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EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

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ARCHIVE ISSUE NUMBER

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BUILDING THE 90 GRAIN AR- 15, PART TWO

AR RIFLES • PRECISION BARREL FITTING, PART TWO • SHOT 2014 • FIXING THE COMMODORE

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 125

DIGITAL ARCHIVE EDITION

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A complete guide to the searchable editorial work preserved from May 2014.

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RIFLES

AR Rifles

BY AMERICAN GUNSMITH EDITORS MAY 2014

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Impressum Media Inc., publishers of the popular Firearms Guide series of guns and ammunition references on DVD, recently released AR Rifles, a new digital guide on over 1,300 AR-15 rifles. The original Firearms Guide includes a schematics library with over 3,000 printable firearm schematics and parts lists from 268 manufacturers among a total database of 55,000 various types of firearms.

The AR Rifles digital guide presents over 1,300 semi-auto and full-auto Stoner platform rifles from 65 manufacturers from around the world along with a schematics library with printable and zoomable exploded views and parts lists. The military and civilian-legal AR rifles covered include chamberings from .22LR to .458 SOCOM and are presented with complete technical specifications, features, prices and with up to 12 high resolution zoomable pictures per model.

AR Rifles This collection of AR rifles for gunsmiths and AR rifle enthusiasts is searchable with 10 different search criteria, including by caliber, price, manufacturer,

gun finish, barrel type and country of manufacture. Rifles, schematics, parts lists and information can be found in seconds. While researching rifles, the user can get information on bullet styles, bullet weights, features and ballistics of all the ammo in the caliber of that rifle.

The DVD-based digital guide works on Windows XP, Vista, 7 and 8 and starts automatically when inserted with no installation required. All content is on a single DVD and no Internet connection is required. The AR Rifles digital guide is available at FirearmsGuide.com with a retail price of \$15.99.

Impressum Media offers dealer pricing for the Firearms Guide series and AR Rifles: 20–99 = 45% discount off retail; 100–199 = 50%; 200–299 = 55%; 300+ = 55% discount plus 10% free copies (you pay for 300 copies at the discount rate and receive 330.) Contact Chris Mijic if you are interested in offering Firearms Guide or AR Rifles and to work out a discount rate for selling at your shop.

RIFLES

Precision Barrel Fitting, Part Two

The second in our series on precision chambering and the fitting of rifle barrels.

BY CHICK BLOOD MAY 2014

ORIGINAL PP. 3-5

In Part One we introduced *The Complete Illustrated Guide to Precision Rifle Barrel Fitting* by John Hinnant, a superb book on barreling. By now, I hope you have either made or purchased a barrel vise, one of the two indispensable hand tools required. The second indispensable hand tool is a receiver wrench. A strong, well-constructed receiver wrench is every bit the necessity as the vise and must be even more flexible in its design to be adaptable to a multiplicity of rifles.

In two areas, the fabrication of the vise and wrench share methodology. The wrench jaws are made the same as was outlined for the vise base and sliding plates. To repeat myself, drilling and boring for wrench jaws mirror the preparation of vise clamp blocks. The bored dimension illustrated matches the diameter of the Kleinendorst Remington 700 barrel tool that is available from Brownells. The tool holds the recoil lug in alignment when installing the barrel.

If you work exclusively on Model 700 rifles you'll never need different wrench jaws, however, there is no sound reason why you should limit your capabilities and your business to only fitting rifle barrels to the Model 700. I have a sound reason to believe every one of our members is aware all rifle receivers aren't round like a Remington. Some are round at the top and flat on the bottom.

In these cases the bushing has to be turned to the correct outside diameter—not bored to that diameter—then split in

half, fit into one of the wrench jaws and filed or milled flush. The Ruger 77, Sako and Shilen DGA require two flat jaw bushings. The same is true for lever and single shot actions. You see, using a receiver wrench capable of accepting different configurations between its jaws, as does the design offered by Brownells, opens your door to a near limitless list of rifle lovers.

Just as important, these receiver wrench bushings should be made of steel, not aluminum. In making a universal wrench, note a receiver wrench is going to take a lot of abuse and may demand a length of pipe be slipped over its handle to provide more torque in getting tight barrels started. The handle is fabricated from husky bar stock. It must never be threaded to fit a hole drilled into a jaw. Doing so can further weaken what already is a comparatively weak area.

The handle must have a heavy duty weld holding the jaw in place. An alternate wrench design uses no bushings—meaning it cannot be considered universal—and can double as a reamer wrench. The subject of reaming and finishing a chamber will be discussed in a future article at which time this wrench and duplicates of it will be discussed in greater detail. Going Lathing As illustrated, the basic lathe set-up is shown. The bed of the machine should be long enough to hold the barrel as dictated in the drawing.

Note, the captions refer to a relief shoulder. Said shoulder is created when a cut has been made at the muzzle to recess the

land and grooves of the rifling. This recessing protects the extreme muzzle end of the rifling from dents and dings. All target rifle barrels have this recess. There is nothing quite like having a bullet come into contact with damaged rifling just as it departs the barrel to assure it will fail to strike the point at which it was aimed.

How to make this protective cut will be shown in a separate article. Another reason I bring up the relief shoulder is due to the fact that the shoulder, while critical to accuracy, thins the end of the barrel. Ergo, never squeeze the barrel between lathe head stock jaws by its relief shoulder. To make that perfectly clear, yours truly has shaded the area between the jaws.

Consider it the forbidden zone, the rifle graveyard or simply a big “no-no.” In the illustration on short bed lathe set-up, all the warnings just made have been ignored. How come? When the lathe bed is too short to accommodate the set-up described before, the muzzle end of the barrel has to pass through the head stock. In these cases you must protect the barrel surfaces held between the jaws.

You can either wrap a single thickness of masking tape around the barrel or snip out aluminum, brass or copper shims from uniformly-thick pieces of stock to be placed between the jaws and the barrel surface. I think a few words about head stock jaws are in order. A universal, three jaw, self-centering chuck with 0.001-0.002 of repeatable capability is accurate enough in many ap-

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You'll learn more of them as this series progresses. plications. If the three jaw cannot meet those specifications a four jaw chuck is recommended. They make it possible to center a barrel within plus or minus 0.0005 or less. When consulting with your lathe provider make the source fully aware of your requirements. Some notes for tuning metal between centers.

Though the face plate and lathe dog method is a common means of working over a piece of metal, when the metal being worked over is a barrel it is not recommended. The tailstock live center—the best among them are of the bearing variety—must always be used as support. Without it, the barrel will fall off the face plate. Since moving the tailstock center away from the barrel is required in some fitting and chambering steps, this departure of the work piece can run up time in reestablishing set up.

One major problem with multiple set ups is the possible loss of, or at least a fluctuation in, the indicator. To lessen or totally free operator concerns, a collet inserted into the headstock chuck is considered superior to

any other method of holding a barrel and is very accurate. Collet use will not eliminate use of the steady rest to avoid tool chatter and the barrel relief cut must be turned to match the size of the collet.

Always remember, the barrel is not removed from the lathe until all fitting and chambering steps have been completed. Lapping Bolt Lugs Why the detail so vital as lapping bolt lugs in rifle work is ever overlooked or omitted on barrel fitting jobs makes me wonder if it happens due to a forgetful practitioner or a lazy one. I'll make this pretty simple. Lapping bolt locking lugs to mate evenly in the receiver is related to both accuracy and safety.

Pay close attention to how the end of the work piece is not held in position via contact with the lathe chuck jaws. One reason is mentioned in the text. There are others. More rifles than you'd suspect are made with only one bolt lug. That is never as safe as a rifle with two lugs. How those two lugs bear has an adverse effect on accuracy. Every serious rifle shooter from bench rest

competitors to trophy hunters to the seasonal seeker of meat for the family freezer would agree on that.

It is specifics on accomplishing this they might not know. The next paragraph provides the "what" you can tell them from now on. When you do you'll be moved to a higher place in their opinion of you as a person who really knows the inside story of rifles. Feel free to make notes regarding twin lug bolts. When both lugs fail to make uniform contact with the main portion of the cartridge thrust uneven pressure is transferred to the receiver.

If the lower lug is the only one contacting, the receiver bows upward at its ends. If only the upper lug is the culprit, the receiver leans toward bowing up in its middle. In either case, the barrel is affected and so is the point of impact. The included illustration can serve as a guide to making a bolt lapping tool. The only specification not subject to deviation in the fabrication is the receiver thread. All others can be modified.

The sleeve can be turned from any type of bar stock including low or medium carbon steel. A visit to a salvage yard

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The barrel has to extend beyond the head stock. The drawing points out the measure to be taken in avoiding finish damage to the barrel, might turn up a soft piece of stainless steel. Despite the rust resistance gained, some opinions hold stainless is too hard for machining. However, if the piece selected can be filed easily it can usually be machined in a conventional manner. The spring loaded plunger can be turned from steel, brass, copper or Delrin plastic. Aluminum can be used but it wears rapidly.

The spring itself should only provide moderate pressure. Too much spring tension makes the bolt hard to operate during lapping. In addition, excessive tension can force the bolt out of alignment with the receiver. Checking bolt lugs for uneven bearing is quite easy. Coat the rear of the lugs with layout dye and allow to dry. Insert the bolt in the lapping tool. Thread the unit in the receiver. Close the bolt. Using the tool, apply light to medium pressure and push the lugs against the receiver locking recess.

Withdraw the bolt. Layout dye will have been scraped off the rear of both lugs if both are bearing. Frequently, only one lug is partially bearing and the other not at all. When more than two lugs are involved it's not unusual to discover lugs bearing evenly on half or fewer. To even the lug contact, clean off the layout dye and coat the rear of the lugs with 120 grit lapping compound. Open and close the bolt 10 to 20 times. The receiver can be held between the padded jaws of a bench vise during this action.

Remove the bolt and check the rear of the lugs. If all are bearing evenly their rear surfaces will be uniformly polished. Repeat the polishing until they are. Then and only then are the lugs properly seated. Wash off any remaining lapping compound and consider the job finished. A few words of caution about Mauser 98 rifles. The receivers of these rifles were machined from tough, high quality but low carbon steel. The finished receiver was then carburized (case hardened) to give them a hard surface with a soft core.

Normally, the bolts were made of medium to high carbon steel and then hardened to a higher degree. Fortunately, most 98 actions with matching serial numbers on their bolts and receivers will not require lapping. They've been shot so much over the years the bolts have been set back and the lugs seat properly. The exception to this turn up with various Mauser 98s produced for South American countries. They are very soft. How far the lugs will set back before finally seating remains an open question.

Complicating things further, it may not be possible to reheat treat their receivers without repeating the carburizing process. A carburized surface isn't very thick. It's not difficult at all to lap through the hardened part and into the softer metal beneath it. Hardened bolt banging into a soft receiver? Uncertain heat treatment? My answer to those concerns is a recommendation against any willy-nilly lapping of 1898 Mausers that weren't made for the Wehrmacht. AG

FROM THE ARCHIVE

Building The 90 Grain AR-15, Part Two

BY JOE CARLOS MAY 2014

ORIGINAL PP. 6-10

Bullet, barrel, bedding. Back in the M14 days we figured that if you got these three things right you'd have a tack driver. The AR-15 has eliminated the bedding issue (kinda/sorta) so we can concentrate on the remaining two. In this installment we will talk about barrels and next time will cover bullets and other 90 grain loadings issues. Last time we said that you will need a barrel with a 1:6.5" twist to shoot 90s optimally.

There are barrels in 1:6 twist and 1:7 twist that are just on either side of that which should also shoot 90s. Of the three manufacturers of 90 grain bullets, Sierra and JLK recommend a 6.5 twist. Berger says a 1:7 twist will work with their bullets. I have tried a couple of different brands of 7 twist barrels with the Berbers and never had much luck. While the bullets stabilized and went in straight, groups were just too big for my liking. These experiments were tried with 20" service rifle barrels.

Perhaps in a 26" match rifle barrel where a person could get a more velocity (about 100 fps) the 7 twist would work. I have also tried 1:6 twist 20" barrels with the 90s. The 6 twist worked better than I expected and a whole lot better than 7 twist. In fact, one of them is the best barrel I have ever tested in any twist rate and any bullet. There are disadvantages to going to a 6 twist, however. Barrel heating, fouling and pressure will worse.

Let's face it, it takes a lot to overcome the inertia of a 90 grain bullet in .223/5.56mm cartridges in the first place. Trying to get that bullet not only moving down the bore but rotating once every 6 or 6.5 inches is

quite a chore. A 6 twist barrel only makes pressures worse and with no pay off with long 90 grain bullets, so you can imagine how much this over spins 77 grainers on the short lines.

Sometimes I hear the phrase "over stabilizing" used in place of the proper term, "over spinning." Over stabilized almost sounds like "too much ice cream" but a bullet is stabilized at a certain twist rate and increasing beyond that point won't net more accuracy. Over spinning too-thin jacketed bullets can result in mid air blow ups before reaching the target. Before we talk about the various barrel options we need to discuss the pros and cons of what is offered.

Obviously not all barrel companies agree or everybody would make their barrels alike. Not all gun writers and shooters agree either. I can only relate what I have seen in the past eight years of working nearly every day with 90 grain bullets and the barrels that are available to shoot them. If you are shooting other bullets my observations may not apply. I have tested about 100 1:6, 6.5 and 7 twist barrels to date in both 20" Service Rifle and 26" match rifle lengths.

There are two general types of barrel steel, stainless and chrome molly. Within those broad types there are different alloys and barrel manufacturers are free to choose which they use. Price is no doubt a factor in their decision making. Each alloy will machine and wear differently. When I first started working with the 90s I fielded sev-

eral, mostly chrome molly, button rifled barrels that were driving tacks. Loads used high energy imported powders.

Within about 500 rounds they all started tearing jackets off Sierra 90 grain bullets and causing them to explode. My first thought was that the throats had eroded and the bullets were jumping too far. The bullets that were blowing up were boat tails, not VLDs, however, and I initially thought they should be jumped as the throats grew longer with use. When I called the guns back in and bore scoped them the throats and the whole back sections of the barrels were rough as a cob.

That roughness was tearing up the bullet jackets as they passed through. Remarkably, some of those barrels were still shooting thicker jacketed 77s and 80s fairly well. That experience caused me to recalla conversation that I had with Boots Obermeyer nearly 20 years ago. We were talking about the .223 cartridge, the powders used in it and the pressures they develop. Boots told me that considering all these factors he felt stainless barrels would generally erode smoother in the AR-15, but not necessarily less.

As I was bore scoping those rough barrels I also remembered hearing anecdotal reports that the imported high energy powders burn at a higher temperature than conventional powders and this might result in rougher throat erosion. I sent an email to the technical representative of the powder company in question asking if he could either confirm or deny this claim and if there was validity to the rumor, could he recommend another powder in their line

BUILDING THE 90 GRAIN AR-15, PART TWO CONTINUED

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that might be friendlier to my barrels. I received no reply. I followed with a second email a year later which also met with silence. I then asked a number of gun barrel manufacturers and gunsmiths if they had any experience in this regard. Some said that they had heard the same rumors and that it seemed to make some sense but none had performed any experiments to scientifically prove or disprove the idea.

Finally, I got hold of a private study that had been conducted that confirmed the rumors about higher temperatures associated with high energy powders. I can't say if the higher burning temperatures were the only factor in the rough erosion. Powder chemistry is an esoteric topic that I don't want to get into here but suffice to say that some powders are believed to leave behind a residue that actually acts somewhat as a lubricant for the passage of the next bullet.

Based on that early experience I made two changes, one of which I still stand by. I abandoned the use of high energy powders entirely in my chrome molly barrels. Since I made that decision the life of my chrome molly barrels has doubled to quadrupled. Bore scoping chrome molly barrels confirms that less rough erosion occurs. For about a year I bought nothing but stainless barrels in 6.5 twist. The longevity of them was good but I wasn't happy with the accuracy.

There can be machining differences between the two steels and those differences can affect accuracy. Those machining differences can also manifest themselves in how the barrels treat the bullet jackets that pass through them and I was having a lot higher incidence of 90 grain bullet failures when I was buying stainless. I guess one of my shooters summed it up best, saying if a barrel isn't shooting top notch, who wants it to last along time?

The only stainless barrel that I am currently using with 90s is the very good Brux 6.6 twist narrow land. Before I give you the contact information to purchase a barrel

we have to briefly discuss numbers of lands, rifling patterns, and chamber options. There is a general theory that, all other things being equal, a barrel with a low number of grooves will stress a bullet less than one with a high number of grooves. Therefore, a three groove barrel should stress bullet jackets less than a six groove.

The theory is extended to say that barrels with fewer grooves will also foul less. Again, one brand of 90s has a reputation for blowing up so we want to reduce stress on their jackets. Polygonal (available from Pac-Nor with five grooves, designated 5P) and Russian canted land configurations (available from Rock, Bartlein, and Satern with five grooves, designated 5R) are supposed to stress jackets less than conventional rifling.

And to top it all off, odd numbers of lands (three or five) are thought to stress bullets less than even numbers. The theory is that with even land numbers the lands will be directly across from each other. By pressing in on the jacket lined up this way there will be more stress imparted. Odd numbered lands will be staggered and never line up directly across from each other. My tests with 90s show that there is some merit to all these theories and I would take them into consideration when choosing a barrel.

You can get away with abusing 77 and 80 grain bullets to a far greater degree than with some of the 90 grain choices. I recommend building in all the advantage you can get by making wise barrel selections. Quality of workmanship can't be overlooked. You can employ all the theories in the world but if the barrel maker buys bad steel or rushes the job the end product won't shoot well.

Chambers This one is easy if you are building a gun for 200, 300 and 600 yard shooting where magazine-length 77s are used at the short lines. Wylde! I know that some civilian shooters like shorter cham-

bers, such as available from Compass Lake, because the slightly shorter throat gives them a little greater longevity when shooting 77s and 80s, but the 90s are longer bullets and that length needs to go somewhere, preferably not buried way below the case neck.

I think that the slightly longer throat in Bill Wylde's dimensions is a good compromise and will allow you to achieve velocities that will keep bullets supersonic to the 1000 yard line at pressures you can live with. I have learned the hard way that you need a 1 degree 15 minute lead angle on your reamer. This will ease the bullet into the barrel better than the sharper 1 degree 30 minute .223 reamers that are very common.

Some chambers even go all the way to 3 degrees, which would really eat some bullets for lunch. Be warned, I have seen all kinds reamer dimensions passed off as supposedly being Wylde. Check the blueprint and confirm that it has the shallow 1 degree 15 minute angle. If you measure a true Wylde chamber when new with an 80 grain SMK and a Stoney Point Comparator, you should get an overall length reading of 2.475".

Note, use of chambers with longer throats (overall readings of 2.50, 2.55", etc.) may be helpful in reducing chamber pressures, promoting "softer" obduration of the fragile Sierra 90s, and achieving higher velocities to support 1000 yard shooting. Longer throats will significantly degrade 77 grain performance, however. I recommend you only consider longer throats in rifles dedicated to shooting beyond 600 yards and make sure they have the 1 degree 15 minute lead angle of the Wylde.

John Holliger at White Oak offers such a chamber and I recommend it to anyone not shooting any mag-length bullets. Most other long throated reamers will have a more abrupt lead angle and will do more damage than good with regard to jacket retention. Also understand

BUILDING THE 90 GRAIN AR-15, PART TWO CONTINUED

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the trade off in longevity of the barrel. Barrels born with longer throats shoot out sooner! Some of the barrel manufacturers I list will only furnish you with the basic rifled blank and you will need to have it turned, chambered, headspaced with the barrel extension installed and the gas port drilled. Others will do all of that for you.

If you elect to buy a blank and don't know who to send it to for the additional work, I recommend Compass Lake Engineering (compasslake.com, Frank White has probably done several hundred barrels for me and at least 100 of them in 6.5 twist. His Wylde reamer has the correct leade angle, his prices are competitive and turnaround time is reasonable. They are able to blacken your chrome molly blank if you choose that steel.

When shipping three or four groove blanks, be sure to stress that you want the gas port drilled in a groove and that you will not accept cutting of a land with the port. Of course, drilling gas ports in any six groove .22 center fire bore will result in cutting a land, probably also in five groove .22 caliber barrels as well.

For button rifled blanks in chrome molly or stainless six groove 1:6 twist, I recommend Douglas Barrels, Inc. (douglasbarrels.net, These barrels will shoot Berger 90 grain boat tails and VLDs well but are not "Sierra proof." For stainless button rifled six groove 1:6 twist complete barrels, go with Hart Rifle Barrels (hartbarrels.com, This barrel maker is the only one I have not tried with the 90s.

I don't know what their chamber options are but they will also sell you a blank which you can have turned and chambered elsewhere. For Pac-Nor button rifled barrels in either three groove standard or five groove polygonal chrome molly or stainless steel, contact Noveske Rifle Works (noveske.com, For one stop shopping.

John Noveske will turn and chamber the Pac-Nor blank for you and he has the correct lead angle on his Wylde reamer.

Their chrome molly 5P (five grooves with polygonal rifling) and conventional three groove barrels are the most "Sierra proof" barrels I have ever tested. Accuracy with both is stellar shooting 77 and 90 grain Sierras. The Pac-Nors will also shoot the new Berger 90 grain thick jacketed boat tails but really like the Sierra 90 the best. I have not had similar luck with Pac-Nor 6.5 stainless, however. Nor have I had much luck getting any Pac-Nors to shoot VLDs.

Other people report that they have been successful with VLDs in Pac-Nors, however. John Noveske will also turn and chamber blanks provided by Douglas, Krieger, Bartlein and others if you ask him to. His work is very good. When dealing with three or four groove barrels be sure to stipulate that you expect the gas port to be drilled in a groove and that you won't accept a barrel with a land cut by the port. Note, polygonal rifling has the reputation of pressuring up a little more than conventional rifling.

I have seen this with other barrel brands but don't remember it striking me with the Pac-Nors. Take this into consideration when building 1000 yard rifles where it is critical to start bullets at very high velocities. For Across The Course shooting out to 600 yards, I wouldn't worry about it. For Badger's six groove, broach cut, 6.5 twist, chrome molly steel barrels, try Northern Competition (northerncompetition.com, Again, one stop shopping.

This is the only company that I list having finished barrels in stock ready for immediate shipment, or immediate instillation if you ship them your upper. They make Wylde chambers with the proper leade angle and stock 20" barrels in multiple configurations as well as 26" match rifle 6.5 twist barrels. All come standard with a blued finish. Isonite coating, a saltbath ni-

triding process applied to both the inside and outside of a barrel by MMi Trutec (parkertrutec.com), is available upon request.

I have found barrels processed with this finish to clean up easily and to be corrosion resistant, especially important if choosing chrome molly. Badger barrels are made from a good quality, special order, low sulfur C. M. steel that wears well. So far the Badgers that I have tested liked the Berger VLD bullet and was pleasantly surprised with the Sierra 90s.

Considering they have six grooves and cut rifling, which sometimes tends to be sharper than button rifling, I was fearful that the deck was stacked against the Sierras and opted not to field Badger barrels with them. Badger barrels also shoot 77s and Berger 90 grain boat tails well. Northern Competition is the only company I will let flute barrels for me because they use a slow, very low stress inducing method.

They also market and install their own National Match, double pinned, 1/4x1/4 minute rear sight and what I consider to be the best 1-3/8" float tube on the market. They have expander mandrels in stock to set the proper neck tension on new primed military WCC and LC brass for loading 90 grain bullets.

For four groove, single point cut, 6.5 twist blanks or completed barrels in either chrome molly or stainless, contact Krieger Barrels, Inc. (kriegerbarrels.com, Krieger is noted for tightness in their internal dimensions (0.218" lands as compared to 0.219", which is more standard in the .223 Remington) which, coupled with meticulous machining and quality barrel steel, normally results in a combination of good accuracy and longevity.

Their standard 0.218" x 0.2240" internals works well with both VLD bullets but is murder on the touchy Sierra 90s!

BUILDING THE 90 GRAIN AR-15, PART TWO CONTINUED

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Several summers ago I sat down with their plant manager while at Camp Perry during CMP week and we talked at length about the problem with Krieger barrels shredding Sierra jackets. We decided that relaxing the groove diameter to 0.2245" (the standard dimension is .224") and heavily finish lapping the barrel might help the problem. It certainly did! In chrome molly it shoots very well and comes close to being "Sierra proof." I refer to this modified barrel as the USAR Pattern.

If you are ordering one and use that phrase, specify the 0.2245" groove and the fact that you want to shoot Sierra 90s, I am sure they will know which to make for you. For shooting Berger boat tails, the 0.218" land and 0.2245" groove is my choice to try to control pressures and lessen fliers. Like Pac-Nor, I see better accuracy performance from Krieger's chrome molly than stainless.

Again, if ordering a finished barrel from them specify that you expect the gas port to be drilled in a groove and will not accept a barrel where a land is cut by the gas port. For 5R, 6.5 twist, single point cut stainless or chrome molly barrels, try Satern Custom Machining, Inc. (saternmachining.com, They will make the blank, turn and chamber it with a proper leade, headspace and furnish the barrel extension and bolt. Service rifle 20" and 26" match rifle barrels are all available.

They use a quality steel with good wear properties. If you plan to shoot the new Berger boat tails, ask for their 0.218" land and relaxed 0.2245" groove. Avoid sending their barrels out to be salt bath nitrided. They tell you right on their website not to do this!

If you or your customer insists on having one of their barrels coated, follow the instructions in my previous article on, "Retention Of AR-15 Barrel Extensions" (September 2013.) The last Satern barrels I purchased had the extensions put on with extremely light torque. Likely hand tight with red Loctite. Every one of them

came right off after being nitrided. It is very embarrassing to have a barrel start to unscrew in a customer's rifle.

For 5R or 4 groove, 6.5 twist, single point cut rifled blanks in either stainless or chrome molly, look at Bartlein Barrels, Inc. (bartleinbarrels.com, Their normal bore is a tight 0.218", like a Krieger, with a 0.224 groove. They will also give you a 0.2245" deeper groove if you ask. Call it the USAR Pattern. I would go with that 0.218" x 0.2245" option for the Berger boat tail. The deeper 0.2245" groove helps control pressure and lessen fliers.

Bartlein double laps their barrels, once before cutting the grooves and again afterward. For 5R, 6.5 twist, single point cut rifled blanks in either stainless or chrome molly, try Rock Creek Barrels, Inc. (rockcreekbarrels.com, To date I have only tried their stainless blanks and they exhibited very good wear characteristics. All three brands of 5R barrels (Satern, Rock Creek, and Bartlein) shoot JLK VLD 90s well.

I am working with Bartlein on again twist that begins with 1:13" at the chamber and doubles to the muzzle where it hits a final 1:6.5" twist. It easily controls pressures and allows hitting 2,600 fps at the muzzle while keeping primers intact. Accuracy is stellar with both 77 and 90 grain bullets. Specify the 0.218" land and deep 0.2245" groove. If you are going to shoot 1000 yard events with a Service Rifle, this in a 20" barrel is the ticket. You can also use it for ATC shooting, yielding a competitive to 1000!

Note, when ordering gain twist blanks the barrel maker needs more information than usual in order to get it right. You don't just send them an email asking to start in front of the chamber at 1:13" twist. You have to tell them how long your chamber is (1.94" with a Wylde, including

BUILDING THE 90 GRAIN AR-15, PART TWO CONTINUED

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throat) and how much you intend to cut off the back of the blank in the machining operation. Likewise, you don't just tell them you want to have the final twist at the muzzle come out at 1:6.5" because you are going to cut some off in the machining process. Some of you may cut off ½" while others may cut off an inch.

If all this sounds like techno-babble or you are having trouble visualizing it, stop at my Camp Perry store front on Commercial Row (Bldg. 910-A) during CMP Service Rifle week and I'll have a 20" AR-15 gain twist barrel split lengthwise and that will help make sense of things.

For four groove, single point cut rifled 6.6 twist barrels in stainless, try Brux Barrels (bruxbarrels.com). Their product came to me highly recommended and they will provide a complete barrel with the extension installed in either 20" service rifle or 26" match rifle lengths. Their standard land configuration (60% groove/40% land with an industry standard 0.219 bore) in a stainless barrel with four-groove, single-point cut rifling shoots well with Berger 90 grain VLDs.

I have not had the same luck with JLKs in the Brux bore and have never tried the Sierra boat tail in them. For 1000 yard use with the new Berger 90 grain boat tails, I recommend the Brux narrow land configuration (80% groove/20% land with the tighter 0.218" bore option) to help control pressure when attempting to drive the bullet to 2,600 fps, which Berger recommends for best performance.

Stainless Brux 6.6 twist narrow land and Bartlein gain twist barrels are the only 20" service rifle barrels I have been able to consistently achieve 2600 fps with the thick jacket Berger 90 grain boat tails while maintaining 100% primer retention. The narrow lands really help control chamber pressure and accuracy with both 77 and 90 grain boat tails is stellar, making it a good choice for ATC and 1000 yard events.

Bartlein's gain twist has wider lands than the Brux and I believe it wears better, giving a higher round count before shooting out. Again, stress to them that you expect the gas port to be drilled in a groove. RKS Enterprises in Canada makes six groove gain twist stainless and chrome molly blanks. Like Bartlein, RKS will make any gain you desire. I recommend 1:13" just in front of the chamber doubling in the next 18" to 1:6.5" at the muzzle.

Ron Smith will also give you the tall 0.218" land and deep 0.2245" groove that has proven so successful to accuracy, pressure control, and reduction in fliers. To date I have only tested a limited number of their products. If you want a single point cut rifled gain twist barrel quickly, their delivery time is less than half that of Bartlein, a significantly faster service at a similar cost.

RKS does not lap their blanks, however, but their break in is not overly difficult and the appearance of their blanks in the bore scope looks smooth and very clean. In summary, if you want to shoot Sierra 90

grain boat tails I recommend the two Pac-Nors, the 3 groove or the 5P in chrome molly. They are most certainly not guaranteed to be "Sierra proof" and when throats lengthen and get rough as you jump bullets further into them, you can experience bullet failures.

I have been torture testing the Bartlein gain twist 1:13 x 1:6.5" with the old Sierra 90s and have yet to blow a bullet. Gain twist may end up becoming the solution for that fragile bullet but I want more test data before making that recommendation. For JLK VLDs the 5Rs from Rock, Satern, and Bartlein seem to be the best. Berger VLDs seem to shoot well in all but the Pac-Nors. Berger 90 grain boat tails shoot well in almost all barrels for ATC performance at speeds of 2,500 to 2,550 fps.

My top two picks for the Berger boat tail remain the "USAR Pattern" from Krieger and Bartlein. I performed a study where I compared rifles shooting 80 grain bullets to rifles with "USAR Pattern" barrels shooting 90 grain Berger boat tails and the latter shot fliers about half as often and with about half the severity. For 1000 yard events a 5.56mm needs to push a 90 grain bullet at least 2600 fps at the muzzle.

I would recommend the Brux narrow land 6.6 twist in stainless with 0.218" land and 0.2240 groove, the Bartlein or RKS gain twist 1:13 x 1:6.5" with 0.218" lands and 0.2245" grooves. Obviously, if you want just one gun that will perform from 200 to 1000 yards, these are also the barrels of choice. AG

FROM THE ARCHIVE

SHOT 2014

BY CHICK BLOOD MAY 2014

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Starting right off, the first interesting bit were two new gun control actions that almost stole the show. At every Shooting, Hunting, and Outdoor Trade Show most conversations get right down to business. Reams of orders are written, thousands of products and services are introduced, new partnerships are haggled, others are dissolved.

When those matters are not top of mind there is always a common undercurrent of a subject, or subjects, discussed that soon come close to dominating communications on both exhibitor floors of the vast Sands Expo. Last year, the big talk it was the simultaneous AVN Adult Entertainment Expo gathering going on—and coming off—over at the Hard Rock Hotel & Casino. The primary sources for much of the secondary chatter this year spread outward from the Smith & Wesson and Ruger exhibits. And idle chatter it wasn't.

Both companies have announced they will stop selling new semi-automatic handguns in The People's Republic of California. The Republic has asked for it. In 2007 its Governor signed a proposed law requiring a number to be laser micro-engraved on the business end of the firing pins in semi-automatic pistols. Theoretically, the number would be transferred to the primer of any case fired and ejected from the pistol. The legislature of The Republic finally got around to enacting Arnold's law.

S&W and Ruger took little time in reacting. Like most of the "auntie" gun laws enacted since the Brady Bunch initiated its campaign to eliminate handguns and handgun ammunition in the United States since 1976, this one won't do a thing to stop crime. There are federal, state and local law enforcement statistics to verify that

statement. Very likely, this one won't help law enforcement directly link spent cases with a specific gun or gun owner either.

It doesn't require rocket science to "salt" a crime scene with spent cases of the same caliber that have been fired from another gun. End of the trail, folks. You bet challenges to the microengraving fiasco are underway. One is from the National Shooting Sports Foundation. Check with the National Rifle Association's various web sites to see what's up with the Institute for Legislative Action.

Among the facts presented in the challenges, the lasercreated identifying number is very small and extremely shallow, such that normal wear from the repeated impacts of a firing pin would soon obscure the tell-tale numerals and, but not finally, all a bad actor has to do before committing his or her bad act would be swiping the end of the intended pistol's firing pin with a common nail file. Two passes should make it happen. The base of the Second Most Talked Up concern is in New York City.

The UN is getting into gun control big time. It already has 150 nations signed up to ratify its Arms Trade Treaty. Want to know more about it? You won't find much revealed on the UN website regarding what Manhattan Island's East Side Gang refers to as a "Review Conference on the Illicit Arms Trade." Don't waste your time looking for any forthcoming explanation from gang HQ.

Browse up The Washington Times newspaper editorial entitled "Gun Control in the UN." Without pulling too many punches it shines a harsh light upon what the 150 nations are cooking up. Hold everything. I should say 151 nations if you include this one. Yep, POTUS instructed the guy who married into the Heinz

Tomato Ketchup fortune and is now our Secretary of State to sign the proposed treaty. Ever obedient, the former Senator and failed candidate for the Presidency did so on January 13, 2014, the opening day of SHOT.

There was little risk involved in their actions. Neither is running for office in 2014. Others who are don't have that luxury. They all realize a treaty must be ratified by act of Congress before it can supersede any existing law of this land. Four Senators, all Democrats, have written the President, Secretary Kerry and the United Nations that the treaty will never be ratified.

The four joined 50 fellow Senators and 181 House members who have sent a letter to President Obama expressing their opposition to the UN Arms Trade Treaty. Presently, it appears the proposed treaty will be DOA in both houses. In the opinion of every manufacturing or importer executive and all those gun folk roaming the floors, including yours truly, it had better be. If ratifying a UN treaty usurping the Second Amendment is successful, why stop there? Take a shot at the First.

Everyone in favor of eliminating freedom of speech, religion, assembly and the press please stand up. Other Noise at SHOT No Ethel, it is not a snake. It's a Ripcord, the newest tool providing breech-tomuzzle cleaning from Otis Technology (otisgun.com). The thinnest part is 24 inches long and it is fed into the breech to extend out the muzzle.

The solid brass tip at the breech end is internally threaded, 8-32 standard, to allow attachment of cleaning accessories such as brushes and patch tips and will not damage the bore. The Nomex "skin" of the snake is stretched over a helix-formed rubberized core, ensuring 10 inches of 360-degree cleaning surface engages the rifling

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A full story will appear in a future issue. Far I set up a separate scope for each barrel to keep ballistic variations of the rimfire at one MOA. through the length of the barrel. This safe but intensive action is initiated by grasping the exposed end and pulling it like, well, a ripcord. Featured here also is the proven indispensable, and not brand new to black powder practitioners in the know, Otis Retractable Nipple Declogger. Nipples do have a tendency to become stubbornly plugged with residue.

The curved end protruding from the body of the Declogger is an extremely strong wire that has never failed to open up a plugged nipple for any smoke pole shooter I know. It never stuck one in the rump either. That strong, stiff wire disappears completely inside the tool body when it's not going about its business. The Otis Retractable Nipple Declogger is one of those little things you'll never need until the hammer falls and the only sound you hear is "click." Encore! Encore!

Making a first appearance in these pages is an exciting development in rimfire rifles from Majestic Arms Ltd. (majesticarms.com). You never heard of them? Yes you have! We did a step-by-step how-to on the Ruger .22 Pistol Speed Stripping Kit developed and patented

by Majestic's chief gunsmith, Dino Longueria, a/k/a "The Boss." Thanks to Dino, it may not be long before small bore fanatics will be blazing away with the next generation in takedown rimfire rifles, the MA4.

The MA4 is a rimfire system, combining the concepts of a completely new, self-contained action with quick change barrels and bolts. It delivers extremely good accuracy in four rimfire calibers from the same platform by merely changing the barrel and bolt. I will be purchasing Dino's newest creation soon, shortly after .22WMR, .22LR, .17HMR and .17HM2 have again become abundant. Tap, Tap. Who's There? There are more CCW handguns than ever. Two were getting special attention from the crowds roaming the show.

One was introduced last year. Since it is being made by Remington (remington.com), news that the second is now a reality came as somewhat of a surprise. Though it turned out thousands of the M1911A1 during World War Two, The Ripcord is introduced at the breech, pulled through the barrel and maintains full contact with the bore with ten inches of cleaning contact during withdrawal.

Below Center and It is shown with its extremely stiff wire clog buster extended and has proven to be indispensable for eliminat-

ing misfires due to plugged nipples. With the wire retracted into its brass body, the Declogger further eliminates painful wounds made possible when carried in a rear pants or hunting coat pocket. Remington hadn't produced an automatic of its own design since the Model 51, discontinued in the mid 1920s. Well, the M51 is back. Right now, it's chambered only in .380.

The new pistol, renamed the R51, is quite different from any original Model 51 you have been handed in the past. Not to worry. The new Remington 51 is being scheduled for a disassembly/ reassembly article this year. Another feature article I'm preparing will be dedicated to the Double Tap Tactical Pocket Pistol (doubletapdefense.com). The little O/U ran into production problems after its initial 2013 intro. Those problems are no more.

Orders are now being quickly filled for a newer, higher quality, significantly improved type of concealed carry pistol. Among the improvements are 9mm and .45 ACP interchangeable barrels, an easier to operate thumb latch and a patentpending sequentially fired trigger system with double strike capability that's been simplified to only four major components. AG

MAINTENANCE & REPAIR

Fixing The Commodore

Compact handguns, especially Commander-length 1911 handguns, can be ideal for many carry applications. Here's how to work on one from the Philippines.

BY ROBERT K. CAMPBELL MAY 2014

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During the course of working with firearms I expect guns coming into the shop to be older, abused, seen hard use or even dropped and broken. I do not expect factory new firearms malfunction and exhibit more than one serious drawback. Such was the case with a handgun I recently examined. The problems were handled in a straight forward manner and the procedure will apply to other handguns of the same type.

The rub is that in some particulars the handgun, the Shooters Arms Manufacturing (shootersarms.com.ph) Commodore, had promise. The SAM Commodore is Commander-length 1911, meaning it has a 4¼-inch barrel and slide compared to the 5-inch Government Model 1911, but with a steel frame. When first introduced, Commanders were aluminum framed weighing about 27 ounces. Today, most 1911 pistols this size are called Commanders and the aluminum frame guns are called LW (Light Weight) Commanders.

The Philippine-made Commodore takes its name from the naval rank Commodore, which outranks a Commander. There must have been some marketing talent involved in selecting the name. The Commodore exhibits good fit and finish. The barrel and the locking lugs seem well fitted. The barrel bushing is finger tight but nice and snug. When the slide is racked the fit of the locking lugs is good and the barrel link seems OK.

A different model of 1911 from the same maker tested a few years ago showed indifferent fit, however, it functioned fine except it did not lock on the last shot. This earlier handgun also showed such a loose barrel link fit the link pin fell out when the pistol was field stripped and examined. The latest pistol was a different matter, I first thought. The Commodore exhibited good fit and finish. Feed ramp polish is indicated. The rib along the top of the slide gave it a nice look, akin to a short Gold Cup.

The slide features an ejection port scalloped out in a manner superior to GI guns and equal to most modern production 1911 handguns. The rear sight is a good design, thicker than average and with a good square notch and dovetailed front sight, superior to staked-in sights. The grips are rubber, just fine in an inexpensive pistol, and properly supported the plunger tube.

Trigger compression is smooth enough and seems free of both creep and backlash, with the RCBS registering trigger pull gauge showing 6.25 pounds of trigger compression. The SAM Commodore .45 is supplied with a single ACT-MAG (act-mag.com) magazine. The pistol exhibited quite a few tool marks after the slide was removed from the receiver. When field stripped the re-

FIXING THE COMMODORE CONTINUED

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The barrel finish leaves something to be desired. coil spring simply fell off of the recoil spring guide. It was not a press fit. This did not impede function but doesn't seem ideal. The Commodore features a well designed beavertail grip safety and extended slide lock. The safety has good indent. A warning was the large paddle-type slide lock. Past experience indicates that these slide lock safety designs are prone to problems.

Whether the extra weight builds momentum or the support hand contacts the slide lock and forces it into the slide during recoil, these heavy slide locks tend to cause tie ups in the 1911. The slide lock indent is in the same position as the other 1911s but the other slot in the slide is not. The initial opinion

after examination was positive, however, when the firing test came the Commodore proved to be a disappointment. The pistol continually locked open during the initial test with 230 grain ball ammunition.

The slide lock was locking into the slide with no apparent cause. Despite attempting to shift the grip, the problem was traced to the support hand contacting the oversize slide lock. Adopting a very low support hand hold helped, but only by firing with one hand was the problem alleviated. That isn't acceptable. The second problem was worse. The pistol would not feed any of the hollow point ammunition we brought to the range. Not the loads chosen for testing, not a few XTP loads in the range bag and not even com).

This was a concern due to the high sights and barrel rib but the pistol is all 1911. the Winchester Silvertip, a bullet with a nice rounded ogive. There was no use to waste more money and ammunition by checking the piece with other types. This is anew pistol and should feed JHP ammunition. Other tests that were attempted. Changing the ACT MAG out for a Wilson Combat ETM magazine made no difference.

A Wilson Combat slide lock was tried as their Bulletproof line is excellent and didn't require fitting (Brownells #965-000-028WB). At \$57.99, this fix adds considerably to the cost of an inexpensive hand-

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This part was a poor choice for the Commodore. gun but it proofed with 230 grain FMJ ammunition. The original, poorly-designed slide stop should have been caught during testing and evaluation. It might be understandable that American JHP might not be widely available in the Philippines but the pistol malfunctioned in factory configuration with 230 grain FMJ. SAM pistols aren't junk grade guns in appearance or fit but the first firing impression gave pause.

As for the feed ramp, this can be cured by careful polishing. The owner is going to handle this later and the pistol was up and running with ball. The handgun seemed salvageable. Auto Forward Another problem related to the slide stop is auto forward and has sev-

eral causes. This defect occurs when a loaded magazine is inserted and the slide runs forward on its own. There are several ways to check for the problem for it.

First, with dummy rounds in a magazine, lock the slide back and firmly insert a magazine with a good slap while avoiding contact with the slide stop. If the slide falls, retry the test inserting the magazine slowly, carefully observing to see if the slide lock catches the nose of the cartridge. If so, the slide lock is too long and should be trimmed down to accommodate loaded cartridges. If this isn't the cause another problem could be the slide lock isn't gaining sufficient adhesion with the plunger tube spring.

This is difficult to check. Even a broken spring isn't always easily discovered. Field This results in a problem as the part picks up inertia and locks the slide during firing. strip the pistol and check the plunger tube spring. If all appears normal, drill a small indent into the back of the slide stop to allow the plunger spring to take a bigger bite of the slide stop. Another area of concern might be the engagement of the slide lock into the slide.

Possibly the indent in the slide has become worn and needs to be recut. It can never be assumed that anew production pistol is reliable. As illustrated with the Commodore problems, sometimes mistakes occur that should never have left the factory. AG

MACHINING

AR-15 Upper Quick Fixes: Match Bolt Carriers

Are match bolt carriers just another expensive trinket or something that really improves accuracy?

BY JOE CARLOS MAY 2014

ORIGINAL PP. 16-19

When I became the armorer for the Army Reserve Marksmanship Program Service Rifle Team I followed the advice taught in various military leadership schools. I assessed what we had, machine rest testing all the uppers I inherited. Average group size was over a minute of angle and only 39 out of 135 rifles would shoot one MOA or better. As in Shelley's poem, I despaired! I expected much better. In connection with this initial assessment I recorded all group sizes and throat gauge readings.

While most of the barrels were not shot out, the uppers just weren't shooting well. From having been in the firearms business for decades I knew it could take up to a year or longer to get enough replacement barrels. Seeking a quicker and cheaper fix, I eventually cut average group sizes in half but it involved a lot of work coupled with a fair amount of trial and error. Match bolt carriers contributed their share of the improvement. Visual inspection of the Army Reserve uppers revealed glaring errors.

Lots of gas tube and float tube contact, front sight housings contacting the front of the float tube hand guards, broken float tubes, among other things. With the exception of the latter, most of those faults could be corrected cheaply with hard work and long hours. I began by tearing most of the below average uppers down to their component parts and carefully reassembling them.

See my two part article in the March and April 2013 issues, "The Relationship Of Barrel Extension Diameter To Accuracy In

The AR-15" for details on how to stabilize the barrel extension in the upper receiver. This alone resulted in an 18.6% average reduction in group size. Now that I am using the great BAT Machines (batmachine.com) oversized match barrel extensions I am realizing closer to a 35% reduction in group size. I read up on match bolt carriers. There seemed to be two major claims made for them.

First was a slick finish. This would amount to better polishing of contact surfaces and/or a finish different from standard bluing having a lower coefficient of friction. The finish could be hard chrome or some gee-wiz self lubricating finish. It was claimed that the low coefficient of friction would result in more consistent bolt carrier velocity and more consistent lock ups.

Having accurized M9 and 1911 pistols in a previous life, I had already documented the importance of consistent slide velocity in enhancing accuracy. It made sense that consistent bolt carrier velocity should result in tighter rifle groups as well. The other attribute of match bolt carriers was for either increased bearing surface and/or fatter dimensions that, again, were purported to result in more consistency in lock ups and positioning.

I had observed high end bolt gunners and their gunsmiths paying a lot of attention to bolt lock ups in their gun building. I figured they had good reasons for their diligence and that applying the same principles to gas guns could harvest some accu-

racy. I don't consider a carrier to be match grade unless it has a slick finish and greater or fatter bearing surface.

Just dipping a regular carrier in some hard chrome solution or making it out of stainless without incorporating bigger dimensions does not qualify it to true match carrier status. Obviously, some manufacturers have their own ideas and marketing strategies as there are "match" carriers advertised that don't fit my criteria. Since I can't issue Executive Orders they are free to do as they see fit. I use three carriers in my building meeting my criteria: JP Enterprises, Young, and Les Baer.

As the Army Reserve Team armorer I had a modest budget for gun parts. In the early 2000s I could purchase about four match bolt carriers for the cost of one premium match barrel and, unlike good barrels, there wasn't along wait for the carriers. I purchased a few dozen match carriers with keys installed and went to work. The process wasn't esoteric. I just machine rest tested each gun with several known lots of ammo and the stock carrier. Then I substituted the match carriers and retested using the same ammo lots.

Which ever carrier shot the tightest aggregate group size was the one left in the gun. Most of the uppers responded favorably to the match carriers but not all of them. Asking why some match carriers failed to improve groups or sometimes made the gun shoot fatter groups than the standard carriers, I

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From front to rear, Young, JP Enterprises and Les Baer. believe the carrier influences barrel harmonics. This makes sense in as much as the carrier is locked up via the bolt with the back of the barrel as the bullet is traveling forward and exiting the muzzle. Match carriers are meatier, up to a full ounce or so heavier than a stock carrier, and I believe this changes barrel harmonics. The same thing happens with bolt carrier weights inserted in the back of the carrier are installed.

Sometimes the gun shoots better but, about as often, groups get fatter. The purpose of the weights is not to improve the accuracy of the gun, they are used to increase dwell time—how long the bolt stays locked up—which can help with primer retention when shooting hot loads. I see shifts in point of impact when substituting different carriers or inserting bolt carrier weights, supporting my idea this influences barrel harmonics.

If you are installing either device in a customer's gun, stress the need to recheck zeroes. Caveats Some guns performed worse with match carriers than with the original stock part and I feel this is due to barrel harmonics. Those not seeing accuracy im-

provement likely had more consistent bolt lock ups but that was canceled out due to bad harmonics.

You can influence Stoner platform rifles by changing pressures and angles applied to the barrel or by making ammo changes, varying powder charges or bullet seating depth to hit a "sweet spot." Just because a match carrier doesn't immediately improve a gun doesn't warrant giving up. Function, cleanliness and lube. A couple decades ago as a firing member of the Army Reserve Marksmanship Program, before I became a professional gun plumber, a conversation on the range at Camp Robinson.

This back when the Army Marksmanship Unit Custom Firearms Shop at Fort Benning was beginning to experiment with the AR-15 for National Match competition. It was so early in their development project many members of their Team were still shooting the old, high maintenance M14s. Mr. W. O. Harden, then chief of the AMU CFS, was present and members of other service teams were picking his brain about their progress.

Someone asked him how often the AMU was cleaning their guns and he answered, "Every time we shoot them and that in-

cludes the bolt carrier assembly." This was before match bolt carriers had been invented, with everybody using stock carriers. Without thinking, I blurted out that I believed my AR-15s would function flawlessly if the bolt carrier assemblies were only cleaned every 1,000 rounds. I was only a Staff Sergeant at the time, saw Mr.

Harden take a minute to size me up and figured I was going to get a good butt chewing. Much to my surprise, and very much to his credit, he addressed me by name and rank and, with more patience than I deserved, explained the reason they cleaned their bolt carriers daily had less to do with function and more to do with accuracy. The CFS gunsmiths believed keeping the carrier assembly clean and well lubed gave more consistency in lock ups and pressures on the cartridge and orientation of rounds in the chambers.

I began to pay more attention to the cleanliness of my bolt carrier assemblies and I included nightly cleaning of my chamber and barrel extension using the appropriate chamber brush. By doing so and relubricating frequently I noticed my shoulder fired groups were

AR-15 UPPER QUICK FIXES: MATCH BOLT CARRIERS CONTINUED

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tightening up. When testing and tuning Stoner platform guns on the machine rest, I begin each session with an immaculately clean bore, chamber and bolt carrier assembly, adding oil through the holes in the carrier every 20 rounds. Was Mr. Harden overstating the importance of weapons cleanliness all those years ago?

If you ever get the chance to visit Camp Perry during the National Rifle Matches, walk by the military trailers at the end of the shooting day you will still see the AMU shooters diligently cleaning their rifles. Then walk past the scoreboards and see which team is normally on the top or very near.

Weapons cleaning alone won't make Young (center) does not stake, while JP Enterprises (right) stakes each side. 078") between the top of the carrier and the receiver indicating bolt carrier tilt, a situation that robs accuracy. you a national champion, nor will it turn a sow's ear of a gun into a silk purse. The AMU wins often because they have talented shooters and they train often. They also dot their equipment i's and cross their cleaning t's, thus leaving little to chance.

Fast forward to the early 2000s when I was working on the Army Reserve Service Rifle Team ARs. Knowing match bolt carrier manufacturers made dimensional changes to

Eugene Stoner's design, I was hesitant at first in substituting them for fear of inducing malfunctions. I was pleasantly surprised when my team members reported no problems with the improved carriers. In fact, they liked the ease with which the polished surfaces cleaned up. That said, however, they are fatter and have more bearing surface.

I can't overemphasize the need to keep them clean and well lubed. I recommend nightly cleaning of the carrier assembly. An ultrasonic unit makes this less painful. Keep

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the area where the carrier lives in the upper receiver followed up with plenty of lube. Just be careful not to over lube the parts of the carrier near the ejection port so you don't get excess spraying out. On the range I like to see a little lube going on the rings of the bolt every 20 to 40 rounds.

Pull the carrier back a short distance with the charging handle until you see the rings line up with the two vertically spaced holes in the side of the carrier and put a couple of drops of oil through each hole directly on the rings. It is best to position the upper on the left (bolt carrier release) side when doing so. Wipe off any excess that gets on the side of the carrier. This is not just a function issue but an accuracy influence as well so we can get those consistent bolt carrier velocities and lock ups.

How much did the substitution of the match carriers help? My records show an average 8.8% improvement, which is on the modest end but needs a little explanation. I arrived at that figure not only taking into account the majority of uppers that shot better, but the ones that degraded as well. I wanted to see what a person without

knowledge of the influence harmonics in the AR-15 could expect by just a simple substitution of the better carriers.

My attitude as the armorer for a big military shooting team was to take all positive gains I could get and add them with other gains. This eventually led to cutting group sizes in half. If you are building a gun from scratch and need a carrier anyway, why not buy one that helps shoot tighter groups? The difference in cost between match carriers and garden variety ones is not that great.

Carrier Key Staking I covered this in detail in a previous two part article on troubleshooting ("Do You Have Gas?", January and February 2014) so I am only going to skim over it now. JP Enterprises and Les Baer both stake their key screws on to their carriers. The military also stakes theirs. Young elects not to but uses an epoxy and slightly greater torque on their screws. I suspect that many of your customers will expect and insist on staking.

I had an unstaked key (not a Young) come loose during a match in England and it gave me fits. If you buy a Young carrier, realize

that staking will void their warranty and they include a detailed write up with the carrier stating their reasoning. If you elect to stake, a tool from Brownells will help get it right. Bolt Carrier Tilt Look at the back end of an AR-15 where the rear of the carrier sits. Insert your finger in the back of the carrier and you will quickly see that it can be moved in all directions.

Obviously, as you are doing so you are also moving the front of the carrier which holds the bolt, moving the bolt face as well. This has been a major detractor in AR-15 accuracy from the get go. Match carriers attempt to compensate for this by being fatter at the front. Certainly they help but all of them ignore any improvements to the back of the carrier where it is so desperately needed. So we aren't finished with the very interesting topic of improving the carrier by any means.

This is a good jumping off point in the discussion, however, as the topic of options to combat carrier tilt is a full article by itself. AG

PISTOLS

Seeing The Sights

Handgun sight installation and repair can be a great part of any gunsmith's business.

BY ROBERT K. CAMPBELL MAY 2014

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When working with handgun sights it is difficult enough to get it right the first time without attempting to straighten out a mistake by the home tinkerer. There are quite a few experienced shooters, primarily competitors, that are capable of different types of parts changing and firearm modification. Many can handle simple tasks and don't always need professional help, but there are others that do. These are the ones we meet most often. They keep us in business and give us gray hair.

A simple slot in the slide should not bring so much attention to the shop but it does. The slots and fitting sometimes defeat the home tinkerer. After all, if the sight is too large to fit the existing dovetail they always figure a bigger hammer will do the business! The result is a ruined sight, or worse, a ruined dovetail.

Sometimes, when the job is accomplished more or less correctly—a working handgun that shoots to point of aim—the end result is less than desirable as the handgun's sights now bear witness to heavy hits with a brass hammer. Even if it works, having the sights bashed in with a brass hammer isn't ideal. When a customer

brings in a drop-in fit set of sights he doesn't always understand that easy fit isn't always the rule. Subtle differences in fit must be understood.

If the sight was that easy a fit it would be too loose in the dovetail. Some fitting must be required. The first thing I do is to inspect the sights and see if they fit the dovetail. Ordering the proper size, whether it be a Novak cut or a Heinie, is vital to the end job. Colt and Springfield tenons differ. As an example, not long ago I took in a Llama 1911 .45 for what was supposed to be a simple sight repair. The young lady's .45 had suffered the sight flying out during a range session.

I could not help but wonder how it became that loose as the dovetail was clean and showed no signs of previous work but the missing sight was not found on the range. The dovetail still maintained most of the finish and showed no signs of a problem but the metal is pretty soft in these handguns. Adding to this, the young lady had vision problems.

She could see images and her sights against close targets, well enough to defend herself and shoot effectively at typical A brass hammer, a brass punch, Allen wrench for loosening Novak sight set screws and towel to wrap around the sights to mitigate punch impact.

SEEING THE SIGHTS CONTINUED

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handgun distances, but couldn't see well enough to drive and get a driver's license. I had an interest in keeping her shooting and wished to help her get her pistol back into action. A friend of the young woman had changed the sights on a GI 1911 for high visibility sights and gave her the old sights. Not surprisingly, the Llama dovetail swallowed the GI rear sight and I had to find an alternative.

After some scrounging I found a set of sights from some forgotten project, a type of night sight from a now defunct company considerably thicker than GI sights. The night sight component was long burned out and they were too large for the Llama but everything else in the shop was too small and we were on a budget. A combination of carefully filing of the sights and opening the dovetail made for a good fit. I know, this is non standard.

If the sights have to be replaced at a later date no one Bottom would find the right fit but this was expedient. No parts house had a rear sight for a Llama. The file was taken to the dovetail and enough of the dovetail opened to present a flange to slide the modi-

fied sight in. I think it turned out well. In the unlikely event the sights are ever changed the course of action would probably demand a Novak cut, something out of the question on this inexpensive handgun. Most sights are not that large an obstacle.

Sometimes the question to ask is, how tight should the sights be in the dovetail? I like to begin just pushing the sight into the dovetail. There should be little resistance as you go along with the greatest resistance as the sight has covered about three quarters of the dovetail. It isn't as if the sight is welded in place; the sight has to be moveable for windage. Truth be told, few shooters ever adjust the rear sight once you have set it for them. If they are target shooters they will need adjustable sights.

Just the same, the simple rear notch windage adjustable sight solves a lot of problems. When moving the dovetail-fitted sight into place it is a good idea to have the dovetail heavily greased. The grease will dry out and you will have a sight that is properly set in place. I have never used any special Bottom While not attractive, they have worked well

for decades. tools for dovetail sight work. I use a standard brass hammer but do not directly contact the sight.

Instead, I only make contact with a leather pad or a heavy pad cut from an old felt hat and use this to adjust the rear sight. The punch impacts the pad, saving any unwanted marks. Another neat trick is to fabricate your own heavy duty hardwood punch. This is really the best route. I have cut one from an old miniature baseball bat and it has lasted for years. This covers placing the dovetailed rear sight into place when it is a tight or proper fit. How about the rear notch itself when it is too loose?

Sometimes the metal is soft, as is the case of the Llama or the sight may have actually been adjusted so often that it is becoming loose in the dovetail. The Novak type with a set screw solves some of these problems. The other types require a little handwork. When the sight is removed from the dovetail, the dovetail may be peened a bit with a punch. To peen the dovetail, the slide must be stabilized in a vise and all

SEEING THE SIGHTS CONTINUED

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Above Center: This CZ pistol features a roll pin in the slide for removal of the front sight. They are overdue for a good cleaning! of the area around the dovetail covered with tape to protect the finish in case of a slip. Take the punch and brass hammer and raise the dovetail by tapping and roughening the interior of the dovetail. This will make for a tighter fit. The dovetail slot is actually affected little but the adhesion is much better. A little goes along way.

I have seen old military sights that have been adjusted roughly, as evidenced by strong punch marks on the sight, eventually become

loose and tightened in this manner. I would not wish to do this with a nice handgun but an ancient Browning High Power of my acquaintance with such markings is over sixty years old, still in daily use and the sights remain firmly in place. Among the most touchy jobs is adjusting night sights.

However, by These front sights are all advertised as Novaks and are factory supplied in these 1911 handguns but each is different! Be certain the customer understands the differences in sights as some are suited for target shooting and others for combat shooting. using a wooden punch you should be able to

adjust such sights without causing the ampules to pop out. It is important that the adjusting tool, block or bunch strikes flat against the base of the rear sight.

Be very careful and do not impact the sights near the spot where the tritium tubes are shock mounted. They are mounted in a thin aluminum sleeve with a rubber insert between the tube and the sights, but they may burst or be jarred out of place. AG

READER FORUM

Reader Forum

BY AMERICAN GUNSMITH EDITORS MAY 2014

ORIGINAL PP. 23-24

New Index I have been a subscriber to American Gunsmith for about seven years now. I find the magazine is a great way to continue my gunsmithing education. Awhile back I decided to work on learning more about the Internet and websites and set out to learn the basics of how to design, build and run a simple database on a website. I wanted to combine my gunsmithing and website interests so I created a database that indexed all of my back issues of American Gunsmith.

I have been using it for a little while now and wanted to make this available to all members. You can access this index from my website, GunsmithInfo.com. From that main page, click on the "Magazine Index" link to be taken directly to the database. I realize that this site can use a few enhancements and a little graphical polish but the basic data is there and ready for use. If others find this site interesting I will put the time and effort into making improvements.

The index covers every article from every issue that I have been able to find going back to April 1992. The magazine index link that you click on will take you to a list of every article in that issue. This list contains the basic information such as Title, Author, Section, etc. There is a column labeled "Summary." Hovering your mouse on the icon will reveal a pop-up that contains a brief summary of the article. The columns can be sorted by clicking the Label at the top of the column.

The columns can be searched by clicking on the magnifying glass icon and typing in a word or phrase. I work in Information and Technology. Gunsmithing is a hobby I started when I wanted to be able to work on my own collection. I plan on adding more gunsmithing information to the site

as it grows. I would love to hear from any readers if they have suggestions on information that I should add. Email me at bob@gunsmithinfo.com. Also, help support the site by clicking on one of the ad banners.

GunsmithInfo.com This is an outstanding index and a great resource for all American Gunsmithing Association members. Kudos to Mr. Richardson for putting this together and making it available for all of us! Savage 99 I have a Savage 99 in need of repair and am having difficulty locating a manual. Can you recommend a detailed repair manual with directions and particulars to help me? James A.

Billings If the repair is limited to part replacement there are excellent disassembly/assembly instructions in the Official NRA Guide to Firearms Assembly: Rifles and Shotguns. The manual you seek covering detailed repairs and instructions is not readily available outside authorized service centers and factory service personnel. Care to give us specifics of what is in need of repair? We may be able to uncover the cause and guide you to a cure.

Savage Model 6 Do you know where to find a assembly/disassembly for a Savage Model 6D? Or know how to install a cartridge guide spring that was missing? I have The Gun Digest Book of Firearms Assembly/Disassembly Part III: Rimfire Rifles but it doesn't show how to install the spring. The Model 6 was introduced in 1938. Yours is one of a series that underwent no significant mechanical changes over the years, with the exception of a switch from tube feed to clip feed.

The unique feature of the rifle was, and is, its versatility. It could be fired as a straight pull, single shot with .22LR, .22 Long and .22 Short or as a semiauto with .22LR. Bob

Richardson There's another assembly source you should check out. Official NRA Guide to Firearms Assembly: Rifles and Shotguns contains a very good schematic. In it the guide spring appears to be configured to fit in the guide ahead of the lifter, which has its own spring.

Recalling the functions of the guide spring and lifter should be helpful. The lifter receives the cartridge from the mag tube and presents it to the guide/guide spring. In turn, the long legs of the guide spring serve to present the cartridge to the barrel breech as the bolt moves forward to chamber it. Llama Especial .380 I have a Llama Especial .380 (a 1911like pistol in miniature) serial number 156XXX and need a barrel link for it.

Numrich has been out of them for months and they have no idea when they'll find anew supplier. Where else can I look for the part? Can I get specs to make one? Can I use a link from one of the new 1911-style .380's? When I find/make one and install, what is the real test for proper fit? Portland, OR Peter Krauss After reaching deeper into the parts aftermarket, i.e.

Jack First, try the importer in Wannamassa, NJ To address your questions, no, because neither you or this organization can secure factory blueprints and we'd not recommend casting about for a link from a pistol made by another manufacturer. Dennis Johnson As for fitting up the replacement link, study up on link fit in a full-size M1911A1. The best book for this is The U. S. M1911/M1911A1 Pistols & Commercial M1911 Type Pistols, A Shop Manual by Jerry Kuhnhausen.

The basic objective is to disengage and re-engage the barrel lugs with the slide lugs in a smooth and highly repeatable manner.

READER FORUM CONTINUED

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Savage 24V Series B I have a Savage 24V Series Bin my shop with barrels that cannot be unbreeched. Someone before me has attempted to unbreech it by prying on the yoke from inside of the receiver that attaches to the locking plunger. I found that the yoke was broken in two pieces when I removed the stock. I have soaked the locked-up plunger with penetrating oil for several days in hopes that would loosen the locking plunger but have had no luck in getting it to loosen at all.

Can you give me any advice as to what I should do? This is anew gun that has never been fired but has been stored for along time. I do not want to do anything that would damage the appearance. The individual doing the prying should be the individual to pay for the damage done. No exceptions, not even if total replacement with anew gun is the result. We fear repair of that damage will require it be performed by factory technicians.

Call Savage, describe the condition and make arrangements to ship the 24V to them for service Frankly, since it was anew gun, never fired and had been stored for along time we suspect vandalism may be involved here. Marlin Model 88 A customer brought in a Marlin Model 88 with some parts another gunsmith had ordered for them and then went out of business without fixing the gun. I am in need of the breakdown procedure for this gun so I can hopefully get it fixed for them.

The Model 88, later to become the 88C (tubular) and 89C (clip) was the first of its kind made by Marlin. It could be fired semi-auto or single shot. There's no schematic perhaps because the M88 pre-dates their use. There is, however a patent (#2430680) issued to R. L. Jenkinson for a semiauto/single shot action. This could be useful in working with the piece since patents get into great detail on function.

A copy of the patent can be obtained from the Patent and Trademark Office (uspto.gov, google.com/patents) in Washington, DC. Don Ferguson Towering Arms

Union, MS Winchester 1885 Low Wall I have a Winchester 1885 (Miroku) that has problems. It seems that internal parts have broken. It won't cock and the hammer won't stay back. Do you have disassembly instructions for it? Have they been published in your magazine? Can you tell me where to get them? Taking it apart without losing parts must be difficult.

Stanley Shaw The September 2010 issue covered the M1885 but the shotgun might not have been manufactured by Miroku. To ascertain that, after reading the article, contact Jim Heverling (contact information omitted in this digital edition). Jim serviced Miroku-made guns in the past and should be able to help with any parts you may need. Parker Shotgun I have an older Parker double barrel shotgun in 12 gauge chambered for 2-1/2 inch shotshells, serial number 1342XX. According to the book it was manufactured around 1905 using Vulcan steel.

Is it possible to rebore the chamber to accept modern loads and still have a margin for safety? If so, would you have knowledge of someone capable of making proper modifications to this gun? June Jones Philip R. Burns Kittery, MA If we had the specifications on Vulcan steel we'd like to be able to say "forge ahead!" But we don't. Not too long ago Remington produced a run of Parker doubles. You can try reaching them in Ilion, NY to see if they can shed more light on the metal.

If it's judged unsafe or was cut into strips to be forged over a mandrel in making Damascus barrels your best bet is to call Briley Manufacturing and explore the possibility of full length barrel inserts. This would result in a shotgun capable of safety firing modern loads and a reduction in gauge. Of course, the original Parker would no longer be considered an original. AG

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