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ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

THREE GENERATIONS OF S&W SEMI-AUTOMATICS

BOOK REVIEWS • DATUM MEASUREMENT • ULTRASONIC FIREARM CLEANING, PART TWO • DO YOU HAVE GAS? PART TWO

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 122

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FROM THE ARCHIVE

Book Reviews

BY AMERICAN GUNSMITH EDITORS FEBRUARY 2014

ORIGINAL PP. 2

The Gun Book for Girls The Gun Book for Girls by Silvio Calabi, Steve Helsley, and Roger Sanger from Rowman & Littlefield (rowman.com) is the third installment of a series written to introduce firearms and shooting to all demographics. Despite the fact that criminal misuse of firearms has been steadily declining since the early 1990s, guns remain linked to crime and violence, gun control politics has become an increasingly polarizing political issue and misinformation about firearms continues to spread.

The Gun Book... series explores the realities of guns and shooting and sets the record straight about some common misconceptions. Book Reviews On the heels of The Gun Book for Boys and The Gun Book for Parents, The Gun Book for Girls is for girls and women interested in guns and shooting but who have no background in firearms and is expanded over the previous editions. The book emphasizes safety and proper usage of firearms, defines terms and provides practical advice about using and maintaining guns.

It also covers firearms, shooting methods, clothing and accessories for women, profiles females who shoot and who work in the gun trade, and discusses the issues around guns for self defense. This series is non-political and written in an easy-to-understand conversational tone. Each book is thoroughly illustrated and content is presented in easily managed portions that can be read in series or singly. It makes for an attractive history book and practical guide.

Shooter's Bible Guide to Home Defense Shooter's Bible Guide to Home Defense: A Comprehensive Handbook on How to Protect Your Property From Intrusion and Invasion by Roger Eckstine from Skyhorse Publishing (skyhorsepublishing.com) is a full color, beautifully photographed, comprehensive overview on home security. While there is coverage of a number of techniques, firearms and equipment included, this book is more than a catalog of guns, gimmicks, gadgets and drills that only the highly trained can employ.

It is an introductory overview on how to fortify your home or business discreetly and protect yourself from crime. Eckstine examines how to evaluate your premises, how to choose various security systems and how to safely interact with aggressors should someone invade your home or business. Other topics include minimizing hiding places, body language and verbal judo, improvised weapons, fight versus flight and creating a customized strategy for your home.

Obviously, a book this wide in scope can't give each topic the full treatment it deserves, however, it is solid overview. Defense in depth, also known as layered security, is the practice of combining multiple security controls for protection. With multiple layers of defense, we aren't dependent on any one of them being breached because an attacker would have to circumvent all of them. This book will teach you how to establish these layers for an overall plan that can fit your budget.

FROM THE ARCHIVE

Three Generations Of S&W Semiautomatics

BY WENDELL DEANER FEBRUARY 2014

ORIGINAL PP. 3-10

Concealed carry permit holders have the best assortment of suitable guns for this purpose available than ever before. A plethora of .380s, 9mms, .40s, and .45 semi autos have been introduced to cater to the demand of a public fed up with being disarmed and helpless in the face of vicious criminals who don't obey laws, gun controlling or otherwise.

Back in the day, before the highcapacity 9mm revolution when revolvers ruled as defensive weapons, you had choices including all the snub-nose revolvers from Colt and S&W; about the same as the Model Tas long as it was black. Those preferring an autoloader had to be content with Colt Commanders or European Walthers and such (along with James Bond.) These guns were not bad choices, and still do the job today, but firearms evolution in America produced something a little different.

It seems along time ago but the first centerfire, self-loading pistol of double-action type designed and produced for the commercial market by an American firm was the Smith and Wesson Model 39, introduced in August 1954. In my 1964 Gun Digest the blued gun was listed for \$89.00 and the nickel-plated version at \$95.00. Before that, most of these types of pistols were of European manufacture, the most notable being the P38 that was made in large quantities as the official German service pistol.

Double action in these types of guns means that when the safety is released and the hammer down the gun may be cocked

and fired by pulling the trigger. The subsequent shots will then be fired single action with the hammer already cocked. Also, if there is a misfire on the first shot another trigger pull will give the firing pin a second chance without having to pull back the slide to eject and replace the cartridge. I don't know if that is a big deal.

If the piece fails to fire on the first strike, and the pistol is in proper condition, a second blow probably won't make any difference. However, I do think this is a worthwhile safety feature, especially on a duty pistol or one being used for self defense as a cocked pistol has a much lighter trigger pull. In a tense situation a trembling trigger finger can let 'er go bang almost as easy as blinking an eye. That's the same reason I will not cock a double-action revolver unless I know I'm going to shoot.

Many police departments around the country agree with me and require double-action pistols. That being said, these little pistols can spit out a bunch of lead in a hurry if need be. The 39 was made with a single-stack magazine that held eight rounds and was adopted by the Illinois state police in 1967, giving a positive bounce to its popularity. In 1971, S&W responded to public demand by bringing out the same pistol with a fourteen round capacity—the Model 59.

The grip contour of the original was made straighter and the grip panels changed from walnut to a thinner nylon to accommodate the larger magazine. In 1989 the stainless steel model 5906 was introduced and became immediately popular with

many law enforcement agencies. You may encounter model 39s with either an alloy or all steel frame. In 1981 the gun was designated the 439 for the standard blued version and 639 for the stainless steel version.

As a gunsmith, one of the things about these first generation pistols you should be aware of and alert your customer to is that they were manufactured with an inertial firing pin without an automatic firing pin safety plunger. This means, with the safety in the fire position, a loaded gun can discharge with a sufficient blow to the muzzle, like being dropped, for instance. A 9mm pill ricocheting around the floor is a nasty situation and the best way to instill happy feet in innocent bystanders.

The second generation pistols having three digit model numbers (439, 459, 469, 639, 659, and 645) and the four digit, third generation guns (3904, 3906, 5904, 5906, 6904, 6906, and 4506) all have an automatic firing pin safety plunger. This prevents the firing pin from moving forward unless the trigger is held to the rear. Field Stripping After making sure the gun is unloaded and the magazine removed, move the safety to the fully up "fire" position.

Pull the slide rearward until the slide stop hole in the frame is aligned with the cut in the slide to allow removal of the slide stop. The slide assembly is then withdrawn towards the front and off the frame. It is a good idea to grasp the recoil spring and slide assembly together as the spring is under tension. The spring is removed by depressing it

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slightly and freeing it from the small radial undercut in the barrel lug. The barrel can be easily removed for cleaning from the breech end. This is all the disassembly necessary for field maintenance and general cleaning by the amateur owner. For a gun with feeding problems, broken or worn parts to be replaced and for a gun that has been fired extensively that can use a good cleaning, a more thorough take down is called for. Let's start with the disassembly of the slide into its component parts.

First, inspect the extractor. It doesn't fit flat in the slide and should have a slight bow. This is normal and necessary for proper function. If the owner is having problems with the pistol ejecting properly it can often be traced to a bent extractor or a broken one. The hook should be sharp and not unduly worn. If the extractor appears to be the problem it can sometimes be bent slightly, but this is a job for someone who knows exactly what he or she is doing.

It might be best to return it to the nearest S&W Warranty Service Center. We'll take the safety off the slide first. The early pistols (first generation) use a screw that must be turned out using an Allen wrench

to remove the safety. This screw holds the lever on the left side of the pistol and, when removed, this small lever can be slid off.

The problem you might find with these kinds of safeties is that the screw becomes loose and the nature of the slide and safety geometry of the first generation guns might have allowed the slide to batter the safety and create a sloppy fit for the lever in its slot. The screw may have even broken off completely. S&W solved this problem by replacing the screw with a plunger arrangement to hold the lever in place.

Also, a slight modification to the safety body consisting of a small slot locking into the slide so the safety cannot move side to side when placed in the off position was made. To remove the lever on the right side of the gun's safety, use an appropriate sized punch and push in the plunger. Cover the plunger with your thumb when removing the lever so the plunger does not fly out.

To remove the safety from the slide push down on the firing pin block on the inside of the slide and push in the firing pin with another small punch at the same time.

Release the block and it will hold the firing pin in enough to allow the safety to start to come out when moved about half on, half off. When the safety starts to come out, use the punch to push the firing pin in enough to allow it to clear and you can push and pull the safety free of the slide.

When the safety is out, push down on the firing pin block and the firing pin will pop out. Be careful it doesn't pop out to the other end of your shop. Note, there is a small plunger in the safety body itself. Next, punch the extractor pin down and out from the top of the slide. There is a small spring behind the extractor that will come out when the extractor body is removed. Use a short no-flex punch on this pin as it can be pretty tight. The rear sight must be driven out of its dovetail from left to right.

I carefully put the slide in a vise using leather padding to keep it steady while I used a brass drift to tap it out. With the sight removed, two small springs are revealed: The ejector depressor plunger spring and the firing pin safety lever spring. They are not the same. Note how

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45 ACP and a Model 66 S&W .357 magnum. The 66 was THE cop gun back in the day, and where each must be returned. Removing these small springs allows the aforementioned plungers to be removed through the top of the slide. This ends the slide disassembly.

On the first two generation guns the grips are held to the frame by screws much like the model the grip pin out of the bottom of the grip (I went from left to right using a 3/32" punch.) This allows the rear grip insert to be removed along with the mainspring and mainspring plunger. On the third generation types, the grip is a single piece that must be

spread apart slightly and slid off the frame. There are two small lips inside the grips that hold them in place.

I think this is a pain in the you-know-what, but if you have three hands it can be accomplished without breaking the grips. Also, the mainspring plunger fits into the bottom of the grip so the grip has to be pulled down at first to clear it. While difficult to work with, these kinds of grips do offer a thinner profile to accommodate the double stack magazine. On the left side of the gun the sideplate assembly is gently lifted part way with a small screwdriver. The sideplate holds two pins.

One is stationary to the plate and holds in most of the parts in the top of the frame. The other is the sear pin which can be easily removed from the plate and obviously holds the Notice the pronounced bow. sear. The sideplate is pulled up and out as a unit and this leaves most of the other parts ready to come out by simply pulling up on them or letting them fall out.

The parts that you can now remove are the sear, firing pin safety lever, sear release lever, ejector and magazine depressor, hammer and stirrup as an assembly, and maybe the disconnecter (you may have to loosen the trigger pin to remove this.) A small tip when doing this job. Take careful note where these parts

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came from and study the schematic. I try and keep all the assemblies, plungers and springs that go together separate and easily identifiable. If you take these guns apart frequently you will get a better feel of what goes where and the subtle differences that may be apparent in the different generations. For the first-timer or unfamiliar user I recommend taking digital pictures before complete disassembly and using a holder to hold all these tiny parts. An empty egg crate works as well.

Drive out the trigger pin using either a 3/32" or a 1/8" punch. The 1/8" punch may be a little tight and this pin comes out pretty easily. This will release the drawbar, the trigger assembly and the pins, and the plunger and springs that go with it. They really shouldn't fly all to pieces and you may need to wiggle

the drawbar a little to take it out the back of the frame. Cover it with your finger just in case it comes out with force.

The drawbar has a small copper plate secured by a rivet on the front that is called the trigger play spring. Take care not to bend the lips on this. The trigger is removed straight up through the top of the frame with some wiggling. The only parts left on the frame are the magazine catch and the sear spring. The sear spring is held in place by a very small pin running across the back of the frame. You will probably never have to remove these parts and I left the sear spring in place.

The magazine catch has a small plunger holding a nut in place to retain it. Just depress this plunger with a 1/16" punch and unscrew the nut. Notice the small plunger on the left

side. This just lifts out. which will usually turn with finger pressure. The plunger, spring and catch can then be removed. There are two small springs on top of the frame at the rear called the ejector springs. They do not usually need to be removed but will pull out easily if you want to. This is as far as this gun can be disassembled.

Look for any damaged parts or anything that needs to be replaced. If all is well, clean everything. How you go about this is up to you. Some use a parts cleaner and a spray lubricant after everything dries. The gun I am working on was not all that dirty. I estimate only about 3,000 rounds have been put through it. I made do with a toothbrush, a little solvent and a degreaser. After it all dried, I used some Break Free to

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lube and protect, letting that dry for awhile as well before starting to reassemble the gun. Starting with the slide, put the small extractor spring in place and the extractor in position. Start the extractor pin from the bottom of the slide. With the barrel in the slide, try a dummy case by locking the case under the extractor and almost, but not quite, pushing the barrel all the way into the locking position.

When the barrel is pushed back to the front, the case should remain held by the extractor and can be pushed downward and out by slight finger pressure. Next, insert the ejector

depressor plunger and the firing pin safety lever plunger and their accompanying springs in the dovetail for the rear sight. The springs area different size from each other so make sure you put them in the appropriate place. Start the sight in the dovetail making sure the springs go underneath without kinking.

Tap the sight in until it is approximately centered in the dovetail. Inspect the firing pin, looking for a nice smooth hemispherical tip. As long as it wasn't causing any problems before, just make sure it's clean and lubed slightly. If it has been piercing or damaging primers it may need to be polished. Do not

overdo it and make the tip round or flat. Hemispherical is the way it's supposed to be. Also, it should not have any tiny lips or burrs on the side at the end.

A little emery paper or very fine grit abrasive paper should take care of that. Put the firing pin with its spring in place and push down on the ejector depressor plunger while pushing the firing pin in and release the plunger. This will hold the firing pin in place enough to start the safety part of the way in the slide. Remember that the safety can only go in so far unless the firing pin is slightly depressed more. The small plunger

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The older generation has an insert instead of one-piece grips. on the safety has to be depressed before the safety will go all the way in its recess. If you are reassembling a first generation gun, degrease the screw and seat that holds the safety lever in place and apply some blue Loctite. If it's a second or third generation replace safety lever plunger and spring and slide the lever over the plunger.

If you are working on a gun with a removable barrel bushing, insert the barrel and replace the bushing, then put the recoil spring and guide back in its small notch at the back of the barrel. I didn't take the magazine catch

out of my gun. If you did, put it back now, making sure that the large notch on the nut is down and the slot to use a screwdriver on it is up. Replace the catch and the plunger. Push the plunger in with a 1/16" punch and start the nut turning until it snaps in place.

The sear spring (which I also refrained from removing) would go in next—pretty simple. Just remember that one end of the pin is flattened and goes in last. Make sure the pin goes on top of the spring, not underneath. Guide the pin into the hole on the other side of the frame (it has a slight bow) and tap it slightly with the 1/16" punch to make sure it

is secure. Remember how they go back in. The trigger goes in the top of the frame and the trigger spring and plunger are put in place.

As I said, the drawbar has a small plate on it held by a rivet. Sometimes this plate, called the trigger play spring, has the ears broken off and it will greatly affect the trigger pull. Fortunately, it is available as a replacement part and not difficult to repair. Make sure the drawbar is replaced correctly with this plate on the top side. Guide the trigger spring plunger in the hole in the end of the drawbar and the trigger

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Don't bend these little lips. itself into position. Hold it all together with one hand and insert the trigger pin to secure the complete assembly. The disconnecter should be able to be replaced now. If you can't get it to go in place you may have to remove the trigger pin to give clearance from the disconnecter, but it's much easier to leave that in place unless you have to. When the disconnecter has been replaced the sear should be put in with the slot in the top, holding the disconnecter so it can't fall out.

The sear pin is removed from the side- The hammer was my grandfather's. It has a polished head. plate and pushed in to hold the sear in place. Replace the hammer and its stirrup assembly. Start the first lever, the ejector and magazine depressor, then guide the sideplate pin through to hold them. Continue with the sear release lever and firing pin safety lever until the sideplate pin holds them. The sear pin can usually be started through the side plate with a light tap on the other side.

Replace the mainspring and plunger end and then slide the insert or whole grips onto the frame depending on the model being worked on. Replace the grip pin and put the frame and slide together and check for function. I like these guns, especially the third generation. They are reliable and durable and I keep one at my bedside. Usually you won't find too much wrong with them except maybe broken parts or parts that just wear out from hard use.

Keep them clean and lubricated and you can shoot a lot of rounds before that happens. AG

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Typical Smith & Wesson Semiautomatic Centerfire Pistol (Specifications subject to change without notice)
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Plunger Spring 6 Barrel 7 Barrel Bushing 8 Disconnecter 9 Drawbar 10 Drawbar Plunger 11 Drawbar Plunger Spring 12 Ejector Depressor Plunger 13 Ejector Depressor Plunger Spring 14 Ejector & Magazine Depressor 15 Ejector Spring 16 Extractor 17 Extractor Pin 18 Extractor Spring 19 Firing Pin 20 Firing Pin Safety Lever 21 Firing Pin Safety Lever Plunger 22 Firing Pin Safety Lever Spring 23 Firing Pin Saf. Lev. Spg.

Ret. 24 Firing Pin Spring 25 Frame 26 Front Sight 27 Grip 28 Grip Pin Hammer Assembly 29 Hammer Hammer Pin (Sideplate Assembly) Magazine Assembly 30 Magazine Buttplate 31 Mag.

Buttplate Catch Assembly 34 Magazine Catch (Right Hand) 35 Magazine Catch Nut 36 Magazine Catch Plunger 37 Magazine Catch Spring 38 Magazine

Follower 39 Magazine Spring 40 Magazine Tube 41 Mainspring 42 Mainspring Plunger 43 Rear Sight (Fixed) Rear Sight Assembly (Adj.) 44 Rear Sight Base 45 Rear Sight Base Screw 46 Rear Sight Body 47 Rear Sight Body Plunger 48 Rear Sight Body Plunger Spring 49 Rear Sight Elevation Plunger 50 Rear Sight Elevation Screw 51 Rear Sight Elevation Spring 52 Rear Sight Plunger 53 Rear Sight Plunger Spring 54 Rear Sight Slide 55 Rear Sight Windage Nut 56 Rear Sight Windage Screw 57 Recoil Spring 58 Recoil Spring Guide Assembly Recoil Spring Guide Recoil Spring Guide Bushing Recoil Spring Guide Plunger Recoil Spring Guide Plunger Spring 59 Sear 60 Sear Pin 61 Sear Release Lever 62 Sear Spring 63 Sear Spring Retainer Pin 64 Sideplate Assembly Sideplate Slide Assembly (Fixed Sight) 65 Slide (Fixed) Slide Assembly (Adjustable Sight) 66 Slide (Adjustable Sight) Slide Stop Assembly 67 Slide Stop 68 Slide Stop Pin 69 Slide Stop Plunger 70 Slide Stop Plunger Spring 71 Stirrup 72 Stirrup Pin Trigger Assembly 73 Trigger 74 Trigger Pin 75 Trigger Play Spring 76 Trigger Play Spring Rivet 77 Trigger Plunger 78 Trigger Plunger Pin 79 Trigger Plunger Spring

MEASUREMENT & INSPECTION

Datum Measurement

BY CHICK BLOOD FEBRUARY 2014

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The eloquent explanation regarding ammunition shortages provided by our editor in the September issue omitted a major factor. Before he descends upon me in a dark fury, I'll explain. Every time Senators Feinstein, Shumer or The Golfer-in-Chief mention more "gun control" in seeking a cure for nutcase-inflicted mayhem, firearm production can't keep up with the subsequent public demand, the sale of reloading equipment soars and the hoarding of related components begins.

If the Senators, et al., were wise enough they might realize they are all candidates for being handed Salesperson of the Year awards by every member of the National Shooting Sports Foundation. How embarrassing! But then, any desire for wisdom to suddenly emerge in Washington, DC is an exercise in futility. As this is written, new guns of all de-

scription, ammo, powder, bullets, primers and brass have all but disappeared from local retail inventories.

However, my sources tell me the industry is rapidly catching up with the surge in sales and the shortages are being overcome. I trust they will soon pass but I am certain they will return immediately after the next outburst from the ill-informed "auntie gunners." So will the hoarding. In my not-too-far-distant past days of competitive shooting, my Hamdenmade Hi-Standard Victor was putting out a brick of standard velocity .22LR every month.

The certainty a shortage would arise some unpredictable. The caliber is not included. Bottom It is aligned with the chosen case diameter. Available from Forster but not shown is a blank disk with five starter holes to allow custom drilling of datum or bullet diameters

not included in the kit. day and having no desire or funds to invest heavily in rimfire reloading equipment, I changed my habit of purchasing bricks of .22 ammunition to one of acquiring cases of it. Did I gouge them on price? No.

After applying my normal markup I charged the same as I had when .22LR was plentiful. How so, you ask? The cost of the ammo, even in case lots, had to rise because of the shortage, true, and sales volume increases more than made up the difference. Of course, I loaded my own centerfire ammunition after load testing at the club I've belonged to since 1977. As with .22LR, I purchased larger quantities of bullets, primers and brass, and did not gouge reloading customers seeking them.

THEY PAID WHAT THEY HAD ALWAYS PAID. A PORTION

DATUM MEASUREMENT CONTINUED

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These area good beginning. The dangerous consequences when excessive headspace is present are case stretching, case separation and gas leakage. of their price, equal to what I had paid for the requested items, was placed in an interest-bearing fund. It existed as the source from which all additional component purchases was drawn. The fund was never allowed to run dry. Admittedly, interest rates at savings institutions were higher then. My plan was long term, not immediate gain.

So I made another investment in some additional cramming up on reloading. This included books such as The Shooter's Bible Guide to Rifle Ballistics, Designing and Forming Custom Cartridges for Rifles and Handguns by Dr. Ken Howell and Handloading by William C. Davis. Your

choice of the many volumes mentioned in the later pages of Dr. Howell's book and the official chamber specification drawings available from SAAMI (saami.org, Newtown, CT 06470) are valued contributors to your education.

The table of contents in Handloading alone gives you long list of sources. Here's an abbreviated sample: Modern rifle and pistol bullets, gunpowder development, basic reloading operations, cartridge case troubleshooting, and how to make chamber casts. After all that comes a section on internal ballistic considerations for handloads. By the time you have mastered 50% of this, you will be considered the guru of gun gabbing for miles around holding a Ph D in handloading.

Recently, in addition to these books I made another investment. It's anew tool from Forster Products, a familiar name to reloaders for their case conditioning system, case trimmers, Co-Ax presses, Bench Rest rifle dies, and among gunsmiths for tooling for over 60 years. Adding this tool to the Forster Universal Sight Mounting Fixture, screw assortment, and headspace gauges I already inventoried ought to make my Datum Dial Ammunition Measurement System feel right at home. Datum what?

The tool is versatile, easy to use and provides data to refine case sizing and bullet seating operations. I hear some of you asking, "That's all very nice, Chick, but what 'n where's a 'datum'?" A datum is a reference plane, point or diameter providing a base for other

DATUM MEASUREMENT CONTINUED

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measurements and calculations. In terms of cartridges, this indicates a relative measurement between the base of a fired case to a datum point established by SAAMI on its shoulder angle. This measurement must be taken from several cases fired in the same rifle firing identical loads and then averaged to establish the optimal headspace for that rifle's chamber. The customer has to provide the fired cases. You may have, or want, to lend a hand taking and averaging these measurements.

Once the average is established, it represents the datum point for fired brass taken from a specific load in a specific rifle. Once established, a resizing die can be adjusted to consistently resize fired brass, thereby fine tuning it to match the chamber. The resized cases should be checked against the data produced by relative case measurement. The die adjustment should be checked periodically to assure it's maintained.

Use an extra fine Sharpie indelible marker to note rifle, caliber and datum point on a piece of spare, spent brass for record keeping. As long as the measurements are sustained there should be no need for gauges to check headspace. For the reloader, it affords the opportunity to repeatedly produce ammunition custom tailored to the chamber of a specific firearm.

This tool can be used to check consistency shared by a given manufacturer's batch before seating operations, assist in establishing seating depth and taking measurements, including overall cartridge length. Unless a range is close to or included in your operation, the customer may have to jump in to establish seating depth of the bullet. In either case, this reveals how I've done it when into precision reloading for ultimate accuracy. A fired, unprimed case was used.

The bullet was inserted in the case mouth by hand to a depth leaving the ogive generously exposed. The end of the bullet was coated with an easily removed indicator and the dummy cartridge slowly chambered. Go very slowly until the bolt comes to a stop as a result of the bullet contacting the lands. Just as slowly, the case is extracted, overall length measured, the bullet removed, the case resized and primed, charged with powder, the bullet resealed, the OAL of the cartridge measured again, rechambered and fired.

Was the accuracy OK but could more or less leade improve it? Leade (pronounced leed) defines an open area located just forward of the chamber and slightly enlarged to make bullet entry into the bore easier. When fired, a bullet should move freely through the leade area prior to contact with the rifling. There's somewhat of a debate twist precision shooters. One group

insists that allowing the bullet to barely touch the lands results in the best accuracy.

Another faction maintains more solid bullet contact with the rifling delivers more X-ring hits and takes more game. It has also been claimed too much leade could allow bullet wobble or other eccentric entry into the bore (while I've heard the claim, I have never heard how much leade is too much.) Which side your customer's rifle favors has to be determined with multiple reloadings and test firing. The advice should be given before tests begin.

The cartridge must never be so long overall that the bullet becomes heavily engaged with the rifling. This can and has produced excessive chamber pressures. Some have been so excessive as to cause a brass case to rupture. I always favored the no-contact approach when loading for my pre-'64 Model 70 Winchester .30-06 bull-barreled match rifle, which now serves as the prize sniper rifle of the local SWAT Team (sigh.) I favored this approach for a simple reason: The rifle liked it the best.

I even won a few bench rest competitions with it. It's unlikely this ammo and loading approach would perform as well in every other .30-06. Reloads and the guns in which they are tailored to serve make for happy marriages best left alone. All others, get in line.

MAINTENANCE & REPAIR

Ultrasonic Firearm Cleaning, Part Two

A remarkable, time-saving tool with the potential to wreck finishes if used improperly. Proper cleaning techniques and the experts reveal essential tips.

BY RICHARD MACLEAN FEBRUARY 2014

ORIGINAL PP. 14-19

When it comes to devices that have on-off switches, “We don’t need no stinking directions!” seems to be the predominant thinking when setting these units up for the first time. “Turn ‘er on and let ‘er rip!” This start-up mode may work for home electronics that come supplied with one-page quick-start guides, however, this approach can lead to all manner of problems with ultrasonic units.

In part one, we covered the background on ultrasonic cleaning, its evolution in firearm cleaning, and the current state of the technology. In this second part we will explore proper cleaning techniques, what the experts say about ultrasonic cleaning, and essential tips that have, to the best of our knowledge, never been published before. Proper Usage Instructions for systems vary from manufacturer to manufacturer, but the basics are all the same.

Firearms must be unloaded, of course, and for best results, field stripped. In the case of handguns, grip removal helps. Removal of forends and stocks on rifles and shotguns can be labor intensive for routine cleaning, but if these are synthetic, they can stay on. Wooden furniture should always come off. The same applies to telescopic, electronic, and laser sights. We will discuss other forms of sights later. The cleaning solution concentrate should be diluted according to the manufacturer’s recommendations.

Dilution ratios vary among products, thus one should consider the “true” cost when selecting a cleaner in addition to the product’s reputation for performance. Everything should be left unplugged until the solution is added. Running ultrasonic units empty or at below recommended levels can damage the transducers. Fresh cleaning solutions should be “degassed” of entrapped gasses by running the system for about five minutes. The solution also should be heated to the recommended temperature prior to parts immersion.

There is an optimum temperature range to promote cavitation and while room temperature works, 120-130°F is ideal for today’s solutions. Temperatures as high as 150°F are possible, but the parts become too hot to safely handle without protection. Evaporation losses also increase and manufacturers such as Crest Ultrasonics do recommend elevated temperatures when the parts are coated with heavy greases such as Cosmoline.

It is important that parts are kept off of the tank floor where the transducers are, in most cases, attached. That means that parts must be held in baskets or suspended. Most units today are supplied with stainless steel wire baskets made from square weave, 3 mesh, or lower stainless steel. There is a reason. Mesh above 50 acts as a solid to the ultrasonic waves. Very heavy baskets can also reduce the effectiveness of cleaning.

Suspension hooks from rubber and non-rigid plastics absorb energy and should be used sparingly. The amount of loading (i.e., weight of parts in the tank) also affects performance. The rule of thumb is load the tank to less than half the weight of the water volume. For example, if a unit’s capacity is two gallons or about 16 pounds, no more than eight pounds should be loaded. Another guideline is that the cross-sectional area of the parts should not exceed 70% of the tank’s cross-sectional area.

Just like doing loads of household laundry, two small loads get the wash cleaner than one large maximum-capacity load. The parts in the basket should be tipped to release trapped air. Slides and receivers should be placed dirty side facing down. Revolvers should have cylinders open and ejectors held open with some object such as a coin. For best results, hammers should be cocked during half of the cycle and down the remaining time. More about the nuisances of proper loading later. Now comes the most critical step.

Set the timer to no more than the maximum recommended time. This may be only five minutes for most firearms. For anodized, parkerized, baked-on paint finishes, and specialty finishes, the maximum time may be even less. If your unit

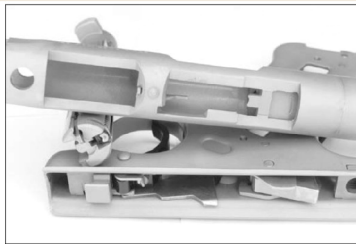
ULTRASONIC FIREARM CLEANING, PART TWO CONTINUED

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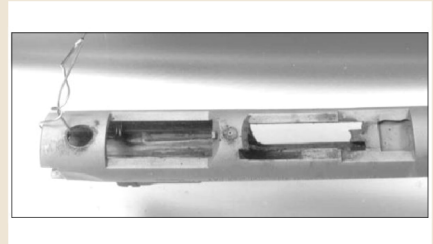
Above: The "after" results (right) from ultrasonic cleaning can be dramatic, as demonstrated by this suppressed Ruger Mark II Amphibian by AWC.

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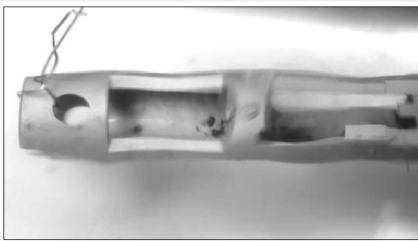
Above: The "after" results (right) from ultrasonic cleaning can be dramatic, as demonstrated by this suppressed Ruger Mark II Amphibian by AWC.

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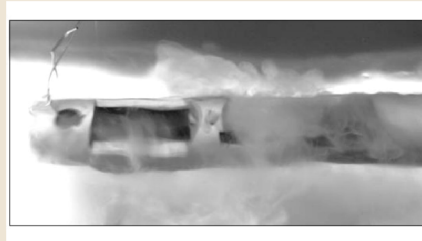
Counterclockwise: Cleaning progress can be seen in this series for the Ruger Mark II barrel suspended horizontally (distortion is from surface waves). From top: before the unit was turned on; one minute into the cleaning; after 5 minutes. Note the carbon accumulation, illustrating why areas where crud can accumulate need to be blown out or mechanically cleaned.

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Counterclockwise: Cleaning progress can be seen in this series for the Ruger Mark II barrel suspended horizontally (distortion is from surface waves). From top: before the unit was turned on; one minute into the cleaning; after 5 minutes. Note the carbon accumulation, illustrating why areas where crud can accumulate need to be blown out or mechanically cleaned.

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does not come supplied with an internal timer, get an external in-line one and use it. Do not count on your memory to shut the unit off at the right time. Non-baked-on painted finishes can be particularly sensitive to damage, including painted sights and cartouches. Indeed, manufacturers such as Crest Ultrasonics recommend that painted pictograms or cartouches be first coated over with a wax crayon. By the time the wax is ultrasonically removed, the overall firearm is done. With ultrasonic cleaning, less is better.

For extremely dirty areas and especially bores, some mechanical brushing and re-submersion for a few minutes will yield the best results. Problems occur when individuals assume more is better, and even the thickest of

fouling will be removed without brushing. Once cleaned, the firearms are drained, rinsed with water, and dried. Again, there are variations on how best to accomplish this, including the use of compressed air. Common sense should be used.

For example, the hardened gunk in the firing pin channel will be loosened, but unless it is mechanically scrubbed or blown free with compressed air, it will remain entrapped. More about this key point later from the experts. Counterclockwise: Cleaning progress can be seen in this series for the Ruger Mark II barrel suspended horizontally (distortion is from surface waves). From top, before the unit was turned on; one minute into the cleaning; after 5 minutes.

Note the carbon accumulation, illustrating why areas where crud can accumulate need to be blown out or mechanically cleaned. The next step is to coat the parts to displace any residual trapped water and provide a protective coating. Parts can be sprayed or submerged with a water-displacement solution that also protects and lubricates. But the best method is to place the cleaned parts into a basket suspended in a pan containing an ultrasonic displacement lubricant.

This pan rests on top of the cleaning solution and the unit is run for several additional minutes. The ultrasonic waves are transmitted through the bottom of the pan into the lubricant. Finally, the parts are

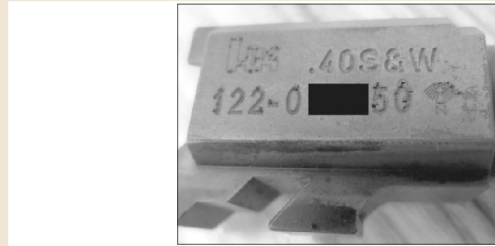
ULTRASONIC FIREARM CLEANING, PART TWO CONTINUED

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Above left: Optics and wood furniture need to come off, such as on this S&W Model 41 (right). Field stripping is essential. Plastic grips can stay on, but it is best to remove these to improve cleaning. Glock states that ultrasonics will not affect its guns.

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Above right: H&K reports that even Hoppe's 9 can remove the paint from lettering and cartouches if a part, such as this barrel, is soaked long enough. Source: H&K USA.

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Below: Painted sights and lettering are more vulnerable to cavitation damage than baked-on gun finishes. Damage can be minimized by a coating of wax or crayon. By the time the crayon is removed, the firearm is clean.

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Below: Painted sights and lettering are more vulnerable to cavitation damage than baked-on gun finishes. Damage can be minimized by a coating of wax or crayon. By the time the crayon is removed, the firearm is clean.

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) Field stripping is essential. Plastic grips can stay on, but it is best to remove these to improve cleaning. Glock states that ultrasonics will not affect its guns. Source, H&K USA. drained and the excess lubricant is removed with a rag and, if available, with compressed air. The gun is then assembled and lubricated and/ or greased according to the firearm manufacturer's recommendation.

Damage To Finish Controversy The first part of this article explored the power released through cavitation induced from ultrasonic waves and the ad hoc history of its early application for firearms cleaning. Not surpris-

ingly, there have been numerous cases over the years of very unhappy individuals left with wrecked finishes on valuable firearms.

Google "ultrasonic cleaning damage to firearm finishes" and you will get nearly half-a-million hits, the vast majority irrelevant but still there are numerous posts that raise the issue of surface damage. What are the facts? Yes, ultrasonic cleaning can cause surface erosion to some finishes. The extent varies from zero for stainless steel to significant for non-baked-on paints if the wrong cleaning solvents are used for long periods of time.

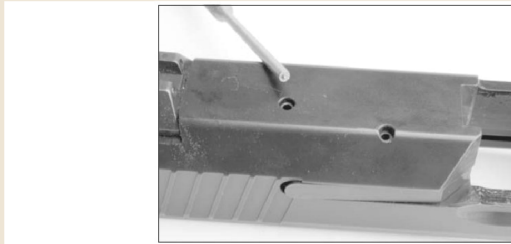
Softer, shiny metals such as aluminum foil show the effect most dramatically. Even glass can be etched given the "right" set of condi-

tions. Weapons made from 7075 alloy aluminum Damage can be minimized by a coating of wax or crayon. By the time the crayon is removed, the firearm is clean. with a hard anodized finish can also be impacted if all the wrong parameters are employed and the finish is not the best quality.

Monty Crain, head of Brownells technology group, states, "After cleaning our M16s and M4s about 10 times [typically made from 7075 alloy], you could see some of the anodizing becoming lighter, most likely due to a poor finish at the manufacturer. Those were probably

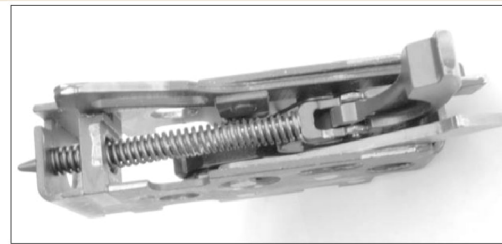
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Above: Gunk can accumulate in the firing pin channel after ultrasonic cleaning. For many firearms, disassembly and cleaning of this channel takes seconds, but for firearms such as this H&K USP (left), removal is more difficult. Blowing with compressed air is recommended. Other assemblies, such as this MP5 trigger pack (right), are wide open and easily cleaned without disassembly, as long as they are properly positioned in the tank so that gunk can flow out.

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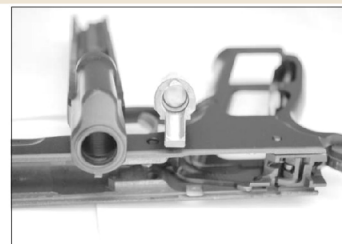
Above: Gunk can accumulate in the firing pin channel after ultrasonic cleaning. For many firearms, disassembly and cleaning of this channel takes seconds, but for firearms such as this H&K USP (left), removal is more difficult. Blowing with compressed air is recommended. Other assemblies, such as this MP5 trigger pack (right), are wide open and easily cleaned without disassembly, as long as they are properly positioned in the tank so that gunk can flow out.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Below: This CZ 75 has a hard baked-on finish. Only three minutes max is recommended to achieve the cleaning results illustrated on the right.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Below: This CZ 75 has a hard baked-on finish. Only three minutes max is recommended to achieve the cleaning results illustrated on the right.

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For many firearms, disassembly and cleaning of this channel takes seconds, but for firearms such as this H&K USP (left), removal is more difficult. Blowing with compressed air is recommended.

Other assemblies, such as this MP5 trigger pack (right) are wide open and easily cleaned without disassembly, as long as they are properly positioned in the tank so that gunk can flow out. because of extended cleaning times due to distractions while busy on other tasks. "If you violate the canons of good gun cleaning and leave any surface in any solution too long, you will suffer the wrath. All ultrasonic cleaners will damage any painted surface within 15 minutes of submersion if it is not a baked-on finish.

Fifteen minutes should be the rule of thumb on submersion for most surfaces because you are only loosening the grime, and some phys-

ical scrubbing is required to remove the particulates from the surfaces, both internal and external. "All vagaries aside, it will also depend on the type and quality of the coating. I have left parkerized parts in for well over 15 minutes and all but a mere vestige of parkerizing was gone.

Teflon/Moly, Aluma Hyde II, Dura Coat, Aluma Hyde, Spray Texture, Camo colors, and so on can be adversely impacted at times exceeding 30 minutes in certain ultrasonic cleaners and solvents. There are no standards for damage/time estimates as no destructive tests have been performed." Ultrasonic cleaner manufacturers recommend much less time-in-tank. Fifteen minutes, as stated by Monty Crain above, should be considered an upper limit never to be exceeded.

Three-to-five minute durations followed by a little brushing and another minute or two in the tank will get the job done faster with little or no finish damage, according to Greg Infante of Gun Cleaners. Only three minutes max is recommended to achieve the cleaning results illustrated on the right. What about the major firearm manufacturers?

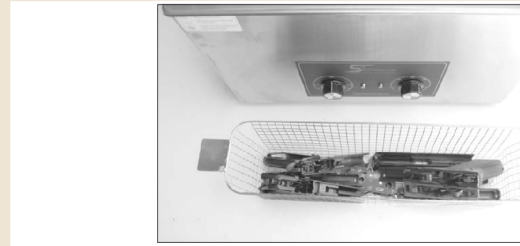
Glock USA states ultrasonic cleaning is not an issue for their line of products, as long as "non-ammoniated cleaners are used." Apparently, both the polymer and the metal finish can be impacted. Ultrasonic cleaning solvents for firearms are typically advertised as "non-ammoniated." Glock USA also states that their tritium sights are not affected. Ultrasonic unit manufacturers recommend that these sights be positioned face up or away from the bottom of the tank for additional protection.

ULTRASONIC FIREARM CLEANING, PART TWO CONTINUED

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Above right: Proper loading of the tank is essential, as shown here.
ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Above left: An improper stack. Firearms and parts stacked such that gunk cannot flow out and the surfaces can vibrate next to one another.
ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED

Firearms and parts stacked such that gunk cannot flow out and the surfaces can vibrate next to one another. Sam Bass, Heckler & Koch's Repair Manager for the U. S., states that their product lines are ultrasonic safe. "The most important issue concerning ultrasonic cleaning is to use the right solution at the right temperature and for the correct time. We have not seen damage from cavitation; if there is damage it is because of excessively harsh or caustic solutions.

Yes, the paint inside the engraved cartouches can be gradually removed." As stated earlier, some ultrasonic manufacturers recommend that these engravings be filled with a coating of wax or covered with crayon. Sam discloses another key factor, "It is important to correctly position the parts in the tank. You should take a look at each part and determine the best path for the loosened gunk to flow out and away from the part.

For example, when cleaning an MP5 trigger group, the unit should be placed vertically so the sediment flows down, especially if the trigger assembly is not removed from the trigger housing. This same concept applies to pistols and, in particular, the firing pin channels. These may need to be stripped and cleaned of the loosened gunk. What we have also seen is that the cleaning

solvent and the oil trapped inside after cleaning may eventually react together and turn into something resembling pine tar.

Obviously this can create a dangerous situation with regard to reliable firing pin function." To gain an appreciation of Sam's concern over gunk accumulating, it is recommended that you watch a fascinating YouTube video (Ultrasonic Gun Cleaning) showing the crud flowing off a submerged revolver being ultrasonically cleaned (youtu.be/n OVUpen Svdw). What about the specialty finishers? Robbie Barrkman at Robar robarguns.com) states that NP3 coatings are completely ultrasonic safe.

Similarly, Chris Peters of Metaloy Industries (originalmetaloy.com) states, "Ultrasonic cleaners, when used properly, will have no effect on firearms finishes, be it hard chrome, parkerizing, bluing, and the spray and baked-on finishes. I highly doubt these units damage gun finishes since they would not make their way into many police departments, military units, or small gun shops. "What I believe is the problem is the improper use of the units.

For example, not racking the parts properly, letting parts, frames, and slides touch while in the operating unit and scratching the finishes that way rather than because of the unit cleaning and doing its job. If not racked or put in a wire basket, the ultrasonic waves in the cleaning solution could pos-

sibly move or vibrate the parts together causing damage. I also doubt the manufacturer-supplied cleaning solutions are at fault since most water-based solutions are nontoxic and environmentally friendly.

We recently purchased a small ultrasonic unit for other projects and for R&D purposes. It works very well. We have experienced no damage to our finishes or any others." Others within this community of finishers have strong reservations. Bob Ford of Bear Coat Gun Finishes bearcoat.com) states, "They can do significant damage to 'coated' firearms and aluminum. It's called read the directions! With clean solvent they are okay.

Most users do not filter or clean the material being used, trying to get as much mileage as possible out of it. With any buildup of trash in the solvent, a firearm sitting in the ultrasonic device will use the combination of ultrasonic vibration and contaminants as a grinding compound and will damage the firearm. We have had police departments all over the country send in firearms for rescue from such damage. Mostly SIGs, Colt ARs, and some coated firearms." What about the suppliers of sights?

As previously stated, painted sights can be problematic unless pre-coated with wax. Tritium sights are less prone to damage. Glock USA

ULTRASONIC FIREARM CLEANING, PART TWO CONTINUED

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has not had problems, and Trijicon states that its sights are “impervious to oils and solvents, with the exception of any solvents such as acetone or ethanol that could have a negative impact” on the paints and cements used in their sights. Ultrasonic cleaners used “to clean a weapon with Trijicon sights will have no effect on the sights” unless the wrong solvents are used. What about suppressor manufacturers?

Modern suppressors are typically sealed units and, one would think, an ideal candidate for ultrasonic cleaning. But “cleaner is better” does not apply to suppressors. Tom Bowers of Bowers Group LLC (bowersgroup.com) explains, “The shiny internals of new suppressors are reflective. Some fouling will slightly improve performance.

Of course, if the unit is literally plugged with material, the performance will be dramatically reduced, but we have rarely seen this under normal use. “If a suppressor is significantly impacted with fouling and lead deposits, it is unlikely that ultrasonic cleaning would even work. Some suppressors are of ‘open architecture’ and more easily cleaned, even by ultrasonics, but some, such as those based on a K-baffle design, utilize voids with small access holes.

Even if the fouling is loosened, much of it will typically remain entrapped and the suppressor cannot be completely drained. If the unit is entirely stainless steel, solutions can be used that will dissolve everything, including aluminum. You have to know the construction since some units have stainless on the outside but aluminum on the inside. It is best to let the original manufacturer handle service, and we don’t recommend cleaning of any type to our clients.

People who have competing products should consult with the manufacturer for instructions related to those products.” Another claim is that these devices may

propagate preexisting surface cracks. Indeed, these devices are not recommended for cleaning jewelry with natural emeralds since these gemstones have natural veins that are subject to vibration separation. Yes, if there are cracks, ultrasonics will “clean them,” but we have found no documentation of properly used ultrasonic cleaning propagating these further.

Features To Consider If you are in the market for an ultrasonic unit, the first step is to map out exactly what you want to accomplish. For example, there is a major jump in cost if you want to clean rifles versus just pistols and small parts. There are also differences in the recommended process, such as how long each step should take, drying, use of compressed air, and so on.

Costs vary widely starting with tabletop imports for brass less than \$200; to single pistol, one-gallon imported units at about \$400; to \$700 for two-gun units; to \$1,700 for units large enough to handle seven guns, submachine guns, or rifle barrels. Domestic units are generally 30% or more higher with large rifle-size tanks costing over \$5,000.

Used industrial units can offer a distinct cost advantage, but they could prove to be a fool’s investment if they are not at the proper frequencies and power levels as discussed in this article. Industrial units may have been designed for cleaning operations where surface erosion is not a significant concern, such as in carburetor cleaning. If these are not equipped with a shut-off timer, then, as stated earlier, one must be added. Another fool’s investment is to use homemade cleaning solutions.

The factors that go into commercial cleaning solutions include buffering agents, defoamers, dispersants, emulsifiers, inhibitors, pH, saponifiers, sequestrants, surfactants, and wetting agents. Making these would be fine if you happen to be a chemist, but beyond the reach of most

gunsmiths. If you are using your unit to clean auto parts, by all means, make your own solution with a mixture of a cup of Simple Green® and a tablespoon of dish detergent to about five gallons of water. It may work just fine.

We provide this formula because if you should run across this or another cheap homemade ultrasonic cleaner in the context of firearms, watch out. The firearm you save may be your customer’s. Closing The reoccurring theme from very knowledgeable individuals within the firearms industry is very consistent. Be they the manufacturers of the units or firearms, the distributors, or the coating companies, they all state that these units can damage finishes if improperly used.

If used properly, they can dramatically cut cleaning times and clean hard-to-reach nooks and crannies like no other method. One should understand what their strengths and limitations are. For gunsmiths, time is money and specialized services can expand your list of offerings and increase profits.

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FROM THE ARCHIVE

Do You Have Gas? Part Two

In this last installment, Army Reserve Team Armorer Master Sgt. Joe Carlos (ret.) reviews AR-15 build experiences at Camp Perry.

BY JOE CARLOS FEBRUARY 2014

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One summer while the Reserve Team was at Port Clinton, Ohio for the National Matches and one of our shooters spent the whole tour growling about the ammo being of poor quality because his bolt wasn't locking back. Certainly weak ammo can cause this to happen as can lack of gas. He was one of those cussed individuals who would rather complain than seek help. Nobody else on the team was having ammo related function problems but he clung to his ideas through the summer.

Despite holding a High Master classification from the NRA and being a very good shot, his knowledge of the technical gun side wasn't anything to write home about. To nobody's surprise, and not entirely of his own volition, he ended up leaving the Team. It was Team policy that all turned-in rifles cycle back through the Armorer for technical inspections and machine rest retesting before being reissued back out. It didn't take long to diagnose his three "bad" rifles.

All of the rifles I build have the front sight attached using four set screws that match up to milled flats on the corresponding sides of the bottoms of the barrels. This allows the shooter to move the sight from left to right and adjust it so his rear sight Mechanical Zero and his No Wind Zero are

the same. Using a pointer gauge in the carry handle, it should line up with the front sight post.

While not exact, it allows the gunsmith to get a the front sight roughly centered quickly without some sort of bore laser or actual range firing. These pointers used to be available from both Arma Lite and DPMS. In his book, Derrick Martin offers an alternative diagnostic method. The gas hole in the sight housing is bigger than the gas port in the top of the barrel, so a carbon ring will form around the barrel's gas port. If that carbon ring is not centered around the gas port it shows some degree of misalignment.

External checks, such as the pointer gauge, are quick and don't require the front sight housing to be removed and the front sight zero lost. The gauge clearly showed the shooter had his front sights cocked way to the side. All three of his rifles were that way and the one that was malfunctioning was the farthest off. This guy classified High Master and I don't doubt he knew what proper sight alignment and picture looks like.

I guess there was just something in his position, his eye, his head pressure, trigger action, etc. that caused the abnormality. To make sure it was a shooter idiosyncrasy and not a gun issue, I took time to fire the gun out of my shoulder and it was way off for

windage for me. Bringing the front sight back up to top dead center where you would expect it to be cured all function problems and the next person to inherit it had no complaints.

This doesn't happen often but I have seen it in the past and that helped with the quick diagnosis. As extra insurance, before I reissued the gun I countersunk the top of the gas port hole a little to allow gas to flow if the sight got cocked out of whack again. Not long after, I bought some Badger Barrels from Northern Competition and found the same kind of countersink on their ports. They said they do this with all AR barrels they sell for the same reasons.

Since then I have adopted their philosophy and do it on every gun I build. If you are doing bunches of these it would pay to set up a drill press and get the cut uniform and mindless to execute. If you are doing these in small batches I recommend just using a hand drill and any bit between 1/4" and 3/8" to get a wide chamfer to catch gas if the sight gets cocked. You don't want to go deep so just a quick "kiss" is all that is called for.

Remember your work is going to be hidden by the front sight and not seen so it doesn't have to be pretty. It just needs to get done and fast. There is another way to fix mismatched sight housings and gas ports that I used to employ. The only

DO YOU HAVE GAS? PART TWO CONTINUED

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reason I went to the chamfer method is because it is a minute or so faster. The designer of the front sight base for this rifle was smart and made the gas hole in the base fatter than the gas port so we could be reasonably sure to capture gas in the event of a less than stellar alignment of the two holes. The hole in the sight base is about 0.144" and the gas port is commonly 0.093".

You can enlarge that hole in the sight base by going up from the access hole in the bottom of rear barrel band with either a 5/32" drill that will enlarge the existing hole to about 0.1562" or use a Size #21 (about 0.1590") if you want something just a bit fatter. In doing so you want to just kiss the bottom of the gas hole and there is no advantage in going all the way up to the gas tube.

While you have the base off, this is a good time to ensure that the hole in the gas tube is in proper alignment with the one in the front sight housing. This is just a quick visual confirmation. Poor drilling of the cross pin holes in the gas tube (or sight base) can result in a cock in the tube either right or left of centering up its hole with the one in the front sight housing. A small flash light is handy to see up there with a directed beam of light. Let's be very clear of what you are looking for, however.

The hole in the gas tube is supposed to be smaller than the 0.144" hole in the sight housing, so it is key that you don't confuse

what is correct (the smaller size of the hole in the gas tube—about 1/8") with a cocking or misalignment. You want to avoid enlarging that gas tube hole unless it fails to line up because its size is set to meter the right amount of gas back to the bolt carrier key.

The modifications suggested so far are simply designed to capture gas that the gun was designed to work with when misalignments occur. None of our modifications are designed to permit more gas than the manufacturer wanted. Drilling of the roll pin hole in the gas tube or front sight housing at an angle is such a rare occurrence that you will likely never have to deal with it anyway. If you look up in there and think you have a misalignment but you are not sure, just assemble everything and test fire it.

If the rifle functions OK everything most likely is the right size and aligned correctly. Too easy! Final Problem When I became Armorer for the Army Reserve Service Rifle Team I inherited 85 National Match uppers built for the Reserves by a competing military team. The Reserves were too broke to have their own armorer so they paid another team to build uppers for them! I wonder if you could find any race car driver who would allow another race team to tune his engine?

One as bad as shown here can cause misalignment between the gas pick up hole in the sight housing and the gas port in the barrel, resulting in low gas flow. Below Center:

Using a drill between 1/4" and 3/8", give the top of the gas port a light "kiss." One of the first things I did was machine rest the whole lot for accuracy and found most to shoot in excess of one MOA, which is too fat in group size to be competitive. I started tearing the whole lot of them down and rebuilding them from the bottom up.

Since the Team had no parts I simply recycled what I had inherited and put the rifles back together right. Eventually, I was able to cut group sizes in half from what I had inherited and spent very little money in doing so. I had noticed when I had the guns on the machine rest during initial evaluations that function was often sluggish but bolt ring and other quick tests revealed no obvious reasons.

Obviously, I took the front sight housings off during the rebuilds and noticed something odd with the gas ports that were now visible. Some appeared to be undersized and I started to gauge them. I found some ports to be spot on at 0.093" (those were the guns that functioned properly) while about equal numbers were either one or two full drill sizes too small! The ones that were one drill size small functioned sluggish and the ones two sizes small were the rifles I was getting function complaints.

I NEVER FIGURED OUT WHY SOME OF THESE GAS PORTS WERE SO FAR OUT OF

DO YOU HAVE GAS? PART TWO CONTINUED

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spec. It is common to drill the initial hole for the port a little on the small size and then ream it out. Perhaps whoever did the work on these barrels got distracted and forgot to go back and perform the reaming. Or maybe someone did the work who was confused about what the finished size was supposed to be. There are at least two good reasons that I can think of to keep gas ports on the “skinny” side. First, the smaller the gas port the less chance you are going to have of hitting a land.

Second, felt recoil in Stoner platform guns comes from two components. Acceleration of the bullet (the same as in any other firearm) and “secondary recoil pulse” coming from the bolt carrier pushing the buffer to the rear until it hits the rear of the buffer tube, halting its movement. Metering less gas will soften secondary recoil pulse because the carrier and buffer will be moving to the rear with less speed.

Go too small on the gas port, however, and one runs the risk of not moving the carrier to the rear far enough to reliably eject spent casings, pick up the next round, or lock the bolt to the rear on the last shot in a magazine. Quick Fixes Every military armorer that I have ever known has carried some kind of kit with him down range. These kits can be in some sort of canvas bag or an old fishing tackle box.

Each kit contains an assortment of basic hand tools and spare parts to quickly get a shooter up and running again in a hurry in

afield environment. One of the gas related items that I always carried was a light weight bolt carrier assembly, mostly relating to the amount of metal at the bottom rear of the carrier. The commercial carriers have varying lengths of metal at the bottom and I always selected one with the shortest section to lighten the carrier.

This can amount to a good ounce of weight reduction and that, by itself, will sometimes get a gun functioning again. My spare assembly was one that I had field tested in a number of rifles. I always made sure it had new rings and a properly staked key so I could drop it in a shooter’s rifle and check a bunch of potential problems in seconds. If the bolt carrier swap works, in addition to checking the original carrier’s key and bolt rings, you might also want to check the size of the “tail” of the bolt.

Derrick Martin says this should measure between 0.2500" and 0.2506". The corresponding hole in the carrier should measure between 0.2520" and 0.2526" resulting in no more than 0.002" of clearance. He says that more clearance than that will allow gas to escape, resulting in possible malfunctions. If you have customers complaining about getting gas back in their faces and eyes you might want to check those dimensions on offending guns. The lighter carriers can sometimes eliminate some function issues.

Below Center: Two potential quick fixes to low gas problems that no armorer should ever leave home without. Wolff Gunsprings

reduced power buffer spring on the left and, on the right, a low mass buffer by JP Enterprises. The second item I carried was a low mass buffer for problems more severe that weren’t cured by the lighter carrier. JP Enterprises sells a nice low mass buffer that is red for easy identification.

If you want to save money you can simply disassemble a regular buffer and pour out the innards, lightening it about four ounces. If you are concerned about maintaining rigidity of the unit, cut a section of half inch diameter wooden dowel and put that in the hollow space. Back in the van I also had larger items like reduced power buffer springs and the like. Any parts change mentioned can cause zero shifts.

In an emergency I am pretty sure most any shooter would far rather accept ten shots in the 9 ring, forfeiting 10 score points, as opposed to having to sacrifice the full 100 points because his gun wouldn’t function and he had to sit out a string. The field expedient repairs are just band aids to get the shooter back up and running quickly. You still need to do a real diagnostic and repair of the underlying cause when you follow up off range later.

I am sure I have missed problems, diagnostics, and repairs that you may know of. Feel free to email me and I’ll try to work your tips in at some point. AG

TOOLS & FIXTURES

Reader Forum

BY AMERICAN GUNSMITH EDITORS FEBRUARY 2014

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Unintentionally Magnetizing Tools I've experienced something strange in my shop and am baffled as to how it happened. All of the small tools in my shop—screwdrivers, punches, pliers, tweezers and Allen wrenches—have become magnetized. I borrowed a demagnetizer from a friend and used it on all these tools, however, a week later they had all become magnetized again. There is no electronic equipment or electromagnets anywhere around the shop. I've asked around locally and nobody has an idea what's going on.

I'd be grateful if you or any American Gunsmith reader can answer shed some light on this. Louisville, KY 40222 From author Richard Mac Lean. Magnetizing tools is normally done by passing the tool through a strong magnetic field. There are lots of ways to accomplish this and for under \$10 you can buy a small plastic covered block with a strong magnet in it. You just pass the object through one of the two openings to be magnetized and do the reverse to demagnetize by passing the object through the other hole. James B.

Board Glen Dale, WV If you were experiencing this with just one or two tools, one could assume that it might be some unusual property of the material, however, with such a wide variety, this is highly unlikely. My suggestion is to get a compass and see how it is oriented in your workshop relative to true magnetic north via a map of the local area. If the compass is way off in your shop there may be something in the area that is doing it.

Also, try running all your major power tools and see if the needle goes wild with a particular one. Try this in a number of areas within the shop. This may help track down the source. Smith & Wesson Safety Hammerless (New Departure) I am working on an old Smith & Wesson Safety Hammerless (New Departure) .32 caliber revolver, Second Model, serial #105XXX. It wouldn't revolve the cylinder and I could not squeeze the trigger. With the side plate off I could see that one leg of the split spring was broken off.

I ordered a replacement from Jack First with the proper number from their catalog but received a different part (for a .38 caliber) with a word "USE." It doesn't work because it hits the bottom of the sear and stops, being about 0.060 inches too long. After deciding to try it anyway, I took off about 0.060 and the part misses the sear, however, the opposite end that the hammer hits about 0.060 away from the hammer knob and won't unlock the cylinder.

When I put a small screwdriver bit about 0.060 thick between the hammer knob and the split spring it works well. The new spring was about 0.060 short of where they meet. Harold L. Pierce I ordered anew hammer from Gun Parts Corp. It is the same size but didn't make any difference. Would spot welding the knob on the hammer and finishing it to about 0.060 be OK? Is the split spring for the .32 different from the .38? I called back to Jack First but they haven't been able to help.

Al Estacio Having received the wrong part only complicates everything you're trying to do. We recommend you call Old West Gunsmithing It is presently operated by the son of David Chicoine, a contributor to these pages and author of more than one volume dedicated to the care and maintenance of older revolvers. He is also a source for out-of-production S&W parts and may be offer a better solution than the one presently under consideration.

Winchester 1890 I was reviewing by October 2013 issue and the question on the Winchester 1890 .22 rifle caught my attention because I don't think it was completely answered. The 1890 has a cartridge-specific lifter; there is no separate cartridge cutoff. The depth of the cut in the lifter matches the cartridge length and an extension on the lower part of the lifter prevents the next cartridge from

READER FORUM CONTINUED

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entering the action when raised. With a longer or shorter cartridge entering the lifter, the lifter will not move up to position and jam. A spacer placed in the lifter would make the short cartridge work or you could get a LR lifter and ream the chamber. My 1890 is Short only because I can still get ammo. Longs are hard to get. Just wanted to let you know what I have found out about the little rifle over the years. Only worked on three of them, replaced a screw on one and never had a parts failure.

Thanks for the input Member Potter. We checked The Winchester Book on the 1890. A segment of the production run was limited to .22 Short rifles. Another segment could and did operate with .22LR, .22 Long and .22 Short. The reported reason for the dedicated Shorts was due to their preponderance of use as the preferred weapon in shooting galleries.

At one time, prior to the present abject and demented conviction that shooting at a target encouraged the criminal use of a gun, shooting galleries were abundant at county fairs, state fairs and even major city penny arcades. There-in people, including young children, stood four or five deep awaiting their crack at knocking down metal duck silhouettes swimming across "ponds" downrange or putting a well-placed round through a small hole in a stationary target to ring a gong hanging behind it. "Step right up folks!

Ten shots, two bits! Only one quarter of a dollah! Win a Kewpie Doll or box of candy for the pretty lady!" We remember it well. Interarms Virginian Dragoon I have an Interarms Virginian Dragoon in .357 Magnum marked "Interarms, Alexandria Virginia, USA" on top of the barrel with "Virginian Dragoon cal .357 Magnum" on the left side of the barrel. On the left side of the frame, below the cylinder, is a patent number and below that "Date Apr 16, 1974." It has an "A" prefix serial number. Walter S.

Potter My customer said the ejector rod was causing the action to lock up. I checked and the first thing I noticed was the ejector rod is missing. The spring and the finger grip are still there, but no rod. I checked Numrich (gunpartscorp.com) but they don't have an ejector rod. Would one from a Colt SAA or Ruger work? I did have the action lock up on me, so I searched online.

One of the sites mentioned something called the "Swiss Safety" and that it worked by letting the base pin extend deeper into the frame, effectively locking the action so that the cylinder would not turn and the hammer is locked in on the first click. The site also said something about having a gunsmith rework the base pin to eliminate the Swiss Safety. Is this possible? It doesn't really sound safe to me. And just what is a Swiss Safety?

It is not difficult to unlock the action: Push in the base pin retainer, the base pin pops forward, and you're ready to go. Jimi As you have discovered by this time, Interarms is no longer in business. The Virginia Dragoons they once imported were made by Hammerli, made very well, and included a Swiss Safety despite being single actions. The design called for and received a second cut, or notch, in the cylinder pin. How it works?

With the cylinder pin in place, depress its locking stud as you would when removing the pin. Instead of removing it, push the cylinder pin further into the frame until it engages the second notch. What you've done is moved the pin through the frame so it extends far enough back to block the hammer. Presto! The Swiss Safety is now at work. Removing the cylinder pin unlocks the safety system.

Seems that peaceful nation with the lowest crime rate in the world— because everyone ever serving in the Swiss army takes their issued fully automatic rifle for keeps—is just as smart about guns as with making great watches. You can defeat the Swiss Safety when the second notch is eliminated by replacing the cylinder pin with one having no such feature. But why? Should you decide to regardless, try Jack First and VTI The latter imports retro-replica firearms.

If there's a Virginia Dragoon among them, its cylinder pin might fit yours. AG

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