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PRECISION ARMS WORKSHOP

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08

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.224 VALKYRIE

CHOATE MODULAR STOCK • ITHACA MODEL 37 FEATHERLIGHT • M94 WINCHESTER VINTAGE PEEP SIGHT • 1911 GRIP S...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 188

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MACHINING

Choate Modular Stock

BY AMERICAN GUNSMITH EDITORS AUGUST 2019

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Choate Machine and Tool, a manufacturer and OEM supplier of rifle stocks, shotgun magazine extensions, and firearms accessories, is offering their Choate Modular Stock (C. Mod) chassis system. As a modular design, the C. Mod allows the user to change the forend or buttstock without removing the rifle action from the main chassis section after installation and/or bedding.

This modularity provides adaptability for different shooting preferences without disturbing action-to-stock fit or needing to reconfirm zero after reconfiguring the set up. At the base is a CNC machined chassis made from a block of aluminum. When installed, the chassis rigidly holds the action while the desired buttstock and forend can be changed as needed.

The chassis uses the popular AR-style magazine release, eliminating accidentally dropping the magazine by hitting a release lever located in front of the trigger guard. C. Mod magazines accept cartridges up to 2.860 inches in length such as the .308 Winchester, 6.5 Creedmoor, .260 Remington, 6mm Remington, .257 Roberts, and

7X57 Mauser, among others. Each C. Mod chassis includes two magazines and the required action screws. The versatility provided by the C. Mod is in the selection of forends and buttstocks.

Currently, forend options include a target/varmint style forend with a wide, flat bottom and a sniper/tactical style forend that is shorter and slightly tapered toward the muzzle end. Both come with a T-rail and bipod adapter. Buttstocks options currently include a basic tactical style, AR-style telescoping buttstock (compatible with any AR-15 buttstock), folding stock/pistol grip combination, and fully customizable target/tactical style with adjustable check piece and length-of-pull.

All buttstocks and forends include required hardware for installation. C. Mod stocks began availability for the Remington 700 short action and Remington Model 7. MSRP is \$710 and includes the CNC machined chassis, tactical forend and buttstock, and two magazines. For more info, contact Choate Machine and Tool (RifleStock.com/CMOD),

MAINTENANCE & REPAIR

Ithaca Model 37 Featherlight

This 1950s vintage Ithaca Model 37 Featherlight would not feed from the magazine and had a cracked buttstock. Here is how it was disassembled, assessed, and repaired.

BY GLEN CALVERT AUGUST 2019

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The broken Ithaca Model 37 Featherlight pump shotgun on my bench was assembled in 1955 based on its serial number of 618XXX. My father had purchased it for hunting rabbit, pheasant, and quail. True to its name, it is light, easy to swing, and soft shooting. It saw frequent use through the late 1950s and early 60s and then less use over time before it finally ended up in the closet at my parent's house.

The barrel was removed and cleaned usually after each outing along with a quick swipe of the inside of the receiver, but I don't think the action was ever disassembled. After Dad passed away I brought the gun home and lat-

er taught my kids how to shoot it along with the .22 bolt action rifle that I also inherited. The gun sat idle for along time until I decided to use it for trapshooting.

After many years of trouble-free operation, it had developed a problem where it would not feed from the magazine on follow-up shots. Notice the hammer is in the fired position. I disassembled the action, cleaned, and inspected it but could not find any issues. Another trip to the range showed that the same problem existed. It would cycle normally without shotshells in the magazine but would jam when loaded.

Turning the gun 90 degrees so the bottom ejection port was horizontal or inverting the gun allowed the action to cycle ammunition from the magazine normally. Typically, I would load the magazine and cycle the first round into the chamber with the gun held with the ejection port horizontal, pointed away from me. Aiming at a clay, I would fire the first round and try to cycle the action but with no luck.

Inspection showed that the nose of the next shell had caught on the chamfer of the receiver below the barrel chamber. Obviously, I had missed something on the previous tear down.

ITHACA MODEL 37 FEATHERLIGHT CONTINUED

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Disassembly Disassembly is simple and straight forward. Make sure the magazine and chamber are empty. Rotate the knurled cap on the magazine tube counter clockwise (looking from the breach) until it is fully disengaged from the barrel lug. Pull the slide back about half way to retract the bolt. Rotate the barrel 90 degrees clockwise so the interrupted threads on the barrel disengage from the receiver. Pull the barrel from the receiver. Remove the plate from the buttstock.

Along screwdriver is used to remove the buttstock screw and the buttstock is removed. The trigger group screw is removed from the left side of the receiver. The hammer needs to be in the fired position so that it will clear the rear of the shell lifter. Slide the trigger group rearward from the receiver. I was able to clean the trigger group without

disassembly. The right side interrupter bar is removed. It has a pivot pin that fits in a hole in the receiver.

The shell lifter pivots on the two larger screws and they in turn are retained by the smaller screws that fit into one of four grooves in the bolt head. Removing these screws allows the lifter to be pulled from the rear of the receiver. The bolt will need to be at the rear of the receiver to remove the lifter. Some wiggling of the lifter is required to get it past the bolt. To remove the bolt, it must be disengaged from the action bar.

The spring-loaded pin in the bottom of the bolt is pushed toward the right side of the receiver, disengaging it from the mating hole in the action bar, allowing the bar to be pulled forward. The bolt is then slid from the receiver. The bolt has only two major pieces and is

easily cleaned. The left side interrupter bar is held in position by a small diameter screw-pin in the bottom of the receiver. It requires a screwdriver small enough for eyeglass screws for removal.

The interrupter has a small coil spring in a recess; the spring is not retained so it can fall out. The fore grip and action bar can be removed from the magazine tube after removing the knurled cap and barrel support. **Repair** With the gun disassembled, I found two small burrs on the edge of the chamfer below the chamber, one on either side. They were barely visible but could be readily felt with a finger nail.

The burrs were the edges of the chamfer that had been “rolled up” ever so slightly, most likely by the bolt face hitting the chamfer when cycling the

ITHACA MODEL 37 FEATHERLIGHT CONTINUED

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The opposite side had a burr at the same location. gun without shells. I removed the burrs with a small file, being careful not to remove any additional material. I then turned my attention to the cracks in the buttstock. Each side of the stock was cracked, starting at the receiver end of the stock and extending about 2.5 inches. These were the sort of cracks commonly seen in older firearms. The cracks extended from the outside of the stock into the center hole.

I used the typical repair method of drilling a small hole in each of the cracks, filling the holes with glue, and then forcing the glue into the cracks. Fortunately, the wood was dry and not oil soaked. I very slowly drilled a 9/64" diameter hole in the center of each crack, being careful to follow the angle of the crack to a depth of about two-thirds that of the crack. I compressed the cracked area with heavy rubber bands when drilling to prevent chatter and to prevent the cracks from growing.

I removed the rubber bands and added the glue, forcing it into the cracks with a 1/8" diameter dowel. I repeated this until glue was showing on the outside of the stock along the full length of the cracks. I compressed the cracked areas with heavy rubber bands, wiped off the excess glue, and set the stock aside for 24 hours to cure. Reassembly Reassembly is the reverse of the disassembly. The left side interrupter bar is installed before the bolt.

The interrupter bar will prevent the bolt from sliding all the way into the receiver unless the front of the interrupter is pivoted into the receiver. This allows the small tab on the bolt to slide past the other end of the interrupter. The spring-loaded pin in the bottom of the bolt is pushed toward the right side of the receiver and the action bar slid along the bolt until the pin and the hole in the action bar are aligned. With the bolt installed, the shell lifter is inserted into the receiver past the bolt.

It helps to have the bolt at the rear of the receiver. Again, a little wiggling is required. The shell lifter pivot screws are installed and finger tightened so that one of the grooves in the head aligns with the small retainer screw. The right side interrupter bar and trigger group are reinstalled with the hammer in the fired position. The buttstock and barrel are installed. Test Firing The shotgun was reassembled and successfully cycled with snap cap rounds.

Testing at the range with live ammunition showed that the gun now operated correctly. Apparently, holding the gun sideways or upside down was enough to allow the next shell to get past the burrs and load into the chamber properly. Only when holding the gun in the normal position and lifting the shell against gravity, the slight restriction caused by the burrs was enough to prevent proper function. My fix proved to be just what was needed to restore this Ithaca Model 37 Featherlight. AG

PEOPLE & COMPANIES

.224 Valkyrie

While my initial tests with 90 grain bullets had some problems, improved performance with this cartridge may be fixable.

BY JOE CARLOS AUGUST 2019

ORIGINAL PP. 6-11

When the .224 Valkyrie was first introduced, I yawned as I didn't get what it was good for. AR-15 gunners have already been successfully shooting 90 grain bullets at 600- 1000 yards for over a decade and a half. With .223 Remington we simply seat the bullets out longer than magazine length in an appropriately-chambered rifle and single feed by hand. Competitors have been turning in good scores in Service Rifle, High Power, Mid-Range, Long Range, Palma, and F-Class using this technique.

Recently, .22 Nosler gunners have been using the same long seating technique with 90 and 95 grain bullets and achieving higher velocities than either the .223 Remington or the .224 Valkyrie. Gun writers, however, ignored these successes and gave the impression that absolutely everybody in the shooting community had been waiting with baited breath to be able to stuff 90 grain bullets into a magazine and then emptying that magazine as quickly as possible and out to distances of 1,300 yards.

I am very much reminded of legendary Border Patrol officer Bill Jordan's famous admonishment, "You can't miss fast enough to win." It appears to be true that one can reach that far with the Valkyrie depending on barrel length, the specifics of the powder charge, elevation of the range, etc. The same can be said of the older .223

Remington, though have never had anyone say they tried shooting it beyond 1,000 yards. Furthermore, where are all these ranges with safe backstops out to 1,300 yards?

In another lifetime I spent nearly two decades as Author Aaron Carter mentioned how excessive bullet jump can "negatively affect accuracy". a firing member of the All Army Reserve Shooting Team. I shot all over the U. S. and a fair share of the rest of the world and can't remember ever being on a rifle range that allowed shooting beyond 1,000 yards (or perhaps 1,000 meters in some countries).

While there are some places open to civilians where one can safely engage targets beyond 1,000 yards, very few places exist within a two hour ride for most of us. Gun companies would have readers believe that the very act of buying one of their Valkyries will make the owner a successful longrange shooter. While it is important to long range shooting success that bullets arrive traveling faster than the speed of sound, that is only one of the important points.

Also important is for the gun/ammo combination to be capable of shooting tight groups and may be the greatest challenge for the Valkyrie. Last, but certainly not least, the shooter must be capable of delivering a perfect shot on demand. Over and over again. On top of all that, the shooter

must be able to notice changes in range conditions that will move the impact of the bullet from target center.

It takes many, many years for most of us to develop these skills (some never do) and if the gun store salesman tries to convince you that buying a Valkyrie will allow you to shoot through varying range conditions, he either doesn't know his business or isn't being honest. Meanwhile, gun writers kept publishing lavish reports on the Valkyrie. They all parroted the 1,300 yard range and as time went on all of the articles started sounding more and more like those published earlier.

This left me wondering if some of these writers had actually gotten away from the air conditioner and ventured out for valid test firing or were they just "borrowing" the limited live fire research that other writers had previously done? Those gun journalists who never admit to shooting a group that is bigger than sub-minute continued their trend by reporting tight groups from the Valkyrie.

Meanwhile, likely spurred by these flowery reviews and the novelty of the new cartridge, coupled with an American tendency of buying everything that is new, sales of anything Valkyrie went through the roof. Reports were different when real shooters got their hands on Valkyrie rifles, finding four shortcomings. Three of them are fixable to some extent

.224 VALKYRIE CONTINUED

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On bottom, an old school Hornady Overall Length Gauge. Top, LTL (Length To Lands) Gauge by Dead Center Sports. Micrometer adjustable match bullet seating die used when finding bullet seating sweet spot. while I see less possibilities in getting around one of them. I'll discuss all of these issues with emphasis on 90 grain bullet performance. Twist Rates The big draw of the Valkyrie is the short, fat case permitting 90 grain bullets to be loaded to magazine length.

Federal loads factory ammo with 90 grain Sierra Match King bullets and also offers 90 grain soft points for hunting, along with 75 and 60 grain loads. In 2019 Federal offered 80.5 grain Berger bullets and 78 grain Barnes bullets. Hornady loads ammo with their 88 grain ELD bullet and the DRT load uses a 90. This is a very nice selection of factory loads. Obviously, handloaders are free to use any other bullet that they may fancy. Different bullets require varying twist rates to achieve optimal performance.

We will limit this portion of our discussion to just factory loaded ammo and start with the 60 grainers. I have easily stabilized other bullets in that weight range and velocity in 20" barrels using 1:9 and 1:10 twist barrels. A 1:8 twist should easily stabilize both the 75 and 80.5 grain bullets. Competition shooters seldom use Barnes bullets so I have no experience with them.

I went on their website and couldn't find a recommended twist for their They listed the ballistic coefficient but not the length

and both are needed for most twist rate calculators. If you are interested in shooting this bullet I recommend contacting the factory and getting their twist rate recommendation. That brings us to the 90 grain bullets. Back in the early 2000s we tried to stabilize 90s in 1:7 twist barrels. Most of us found the bullet would go into the target straight but groups were fat.

Bullet manufactures recommended using 1:6.5 barrels and groups tightened up a bunch. These tests were carried out at the same velocities as the Valkyrie is producing today. Folks, it is written right on the boxes of 90 grain Sierra Match King bullets in large, bold, red, all-caps print, "6.5" TWIST BBLS ONLY"! It is pretty obvious to me that the bullet maker has strong feelings about this. And what Sierra is stating on their bullet boxes agrees with what a bunch of us have verified in actual range testing.

In spite of the fact that all of this was well proven by the mid 2000s, advertisements for Valkyrie uppers and barrels today shows a staggering number of 1:7 low-bid button rifled barrels of questionable parentage. Given the precision of 90 grains bullets is best with 1:6.5 twist, what happens to shorter bullets that stabilize in slower 1:8-1:10 twist rates? They're overspun! Overspinning bullets is not like "too much ice cream" (which can be a good thing).

Overspinning bullets will tend to exacerbate any flaws in the ammo and make groups larger. Depending on the marks-

manship and reloading skills of individual gun owners, some may not notice these larger groups. I use state-of-the-art testing equipment that eliminates marksmanship errors and the result of overspinning is easy for me to notice. The Valkyrie is a prime example of what happens when you try to cram 15 pounds of potatoes in a 10 pound sack.

Trying to shoot bullets all the from 60-90 grains in the same gun is just bound to compromise the performance of some of them. So, if you area gun owner who purchased a Valkyrie at his local gun store where the salesman had no clue about different twist rates and you ended up with a slower 1:7 twist, what do you do? If you intend to shoot at greater distance with magazine-length bullets, begin by testing 90s. If group sizes exceed your expectations as I predict, try a box of the new Federal 80.5 grain Gold Medal.

Berger designed the 80.5 bullet many years ago for the .223 as a legal Palma bullet. While Palma rules disallow the Valkyrie, it does shoot this bullet supersonic and stable out to 1,000 yards in longer barrels with a stout load. Any idea of shooting this bullet seated to magazine length in an AR-15 accurately out to 1,300 yards is probably pie in the sky. Handloaders might want to also try the equally good 82 grain Berger. Chambers Twist rates are not one size fits all. Chambers are the same.

BEFORE DISCUSSING CHAMBERS, WE HAVE TO MENTION BULLETS BECAUSE THE TWO

.224 VALKYRIE CONTINUED

ORIGINAL PAGE 8

Center, a 90 grain Berger Boat Tail in a Valkyrie casing seated longer than magazine length. On right, .223 Remington with a 90 grain SMK seated long for single feeding in a Wylde chamber. The bullet does not extend nearly as far down as the same bullet in the Valkyrie. are very much related. "Varying ogive profiles" sounds esoteric but any American Gunsmith reader has looked at a fair number of bullets.

You probably noticed that ogives (bullet nose cones) of some hunting bullets are more rounded whereas long range target bullets are more pointed. When an ammo manufacturer loads a half dozen or more different shaped bullets to magazine lengths some will be closer to making contact with the chamber's throat.

Looking at that very long 90 grain SMK bullet (over an inch) one might think it would be one of those bullets that would have a short jump before contacting the throat, however, measurement reveals the .224 Valkyrie SAAMI specification chamber has the 90 jumping longer than optimal. Most chambers have freebore in front of the cartridge case mouth at bullet diameter before the lands.

This provides some support to the bullet to help keep it from tipping while offering little resistance to forward movement and reducing pressure with heavier powder charges and higher velocities. Unfortunately, too much freebore will re-

sult in larger groups and longer freebore combined with normal throat erosion over time causes the barrel to "shoot out" at lower round counts. The SAAMI chamber for the Valkyrie has 0.050" of freebore and every 90 fired jumps that far before entering the throat.

I've heard of other Valkyrie chambers designed by gunsmiths with even more freebore. I pulled bullets from Federal's initial Valkyrie loadings and Hornady's 88 grain offering and none of them required this excessive freebore to chamber. The 75 grain American Eagle had the least amount of jump but was still excessive. The 88 grain Hornady had the most jump at nearly 1/10". How did SAAMI end up approving a chamber design with such excessive jump?

During early Valkyrie development there was great pressure on SAAMI to approve something. My guess is back then nobody predicted 88 grain Hornady and 80.5 grain Berger and Barnes bullets available in factory ammo. Perhaps out of an abundance of cau- Left, some theories state unsupported bullets swell out under pressure.

Right, uneven powder may create more gas (drawn on the right of the bullet) in some places. tion, SAAMI chose to err on the long freebore side so almost every .224 bullet could be safely stuffed in a Valkyrie. In trying to optimize 90 grain bullet performance I went in the opposite direction. Working with Dave Kiff out at Pacific Tool

& Gauge (PacificToolAndGauge.com, we came up with a Valkyrie chamber with zero freebore.

The 1 degree/30 minute leade angle allowed 90 grain SMKs seated magazine length to sit right behind the throat with almost zero jump. Groups have been quite good. I control pressure by using a 20" Bartlein gain twist barrel starting at 1:13 and ending at 1:6.5 at the muzzle. Starting with a twist rate about half the final, desired twist is ideal and this is the same that has proven effective with 90s in .223 Remington and .22 Nosler.

Bullet stabilization only "cares about" the final twist as it exits the bore and there are disadvantages to spinning a bullet at 300,000+ RPMs all the way from the chamber to the muzzle. I discuss this further in "Revisiting Gain Twist" (November-December 2013) and have found this so effective that I am able to use maximum powder charges listed by Sierra in zero freebore Valkyrie chambers with no pressure issues and tight groups. Brass I know of three companies making Valkyrie brass: Federal, Starline, and Hornady.

The first two are soft and their service life will be short even with moderate loads. Starting with virgin brass, Federal and Starline brass had primers falling out of the pocket after the third firing

.224 VALKYRIE CONTINUED

ORIGINAL PAGE 9

despite having thicker walls than needed, which just contributes to higher pressures. Thick case walls also limits the amount of some stick powders that will fit. Hornady case walls run 0.001-0.002" thinner, allowing for higher case capacity and more room for bulky stick powders. Hornady brass seems to be made of stouter material and holds primers better. The only disadvantage of the Hornady brass is, as of this writing, it is more difficult to acquire.

I found Federal brass holds about one grain of water more than .223 Remington. By coincidence, my load workups for the Valkyrie came out wanting one grain more powder than the same powder in a .223 with a Wylde chamber. When shooters heard that the Valkyrie holds a miniscule amount more powder than the .223 they assumed that the Valkyrie would produce great big velocity increases but my chronograph readings showed virtually the same speeds.

Excessive Bullet Seating The fourth and last major factor limiting precision with 90 grain bullets in the Valkyrie has to do with the enormous distance down into the powder column that the back of the bullet extends. For folks insisting on loading 90s to magazine length, this may be the most difficult issue to fix as the back of the bullet is below the shoulder/case sidewall with about a half inch of the bullet below the case mouth.

There have been theories posited for decades, long before the invention of the Valkyrie, about how this will contribute to fat groups. I tested these deep bullet seating theories in the .223 Remington and found this concern is overstated, however, none of the bullets in my .223 tests were seated as deep as 90s in the Valkyrie. Summarizing the two excessively deep seating theories will help with understanding. Picture a cartridge with part of the bullet below the case neck swelled out to egg shaped.

Some theorists posit that expanding gas from the burning powder "smacks" the base of a bullet when it lacks support and prematurely obturates when the back end swells out. When that swelled out section is then swaged back down in the rifling, damage to the bullet occurs. Influencing the bullet to move forward before the premature obturation limits damage. Gain twist rifling can be helpful in allowing bullets to begin moving forward earlier.

Gain twist also limits other bullet damage (bullet skid) that can occur with uniform twist barrels. Longer freebores should also allow deep seated bullets to begin moving forward and limit deformation, however, excessive bullet jump results in fat groups. The 90 grain Berger B. T. bullet has a thick jacket and may resist this deformation better than the Sierra 90.

The second theory states the powder is not always ignited or burned evenly and uneven combustion may create more gas on one side, causing the bullet to tilt. Such bullets will enter the barrel throat crooked and deform, resulting in fat groups. This is not all that different than bullets seated in case necks at an angle during loading. Sinclair International makes a tool that inserts through the neck of an unprimed case to chamfer the inside of the flash hole.

Precision shooters claim creates more even powder ignition. Some of them also claim that using one of these tools can result in more consistency in velocities, always a good thing. The Valkyrie case has a longer neck than the .223 which is thought to combat bullet cocking due to powder burning unevenly. Full disclosure: I have not personally conducted any testing of these flash hole tools and am simply repeating what some Benchrest and Long Range competitors have told me. Let the buyer beware.

The back of a 90 grain bullet seated deep occupies space and limits gunpowder that can fit. Also, unless the powder is packed evenly, one side of the bottom of the bullet may be met with greater resistance. This can cause bullets to create runout and negatively influence groups. I use a drop funnel when charging Valkyrie casings and load with less bulky powders. Shooters and loaders should always employ a concentricity gauge like the stellar Hornady Concentricity Tool which corrects runout.

In addition to using these tips for load workups, I use quality Bartlein gain twist barrels on Valkyrie builds. While I am getting true sub-minute ten-shot machine rest groups using 90 grain bullets in my Valkyrie builds, groups from .223 and are tighter. I blame the slightly fatter groups from the Valkyries on the excessively deep bullet seating. The only disadvantage .223 and .22 Nosler has is needing to seat bullets longer than magazine length.

If a customer truly believes he will be shooting to 1,300 yards, the Nosler achieves more bullet speed over the Valkyrie. What's not to like about tighter groups and increased velocity? Unfortunately, the only brass that I have been able to find for the 22 Nosler is made by Nosler and they are soft. The rebated rims tear and deform very early in life even with modest loads. So brass life is just as limited as with the Valkyrie but for a different reason. See ".22 Nosler" in the March 2019 issue.

Bullet Seating Length I admit initially avoiding building any Valkyries but felt it would be an interesting challenge to get them shooting tighter groups. When I finally agreed to start build Valkyrie uppers my first customer started out wanting to magazine feed 90 grain SMKs. By the time all his parts had arrived he had discovered his range's rules now prohibited self-loading firearms from being maga-

.224 VALKYRIE CONTINUED

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zine fed. Had I known he'd have to hand load single rounds, I would have tried talking him into a .223 or .22 Nosler build instead. I felt that seating bullets out longer than magazine length would help groups a lot and would be in compliance with the rules of my customer's range. The Valkyrie chamber that I had designed, however, limited seating of 90 grain SMKs to magazine length. For my customer's gun I substituted 90 grain Berger Boat Tail bullets.

Due to their different ogive, Bergers seat about 0.041" longer than magazine length without making hard contact with the throat in my chamber. This also has the additional benefit of moving some of that excess bottom section of the bullet up out of the powder column of the casing a little. Groups were really impressive and much tighter than the Sierra 90s seated to magazine length.

If you have a Valkyrie that is shooting fat groups with 90s seated at magazine length you might find your groups tightening significantly by taking readings with a Length To Land gauge and establishing ammo with bullets seated longer than magazine length and closer to the throat. My average 90 grain sweet spot with either the Sierra Match King or Berger is when my ammo is just 0.004" short of touching the throat with .223, .22 Nosler, or .224 Valkyrie.

Each gun is different, however, and each person has a little measuring difference. I fully realize that Stoner designed this platform to feed from a magazine and self load, however, if firing 90s seated to magazine length is resulting in fat groups you now have a potential accuracy solution. I

have also done some testing of the new SMK 95 grain bullets seated long in the Valkyrie. Some guns are showing promise.

Since the 95 is even longer than the 90 I am reluctant to seat 95s to magazine length in fear that doing so will only exacerbate the grouping problems previously described with the 90. That said, the 95 is a very fussy bullet that a lot of handloaders (including me) are experiencing fat groups and bad fliers with in the .223.

Trying to get such a fussy bullet to shoot tight groups in the Valkyrie, which by itself is "challenged" with precision, may be an example of biting off more than researchers can successfully chew. Bullet Seating Sweet Spot If the very thought of single feeding ammo into an AR-15 by hand causes you ulcers, the following technique will work with magazine-fed ammo and will likely shrink your groups by about 20%.

Each firearm/ammo combination will have a sweet spot when the bullet is seated to a specific depth in the casing. This is firearm specific and what works well in one gun may not be sweet in another gun. Finding that specific bullet seating sweet spot requires actual range firing. I do it on a machine rest and it takes about a half day. Seat ten rounds to magazine length of 2.250" and shoot the best group possible.

A lot of shooters attempting to perform this from a bench rest settle for five shot groups to save time. I take a Lee Hand Press with a micrometer-adjustable match seating die to the range to perform the bullet seating. By the time you have walked downrange and swapped out tar-

gets and seated the next ten rounds, the barrel will have cooled enough for the next group.

The second ten rounds of ammo are seated 0.002" deeper by coming down two tick marks on the micrometer adjustment, going to a cartridge overall length of 2.248". Fire that second group and then adjust again to 2.246" and fire again. As you shorten the seating length you may see groups initially getting either larger or smaller. Continue to shorten seating length as long as groups are getting tighter. When groups reverse and start getting larger, stop!

Go back to the tightest group and that is your seating sweet spot. Normally, this spot is between 2.250" and 2.238". I did this on every Valkyrie I built and all of them responded favorably. Shortening the ammo lengths by these tiny increments does not cause any feeding malfunctions and this sweet spot works on both factory and handloaded ammo. Note, Federal loads its 90 grain SMK bullets to 2.242" for some reason; a bit shorter. No worries! Start your first group at that length, your second at 2.240", etc.

By the time you reach 2.230" you should have found your bullet seating sweet spot. See "Bullet Seating Sweet Spot" in the June 2016 issue. The June 2018 American Rifleman reported on group size and consistency in velocity of four Federal factory loads that were available at the time of their testing. As near as I can tell their testing was done in just one gun. I performed my load work ups in a wide selection of uppers but, like the Rifleman, I only tested factory ammo in one of

.224 VALKYRIE CONTINUED

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them. Combining their test results with mine yields factory ammo data with two guns, not enough to satisfy any statistician. Despite that, both the Rifleman and I got our best factory ammo groups using the Federal Gold Medal 90 SMK load. We also found our velocity readings were most uniform with the same load. My handloads ended up about 25% tighter in group size than the factory Federal and my average velocity was about 50 fps faster.

I made one very interesting discovery when working with the Federal 90 grain ammo: Federal is not crowding the front of the magazine by trying to seat their bullets too far out. Their overall cartridge length with the 90 SMK bullets measures about 2.242". I did not know this seating length while I was performing my load workups with the 90. As mentioned previously, my load development includes finding the bullet seating sweet spot for each of the uppers I work on.

What is pretty staggering is that my average seating sweet spot ends up with a cartridge length exactly the same as Federal's ammo. I don't know how Federal arrived at their seating depth but when the two smartest folks we know come up with the same conclusions I would say that a cartridge overall length for you handloaders of 2.242" might at the very least be a good starting point in finding the sweet spot for your gun!

The next factory ammo I can report on is from Dynamic Research Technologies (DR-Tammo.com). It appears they are using the same 90 grain SMK as Federal and loading in Federal brass. DRT groups were a little larger than the Federal ammo and the velocity average was about 50 fps slower with a greater velocity spread. I also tested

the Hornady factory ammo which is loaded in Hornady brass with a Hornady 88 grain ELD which has a lower ballistic coefficient than the 90 grain SMK.

This ammo jumps its bullet the farthest of all the factory ammo I tested and also had the highest amount of runout. The combination of the high runout and excessive bullet jump made for fatter groups. The Hornady ammo chronographed about 40 fps slower than the Federal Gold Medal and the velocity spread was the highest of all the factory loads I tested. The Federal American Eagle 75 grain full metal jacket ammo was the last tested and my results pretty much mirrored the American Rifleman.

The most important conclusion from this ammo had to be combined in the other Federal 90 grain Gold Medal load. I was performing my tests in a 24" Bartlein gain twist barrel whereas the Rifleman test used a 18". Based on barrel length, I would have expected my velocities to be about 150 fps higher but my chronograph readings were running a significantly faster 250 to 300 more. Even more staggering was my greater consistency in velocity.

Where the Rifleman reported standard deviations of 15 for the Gold Medal and 37 for the 75 grain American Eagle, I got 9 and 15 respectively. How do we explain the differences in velocity figures? We could say that the greater speed of my ammo might be due to the outside temperature but I was testing in February Pennsylvania winter with temperatures in the 20s. Differences between ammo lots could be a factor but I suspect my gain twist versus their uniform twist is the likely difference.

Some makers of gain twist barrels claim progressive rifling results in more uniform pressures and this leads to more consistent velocity. Conclusions The Valkyrie is mostly a novelty caliber. Unless you are one of the very few AR gunners who have a real need to shoot 90s out of a magazine, the Valkyrie is really an ideal solution to a non-existent problem. Discussions by gun makers of shooting this firearm to 1,300 yards are mostly examples of clever marketing.

When first brought out, the .224 Valkyrie had design problems making a lot of guns shoot fat groups with ammo loaded with 90 grain bullets seated to magazine length.

This author's research revealed some potential solutions to improve precision: Build with quality barrels using a proper 1:6.5 twist, consider a chamber reamer addressing excessive freebore, use Hornady brass, use a drop funnel and cartridge straightening tool when loading, find your rifle's bullet seating sweet spot, and consider seating heavy bullets out longer than magazine length and single feeding them. Guns are individuals.

There will be exceptions to the above suggestions and you may luck out with a straight 1:7 twist and long SAAMI freebore that shoots magazine-length 90s to your satisfaction. However, I suspect most buyers getting a low bid 1:7 button-rifled barrel with SAAMI spec chamber won't be this lucky. If you area gunsmith contemplating building Valkyries, consider a better chamber reamer option and address load development with your customer. Shrinking groups further may well end up in your wheelhouse.

AS ALWAYS, I INVITE QUESTIONS AND DISCUSSION VIA MY EMAIL, G

HISTORY

M94 Winchester Vintage Peep Sight

When asked if I could install a cusomter's older Redfield micrometer adjustable peep sight on his top eject Model 94 .30-30 WCF rifle, my answer was right there—Yup! Darn good choice.

BY NORMAN E. JOHNSON AUGUST 2019

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My first experience with a peep sight was back in 1952 as a U. S. Marine. I had never used the peep sight before and managed to earn an Expert Rifleman qualification badge quite handily with the old M1 Garand. I've used quite a few peep sights since, until my aging eyes told me it was high time for a scope. A peep sight isn't mounted just any place on atop eject rifle. In fact there isn't a lot of room.

First of all, there must be a flat surface sufficiently to the rear on the left side of the receiver for ample screw attachment of the sight base. There also must be adequate receiver wall thickness to accommodate the attaching screws. The older pre-1964 Model 94s met both of these requirements. On top is the peep sight micrometer adjustment assembly with retainer clip on right. In the center is the main peep sight attachment block. Peep sight attachment block is seen below.

The Redfield peep sight attachment base began as a solid steel base an inch in length, 0.75" high, and just over a half-inch thick. Milled into this base is a slot for the outer micrometer scale worm gear, driven from inside, to serve as a fully adjustable sighting elevation mechanism. There are two countersunk screw holes located 400" below the top of the receiver, centered 4" back from barrel/receiver juncture.

M94 WINCHESTER VINTAGE PEEP SIGHT CONTINUED

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30-30 Winchester rifle. inside the base spaced 0.400" apart and 0.490" below the top used to attach the block to the receiver. A pair of 6-48 screw holes, centered 4" back of the barrel/receiver juncture, are drilled and tapped for attachment screws. These were The coin elevation adjusting screw is seen at top. Below center: The sight seen here shows its rearward position on the receiver and the two coin-adjustable elevation and windage adjusters.

The bolt and firing pin are seen with the hammer cocked. substituted with hardened torque screws. The threaded screw holes must be spaced 0.400" apart and 0.490" from the top of the receiver. The sight is positioned so the rifle bolt can travel freely a distance of 2.75" beneath it as cartridges are loaded or ejected. I couldn't help but wonder if anyone had ever mounted such a peep sight just a little too far forward causing case or cartridge ejection interference.

Adjusting The Sight Sight adjustment is a snap with the Redfield micrometer peep sight. Aperture height is about 0.7" above line of bore. With a 0.110" aperture, the visual coverage at the front sight is about 0.50". As I viewed things, the rear sight aperture clearly encircled the round, front sight hood with the front sight bead at center. This presents a very easy to use sight picture. Elevation and windage adjustment are conveniently made using a coin such as a quarter. As adjustments are made an au-

M94 WINCHESTER VINTAGE PEEP SIGHT CONTINUED

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Far 30-30 WCF ammunition has been available for many years. Pictured here area few. From top, Hornady 170 grain Interlock; Winchester 150 grain Power Point; Remington 160 grain Extended Range; Federal 150 grain Classic. dible quarter minute click is felt as each calibrated notch is moved. On top of the scale is printed "MIN" on the left and "YDS" on the right. I later discovered it is calibrated in quarter minute and yards as determined by actual sighting in. Anyway, the rifle sighted in without complication.

This hunter appears very comfortable using the Redfield peep sight. 30- 30 WCF wearing the old Redfield peep sight covered in the text, leaving two highly pleased individuals... the hunter and the gunsmith. I have the only special order 8-groove .30-30 Winchester barrel made by Thompson Center for my TCR'83 rifle and it shoots well. I was a bit surprised as the Model 94, with its Redfield peep sight, shot groups at 50 yards that closely measured up to the scoped TCR'83 .30-30 WCF barrel.

Winchester sold about 5,000,000 Model 94s through 1983 and the cartridge has reportedly killed as many whitetails as most of the others put together. Peep sights were not popular on the Winchester Model 94. Perhaps they are not quite as fast to shoot in the deer woods. While I have used both open and the peep sight, the peep delivers better accuracy in my hands, particularly with a hooded, front sight, which helps alignment.

I was pleased to learn that the hunter, who had this Redfield peep sight installed, shot a large buck with it... lots of satisfaction from both sides here. AG

PISTOLS

1911 Grip Safety

The history and fitment of safety devices for a classic handgun.

BY ROBERT K. CAMPBELL AUGUST 2019

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Over the many years I have used the 1911, carried the piece, and worked with the handgun, I have had interesting discussions concerning the grip safety of the 1911. I regard the grip safety as a fine feature that offers an extra margin of safety. Some do not. We may acquiesce to their wishes on a Bullseye gun but not a carry gun. Some point out that John Moses Browning did not originally incorporate a grip safety into his design. He did not include high visibility sights and a lowered ejection port either.

The 1911 was a pistol with plenty of stretch in the design. It is true that the grip safety of the 1911 handgun was not originally incorporated into the design by Browning but by the designer in charge of the Colt program. The addition was proposed by the U. S. Cavalry,

at the time the most influential branch of the Army. The pistol was intended to be used during a cavalry charge and fired from horseback. It's worth noting that if you fire from the back of an untrained horse, you'll likely need a parachute.

If a trooper dropped a cocked pistol the grip safety would prevent the pistol from firing and shooting the trooper or horse. The grip safe- This is NOT correct. This is a Coonan .357 Magnum. ty is pressed out by a spring and in doing so blocks the trigger. In away, the grip safety is a "free" safety in that it doesn't have to be consciously manipulated. Spring tension from the grip safety is controlled by the right hand tab or finger of the spring as viewed from the rear of the pistol. You may affect

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On the right is a curved mainspring housing and old style grip safety. Some prefer the older design, especially for fast work. Consider and fit each as an individual. the trigger pull by altering or moving the left hand tabs, but the right hand controls the grip safety. The proper release is for the grip safety to allow the trigger to move about half way into grip safety compression. I have checked factory pistols that required the grip safety to be pressed until it bottomed out against the frame. This isn't ideal.

It is possible to polish the contact points on the spring and also polish the very back of the sear and disconnecter to make for a smoother trigger action. Do not go overboard with this as the sear may "bounce" and cause the pistol to fire. While sometimes referred

to as sear bounce, it is actually inertia from the trigger causing it, allowing the sear to roll away from the hammer hooks. If it rolls out enough, the hammer follows and stops on half cock—if all goes well.

A problem that occurs with competition shooters using the popular thumbs forward grip style has the palm rising off the grip safety where a cup is formed by the hand. The result is that the grip safety isn't properly pressed. Modern beavertail grip safeties go along way toward curing this problem but they are not immune to this type of difficulty. I have seen a number of solutions to the problem. Some use duct tape, a wide rubber band, or rawhide thongs to block the grip safety shut.

Perhaps the most elegant solution is drilling a hole in the frame and inserting a wire to block the safety. Note, these were for competition pistols and I would never do this under any circumstances in the case of a personal defense or service pistol. The important point is that while the modern beavertail safety cures many problems, it does not cure them all. It's also worth pointing out this problem is exacerbated by an arched mainspring housing.

For those that prefer the grip safety's advantages but are having trouble with a grip safety that may not be properly set up, the spring may be adjusted. By moving the

1911 GRIP SAFETY CONTINUED

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spring backwards (if looking at the rear of the gun) the arm that controls the grip safety, the far right hand arm, may offer less pressure. For more pressure, press it forward. Always remember to bend from the bottom of the spring, not right at the tip. This movement adjusts the amount needed to block or release the grip safety as needed. Another concern is the final fitting of the grip safety after we have installed a modern grip safety. The grip safety arm is a point of concern.

You will be able to adjust the fit of this arm to the mechanism and con- This is OK for a Bullseye gun. Modify only very carefully. trol how much travel is in the grip safety arm so that it will rotate to clear the trigger bow

when the safety is depressed. The safety must move when released and butt against the rear of the trigger bow preventing trigger movement. There are a number of ways to properly fit the grip safety. My method is one used by the majority of gunsmiths and one I learned many years ago.

You will use a file to begin and a stone to finish. The portion of the grip safety arm overlapping the bow is filed to a good fit. This is sometimes referred to as an interface. A tip: No one gets this right the first time. Be certain the mainspring housing isn't crowding the grip safety for a false reading for fit. I

have a friend that uses an alternative method. First, he relieves an area on the right hand corner of the trigger bow.

Then he reassembles and checks the operation after working the bow and weights the trigger. This approach costs less than buying and installing a modern beavertail grip safety. I am too old to change gears but it has worked for him. If releasing the grip safety doesn't cause the grip safety to spring out, you will have to file more. Go slow as the portion filed is very small. Rarely you may find the tip of the grip safety rubs the frame. If so, file a little.

The grip safety is a great invention but not always as simple as it appears. AG

RIFLES

Loading Ramp Bedding Pillar Combo Installation

Here's how the Model 700 Remington rifle, converted to single shot with a special loading ramp and serving as a dual-purpose bedding pillar with added central action screw, shoots with the best of them.

BY NORMAN E. JOHNSON AUGUST 2019

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In my long journey as a rifle builder there have been numerous improvised and modified parts adaptable to the performance improvement of many of these rifles. Such was the case with a Model 700 action set into a Bell and Carlson target stock, made over as a single shot and equipped with a special dual purpose cartridge loading ramp and bedding pillar. This rifle is also a switch barrel with two bolts. The stock used is a Bell and Carlson with two-point bedding system.

A central action screw will be added through the hole back of the loading ramp/bedding pillar. The flat side surfaces of the cutout rest squarely onto the side rails of the loading ramp/bedding pillar. The bolt is pictured here half forward as it would move through the channel in the cartridge ramp feeding a cartridge into the chamber. and four barrels, chambered for .260 Remington, .270 Winchester, .204 Ruger, and 5.6x44 (.223 Improved) of my own design.

Getting To The Work There was nothing mysterious about this work. Bedding pillars are commercially available for this purpose but not this particular one. In American Gunsmith April 2013 ("Davidson Loading Ramp Remington Rifle Installation") I covered the installation of a Davidson Loading Ramp on a Model 700 Remington short action rifle. The part is bonded into the receiver race, originally occupied by the magazine box. These ramps are normally cartridge specific to accomplish smooth cartridge feed.

But this loading ramp does not have a pillar bedding feature. In this new design, a unique loading ramp serves a twofold special purpose, interfaced between the laterally opposing races in the receiver (where the magazine box was removed) and built up stock support from below. The new loading ramp actually serves as a solid bedding pillar, bonding solidly in place with Brownells Steel Bed. This adds measurable support to the central bedding area where the Model weakened somewhat by the magazine cutout.

LOADING RAMP BEDDING PILLAR COMBO INSTALLATION CONTINUED

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Above, the loading ramp/bedding pillar is bonded into the stock occupying the space where the magazine box was removed. The rifle bolt passes through the slot in the ramp, pushing the cartridge forward into chamber. The new (third) action screw passes through the front of the trigger guard from below and between the trigger assembly and rear of the loading ramp/bedding block into the underside of the rifle receiver. Each loading ramp/bedding block combo is unique to the rifle stock and action being worked on.

Precise measurement must be taken in making and fitting this part. Here I like to work with cast aluminum which is easy to machine and has excellent durability and maintains good dimensional stability. Some space is allowed at the sides and bottom of the block for the bedding material. The old magazine housing makes a good pattern. Always be sure to place the new bedding block/loading ramp in position on the rifle from below to be sure of proper bolt clearance.

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As a means of assuring solid square contact between the bedding block and the machined races on the receiver, I use a screw-on cleat to attach the bedding block to the receiver as the Brownells Steel Bed bonding material sets. There is a telltale, filled-in screw hole in the bolt channel as evidence of this. A poorly fitting receiver rail would present a real problem, particularly with use of a central action screw.

The third action screw is added, positioned back of the loading ramp/ bedding pillar entering the action immediately behind the new loading ramp where a semi-circle notch is cut at the rear of the ramp. Here I used a 10-32 threaded screw with This screw replaces a wood screw used here to secure the front of the trigger guard. The third screw adds strength to the action as the screw pulls it into the bedding block.

LOADING RAMP BEDDING PILLAR COMBO INSTALLATION CONTINUED

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The front screw enters a newly tapped and threaded hole. These two screws provide a great deal of stability to the action with the bedding pillar interfaced between them. The result is a very sturdy bedding system converting a weaker repeater action into a thoroughly-bedded, single shot target rifle. socket head to match the other two receiver screws. It was necessary to enlarge and re-tap the smaller existing receiver screw hole. This central screw also serves as the front trigger guard attachment.

There is absolutely no action springing in the stock as these three screws are alternately torqued. Dial indicator tests show absolutely

no barrel movement in the forend channel as action screws are alternately loosened and tightened. This four-barrel rifle is shown equipped with a Sightron S-TAC 4-20x50 rifle scope mounted on a Tally Picatinny mounting system. The rifle wears a Criterion 8 twist, 26" barrel chambered in 260 Remington. Exemplary accuracy is shown in the two series of groups shown.

Used were a variety of bullets and components, including bullets by Berger, Nosler, Sierra, Hornady, and Barnes. All of the five-shot, 100-yard groups shown here are sub-half inch with an average in the 0.34". I installed a Talley Picatinny scope rail, adding to

the rigidity to the Remington 700 action. This has been proven in tests conducted using specially mounted dial indicators. This, in conjunction with proper coaxial scope mounting, is a positive measure in accuracy enhancement.

Conclusions There are scores of things that affect precision to some degree, however small. Shooters wanting groups hovering around minute-of-angle may not notice such modifications, but I can assure you where quarter-minute groups are in the realm of possibility, there is a difference. AG

TOOLS & FIXTURES

Woodworking Tool Basics

Quality tools are a must for any project, including wood working. Here are the must-know basics.

BY ROBERT K. CAMPBELL AUGUST 2019

ORIGINAL PP. 21-22

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An all around gunsmith must have on hand a good number of proper tools including chisels, files, and assorted hand tools. In this category of tool the value of each one is based on the ability of the user. They say a poor workman blames his tools and this is true to a large extent. However, there are a number of poor quality tools available and while price isn't always the sole indicator of quality, cheap tools are cheap tools. With the better class of tool the quality remains after the price is forgotten.

Gunsmiths and other craftsmen also like to have a warranty but the very nature of our craft will often void a warranty. We like to modify our tools and change the edge and surface in order to have a something better suited to the task at hand. I have done quite a

bit of wood working. While it wasn't all on gunstocks, most of it has been. A stock may be modified to have a better fit, to look better, or to be more accurate. We rout out areas, we fix dents and cuts.

Modifications Considering tool modifications, how about a ten degree angle on most edges? This will provide a versatile angle for most of the work to be done. Less than ten degrees is ideal for some chores while an angle of as much as twenty degrees may be needed for harder surfaces. Some wood is very hard and requires more effort to cut. Something that doesn't demand much effort is cutting and sharpening the tool. A grinding wheel should be allowed to do all of the work.

Lightly touch the surface of the chisel to the grinding wheel and let the powered wheel do the work. This also applies to cutting special purpose screwdrivers. While Brownells offers excellent quality tools for the task I have modified screwdrivers to remove revolver bolt stops and the like. Over time, these modifications will create an assortment of tools for every occasion. It is important to remove impressions and hollows in the grind with a dose of oil followed by a smoothing stone.

The edge should be sharp and never place the cutting edge of the tool against the grinding! The edge will catch and it may become airborne. The inevitable hollows in grinding should be smoothed out.

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Take care not to roll over the radius of the tool. Done right, the end result is a true custom job that suits your hands and leverage. Use jeweler's rouge to finish. I learned this process many years ago from a combination of reading Bob Brownell's books and from practical experience and demonstration. The end result is a very nice edge that is truly sharp and which keeps your work looking nice. Here is a tip that takes a little time but results in far less work over the long term.

Never work the tool until it is dull. Once you have done your custom work and come up with a keen edge (keen is a good description as it means more than sharp) keep it that way. When working wood, stop what you are doing every so often and wipe the wood from the tool. If needed, apply polish to the edge and dress it up. This will keep the edge clean and sharp and you will be able to keep working with a fine edge.

Don't wait until the tool is dull as this will make it likely that the edge will not be perfect and there will be some roll over that

must be polished out. This sounds like some work but the fact is it is just a learning curve. It is a process in your education. Once learned, life will be easier and you will be a better craftsman. I am going to repeat advice I was given and read in the early 1970s. Buy first quality. Have a handful of very good tools. Better this than a dozen poor quality tools.

The cost is similar but you will be able to get a lot more done, do a better job, and encounter less aggravation with good quality tools. I like keeping the tools hanging if they have a hole drilled in the handle. Having just a few for wood cutting in a corner makes them easy to find and putting them back in the same place every time means much to your piece of mind. As for oilstones (whetstones), the "oil" in the name is there for a reason. I keep mine soaking in oil at all times when not in use.

I am not certain this is necessary but it has worked for me for many years and seems right. It does seem the stones soak a bit of oil up and this helps when we oil parts to

be stoned. I'll close with some of the most important things concerning tools. The bevel should be longer than that used for most types of wood working. Gunsmiths work with gunstocks and for the most part these are heavier and thicker wood than most wood carvers like to work with. Tools must be sharp.

The sharper the tool to begin with, the longer it will maintain its edge. When the tool becomes less sharp and more effort is needed to gouge the wood, the time has come to buff and clean the tool. Keep the tool sharp as you work. Remove the wire edge or it will dig into the wood. Keep the corners of the tool rounded so that they do not dig in as you work. The test is performed on a piece of hard treated wood that is harder than most of the stocks you work with.

This provides a better test and is a learning process as to the bevel you need. AG

SHOTGUNS

Reader Forum

BY AMERICAN GUNSMITH EDITORS AUGUST 2019

ORIGINAL PP. 23-24

Single Shot Shotguns The single shot shotgun can be smoothed up for hunting or for defense. RK Campbell's April 2019 article "Coach Gun Smooth Up" did a darn good job covering side-by-side shotguns and is about the same idea on single shots. With practice and carrying two shotshells in the support hand, a shooter can rattle off three good shots quick. I don't have big hands but can hang onto two 12 gauge shotshells while still controlling the gun well.

Over the years I've successfully shot doubles and triples in this manner while bird hunting. Most single shots have exposed hammers and opening the gun doesn't cock them. This helps the reloading process. Normally, the front of the receiver and the forearm end piece—where the barrel pivots—is a little rough. This area needs polishing. If the gun cocks on opening, I recommend finishing the area with 600 grit wet or dry sand paper. Some guns will be okay with 400 grit here.

If they open and close tight, use 600 grit to finish. Also, the barrel hinge pin in the receiver and hinge pin area should be polished. Be careful as the clearance here is critical when the gun is closed. Use 600 grit and polish the high spots only. A rat tail file or similar wrapped in the sand paper can be used if you're careful. Clean and lube the polished areas when done, otherwise they seem to want to rust immediately. Complete with a good gun grease (not oil) and use a good oil elsewhere.

Where the barrel locks up on the lock block on closing can bind up there. If a gun opens up on firing, the barrel is not fully locking. It may not do this every time. Note, Winchester Model 370s may open during recoil if shot with a light grip as the opening lever is back on the receiver a little too far. I've closely watched the hands of other shooters to notice this. The lock block can give problems on these shotguns but a loose grip is more likely the cause of a gun that opens upon recoil.

On recoil, the lever moves back into the shooter's thumb and opens the gun. A tight grip fixes this, however, a looser grip can speed up reloading. Regardless, this is not a safety factor. The sides of the lock block and the receiver sides may be all that are needed to smooth up. I've found some of the sides of the lock block can catch and hang up on the receiver. Some receivers are rough and a file works well, especially with a lock block polished on the sides.

To better understand how single shots wear on the hinge pin and the surrounding areas of the barrel, let the barrel move forward in the receiver. This makes a gap between the end of the barrel and the breech face. If excessive, it creates headspace problems. This normally also loosens up the barrel lock up. Loose lock up lets the barrel move up and down in the receiver. A good idea is to polish the lock up parts carefully. Normally, a spring moves the lock block into place on the barrel when the gun is closed up.

You will find wear on these parts on older guns or on guns not lubed correctly. Not using a good grease on the hinge pin and hinge pin area is normally the reason for wear here. It only takes a smear of grease to lube. Of course, you want the gun to open easily and close smoothly. And you want the gun to fully lock up when closed. I have had to disassemble a gun two or three times to get it fully lock up before. It's better to take it apart a few extra times then to create a problem.

It is easy to get carried away on the barrel and lock block surfaces. The lock block should be harder than the barrel and a newer gun is going to be rough but should have better designed angles. Your opening lever may or may not need smoothing. Check this with the barrel opened or off the receiver. Sometimes a little cleaning and gun oil will smooth up the opening lever. If the lever is loose it will cause the lever to bind.

There is a screw inside the receiver on the bottom of the lever on some older guns and it can give you fits to either tighten or loosen. Offset screwdrivers are too tall to fit into the receiver and get to the screw. I have two custom screwdrivers I made for this. I have found one old gun with a removable trigger guard screw and it took along shaft screw driver with the tip ground on the sides of the shaft diameter to reach the bottom of the receiver.

A drop of white Loctite 565 works well as it is high-temp and vibration resistant and, more important here, it cures in confined spaces with an absence of air. I have worked on H&Rand New England Arms push button levers and the teeth sometimes are nicked and the burrs need to be polished off. The goal is for the release to be smooth and not bind. The ejector must work without hanging up and usually needs to be addressed. Normally, these parts do not require a high polish, just a cleaning and smoothing.

You may find metal chips in the ejector housing in the parts along with burrs and nicks. A pig tail on the end of the coil spring is more common on the older guns. I use a needle nose pliers and bend the pig tail out of the spring. The spring can have a kink or bend and needs to be carefully straightened. Take a small light and look into the ejector housing. Sometimes you'll find nicks, burrs, chips, etc. Needle files will be needed to clean this up as ejector parts need to be smooth.

The chamber should be polished such that an empty hull practically flies out of the gun when opened and a shotshell drops right in. With old guns, even a chamber marked as 2 3/4" may be undersized for modern plastic hulls. Check the chamber for actual size as a too short chamber is like shooting proof loads. Along forcing cone reduces felt recoil some and pro-

READER FORUM CONTINUED

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vides a more even pattern. There is some question regarding polishing the bore and what effect this has on recoil. I use along forcing cone reamer to lengthen short chambers. Making a 2 3/4 into a 3-inch chamber is not always a given regarding safety. Most single shots have plenty of metal but not all of them do. The feel of cutting a forcing cone will vary among barrels. I've yet to encounter a chrome-lined bore on afield gun while trap guns often have them and would be a no-no for lengthening the forcing cone.

I make my own simple chamber polishing tools that also address forcing cones of varying length and the bore. Starting with a hard wood dowel that fits in the bore, cut off about two inches and center drill a hole that fits onto a mild steel rod. Use a hack saw to cut a slot across the front end just over an inch deep. Cut about an inch-wide strip of sand paper and place into the slot with the grit on the outside, folded around the tool's head in opposite directions as the tool is turned.

I use a hand drill to turn it with a lubricant such as WD-40 in the chamber. This creates a black slurry in the bore which aids the polishing process. It also makes a mess, so I do this outside. Start with 320 grit and work to 600 grit for a very nice finish. Single shot chambers can be rough and this helps greatly. If you have a choke tube, polish it and the bore in the barrel together. Turn the tool in the direction of tightening the choke or it will unscrew. Do not polish the choke tube threads.

I use paper towel as a patch and push through the bore to clean it. Oil the bore when done, clean the choke tube and threads, and use anti-seize lubricant on the choke threads. On some H&Rand New England Arms single shots, the stocks are made wrong. Upon firing, the stock hits the shooter's face hard. This area forward of the stock needs to be reshaped or tapered forward so as to help the stock move away from the shooter's face during recoil.

This will take around a quarter inch of material off and should not end with a straight line but a taper that blends into the rest of the stock. Refinish as normal when done shaping. I once found a nearly-new shotgun in a pawn shop listed at less than half its value when new. I could tell that shotgun was there because of this stock shape issue without even asking. Single shots are light (one reason I like them) but recoil is a factor, more so when shooting three-inch magnums.

Keep the stock shape in mind, install a recoil pad as needed, and realize heavy kicking rounds can not be speed loaded. Daniel P. Horn Wolsey, SD *Sixty Years Of Testing Guns* Ray Ordorica released his autobiography covering his career as a professional editor, gun writer, novelist, photographer, wood-worker, pilot, machinist, engraver, and musician, including his experience testing firearms for at least sixty years. His path to becoming a world-class gun writer was pretty well off the beaten track.

Sixty Years Of Testing Guns is the story of Ray's journey. Extractor I am look for an extractor for a Remington Model 721 in a .270 bolt action. I have exhausted all of my search options. Jerry Spadorcio Jerry's Gunsmithing From Sergey Lyalko and Mark Hollensen. This extractor does not have to be specific for the cartridge the rifle is chambered in. It will also fit a number of Remington 700 rifles.

The extractor may need some small adjustments to work but it will fit a .270 and is available from Brownells (bit.ly/2RgpdGH). The first place to check is with David Snoap at dpsnoapjr@yahoo.com. He used to be a Remington Factory representative and has an inventory of Remington parts. We don't have a phone number but emailing him revealed he was able to supply a needed part for a 742 worked on last year. The second place to check is Kelsey at Gunsmith's Inc. in Jacksonville, FL (GunsmithsInc.com).

SHE MIGHT HAVE ONE. AG

SEARCHABLE ISSUE RECORD

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