINAL PP. 17-19

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It has always seemed to me that gun writers and gun magazines area little out of touch with the realities of most hunter's lives. The vast majority of the hunters I know live in small towns and cities and work hard for \$10 to \$15 an hour. On that kind of money they try to pay the mortgage on a modest house, feed and clothe their kids and make the payments on a used car or truck. Most of their wives work because they have to in order to make ends meet.

Money for new guns and hunting trips is scarce as hen's teeth and most of them hunt near home out of necessity. I recently read an article singing the praises of anew 1911 clone that came with "all the goodies". The writer was ecstatic that the retail price was a "modest" \$895. Another writer recently said that he never understood why a guy would put a \$100 dollar scope on a \$1000 rifle. Well, I have news for both of those guys and the magazines they write for. At \$12 an hour a \$900 handgun ain't modestly priced.

I know that compared to having a custom gunmaker put one together with the same goodies it would be closer to \$2000 but for a working guy that isn't an option. Most guys can only dream of a \$1000 rifle and, if

he could squirrel away that much for a rifle he would be lucky to have \$100 left over to buy any scope. When I was 30 years old my entire hunting arsenal consisted of a Stoeger Luger .22 pistol, a Stevens 311 12 gauge double and a Savage 110 5 MOA performance to about 1 MOA after modification.

In addition to the remodeled buttstock the forend has been slimmed and tapered. With the work done the rifle has a much more classic line. bolt action rifle in 30-06. If you are not familiar with these old guns I can tell you that they all had one thing in common: They were cheap! It had taken me almost ten years to accumulate them and I treated them like they were the family jewels. Let's say you're one of us working stiffs.

The phone rings one evening and a very excited buddy tells you that him and a bunch of his friends are going on a prairie dog hunt and you're invited to join them. Wow! It sounds like a ball and you're ready to jump at the chance when it dawns on you that you don't have, and can't afford, one of those high dollar, super accurate thousand dollar tack drivers with the equally high dollar super zoomie 36 trillion power scope.

Much as you would like to have a rig that will shoot the nose off of a prairie dog three counties away it looks like you will have to leave the fun to the rich guys. But wait, maybe not! Lets talk about the realities of varmint hunting for a moment. Like you, at one time all I knew about it was what I had read and I thought all prairie dogs were shot at distances starting from 200 yards out to the horizon. That is just not true!

Sure, guys brag about the long shots they have made but they are shooting them that far out because they can't get closer. I've shot a few prairie dogs and the vast majority were within 100 yards. You only take the long shots to see if you can, not because you have to. If you have a hunting rifle chambered in any centerfire caliber between .22 and .30 and fitted with a scope you already have a varmint rifle. On my last trip all I used was a Remington 700 in .308 and a 3-9 power \$100 scope.

I'm a hand loader and brewed up a load that was very accurate with 125 grain varmint bullets. For those of you that don't already have a rifle that will fill the bill there is still hope that you can make that trip. I set out to find a truly affordable rifle and scope combination that most guys could afford without dip-

WORKING GUNS FOR WORKING GUYS CONTINUED

ORIGINAL PAGE 18

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If only we can shrink that vertical stringing this gun will shoot! My tests suggest a muzzle dampener may be the solution. It ain't pretty but it worked, proving that a dampener would help. ping into junior's college fund. After an extensive search I came up with a New England Firearms (NEF) Handi-Rifle that looked like just the ticket. This is a single shot break open rifle built a lot like the single shot shotguns that many of us started hunting with.

It's not particularly pretty but it is available with a laminated wood or synthetic stock in just about every standard caliber from .223 to 45-70 for around \$200 on the used gun market. I found one on Gunbroker.com in .223 complete with mounted cheap 3-9 power Chinese variable scope. I bid \$200 on it and at the end of the auction the gun was mine. First, let me tell you what \$200 does not buy. It does not buy fancy walnut hand fitted stocks. The laminated stock stands proud above the metal and is rather blocky.

It does not buy precision optics. It does not include color case hardening of the receiver. The triggerguard and forend spacer are plastic. The Chinese scope on the gun was difficult to get focused and leaves a lot to be desired in the clarity and sharpness of the image. I've found this scope retailing for around \$45 and if it had not come with the gun I would have sprung for that \$100 model we were talking about earlier.

None the less, I cleaned the bore just to make any comparisons fair and took it to the range just as it came out of the box. Now lets see what we did get for our \$200. The .223 barrel is a sporter weight and that caused some problems. A quick check while cleaning showed it to have a 1 in 12 twist, which should be best with bullets of 55 grains or less. Perfect, as .223 varmint bullets usually run 45 to 55 grains so this should work for us.

The real question is what kind of accuracy can you expect out of this bargain basement varmint. To set a base line for any improvements I make I The results are much nicer looking. used handloads I had worked up for a Remington 700 in .223. As to the results, well, it ain't a thousand-yard tack driver. With this load, 100 yard ten shot groups ran around 3.5 inches. Yeah, I could have shot a series of three shot groups and picked one or two that gave sub minute groups.

In prairie dog hunting things can get fast and furious and I'd rather give you a result as close to the reality of what you can expect from a barrel that will get very hot than what it will do under ideal conditions. Still, that group is within "minute of prairie dog" and every shot in it would send a varmint to the happy no-hunting ground. Would I take it hunting? Just invite me and I'd happily take it, as is, and we would have

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The yellow lines show where wood was to be removed. In this photo the grip cap is already in place. a great time. Can it be improved? Ah Grasshopper, now you are asking the question that can really drive up the cost, or perhaps not. The Chinese scope had to go! It wasn't sealed and no amount of adjustment centered the group. In keeping with our economic theme I found a 4-12 power Pentax scope on clearance in the Sportsman's Guide catalog (sportsmans-guide.com) for \$69.95.

The real problem with the rifle was that it was stringing shots vertically. Groups were an inch wide and 3 1/2 inches from top to bottom. Normally this suggests a problem with the forearm putting pressure on the barrel. To get a handle on the problem I bedded the forend with Acraglas Gel from the receiver to the stud that attaches the forend to the barrel and free floated it from there forward. I saw an improvement but was still bothered with that darn vertical stringing.

A friend suggested that I try adding weight to the end of the barrel. Duct taping three pieces of empty brass to it realized an immediate improvement. Wanting something a bit nicer looking than the duct tape and empty brass concoction I improvised a muzzle weight made of solder and hose clamps. Groups never did really settle down with that ugly thing so I purchased a Limb Saver Barrel De- Resonator. This rubber gadget slips over the muzzle end of the barrel and I can attest that it works as advertised.

Consistent one-inch five shot groups were shot over and over once the right location on the barrel was found. At about \$10 the De-Resonator is worth its weight in gold. Now, you may still not be impressed with one inch groups as 100 yards but keep in mind that this was with one load and one bullet. If you area reloader you know that there are dozens of powder and bullet combinations available, not to mention a variety of factory loading options.

Now that I have the gun behaving itself and have established a base line I can play with other combinations of powder and bullets until I find what this particular rifle likes best. The factory trigger was pretty good, breaking at five pounds, but felt pretty gritty. I disassembled the gun while referring to The Official Guide To Firearms Assembly: Rifle and Shotguns and simply deburred and polished the parts.

No fancy changing of angles or major modifications was done, just a quick touch with a fine Arkansas stone. Upon reassembly the trigger broke smoothly at three poinds. At this point I had a nicely shooting varmint gun but, always one to try to make a silk purse from a sow's ear, I just couldn't leave that stock alone. Basically, there are four problems with the stock and forend. First, they are made of laminated Birch. Two, they are oversized and clubby looking to my eye.

Three, with the recoil pad the 14 1/2-inch length of pull is too long for me and I had to crawl all over the stock to see through

the scope. Last, but not least, it has a comb that makes it look humpbacked. I started out looking for a Walnut replacement stock set but was not able to find one that was priced in my range, so there was nothing I could do but modify the laminated factory stock.

Removing the recoil pad and replacing it with a plastic one was a no brainier that reduced the length of pull to 13 1/2 inches. Then I went to work with the rasp reducing height of the comb just in front of the buttplate to a more classic style, gently tapered the thickness of the stock from butt to grip and cut flutes at the front of the comb. I then added a grip cap and slimmed the pistol grip down. None of that made the gun shoot better but it has made me like it more.

The forend was likewise reduced to a slim taper with a less aggressive Schnabel giving the gun a much more classic look. To sum it up, the only real problem with the stock is that there is just to much of it and anyone with a few basic woodworking skills can easily solve that. For an affordable varmint gun at less than \$300 I think we have a winner.

When your ship comes in and you win the lottery or that long lost rich uncle dies and leaves you a fortune I'm sure you can find love in a \$2000+ rifle and scope combination. Until then the Handi-Rifle will get you in the game and serve you well. AG

FROM THE ARCHIVE

Headspacing 101

The sometimes misunderstood subject of cartridge headspacing leads shooters to complicate an otherwise rudimentary part of firearms.

BY NORMAN E. JOHNSON APRIL 2012

ORIGINAL PP. 20-22

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The very definition of headspace is expressed by many shooters and gunsmiths in different ways, almost as if there were some mystery attached. It being an esoteric term, I failed to find the word “headspace” in my Webster’s New Collegiate Dictionary. In fact, the word headspace does not appear in the glossary of shooting terms published by the National Shooting Sports Foundation. So here goes my interpretation of a word which I have understood and applied for more than a half century.

I define cartridge headspace as the space or distance between the case head and the bolt of breechface of a case that is fully and completely inserted to its most forward position in the chamber. A certain space or tolerance is needed between the cartridge case head and the bolt face or breech block to properly close the action.

This space or tolerance is established between firearm and ammunition manufacturers, Sporting Arms and Ammunition Manufacturers’ Institute (SAAMI, saami.org) to permit ammunition of varying

brands to be safely fired in firearms of different manufacture. Thus, the term cartridge headspace originated. Foreign made guns and ammunition must also conform to such standards. To further compound cartridge/ firearm headspace it must be understood that different methods are used to properly measure headspace.

By design, there are four basic classifications of cartridges where headspace is measured in different ways. These include the rimmed case, the rimless case, the belted case and the rimless, non-tapered pistol or rifle cartridge. I shall explain headspacing function of these four basic cartridge groups. Beginning with the rimmed style case, the rim or flange of the case head is larger than the major case body diameter. These would include cases like the .30-30 Winchester, .22 Hornet, .30-40 Krag, et al.

As the rimmed case is fully chambered the rim makes contact with the barrel as a stop. Some 300 Savage). Note how the case shoulder fits snugly against chamber shoulder wall as a means of attaining proper headspace on a rimless cartridge. guns have

the barrel counterbored so the rimmed case head is fully enclosed within the barrel. Others may have the bolt counterbored to accept the case rim.

Either way, the cartridge rim is chambered firmly against the barrel as the bolt or breech block holds the case at proper headspace. The rimfire cartridge is also included in the rimmed cartridge family. Use of the rimmed case is an old and reliable form of cartridge headspacing. Of course, as cartridges are fired and reloaded, the case shoulder would also serve as a secondary headspace. Next is the rimless style cartridge.

These include a wide variety of cartridges like the .30-06 Springfield, .243 Winchester, .223 Remington, et al. While rimless cartridges do have a rim its diameter is the same or smaller than the case body. If a chamber for a rimless cartridge was reamed too deeply the case head would go too far into the barrel, resulting in excessive

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headspace. Therefore, in the rimless case, a different means must be used to stop the case from chambering too far. Here the case shoulder or datum line is used as a stop in establishing correct cartridge headspace. Again, the firearms and ammunition manufacturers have established cartridge and chamber specifications so varying brands of ammunition fit varying chambers.

Thirdly, we will look at the belted cartridge which is often used on the Magnum cases like the .300 Weatherby, 7mm Remington Magnum and some others. In the belted cartridges the belt essentially replaces the rim in a rimmed style case for headspacing. The belt is substantially wider than the rim and set well forward of the extraction rim by about

0.220 inches. The belt serves as a cartridge stop for headspacing as the chamber is reamed.

As a belted case is fired, the shoulder (datum line) would actually serve as a secondary cartridge stop just as the rimless case shoulder does. In fact, handloaders sometimes need to full-length size the cases to permit re-chambering them. Lastly, we will review the rimless pistol type cartridge, which includes any of these like the .45 ACP and a few such cartridges also used in rifles. Here the mouth of the case, which is just marginally larger in diameter than the bullet, is used as a case stop or headspacing.

Firearms manufacturers and gunsmiths take on a large respon- From left, three case heads separated and a fourth with mid-body separation. The fifth case has its rim nearly blown off. Three sectioned cases at left show essentially normal appearance. sibility in making proper cartridge chambers. Of course, a reamer and headspace gauges are the key tools to accomplish this. The degree of precision in cutting a chamber helps to assure best accuracy in a rifle.

Perfectly coaxial reamer-to-bore alignment is the primary link to a good chamber. As I near maximum reamer depth when making a chamber, I test the headspace gauge, or an empty new cartridge, in the chamber. As I near go-gauge depth—perhaps 0.025" re-

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maining—I carefully ream this part of the chamber by hand. You don't want to over cut a chamber, so watch things closely at this point. As final headspacing is close, I torque the barrel down to about 75- 100 foot pounds to attain near optimal axial pre-load. Then, as the go-gauge chambers with a good feel on the bolt handle, the chamber is ready. This will satisfy the safety needs for factory ammunition and the handloader using conventional cartridges.

However, some of the improved and wildcat chambers will require special attention, particularly the rimless versions. Avoid a loose fitting cartridge in the wildcat or improved chambers. I prefer to use anew, unfired case in these chambers as a headspace guide prior to fire forming the cases. There should be firm neck-shoulder contact to avoid excessive headspace. In handloading, use of a fulllength sizing die can push the case shoulder too far and create excessive headspace.

Always approach this area of handloading with caution, particularly with rimless cases. Improper Cartridge Headspace The alert shooter should be aware of typical headspace problems. Avoiding these issues can lead to serious results, including blown up guns. Too short a chamber leads to difficulty in chambering and sometimes extraction problems. This can be avoided by cutting

the chamber to proper depth in the first place or reaming the chamber slightly deeper until the go-gauge works correctly with some feel.

If ever in question about headspace have a qualified gunsmith check things out. Excessive headspace is often manifest by primer protrusion on firing. This is the result of a case being forced forward in the chamber by the firing pin. As case-body friction holds the case against the chamber wall, chamber pressure forces the primer rearward against the breech face.

Reloading and firing such cases While firing and closely monitoring a single case until case head separation ensued, bullet velocity and bullet impact were recorded. The first 14 shots were within the normal group. Then the bullet impact rose abruptly until the case head separated sending shot number 20 well above the group. All shots rose vertically with no appreciable velocity change between shot number one and number 20.

Some shots spiked as much as 125 feet per second above average. could cause case-head separation with disastrous results. The experienced shooter will be able to detect incipient case head separation and heed the warning. The telltale ring immediately forward of the case web is usually sufficient warning to the wise. A pointed hook

inserted into the case mouth and dragged along the wall near the case head can reveal a case head stretching groove.

I won't elaborate on a figure that constitutes excessive headspace in a firearm. Some feel an allowable tolerance of five to seven thousandths is tolerable. I feel any excessive headspace should be corrected. Setting the barrel shoulder back to proper headspace is one form of correction. A good way to check excessive headspace is to place case head-sized discs as shims between the case head and bolt face or headspace gauge and close the action. I use shims of about 0.003" for this test as needed.

In 1996 I conducted definitive research directly linked to the effects of bullet impact and velocity changes during actual case head stretching to the point of separation. A synopsis of this is shown in a captioned picture with this treatise. As we can see there are no real mysteries associated with cartridge headspacing. As part of normal function all firearms need some space between case head and bolt or breech block. The real culprit is excessive headspace as it makes its insidious entry.

It must be identified and properly dealt with, or shooting can become a major problem. AG

RESTORATION

Reader Forum

BY AMERICAN GUNSMITH EDITORS APRIL 2012

ORIGINAL PP. 23-24

Refurbishing Stevens M-44 I recently purchased a Stevens M-44. It was priced right and was a very clean rifle. The problem is that it's chambered for the .32 Long Rimfire. I expect the cartridge is the reason the bore is in such good shape inside and out. I took it to my gunsmith and to have it rechambered to .32 Special. He said he would try but explained that the breech block was a hardened casting that would be very difficult to drill for fitting the new firing pin.

I told him to do the best he could and left the rifle with him. He called several days later and told me that his drills would not even scratch the surface of the breech block. I was planning to put some fancy wood and color case the frame as a gift to my daughter in law. I hate to scrub the project and turn the rifle into a wall hanger. I would appreciate your thoughts on this. Dominick Pisano Beware the gun "priced right" but not chambered for a readily available modern cartridge.

Whether the intended alternate chambering would be suitable, meaning safe, is a question to be answered by the Sporting Arms and Ammunition Manufacturers Institute (saami.org). Since we do not know the metallurgy of the casting mentioned it's possible your gunsmith needs better drills, like titanium or diamond. Fancy wood costs plenty even before a stockmaker lays a hand on it and color case hardening is a complex, closely guarded process that may not "take" on the casting and requires specialized equipment.

A gift of a new rifle would be a far more economical choice. One that comes immediately to mind is the Savage Model 30. It's a ringer for the old Stevens Crackshot. Optics on Air Rifles I just received the February 2012 issue of American

Gunsmith and got hung up on the Benchwork article "Scope Mounting An Airgun" by Norman Johnson. I thought the article was well done but that it left out one very important point. It appears that the author is mounting a cartridge rifle scope (Tasco four power) on an air rifle.

Nowhere in the article did I see any information to the contrary. I have always been taught that centerfire rifle scopes and air rifles are not compatible. Special scopes are designed and built for airguns because the recoil of an airgun is the reverse of that of a cartridge firearm, therefore the air rifle will ultimately damage or destroy a cartridge rifle scope.

If I am incorrect in my training please advise, if not please clarify for your readers so that the damage or outright destruction of a scope can be avoided. Norman E. Johnson responds: While your point is well taken, in that a standard riflescope may incur damage when used on an air rifle, there are two sides to this issue with no firm answer. In my communication with scope manufacturers I get mixed advice on the matter.

But I do want to give you information from a very reputable scope manufacturer that I have worked with in testing and evaluating a large percentage of their scopes. Many of their scopes are used on modern airguns and they do provide a lifetime warranty on these scopes, including for use on airguns. I was told none of their scopes sustained damage as a result of airgun use. In my own experience, I have conducted dynamometer tests on all types of firearms, including airguns.

Even though the air rifles have a double recoil spring piston, readings taken at both ends of the airgun against the dynamometer were extremely low. This, in part, I feel

may have been due to the extremely short thrust resulting from the recoil spring piston. I have had airguns slide a firmly mounted scope rearward on the dovetail, which tells me there is a short intense thrust on discharge these guns, but I have never had a scope show any damages mounted on an airgun.

I am not aware of the nature of the reported airgun damage to standard scopes designed for use on cartridge type firearms. I do know that modern scope lenses remain intact on some awful shoulder pounding recoil and the scope erector lens systems withstand recoil beyond belief. Each Redfield scope was subjected to punishment equivalent to 3,600 recoil blasts per hour generating a G-force of 1,300 to assure perfect alignment of the internal optical system.

Does all this mean the modern airgun won't raise havoc with some scopes designed for cartridge type recoil? Perhaps not. But thus far I have come to place great trust in the reliability of these scopes whether used on airguns or the big kickers. Ron Matney Winchester Model 12 Featherweight Looking for info on how to take out the breechblock and magazine of a Winchester Model 12 Featherweight. I have worked on many take down model 12's but there doesn't seem to be much info on the Featherweight.

Tom Gregorich Instructions for the Model 12, discontinued finally in 1980, appear in The Gun Digest Book of Firearms Assembly/Disassembly, Pt. V: Shotguns (2nd Edition). Reassembly Of Commercial BAR I have a customer's Browning Auto Rifle (commercial civilian version, not military) disassembled, cleaned, and partially reassembled. My problem is that the bolt is now stuck in

READER FORUM CONTINUED

ORIGINAL PAGE 24

the rearmost position with the trigger group and the stock mounting plate in place. I cannot move the bolt forward to complete reassembly. What do you think I have overlooked? Advice requested and provided as follows: Consult The Gun Digest Book of Firearms Assembly/Disassembly Part IV—Centerfire Rifles (Second Edition). Proper methodology is described in a picture and caption format.

We believe you might have gone a little off track in your reassembly effort and if you must purchase the book include that cost in billing your customer. Said individual is a suspect with us for omitting a key component, or possibly several components, from the sack of parts handed to you. Nikko Shadow I have a heavily rusted Nikko Shadow and need to know if I can blue this in Oxynate No. 7 or need to sub it out. Nikko stood for an area, province or county about 50 miles north of Tokyo.

The manufacturer located there, Kodensha, went out of business after unsuccessful results from partnering with Olin/Winchester, The Golden Eagle Brand, Parker Reproductions, Charles Daly and, prior to those, High Standard. We understand the lack of success was due to internal production and quality problems. Jack Morris All semi-auto shotguns were basically the same design. The same may be true of pump models but parts are assuredly not interchangeable.

We know for certain that at least one of their stateside connections turned its back on the Rising Sun in favor of Spain, Italy or Turkey for their offshore needs. We'd prefer you check in with Brownells on the Oxy 7. However, if there's heavy pitting beneath the rust we wouldn't advise draw filing, sanding or grinding the substrate smooth enough for polishing and bluing. It might further weaken a poorly made barrel or receiver of questionable reliability.

One or more applications of Gun-Kote to a reasonably smooth, meaning lightly sanded then degreased, surface could be sat- Jim Thiel JW Custom isfactory in appearance and lessen safety concerns. Stevens Visible Loader Referring to the June 2011 issue, could Mr. Scott give some other reference's where I might find parts for the Visible Loader, I am trying to locate the outer magazine tube for the weapon.

Thank You for Your Help David Knight Author Robert Scott responds: Here is a list of the suppliers that I have found. None of them had the outer tube when I was doing the repairs on my VL. I was able to salvage my outer tube. You could make one on a lathe and thread it to the 40 threads per inch. Seamless tubing, if it could be found, would be easier to work with. Otherwise I would soft solder a close fitting plug into an old outer tube of the proper size and thread it on a lathe.

The seam can cause problems unless it is supported this way and very small cuts are taken with a very sharp tool on each pass. Parts suppliers worth contacting include, Wisner's Inc. (wisnersinc.com), Numrich Gun Parts Corporation (gunpartscorp.com), Chas Jones Gun Parts (chasjonesgunparts.com), Bob's Gun Shop (gunparts.com), and Poppert's Gun Parts (poppertsgunparts.com). Marlin Magazine Modification I need a magazine for a Marlin A1 .22 Rifle but cannot find one.

Someone told me that they had heard that a magazine for the Marlin model 80 could be modified to fit the A1. Do you know of any information or have the instructions for performing such a modification? Stewart F. Strickland Strickland Firearm Service LLC We haven't heard of the modification. For a replacement, contact Tom Forest, Lakeside, CA. Last phone on file is G

SEARCHABLE ISSUE RECORD

Archive index

Shooting Competitions Help Gunsmiths
American Gunsmith Editors

2

Ruger Speed Strip
Chick Blood

3-7

Machined Stocks In Classic Custom Rifles, Part 2
Dominic Pisano

8-12

Applying Ultra Bore Coat To Defeat Copper Fouling
Wendell Deaner

13-16

Working Guns For Working Guys
Paul Mazan

17-19

Headspacing 101
Norman E. Johnson

20-22

Reader Forum
American Gunsmith Editors

23-24

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