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EDITION

# PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

09

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

# TUNING RUGER SINGLE ACTIONS

KBC TOOLS & MACHINERY • IDENTIFYING HINDU KUSH GUNS • 3D PRINTING REALITIES • GIRSAN REGARD

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 225

DIGITAL ARCHIVE EDITION

# Preserved for the bench.

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# PRECISION ARMS WORKSHOP

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## TOOLS &amp; FIXTURES

# KBC Tools & Machinery

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2022

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**K**BC (KBCtools.com, has a line of metal cutting power and hand tools of use for your shop. The KBC Metal Chop Saw comes in 7.25, 14, and 15-inch models and features a no-load speed of 1550 RPM, a high torque motor, a cast aluminum base with integrated wear plate, and bench mounting holes. They also have a quick release vise with square threaded rod for fast and secure clamping, 0-45 degree miter capacity, and an attachable V-shape block for clamping of round and square tube.

With a 10-foot power cord, base, clamp, and a blade that has fully hardened body plates with tungsten carbide teeth that generate almost no heat, sparks, or burrs, KBC Chop Saws are ambidextrous and compact with ahead lock down pin, carrying handle, integrated tool storage, and chip collection tray. KBC's Pneumatic Hand Chamfering Tool takes the edge off a variety of materials, including ferrous and non-ferrous metals, plastics, and phenolics with speed and repeatability.

Able to remove burrs easily and create a uniform edge with repeatable accuracy up to almost 1mm of depth, prepare metal for welding jobs and clean them up after, and a host of other needs in the machine shop or on site. The bearing runs along the edge of the surface while two carbide inserts chamfer the edge for smooth results. Replacement standard triangular tip carbide inserts are available.

This hand tool fits a spot between hand deburring tools, such as Shaviv and Noga, and table top production chamfering machines. Chamfering capacity is 0.1mm to 1.5mm (0.004-

0.060") with a work depth of 0.1-0.9mm (0.004-0.035") and runs on air consumption of 7.7 CFM and 90 PSI at 30,000 RPM via a 1/4" air inlet. Finally, KBC's Shark Taps by Dormer are color coded to ensure tapping efficiency for the right material.

Manufactured from a unique powder metallurgy tool steel different from any other HSS-E-PM taps with a Ti AlN- Top coating, providing high impact toughness, increased hot and consistent hardness, and edge strength, allowing the taps to perform at higher cutting temperatures while offering excellent performance and longer tool life. The thread geometry and chamfer results in low torque, excellent threads and surface finishes, as well as reduction in axial forces.

Black Spiral Point taps are for high strength steels and heat resistant work materials with hardness up to 45HRC. Blue Spiral Point and Spiral Flute taps are for stainless steel and have Ti AlN + WC/C coating (Super B) with an additional edge treatment. Red Spiral Point taps are for blind hole tapping in most medium alloy steels with a back taper that further facilitates chip evacuation. Yellow Spiral Flute and Spiral Point taps are for through hole tapping in structural, plain carbon, and low alloy steels.

White Straight Flute taps are for semi-bottoming or through hole tapping in cast iron.

## PEOPLE &amp; COMPANIES

# Tuning Ruger Single Actions

*Learn how gunsmithing students at Trinidad State College are taught to tune two-screw Ruger single action handguns.*

BY DAN CROGHAN & GARY YEE SEPTEMBER 2022

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The following is a report from notes taken during the NRA Summer Gunsmithing Program at Trinidad State College as taught by Professor Ryan Newport, the school's Gunsmithing Department Head. This is typical of the courses offered at Trinidad State College. Dan Croghan and Gary Yee were gunsmithing classmates at Trinidad State from 2012-2014. Ruger revolvers are among the most durable and reliable firearms in the industry. Concurrently, Ruger revolvers also have some of the worst trigger pulls of any factory gun.

Fortunately, there is something you can do as a gunsmith to improve them and make your customer happy. While outwardly appearing like the Colt Single Action Army, internally the Ruger has a very different lockwork that incorporates numerous superior safety features. When cocking the Ruger one of the first things you will notice is that, unlike the Colt, there is neither a half cock nor is there any need for one. There are several reasons for this.

First, Ruger has a proven transfer bar that requires the trigger to be depressed for it to be raised. When struck by the hammer, the transfer bar transfers energy to the captured spring-loaded, frame-mounted firing pin and drives the firing pin forward. Unless there is pressure on the trigger, the trigger bar will not rise and the hammer drops on the frame instead of on the firing pin. The second reason for the lack of half cock is the hammer itself has two safety features.

The first safety feature is the step found on the hammer face. This step prevents the flat part of the hammer from physically contacting the firing pin. The second is newer Ruger Single Action Army and Vaqueros also have a cast-in dimple on the hammer. Even if someone were to grind off the safety notch on the hammer face, because of that dimple the hammer cannot strike the firing pin anyway. Before continuing, remember to always use the right size screwdriver to avoid ruining any screw.

You might want to break the sharp corners of the screwdriver though to prevent any burrs from marring the screw hole tunnels for the two re-The Gunsmithing Department at Trinidad State purchased overhead screens and cameras for each classroom that allows students in the class clearly see what the instructor is doing. This is a vast improvement over crowding around a table or looking over his shoulder. Almost grip screws. This avoids engraving a spiraled groove in tunnels which stands out in a blued firearm.

Initial Inspection Let's start with pre-inspection, disassembly, cleaning, and reassembly. Before tuning any gun, begin with a detailed disassembly and cleaning of the firearm. The purpose is two fold. The first is to identify and replace any part that is damaged or broken. Second, since dirt can impair the function, cleaning it gives a truer sense of how the lockwork functions or to identify any malfunctions. After ensuring that the firearm is unloaded and there is no live ammunition present, open the

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Besides weight, the trigger is tested for creep and crispness in break. loading gate, depress the base pin latch and pull the base pin forward and out of the frame. This allows the cylinder to be removed. Close the loading gate. Remove the grips and pull the hammer back. This exposes a hole found on the main spring strut. Insert a pin (you can make it from a nail) into the mainspring strut hole. Press the trigger and ease the hammer forward. Because of the pin, the mainspring is captured in the compressed state.

Flip the gun upside down to expose the screws around the trigger guard. Remove them and place them down such that you know which screw came out of which hole. The shortest screw goes in front of the trigger guard, the longest is the gate side (right side of frame) screw which interlocks with the hammer pivot pin groove and prevents it from walking. The mid length one goes on the opposite side (left side of frame). Use a magnetic parts trays to prevent the screws from being lost.

If the gun is stainless, a compartmental tray is handy here since stainless steel is non ferrous. Remove the grip frame screws that are adjacent

to the hammer. The grip frame may be pulled off the frame next. Since the bolt plunger and its spring rest in the grip frame and can easily be lost, be careful in separating the grip frame from the frame. After the two are separated, the pawl spring and pawl spring plunger may be pulled out of the frame. Set them aside.

The grip frame houses the wire trigger screw as well as the hammer spring and hammer strut. Note the orientation of the hammer spring and strut assembly before removing them. There is a flat surface that faces one o'clock as the frame is held in the right hand. To provide clearance for the hammer spring and hammer strut, it may be easier to lift the legs of the wire trigger spring off their shelves. This creates a little more working space to lift the hammer spring and hammer strut out.

The trigger spring may now be withdrawn from the rear. The next item to be removed is the trigger pivot pin. Depress the gate spring by inserting a punch or screwdriver to relieve the tension on the trigger pivot pin. Use a punch (preferably a brass or similar non-marring

punch) to begin to partially dislodge the trigger pivot pin from the left side of the frame. The hammer pivot pin is removed next.

Once that is removed, the hammer, pawl and trigger assembly (which includes the trigger) and the transfer bar may be removed. Lift out the gate spring. The bolt and spring may now be removed. Finally, the gate may be slid out of the frame. The firing pin's removal is not recommended. If its ill-advised removal proves absolutely necessary, opening the loading gate exposes the hole into which a punch may be used to drive it out. After the pin is removed, the firing pin bushing and firing pin may be removed.

However, once this is done you are committed to refinishing the firearm. It is recommended that the firearm's internal parts are cleaned at this point. If you're not already familiar with the pawl, look at it after you cleaned it. There are two steps on it. The top or Pickup Step engages the ratchet and begins the rotation. The lower or Carryup Step completes the rotation. Functionally this is the same as on the Colt percussion revolvers, Single

## TUNING RUGER SINGLE ACTIONS CONTINUED

ORIGINAL PAGE 5

Action Army, Police Positive, and Python. To reassemble, start with the trigger assembly and hammer assembly. Place the pawl pin into the most forward hole of the hammer. The hammer and pawl may be inserted into the frame. The slotted portion is placed in such that it is on the gated side of the frame. The transfer bar is placed onto the trigger. Insert the trigger assembly into the frame. The trigger should be all the way to the left side of the frame; seen upside down it would be the top.

Insert the pins to secure them. The loading gate is inserted next. The cylinder latch and gate spring are assembled together. The 90-degree bend of the gate spring is parallel with the 90-degree arm of the cylinder latch. They are inserted such that the 90-degree arm We're not trying to remove metal but merely polishing the surface that the moving parts bear against to reduce friction.

Note how the workpiece is clamped in the padded vise jaws to protect against scratches. of the gate spring enters the square hole in the frame and the arm rides on the loading gate's camming surface. This spring supplies the tension that keeps the gate in place. Trigger pin goes in next from the gate side. Compress the loading gate spring and push the unslotted side in first from the right side of the frame. When fully inserted, the slotted side is between the arms of the gate spring.

Open the gate and insert the cylinder. Push the base pin in and seat it. This secures the transfer bar and prevents it from binding beneath the firing pin. Reassemble the grip frame assembly next by inserting the trigger spring. Insert the hammer spring pin to secure it. Insert the hammer strut and spring next. After the latter is in place, hook the arms of the trigger spring legs over their respective shelves.

Next, place the cylinder latch spring and plunger into the grip frame such that the plunger protrudes from the grip frame. Insert the pawl plunger and spring into the highest hole on the left hand side of the frame. The plunger goes in first and the spring is left protruding from the frame. After this is done, you may assemble the grip frame to the frame. The cylinder latch spring must ride on the cylinder latch to provide the cylinder latch upward pressure.

Also, be careful not to bind up the pawl plunger spring against the grip frame. It must be compressed into the frame and not alongside the frame. Should the latter happen, the spring will be damaged and require replacing. The hammer strut must enter its slot in the hammer. Pulling back slightly on the hammer will give you some working space to finagle them together. Before pushing the two frames in together, use a screwdriver to push down on the trigger spring to snap the trigger spring into place.

After ensuring that nothing is binding, push the grip frame forward. Unlike the larger Vaquero and Blackhawk models, the smaller Ruger Single Action revolver grip frames have two stiffening arms that insert into the frame. To assemble the smaller single actions, a slight downward angle is required to depress the bolt plunger before straightening and pushing the grip frame forward. The shortest screw goes into the front of the trigger guard. Take the longest screw (the gate screw) and insert that next.

The mid length screw goes into the non-gate side. The rear screws goes in last. Finally, reassemble the grip to the frame. This completes reassembly of the firearm. On the newer California safety compliant Vaquero, the hammer strut bears against the safety and

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Far Here Professor Newport is discussing the sear and hammer notch relation. These critical surfaces should not be changed but may be polished instead. This is its correct angle. Note how it the face of the sear forms a straight line to the axis of the transfer bar. Here Professor Newport is discussing the hammer notch. He explained that one should not alter the surface marked by the lines but merely polish them.

The beauty of the overhead projector is that by drawing lines on the image, the instructor conveys exactly what part of an object is being discussed. there is no base plate to pin the strut for its removal. While removal is straightforward, reassembly is slightly more difficult. Place the strut against the side of the vise jaws and open the jaws such that the strut fits in. Now put the strut into the spring and the spring against the side of the vise jaws.

Using pliers, compress the strut such that it passes through the spring and exposes the hole so that a pin may be inserted into the strut. This allows the hammer spring to be captured in a

compressed state for reassembly. Pre-work Inspection Besides performing a function check, put snap caps in the cylinder to protect the firing pin and test the trigger for weight and for the trigger pull's crispness. Use your trigger gauge to measure the weight of the trigger pull. Do this five times and take the average.

The hammer controls the operation of the gun. It controls the pawl and the spring-loaded plunger mounted inside the hammer provides tension on the bolt and keeps it locked up. When the plunger rotates over the bolt and when it slips past, the bolt is pushed up by the grip frame mounted spring and plunger. Reassemble the gun and test the hammer for push off. Cock the hammer and with the finger off the trigger, apply pressure on the back of the hammer to ensure that the sear is holding it in place.

Do this for all chambers of the cylinder. Check the cylinder lock up by pulling the hammer back slowly. Check that the cylinder rotates and locks up. If there is a chamber that doesn't lock up, it needs to be marked. Do this by rotating it past

the barrel and use either a pencil or Sharpie to place a mark on the side of the cylinder. Now finish the rest. After all cylinders are checked, use a range rod to ensure that the cylinder and the forcing cone are aligned. It should range for each chamber.

If the range rod hits the chamber face, mark the cylinder for repair. If no range rod is available, there is the old fashioned way of shining a light from behind the cylinder and looking down the bore. Bore and cylinder misalignment is visibly evident. After pulling back on the hammer, the spring loaded plunger should contact the bolt. The audible "click" is the bolt going back all the way and engaging the sear. When the hammer is dropped, its movement should be smooth.

There should be a single click which is the bolt popping out from its window and engaging the cylinder. A note on repairing failure of carry up. If the ratchet is in good condition, then the pawl is at fault for carry up failure. If it is the ratchet, place the cylinder with the mark at 12 o'clock. The ratchet at 9 o'clock needs to have material

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The surface must be fluxed and heated, soldered, and then the soldered overtravel pad placed atop of it. silver soldered in place and then filed to fit. Alternatively, the old fashioned way of handling it is to displace some metal by punching it and shifting metal over 0.002- 0.003". Tuning the Action Before working on the action itself, there are helpful things that could be done in preparation of smoothing the action. Examine the wear marks on the bolt, pawl, trigger, transfer bar, and hammer.

Without touching the working surfaces, use an India stone and then a ceramic stone to remove any burrs. Polishing paper supported by solid backing is then used for a final finish. The object is to reduce the friction A punch is used to apply downward pressure on the pad. between the moving parts. Also stone the windows on the frame.

This would include the window for the cylinder stop and pawl as well as the frame's raceway for the transfer bar, areas where the hammer rotates

and window frame on the grip frame may be stoned. On to lightening the trigger pull. If the customer wants a lighter trigger, either modify the existing spring, or better yet, replacing them with aftermarket springs works. A method found on You Tube which is not recommended is to unhook one leg of the trigger spring.

The unhooked leg not only can catch on the hammer spring, but it can also cause the hammer spring to bind. Since that creates more problems The bolt's plunger is generally very thin so it is not recommended to not dress it with any polishing paper. At most you may lightly stone the top. The part of the transfer bar that contacts the cylinder rod pin could be polished. The trigger weight poundages in our sample revolver as factory delivered were 3.64, 3.77, 3.77, 3.10, and 3.41 with a 3.538 average.

Let's look at the bolt. The height of the bolt where it interfaces with the hammer-mounted plunger determines the time it unlocks. If it is shortened too much, the plunger clears the bolt too quickly

and the bolt pops up too soon through the window; this causes a longer ring mark on the cylinder. Measure the height of the bolt from the top of the pivot pin hole. If the bolt is lengthened by 0.0015" the increased height will delay the plunger's drop.

To add material, use 0.0016" tool steel (this is a bearing surface subject to wear) and silver solder it. Do not TIG weld it since can ruin the dimensions of the tip. On the bolt, polish the top but do not change any angles. To do this, place it into a vise with it barely exposed. A machinist vise mounted in a larger vise gives one a good than it solves, it should be avoided. It is better to buy an aftermarket trigger spring. clean vise jaw to work with.

Note, if the machinist vise jaws aren't parallel, one may put a piece of round stock into the Vgroove of the vise and clamp it. This will cause the jaws to align.

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The round stock may be surface ground to the jaws to make them parallel. Place the bolt such that only the part to be worked on is exposed. Neither round off the edges nor change the angles. Start with an India stone and progressively switch to finer stones. After the top is dressed up, dress up the sides of the bolt and deburr it. Apply TW25B lube or similar on top of bolt and along the side and other working parts of the gun. Next up is the hammer strut.

The long part of the hammer strut where the hammer spring goes should be smoothed. This can be done on a belt sander. Polish the sides and remove the machine marks on the outer edges. Since the center never contacts the spring, don't worry about it. Just polish the high marks left over from the stamping process. The rounded head of the hammer strut is the pivot point against which the hammer bears. This is best buffed on a buffing wheel to clean up the outside radius.

With the base plate, clean up the leading edge of all four sides. Use polishing paper backed by something solid. Polish the inside of the hole where the hammer strut passes through. This reduces the friction and binding of the hammer strut as it passes through the base plate hole.

Next is the gate and spring. The flat part of the gate spring holds the gate in the closed position. If the gate flops, then the angle has been rounded off. Minor radius and polish with a stone.

On the gate, use a fine round stone and polish the flat edge of the loading gate. Let's address hammer creep. Creep is the felt movement of the hammer and the sear. To decrease it, decrease the sear engagement between the sear and the hammer. We can not give a number or amount of material to be removed because the geometry of the holes in the frames can be different as well as the pin and location of the working surfaces of the parts. There are special jigs to work on the trigger.

If one Far The right forefinger was placed atop of the file to prevent Dan from canting the file. Blue painter's tape was placed on the vise jaw to warn the gunsmith if the file got too close to the vise. isn't available, don't worry as you can use the frame as the jig. First, protect the frame's finish by applying masking tape or painter's tape on the frame. Locate the two pin holes and punch a hole through to allow for the insertion of the pin.

After inserting the pins, place the hammer on its pivot pin and the trigger on its pin. This allows for studying the relation between these two crucial parts. Mount the hammer into the machinist vise. Take five strokes front and back on the face of the hook. Next step is to decrease the sear engagement by removing some of the engagement surface on the hammer. Clean up the hammer notch with a square stone. Do not change the angle. Make sure it isn't at a negative engagement angle as it can allow slippage.

A positive angle results in a heavier trigger pull. Finish by using a fine ruby stone; five strokes to clean up inside the hook. After all the parts are polished, deburred, and stoned, clean them again to remove any grit residue and then reassemble. Now test the trigger. Leave the tape on the frame as it tensions the pins. Put the hammer and trigger into the frame. Cock it, and with pressure on the hammer, test for push off. If there is push off, this must be corrected first.

If there is no push off, test for creep. Since the trigger spring is not inside the frame, you get a true test. The en-

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gagement between the parts are without the spring influencing the parts. Overtravel We must start with a disclaimer. The following information describes what was performed at school under the direct supervision of our instructor and is provided for information purposes only. Since improper execution can impair the safe function of the sear and firearm, it should not be attempted as one should first have a thorough understanding of the geometry and operation of the sear.

Neither the authors nor the publisher assume any responsibility for the reader's actions. Padded vise jaws prevent marring and slipping. Overtravel is the movement of the trigger after the sear releases the hammer. To correct this, the class added more material onto the front of the sear. Don't do this by TIG welding since TIG is too hot and at its very high heat this will reharden the sear and make the sear brittle. Then it'll have to be tempered to take some of the hardness out.

The hotter the metal, the more hardness has to be removed. Therefore, the best way to do this is to solder apiece of metal on it since anything at 300 degrees Fahrenheit is not enough to change the workpiece's hardness. Consider these factors in selecting the solder. Silver solder works at about 1150°F, which is a too much. High force/high temp solder is 900 and still too much.

Soft solder is 300, high pressure/low temp solder is 400-425 and has a higher shear strength at 30,000 pounds per square inch.

The metal pad does not need much strength. As for metal, use mild steel. Hard tool steel would be wasteful and the impact force is very little. Use a soft solder with it. Prepare the sear surface by abrading it with 120 aluminium oxide (Klingspore). Apply flux. Hold the torch at an angle from below. Do the same with the preparation of the steel pad. Place the two soldered surfaces together and apply heat to unify them. When it cools, test by pushing on it with a punch to check that it is secure.

Now the part must be fitted to the gun. Insert it in to the frame. Initially the hammer may not be cocked because the additional material hits the interior of the frame and prevents the trigger from rotating forward. Remove the trigger and begin removing from the metal pad that was just soldered on. Start with a file. Sharpie may be applied to ensure that it is being filing evenly. Then install it with the hammer and test again. It probably won't allow the hammer forward so the process must be repeated.

This can be tedious. The goal is that when the hammer is released, the trigger does not travel rearward after the hammer is dropped anymore. Additional Work Case hardening is done to introduce carbon into an object down to 0.005-0.007" depth. The process is to heat the object to

critical and plunge it into Kasenite to coat it with carbon. Repeat this twice more, and then reheat it again to critical and plunge it into water. Clean the part with a wire brush and then 400 grit to remove the scaling.

Don't remove the hardness you just introduced. Chamber polishing may be warranted. If the chamber is clean and the cartridges are tight, polishing may help. A brass polishing stick may be made with 1/4" brass rod. Flatten the top and then put a slight bevel on the edges. Use the cutting edge of the file to cut a line along the top. Now saw it down vertically to the height of the blade. Tear a 1/4" strip off of 400 grit emery cloth. When wrapped around the polishing stick, it should fit into the chamber.

If the polishing stick with emery is a little too tight, remove just a little of the material. Now insert it into the chamber and do quick short bursts to polish the chamber. Do not try to get a mirror bright finish, just go for a smooth surface. Since the forcing cone is tapered slightly, use a 1/8" strip of emery paper and wrap it beneath the 1/4" strip on the stick to give it a taper. Use the same technique to polish the forcing cone.

While this overview covered the Ruger, the techniques can apply to other revolvers. NRA Summer Gunsmithing Program held at Trinidad State College offers many other course to expand your gunsmithing knowledge. AG

## FROM THE ARCHIVE

# Identifying Hindu Kush Guns

*Named for the mountain range west of the Himalayas, here's how I identify guns from the Hindu Kush for restoration.*

BY PAUL MAZAN SEPTEMBER 2022

ORIGINAL PP. 10–12

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Lately, I have been seeing a lot of guns passing through the shop that are copies of British firearms. These copies are generally referred to as “Khyber Pass” guns although they may have been made any place in the Middle East or South Asia. They often incorporate original parts and can range in quality from pretty good to simply terrible. The more you know about these guns the easier it is to recognize what you are looking at and not end up paying the original price for a copy.

Here are some recent examples I have run across. I have often joked that there must be a law that everyone ever touching a British military firearm is required to put a stamp on it. All those stamps have a meaning and usually designate some change in the condition of the gun. For example, the broad arrow means that it has been accepted into service and is the property of the British Government. As the Enfield Number Ones had additional features incorporated into them, they were stamped to indicate that upgrade.

By looking for those markings we can often tell if a gun is an original or a copy. For our first example let's look at a Snider that I ran into recently. At first glance, it looked like an officer's carbine, the sort of firearm that an officer might use for hunting. It has a shortened, checkered stock and barrel with an under rib. However, comparing it to another Snider shows some suspicious details. First, the lock has no stamps on it.

The only marking in the lock is marked “Tower” with the year of manufacture and a crown behind the hammer. Secondly, there is no War Department broad arrow on the action and the hammer is not centered on the firing pin. In addition, the checkering on the stock is poorly done, one of the cleaning rod guides is badly shaped, and there are what appears to be Arabic markings on the barrel.

All together these clues suggest that this particular gun is an accumulation of parts, with some original issue parts and some locally

made. The real convincing factor was the discovery made when I cleaned the badly fouled barrel and discovered that the gun is a smooth bore. To my knowledge the British never made a smooth bore version of the Snider, however, the Belgians did. Many obsolete military firearms were converted to “Zulu Shotguns” by the Belgians in the early 1900s for the “African Trade”.

Both Sniders and French Tabatières are often found marked Zulu. With the Arabic markings on the barrel, I would suspect this specimen to have come out of the Hindu Kush rather than Belgium but my goal was to provide you with information that would allow you to know what you are buying. The second example is a Martini Enfield chambered in 303 British. Although the Brits did indeed rebarrel some Martini rifles to 303 British, Bottom, an unmarked lock of a Snider copy.



Below that is the top of a Snider copy. Note the hammer is not square on the firing pin. there are some suspect features on this one that suggest the conversion was not done by the British. First, it is clear that this Martini has been refinished. However, at first glance, although the receiver seems to be everything it should be, a closer look brings its authenticity into question. The lettering on the side of the receiver seems to be ever so slightly wrong.



The lettering is just not lined up as precisely as you would expect and then there are those broad arrows at the front of the receiver. This is the first time I have seen multiple broad arrows (there are two on the left side also) placed so that they look more like decorations than marks of British Military acceptance. Since British #1 Enfield barrels have the same thread as the Martini it is not an exceedingly difficult task to rebarrel a Martini to 303 British and

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it is possible the markings were restamped by hand after they had been partially removed when the gun was polished and reblued. What we are left with is a nice shootable Martini with little to no collector value. As I've said before, I have no problem refurbishing old project 303. The front side of the suspected Martini copy with

“decorative” broad arrows. guns into shooting condition because if I can afford them, they almost certainly have little or no collector value.

Learning how to identify On top is a Mk II Martini with proper markings. Below that, a refinished Martini chambered in caliber .303 with lettering that seems slightly askew and two broad arrows at

front of receiver. Identify guns from the Hindu Kush, or from any other region or era, will help you determine the historical origins of any firearm you restore. Even if there is no significant collector value, knowing its history will enhance the ownership and shooting experience for you and your customers. AG

## FROM THE ARCHIVE

# 3D Printing Realities

*A discussion of the strength of 3D printed parts, some of the disadvantages, and how to mitigate them.*

BY BRYCE DUNN SEPTEMBER 2022

ORIGINAL PP. 13–14

When I discuss 3D printing it's usually very positive. It is an amazing technology, and it allows the little guy to do things that previously cost large companies hundreds of thousands of dollars in mold making. However there are disadvantages and they are not talked about enough. These disadvantages include time, the steep learning curve, and strength of the printed parts. Printing takes along time and there isn't much you can do about that.

The highest resolution prints are done with a fine nozzle size (0.1- 0.3mm) and layer height (0.06-0.12 millimeters per second) as well as fairly low rates of speed on the XY movement of the nozzle (15-35mm/s). You can sacrifice resolution to speed up the process by increasing the values of any one of these variables or all of them. A good middle ground that many professional printers use is a 0.4mm nozzle, 0.2-0.24mm layer height, and speeds from 40-60mm/s.

More expensive machines that have higher quality bearings can increase these speeds even further without sacrificing much accuracy, just like modern CNC machines. The learning curve is just something you have to make it through, just like when you buy your first lathe or milling machine. There are hundreds of YouTube tutorials on how to fix and service your printer as well as more advanced topics like material selection and slicer settings. The number one thing you will need is patience.

Cheap printers will often present you with problems that seem perplexing but once you figure it out are very simple in hindsight. Look for patterns to the failures, like time into the print (heat creep in the nozzle cold end),

vertical banding (vibration from loose belts or frame bolts, similar to chatter in a milling machine), or excess blobs and zits (not enough filament retraction). Printed parts, for the most part, are inherently weaker than injection molded parts.

This is because of the layered nature of their construction; the degree of this loss of strength varies by material, but what it really comes down to is layer adhesion. In the X/Y plane (flat on the print bed) each layer is about 99% as strong as an injection molded part or extruded part because each layer is a continuous extrusion.

Once that layer is complete, the printer retracts the plastic filament to prevent oozing from the nozzle and lifts the nozzle to the height of the next layer, breaking this continuous extrusion. Then the next layer is deposited into the previous one, which has already started to cool. Temperature plays a role here; the faster the next layer is extruded onto the layer below and the higher the bed/ambient temperature, the less cooling there is between layers, so they bond better.

This means that in general smaller objects and faster print times produce stronger parts. If you print a thin-walled box as large as the build bed it will have much worse layer adhesion, to the point where an apt analogy would be a flaky biscuit. The layers will split if you look at it wrong and may even split on their own as the part cools down. The same applies for even properly printed objects if they are very tall, say a free float AR-15 rail.

The narrow cross section and increased leverage of any forces acting to break the rail on the long axis will cause it to fail between

layers. Mitigating Risk There are a few strategies to mitigate this risk, such as material selection, Z-pinning, reduced cooling, layer stepping, post processing, and print orientation. Some materials bond to each other better than others, so they have better layer adhesion. In my testing efforts I refer to this as the C, or S/O rating.

This is basically a measure of how isometric or even the strength of a printed test sample is. I print samples along each of the three axes: Z (tall), Y (sideways), and X (flat). The break strength values of the Y and X samples are averaged, and the S/O rating is a ratio of Z strength over this averaged XY value. A 1.0 means completely isometric, even in all axes, less than one is weaker in the Z axis (layer adhesion), and greater than one is stronger in the Z axis (very unusual).

So far, the top five isometric filament materials I have tested are Taulman Alloy 910 Nylon (0.75), Poly Maker Max PC- FR (0.86), Iglidur i150 (0.90), Duramic PLA+ (0.99), and Poly Maker Max PETG (1.03). Since PC and Nylon are advanced materials and require more experience to print, two easier to print alternatives are Overture PLApro (0.92), and Form- Futura HDglass PETG (1.04). Z-pinning is a term borrowed from composite engineering, which also has a layered strength problem due to the orientation of the fibers.

In composites this basically means stapling or pinning the layers together to resist delamination, and it's pretty much the same idea for printed parts. Using the free-float AR rail example again, I reinforced this design of a printed M-Lok rail (based on the excellent BCM KMR/

## 3D PRINTING REALITIES CONTINUED

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MCMR barrel nut system) with 2mm carbon fiber or stainless steel rods. The rail prints in two halves with pilot holes for the rods baked into the design. Because of over-extrusion (another common method to increase strength), the parts can't be printed with completely accurate bores for the rods. Instead, they print with 1mm pilot bores which are drilled out to just over 2mm after printing. Then the rods are wet with epoxy and inserted to the back half of the rail, and the front half is then slid on over them.

Regular superglue is used at the joint to ensure they stick together while the epoxy cures and they are also clamped while curing. These rods transform this rail from a weak novelty to something strong enough to survive serious abuse. Reducing the part cooling fan can also increase layer adhesion but at the cost of resolution.

Fine details, especially overhangs, will droop if they are not cooled fast enough, but for the most part many prints can do with as little as 5-10% cooling instead of the more than 50% that is common. This depends on the material used, the design of the object, and it takes I have tested five isometric filament materials in this manner. a lot of experimentation to get right.

However, I have found that 5% cooling makes a slightly stiffer part than no cooling fan, which I believe is due to the self-reinforcing effect of internal stresses created by cooling. Layer stepping can help link layers together by using different layer heights for different structures within the object.

An example would be printing the shells of an object (top/bottom/sides) at a very fine layer height such as 0.08mm for better resolution, but printing the honeycomb interior at an interval of that height, such as 1.6mm. This means that the machine prints two layers of perimeters before it then prints a double thick layer of infill, which links these two layers together. This method also reduces print time while still allowing for fine exterior detail resolution.

The strongest parts I've ever printed were done with 0.12mm layer height on the perimeters and 0.24mm layer height (every second layer) for the infill. Also, the slicer was set to print a solid layer every second layer, meaning there was no honeycomb infill pattern but instead a stack of solid layers throughout the part, making it completely solid. These solid infill layers had the extrusions running in three directions, clocked 120° every layer.

This alternating pattern allows the extrusions to cross over the very small gaps between extrusions in the previous layer, dipping into and filling them, which helps the layers adhere to each other and makes the part more solid. Post processing can only be done with certain types of filament, mainly PLA+, and only if the manufacturer has published procedures for it. This process involves heating the part up in an oven, sometimes with the part packed in salt to help support it's shape.

Depending on the material, this either remelts and softens the part to some degree, or hardens it through crystallization. Remelting strengthens layer adhesion by causing a small

amount of molten plastic to flow into the very small pores and cracks in the underneath layer, making them bonded more strongly when the part cools. This process also stress-relieves the part. Nylon and ABS can be remelted to some degree, but it will negatively affect resolution and critical dimensions.

PLA and PLA+ both print in an amorphous state, and they can be crystallized by specific rates of reheating and cooling. This raises their glass transition temperature, so the treated parts can stand up to higher service temperatures than untreated parts. This effect can also be the source of nozzle clogging issues, especially with PETG. When PETG fully crystallizes it can't be melted again, so if it becomes overheated in the nozzle it will burn and clog. And finally there is print orientation.

If the printed part doesn't need to be very strong in a certain direction, just arrange it so it prints with that direction on the Zaxis where the layers are stacked. You can also split the difference between the three axes by rotating the part 45° in the XY plane and leaning it over 45° on the Zaxis. This arranges the layers so that they are halfway between being aligned in any one axis, spreading out their strengths and weaknesses across different areas of the part.

In composites this is called quasi-isometric layup, where fiber plies are arranged in as many orientations as possible to make the part stronger in more directions. AG

## MACHINING

# Girsan Regard

*The Girsan Regard is a copy of the Beretta 92, a very interesting firearm with good interchangeability with Beretta parts. We'll look at gunsmithing specifics, including interchangeability of parts with the Regard fourth generation model.*

BY ROBERT K. CAMPBELL SEPTEMBER 2022

ORIGINAL PP. 15-17

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Some American companies farm work out to Mexico. In Europe some machine work is farmed out to Turkey. While many European companies have an excellent reputation I sometimes wonder if they will come to regret having Turkey produce a less expensive line of Italian-designed firearms under the Stoeger line. This has given the Turks quite a bit of useful experience! The Benelli shotguns and Beretta pistols marked Stoeger work just fine, they simply are often less nicely finished.

I have lost track of the number of Turkish pistols and shotguns I have examined; they are workmanlike designs and some have been as well

finished as any firearm. The new Browning High Power clone produced in Turkey is not only nicely finished, certain parts known to give trouble in the High Power in long term use have been beefed up.

I am not saying your High Power needed improvement—please hold the angry letters—but in long, hard military use every firearm has a certain weakness, if breaking at 30,000 rounds can be considered a weakness. The High Power has seen hard use in Africa and the Middle East. So has the Beretta 92, which has been given a special treatment by Girsan in their Regard pistol. Unfortunately, many among the new generation of gun owners do not quite understand quality.

They don't understand precision, clearance, tolerances, and specifications and are purchasing largely on hand fit, feel, and bling. Surprisingly but fortunately, this is turning out well for most. As an example, I had a pistol recently land on my work bench that brought back memories from along learning curve. The first time I fitted a custom barrel to the 1911 pistol the handgun was a Llama. The Llama is nothing special. Most were of soft steel. I have never

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. seen one I would trust my life to. It turns out that someone has brought the Llama back as are-branded Rock Island/Armscor handgun. These are much better quality than any original Llama. My friend wished to compete in IPSC but was on a strict budget. We worked up the Llama and he learned a lot about shooting. In a similar situation, the Girsan Regard pistol on my bench was owned by a young man that had purchased it because he thought it looked like the Wilson Combat Beretta he had seen in Gun Tests magazine.

He could not afford the real thing and the Girsan Regard had that look. Would it accept Wilson Combat parts? A custom barrel? I did not snort or discourage this young man. I would learn myself and some good experiences with Turkish guns made me curious and respectful. The Girsan isn't an exact Beretta 92 clone but is based on the

Beretta 92A1, having a light rail and dovetailed sights front and rear. The main departure from the Beretta of controls and ergonomics.

The pistol features front strap finger grooves; they feel okay and the pistol handles well. You will not be using certain aftermarket grips that cover the front strap but other Beretta 92 grips interchange. This fourth generation Regard model features an odd set of grips being made of G-10 (a high-pressure fiberglass laminate) with a clear slot cut to allow viewing the magazine. The magazine has a corresponding slot for viewing cartridges. At first it seems odd but doesn't appear to have any drawbacks.

The magazine release is an enlarged paddle type that works well and seems positive in operation. The safety is a standard Beretta 92 type and the

take down procedure is straight forward Beretta. The take down lever is tilted or angled a bit compared to the Beretta but works fine. The sights seem to be standard 92A1 dovetail. The ambidextrous safety is slightly different from the Beretta but works as well. The hammer is the new Elite II type used on some Beretta pistols.

Overall the pistol seems a hardy rendition of the Beretta with the addition of forward cocking serrations on the slide to enhance combat ability. As aside note, the owner wished to own a Beretta Centurion type pistol so the work was farmed out to a machine shop to have the barrel shortened flush with the slide and recrowned. It turned out well. For other modifications, the owner was curious concerning the adaptability of Beretta parts, and by extension, Wilson Combat parts,

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They are well done. The safety is fine as issued but may be changed out for Wilson Combat parts. to the pistol. As mentioned previously, the subject of grips wasn't an issue and I changed the grips out for a set of high grade presentation Beretta 92 grips on hand without any problem. I slipped out the magazine release and dropped in a standard Beretta 92 part and that magazine release fit well. No fitting was needed for the safety lever. I went so far as to change the firing pin without any difficulty.

Trigger parts and springs are the same. There is some assumption here, however, as the pistol is designated the Regard Gen 4 and I can not comment on any of the other generations. A largely cosmetic difference is the grip strap serrations are different than the Beretta. The rear strap treatment and the finger groove grip seem to be an attempt to make a difference in handling the wide grip of the Beretta 92 type.

The slide stop/ slide lock works in the same manner as the Beretta and interchanges with the Beretta but looks slightly different. I had on hand

a spring kit from Wolff Gunsprings (Gun-Springs.com, for the Beretta and this also worked well enough. It seems elementary after checking the more complicated parts but Beretta magazines also lock in and function. I would have been surprised if they had not. Concerning parts, one difference is the Girsan locking wedge.

The oscillating wedge first appeared, to the best of my knowledge, in the Mauser Broomhandle pistol and was later used in the Walther P38 9mm pistol. The locking wedge rides near the front of the slide with the Walther design. When the double action first shot Walther P38 was adopted into the Beretta 92 the pistol was given a single recoil spring rather than the dual springs of the P38 while the open top slide was retained. The pistol uses an oscillating wedge, however, the wedge is moved to the rear of the barrel.

These wedges occasionally break but not often in civilian use. Beretta changed the wedge design some years ago and the present version is longer lived. Just the same, with a life generally held to be 20,000 rounds this part is robust, however, it

simply must be replaced occasionally. The Girsan locking wedge is both more rounded; upon close examination shows it has been modified to an extent. This will not or should not have an effect with changing the barrel as the locking wedge may be removed from the barrel.

If the new locking wedge is an improvement, and it appears to be, the Girsan is a great pistol and a legitimate choice for those preferring the Beretta 92 system. As for parts interchangeability, then, save for the locking wedge the Girsan is compatible with the Beretta 92. Firing tests have been encouraging without any type of malfunctions, although the tests have been limited. Accuracy seems on a level with the standard Beretta 92.

When the Girsan comes into your shop for modification and upgrade you may order Wilson Combat parts with confidence. You may replace parts with Beretta parts without difficult with the one exception noted. AG

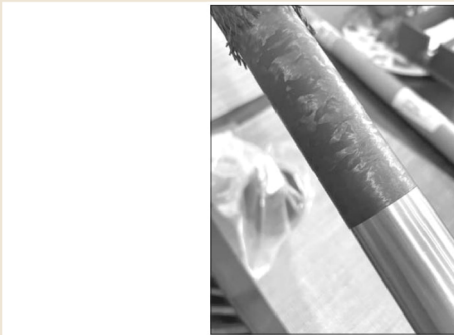
## RIFLES

# Dumoulin Mauser Barrel Work

*Lock, stock, and a really good looking barrel! Here's how I customized the inletting of an aftermarket rifle stock and improved the finish of an action for a custom build.*

BY ROBERT M. LAYNG SEPTEMBER 2022

ORIGINAL PP. 18–22



Above: The carbon fiber-wrapped barrel from Carbon Six. It is ready to be threaded and fitted to the M98 action.

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Prior to the COVID-19 pandemic, I got the idea in my head that I wanted a custom rifle built. I got into the project knowing that I would need the help of a skilled gunsmith to attach the barrel to the action. Outside of that, I was confident that I could handle the rest of it on my workbench at home. The first decision I had to make was going to be the heart of the build: the receiver. It seems that everyone and their brother nowadays is building some variation of the venerable Remington 700. Who can blame them?

It is a proven setup and very widely available, including copious amounts of aftermarket support. I did not follow this trend, as I always liked standing out and going against the grain. Hey, fortune favors the bold, right? A quick side note:



Above: The carbon fiber-wrapped barrel from Carbon Six. It is ready to be threaded and fitted to the M98 action.

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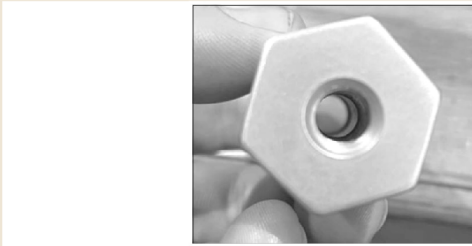
Should you decide to get into one of these It is ready to be threaded and fitted to the M98 action. custom rifle builds, I commend you! It is a very rewarding task to complete.

Having said that, it is a great idea to get into the mindset that this is your build alone and, therefore, you shouldn't expect to get the same money out of it that you put into it. It is not likely that anyone will value this as highly as yourself, especially if you go to sell it later in life for whatever reason. This was a hobby project for me, so I went into it knowing it would cost me more than any mass-produced rifle on the market. Well... at least in "pre-pandemic" dollars!

After a quick Internet search, I found that a gun shop near me had factory-new Dumoulin Mauser 98 actions recently put up for sale and at a really reasonable price. To those of you that read my last article ("The

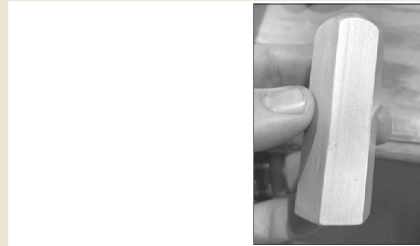
## DUMOULIN MAUSER BARREL WORK CONTINUED

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Above: Hex stock used for the custom monopod after machining, drilling, tapping, and scrubbing the exterior facets with Scotch-Brite.

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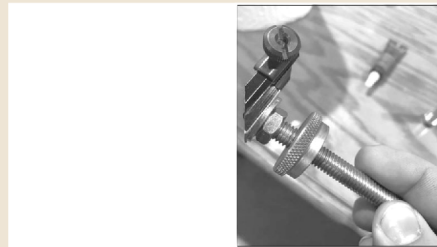
Above: Hex stock used for the custom monopod after machining, drilling, tapping, and scrubbing the exterior facets with Scotch-Brite.

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Left: The old Weaver ring machined and the allthread attached. The brass lock nut as machined, ready for assembly.

[ORIGINAL ARCHIVE IMAGE](#) · [PERMISSION CONFIRMED](#)



Left: The old Weaver ring machined and the allthread attached. The brass lock nut as machined, ready for assembly.

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45 Mauser Mystery”, July 2022) can you sort of see a trend with my preferred type of rifle? I called to verify stock before driving the whopping three miles across town and they had some on the shelf still! I don’t even think I properly hung up the phone before I was out the door with cash in hand. Now I know what most of you are thinking... some version of, “Why on Earth would you choose an M98 when the Remington 700 is so much more modern and the current ‘standard’?” I say that building a 700 clone is too easy!

Who knows, I may just be some glutton for punishment. There is just something about the Controlled Round Feed actions that I find so intriguing. Anyway, after forking over \$300 and waiting the ten or so minutes for the background check to come back, I was back in my car to head

home with the Dumoulin action in hand. This particular model has the dovetailed integral scope mounts, but finding rings to fit them proved rather fruitless. Thankfully, the receiver was drilled and tapped for aftermarket bases.

That same gun shop, SARCO of Easton, Pennsylv-I have an older generation Leupold VX-II 6-18x40mm scope I purchased from a friend specifically for this rifle, but I needed rings to clamp it to the rifle. For this task, I turned to my all time favorites from Warne. Their steel one-inch Maxima rings are, in my humble opinion, second to none. Before I could settle on a barrel choice, I needed to verify what my bolt face was cut for.

As advertised, the factory had machined the bolt face for the standard 12mm cartridge rim. This led me down the path of choosing 25-06 Remington

for the chambering, but the bolt face looked physically too large to hold the standard size rim. Out of curiosity, I found a fired case from vania, also had such a scope base on hand. Made by Evolution Gun Works of Quakertown, Pennsylvania, this unit is a one piece Picatinny rail that rests flat on top of the dovetails and uses provided screws to lock it in place.

At the time, in early March of 2019, the EGW rail was \$40 plus tax, a very affordable option. my 300 WSM in my reloading components. It clicked in and held through a few shakes of the bolt, but a fired 30-06 case fell out every time. So this dictated that my build would be a The brass lock nut as machined, ready for assembly.

ARCHIVE IMAGE WITHHELD

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The package includes the screws needed to attach the rail to the receiver. magnum, but the distance between the two receiver rings measured out to be a short action. Already having a 300 WSM, I didn't want a repeat, but I did want along range round that could also dispatch varmints on my cousin's farm at a moment's notice. The 6.5mm bug has bitten me, so this put me at a bit of an impasse. A 6.5mm pill in a short action... what to do? My gunsmith helped me reach a decision of the relatively new 6.5 PRC cartridge.

Knowing what the chambering would be, I now needed a barrel. I originally had my heart set on a pipe from Proof Research, but they didn't have a barrel with the twist rate I desired at the time. Enter a company called Carbon Six ([CarbonSixLLC.com](http://CarbonSixLLC.com)) I spoke with their Director of Sales on the phone a few times, and these calls are what sealed the deal with them. I spoke with a Mr. Gene Gordon, and the time he spent helping me through my questions made me feel like I was his only customer that day.

The barrel was now on order, and just about six months to the day it shows up on my doorstep. I ordered the optional muzzle threading to attach a device such as a suppressor or muzzle brake. Getting a suppressor, as you all know, is a royal pain in the backside and I do want something to tame the blast at the business end of the tube. I had a chunk of stainless steel on my workbench. So I measured the threads on the barrel, 5/8"-24 x 3/4" long, and drilled the bore 1/32" over the diameter of the bullet.

I turned a taper to go from the one-inch muzzle diameter to the outside diameter of the existing stock and then milled the two opposing sides flat. I then drilled the cross holes from each side, and after that, threw it in the CNC mill to hog out the two pockets and put healthy leading chamfers on them. I plugged the threads to keep out the grit and to protect them, then proceeded to sand blast the entire unit to give it a matte finish in the pockets, holes, and on the rounded sides.

I then lapped the two opposing flat surfaces, as well as the threaded end and business end. I followed this up with some automotive chroming polish and voila! Nearly mirror-like finish contrasted with the matte sandblasted finish that matches the barrel. I would just need to source a Belleville washer to attach and time the brake. Now to bring all the parts together into a nice package that will shoulder well. I needed a stock. This is the one part that I spent the most time researching, hands down.

Sparing you all the gritty details, I made the final choice of a Boyd's Hardwood "At-One" adjustable stock. All the benefits of a Precision Rifle Series-class adjustable stock in a more traditional-looking package. While Boyd's does a phenomenal job at inletting the stock to fit a multitude of receivers, mine did require final fitting of the action pocket and the barrel channel. Brownells had the barrel channel inletting tool I needed, and that made the task of opening up that channel into child's play.

The action pocket, both top and bottom sides, were the more time-consuming fixes. With the Boyds At-One Adjustable Gunstock, the forearm

is a removable part held on with two machine screws threaded into bushings mounted in the underside of the barrel channel. As a result of cutting more out of that channel, I needed to sink those bushings a little deeper into the wood. A 7/16" drill bit did a fantastic job of sinking those bushings deeper.

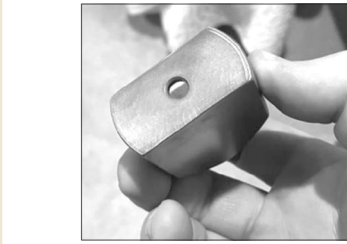
I very gently advanced them to the desired depth to clear the barrel and still lock the forearm back onto the stock. Another quick side note: If you don't currently have a rotary tool of some sort, do yourself a favor and invest in one! On to the action pocket. The Dumoulin I purchased was a little wider at the front ring than a standard M98 large ring action. I needed to open up the area for the front ring ever so slightly. The recoil lug pocket needed some attention as well.

The pocket was a little too small, and the recoil lug didn't fit at first. With some careful attention, and a gentle hand guiding my rotary tool with a wood burr attached, I cut away small amounts of wood until the recoil lug seated properly. Since the Model 98 came in so many variants at the height of its use, Boyds will not cut the bolt channel on the corresponding side. The end user, me in this case, had to do this. Around wood rasp took care of this task.

I gently placed the action into the refined pocket and attempted to close the bolt. It went 90% of the way, but that last 10% was the finite detail work that needed to be done. With the use of a Sharpie marker and that round wood rasp, I gradually took one or

## DUMOULIN MAUSER BARREL WORK CONTINUED

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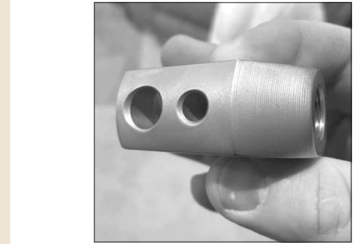
Above and left: The custom muzzle brake I machined and finished out of a chunk of stainless steel I had laying around shown from different angles.

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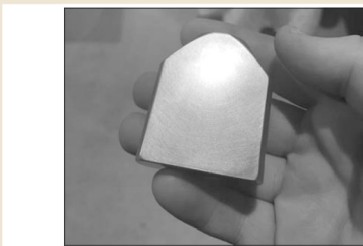
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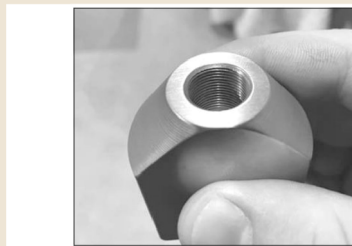
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two passes at a time until the bolt closed all the way without hitting the wood of the stock at all. I then took 400 grit sand paper to round off any ragged edges of the wood. The Dumoulin action from SAR- CO comes from the factory with a useful adjustable trigger setup, but the trigger pocket is only cut for a military style trigger. The pocket in the stock needed to be elongated to prevent interference with my trigger squeeze.

As for the bottom portion, the fitting work for my rifle was equally split between the stock itself and the receiver's bottom metal. While the hole spacing was spot-on, the forging was slightly oversized both fore and aft. I carefully marked and ground off a little bit at a time until it was a "drop-in" fit. This particular action also comes equipped with a swinging floorplate in the FN or Ruger style. When you open said floorplate, there is a little finger that moves up as the floor swings away.

Most 98s do not have this feature, so the stock does not have a relief cut into it near the front action screw to accommodate the finger. Fitting a spherical wood burr to my rotary tool and cranking the speed to its maximum, I carefully carved out a pocket just big enough for the finger to move about freely. My receiver came with a rear pillar that needs to be installed in the stock. A 3/8" drill bit opened up the rear action screw hole nicely. The pillar measured 0.380" in diameter so it pressed in perfectly!

With my intention being along range/varmint rifle, I purchased the upgraded attachments for the grip panels for this stock. This includes a more vertical hand grip, the beavertail-style forearm (which includes two sling swivel studs, one for the sling and a second one for the attachment of a Harris bipod), and a section of three-slot Picatinny rail on the toe of the stock under the buttstock for the attachment of a monopod. Above and Speaking of a monopod, I needed one.

However, because I didn't feel like spending what amounts to a miniature mortgage payment just to have one, I decided to make one. I had some old worn out Weaver scope rings sitting in a parts bin. Being able to mount to a Pictatinny rail, I had my clamp! I had a length of one-inch hex stock leftover from a job, a chunk of one-inch diameter freemachining brass, and a short length of 3/8" threaded rod all within arm's reach.

I faced the threaded rod to five inches long, faced one side of the hex stock square, turned a radius on the other end, and drilled and tapped each end. One end was for the 3/8"-16 threads and the other end for 1/2"-13 to accept a set screw that I turned to a point. I turned the brass down a little bit on one side, then drilled and tapped for the 3/8" threads and knurled the outside for grip.

I needed away to clamp the assembly to the rifle, so I fixtured the beat up Weaver ring in a milling machine and machined off the half ring until a useful flat surface resulted. With that done, I ran a chamfer mill around all four cor-

## DUMOULIN MAUSER BARREL WORK CONTINUED

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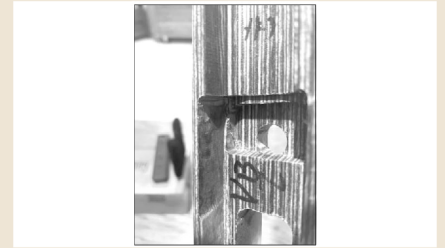
Left: The finished bolt channel.

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Left: The finished bolt channel.

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Below left: Rear action screw ferrule installed in the stock. I will still need to glass bed it in place. Below center: The front ring/recoil lug pocket after opening it up to fit my receiver. Below right: The trigger slot has been slightly elongated to allow for a clearance fit of the adjustable trigger unit that comes with the receiver.

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Below left: Rear action screw ferrule installed in the stock. I will still need to glass bed it in place. Below center: The front ring/recoil lug pocket after opening it up to fit my receiver. Below right: The trigger slot has been slightly elongated to allow for a clearance fit of the adjustable trigger unit that comes with the receiver.

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Below left: Rear action screw ferrule installed in the stock. I will still need to glass bed it in place. Below center: The front ring/recoil lug pocket after opening it up to fit my receiver. Below right: The trigger slot has been slightly elongated to allow for a clearance fit of the adjustable trigger unit that comes with the receiver.

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ners and then found the center of the new surface. After drilling and tapping for the same 3/8" threads, I inserted the threaded rod with some red Loctite. The next step was threading on the brass lock nut and then treading the pointed set screw into the hex stock, point out, until it stopped and torqued it into place. This is designed to be a wear part, to be replaced should it get worn. After threading the hex stock onto the allthread, it was done.

I had a complete home- I will still need to glass bed it in place. Below center: The front ring/recoil lug pocket after opening it up to fit my receiver. made monopod for the cost of my time. All that

said and done, and my wife surprises me with nice folding monopod on Christmas morning! So I am now keeping my custom made rig on standby and attaching the one she gave me. As a result of cutting away some of the bottom metal forging, the protective finish was also cut away.

This had to be rectified to prevent corrosion of the bare metal. A Birchwood Casey bluing kit was just the trick! I used the solution in the kit to removed any old finish and got the bottom metal down to bare steel. Hint, a little extra metal prep before the bluing goes such along way to getting headturning results. I had some Scotch-Brite pads laying around on my work bench, which paired with a

spray or two of WD-40 and some elbow grease yielded a gorgeous polished surface for refinishing.

Denatured alcohol was used to clean away any remnants of oil, grease, and bits of Scotch-Brite pad bits off of the metal. The resulting bluing looks like a factory job! Now to glass bed and assemble this entire project. For that, I will get my hands on some Acraglas from Brownells. Thanks for reading, and I hope this article helps anyone looking to do their own finish work on a custom build. Special thanks go to Evolution Gun Works, SARCO, and Brownells. AG

## PEOPLE &amp; COMPANIES

# Reader Forum

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2022

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**D**esert Eagle G Optic? I want to install a red or green dot sight on my 45 ACP Desert Eagle G model, however, it appears to me that this may not be what's supposed to happen. I contacted the manufacturer asking about what type of aftermarket optics would be suitable and was given a bunch of stuff I don't understand. What I am looking for is the name and model of a suitable red or green dot optic that will fit in place of the existing rear iron sight. Are you aware of any options?

Russ Atchison Spokane Valley, WA The Desert Eagle G model is Magnum Research's take on the infamous 1911 fitted with a high profile sculptured rear iron sight from the factory. Red (and green) dot optical sights can now be had small enough to mount on a pistol slide, often referred to as a miniature reflex sight. Any model small enough to fit a pistol slide can work if you can provide means to mount it. The preferred mounting option is to use a slide machined to accept a mounting plate for the optic.

Ed Brown (EdBrown.com, 1911 Builders (1911Builders.com, ZR Tactical Solutions (ZrtacticalSolutions.com, 317/721-ZRTS), and others offer premade slides with optic cuts. You can also have your existing slide machined. There are mounts that can use your slide's existing dovetail without modification in place of the rear sight. Note, this option is not as robust and the sight will sit really high. This option works better with Glock slides and similar as they're flat instead of rounded like most 1911 slides.

EGW (EGWguns.com, offers a line of dovetail mounts for Desert Eagle and other handguns and is probably your best option. Ask them about their mount for a Kimber dovetail, which should be the same dimensions as for your 1911 G model Desert Eagle. The Trijicon (Trijicon.com, AC32058 RMR Pistol Mount works using an existing 1911 Novak low mount (0.248") dovetail cut. The G model uses a cut like this but may not be the same dimensions; you'll have to measure it to be certain.

C- More Systems (Cmore.com, also offers a 1911 dovetail mount with their C-MORE Systems STS Dovetail Mount for Colt 1911. Shop Safety In "Shop Safety" by Paul Mazan (June 2022) I would like to add a method for removing those stuck screws that not many people think about. The tool is called an impact driver and is designed to use impact on screws of all types. You can find one at any auto parts or hardware store. The tips are replaceable and therefore you can use gunsmith's tips in place of the included tips.

Paul "Face" Krawiec J. C. Higgins 101.1/Savage 94 Regarding "J. C. Higgins 101.1/Savage 94" by Charlie Briggs (June 2022), Bob Brownell's Gunsmith Kinks II has two solutions for installing the mainspring in the Savage 94. Pages 377-378 details home-built tools used to compress the spring into the frame. Gunsmith Kinks III and Gunsmith Kinks 4 show other methods as well. Glen Calvert For those reading "J. C.

Higgins 101.1/ Savage 94" by Charlie Briggs (June 2022), instead of drilling a hole through a receiver it would be far easier and less

damaging to use a basic L-shaped screwdriver available at any hardware or auto parts store to get at that latch screw. There's no need to alter the receiver of a firearm when using the proper tool for the job is an option. If you can't find a small L-driver you can easily make one with a torch and a cheap screwdriver and can even grind the tip to perfectly match the slot.

As far as compressing the mainspring goes, the manual he has is correct. Any needle nose or welding clamp-type/Vise Grip pliers can be ground with a slot for the hammer strut to compress the spring for installation or removal without the absurd combination of a drill press and clamps. If you use the vise grip type you can even lock them in compressed position for easier handling. Those old timers knew what they were talking about; if you don't understand what they mean, you're doing something wrong.

It's always better to take a break and stand back a bit to try and figure out what you're not understanding before hacking away at something. Exeter, ME I had some difficulties figuring out if that gun had an extractor or an ejector as the image showed the snap cap only sticking out about 1/8". I've worked on many old break open designs and extractors generally push the case out a minimum of 3/8" while ejectors send the case flying. I also saw no spring like an ejector would use.

Generally, an extractor system uses a cam or a much lighter spring. If it only extracts the case that much the extractor cam may be worn and might be improved by adding some metal

via MIG or TIG if a replacement part isn't available. Paul "Face" Krawic Charlie Briggs responds. Thank you for reading my article. It is possible that I could have made an angled screwdriver to tighten the latch screw, but there wasn't a lot of room and none of my angled screwdrivers could fit. And since the Sears shotgun was hardly a collector's item, I chose to drill an otherwise invisible hole. I would not have done that on a Purdy, Fox, L. C. Smith, etc.

Regarding the mainspring, I own maybe 15 styles of Vise Grip pliers. None of them have been ground to get under the head of that mainspring pin and would have been very dangerous if it could have been done! I chose to do it my way and no "hacking" or harm was done. Again, thank you for reading my article. I have every issue of American Gunsmith, going back to January of 1993, and despite 37 years of being a federally-licensed gunsmith, I get valuable tips from almost every issue.

Stuck Parts I am a recovering metal shop teacher and want to share a few notes regarding "Stuck Parts and Extreme Measures" (June 2022). On page 14 I'm certain you meant that cold contracts and heat expands. Exeter, ME I've found a homemade penetrating fluid consisting of equal parts acetone and ATF (Automatic Transmission Fluid) works well for difficult parts. Also, I don't think that a plumber's blowtorch and nineteenth-century fire extinguisher are ideal.

Instead, I start with a soldering gun and then progress to a propane torch, alternating with freezer time. Howard Dawson Author RK Campbell responds. Thanks for that. As for the tools... well, they have accumulated over the years. I do have more modern gear as well. I am going to try your homemade penetrating fluid the next time I have a stuck part. Thanks!

Compact Ratchet Tool Fix It Sticks (FixItSticks.com, is a Chicago-based maker of modular maintenance tools and torque limiters with many good options for gunsmiths and shooters, especially for those needing compact tools for the field or range. Their new Compact Ratcheting Multi-Tool is a versatile kit featuring a Ratcheting T-Way Wrench that breaks down for storage, fifteen hex bits, and a mini pry bar.

Everything is contained in a compact, molded polymer tool holder making the configuration portable and easy to include in any range bag, emergency kit, or vehicle or ATV compartment. Cascade, CO The configurable Ratcheting T-Way Wrench has magnetic holders on all three ends that accept any standard 1/4" bits. The reversible ratchet allows for quick tightening and loosening, even with limited clearance.

In addition to the mini pry bar, the kit includes 3mm, 4mm, 5mm, 5/64, 5/32, and 3/32 hex bits; T6, T8, T10, T15, T20, T25 Torx bits; a slotted 5mm and Phillips #1, #2 drivers. MSRP is \$80 and is compatible with all Fix It Sticks torque limiters and other tools. AG

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