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AND THE AMERICAN GUNSMITH ARCHIVE

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01

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

MAXIMIZING THE AR-15

STOCKS AND GRIPS • BERETTA 92 • SAKO P75 • PINS AND SCREWS

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 169

DIGITAL ARCHIVE EDITION

Preserved for the bench.

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PEOPLE & COMPANIES

Stocks And Grips

BY AMERICAN GUNSMITH EDITORS JANUARY 2018

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Phase 5 began after Ken Montes built a firearm component in his garage workshop and showed it to a local shopkeeper who asked him to make more for his store. That first component wasn't built to make money, just to solve a specific problem. The company prides itself that everything they sell is made in America, on American-built machines, with American-built components.

Stocks And Grips The Universal Mini Stock is Phase 5's fixed stock for Stoner-platform rifles that fit a variety of buffer tubes and receiver extensions. Note, the UMS is a stock to be installed on a rifle and installing on an AR-15 pistol variant would be considered an SBR (Short Barreled Rifle) as defined by BATF rules. If you have not paid the fees and received an approved tax stamp from the ATF, it will be illegal to possess an SBR.

Made from raw billet 6061-T6 aluminum—and lighter than most polymer adjustable stocks at 5.7 ounces—and finished with black MIL-A-8625 Type III Class 2 hard coat anodizing, the UMS has a six-position receiver extension. It will fit Phase 5 Hex One or Hex-2 buffer tubes, most cylindrical buffer tubes measuring 1.10-1.25" O. D., and rifle-length receiver extension tubes,

provided the set screw is secured on the cylindrical buffer tube with a small dimple on it. The unit measures 5x1-3/4x2-1/4".

Two set screws and extended hex key for installation are included. MSRP is \$69.99 at Phase5wsi.com, Talon Grips Talon Grips was founded by Derik Losinger, a law enforcement officer and competitive shooter who made his first sets by hand with an X- ACTO knife before going to die and then laser cutting. Made in the United States, the company has custom designs for over 300 firearms in rubber and granulate textures. The adhesive sticks well, even if the frame has a textured finish.

The granulate texture provides positive purchase and is best suited for holster carry and competition shooting. The rubber texture is less aggressive and suitable for shooters with softer hands and for deeper concealed carry options as its less likely to irritate skin or snag on clothing. The grips install in minutes, forming to the firearm with a hair dryer or heat gun. The adhesive will not move once properly installed but can be removed with little residue.

They are resistant to most cleaning solutions and a cleaning pad is included. MSRP is \$17.99 and available direct at TalonGunGrips.com,

HISTORY

Beretta 92

A historic, issue handgun for decades, here's how to work the Beretta 92.

BY ROBERT K. CAMPBELL JANUARY 2018

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One of the most reliable and well-distributed handguns of the previous century is the Beretta Model 92. Despite the introduction of the polymer frame 90-2 and the excellent 92A1, the original 92FS remains one of the most popular handguns in worldwide service. The Beretta is a reliable and reasonably rugged pistol but there are concerns. Chief among them is locking block, a design first used with the Mauser 1896 pistol.

Few pistols still use such an oscillating wedge but it has worked well in the Beretta, provided it is inspected for wear on a regular basis. Wear isn't always obvious and a close examination for hair line cracks is needed. For reasons best explained by an engineer, the left wing of the Beretta wedge usually breaks first. The forces loaded onto this wedge with every firing are heavy and it is

important that the pistol be kept clean and well lubricated to preserve the operating system.

Keep a check for cracks near the indent in the L-shaped wedge. If the wedge breaks while firing the slide will be difficult to remove. While rare, this seems to happen more often with open top slide designs. Never attempt to force the slide off of the frame when the wedge is broken. Some preliminary work must be accomplished first. Slipping a dental pick or small object into the slide recess and shoring up and supporting the broken wedge will allow running the slide forward for removal.

Sometimes it is still necessary to use a brass hammer as the broken part may be wedged tighter than normal but keep the pick in the slide and supporting the broken part. While the broken wedge may impede movement it usually will be trapped in the slide rails and

not completely stop the slide, only hinder movement. Checking the wedge every 500-1,000 rounds is good practice, replacing as needed. While not a common problem, pay attention to it with high round counts.

The wedge is pinned in and replacement is simple. A considerable argument may be made that the design was intended to allow replacement of the wedge often, although no set round count is generally recommended. Trouble seems to start at around 7,500 rounds but some will need replacement at 3,500 rounds.

Also concerning high round counts, the consensus among gunsmiths and police armorers is these pistols in police service fired with 115 and 124 grain +P and +P+ loads fare well in the long term while high round counts with 147 grain subsonic loads often show eccentric wear on the oscillating wedge much sooner.

BERETTA 92 CONTINUED

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While not backed with conclusive evidence, the general impression is Beretta 92s fired extensively with 147 grain loads should be trouble checked more often. High pressure seems to have less effect than momentum on this. A number of months ago I examined a broken Walther P38 slide. The Walther was the progenitor of the Beretta 92. In some ways, the Beretta 92 is simply a highly-developed Walther P38.

The slides are prone to crack in the same places but this is a They are wedged on from long use at times. rare occurrence. Just the same, when checking the wedge also inspect the slide for incipient cracks. One trick passed on from an Army armorer involves using sound to check the slide. This individual recommends using a brass rod to tap the slide. If the slide has a sound similar to a tuning fork it's fine, however, if it reverberates with a dull thud then it's cracked.

This technique may require a deft hand and ear and visual inspection under magnification is still recommended. A cracked slide Barrel cracks are most often the result of a pistol fired with large amounts of heavy loads. These loads may be NATO specification or police-type +P loads. The problem isn't the design of the pistol but the recoil spring becoming worn and tired. The recoil spring should be replaced every 5,000 rounds to mitigate eccentric wear generated by long firing sessions.

A warning sign that sometimes comes up is a bit of metal raised in the extractor relief cut of the barrel; a sure sign the pistol is being battered and the recoil spring needs to be replaced. A cracked barrel must be replaced, however, if routine inspection catches the first signs of wear there is a good chance the barrel will be saved. Replacing the recoil

spring often eliminates battering problems with the Beretta pistol and replacing the recoil spring every to insure long life.

The extractor is pinned in and isn't very difficult to replace but nevcannot be welded and must be replaced but this is rare. There are few handguns with reciprocating slides that do not occasionally break them, including the Browning High Power and the Colt 1911. er seems to give trouble, however, loose grit, debris, and brass shavings can build up behind the extractor. Removing the extractor and cleaning the groove insures the extractor lasts longer.

This is apart of the Beretta maintenance cycle and benefits the pistol in the long run. Provided the recoil spring is changed often and attention paid to the extractor,

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chances are the Beretta will prove reliable and long lived in service. Berettas are criticized for a heavy double action first shot. While not much help, consider the stock spring rate and a lighter press might be obtained while maintaining complete reliability. One simple way is removing the stock 92FS mainspring and replacing it with one from a 92D double action only. Remove the grips and drive out the pin that holds the lanyard ring/mainspring housing. Press the housing in and then out and it should release.

Replace the spring and assemble the mainspring cover in reverse, driving the pin back in. Another method is replacing with a 1911 mainspring but the D-type seems to work better. Where a stock 92FS mainspring has a compression to fire of 12 pounds, the Dmodel is 9.5 pounds. Wolff Gunsprings #16 is similar but not quite as light as the D spring and may require two coils be cut off to achieve a similar let off. Is ignition reliability compromised by a lighter hammer spring?

There are different geometric designs at work between a double action only and double action first pistol but DAO pistols are intended for police duty so reliability is foremost. After fitting a Dspring to a personal 92FS used at the training company, ignition reliability seemed unaffected. The spring was left in for several months and remains in place after firing hundreds of rounds of ammunition while training many students.

THE PISTOL HAS BEEN TESTED WITH A VARIETY OF COMMERCIAL LOADS AS WELL AS

BERETTA 92 CONTINUED

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handloads using CCI primers, which are sometimes harder to crack than others. Its also been fired extensively with CCI Blazer practice ammunition and a duty load of Federal 9mm 124 grain Hydra Shock +P+. There have been no malfunctions of any type and primer indent is always good. Students have remarked that this Beretta seems smoother than their issue pistols. Another expedient that leads to an even smoother trigger action is to polish the action parts.

To smooth the Beretta action, the initial work is done on the contact point of the sear. Follow with a good polish of the sides of the hammer, the hammer pin, the head of the hammer strut, and the side of the action bar where it meets the trigger. By carefully polishing these parts while preserving the original angles creates much smoother operation. I have also used the Beretta #643 trigger kit from Wilson Combat in several pistols with excellent results. Removing the trigger assembly isn't difficult.

First, the hammer spring retaining cap is pressed to remove the hammer spring. With the retaining pin removed, the spring pushes the spring cap out. Pull the hammer pivot pin and the hammer will come out. The hammer strut may follow the hammer spring or hammer; either is fine. Remove the hammer bar spring. The slide lock may be removed now. Push the trigger spring pin out just enough to release the spring and replace with a custom unit.

The yoke on the Wilson Combat assembly is to the rear and the trigger pin passes through it. With our test gun the improvement was excellent. I also replaced the magazine catch with a WC extended unit by removing the grips, then pressing the magazine catch inward and moving it away from the muzzle. It should be pressed out easily. Placing the new assembly in requires simply locking or clicking it in place. I also replaced the safety with a Wilson Combat unit.

Drift out the safety pins; they are small but it isn't difficult. Pull the right hand safety lever out. Remove the firing pin retainer spring pin to remove the firing pin block and spring. Use a punch to remove the firing pin plunger. Depress the firing pin and pull out the left side safety lever. The safety lever goes up and to the left. Be careful with the safety plunger. With any handgun design, certain performance parameters must be met.

Accuracy is often a product of trigger control and the smoother trigger action produced by lightening the hammer spring and polishing the action often results in exceptional improvement. This improves practical, not intrinsic accuracy. By carefully modifying the action and smoothing the internal parts, a more tractable handgun produces better practical accuracy. The addition of Wilson Combat parts also adds up to a superior pistol. AG

RIFLES

Maximizing The AR-15

A former military armorer reveals his secrets for cutting AR-15 group sizes in half.

BY JOE CARLOS JANUARY 2018

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The AR-15 was never meant to be a target rifle, having been designed by Eugene Stoner for battlefield use. Previous U. S. service rifles were difficult to work on, required special tools, and a training period for military armorers that was long and difficult. Stoner corrected a lot of that. With two halves held together by captive pins, AR-15s can share one lower with uppers dedicated to self defense, hunting, target shooting, or other uses.

Barrels can be replaced quickly with a minimum of tools and armorer skill. Bolt carrier assemblies can usually be swapped as needed as it only takes minutes to check headspace with Go/No-Go gauges and I have yet to have a single Stoner rifle fail to pass. Unfortunately, these useful characteristics limit the rifle's ability to shoot really tight groups. Fortunately, the design shoots better than it has a right to.

Part of the problem is a lack of accuracy influence from a conventional stock as was the case with previous rifles. While Stoner corrected problems found in firearms with wooden stocks, he failed to correct the at-

tachment of the front sling swivel to the barrel. Soldiers, hunters, and competitive marksmen can benefit their shooting with sling support but that benefit is hampered when sling tension bends the barrel.

This isn't caused by the sling swivel itself, just when tension is applied with a sling, such as it will when used for support during shooting. This tension problem is cured with a float tube, an improvement on Stoner's design. Service Rifle competition uses modified handguards to retain an as-issued look. These tubes can add a fair amount of weight, which can be good or bad depending on the rifle's purpose.

Geissele Automatics makes another popular handguard for Service Rifle that's ventilated for enhanced barrel cooling. Match Rifle, F-Class, and tactical rifles have a plethora of options doing the same thing and allowing attachment of various sights, bipods, lights, and other accessories. All of these relieve pressure from the barrel and have proliferated in recent years. A poor trigger

also leads to less-than-stellar shooter performance. M16 triggers as Stoner designed are stout but repeatable.

When the military decided to limit full auto and redesigned the trigger to fire three-round bursts it created an over-engineered marksmanship nightmare with a clockwork-looking cam with teeth yielding three distinctly different trigger pulls. Outside of the military and Service Conditions matches, only NFA Class III shooters opting for the burst option have to deal with this.

Better options such as from Geissele Automatics and the Wisconsin Trigger Company (makers of the new version of the Milazzo-Krieger design) help. Research the appropriate match rules for minimum trigger pull and any other restrictions. Barrel break-in and barrel cleaning also influence accuracy potential. Done properly, break-ins make cleaning easier leading to less mess and potential for damage. Checking magazines is also important as they can influence point of impact. Sights are obviously critical.

THE ISSUE A2 SIGHT

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Rails allow attachment of various sights, etc. is pretty good and usually repeatable. Some competition shooters want finer adjustments, most easily accomplished by replacing the stock parts with ones having finer threads. Issue apertures are too big for some younger shooters and too small for more senior folks. These can also be replaced. My sight parts are from White Oak Arms. Owner John Holliger is an accomplished competitive shooter and I believe he knows more about AR sights than anyone else.

Gunsmiths need a sight checker, such as the Ray-Vin Rear Sight Verifier, that clamps on and click adjustments in the sight. I check tracking of every sight that comes into my shop. Replacing worn out sight parts was probably my number one repair job as a former military team armorer. Recent rule changes by the Civilian Marksmanship Program and National Rifle Association allowing optics has seen a decline in iron sight use at these matches along with demand for A2 uppers and integral iron sights.

March and Nightforce are the early optic sight favorites. These combined with properly set up 90 grain loads may end the long stagnation of the AR-15 and rocket shooters to new levels of marksmanship excellence. As I've mentioned before, I spent a number of years with the Army Reserve Marksman ship Program as a competitor and armorer. Most civilians imagine all military shooting teams have deep financial pockets, however, the Army Reserve was always the poor kid on the block with a low purchase budget.

I had to find ways to improve accuracy performance with a tight purse. Most of my fixes are either inexpensive or can be done at no cost and don't require expensive tooling. Some of this tuning does require range time and actual shooting skills. While some gunsmith may shun detailed live-fire testing, if you're working with a good shooter serious about optimal performance, the onus of the range testing can fall to him. These methods aren't a "how to do it" essay but more of a "what to do" guide and overview.

I've covered topics under each of the sub-headings in other articles in depth if you require greater detail. If you lack a particular issue with an article the interests you and can't obtain a copy, email me at and I'll help you. Also, if you're at Camp Perry during They remove sling tension from the barrel and are better ventilated to aid barrel cooling. The same gauge will also check windage. the CMP National Service Rifle Matches visit me on Commercial Row at Building 910-A.

Upper/Lower Fit In "The Accu-Wedge" (April 2017) I recount my initial tests with the USAR Team uppers. Using the same Colt AR-15 in a machine rest, I rated the upper-to-lower fit as "average" tightness. The results were horrible! Average ten-shot groups with match-grade 77 grain ammo were in excess of MOA. I didn't initially use an Accu-Wedge but did part way through the test.

Resting the exact same equipment and ammunition, adding that \$5 piece of red bubble gum resulted in an enormous 26% average reduction in group size! I have never tested or fired an AR without a fresh, tightly-fitted Accu-Wedge in place since!

MAXIMIZING THE AR-15 CONTINUED

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My machine rest grips the lower firmly while also securing the upper. With everything tightened down you'd swear there couldn't possibly be any movement, yet an Accu-Wedge allowed significant improvement. Considering the potential improvement gained when the upper and lower are contained in a machine rest, you can well imagine how much an Accu-Wedge can help when held and fired from the shoulder.

You'll never achieve maximum possible accuracy with a Stoner rifle with a loose upper to lower fit no matter how much money and effort you invest on other improvements. In addition, there are two pins holding these rifles together. The influence of the Accu-Wedge is exerted on the rear pin, however, both pins need to be tightened for best results. Use either thin shim stock (shown) or a BAT Machine Barrel Extension in conjunction with green Loctite.

Below center: Automotive tubing bender is used to help align the gas tube. Premium Barrel The barrel is the foundation of any

firearm and AR-15 gunsmiths must make the effort to harvest all the potential accuracy the barrel maker built in. In "Barrels For Custom AR-15s" I noted that almost every custom barrel manufacturer makes a really good barrel, sometimes. However, they do so at widely varying rates.

Some barrel companies only produce one really good barrel in ten while other makers go as high as eight in nine. That is a huge spread in quality and it behooves custom gun makers to hedge their bets by purchasing from those makers on the high end. Based on my tests, the two custom makers consistently producing the highest ratio of exceptional barrels are Bartlein and Krieger. Both use a single point cut rifling method coupled with quality steel, meticulous workmanship, and good tooling.

Don't overlook chrome-moly steel as stainless is sometimes overrated. Consider gain twist rifling for applications that warrant it as these are more readily available now. For more information, see "Revisiting Gain

Twist" (November and December 2013) and "Gain Twist Barrels For Palma" (December 2016). Stabilize Barrel Extensions "The Relationship Of Barrel Extension Diameter To Accuracy In The AR-15" (March and April 2013) was the first topic I discussed in this magazine.

I explained how the barrel fits in the upper receiver and how the barrel nut holds it captive. While the mounting system is simple and easy, it results in a lot of movement in the back of the barrel. One cure uses thin shim stock and the second a custom oversized BAT Machine match barrel extension. Both are locked in with green Loctite. Done properly, these will cut groups about a third.

Gas Tube Alignment Very few gas tubes will be correctly in line with the bolt carrier key without about 15 minutes of extra fine tuning. Getting this right will not only tighten groups but

MAXIMIZING THE AR-15 CONTINUED

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From front to rear, Young Manufacturing, JP Enterprises, Les Baer. Expect an 8.8% average reduction in group size. Add anti-tilt pads to these carriers and enjoy another 14% group shrinkage. This provides improved support to the rear of the barrel extension. will minimize fliers. The only tool needed is a tubing bender available at auto parts stores. For more information, see “Gas Tube Alignment” (March 2014).

Chamber Selection There is a lot of encyclopedic error circulated about how jumping magazine-length ammo long distances before entering the rifling won't create accuracy problems. The very assertion is false! In “AR-15 Chamber Selection” (July-September 2014) discusses the ideal chamber that is best for your customer's needs. Match Bolt Carriers If you are building anew rifle or upper you have to purchase a bolt carrier anyway.

Why not spend a few extra bucks and buy a match carrier that gives more consistent lock ups? There are three brands of match carriers that work well available in black or stainless

finish. Average reduction in group size will be 8.8% as detailed in “AR-15 Upper Quick Fixes: Match Bolt Carriers” (May 2014). Anti-Tilt Pads With so much slop between the carrier and upper receiver, the back of the carrier can tilt down. This throws the bolt face out of perpendicular to the axis of the bore.

Gunsmiths knew about this when the AR-15 was first released. Some tried to correct it but function can be impaired, so everybody buried their heads in the sand for decades and tried to make believe the problem didn't even exist. In “Combating AR-15 Bolt Carrier Tilt” (May 2017) I offered a couple of cheap and quick solutions and suggested that mine are baby steps. Use whatever method your own ingenuity comes up with to correct the problem.

Significant accuracy gains can result to about a 14% reduction in group sizes based on my study. Some stock bolt carriers are candidates for anti-tilt pads if the customer doesn't wish to invest in anew match carrier. Barrel Harmonics I detailed good ways to tune this

in “AR-15 Barrel Harmonics” (October 2016). Unfortunately, in order to properly influence harmonics someone must spend time shooting groups and making changes in pressures and angles applied to the barrel.

While none of this is difficult it does require shooting skill or a machine rest with expertise in its use. Many gunsmiths will want to encourage the shooter to perform their own range testing. Done properly, accuracy gain can be expected to be about 20%. Heavy Upper Receivers These are currently available as the DPMS Lo-Pro and Sun Devil Heavy-Walled Billet Receiver. Both are flat tops. The Lo-Pro comes without either a dust cover or forward bolt assist and is made to be mounted on regular lower receivers.

The Sun Devil is available with any combination of dust covers and forward assists and looks best when mounted on their matching heavy-walled lower but will fit regular lowers as well. The advantage to the heavy walls is they provide better support to the back 2/3 of the barrel

MAXIMIZING THE AR-15 CONTINUED

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extension that lives behind the barrel nut threads. Barrel extensions still must be fitted to these receivers the same as conventional skinny ones. Check match rules as these are not legal in Service Rifle events. Cryogenic/Fire Lapping Both of these are last ditch efforts to fix sick barrels. Cryo was covered in "AR-15 Barrel Treatments For Maximum Precision" (September 2016).

My records show applying cryo to under-performing barrels resulted in a 9.4% average reduction in group size but does nothing for healthy barrels. "Electropolishing & Fire Lapping" (May 2015) discussed how I On right, the rounds outlined in the square at 4 o'clock and 6 o'clock just outside the group were the first and second fouling shots after cleaning.) on bores when storing firearms, even for short periods.

These reduce cleaning rod damage to paper-thin lands. fire lapped about 100 sick barrels for an average accuracy gain of 19.3%. I do not recommend proactive application of this process to healthy barrels. I have not used either treatment in about a decade since I concluded my massive barrel accuracy study and began purchasing barrels from only Krieger

and Bartlein. My mind set is that it's best to purchase a quality barrel already capable of sub-minute groups without performing work arounds.

The next tips are on the shooter to perform. Here is a to-do list to provide your customers. Bore/Carrier Cleaning The bolt carrier assembly and bore need to be cleaned every time the gun is fired unless you are using it as a hunting rifle firing one or two rounds a day. Of the two, bolt carrier cleaning is more straight forward. Most gunsmiths will want an ultrasonic cleaner for this. Lacking such a unit, shop rags work fine.

Most ultrasonic cleaners use solvent with water in it so let the parts dry thoroughly before running through a second time with the manufacturer recommended lubricant. These lubricants work better to prevent rust than to actually lubricate so I always finish with regular gun oil and add oil to the bolt rings during range sessions as they dry out fast. Anti-tilt pads require daily lube and I like something thicker, such as Tetra Gun Grease. Bore cleaning is damned if you do and damned if you don't.

On the one hand, you are damned for cleaning as there's risk of damaging the delicate, paper-thin lands due to cleaning rod flex. Cleaning must remove baked-on carbon and copper fouling and these require different methods to remove. Most of the worry goes to copper fouling but it's easier remove and less likely to damage to the bore. There are plenty of good copper solvents on the market, just follow the manufacturer's instructions. Many copper solvents result in a greenish or bluish coloration to the patches.

Cleaning until patches no longer have these colors is a fair indication the copper is gone. Carbon fouling is more difficult to get out. Lacking a bore scope, it's difficult to know when you have removed it all. Solvents don't a discoloration with carbon and I don't know of a solvent, incantation, or snake oil that reliably removes it. Carbon fouling requires an abrasive for removal and that is where we get in trouble. It is not the abrasives themselves so much as the back and forth scrubbing with a bore brush.

BEING FATTER THAN THE LANDS AND

MAXIMIZING THE AR-15 CONTINUED

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Stop when your index finger hits the leading edge of the ejection port. grooves (anew bore brush typically measures 0.235" for a .22 centerfire with 0.218-0.219" lands and 0.224" grooves) there is quite a bit of resistance, causing the cleaning rod to flex and scrape into the easilydamaged lands. Bore guides help keep the rod straight but aren't fool proof. J-B Bore Cleaning Compound is a common abrasive used on a patch for fouling removal.

The direction of the patch is actually changed inside the bore before the patch can exit the muzzle and this reversing of the patch can cause significant rod flex and resultant bore damage. You are also damned by failing to clean the bore as accuracy will suffer. Each barrel differs as to how many rounds or how severe.

I had a customer bring in an upper at the end of a shooting season to reset 308 and .223 long range loads in full-value cross winds. bullet seating depth and update the sweet spot to compensate for throat erosion. The customer had been letting the bore soak overnight with Hoppe's Bench Rest as per

the directions. My bore scope revealed no copper fouling but I could see some remaining carbon fouling at the back third of the barrel.

Not severe but enough that I recommended using a few more brush strokes on each cleaning. I decided to perform a machine rest test to find out the importance of getting the carbon out. The test targets revealed a very significant 47% reduction in group size clearly brought about by the removal of the carbon fouling. I had used J-B short stroked back and forth in the rear third of the barrel and let the bore soak in between applications.

Each time I ended up with several patches showing copper fouling finally removed after being laid down and covered by carbon in layers over many shooting sessions. People have maintained fouling can be layered over time and I believe it. When patches of Hoppe's proved the copper was gone, I went back to another session with J-B to remove the next layer of carbon and another soak of Bench Rest revealed more copper. When the bore was finally truly clean it shot a much tighter sub-minute group.

Another cleaning topic is salt bath nitriding, such as Isonite or Melonite. It works both on stainless and chrome-moly steel and differs from regular bluing because the salt bath coats both the inside of the bore and the outside of the barrel. I have tested the process extensively. It has no negative impact on accuracy or velocity and makes cleaning much easier. More frequent cleaning with and easy-to-clean bore means damage is much less likely.

The bore should still be coated with a corrosion inhibitor, such burnishing with WD-40 or Boe Shield T-9 prior to storage. Caution: If you plan to send a barrel off to be nitrided, read "Retention Of AR-15 Barrel Extensions" (September 2013). The nitriding process is performed at very high temperatures and can cause your barrel to unscrew from the extension later on. The article will detail two very good ways to avoid this problem.

Concentricity Management Getting the bullet lined up perfectly with the center axis of the bore has been known for decades and is practiced religiously in some precision shooting disciplines. Un-

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fortunately, AR-15 shooters seem to have migrated away from the practice. Compared to the M14, AR-15s are much more accurate. I think shooters have taken some things for granted and sometime get careless with their ammunition concentricity. This is unfortunate because barrel makers and gunsmiths can't build a rifle that will shoot crooked ammo well. Managing concentricity is fast, easy, and cheap and will improve performance. See "Better Ammunition" (April 2016) for details.

Outside Neck Turning Another ammunition topic in the same article, some shooters perform neck thickness uniforming in an attempt at more concentric ammo. More uniform case necks can improve accuracy by helping line up the bullet straighter with the axis of the body of the casing. Case necks that are fatter on one side hold the bullet at the moment of firing differently. The thick side of the neck will be more tenacious and tend to let go of the bullet less than thinner section.

Even with the bullet seated straight it can tip a little going into the throat. Shaving off areas of thick brass from case necks during the neck turning process helps eliminate some of this tipping. However, neck turning is gun specific. Some guns really benefit while others don't. I think that the dimensions of chamber necks have a lot of vote in this. Chambers with tighter necks seem to like the neck turning process more so than chambers with overly fat necks.

Case Forming Concentricity has to do with getting the bullet lined up in the center of the case neck. A related topic involves get-

ting the whole cartridge properly lined up in the chamber itself. This is best accomplished by fire forming brass in the specific chamber and then neck sizing and bumping the shoulder back a little during the loading process. The case body isn't touched and this eliminates accuracy-robbing slop in the chamber. Such around will center in the chamber much better.

Expect an average reduction in group size of about 16% when using this technique. For reliability sake, this technique is mostly reserved for shooting situations where single rounds are hand fed into the chamber. Full-length resize for magazinefed ammunition. Also, when feeding singles shove each round to the same point up into the chamber each time. This will uniformly position each round and result in more consistent velocities and a 13.8% average tighter groups for no extra real work.

Bullet Seating Sweet Spot This also is best with hand-fed cartridges and requires load development with range testing. It takes me about half a day with a machine rest to arrive at the exact seating length to hit a firearm's sweet spot. The improvement to accuracy, especially when combined with the previously discussed ammo topics, can be astonishing. Expect about a 20% average reduction in group size.

I do this for every firearm I build or rebarrel and the customer gets sample rounds that he can measure and set up his die to duplicate the exact length. This custom seating length combines well with other hand loading tailoring such as varying powders and charge weight to produce optimal accuracy.

More details are in "Bullet Seating Sweet Spot" (June 2016). 90 Grain Bullets 90 grain bullets are the next logical step in the evolution of the AR-15.

They first came on the market around 2004 and, like any new bullet, took about a decade to work the kinks out. For those shooting long range slow fire disciplines, 90 grain bullets are the ticket. In equal length barrels, 90s fight wind drift as efficiently as anything you can load in a .308 for fraction of the recoil and expense. This creates from about 17% (with the Berger boat tail and its 0.512 ballistic coefficient) to 24% (with the improved second generation Sierra Match King and its 0.563 B.

C.) of "wind proofing" over popular 80 grain options with a B. C. of 0.420. 90 grain .224 bullets shoot about 7.7% tighter groups with half the fliers and of less severity than the 80s. These gains assume the rifle is barreled with the stellar Bartlein 5R gain twist (1:13-1:6.5) having 0.218" lands and 0.2245" grooves. Chromemoly steel is preferred. What's not to like about those statistics? Detailed information is in "Building The 90 Grain AR-15" (April-May 2014).

I also suggest going to Bartlein's website (BartleinBarrels.com) and read their testimonials. At the time of this writing, everyone featured shoots Service Rifle using this gain twist/90 grain combination. Customers should consider making the switch and achieving similar marksmanship excellence to get their pictures placed on the website next.

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Marksmanship I have saved the most difficult shooter's task for last. All of our work as gunsmiths and all of the shooter's work on preparation goes into the dumpster if the shooter makes marksmanship errors. We are trying to build guns that guarantee holding to the Xring will keep a bullet inside there. That same guarantee holds, unfortunately, if the shooter points into the 7 ring at the moment of truth.

Many shooters want to spend extra money in the hopes that gunsmiths can make life easier for them so they don't have to put in the tremendous effort of mastering the fundamentals of marksmanship. Unfortunately, I don't possess a shortcut for this. If I did I would rush to the Patent Office! I provide my customers with a copy of the final test targets fired from machine rest. Given such hard evidence, it's difficult to argue a bad shot was the fault of the gun.

Accuracy wise, the AR-15 has been on a roller coaster for about a half century. There are design features that make it shoot surprisingly well. However, accuracy stagnated in early life. Even when the A2 was adopted not much was done to get it shooting better. In fact, things like the burst cam, a 1:7 twist over-spinning bullets, and issue M855 ammunition with steel penetrators made it shoot worse!

In "Improving Rack-Grade AR-15s" (December 2014) I mentioned how Derrick Martin with the National Guard and I with the Army Reserve both found that 1:9 twist shoots green tip much better. I even tested 1:10 with good accuracy. We made those discoveries a quarter century ago. When the Army Marksmanship Unit and individuals

like Bill Wylde, Albert Turner, and Frank White became interested in improving ARs, several innovations took place.

Float tubes removed barrel pressure, improved triggers from people like Charlie Milazzo and Bill Geissele, and true match bullets from Sierra, starting with their 69 grain Match King. Heavy premium barrels with an appropriate twist filled out the rest of the bill. Sierra soon released their 77 grain SMK, still magazine-length but with improved ballistic coefficient. The 80 grain SMK seated longer than magazine length but improved long range capability a bunch.

Twist rates had to go back up a bit to stabilize these longer bullets and chambers were adjusted by increasing free bore. In my opinion, some of that free bore got carried away and actually compromises the performance of magazine-length ammo and the life of the barrel to this day. The rear sight improved a little as clicks were made finer and a single pin was added to the front to aid in tracking. When a second pin was added at the back, a "double pinned" rear became the new standard.

The AMU took the lead along with John Holliger at White Oak. However, after that all too brief surge, the design stagnated for a period. I guess guys thought that it was as good as it was going to get. I often compare the AR-15 to my 1966 Dodge Charger as they were born about the same time period. The Charger was equipped with a four-barrel carburetor, manual window operation, an AM-only radio, and no air conditioning. Average sticker price was around \$3,100! Compare that to features common today.

Automotive designers and mechanics have not been afraid to redesign and improve, nor was the auto industry afraid to risk failure. Are we collectively risking failure with firearm designs? I assure you not everything I have tried has resulted in improved accuracy. In fact, "AR-15 Build Problems" (May 2016) chronicles some of those mistrials. During a two-decade hiatus while other gunsmiths were reluctant to innovate, I was happy to experiment for the Army Reserve.

I borrowed, dusted off, perfected, polished, and sometime invented affordable, effective, and easy techniques that worked. In 2006 I also started working with bullet and barrel manufacturers to push performance further with 90 grain bullets. With Sierra's successful second generation 90 grain Match King my research in that arena is finished. This makes for a 90 grain long range bullet that's easy to get, to handload, totally reliable, and really bucks sudden wind changes.

Using the methods and parts detailed in this article I was able to fully cut in half the average group sizes of my Team's uppers. When I came on board only 37 out of 135 of the uppers I inherited would shoot ten-shot groups to an honest one MOA in a state-of-the-art machine rest. When I left every single upper could shoot that well. Most of this work is simple enough.

As you read through the supporting articles ask, "Why didn't somebody think of this stuff forty years sooner?" If you employ the tips in this article there is no reason you can't cut your group sizes in half and achieve true sub-minute groups as well. Most of the work is easy to do, not all that time consuming, and relatively cheap. AG

MAINTENANCE & REPAIR

Sako P75

BY MARK R. HOLLENSEN JANUARY 2018

ORIGINAL PP. 15-19

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Every now and again, something comes into your shop that just catches your eye. This little Sako was one of those guns. It was in for a deep cleaning and a complete inspection as the owner had inherited this little gem and wanted to be sure it was safe to shoot. I checked my extensive library and found absolutely nothing on it. My research quickly found that not much has been written on this rifle, at least not that I was able to locate.

No detailed schematics were found other than one that I was unable to secure permission to reprint here and that was more of a drawing and appeared to be incomplete. It looked much like the gun I had in the shop based on the bolt parts drawings. I was able to run across some patches of information about this rifle. It is well known that Sako firearms are considered to be well-built, sturdy guns worthy of any gun collection.

SAKO, Limited was established as an independent manufacturer in 1921 and located in Riihimäki, Finland, according to information Blue in Book of Gun Values—23rd Edition by S. P. Fjestad. It further states that Sako firearms are currently part of Beretta Holding S.p. A. and imported into the United States by them. Before that,

they were imported by Stoeger Indus- 22 Hornet, a bolt-action sporter rifle. tries, Garcia Corporation, and Rymac.

The gun I have in the shop now has “Imported by Stoeger” inscribed on the bottom of the barrel just forward of the forearm. A look at the Sako website revealed Sako firearms are still manufactured in Finland, with an address of Sako Limited, Fi-11101 Riihimäki, Finland. Just note that this particular model is no longer in production. During my research, I read that the P75 (not to be confused with the Sako Model 75, a totally different firearm) was only offered in .22 Hornet beginning in 1975.

The Hornet cartridge is very impressive and can be handloaded with a variety of bullets weighing between 35 and 55 grains with muzzle velocities of 2,600-3,100 feet per second. This cartridge was long and is still considered to be a varmint and target loading. In 1978 the Sako P78 was born and offered in .22 Hornet, .22 Long Rifle, and .22 Magnum. I also found these guns came with sporter stocks, 22.5" barrels, and that the .22LR could be had with a heavy target barrel. 22 Hornet cartridge shown next to the rifle.

This potent little guy can exceed 3,100 feet per second and is a fun and accurate cartridge to reload and shoot. P75

Maintenance To completely disassemble this rifle, open the bolt and visually and physically inspect the chamber to ensure no live rounds are in it. Remove the magazine while the bolt is still open so there is no risk of accidentally loading an unloaded gun. Remove the bolt by pulling it to the rear while depressing the bolt release button located on the left side rear of the action.

With the bolt removed, turn your attention to the action screws. There are two on opposite ends of the one-piece trigger guard housing and these screw heads have wide screw slots, so get the correct screwdriver bit to fill the slot. When I say wide, the screw slots on this gun measured a full 0.090". Too often, these wider slotted screw heads are damaged from using a local hardware store screwdriver or a bit that is just too thin to fit securely into the screw slot.

These two screws come out fairly easily and allow removal of the trigger guard plate as it lifts out of the stock straight up. Turn the rifle back over and lift the barreled action out of the stock. This action had been “lightly” glass bedded and that had not been done very well. I have to assume this was not a factory offering as it was very thin and not enough release agent had been used, making it more difficult to remove the action from the stock.

SAKO P75 CONTINUED

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The release is held in place by a small roll pin and under spring tension by a small horseshoeshaped wire spring. A heavier spring can keep the magazine in place and less prone to falling out when filled with ammunition to its four round capacity. This bridge swings over the back of the trigger/sear bar to prevent the trigger from being pulled to the rear. This trigger can be adjusted for sear engagement/creep and reduced trigger pull weight down to two pounds according to Sako.

Thankfully, it did come out without any damage or breakage. Looking over the barreled action, this gun was fitted with a Williams fully-adjustable rear sight and a hooded ramp front sight. I am not certain if the Williams rear sight came with this gun from the factory, but the front ramp sight and hood appeared to be factory installed. Also on this rifle was a nice Leupold M8 6X scope secured to a two-piece 5/8" dovetailed Put red Loctite on this set screw once dialed in for customer safety and your liability.

Once removed, the bolt can be completely stripped except for removal of the extractor, which is held in place with a spring and detent pin. scope mount bases with Weaver 5/8" dovetailed claw-type mounting rings.

The scope base set appears to be original and each base is held in place with two screws. The dovetailed scope base enables the shooter to attach any 5/8" grooved scope ring/mount setup.

Getting back to the working parts of the rifle, it should be noted that this rifle was manufactured with a rear locking bolt lug system. The bolt body does not have locking lugs on the breech end of the bolt, instead, a single locking lug is milled into the bottom of the bolt handle. Some say this is a weakness, however, rimfire guns as well as this Hornet don't have hammering recoil or pressures that would cause failure concerns when shooting. I certainly wouldn't want this setup on a belted Magnum though.

A little build up with a weld on that single lug can help re-set headspace should it become excessive as the lug is on the bolt handle and not the bolt body. The single lug on the bolt handle rides in a groove milled out for it in the action underneath the bolt handle. To continue disassembly of the rifle (and only if really needed), remove the magazine well "box" that the magazine fits into by removing the two screws securing it to the underneath of the receiver.

This box has the magazine release button roll pinned in place and a single horseshoe wire spring serves to ensure the magazine locks into place when installed. A second small roll pin is inserted into the arm of the magazine release serving only as a stop to prevent the magazine release button arm from going too far into the magazine box when the magazine is removed. Another item of note is the round pin-type nose on the magazine release arm.

This is a very small detent that protrudes out and secures the magazine when inserted. If the magazine is loose fitting, this can tighten up the fit either by replacing the single wire horseshoe spring with a stiffer one or by replacing the magazine release arm, which may be difficult as parts are scarce for this gun.

You could also build up the magazine latching hole so that the magazine is held tighter in place with the pin nose on the magazine release arm, but again, replacing a magazine that gets messed up may prove impossible due to the lack of available parts, so be careful. Moving on to the rear of the action, the rifle has an adjustable twostage trigger. This can be adjusted to the point of a clean and crisp trigger

SAKO P75 CONTINUED

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and sear breaking when firing down to about two pounds, the lowest recommended setting. I left this rifle at a three-pound pull as it was already crisp and light enough for hunting and target hole punching. If you need to remove the trigger group for a refurbish job, just drift out the single roll pin that secures the group to the receiver.

The trigger group will be under spring tension as the trigger pull coil spring (at the front of the trigger group assembly and under the large locking nut) will be pushing down with tension when removing the roll pin. After the roll pin is removed, carefully pull the trigger group downward and forward so that the rear of the trigger group clears the safety "bridge" arm. With the trigger out, access the trigger pull tension coil spring (front of the trigger group) to clean or replace it.

This larger coil spring is retained by a set screw and large locknut. To adjust, loosen the lock nut and turn the screw to achieve proper or desired spring tension, then tighten the lock nut. A drop of blue Loctite is recommended here. To replace the small coil spring (trigger return spring) located inside a cutout

in the back of the trigger itself, drift the small roll pin out that holds the trigger to the trigger group assembly.

This small coil spring is visible behind the trigger and serves as the trigger return spring for both stages of the trigger. It can be replaced while the trigger group is still attached to the receiver. Next, locate a single, small set screw behind the trigger for sear/creep adjustment. Increase or reduce sear engagement travel and creep by adjusting this screw. I recommend a drop of red Loctite once safely set as this is a critical adjusting screw that could render the rifle unsafe.

Always perform the stock bump tests with the safety on and off along with rapid opening and closing of the bolt functioning tests to ensure the sear engagement isn't so close that it fires when bumping or jarring the rifle. If that occurs, back that set screw out some until it will not drop the sear with any heavy handling or bumping of the rifle or when the bolt is being cocked. Remember, liability is all on you so proceed like you are turning this gun back over to the most powerful attorney in town.

The Sako factory recommends that sear adjustments should be performed only by factory personnel. This sums up the trigger group and adjustments. Since I could not locate a detailed schematic, I have no way to confirm if this particular trigger group is the same or identical on all P75 models.

I am still not certain if any rimfire rifles were ever produced under the P75 model, so proceed with great caution if you have any Sako model with a different trigger group/ assembly than the one discussed here and pictured in this article. Moving on to the safety, remove the two screws on each side of the safety arm "bridge" and it comes off. The screw on the right side of the safety bridge also holds the safety thumb engagement tab in place as well.

Before removal, look at how this safety operates. It is designed to swivel the "bridge" up and over the back of the trigger/sear bar at the rear of the trigger, preventing the sear from dropping low enough to fire when pulling the trigger. The safety on this rifle is on when the thumb tab is at the rearward position and off when the thumb tab is pushed forward. If the stock still has it, there should be a dot in

SAKO P75 CONTINUED

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The specific measurements of this particular firing pin are listed in this article. The single lug on the bottom of the bolt rides in this groove and locks the bolt into place when the bolt is closed. Also note the safety thumb tab and dovetailed scope base for 5/8" grooved, claw-type scope ring/mounts. The wood that is displayed when the safety thumb tab is pushed forward and disappears when the safety tab is pulled back to the rear.

The other interesting part of this "bridge" type safety is the one lone set screw and locking nut located at the top of the bridge. This set screw can be adjusted downward to decrease the gap between the bridge and the back of the trigger/sear arm so that when the safety is on and the trigger is pulled, the trigger cannot move at all or not very much.

If you get one of these rifles in and the safety will not go on or does not work, most likely the set screw became loose and moved in too far to cover over the trigger/sear arm. You don't want this to happen because the safety will not work. Adjust it so the safety bridge swivels into place over the rear of the trigger/sear arm, preventing the trigger from

having any or limited movement when pulled with the safety on. Use red Loctite to secure the lock nut in place for this set.

Just another critical engagement area that should be inspected and adjusted properly when one comes in for inspection or repairs. To reinstall the safety, replace the bridge and safety tab and then both screws on each side of the action. The last piece to remove from the action is the bolt release button located on the left side rear of the action. The screw that holds it in place serves as the pivot pin as well.

When removing the screw (accessed under the button) be ready to catch the small coil spring as it is under tension. Reinstall in reverse. This completes the barreled action disassembly other than the front and rear sights, which are held in place by two screws each. If you are finished working on the action, reassemble it in reverse order. Below and If you own one of these rifles always be on the lookout for a spare! It will have "Hornet" inscribed on the bottom of the magazine floor plate.

Although they are made to hold four rounds, this particular gun would not feed properly when full but worked flawlessly with three

cartridges in the magazine. and place it back into the stock. Place the barreled action into the stock first, then turn the rifle over and install the single trigger guard plate and the two action screws. The front action screw is a tad shorter (maybe two threads) than the rear screw.

Turning our attention to the bolt, begin disassembly by rotating the bolt handle a quarter turn downward to take tension off of the mainspring. You will know you did this correctly by the firing pin protruding out from the face of the bolt, provided the firing pin isn't broken. Using a bench block, tap the large pin located at the far back end of the bolt assembly (I call it the "cocking knob" for lack of an official part name) with a brass punch of like size.

I removed this pin from the bottom and out the top of the cocking knob. When the pin comes out, the brass punch will now be caught under mainspring tension. Hold onto the cocking knob with your thumb covering the back end and withdraw the punch. You will now be able to fully disassemble the bolt. First, the "cocking knob" pulls back and off and then a short mainspring guide rod with a hole drilled through it on the back

SAKO P75 CONTINUED

ORIGINAL PAGE 19

end (which had been retained by the pin you just took out) can be removed. That guide rod has the coiltype mainspring attached to it. Slide the mainspring out of the bolt body. Pull the firing pin striker rod/sear out of the bolt body and slip the bolt handle back and off of the bolt body. Note the single bolt locking lug under the bolt handle. This is what locks the bolt up when cocking the rifle. Dump the bolt body backwards and the firing pin should drop out.

Note, due to the absence of a detailed schematic, I was unable to ascertain whether or not there should be a firing pin return spring inside of the bolt body. The absence of one on this bolt leads me to assume that either it was never installed by the factory or it was lost somewhere along the way. Firing Pin Since the firing pin is the most vulnerable and fragile part in the rifle that often needs replacement, I decided to record its measurements in case there's a need to make a replacement.

The absence of a firing pin return spring tells me this particular gun should never be dry fired without quality snap caps or dummy rounds installed. The nose of the firing pin is vulnerable to breaking, so an old, fired case is not enough. The following measurements listed here are for this firing pin only and should not be assumed identical to dimensions on other Sako P75s, .22 Hornet or otherwise.

The overall length (OAL) is 2.550", diameter of the firing pin body is 0.150", length of firing pin main body to start of 45° step down is 2.200", length of the firing pin tip only from 45° step down forward is 0.290", and diameter of the firing pin tip only is 0.055". These firing pin measurements should help you down the road if you get one in that is either missing or broken and you need to manufacture one.

Firing pin protrusion should not exceed 0.045" when installing in the P75 .22 Hornet or you may get holes in your primers along with the dents. The last item to remove from the bolt body is the

extractor (only if needed) and it is held in place by the extractor spring and detent pin. Pull the extractor backwards or away from the bolt face and wiggle it until it comes out of the groove milled for it in the bolt.

Keep a finger over the extractor slot when doing this or you will be on your hands and knees looking for two parts. Replace by pushing the rear of the extractor over the spring and detent pin and push down into its slot. The bolt is then reassembled in reverse order. Begin by inserting the firing pin first, then slide the bolt handle over the bolt body with the lug of the bolt handle facing up with the bottom of the bolt facing up as well. Insert the firing pin striker/sear lug rod into the bolt body.

The sear lug rod fits inside the cutout of the bolt body. Once the sear lug is pushed fully forward into the V-notch of the bolt handle, insert the mainspring and mainspring guide rod into the firing pin striker/sear lug rod body making sure that the hole through the mainspring guide rod is in alignment with the hole in the bolt body. I found that the best way to get the bolt reassembled with the pin is to clamp the bolt body in a vise with protective vice jaws.

Make sure the bolt body pin hole and guide rod holes are in alignment, then slip the cocking knob or rear of bolt over the mainspring/guide rod and push in (under spring pressure) until you are able to align all three holes so that the pin can be reinstalled. I used alike-sized brass punch to get the three holes (bolt body, mainspring guide rod, and rear bolt cocking knob) all in alignment, then tapped the pin into place, drifting it all the way through so that the pin has captured all three holes.

Then, while the bolt body is still in the vise, turn the bolt handle gently quarter of a turn to cock the bolt, putting tension on the mainspring. Do this to be able to reinstall the bolt back into the receiver. Push the bolt into the rear of the receiver and depress the bolt release button on the left

side of the action and the bolt will slide back into place. Test to make sure the trigger, sear, and bolt lockup is operating correctly and that the safety is operational.

Perform the bump and jarring test with the bolt cocked, along with the rapid opening and closing of the bolt on your snap cap or dummy round to ensure the gun is safe from accidental discharging. If the firing pin discharges on any of these tests, go back in the gun and adjust until it holds. The magazine can be disassembled by turning the magazine upside down and using a brass pin punch to depress the plunger located in the middle of the magazine floor plate.

Slide the magazine floor plate or base off of the magazine body while holding the plunger down with your pin punch. The spring and follower then come out and the magazine can be cleaned up. I looked for magazines for this rifle and did not find any new ones. A few used ones were listed on websites for sale but they weren't cheap! The bottom of the magazine on this rifle had "Hornet" inscribed into the floorplate should you need to seek a replacement. I am unsure if they marked any rim-fire magazines in this manner.

I had the opportunity to sight this rifle in for my customer and it was a dream to shoot. He had provided some reloads that appeared over 25 years old based on the box they were in. Remarkably, the gun shot a threeshot half-inch group at 100 yards from a sandbag on a bench rest. With very little recoil, this gun is a favorite to take to the range and for kids to shoot. Best of all, you can handload favorite loads for target shooting or hunting to keep shooting costs in check.

This is a nice, unique little gem of a rifle. The only drawbacks to using it often are the absence of available parts. Be gentle with this old bolt action, keep it squeaky clean, and it should last along time to come. There is no doubt room in any collectors safe for this Hornet! AG

FROM THE ARCHIVE

Pins And Screws

and machines together.

BY ROBERT K. CAMPBELL JANUARY 2018

ORIGINAL PP. 20-22

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Pins and screws keep the world and our machines fastened together. Not incidentally, at several points in my life my limbs have been held together by pins and screws working on a similar principle. They served just fine for the intended purpose. We'll start with pins. Straight pins and threaded screws work well but there is more to firearms than the simple. Tapered pins, with one end larger than the other, take a little more effort to understand.

They are more secure in their position but take more time and effort to deal with. The diameter difference is very small, typically thousandths of an inch, but that difference is pretty important. A cardinal rule with pins is they should not be removed unless absolutely necessary. Some pins are a base of movement for other parts, such as those found in the trigger action.

Most often your work may be done without removing these. The grip screw at the right was easy enough while the one on the left came out after an overnight soak and considerable effort. pins. If they are not broke, do not fix them, however, if there is corrosion on the parts they may need to be detail

stripped. When the task demands pins to come out, start by carefully choosing your punch. A strong, purposedesigned punch, not a cheap flea market unit, is needed.

The punch must smaller diameter than the pin or you may stick the punch into the pin hole with a few strikes of the hammer. Pins are usually driven from left to right as you are look toward the muzzle and down the sights (port to starboard, as the sailors say.) After the pin starts to be driven out, resist the urge to speed things up by grasping it with a pair of pliers. Doing so is almost certain to bend the pin and ruin it. Any torque—left, right, up or down—ruins pins.

After the pin is removed using a punch, tape it to a carefully-marked index card. Mark both orientation (left or right) and the place on the firearm it must be returned to. If you are doing several projects simultaneously or if the firearm has many pins, this is a lifesaver. The pin must be replaced in the appropriate direction. For example, tapered pins must be replaced so the larger diameter end seats on the correct side. Not all pins require hammering for removal.

Some are easily pressed out with finger pressure and a punch head. A good soaking in penetrating oil before attempting to budge a pin is never a bad idea. An overnight soak is a Standard Operating Procedure with pins on my bench. Following that, the firearm or part is clamped in a vise with all precautions in place to prevent marring, such as boards or leather pads. There are occasions when the pin will come out just so far and it seems to refuse to budge further; these are the devil to finish removing.

The pin may be tapered and may have been previously inserted incorrectly. You may attempt to tap in the opposite direction if the pin moves a bit and stops to check for this. It is worth a shot, but be conservative. The pin may have been replaced the wrong way and simply driven home with great force. There is also a chance that the pin and the pin hole are corroded and fused together. No amount of feasible leverage seems to move these.

The solution I use is to apply heat with a small torch, heating primarily the pin. Note, this is

PINS AND SCREWS CONTINUED

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Some of them have flattened heads indicating ten-thumbed handling. Above center: When using a punch be careful to choose one that is smaller than the pin being knocked out of the firearm. Note, this pin would have been driven out the wrong way if the author had continued! Left to right is the rule. This is a parts gun. only attempted after the overnight soak in penetrating oil and force did not work. I heat, tap with the mallet to try to move the pin, then soak, heat, and tap again.

This results in the pin being loosened enough to drive it out and this procedure has never failed. Pins are simple enough to deal with but demand patience. Screws Gun screws also require the correct procedure and may require more elbow grease and effort than pins. Poorly-fitting screwdrivers probably cause more marred screw The parts were

actually hard by the standard of the day. Below center: Always properly secure the firearm in a padded vise.

This is a small vise used for lightweight revolvers. heads than corroded screws. Soak the screw and then apply as much turning force as needed with a properly-fit screwdriver. When screws are stuck in place after a soak in penetrating oil, the same heating procedure used with pins (soak, heat, force) may be used. Slightly heating the screw demands care in application. Be aware that applying heat may damage the firearm's finish. Base metals and plastics will melt and warp so keep heat as a last resort.

If the screw head is heavily corroded it is possible the head can break off. This is another reason why it's important to use a proper fit-

ting screwdriver. If faced with a worn screw head it is possible to drive a larger screwdriver into a worn, smaller screw head to achieve better leverage. With a solid fit, the screwdriver may be more tightly engaged to the screw and driven out.

Alternately, you may custom grind a screwdriver to properly fit the screw head or file and clean the screw head slot carefully with a file for the larger driver to fit. Consider the difficulty involved and soak the screw head well before the screw head slot is burred in the first place. Often, even a damaged screw head responds well to taking a screwdriver, grinding to a good fit, and applying force as needed. If a screw head breaks off and leaves the screw in the hole, the screw's body may be drilled out.

PINS AND SCREWS CONTINUED

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Above center: This revolver has been liberally doused with penetrating oil. It helped but not as much as the author had hoped. These are first class parts and the pins are helpful in rebuilding handguns. When doing this type of work, finesse is everything. If the screw head breaks off, carefully clean the area of all parts of the screw head that are larger in diameter than the screw body. Do not nick surrounding wood or metal.

Note, some less expensive firearms have soft screws and the act of simply tightening the screw may result in stripping the head before you realize you are doing so. This results in a bugged up and ugly screw head. A few simple tools are helpful. As an example, when an Allen/hex screw head is broken off, sometime the remaining screw body can catch and allow the screw to be screwed out. Below

center: Screws break. This wasn't as bad a problem to remove the screw as it first seemed.

Repairing Screws First, use a quality, gunsmith-appropriate screwdriver, such as those as offered by Brownells with a hollow grind. Otherwise, the screwdriver will not bottom into the screw and grip the sides of the screw head properly. Given an already-damaged screw, place it in the vise and dress it back up. Get the screw in a small vise, properly padded, and peen the metal back into the screw head by tapping with a small hammer.

Tap the raised burs and get the screw head back into shape by moving the metal with the hammer. Next, beat the metal back into the screw slot. Use a small file and work the metal carefully until you have recreated the original slot. This isn't difficult, it just takes time. Use good magnification and a properly-cut

flat file. A jewelers file is sometimes needed. Once the slot is deemed well shaped, polish the screw head to remove file marks. This isn't difficult on such a small part if it is secured in a vise.

Polishing rules follow the same as with a frame or slide depending upon whether you are going to go for a matte finish, which doesn't require as much effort, or a brightly-polished blue finish, which will require more effort. When you are done, use touch up blue, such as Brownells Dicropan T-4 (082-056-004WB) to finish the part. While you may prefer to order and replace some types of screws, this process doesn't take a lot of time and gives good results.

Some types of screws for older guns are particularly difficult to find. With this process you will be able to save the screws, once you have them removed. AG

MAINTENANCE & REPAIR

Workshop Aids

Cleaning and information resources for your shop.

BY DEAN MEIER JANUARY 2018

ORIGINAL PP. 23

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Solvent Kleene (Solvent Kleene. com, offers a series of industrial-grade cleaners ideal for high use shop environments that meet modern safety and environmental standards. D-Greeze 500-LO is a non-hazardous, solvent-based degreaser/cleaner that outperforms trichloroethane. Designed for room temperature cleaning without heating, it rapidly penetrates and emulsifies oils and greases.

As a firearms cleaner, D-Greeze 500-LO has an aggressive cleaning action that penetrates, dissolves, and emulsifies lubricating oils, grease, adhesive, deposits, and other contaminants. With a low surface tension, it quickly penetrates and cleans small orifice openings, blind holes, and other difficult-to-clean surfaces. Unlike aqueous and other nonhazardous cleaners, D-Greeze 500-LO does not compromise performance for safety. It can be used with existing equipment and replaces hazardous solvents.

Current degreasing equipment with good local exhaust ventilation and cleaning methods such as parts washers, immersion with agitation, soak and agitate methods, pump through flushing, and ultrasonic systems without heating. It is non-toxic, non-flammable, and non-HAP (no hazardous air pollutants), and contains no halogens,

chlorinated components, terpenes, CFCs, or SARA-listed chemicals and has a very low degree of inhalation toxicity.

Safe for use in a wide range of cleaning and degreasing applications (including aircraft components) D-Greeze 500-LO is compatible for use with all ferrous and nonferrous metals including aluminum, titanium, magnesium, copper, brass, carbon steels, and stainless steel. D-Greeze 500-LO is available in 5 gallon pails or 55 gallon drums. D-Zolve 339 is an industrial-grade carbon remover designed for carbon and burnt-on oil produced by combustion.

Parts can either be placed in an immersion tank applied to a surface via spray. D-Zolve is suitable for use with all ferrous and non-ferrous metals including aluminum carbon steel, stainless steel, titanium, magnesium and others. In an immersion tank, D-Zolve 339 dissolves and emulsifies. Adding agitation to the immersion tank accelerates the cleaning process. Any remaining deposits in narrow, difficult-to-reach spaces can be removed using a nylon brush.

D-Zolve 339 breaks the chemical bond between the deposits left following combustion and the metal substrate. Devoid of any water content, D-Zolve 339 doesn't promote oxidation. Firearms can be placed in a soaking tank followed by standard cleaning

of barrels rifling. It contains no halogens nor CFCs and is non-flammable, non-corrosive, and non-ozone depleting.

Firearms Guide Impressum Media has released an updated and expanded version of Firearms Guide, their series of guns and ammunition references and value guides. The new eighth edition is published as a DVD, USB flash drive, and an online resource (FirearmsGuide.com) accessible via user account. Gunsmiths, retail shops, and gun stores can receive discounts to stock DVD, drive and online edition activation cards.

The Firearms Guide is the world's largest single-source firearms, ammo, and air gun reference, value guide, and schematics and blueprints library. Over 67,000 examples from 1,000 manufacturers in 52 countries are searchable with 14 criteria. Over 45,000 high-resolution color pictures with up to 12 pictures per model. The gun value guide presents antique and modern guns with gun values online based off of the 100-30% condition ratings. A schematics and blueprints library contains 6,800 printable items.

In addition, there's 650 printable targets along with a U. S.-to-European caliber conversion section. AG

READER FORUM

Reader Forum

BY AMERICAN GUNSMITH EDITORS JANUARY 2018

ORIGINAL PP. 24

Liability Of Gunsmiths I believe “Potential Liability Of The Professional Gunsmith” by Joseph Reichert, Esq. misses the point. Mr. Reichert spends much time discussing the property liability of a gunsmith involved in a shooting incident. This is outside the scope of our profession. As a concealed carry trainer licensed by the California Department of Justice, there is no doubt about the liability of the property owner in this matter, however, it has nothing to do with being a gunsmith.

Our advertisement of our profession indicates competence in the repair and testing of weapons. Let me discuss two type of liability for us. Ordinary Negligence: What I call “just stupid” or knowing that you know nothing about the weapon and have no resources to figure out how to assess its safety. Regardless, should you “repair” the weapon and give it back to the customer after charging for your work and it fails, you get sued. You are liable for this failure.

Intentional Negligence: What I call “knowingly stupid” and ignoring known facts. For example, a collectible 1911 was destroyed in a fire. The client took the weapon to a “gunsmith” who pronounced it safe to shoot. Afterward, he brought it to me. I took the weapon apart and found the fire damage and that the gun was assembled with parts missing.

Since this was my first fire-damaged weapon, I read all the literature on fire damage and then checked with my master

gunsmith at AGI, who concurred with my findings that the weapon was unsafe and I should advise the client to seal the barrel. I gave my client an opinion letter for his insurance. This “gunsmith” committed Ordinary Negligence telling his client that the gun was safe to shoot; he also failed to assemble the weapon with the correct parts.

The “gunsmith” may have also committed Intentional Negligence because he intentionally ignored the safety standards of the industry and by failing to ask for a second opinion or having supporting evidence by writing that the weapon was safe. Had the client not sealed the weapon and fired it, the gunsmith would have been liable for Ordinary and Intentional Negligence and all the damages from the natural consequences of the injury to the owner and all other persons.

As a retired attorney with 40 years of practice in civil and criminal law, I urge all my colleagues to seek advice from another master gunsmith when the safety of the weapon is in question. That is the scope of our profession and our liability. Overall, the article is good on the issue of general property liability, worker’s comp, and the more specific liability issue of the performance of a gunsmith is related to the issues I’ve addressed.

A shop owner would be faced with the same issues if he were just a home owner in the same situation. Steven J. Ybarra, JD ConsultantsAssociated.com Author Joseph Reichert responds. I respectfully submit

that my article does not miss the point because a gunsmith who holds himself out to the public by maintaining a place of business and offering services shoulders a number of legal duties in addition to the duty to exercise sound professional knowledge in the repair and modification of firearms.

Among other things, he has a duty to maintain safe premises to protect his customers from injury. In all jurisdictions with which I’ve had contact, he is obliged to maintain worker’s compensation coverage for his employees. My point in writing the article was to apprise gunsmiths, who may have limited knowledge of the law, of some of the ways in which their business activities can expose them to potential liability.

In this array of perils, incompetence in the repair of firearms is only one type of error which can land them in court. In retrospect, I wish I had added the following statement to my article: “As a gunsmith taking in paid work, you are also a businessman and are subject to the liability and risks to which all businessmen are exposed.

This article is intended to assist your business planning by explaining some of those risks.” Nothing I wrote was intended to diminish the role of gunsmithing competence and sound judgment in the repair of firearms. I agree wholeheartedly with your admonition to seek advice when the safety of a weapon is in question. AG

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