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SLOW-RUST BLUING: SCIENCE OR ALCHEMY?

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ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 063

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FROM THE ARCHIVE

SHOT Show Signals Positive Start for 2009

BY AMERICAN GUNSMITH EDITORS MARCH 2009

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As this issue heads to the printer, technical editor Chick Blood and I have just returned from another amazing SHOT Show't his one in the sprawling 715,000-square-foot Orange County Convention Center in Orlando, Florida. Anyone with any doubt about the health of our industry would only have had to spend a few hours walking the aisles of this mammoth trade show, although by my estimate it would take something like two full days just to take a cursory glance at all 2,000 exhibits.

The SHOT Show, owned and sponsored by the National Shooting Sports Foundation (NSSF), is the world's largest showcase of firearms, accessories, and hunting and outdoor products. It provides a forum like no other for the industry to show off the newest products that will line the shelves of gun shops and sporting-goods stores in the coming year. Revenue raised by the SHOT Show funds NSSF's many programs and services that promote, protect, and preserve hunting and the shooting sports.

Though many trade shows have seen a decline in attendance, attendance at the SHOT Show remained strong this year, rising 3 percent compared to the show's last visit to Orlando in 2007.

According to NSSF's figures, this year's show attracted 25,384 attendees, 22,098 exhibiting personnel, and 1,425 members of the media for a total attendance of 48,907. "This has been a tremendously successful show from a number of standpoints," said NSSF President Steve Sanetti. "Exhibitors and buyers were very upbeat, the products sold well, and I'd say the industry begins 2009 with a sense of cautious optimism in this challenging economy."

Business was brisk on the floor throughout the show, according to exhibiting companies and retailers. "It's been a good show, and, in fact, it's been above my expectations," said Phil Murray of Houston-based clay-target maker White Flyer "It's really

exciting to see so many people being so positive about the industry. It is very encouraging for the rest of the year.

New products highlight the show's offerings each year, which is one reason attendees say the show is always a can't-miss event. "The most important reason for anyone to come to the SHOT Show is to see the latest and greatest," said Ken Jorgensen of Sturm, Ruger & Co. "They're going to see the new products that they may not hear or read about for weeks or months." Personally, I spent most of my time at the show hanging out with friends at the Passport Sports, Inc., booth.

Their sales in the first two days of the show equaled what they did in all four days the last time the show was in Orlando. I have to thank all the American Gunsmith subscribers who stopped by to say "hello." I just wish we had had more opportunities like this to meet in person. Editor Keith Lawrence Technical

PISTOLS

Dissecting the Sig Sauer Mosquito .22 Pistol

This little semi-auto forces you to know where you are, where you're going, where you've been, and how to get back to where you started. And that's only if you can get beyond the starting point.

BY CHICK BLOOD MARCH 2009

ORIGINAL PP. 3-7

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Dealing with the pesky insect it's named for could be easier than dealing with the Sig Sauer Mosquito. You can buy the tools you need to control the flying pest; for the pistol, you can't. I won't venture to guess what thoughts dominated the Sig Sauer design team when they created this bug on their drawing boards and computers. It's possible their goal was to make life difficult for every gunsmith destined to deal with it. At least, that's the way it seems to me.

Now that those comments are off my chest, I must admit the Mosquito is a skillfully built pistol. It balances well. It's sturdy. It looks business-like and the factory sights are more than acceptable. That said, I'd never recommend the Mosquito to anyone considering the purchase of a .22 pistol for serious target shooting. A precision bull's-eye gun it isn't, and it's a bit pricey for a plinker. The Mosquito is usually purchased as a Standard version.

It can be converted to a Sport or Silencer version by removing the Standard barrel and replacing it with one threaded at the muzzle end. To those threads can be fastened a weight for the Sport model or a silencer for the Silencer version. Since these devices are illegal for civilian use, I'm chalking up that option to over-engineering and/or simple ignorance of our laws. Who really needs a silencer on a .22 anyway? Except maybe a Mafia hit man. The version shown and discussed here is the Standard.

Though insignificant differences in specifications exist between it and its brethren, one Mosquito is mechanically the same as any other. All specifications stated here are for the Standard. The caliber is .22 Long Rifle, the weight without magazine is 22.9 ounces, and the out-of-the-box trigger pull is about 4 pounds in single action and a little over 12 pounds in DA mode. Magazine capacity is 10 rounds. There is both a man-

ual safety and a decocking lever, the latter being a rare feature on a .22-caliber semiauto.

There is also a key-operated integral safety lock that totally freezes up the gun when engaged. When the magazine is completely out of the gun it cannot be fired. There are some minor details concerning the basic 22-caliber Mosquito Standard Model pistol is shown here. With the proper recoil spring installed, it can digest both standard and high-velocity ammunition. servicing and operation in the Mosquito's owner's manual. Though minor, I'd consider them important.

Owners make a habit of losing their manuals, of course, but y calling SIG Arms Field Stripping Make the gun safe and hide your eyes behind something transparent that will protect them. Remove the maga-

DISSECTING THE SIG SAUER MOSQUITO .22 PISTOL CONTINUED

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zine. Fully retract the slide (#4), lock it back with the slide-catch lever (#18), and keep your fingers out of the ejection port. (I've had mine painfully betrayed many times by a slide that disengaged from a catch all by itself, and slammed forward too rapidly for me to perform a defensive retreat.) Now depress the catch lever to close the slide. Rotate the takedown lever (#16) clockwise until it points toward the muzzle.

Retract the slide fully, lift it at the rear to clear the frame, and control its movement forward. Remove the entire slide assembly to the front, and then pull the recoil spring (#3) and guide (#2) off the barrel. That takes care of that. Detailed Disassembly I'll begin in my usual manner, with the slide. Undo the rear-sight screw (#68) as far as you can without forcing it out completely. Remove the right lever screw (#67) with an Allen wrench.

Choose a punch appropriate for the diameter of the slide breechblock pin (#7) and use it to push the left lever (#46), its spring (#30), and detent ball (#31) out right to left as a unit. The detent ball is only .02 mm in diameter. The spring isn't a heck of a lot bigger, and they're both housed inside

the left lever. Take precautions against losing them or be prepared for a lengthy search.

Move the rear sight from left to right until it releases the breech-block assembly (#9), then tilt the slide forward to remove the block. The rear sight can be taken off the slide now, but I see no need for it. At this time, there are no aftermarket or alternate factory sights made for the Mosquito. I'll bet the schematic does to you exactly what it did to me. The firing pin (#11) and spring (#12) appear to be housed in the barrel breech. They aren't.

You'll discover, as I did, both pin and spring are in the breech block and retained by a left-to-right-driven pin that's not shown on the drawing. Combined with that pin in securing the firing pin and spring are the safety lock (#13) and its pin (#14). Both the Then depress part #66, remove #16 and #58, and lift out the barrel and the takedown-lever insert (#25). Reverse the procedure to install anew barrel. latter lift off the breech block.

When you drift the extractor pivot (#74) downward with a 1/16-inch punch, you'll free up both extractor guides (#73), the extractor (#10), and its spring (#38). Take

note of the two smaller drawings on the main schematic on the next page. The front sight on the pistol in your shop depends on the model. A Standard Mosquito has barrel (#1a) and front sight (#5a). The Sport barrel (#1b) gets a different front sight (#5b) and the Silencer Model barrel (#1c) goes with a third sight (#5c).

All front sights can be popped from the slide with the flat of a small screwdriver, and the sights vary in height according to their alphabetical suffix. For example, #5c is higher than #5b or #5a. Any barrel can be switched to another barrel, but when going from Standard to Sport, you'll need the counterweight (#77), threaded pin (#79), and Allen key (#80) shown in the lower insert of the main schematic.

When going from Standard or Sport to Silencer (or the other way around), the assembly wrench (#82) and threaded cap (#81) shown in the lower drawing on the schematic insert come into play. Any components or tooling required to perform these barrel conversions are available from SIG Arms. Exactly how barrels are changed is included in the Mosquito owner's manual. Inevitably, your Mosquito owner will have lost his manual, so you can refer to the drawing below for



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1a Barrel 1b Barrel 1c Barrel 2 Recoil Spring Guide 3a Recoil Spring (standard velocity) 3b Recoil Spring (high velocity) 4 Slide 5a Front Sight 5b Front Sight 5c Front Sight 6 Rear Sight 7 Slide Breech Block Pin 8 Trigger Bar Spring 9 Breech Block 10 Extractor 11 Firing Pin 12 Firing Pin Spring 13 Safety Lock 14 Safety Lock Spring 15 Frame 16 Takedown Lever 17 Striker Pin for Safety Lock 18 Slide Catch Lever 19 Slide Catch Lever Spring 20 Trigger 21 Trigger Pivot 22 Trigger Bar 23 Lock 24 Sear 25 Takedown Lever Insert 26 Sear 27 Spring for Integral Lock 28 Safety Lever 29 Hammer 30 Spring for Safety Lever 31 Ball for Safety Lever 32 Ejector 33 Hammer Strut 34 Mainspring 35 Action Casing, Left 36 Ball, Centering 37 Action Casing, Right 38 Extractor Spring 39 Magazine Safety 40 Decocking Lever 41 Decocking Lever Bearing 42 Decocking Lever Spring 43 Magazine Catch 44 Manual Safety Lever, Right 45 Magazine Catch Spring 46 Manual Safety Lever, Left 47

Feeder Axle 48 Grip Plate, Left 49 Grip Plate, Right 50 Grip Plate Screws 51 Magazine Tube 52 Magazine Spring 53 Feeder 54 Magazine Floor Plate 55 Floorplate Insert 56 Threaded Socket for Grips 57 Retainer 58 Screw for Grip 59 Hammer Reset Spring 60 Hammer Pivot Pin 61 Hammer Strut Pin 62 Trigger Bar Pin 63 Spring for Magazine Safety 64 Safety Lever Pin 65 Magazine Safety Pivot Pin 66 Screw for Decocking Lever Sig Sauer Mosquito Semi-Automatic .22 Rimfire Pistol 67 Screw for Safety Lever 68 Adjusting Screw 69 Key 70 Mainspring Washer 71 Mainspring Strut 72 Key Ring (Specifications subject to change without notice) 79 Threaded Pin (b) 80 Allen Wench (b) 81 Threaded Cap (c) 82 Assembly Wrench (c) a = Standard Model b = Sport Model c = Silencer Model 73 Extractor Guide 74 Extractor Pivot Pin 75 Breech Block Pin 76 Breech Block Spring 77 Counterweight (b) 78 Cap (b)

DISSECTING THE SIG SAUER MOSQUITO .22 PISTOL CONTINUED

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the “how to.” It’s safe to assume you’ve never come up against a handgun with a firing system like the Mosquito. Part #35 is called an “action casing” and occupies the left inner side of the frame. Its opposite casing is located inside the right side of the frame. Held between them are enough parts to make you dizzy, and they’re all vital to the safe, reliable functioning of the pistol. The frame is polymer.

The casings provide a steel bearing surface for the steel slide that’s far more durable than polymer-to-metal contact. It’s possible to remove both casings from the frame simultaneously. Remove the grips (#48 and 49). Push out the magazine catch (#43) “and be wary; within the catch are its spring (#45) and retainer (#57). The spring likes to take off on its own. Drift the trigger pivot (#21) in either direction.

Study how the decocking-lever spring (#42) and lever (#40) are joined together before removing them from the The socket screw (A)

is used to secure components or a casing beneath the hold-down piece (B) during operations. left casing. Get your thumbs under both casings. Push them both upward at the same time until the casings and all they contain can be lifted free. In this united state, accumulated residue can be flushed away or cleared out with a sonic parts cleaner.

Dry the casings inside and out with compressed air or a hair dryer set on “warm.” Lightly spray lubricant on both outer surfaces and inner components before reinstalling the casings. I prefer a silicone-base lube for this. Remember, the frame itself is polymer. Oil-based lubricants have been known to weaken or otherwise damage some polymers used in modernday firearms.

Worse, the misguided application of harsh solvents such as carburetor or brake-drum cleaner have actually reduced the housings of many firing systems to an unrecognizable blob. Though some polymers are immune to these harsh solvents, you can’t tell by look-

ing. It’s always wise to contact the manufacturer or Aimporter of any gun with plastic in its construction before using a cleaning solvent. It’s wiser to simply restrict your supply of solvents to those made exclusively for sluicing out guns.

There are photos below of a special German-made jig that the factory assemblers use when building or servicing a Mosquito. I tried to secure some form of dimensional drawings. They were not available, so the photos were taken at my request to serve as a substitute. In order to work further with the casings, you’ll need a fixture like this made from a nonmarring material. High density polymer is my recommendation, except for the adjustable hold-down piece and its socket-head screw.

This particular kind of polymer machines beautifully, so milling, drilling, and tapping it present few problems. Assuming you’ll be able to build yourself a working substitute for the jig, I’m going to take you through the

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The photo clearly shows how the decocking lever and its spring are engaged initially, and how they must be reengaged during reassembly. disassembly process for the casings followed by some reassembly tips. All I can say is: Without the tool or a reasonable facsimile thereof, don't try it. On the left casing, the ejector is riveted to the casing. Enough said. Remove the slide-catch lever (#18).

Unless you're aware of the probability, and you are as of now, the lever spring (#19) will depart to that alien world where lost parts live. As far as the magazine safety (#39) and its spring (#63) are concerned, the identical probability exists after the magazine safety-pivot pin (#65) has been drifted right to left. I figure I'd better tell you that the loss of the slide-catch lever spring can be considered assured unless the trigger-bar spring (#8) is removed first.

But you can't remove the trigger-bar spring unless you can get at it, and you can't get at it without the disassembly/reassembly jig. Ever heard of a Catch 22? The right casing holds most of the internal firing mechanism. Remove the mainspring-strut assembly (#34, 70, 71, and 36). Pivot the sear

(#26) upward. The hammer-pivot pin (#60) trigger-bar pin (#62), trigger pivot (#21), trigger (#20), and trigger bar (#22).

Throughout the process of disassembling the casings, you must take care to examine how each inner component is attached to its related components before separating them. That will definitely make correct reassembly easier. With guns that are strange to me, like this one was, I've gone as far as to make careful pencil drawings or take photos to serve as guides. The grip frame is simple. Both threaded sockets (#56) for the grip panels (#48, 49) are integral with the frame itself.

Reassembly Tips The trickiest part of the reassembly begins with the right casing. Reinstall the safety-lever pin and spear the lecan be a bugger to drift, but try to do it without causing peripheral damage if at all possible. Take out the hammer (#29) and its reset spring (#59). Drift out the safety-lever pin (#64) to free the lever (#28). This is followed from the casing by the ver on it.

On all newer Mosquitoes, there are very thin washers on each side of the hammer and trigger. None of these washers are shown on the schematic, but all have to be

present when hammer and trigger pivot pins are reinstalled. If the hammer-strut pin (#61) has been removed, reinstall it. Slip the long end of the hammer-reset spring over the strut pin, and install the hammer on its pivot. After you slide the hammer close to the left casing, align the hammer-reset spring with its own pivot pin.

Don't look for this pivot pin on the drawing; it's a permanent part of the frame. You'll find it helps to use a small punch when getting the spring into position and maneuvering its short end to tension it. Install the mainspring assembly and force the hammer into its decocked (forward) position before reinstalling the sear.

Conclusion Pardon me if I'm repeating myself here, but before you take one layer off the Mosquito's "casing sandwich," be absolutely sure you know how the part you take off relates to the next layer. If you can come up with something to use in place of the factory fixture, and if you're very careful with the disassembly, you might be able to suppress the urge to dispatch this Mosquito with a large dose of flyinginsect killer. I

MAINTENANCE & REPAIR

Rebuilding a Firing-Pin Tip

Finding replacement parts for rare or obsolete firearms can be a frustrating endeavor. Sometimes machining a new part or repairing the original part are the only options.

BY DENNIS A. WOOD MARCH 2009

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Once in awhile, I'll have a weak moment and allow myself to get roped into a repair where I didn't ask enough questions before agreeing to take on the job. And, as you know, some of these can be a nightmare. Such was the case with a .22-rimfire bolt-action rifle with a firing pin that wouldn't hit the case rim hard enough to detonate the primer. The customer described the problem on the phone, and wanted to drop it off the next time he was in the area.

I agreed, mainly because I have a longstanding interest in .22-caliber rimfire rifles. I've worked on so many of these rifles in the past, I thought to myself: "How difficult could the job be?" When the rifle arrived, it turned out to be a B-Series Mauser .22-rimfire bolt-action that this customer's 22 cartridge showing a proper strike to the rim from a firing pin of the correct length. On the right, the strike was too light to detonate the primer (arrow). father had acquired while stationed in Germany with the U.

S. Army. This type of rifle was used as a training weapon during World War II for young infantrymen serving the Wehrmacht. Start by Cleaning The first step I go through when diagnosing any type of ignition failure is to do a thorough cleaning of the firearm. (That's after I've made sure that the action is safe by ensuring that it's empty.) Then I removed the bolt from the action and completely dismantled it.

All of the bolt components were then scrubbed with cleaning solution to remove the buildup of grime and gunk so that any cracks, chips, or flaws could be easily seen. For parts cleaning, I've been using a product called "Jungle Jake" for a little over a year now, and this stuff really does a terrific job on removing grease and gunk. What makes its use even more appealing is that this stuff is one of the "green" cleaners, in that it is water-based and biodegradable.

Unlike with petroleum-based cleaners and solvents, you don't need to wear protective gloves with this product to prevent harm to your skin. The cost is less than \$3 a gallon at your local farm-supply store. Once the parts are given a final rinse with clean hot water, I blow them dry and wipe them down with a protective solvent like Break-Free CLP before reassembly. Now that I had the bolt and striker assembly clean and lightly lubed, the bolt was reassembled and I reinstalled it back into the action.

Then I took the rifle outside to my 25-yard range to see if the cleaning had cured the ignition failure issue. I tried several brands of .22-rimfire ammunition with the same results—no detonation of the primer. To detonate the priming mix of a .22-rimfire cartridge, the firing pin must flatten the rim of the case in the

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010 inch over the correct length. area where the firing pin hits. This firing pin did not seem to strike with enough strength to accomplish that important task. I ordered a replacement 14-pound striker spring from Wolff Precision Gunsprings and installed it. When I tested the rifle, the results were the same ignition failure. Once again, I disassembled the bolt and this time I inspected the firing-pin tip with a 10-power illuminated magnifier.

Under magnification, the firing-pin tip appeared to have been worked on with either a file or a grinder. In all probability, the firing-pin tip had “mushroomed over” from dry firing, and the owner then cleaned up the rounded-over tip, thus creating a situation where the length of the firing pin became too short. Repair Solutions Replacement parts for rifles such as this one are nearly impossible to locate and could run up an incredibly large phone bill.

Sometimes the only practical solution is to either make anew firing pin or put anew tip on the original pin. In this case, I actually did both. Not knowing what type of steel the original firing was made of, or how the original steel would react to the heat from a torch, I decided to first make anew firing pin. The one I made had a front tip a bit longer so it could be adjusted for length later.

Once I had this replacement firing pin as a backup in case the original one melted or became botched up beyond repair, I started making the calculations required to put anew tip on the original firing pin. The tip of the original firing pin would make an impression on the rear face of a .22 cartridge rim that was barely noticeable. Averaging the rim thickness on .22 rimfire cartridges made by Winchester, Federal, Remington and CCI, I came up with a thickness of .040 inch.

The distance from the back face of the striker-spring collar to the current tip on the firing pin measured .626 inch. I then chucked the original firing pin in the lathe and faced the damaged tip back .300 inch to where the radiused shoulder began to blend with the .075-inch front diameter of the firing pin. The diameter at this point measured around .110 inch. Next, I chucked a number “O” center drill in the lathe tailstock drill chuck and used it to create a starting hole for a #52 (.0635 diameter) drill.

The #52 drill was then used to drill a hole to a depth of .240 inch into the front end of the original firing pin. The inside diameter of this .0635-inch-diameter hole was then chamfered slightly to accommodate the tiny radius that will be present on the tail of the lathe-turned replacement tip, allowing the replacement tip to fit flush against the face of the original firing pin.

What would eventually be the replacement tip on the original firing pin started out as .125-inch-diameter “stress-proof” steel purchased from Brownells. (The same steel in .375 inch diameter was used to make the duplicate firing pin with a longer tip referenced previously.) This steel is very easy to machine, but is tough enough without heat-treatment to use for making firing pins or assembly pins, so it’s a good material to keep on hand.

The .125-inch-diameter stressproof steel was then turned to a diameter of .110 inch for a length of .350 inch. This part was then reversed in the lathe chuck and then the tail that will be inserted into the original firing pin tip was turned to a diameter of .065 inch for a length of .200 inch. The tail diameter going into the end of the firing pin depends on which type of permanent assembly you wish to accomplish. The assembly I chose involved using hard-solder to bond the joint permanently.

Two other methods that could be used are press-fit or a shrink-fit. Of these two, I would lean toward the shrink-fit to avoid the risk of breaking the little tail off the replacement tip. The shrink fit would involve turning the replacement tail on the new tip to a few ten-thousandths of an inch over the true hole size in the (continued on page 17)



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original firing pin. The replacement tip would then be frozen by spraying with a product called “Freeze It,” while heating the original firing pin end with the hole in it with a propane torch. The new tip shrinks from freezing while the hole expands from heating, and then the tip is inserted in the hole. Once the temperature of two parts normalizes, you have a very tight bond.

Once the two parts have been permanently fastened together the front end needs to be turned down to a diameter of .075 inch and blended with the 12mm radius just in front of the striker-spring collar. I was careful to avoid cutting into this radius. For this process, a radiused file does a good blending job. Conclusions The exact tip length of this firing pin is a “cut and try” proposition.

Once you get a tip length that puts an impression into the rim of the cartridge case deep enough to detonate the primer, it’s time to end the length trimming. The

firing pin will work just fine with the tip diameter left in around state. The original on this rifle had a chisel point with the side angles cut at 20 degrees, so that’s how I tipped this one.

Also, the firing pin on these Mauser B-Series rifles acts as the ejector also, so if the firing pin tip is left too long, premature ejection could cause jams in the action. Your customer should be reminded to avoid dry firing a rim-fire rifle, as it will damage the firing pin tip.

Also, to relax the striker tension on an empty chamber when storing these rifles, he only needs to hold the trigger back with the index finger of the left hand while pushing the bolt forward and turning the bolt down and into the forward locked position. Of course, your customer will probably ignore your advice, and eventually will be coming back to you for a replacement firing pin. If you can’t easily locate a replacement pin, you can consider using the procedures outlined here. I

FINISHING

Slow-Rust Bluing: Science or Alchemy?

Actually, it's science. But your customers will think you worked some kind of magic when they see the transformation this process can make in an old firearm.

BY DAN HERMAN MARCH 2009

ORIGINAL PP. 10-17

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Life, if one takes the time to look, is full of wonderful little pleasures. Be it meeting anew grandchild, watching a spectacular sunset, listening to an elk bugle on a frosty Montana morning, or a quiet walk in the woods with a special someone, wherever you choose to seek those good feelings you'll find them if you just look.

In addition to the aforementioned, one of the little pleasures that ranks close to the top of my list is seeing a finely crafted firearm't he graceful lines, the grain of the stock, and the balance as you bring it to shoulder. But to my way of thinking, the characteristic that most enhances that firearm and speaks to me of quality and beauty is the finish that has been applied to the metallic parts' the bluing.

You only have to walk the isles of a gun show or view the gun racks in a hunting camp to get a notion of what I'm saying. Granted, the first thing that might capture

the attention is a nicely figured piece of wood. But as you watch a person pick up a gun, where does their attention go and linger the longest? The metal to wood fit and, yes, the bluing.

The customers who come through my shop always leave with a smile on their faces, but the thing that really lights up their eyes is the first glimpse of that old "clunker" that only weeks ago was bouncing around in the bed of a pickup, now sporting a fresh and gleaming new blued finish. The finishing and refinishing of gun barrels and other metallic parts with rust bluing has been around along time. The earliest techniques were probably a carryover from the time-tested treatments applied to body armor and swords.

As with anything else, this technology has progressed through its own evolution, as attempts were made to speed the process, improve the appearance, reduce the cost,

and increase the durability. Today, the customer can choose from a number of finishes ranging from browning, to Parkerizing, cold-bluing, nitre bluing, hot-bath bluing, even to nickel and chrome plating, painting, and anodizing. Whichever process is chosen, there are two main reasons for the finish: protection and appearance.

I think everyone understands the appearance aspect, but the protection requirement may not be so readily apparent. When left in the raw state, iron and steel have a nasty habit: they oxidize (rust). If neglected, any raw iron or steel will quickly become unsightly, and will eventually destroy itself. Guns are no exception. These include screwdrivers and punches for disassembly, files and sandpaper for buffing, compounds for metal preparation, as well as steel wool and fine wire brushes for carding.

SLOW-RUST BLUING: SCIENCE OR ALCHEMY? CONTINUED

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The author's first slow-rust job was accomplished with a length of capped-off drain pipe and a Bunsen burner. A Coleman stove works great. Careful measurement, mixing, and use of the proper mixing and storage containers are mandatory. treatments mentioned are applied in order to reduce or eliminate iron's and steel's mad dash toward total entropy.

The way to retard or eliminate this natural process is to alter or cover the surface of the metal effectively, thus protecting it from the actions of oxygen and reducing its direct contact with water, which accelerates the oxidation process.

Interestingly enough, if we exclude plating, Parkerizing, and painting (which gain their effectiveness by coating the metal), the "bluing" methods used to protect the metal take advantage of those same destructive processes which, if not controlled, would lead to the total ruin of the firearm. Specifically, I'm talking about the tightly controlled oxidation of the surface of the metal. In essence, the bluing process allows the firearm to rust in order to protect it from rust.

Having said that, it may be clear that any substance that will cause rust can be used to blue or brown a firearm. Simply letting the bare metal "sit" exposed to the air is sufficient to produce a blue or brown if the

process is controlled. This approach is certainly not practical, since a great deal of time is needed and the "control" referred to is particularly difficult to achieve, leading to something far less than the desired result.

Substances which have historically been used to speed up the process include table salt, blood, and urine, but still require more time than most gunsmiths would want to spend and produce results that are anything but predictable. The bluing and browning concoctions on the market today pretty much eliminate the concerns of time, predictability, and an undesirable end product. That doesn't mean, however, that there aren't tradeoffs to be considered when choosing among them.

Cold blues, for example, are by far the fastest and, in my opinion, are very good for small parts. However, unless extreme care is taken, attempting to use one of them to blue an entire gun can produce results that are less than spectacular. Hot bluing, the hotbath method used by most firearms manufacturers, produces a very uniform and attractive finish (albeit more black than blue) in a relatively short amount of time.

The drawback is that the hot-bluing process requires a considerable investment in equipment (salts, tanks, heat sources, buffing equipment, protective clothing, and

so forth) which makes it impractical for the individual or small shop that does an occasional bluing job. Slowrust bluing, on the other hand, takes more time than other processes, but requires less equipment and produces a more lustrous finish than the hotblue method and produces a more durable and uniform finish than any of the cold blues I've tried.

When you look at a fine Belgium or English firearm, you'll understand the visual appeal of the slow-rust process. The slow-rust bluing process employs the repeated application of an oxidizing agent, a "rest period" in a warm, humid environment, and the subsequent removal of the accumulated oxidation (rust) between each application. The entire process can take from three to 10 days, depending on the particular steel and the environmental conditions (temperature and humidity) in the shop.

Thus, the process is indeed slow, as the name implies. Metal preparation and the avoidance of grease and oil contamination during the bluing phase is critical with any bluing process, but is particularly important for slow rust bluing. With slow-rust bluing, there's no substitute for care and attention to detail. After complete disassembly of the firearm, the process begins by systematically preparing the metal surfaces

SLOW-RUST BLUING: SCIENCE OR ALCHEMY? CONTINUED

ORIGINAL PAGE 14

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for bluing. If the gun is in really bad shape, with pitted and rusted surfaces, draw filing (striking) the barrels with a fine to medium mill file should be the first step. If necessary, a rust remover such as Steel White (available from Brownells) can be used prior to draw filing. This step will greatly reduce file clogging caused by fine rust particles. To prepare the file, draw apiece of chalk (yes, the kind used to write on blackboards) against the file's grain, thus filling the teeth with a layer of chalk.

This will greatly reduce file clogging and ease cleaning with a file card. With the barrel (or other part) to be filed held firmly in a vise, lay the file on at approximately a 45-degree angle and with light downward pressure draw the file toward you the full length of the barrel. If done correctly, this will create a very tiny "flat" where metal was removed. Rotate the barrel and repeat. Continue until all rust and pits have been removed, going slowly and only removing enough metal to get rid of the pits.

Don't concentrate the filing in one location or depressions or flats will be the end result. Coating the teeth of the file with chalk reduces clogging and simplifies cleaning of the file. Always use a "backer" (thin, flat piece of wood) behind the abrasive paper or cloth to prevent "washing-out" screw holes and to

keep flat surfaces flat. On barrels, backers are not necessary. Instead, a modified "shoe-shine" stroke can be used.

Once the pits have been removed, you can begin polishing, starting with the coarser grits (120 or so). Again, use a "drawing" action along the long axis of the barrel or other part until all of the scratches and flats from draw filing have been removed. If you have access to polishing wheels made of stitched muslin, Brownells Polish-O-Ray is a good alternative to the above. Great care is needed to avoid washing out screw holes and stamped lettering or rounding off corners.

Anywhere this is likely to happen, I prefer to use paper or cloth abrasives and a wooden backer. Repeat this process in progressive stages to at least 320 grit, with 400 grit being better. Finer grits are neither necessary nor advised. This level of polish will give a fine satin finish and allow sufficient "roughness" to give the bluing agents a "bite" on the surface.

Once this stage is reached, going over the finished surface with an oily wire wheel or steel wool (again on the long axis of the part) will blend any remaining abrasive marks and highlight any imperfections you may have missed. You can purchase many different commercial slow-rust bluing agents or you might choose to mix up your own agent. Two

very good sources for all kinds of bluing-agent formulas are Gunsmithing by Roy F. Dunlap and Firearm Bluing and Browning by R. H. Angier (both published by Stackpole Books).

I've tried many recipes, but the one I settled on years ago and the agent that I currently use in my shop is a variation of one from the Dunlap book, called "the Niedner cold blue." This is where the alchemy and science merge. The formula for the Niedner blue is: 2.5 oz. Nitric Acid 2 oz. Hydrochloric Acid 1 oz. Wire Nails 30 oz. Distilled Water You shouldn't have any trouble finding wire nails and distilled water. The hydrochloric acid I use is 37 percent, and the nitric acid is 69 percent.

Check your phone book or with your local drug store or chemical supply to find local sources. (If you're forced to purchase acids that are weaker'm ore dilute'you can reduce the amount of water you use accordingly.) Before we start talking about mixing acids, there's something you need to remember: When diluting an acid, always add the acid to the water'not the other way around.

Diluting an acid creates lots of heat; if you add water to the acid, the water can boil instantly, spattering concentrated acid over a wide area. This is obviously a

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Squeeze it out; too much solution in the cotton will cause runs which cause blemishes which are very difficult to remove. Application should be in long, lengthwise strokes running the full length of the barrel or part. hazard for you, as well as anyone or anything nearby. According to Dunlap's instructions, the acids should be mixed in "a large crock or glass container outdoors." I use a large Pyrex beaker. (My wife frowns on my using her twoquart Pyrex measuring cup).

You want to use Pyrex, because a great deal of heat is produced in the process, sufficient to crack ordinary glass jars. Once the acids are mixed, the nails are added, just a couple at a time because the resulting reaction is fairly violent and would probably result in a boilover if all of them were added at once. Actually, I depart from the Niedner recipe in that I dissolve all the nails the solution will take.

What I am after is a totally saturated iron solution which assures the finest "bite" on the metal to be blued. After all the nails are dissolved and the solution has cooled, slowly add to the distilled water. All of this should be accomplished with great care. You're dealing with very strong solutions that can produce severe chemical burns and or poisoning.

Therefore, it's imperative that you wear eye protection, rubber gloves, and protective clothing. (I always wear a rubberized lab

apron when mixing this solution.) I would also suggest that you read both Dunlap's and Angier's cautionary notes before attempting to mix this or other bluing solutions. I store my bluing solution in brown, capped and well-marked reagent bottles in a location not accessible to anyone but myself.

Prior to starting the actual bluing process, the parts to be blued must be cleaned of all grease and oil. There are several suitable agents on the market for this purpose, but the one I like best is Brownells Dicro-Clean No. 909. This cleaner comes in 8-pound and 24pound containers and has an operating temperature of 180 degrees.

If you only blue once in awhile and don't need a large quantity of cleaner or don't want to use a heated-bath cleaner, I suggest you consider one of the liquid degreasers available in smaller quantities that can be used right out of the bottle. The object is to end up with "surgically clean" parts. Any trace of oil can ruin an otherwise great bluing job.

This is not as important a consideration with hot bluing since the sodium hydroxide in the bluing salts will "make soap" out of very small trace amounts of oil, but with all the cold and slow-rust blues, cleanliness is crucial to a satisfactory end result. From this point on in the process, I wear clean (and I mean clean) cotton gloves. I use degreased wire parts hangers (black-iron

stove-pipe wire or coat hangers work well) and degreased hardwood dowels to handle all parts.

When applying the bluing solution, I wear latex surgical gloves, available at any drug store. Do not touch any of the parts that will receive the bluing solution with your bare hands. For barrels, drive an appropriately sized dowel into the bore from both ends. This effectively seals the bore protecting it from the hot water of the bath and serves as a place to grab without touching the surface of the metal. Small parts can be suspended from loops of wire.

Pour a small amount (an ounce or two) of the bluing solution into a small wide-mouth glass container (baby-food jars work well for this as do 250ml beakers if you wish to play the chemist). Wearing rubber surgical gloves, dip a cotton ball into the solution, squeeze most of the solution out of the cotton so that it is wet but not dripping, and using long strokes (from one end of the barrel or part to the other in a single motion) apply the solution to the part or barrel. Rotate the barrel and apply another swath.

Don't start and stop the application midway on apart, and don't go back over the barrel or part unless you do the whole thing. Trying to "spot ap-

SLOW-RUST BLUING: SCIENCE OR ALCHEMY? CONTINUED

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Don't fret, however; the boiling and carding process will convert this ugly duckling into a thing of beauty. Note the wooden dowel driven into the barrel to keep water out of the bore during boiling. ply' the solution will cause blemishes, which will show up in the finished product. Continue doing this until the entire barrel or part is covered. Set the parts aside in such away that the "blued" parts come in contact with nothing.

For small parts, I suspend them by their wires; for barrels, I stand them in a rack so that only the wood dowels contact the supports. Here in Michigan, the ambient humidity is normally high enough that sufficient moisture is not an issue. In drier climates, a "humidifier box" can be constructed. This can simply be a wooden box large enough to accom- Swatches of steel wool can be wrapped around toothpicks or splinters of wood to get into those places that brushes won't reach.

All materials used for carding must be thoroughly degreased prior to use. To speed the carding procedure, a buffing head with a fine iron wire wheel can be used. Carding by hand works just as well, but takes a little longer. modate barrels, receivers, and small parts into which wet towels are placed. The wet towels will provide the water vapor necessary to raise the humidity and speed the chemical reactions. The parts should be allowed to sit and rust for three or four hours.

At the end of this period, the parts will look like the dickens, with various colors of gray, black, yellow, and rusty red. But despair not, this is normal. During this waiting period you can set up the tank for boiling the parts. I like to use distilled water in my tank, thus eliminating any concern about hard or soft water, chlorine, and other chemicals. About a half hour prior to the end of the rusting period, start heating the water.

Once a vigorous boil is achieved, suspend all the parts in the water and allow them to boil for about 20 minutes. For the chemically curious, the reaction on the steel parts produces ferric oxide, which is brown. Boiling, in addition to softening the scale making it easier to remove, converts the ferric oxide to ferro-ferric oxide, which is also known as black oxide. Why mention this? In the past, I've taken advantage of both of these properties.

If I am working on an old (or new for that matter) blackpowder muzzleloader, I want the finish to be a rich "plum brown." To get that brown coloration, I simply do not boil the parts. If the firearm is to be "blue," then I boil the parts to take advantage of the blackoxide conversion. Once the parts have boiled for the requisite period, they are removed from the bath and allowed to cool, making sure they are protected from coming into contact with anything

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that might contaminate them. When cool, using a variety of fine wire brushes (or wheels) and 00 or 000 steel wool, I card off all the rust and scale. Under all this will be revealed the beginning of the blue you are trying to attain. When all the scale is removed, replace the wet wood plugs with dry ones, apply another coat of the bluing solution, and let it react for another three or four hours. Then boil the parts and card again. Repeat this process until the desired level of bluing has been achieved.

This can be anywhere between six and 10 or more applications, depending on the hardness of the steel. When the desired color is reached, conduct the last boiling and carding, apply a good grade of gun oil, and allow the parts to set for a day or two. After that, wipe the excess oil off with a soft clean cloth and admire the deep rich blue all your labor has produced. Finally, re-assemble the firearm, call your customer, and invite him to view the beauty you have bestowed on his now precious rifle or shotgun.

He'll think you are indeed an alchemist and that you've found the philosophers' stone. Conclusions Slow-rust bluing is admittedly more labor intensive than other

forms of bluing used in the industry, but it definitely has its advantages. For the one-time bluing job you might want to do on a personal gun, the cost of the set-up is considerably less than conventional hot bluing and the results are more predictable than "bottle" cold bluing.

For the gunsmith, it opens Then it's time to sit back and relish the work of art you've created for your customer. Note: the 410 shotgun shown here was blued 35 years ago by the author. After much use by children and grandchildren, it looks as good as it did the day it was blued. the door to refinishing high end guns that were originally blued by this process and allows him to blue those old soft-soldered doubles that can't be blued in hot-bluing salts (unless your objective is to end up with two single barrels).

For me, the real benefit of slowrust bluing is that I can produce a metal finish that is far superior in both appearance and durability to other methods. And more than that, it allows me to experience another one of life's wonderful little pleasures. I

PEOPLE & COMPANIES

Making a Custom Rear Sight For the “Slugger” Shotgun

A fully adjustable rear sight on a slug shotgun certainly beats having to aim down the bare rib of the barrel. But a custom sight might require some ingenuity when fitting on a ventilated-rib shotgun.

BY NORMAN E. JOHNSON MARCH 2009

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When a father brought me his young son's Winchester Model 1300 shotgun to have a rear sight installed, I gave it some serious thought. It was obvious that a low sight would be required to prevent too-high slug impact at normal shooting distances. The son wanted to use the front bead for wing shooting, so the rear sight would have to be mounted to just clear the rib. My search for such a sight turned up nothing.

They didn't want the available clamp-on rib sights commonly used as shotgun sights for shooting slugs, so I suggested modifying an existing leaf-type rear sight I had on hand. It was mutually agreeable and appeared to be a workable plan. The blade-type sight I worked over had a 3/8-inch dovetail and a foldcontinued on page 22) down leaf. To make low mounting possible, the leaf had to be removed and the dovetail milled down.

Following these changes, a much lower replacement leaf sight was made and silver-soldered in position. Then a hole was drilled into the front of the sight for attachment through a rib stud. The hole was beveled deeply to fit a flat-head #8-40 screw. The screwhead was ground flatter for a low flush fit with the sight blade. On the Model 1300, the last 3 inches of the ventilated rib slopes down-

ward about six degrees, providing room for the lowered leaf of the twoinch sight. The sight screw was attached directly into the rear-most interfacing rib stud. The rib studs are made of steel, providing a sturdy anchor for the screw threads. It was necessary to bend the sight blade downward to follow the sloping contour of the rib in this area, and to give it sufficient tension to hold the elevation-adjustment leaf. A temporary stepped elevation leaf was tried as the shotgun was being sighted-in at 50 yards.

The stepped elevation leaf must be kept below the sight aperture to avoid obscuring the view. A final stepped sight adjustment leaf was then fitted. My first attempt at sighting-in the shotgun at 50 yards produced high impact, so I raised the front bead about 1/8 inch, using a higher brass bead as a replacement. This solved the problem.

I used a small round file to finally form the 0.085-inch, half-moon rearsight aperture, which permits the 0.190-inch front bead to just fit the aperture borders with the eye 16 inches from the rear sight. The sight was then blued. Despite the required modifications, this special rear sight for a Winchester Model 1300 slug gun was a worthwhile project. Shortly thereafter, the young hunter used the gun to bag a fine whitetail buck.

All in all, the project was a good move in helping to keep more of our youthful hunters afield. I

MAINTENANCE & REPAIR

Working the Winchester Model 1886 Rifles

This big lever-action, the second Browning design manufactured by Winchester, is still popular today, both as a shooter and as a collector's piece.

BY DAVID R. CHICOINE MARCH 2009

ORIGINAL PP. 19-22

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The venerable Model 1886 Winchester was originally designed by none other than John M. and Matthew S. Browning. In 1885, Winchester purchased the Browning patent rights and after some alterations, introduced the Model 1886 in that year as a replacement for their large-frame 1876 rifle. The Model 1886 was also a large rifle, with a particularly strong action. It became popular with big-game hunters from its introduction.

Winchester produced the 1886 in sporting rifle, carbine, and musket variations, and it could be ordered in almost any imaginable caliber of the day, from .33 WCF up to the huge .50-110 Express. All manner of special features, varied barrel lengths, and configurations were available and, for most of its early production years, a takedown feature was also an option. The classic Model 1886 was produced from 1886 until 1935, with a total of nearly 160,000 weapons manufactured.

After the model was officially dropped in 1935, a modernized variation of the Model 1886 with a coiled mainspring, renamed

the Model 71, was manufactured in .348 Winchester caliber for the next 22 years until 1957. The old 1886 is still popular with collectors and with shooters alike, who eagerly seek out the rifles, especially in the 45-70 and 45-90 calibers. Today the Model 1886 is being reproduced by Browning, although these new rifles are being manufactured in Japan.

In the early 1890s, Winchester greatly simplified and scaled down the 1886 action design in order to suit pistol-sized cartridges. They then reintroduced it as the Model 1892 and that became their replacement for the well-liked 1873. The 1892 had the distinct advantage of the strong, Browning-designed doublelocking-bolt action over the weaker toggle-link action of the 1873. Other advantages of the Model 1892 from both a manufacturing and sales points of view were fewer, simpler parts and a more compact action.

As a result, Winchester was able to offer the public the same punch but in a much stronger, lighter, simpler, and smaller rifle. Disassembly Instructions The exploded dia-

gram of the Winchester Model 1886 on page 21 comes from The Gun Digest Book of Exploded Firearms Drawings, 2nd edition, edited Murtz (DBI Books Inc.; Disassembly is straining the steps Start by making sure the rifle is unloaded. Grasp the rifle around the barrel and forearm wood with your left hand.

Then, being careful to keep the muzzle pointed in a safe direction, open the action by pulling the finger lever (#57) all the way down with your right hand. Examine the opened action to be certain there is not a cartridge in the barrel's chamber, and to make sure there is not one lying in the cartridge carrier (#61) within the action just below. If there is a cartridge in the carrier, when you close the lever, the rifle will be loaded.

A cartridge in the carrier also indicates there may be more cartridges remaining in the magazine. "

WORKING THE WINCHESTER MODEL 1886 RIFLES CONTINUED

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Only one screw retains both pieces. To safely unload a rifle with a loaded magazine, keep the muzzle pointed in a safe direction and keeping your finger away from the trigger, operate the lever to the fully open and closed positions several times to expel the cartridges in the magazine. Repeat this until no more cartridges come out. It's a good idea to remove any live ammunition to a separate location. 2.

Remove the buttstock and the mainspring by unscrewing and removing the upper tang screw (#21) from the upper tang. This will be the rear-most of the screws located behind the hammer. Then unscrew and remove the

lower tang screw (#22), which is a wood screw. The buttstock (#20) is now loose and is removed from the receiver (#19) by pulling it off to the rear. Unscrew and remove the springcover screw (#31) from the right side of the receiver, then lift the springcover assembly (#29 through 33) away from the receiver.

Place the hammer all the way forward. With the lever closed, in this position the rear tail of the main- The parts just below the upper tang are the carrier stop and its screw. These attach under the upper tang. (Notice the large pin punch.) The parts to the left of the lever are the carrier and carrier hook. spring

(#39) can be driven out of its seat with the tang from left to right using a pin punch and hammer. Notice how the ears of the mainspring (#39) fit into the hammer stirrup.

The mainspring is now lifted out of the hammer stirrup (#36) and the spring can be removed from the frame. 3. Remove the hammer and the lower tang next. To disassemble the lower tang, close the lever and while you're holding the trigger (#47) to the rear, unscrew and remove the receiver (hammer) screw (#34). The hammer (#35) is removed by pulling it up-

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Winchester Model 1886 Lever-Action Rifle 1 Magazine Tube 2 Magazine Plug 3 Magazine Plug Screw 4 Magazine Spring 5 Magazine Follower 6 Magazine Ring Pin 7 Magazine Ring 8 Forearm Tip 9 Forearm Tip Screws (2) 10 Forend 11 Forend Tip Tenon 12 Front Sight Base 13 Front Sight 14 Rear Sight Elevator 15 Rear Sight Assembly 16 Elevation Leaf 17 Elevation Leaf Screw 18 Barrel 19 Receiver 20 Stock 21 Upper Tang Screw 22 Lower Tang Screw 23 Buttplate 24 Upper Buttplate Screw 25 Lower Buttplate Screw 26 Buttplate Slide 27 Buttplate Slide Spring 28 Buttplate Slide Screw 29 Spring Cover Base 30 Spring Cover Spring 31 Spring Cover Screw 32 Spring Cover Leaf 33 Spring Cover Leaf Pin 34 Receiver Screw 35 Hammer 36 Stirrup 37 Stirrup Pin 38 Lower Tang 39 Mainspring 40 Mainspring Tension Screw 41 Sear/Trigger Spring 42 Sear/Trigger Spring Screw 43 Sear Catch 44 Sear Catch Pin 45 Sear 46 Kick-off for Set Trigger 47 Trigger 48 Trigger, Sear & KO Pin 49 Carrier Stop Tension Screw

50 Carrier Stop 51 Carrier Stop Screw 52 Locking Bolt (right) 53 Locking Bolt (left) ward, to the rear, and out of the action.

Open the lever and pull back on the lower tang (#38). The tang will come off by pulling it straight out the rear of 54 Finger Lever Pin 55 Bushing & Pin Screw 56 Finger Lever Pin Bushing 57 Finger Lever 58 Friction Stud 59 Friction Stud Spring the receiver. The lower tang assembly contains the trigger and its spring.

Unscrew and remove the trigger/ searspring screw (#42) from inside the 60 Friction Stud Pin 61 Carrier 62 Carrier Hook 63 Breech Bolt 64 Lever & Breech Bolt Pin 65 Ejector 66 Ejector Collar 67 Ejector Spring 68 Firing Pin 69 Extractor 70 Extractor Pin 71 Cartridge Guide 72 Cartridge Guide Screw 73 Cartridge Stop 74 Cartridge Stop Screw lower tang, then lift out the trigger/ sear spring (#41). The trigger can be removed out the bottom of the lower tang by using a pin punch and ham-

WORKING THE WINCHESTER MODEL 1886 RIFLES CONTINUED

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mer to drift the trigger pin (#48) from either side of the lower tang. 4. To disassemble the action, unscrew and remove the carrier-stop screw (#51). The carrier stop (#50) can now be removed from behind the underside of the upper tang. Using a suitable pin punch and hammer, drive out (from left to right) the finger-lever bushing pin (#54), and remove the finger-lever bushing (#56). This pin looks like a slotted screw, but it is actually a split pin.

Remove the locking bolts (#52 right and #53 left) by pulling them down and then out of the receiver. Lower the finger lever and slide the breechbolt (#63) to the rear far enough so the lever and breech-block pin (#64) is exposed. Use a hammer and suitably sized pin punch to drift out the lever and breech-block pin (#64). This disconnects the finger lever from the breech bolt (#63.) The breech bolt assembly is now withdrawn out the rear of the receiver.

Take note that the ejector (#65) is loose at the front of the breech bolt. It can be pulled out the front of the breech bolt, along with the ejector spring (#67) and ejector collar (#66). Pay careful attention to how these parts fit together with the bolt for later assembly. The lever with the carrier (#61) and the carrier hook (#62) are removed by pulling them out through the bottom of the receiver. Take note of the relationships of these parts as you separate them for ease of assembly later.

Finally, unscrew and remove the cartridge-stop screw (#74) from the left side of the receiver. Now lift the cartridge stop (#73) out from inside of the receiver. 5. To begin disassembly of the lever and the breech bolt, use a pin punch of appropriate size and a small hammer to drive the friction-stud pin (#60) out of the finger lever (#57). This frees the friction stud (#58) and its spring (#59), which are pulled out of the hole in the finger lever.

The extractor (#69) is removed from the breech bolt by using an appropriately sized pin punch and hammer to drive out the extractor pin (#70), freeing the extractor so it can be removed by pulling it forward and up until it comes free of the breech bolt. The firing pin (#68) can now be removed by pulling it out to the rear of the breech bolt. 6.

On Model 1886 rifles, begin the disassembly of the magazine tube and forearm by unscrewing and removing the magazine-plug screw (#3) from the bottom-front of the magazine tube (#1). The magazine-tube cap (#2) is now loose (careful, it's under spring tension) and can be turned one-quarter turn with a screwdriver and then pulled out the front of the magazine tube, along with the magazine spring (#4) and the magazine follower (#5).

Unscrew and remove the two forend tip (cap) screws (#9), located on each side of the forearm cap (#8), and slide the forearm cap forward slightly. Use a cup-tipped pin punch and hammer to drift out the

magazine-ring pin (#6) from the magazine ring (#7). Next, pull the magazine tube out toward the front. Once the tube has cleared the forearm wood, the forearm can be tilted down and pulled forward off the rifle.

The magazine tube is then turned toward either side of the rifle one-quarter turn perpendicular to the barrel to free the magazine ring from its dovetail seat in the bottom of the barrel. On Model 1886 carbines, unscrew and remove the magazine-plug screw (#3) from the very bottom-front of the magazine tube (#1). The magazinetype cap (#2) is now loose and can be pulled out the front of the magazine tube, along with the magazine spring (#4) and the magazine follower (#5).

Note that the plug will be under spring tension. Also, be sure to take notice of the direction the screws entered the bands before removing the bands so they can be reassembled correctly. Unscrew and remove the front and rear band screws from the front and rear magazine bands. The magazine tube can now be pulled out to the front and off the weapon. Slide the rear magazine band forward off the forearm wood, and then tilt the forearm down and pull it off to the front.

The forward magazine band can now be rotated one-half turn and will slide off over the sight base, as can the rear magazine band. That's all there is to the disassembly. Reassembly is in the reverse order of the steps above. I

HISTORY

Reader Forum

BY AMERICAN GUNSMITH EDITORS MARCH 2009

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Savage 340 Barrels I own a Savage 340E in .222 Remington. I don't know a lot of history about this gun or the 340 in general. I bought it about 22 years ago from a Tennessee groundhogger. I've been shooting it for about 4 years now (with Hornady V-Max). At 100 to 150 yards, it's a tackdriver. Here's my problem'ejection. I think the throat is burnt out. After about six rounds, it's time to get out the ram rod. I can't find a barrel and I don't want to think about tooling it up to .223 (if that's even a possibility).

Got any suggestions? Thanks in advance. If the throat is enlarged as you suspect, the problem is more likely related to extraction, because when the cartridge is fired the case expands to fill the breech tightly. We suggest you make a chamber cast with Brownells Cerro Safe and measure the casting against SAAMI specifications for a .222 chamber. If it's enlarged, call Savage and see if they can provide a replacement barrel or contact a barrel maker for a quote on anew barrel.

Winchester Model 37 Lever Did you ever do an article on the Winchester Model 37 Red Letter? I was told the barrels are fitted to each gun, but what's fitted to what?

And, if the lever doesn't return to center, how do you center it? Thanks. We've never done an article on this particular Winchester. The barrels are fitted to the receiver using factory headspace gauges.

When the action closes on a "go" gauge, the barrel, if not screwed in to that point, is otherwise secured in place and the shotgun is considered to be properly breeched. Shooters frequently fail to keep a thumb or other part of their hand clear of the lever when closing a breakopen shotgun. As a result, the lever is blocked from returning to dead center. In some designs, the lever never returns to center position, but is slightly to the left or right when the action is closed.

This does not mean the gun is unlocked and should not be fired. Crescent Victor Part? I am in need of the fore-iron and wood, if possible, for a Crescent Victor 12-gauge, single-barrel, auto-eject flat-spring model. As you probably know, the flat-spring model is different from the coil-spring model. Please advise if you have these items and I will place an order. Thanks. The AGA doesn't sell parts for guns, whether new or out of production.

READER FORUM CONTINUED

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Call Brownells and ask for a free copy of their "Parts Source List." After you get the list, be prepared to make some phone calls. Bolt for Sako 222 Rem Mag? I have a Sako .222 Rem Mag on which the bolt is missing. I've been to several gunsmiths trying to get a bolt or have one made. No one close in my area help me. I did try Numerich and they didn't have one. The only information on the gun is "SAKO Riihimaki No 48824" and several gunsmith marks. I've been told that the model is a Vixen.

Can you help me get in touch with someone who can supply a bolt or someone who can make one for this rifle? Thank you for your time. The SAKO rifle line is presently under the wing of Beretta US. They might be able to provide more general information on your rifle, although we suspect it predates their acquisition of SAKO by more than a few years. Securing a bolt is a much larger problem.

If Beretta USA had one, they wouldn't sell it to you. (It's restricted.) Searching the aftermarket is likely to result in a frustrating search involving lots of long-distance phone calls and ultimately leading to a dead end. Perhaps the best opportunity to have a bolt made lies with a master-metalsmith member of the American

Custom Gunmakers Guild But before you do that, you might want to check out your rifle in The Blue Book of Gun Values.

That might convince you to consider anew gun in .222 Rem Mag, rather than spending an equal amount of money'or more'chasing a bolt for your Vixen. Problems with the M1911? Do you have a back issue covering any problems with the Colt OM .45 ACP pistol? Over the years, there have been numerous articles on the M1911 in American Gunsmith. Some addressed problems, some were about upgrades, and there was a series of five articles with instructions on building a comp gun from scratch.

All of these are out of print now, but there will be another series on building a standard "government model" coming up soon. In the meantime, there is another source for the information you seek.

A very well known, highly respected gunsmith named Jerry Kuhnhausen has compiled many years of notes on the M1911 in three "Shop Manuals." These manuals, complete with diagrams, dimensions, and key information on troubleshooting/repair/modifications are available from Brownells By the way, if your Original Manufacture Colt wears "Property of U. S. Army" or other branch of the military, don't change a thing about it. Keep it clean and lightly lubricated inside and out.

FROM THE ORIGINAL PAGE

Its value is sky high and going nowhere but further up. Starfire .380 Takedown I need info on a Star Model F, also known as a Starfire .380 pistol, including the takedown procedure. I've saved all the American Gunsmith is-

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(continued from previous page) sued since I joined the AGA, but I need the month and year, if possible, of any article that might apply. Thanks. An article on the Star Model Fin .22 caliber appeared in the December 04 issue, and the Firestar was featured in the December 01 issue. The Gun Digest book on disassembly/reassembly for pistols also includes the Star PD. Between the information in the three sources, you should have little trouble taking down your .380.

Locking Remington 870 I have a Remington 870 12-gauge express mag in the shop. The customer said she shoots a lot during dove season. When the gun gets hot, it locks up and will not function until it cools down. I shot a box of 25 shells in under 10 minutes, and the barrel got hot to the touch but did not lock up. (She must shoot a lot more than I do in 10 minutes.) Would you think it gets hot enough for something to expand and cause it to lock up, or am I thinking too hard on the matter?

I took it apart and everything looks fine as far as I can tell. Thank you for your help. With a pump shotgun, when a customer delivers the general complaint: "It's locking up," it generally means the same thing as "It's jamming." In both cases, your initial response should be: "How?" Is it failing to

ejector extractor feed back? Or is it double feeding or failing to feed up? If it's locking, is it locking closed or locking open?

If you'll give us the phone number of your customer's he sounds like our kind of girl—we'd be happy to delve into this personally. (Just kidding.) But otherwise, we'd have to make some assumptions in our response. If she shoots a lot during dove season, she probably shops around for the best deal she can get on ammunition.

One of the ways shotshells can be made cheaply is to use low-cost brass for the base. (Low-cost brass flows easier than the better quality metal.) When the barrel heats up, cheap brass can flow in all directions, making extraction difficult, if not impossible. Thus the gun would be locked closed.

Barring the presence of a broken component, however, the most common cause of locking closed with an 870 is a burr that has been raised as a result of the heavy bolt repeatedly impacting the chamber at the barrel breech. Check it out. If it's there, smooth it out.

Conversely, again assuming nothing is broken, when the action locks open it is often caused by debris behind the trigger mecha-

nism, the forearm rubbing the barrel, or the forearm nut being loose. The latter two conditions lead to misalignment of the forearm, making functioning much harder than normal. Don't Touch the Marlin M19 I need an assembly/disassembly diagram for a Marlin Model 19, 12-gauge pump-action shotgun. I did contact the historian at the Marlin Firearms Co., but he was of no help. Thanks.

We have no schematic for the Marlin Model 19, and we aren't surprised to hear the company historian couldn't or wouldn't help you. About 10 years ago, Marlin Firearms issued a service bulletin on a considerable number of shotguns, for which the manufacturing records have been lost. The 19 was among them. Due to the age of these guns, as well as unknown metallurgy, heat treatment procedures, and acceptance standards, the major concern was the possibility of failures in the firing system when modern loads are used.

Possible failures include the hammer half-cock notch, the trigger sear, and the secondary safety sear. At the time the bulletin was issued, we published a report listing all affected guns. Our conclusion was, if one of these shotguns is ever brought into your shop, your reaction should be a polite "Thanks, but no thanks."

SEARCHABLE ISSUE RECORD

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