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DIGITAL ARCHIVE EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

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08

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

BAIKAL IZH-35M

ECONOMIC IMPACT 2023 · SHOTGUN SPEEDLOADERS · WEATHERBY VANGUARD STUCK BOLT · MINI MILL OVERVIEW

DIGITAL ARCHIVE EDITION

Preserved for the bench.

This edition presents the original American Gunsmith editorial work in a modern, searchable layout while preserving its issue, author, and source-page history.

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PRECISION ARMS WORKSHOP

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A complete guide to the searchable editorial work preserved from August 2023.

FROM THE ARCHIVE

Economic Impact 2023

BY AMERICAN GUNSMITH EDITORS AUGUST 2023 ORIGINAL PP. 2

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The National Shooting Sports Foundation has compiled their Firearm Industry Economic Impact and found that our industry has increased 322% since 2008. The total economic impact of the firearm and ammunition industry in the United States increased to $80.73 billion in 2022 from $19.1 billion in 2008, a 322 percent increase, while the total number of full-time equivalent jobs rose to over 393,696 from approximately 166,000, a 136 percent increase in that same period.

On a year-over-year basis, the industry's economic impact rose to $80.73 billion in 2022 from $70.52 billion in 2021. Total jobs increased by over 17,877 in the same period, to 396,696 from 375,819. The firearm industry has broader impacts throughout the economy. It supports and generates business for firms seemingly unrelated to firearms, at a time when every job in America counts.

These are real people, with real jobs, working in industries as varied as banking, retail, accounting, metalworking, and printing, among others. The firearm and ammunition industry paid over $7.48 billion in business taxes, including property, income, and sales-based levies. An additional $1.15 billion was paid in federal excise taxes, which directly contributes to wildlife conservation. "Our industry's economic input is undeniably contributing to every state and every community. This milestone achievement of over $80 billion in economic impact proves that the American firearm and ammunition industry is strong," said Joe Bartozzi, NSSF President and CEO. "Ours is an industry that is consistently growing and innovating to meet the American demand for the highest quality firearms and ammunition for lawful firearm ownership.

Over 4.2 million Americans from all walks of life, for the first time, discovered and exercised their right to lawful firearm owners and safely participate in the recreational shooting sports last year. This growth equals more jobs that add to our local economies, averaging $65,000 in wages and benefits, up from $56,900 reported last year.

Since 2008, federal tax payments increased by 266 percent, Pittman-Robertson excise taxes that support wildlife conservation by 226 percent, and state business taxes by 46 percent." The annual Firearm and Ammunition Industry Economic Impact Report provides a state-by-state breakdown of job numbers, wages and output covering direct, supplier and induced employment, as well as federal excise taxes paid. Access the full report at Bit.ly/3Lseb La John M. Buol Jr. AmericanGunsmith.info

HISTORY

Baikal IZh-35M

built conventional competition pistol.

BY DEAN MEIER AUGUST 2023 ORIGINAL PP. 3–9

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Target pistols often begin life as more common handguns pressed into a competitive role. The classic example is John Browning's 1911 which still serves as the dominant platform for top end competition guns in both speed and precision disciplines. The Russian Margolin 22 Long Rifle Practice Shooting Pistol is similar in that it is a "conventional" handgun primarily used for competitive target shooting in use since the 1950s. By the 1960s the Russians were competing with the IJ-35, a well-regarded target pistol.

They were rarely seen outside of Russia and only a handful of non-Soviets had ever shot one, however, they were a dominant design until the Italian FAS (Fabbrica Armi Sportive, Sporting Guns Factory) Model OP 601 "Domino" was released in the 1970s. FAS is a family-owned business started by Massimo Mencarelli in the early 1970s in Milan, Italy.

The FAS OP 601 chambered in 22 Short is a rapid fire competition pistol and the FAS SP 602 chambered in 22 Long Rifle for international Standard pistol to compete with Pardini, Feinwerkbau, and Hammerli. German manufacturer Feinwerkbau released their AW93 after a delay which was essentially a refined IJ-35 given a once-over by German designers, meaning it was made more complicated. In response, Baikal, the export trademark of the IZhevsk Mechanical Plant, decided to update the IJ-35.

They also added a different upper shroud mounting system, grip safety, and a bottom mag release. This became the IZh-35. The IZh-35 is a Soviet-designed target pistol for conventional international competitive shooting, par- Ideal for ISSF disciplines such as 25m Pistol (previously known as Sport Pistol) and Rapid Fire as well as the .22 Caliber phase of NRA/CMP Precision Pistol and the 22 Rimfire Pistol Distinguished program.

While designed to use iron sights, Baikal includes a rail for mounting optics such as the ubiquitous Ultradot. ticularly disciplines requiring rapid fire such as 25 Meter Pistol (Sport Pistol) and Rapid Fire. Designed by V. A. Yarygin in 1973 and manufactured at the IZhevsk Mechanical Plant, the prototypes were tested by the state in 1976 and made official for Soviet teams in 1979, replacing the previous XP-30 and XP-31 Soviet standard sport pistols.

In 2008, the IZhevsk Mechanical Plant renamed the IZh35 as the MP-35M (Mechanical Plant-35M). This was anew, from-theground-up, competition-specific design. The Margolin was a more conventional design that would go on to use various modifications such as grips, different barrel lengths, compensators, weights, etc. When designers sought to replace it, rather than taking a previous, more straight forward design, they started anew with specific objectives.

Shooting has been in the Olympics since the first modern Olympiad in 1896. In fact, Olympic founder Pierre de Coubertin was a French competition shooter. The International Shooting Union (known in France as UIT, Union Internationale de Tir) and later as the International Shooting Sport Federation, refined the rules over decades. Given a more established rulebook, Russian designers made a gun specifically for them.

They wanted to bring the barrel down as much as permitted to minimize recoil effect in rapid/timed fire. The Margolin was criticized for this and the design did not allow

BAIKAL IZH-35M CONTINUED ORIGINAL PAGE 4

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In use since the 1950s, the IZh-34 and 35 series that largely replaced it twenty years later was anew, ground-up design rather than a modification of an existing design. The trigger has an adjustable trigger point and stop. The five-round magazine locks the slide back after the last shot. anything to be done about it. The designers also wanted to maximize the sight radius length to 220mm and a barrel length of 153mm, both the limit of the rules.

The rules also allowed for a variety of grips and trigger positions and lengths. The designers wanted these to be easily adjustable by the shooter. To keep in line with these requirements, the hammer, sear, and trigger mechanism were moved up and placed horizontally. The hammer is at the top and pivots down to strike the firing pin. The red dot on it also serves as a loaded chamber indicator (sort of) by showing that the hammer is cocked and warning that the chamber is presumably loaded.

Of course, a cocked hammer with the red dot exposed on the top doesn't necessarily mean a cartridge is chambered but cocking the hammer with a filled magazine inserted certainly will. As always, the best policy is to inspect regardless of what an indicator claims. Other manufacturers tried to lower the barrel in their guns, however, they still have to fit rulebook standards. The typical compromise was to sacrifice barrel length for other parts and/or by moving the magazine to the front of the trigger guard.

The Hammerli 280 and Morini CM are examples and both have barrels that are much shorter. These guns with shorter barrels seem to be more ammunition sensitive and a shorter iron sight radius makes it more difficult to notice slight sight misalignment, a vital concern given the small margin of error on bullseye targets in all forms of conventional competition. Other than rulebook-specific design parameters, the IZh- 35M is a blowback Shape them to your hand. design constructed out of steel.

The barrel is fixed to the frame. It has detachable single column box magazine, which is inserted in the grip. Variants include the IZh-34, first introduced for the 22 Short, the second model IZh-35, and the later IZh-35M. This design became a main stay of the Russian .22 caliber pistols for ISSF competition. The pistol uses a unique feed that keeps the bore very low in the hand, includes large, adjustable iron sights ideal for competition shooting, and a fully adjustable trigger system.

Despite its crude finish, the IZh series was refined in the areas that mattered—and nowhere else. It is a competitive pistol that retailed for around $400 in a market where its next cheapest competitors with similar features were at least three or four times more expensive. They have become more rare and now fetch double that. The quality of this pistol is most readily displayed by the fact that Walther refined it and put their name on it.

Walther released their KSP 200 in 1998 which was a more refined version at twice the price of the original. Because the Russian original is rough around the edges, Walther focuses mostly on the grip as that's the shooter's primary in-

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Far top Top Loosen the screw on the trigger and it can be slipped back and forth along the trigger base. The two hex wrenches show the forward and rear limits of movement. Far bottom This one is covered by the left grip panel when assembled. Bottom This is accessible from the top when the pistol is fully assembled, unless the scope rail is installed as shown here. If the rail is installed, the top shroud can be removed to access it.

Some shooters that use an optic drill a hole through the scope rail to make it more accessible;.others don't bother, preferring to set and test a setting and then just leave it alone. terface as well as more refinement with the adjustable trigger.

While still a blowback 22 Long Rifle pistol, the IZh-35M is bit different than more "normal" rimfire handguns such as the Ruger Mark I-IV variations, High Standard, Browning Buckmark, and 1911 conversions based on Bob Marvel's design having been made from the ground up to compete in ISSF pistol disciplines. Overview It's been called the "Perestroika Pistol", "Glasnost Gun", or just "Russian Target POS". The quality is Cold War-era Russian.

Anything not requiring finishing, polishing, or refinement was bead blasted and left as-is with tool marks in place. The finish is black-oxide over bead blast, resulting in a coarse matte finish with enough tooth to rip the cotton off a swab. This does not have a mirror finish as the IZh-35M is meant for business, not for pride-of-ownership; if the part isn't related to the trigger pull or other critical function, the part wasn't polished and left alone.

Most obvious is the rough mill finish on the inside of the slide rails, but it doesn't seem to cause any problems with function. The original target grips supplied by the Russians were blocky and purposely over sized for the shooter to shape as needed. The trigger allows adjustment for pull weight, pre-travel (take up), sear engagement, and trigger position and all are readily made by the shooter with a screwdriver, three of them without any disassembly.

The factory iron sights are classic International style being adjustable, large, and square Partridge type ideal for shooting round bullseye targets. Although ISSF disciplines still don't allow optics, the IZh-35M was designed in an era when they were becoming common and the pistol includes a scope rail and screws which mounts to the upper barrel shroud. Of course, largely due to this being of secondary importance in the ISSF, this is a bit of an afterthought.

To do a thorough cleaning, the shroud along with any attached optics have to be removed to get to the internals. However, basic maintenance and lubrication can be done without removal. Luckily, and probably not by specific design, replacing the shroud usually doesn't effect zero too bad. Of course, this is a non-issue when using iron sights. Let's start with disassembly and cleaning. Begin by clearing; remove the magazine, pull back the bolt (17) by pinching and pulling on the bolt's finger grooves.

Press the Bolt hold back latch (86) and lock the bolt to the rear. Confirm the chamber is empty. Rudimentary maintenance can be done here by brushing the faces of the bolt and

BAIKAL IZH-35M CONTINUED ORIGINAL PAGE 6

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This can be modified to secure the shrouds if the optic rail isn't stable enough. Using a #7 bit, drill a hole through the push button connecting the bottom shroud and tap at 1/4-20. Mount a 1/4-20 set screw 3/8" long. This set screw can be adjusted to apply pressure to secure the shrouds when assembled in place. breech and lubricating the big moving parts. To disassemble further, remove the grips (70, 72) by unscrewing the grip screws. On the underbelly of the muzzle, you'll find a spring loaded button.

Push it, and the lower shroud (75) slides forward and removes. The aft end of the lower shroud tucks in above the front of the trigger guard. Slide the bolt reward and hold it. Remove the upper barrel shroud (76) by unscrewing the three shroud screws on the sides. You may have to hold the bolt to the rear to accomplish this. By design, the sights are still on the frame so disassembly can not For the S&W magazine to fit, a chamfer needs to be beveled at the back of the magazine. affect the iron sight zero.

The scope rail, however, is another matter. Push the shroud rearward and down. Allow the bolt to move to its forward position and move the forward end of the bolt down to clear the front of the barrel block. With the bolt's nose end down, let it slide along with the spring and guide rod off the front past the muzzle block.

This is the limit of disassembly recommended by the factory and there is no need to strip the gun any further as removing the upper and lower shrouds along with the bolt with firing pin exposes all critical parts for thorough cleaning. The firing pin is subject to the most fouling. Plus, it does not have a spring so fouling that impedes its action can create a potential slam fire situation. A rinse with light mineral spirits or similar solvent washes away crud, followed by a light gun oil such as Rem Oil.

Don't use a solvent with dichloromethane or methylene chloride, especially, with the magazines which contain plastic parts. Grips The Russian-made grips were purposely blocky and over-sized. Walther included more refined grips with their KSP 200 and aftermarket makers such as Morini in Switzerland also offer options. Russian competitive shooters considered it a rite of passage to personally work with their gun in order to shoot well.

The idea was for the shooter to determine their best fit as apart of the learning experience. Even more refined grips will likely see some modification as a shooter forever tweaks things to chase those extra points. For many shooters, an ideal grip will have three flats in the front, one straight across and the others at 45 degrees on each side. Port side should bevel towards a flat, keystone-shaped middle matching the shooter's fingers, with another bevel off the other side.

Gripping pressure needs to be front-back to avoid any twist or torque that might very slightly induce misalignment as the trigger is worked while firm grip pressure is maintained. The thumb rest area needs attention as well. Your favorite woodworking tools or a Dremel with appropriate bits are fine. As always, patient trial and error is the order

BAIKAL IZH-35M CONTINUED ORIGINAL PAGE 7

The feed lips may need some attention with a jeweler's file. of the day as you can't just put wood back on after gouging it off. Some shooters apply an epoxy putty or Bondo and then apply their shooting grip to create a mirrorimage of their hand, letting it cure before use. You could purposely remove a bit more material than desired or use this to build up an area that was "modified" more than intended.

The key point is to set the grip up so that the firm grip needed to control the pistol doesn't induce even the slightest deviation to alignment. For conventional competition, all this is done with one hand unsupported. Many shooters believe they understand and have a solid position and grip, maintain great sight alignment, and consistently-smooth trigger control. Bullseye targets scored in conventional competition routinely demonstrates that belief is often false.

Trigger Adjustments Let's begin by going over the five basic trigger adjustments standard in the IZh-35M. The pre-travel screw and overtravel screw (both 25) are on the bottom of the trigger base (23). The trigger (26) is attached to the trigger base and can be removed by loosening the trigger screw (27) and repositioned forward or backward as desired. These three trigger adjustments can be made without disassembling anything.

The trigger pull adjusting screw (14) is accessible from the top when the scope rail is not installed. Some shooters drill through their scope rail to make it more accessible; others don't bother as they set it once and leave it alone. The sear engagement is adjusted with a screw that is near the safety and rear sight and under the left grip panel when assembled. Remove the left grip panel and look for a small setscrew on the front of the rear sight housing.

The screw is threaded into a black plastic cylinder to prevent the setting from changing during firing and takes some force to turn. Be sure to use a properly fit screwdriver as the metal is a bit soft, so be careful not to strip the slot. Turning the screw in (tighten) reduces sear engagement. A small, round window in the frame just below the manual safety reveals the tip of this screw and shows how the adjustments change the resting position of the sear. The screws are painted in with ared paint in my example.

This is like a light thread locker, so be patient and don't force things. To begin adjustments, unload and clear the pistol. Cock the hammer. Take off the grip panels and tie down the grip safety if need be. Turn the overtravel screw out two or more Notice the difference in the bevel at the bottom rear. turns. Screw the sear engagement screw in until the hammer falls, then back out 1/2 to 3/4 turn. Pull back the bolt to cock the hammer to make sure it stays cocked.

Turn the take up screw in until the trigger bar contacts the sear, push the trigger bar down with your finger and turn the screw one more turn. Release the trigger bar and turn the screw out until the trigger bar just engages the sear. Screw in the overtravel screw until the hammer will no longer fall. Turn the screw out until the hammer will fall, then out another quarter turn. Set the let-off weight by adjusting the screw on top of the barrel.

Removing the rear sight provides a large window from above on the secondary sear, making lubrication easy. To remove the rear sight, back out the elevation screw until the sight lies flush with the top of the frame. Use a pin punch to push out the pivot pin, pushing from the end opposite the manual safety. Remove the rear sight by sliding it to the rear, being sure to capture the spring and plunger on the left side with your thumb. This spring is for the elevation screw detent.

While not too strong, ease the sight off to retain it. As you reduce sear engagement, the second stage gets shorter. It is a good idea to also hold the grip safety in while making this adjustment, so the sear does not bind against it. With the sear disengaged, a dab of grease on the working surface of the secondary sear (visible in the small, round sear engagement window just below the manual safety) helps smooth trigger action.

The grip safety has a finger which, at rest, captures the sear and prevents it from rotating out of engagement with the hammer. Adjusting the sear engagement screw

Reversed the follower button by drilling a 3/16" hole through it, press the bottom body tabs flat, and bevel the back bottom edge to engage the magazine catch. This is a simple trial-and-error fitting process. alters the resting position of the sear. Sufficient adjustment will change the resting position of the sear so that it is beyond the reach of the grip safety finger intended to capture it. The result is that you can have a trigger with no creep or a functioning grip safety. Pick one.

It may be possible to modify the parts for the new sear position, but it would mean removing the pins out and really getting into the works. A few cautions here. Adjusting the sear engagement incorrectly can make the pistol capable of firing unpredictably. After each adjustment, carefully test by dry firing. When satisfied, test with a single round before progressing to two rounds under closely controlled range conditions to be certain the sear is still reliably catching the hammer while under recoil.

How much creep you can take out of your second stage without making the gun unsafe depends on how square and true the parts are on your individual pistol. Test and check after any trigger adjustment(s) before trusting to normal live fire. Many shooters have successfully gotten reliable two pound triggers doing nothing more than carefully tuning the screws. The example here has proven reliable at 2.5 pounds. Regarding dry firing, many IZh shooters do it without issue.

Yes, that’s normally verboten with rimfire guns, however, this is fine with many target guns due to being purposely designed for it. Conventional rimfire guns have the firing pin compressing the primer-filled rim against the edge of the chamber. Doing this extensively on an empty gun will peen the edge. In the IZh- 35M the sharp end of the firing pin never touches the rim and in dry firing it is hitting the barrel above the chamber with its entire big flat area. Pressure created there is low.

Numerous IZh-35M shooters have reported dry firing their guns for tens of thousands of shots in addition to regular shooting with no ill effect. Knowing how beneficial dry practice is, it would be odd to build a purpose-built target gun that couldn’t be practiced with. Shroud and Optics The shroud screws and rear-blade screw are prone to loosening from the vibration of shooting. This is especially an issue when using optics. The first issue is the original screws slots are shallow and soft.

The correct size for the shroud screws is 4mm-0.7 thread x 8mm long and some shooters replace them. Others tighten up the shroud with a modification. Using a #7 bit, 100-10X is as good as it gets. drill a hole through the push button connecting the bottom shroud and tap at 1/4-20. Mount a 1/4-20 set screw 3/8" long. This set screw can be adjusted to apply pressure to secure the shrouds when assembled in place. Side note, the upper shroud on the Walther KSP200 are not retained by screws.

Instead, the muzzle end of the shroud it is retained vertically with interlocking grooves on the lower shroud and a small diameter pin and spring loaded plunger about three-quarters of the way back on the upper shroud. So lacking one of these modifications, should you use Loctite or other thread locker? This is a nonissue when using iron sights exclusively. For optics, there are mixed opinions. Some insist to not use any. The shroud may need to be removed for maintenance periodically.

Their advice is to diligently check mounting screws prior to each live session; carefully too, as the original screws are soft. Others resort to clear nail polish. This is a mild thread locker, is less permanent than most types of Loctite, and polish can be broken down with oils and cleaning solvents. Going with a thread locker, use one rated for low strength metal such as the purple Permatex Low Strength or Loctite 222.

On the sample gun, no thread locker was used as performing a check to confirm screw tightness before each shooting session retained the optic’s zero. Other Maintenance Breaking in the IZh-35M is a journey, not a task. Keep it well lubed prior to every shooting session and flush it with WD-40 and/or something like Birchwood Casey Gun Scrubber Cleaner after. An ultra-

1 Pistol frame 2 Trigger base pin 3 Magazine catch 4 Catch spring 5 Pin 6 Front sight base 7 Plug 8 Front sight 9 Front sight screw 10 Lower barrel detent 11 Detent spring 12 Plunger 13 Plunger spring 14 Trigger pull adjusting 15 Trigger base spring 16 Pin 17 Bolt 18 Extractor 19 Extractor plunger 20 Extractor spring 21 Pin 22 Firing pin 23 Trigger base sonic cleaner would be idea. When the gun is new it has excess black oxide and metal chips left over from manufacture.

The idea is to remove any manufacturing remnants and excessive black oxide coating when the gun is new. Also, be prepared to readjust the trigger a few times until you get it just right.

After broken 24 Plug 25 Adjusting screw 26 Trigger 27 Trigger screw 28 Trigger bar spring 29 Trigger bar 30 Base 31 Cover screw 32 Cover 33 Hammer pivot 34 Hammer 35 Pin 36 First sear spring 37 Firing spring guide 38 First sear 39 First sear pivot 40 Grip safety spring 41 Grip safety 42 Second sear spring 43 Second sear 44 Firing spring 45 Pivot 46 Screw 47 Ejector 48 Base screw 49 Pin 50 Rear sight base 51 Rear sight plunger 52 Plunger spring 53 Windage screw 54 Rear sight spring 55 Elevation screw 56 Pin 57 Ball 58 Ball spring 59 Ball spring 60 Rear sight 61 Rear sight slideblock 62 Rear sight screw 63 Pivot 64 Magazine body 65 Follower 66 Magazine spring 67 Magazine cover 68 Button 69 Pin in, maintenance as with any quality rimfire suffices.

When cleaning pay attention to the firing pin as they can be filled with grit. A few lube-shoot-flush cycles fixes this. As there is no return spring, any crud there can prevent free return which might cause the gun to double fire.

Baikal IZh-35M (Speci ications subject to change without notice) 70 Left grip sideplate 71 Sideplate screw 72 Right grip sideplate 73 Palm support 74 Palm support screw 75 Lower barrel shroud 76 Upper barrel shroud 77 Palm support block 78 Recoil spring guide 79 Recoil spring 80 Frame plug 81 Base plug 82 Pin 83 Manual safety lever 84 Pin 85 Magazine release 86 Bolt hold back lock 87 Latch pivot 88 Latch spring 89 Washer 90 Scope mount 91 Scope mount screw 92 Upper shroud screw Magazines Some of the factory magazines need work as delivered.

They are sturdy and made of heavy gauge metal but may need help. Start by deburring the feed lips. The front edge of the rear lips can cause the case rim to hang up if there are any burrs on them. A jeweler's file is good for this. Check to ensure they are smooth, feed properly, and don't leave any burrs on the cartridge case. A bigger problem now is availability. Replacement magazines were about $25 each and now are seen for $100 when available.

Luckily, magazines for the Smith & Wesson 22a can be modified for the IZh-35M and these can be had for under $30. Begin by disassembling a S&W 22a magazine. The follower button needs to be reversed for the IZh-35M. Modify the follower by making a counter drill at 3/16" diameter on the opposite side to allow the follower button to be inserted. The S&W magazine tube has tabs on the bottom near the floorplate. Flatten them as they will catch in the IZh-35M.

The magazine catch in the IZh- 35M holds the back bottom edge of the magazine. For the S&W magazine to fit, a chamfer needs to be beveled at the back of the magazine. This is a simple trial-and-error fitting process. While not of much use for most forms of target shooting, the 22a magazine provides a ten-round capacity over the standard five rounds. The 22a magazine spring can also be used to refurbish and original IZh- 35M magazine as well.

This Russian clunker is an interesting target pistol and has been used to win many championships. Due to less availability and higher prices today it isn't as good of an option, but in its heyday this pistol was every bit as competitive as guns costing three and four times more. It's rough around the edges and takes some coaxing for top performance, but the IZh-35M is still atop notch conventional target pistol. AG

PISTOLS

Shotgun Speedloaders

When having a blast meets the need for speed! Here's how I created a solution for quicker reloading of an over and under shotgun.

BY ROBERT M. LAYNG AUGUST 2023 ORIGINAL PP. 10–11

Above right: Angled view of the shell holding end of the speed loader. Below right: Frontal view of the shell holding end. Notice the undercuts for the rims.

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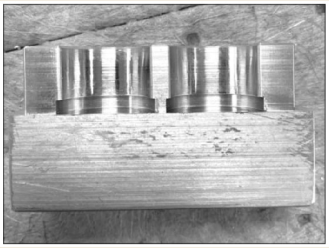

Above right: Angled view of the shell holding end of the speed loader. Below right: Frontal view of the shell holding end. Notice the undercuts for the rims.

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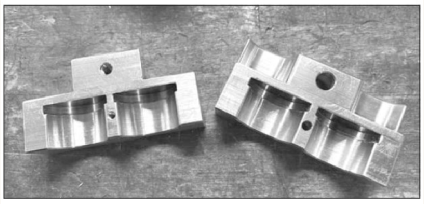

Left: Internal view of the opposing parts. The side with the finger grooves contains the holes and counter bores for the shoulder screws and spring. The "clamp" side has the holes threaded to bolt them together. After testing with both shoulder bolts installed, I found the lower, smaller screw to be redundant and that it impeded the function of the loader. It has been eliminated from the design, and the shells themselves keep the parts aligned while in use.

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One time while shooting around of Sporting Clays, I noticed that I was constantly fumbling fresh shotshells prior to adding them to the chambers of my shotgun. I wanted a solution that would allow me to load both chambers simultaneously and quickly. I took a lot of inspiration from revolver speedloaders in the design process.

After spending an inordinate amount of my free time designing the parts on the pile of graph paper on my desk and remembering hearing a colleague of mine tell me, "When it comes to design, first comes the problem!", I came up with an easy-to-manufacture concept. I also realized that I would need a set of these loaders to allow fast and precise reloads for each station of the Sporting Clays course that I frequent.

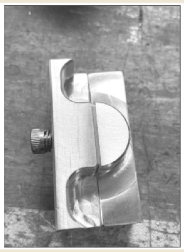
First, I decided to use 6061 aluminum alloy as I have scrap chunks of it lying around from making soft jaws for my mill vise and bench vise. I started by machining the end that holds the shells, since both sides of my clamp-style loader are identical.

After measuring the rims and brass hull diameters, along with the distance between centers of my two chambers (which worked out to exactly one inch on Notice the undercuts for the rims. my shotgun), I cut the half-round pockets in all ten pieces, including the undercut for the shells' rims. This was the easy side to the design and make. Now, onto the opposing top halves.

I decided to do a split clamp style for my speed loader, so the opposing tops needed to be machined in away that allowed me to actuate the splitting of the two pieces to drop the shells freely into the chambers. I drew two finger grooves into one side, and on the opposing side I machined most of the top away. I really only left enough metal there to The side with the finger grooves contains the holes and counter bores for the shoulder screws and spring. The "clamp" side has the holes threaded to bolt them together.

After testing with both shoulder bolts installed, I found the lower, smaller screw to be redundant and that it impeded the function of the loader. It has been eliminated from the design, and the shells themselves keep the parts aligned while in use. hold the threads of the screw used to join the two halves together. To make this unit a clamp and to keep the parts aligned to one another, I originally employed two shoulder bolts. The bolt up top is bigger and also acts as the

SHOTGUN SPEEDLOADERS CONTINUED ORIGINAL PAGE 11



Far left: Top view of the assembly prior to testing. Left: Bottom view of the assembly prior to testing.

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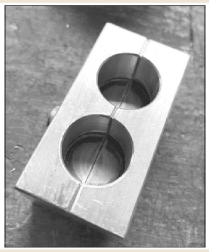

Far left: Top view of the assembly prior to testing. Left: Bottom view of the assembly prior to testing.

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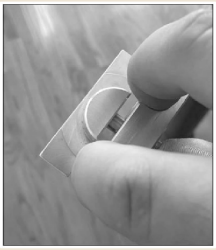

Far left: Top view of testing the "splitting action." Left: Bottom view of testing the "splitting action."

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Far left: Top view of testing the "splitting action." Left: Bottom view of testing the "splitting action."

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push-button to activate the splitting effect. The lower bolt is much smaller and simply aids in alignment. I counterbored the holes for the bolt heads considerably deeper than the standard depths, so as to allow the parts to separate the appropriate distance. The upper counterbore also acts as the spring's retaining pocket. It took a little bit of trial and error to determine the proper spring length, coil rate, wire diameter, etc.

Once I found what worked, I ordered the needed hardware from Mc Master-Carr to outfit this trial run of five speed loaders. Once everything arrived, I assembled and tested all five of them with snap caps. After attempting to test and determining that the lower shoulder bolt was hindering proper use, I eliminated it from the design as having the shells themselves physically keep the parts aligned worked well.

It was at this point that I realized that there are things I could have done better on this design, such as reducing weight, a better shape and Far more comfortable contours, improved aest het ics and functionality, etc. Future iterations of these loaders will have the needed changes until I perfect them. For now, though, I am off to the Sporting Clays course for my first live test run! AG Far ” ”

PEOPLE & COMPANIES

Weatherby Vanguard Stuck Bolt

My customer brought in a Weatherby Vanguard with a suspiciously stuck bolt. Here's how I fixed it.

BY BRIAN R. SMITH AUGUST 2023 ORIGINAL PP. 12–15

Right: The customer's Weatherby Vanguard chambered in 223 Remington with camouflage synthetic stock and Nikon optic; it's a nice rifle setup for eastern United States varmint work.
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Left: The customer's 223 Remington Vanguard showing the bolt handle stuck at nearly full-lift position. The bolt handle could be manipulated only about 1-1/2" up and down, but sequential repeated manipulations finally resulted in the bolt handle reaching the full lift position and allowing withdrawal from the action.
ORIGINAL ARCHIVE IMAGE · PERMISSION CONFIRMED

The bolt of my customer's Vanguard could not be manipulated following a range session. Here's how the root cause was discovered and what it took to get the rifle functioning again. "The bolt handle is stuck," the customer said, handing me the camo-stocked Weatherby Vanguard chambered in 223 Remington. "And the trigger won't move," he added. He was right; at first glance the bolt handle appeared to be in the up position but it didn't look right.

He gave me the details, saying that they had been doing some recreational shooting the past weekend and after awhile experienced a few misfires; a click and no bang. They had been shooting a mix of ammunition, primarily 223 Remington but towards the end of the shooting they were working through some steelcased 5.56. Oh-oh. Now, steel cased ammo in and of itself is generally not a problem despite what the Interwebz may say. My problem is 5.56 NATO in a 223 Remington chamber. I tagged the Vanguard and set it aside.

A day or two later I took it up and tried to manipulate the bolt. It would partially close and all but The bolt handle could be manipulated only about 1-1/2" up and down, but sequential repeated manipulations finally resulted in the bolt handle reaching the full lift position and allowing withdrawal from the action. lift to the full upward position but not quite enough to pull the bolt to the rear.

A few more manipulations and the bolt handle lifted all the way and I was able to pull it to the rear and release the bolt catch on the left rear of the receiver, withdrawing the bolt completely. The Weatherby Vanguard is like many other bolt action rifles, very similar in design, function, and features to the seminary Mauser Model 98, if differing in some details like not having a controlled feed extractor.

Removing the guard screws and taking the barreled action out of the stock, I removed the trigger assembly from the receiver and checked its function. All appeared to be in order with the fire control mechanism, and I was reminded once again at how—erm—"low cost of manufacture" the Vanguard is. Examining the bolt assembly and looking at the positional rela-

Above right: Vanguard bolt as removed from the receiver clearly shows no contact between the cocking piece cam follower and the bolt body's cocking cam. In a normal situation, the striker spring force would be holding the cocking piece cam follower fast against the bolt body cocking cam. This photo could not be taken unless considerable counterforce was applied to the cocking piece sear to pull the cam follower away from the cam surface. Something was jamming the striker assembly inside. Below right: The Vanguard's bolt sleeve shank is keyed to the bolt body, preventing incorrect assembly. The cosmetic bolt sleeve cover is setscrewed to the bolt sleeve shank.

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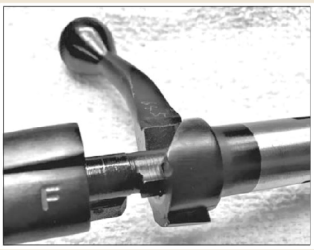

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Left: When reassembling the Vanguard's bolt, a little force is required on the bolt sleeve to compress the striker spring sufficiently to rotate the cocking piece and bolt sleeve so that the cocking cam follower tip is in the bolt body notch. Brace the bolt handle against the base of the right index finger and apply force to the bolt sleeve with the right thumb.

ORIGINAL ARCHIVE IMAGE · PERMISSION CONFIRMED

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The cosmetic bolt sleeve cover is setscrewed to the bolt sleeve shank. tionship between the components, the cocking piece follower was not in its mating groove at the top of the cocking cam and was partially rotated towards the closed position. The cocking piece follower was not in contact with the cocking cam in the rear of the bolt body; there was a gap of maybe 3/16" of an inch between the cocking cam and the cocking piece follower. "Broken firing pin," I thought.

The cocking piece assembly readily unscrewed from the bolt body and the firing pin tip was intact. Peering through the bolt body at a workbench light, I could not see directly through the firing pin passage. After placing a clean paper towel on the bench, the bolt body was upended and tapped on the towel. A number of tiny, dimpled discs fell out. Apparently, this Vanguard had become less of a rifle and more of a precision punch press.

After a thorough cleaning of the inside of the bolt body and lightly lubing the cocking cam, the bolt went back together without a hitch. The barreled action was still out of the stock at this point. After reinstalling the bolt assembly into the receiver, the bolt could be manipulated normally and the firing pin fell as the trigger was pulled. Three primed 223 Remington cases verified ignition.

While the bolt was disassemble d, diameter measurements were taken of the firing pin and its mat- Brace the bolt handle against the base of the right index finger and apply force to the bolt sleeve with the right thumb. ing hole in the bolt face. The cylindrical section of the firing pin tip measured 0.079" and the firing pin hole inside diameter in the bolt face was 0.081". Hardly what one would consider excessive clearance, or consider as a candidate for bushing the firing pin.

In fact, 0.001" clearance on each side of the firing pin is what many consider a practical minimum. Firing pin protrusion was also measured and found to be 0.043", easily on the

Left: Cocking cam follower tip solidly in the notch at the top of the bolt body cocking cam. The striker is cocked and the bolt can be reinserted in the receiver. This is a must for bolt-action rifles of cockon-opening design.

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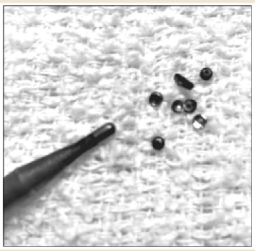

Left: Exhibit A, your Honor. Discs of primer cup material apparently punched by the pressure of the 5.56x45mm cartridges. The primer cup material against the firing pin along with the striker spring forced these through the firing pin opening in the bolt face to be deposited in the firing pin channel in the bolt body. Further objective evidence of this is the anecdotal observation of the customer's nephew of the rifle's striker being cocked immediately following making a shot and prior to manipulating the bolt handle.

ORIGINAL ARCHIVE IMAGE · PERMISSION CONFIRMED

The striker is cocked and the bolt can be reinserted in the receiver. This is a must for bolt-action rifles of cockon-opening design. low side of what one would expect as normal, however, the customer reported no failures to fire except when the bolt locked up. On the face of this objective evidence, it didn't appear as anything was amiss with the rifle.

As a rule of thumb, a firing pin diameter of about 0.075" is generally considered to be suitable for cartridges developing up to and including around 50,000 pounds per square inch, give or take a couple thousand PSI or so, and about 0.062" for cartridges developing pressures higher than 50,000 PSI; the smaller What was disturbing was the customer's use of 5.56x45mm ammunition during his informal shooting the prior weekend.

It is generally given that 223 Remington cartridges can be used in a 5.56-chambered weapon, but not the other way around. The slight differences in the neck and throat/leade areas between the two cartridges can cause pressure spikes when a 5.56x45mm cartridge is fired in a weapon chambered for 223 Remington, and I suspected that this might be the case with the customer's Vanguard. I asked the customer if he had diameter firing pin and bolt face hole provides more support for the higher pressure.

Again, the measured 0.001" annular clearance between the firing pin and the hole in the bolt face didn't raise my concern. some of the .223 and 5.56 ammo left, and he said all he had was some of the 5.56 rounds. He mentioned that his son picked up some empty cases of both and he dropped Discs of primer cup material apparently punched by the pressure of the 5.56x45mm cartridges.

The primer cup material against the firing pin along with the striker spring forced these through the firing pin opening in the bolt face to be deposited in the firing pin channel in the bolt body. Further objective evidence of this is the anecdotal observation of the customer's nephew of the rifle's striker being cocked immediately following making a shot and prior to manipulating the bolt handle. some of each off. The fired primers in the 223 Remington cases appeared normal, not flattened.

On the other hand, the 5.56 primers were flattened, with primer cup flow around the firing pin indent. None of the empties the customer brought in, either .223 or 5.56, had the center of the primer cup missing. The primer cups in the 223 Remington cases were nickel-plated, whereas the 5.56 primers had a brass/gold color to them. Examining the dimpled discs removed from the inside of the Vanguard's bolt under magnification after solvent-assisted ultrasonic cleaning, every one of the discs was brass-colored.

This suggests that they were primers from the 5.56 ammunition that blew out at the dimple. When the customer came to pick up his rifle, I asked if he or any of the others in his group experienced anything unusual when shooting the Vanguard, such as more force required to close the bolt, a puff of gas, or hot burning particles to the hands or face, etc. He said it seemed the 5.56 ammo "took a little more force" to close the bolt sometimes.

His nephew made an observation that after firing around, he noticed the cocking piece was to the rear of the bolt shroud and the bolt handle lifted more readily than usual, indicating the firing pin was cocked just after firing and before opening the bolt.

Left: Vanguard's bolt face with the striker assembly uncocked shows the firing pin projecting from the bolt face as expected. This was not the case with the blown primer cup discs jamming the striker assembly. The firing pin tip projection measured 0.043", a bit on the low side of what many consider normal.

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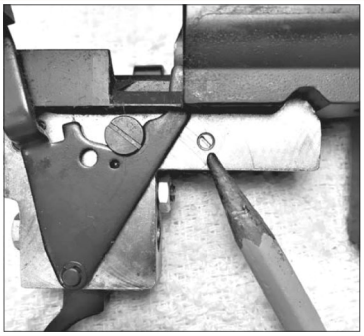

Left: The author checked out the trigger group to ensure its proper function. The No. 2 pencil points to the slotted setscrew that locks the trigger housing screw in place. When removing a Vanguard's trigger housing from the receiver, remember to loosen this setscrew first and then tighten last.

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Recall that the Mauser 98 and its progeny are of a "cock on opening" design. It's been observed by others that a blown primer can cock the firing pin of a bolt-action rifle—gas pressure impinging on a blown primer cup disc in contact with the firing pin forces back the striker, causing the sear surfaces to engage and the primer cup punching is forced past the firing pin tip and into the bolt body.

I showed the customer the cause of the problem, the little pile of dimpled primer cup discs that jammed up his rifle's bolt, and said that based on the objective evidence the 5.56 ammo in his Vanguard as currently chambered effectively converted the rifle into a precision stamping press.

I explained the theory behind the root cause of the problem, that being the necks of the 5.56 cases fitting tightly in the chamber and the case, thus gripping the bullet and causing ignition pressure of the 5.56 rounds spiking higher than that of the 223 Remington ammunition with blown primer cup discs the result. I sent him on his way with his rifle and the recommendation of keeping to 223 Remington ammunition for the Vanguard, saving the 5.56 for his AR-15.

AG This was not the case with the blown primer cup discs jamming the striker assembly. The firing pin tip projection measured 0.043", a bit on the low side of what many consider normal. The No. to the slotted setscrew that locks the trigger housing screw in place. When removing a Vanguard's trigger housing from the receiver, remember to loosen this setscrew first and then tighten last.

MACHINING

Mini Mill Overview

Thinking about buying a mini mill? Here's how to determine the best fit for your shop.

BY GLEN CALVERT AUGUST 2023 ORIGINAL PP. 16–20

There's an old saying that free advice is seldom worth it. While I am not a milling machine expert by any means, this article is based on my research on mini mills and my experience with the one I bought. I am not endorsing any brand of mill and am not being compensated in any way. The Harbor Freight mill that I bought was not my first choice. So why did I buy it? The one I wanted was back ordered for months. I wanted to get started on my project and I got tired of waiting.

Naturally, a few weeks after I received my mini mill and had started my project, my first choice was available, but only for a week or so and then it was sold out again. It's obviously a popular model and I know why. When I purchase tools, firearms, or whatever, I look for the best value, that is, the most bang for the buck. In my opinion, this model was the best value based on price, features, and quality for the type of work that I had planned.

The mills that I discuss in this article are referred to as bench top mills, mini bench mills, or just mini mills. These models typically weigh between 100 and 130 pounds and can be a suitable alternative to a full-size mill while being smaller and less expensive. Two things to consider when buying any power tool are how will it be used and how much will it be used. If you spend a lot of money on a machine and don't use most its capability or it spends 99% of its life sitting idle, it's a waste of money.

A smaller machine may be able do the same work but just take a little longer. On the other hand, if you have a busy hobby or business that requires parts on a regular basis, then you can justify a larger mill. The main factors in selecting a mill are table size, axis travel, and cutter capacity (power). If you primarily intend to make small parts a few inches in size, table length and width and axis travel aren't as critical.

Having extra capacity comes in handy and can make setting up a job easier but it comes with a higher price. When buying a mill, you will also need to purchase several hundreds of dollars of tooling. This includes end mills, collets, T-slot clamping sets, machining vise, center drills, 1-2-3 blocks, cutting fluid, etc. I learned that all mini mills are made in China in the same factories. They are sold under many brand names: Grizzly, Little Machine Shop (LMS), Micro-Mark, Harbor Freight, SIEG, Eastwood, and others.

If you want a domestically sourced mill, start with Bridgeport. While the mini mills come from the same factories and look similar externally, internal components like bearings, lead screws, etc., can vary in quality and affect performance and reliability. The Harbor Freight 2 Speed Benchtop Mill/Drill Machine (model 44991) was the mini mill I purchased. It has worked fine and I was able to complete my project without any issues.

I mainly work with aluminum up to oneinch thick and my mill was able to do what I needed. It cost $800 which is at the lower end of the price range. Shipping was $90 and it arrived only five days after being ordered. It weighs 110 pounds and after uncrating it, I was able to pick it up and put it on my bench.

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Speed control is on the left and the Zaxis fine control knob on the right. I set the base on a pair of 2x4s to get more clearance for the Xand Yaxis handwheels and bolted it to the bench. It has the tilting column, PWM motor, and two speed gearbox with plastic gears. I'll describe the pros and cons of these as compared to other designs. Design Basics Most mini mills have a tilting column, with the column attached to the base with a big bolt and nut.

Loosening the nut allows the column to be tilted left or right, up to 45 degrees. This is a drawback in my opinion as it decreases the structural stability of the column. If you tilt the column to do angled milling, you must tram it again when returning to the vertical position (zero degree tilt). It's better to use an angled fixture to hold the work piece.

There are a few versions with a solid column, such as the Hi Torque Mini Mill models from Little Machine Shop (LittleMachineShop.com, and SIEG in China (SIEGind. com). Tramming a mill means ensuring that the vertical spindle axis is exactly perpendicular to the worktable, particularly along the Xaxis (left-right table movement) and is critical for precise machining. A dial indicator is attached to the spindle with the appropriate fixture and the indicator is swung from one end of the table to the other.

The column is adjusted until there is very little difference in the readings, typically less than 0.002". On a tilting column machine this means loosening the big nut and tapping the column left or right until the column is aligned. Of course, tightening the nut throws off the alignment and you get to do it over and over until it's good. A solid column is trammed by shimming up one side or the other at the base of column.

Since the Yaxis travel is about half of the Xaxis, tramming the front to back tilt (referred to as nod) is less critical but can be done on the solid column machines. There are two types of DC motors used in mini mills: conventional rotor motors with PWM (pulse width modulation) and brushless motors. I'm not an electrical engineer so I won't try to explain the difference.

What it means to the user is the PWM motor has less torque versus speed capability and uses a two-speed gear box to get the full range of speed (0-2500 rpm) with adequate

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The collet and drill chuck are retained in the spindle by the draw bar. torque. The gearbox has plastic gears and is known for breaking the teeth when making heavy feeds, particularly in steel. The gears are noisy and I wear hearing protection due to the high pitched whine. Again, most mini mills use the PWM motors and gearbox. The brushless motor has enough speed and torque to use a belt drive system which is more durable and much quieter. A brushless motor increases the cost but has definite benefits.

Models from the Little Machine Shop offer a belt drive conversion kit with stepped pulleys to get the two ratios otherwise provided by a two-speed gear box to replace the plastic gears in the PWM motor mills. The larger containers leak at the cap so I use the smaller bottles. I mentioned table size and axis travel earlier. A larger table and more travel allow you to mill larger work pieces. A machining vise is very handy to use and can make setting up the work piece simple and easy.

The vise must be trammed when it's installed and aligned with the Yaxis. If the vise is removed to make room to clamp apart to the table, it must be retrammed when reinstalled. This can be a pain. Planning the sequence in howa part is milled can reduce this pain. The advantage of a larger mill table is the vise can be installed on end of the table, leaving room to clamp apart on the other end. This maximizes the mill flexibility. Spindle height is another potential limitation.

It's very frustrating when you can't use the correct size drill bit or cutter because the work piece is too tall and there's not enough spindle height. Using a vise raises the part and reduces the available spindle travel as the drill chuck eats up about 3" of spindle height. Most mini mills have R8 taper spindles which is an industry standard, so tooling availability is not a problem. Digital Readouts (DROs) The Xand Yaxis handwheels have dials graduated in thousandths of an inch to measure the table travel.

Unfortunately, the lead screws have backlash. When you turn the handwheel in one direction, you can track how far it moves by using the dial. No problem until you reverse the direction; the handwheel turns but it does not move the table for several thousandths due to the backlash of the leadscrew.

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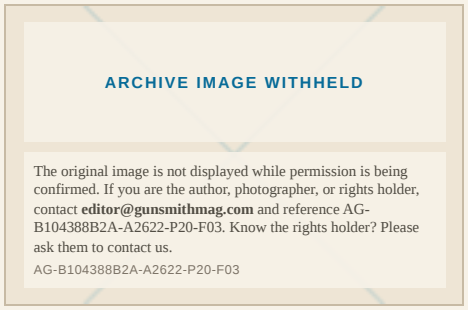
Normally the vise would not be on the table, I did not want to remove it for the photo as I would have to retram it. If you want to reverse the travel to the original dimension, you must keep track of the amount of “free play” it has and add it to the desired travel. The spindle travel is controlled with the drill press type handles for large amounts of travel or with the fine control knob on the front of the mill that has a graduated dial. The fine control has backlash as well.

The backlash makes preci- A low cost version of an Xaxis power feed. sion work more difficult and time consuming and that’s where DROs make life a lot easier and more precise. The DRO on each axis measures the actual travel so the backlash problem is eliminated. If you do a lot of milling, particularly precision work, DROs are worth the investment. They can be added to the mill at any time so the cost can be pushed out to a more convenient date.

Videos/Tutorials There are a lot of mini mill videos on You Tube, some are very good, many are not. The best ones I’ve seen are from Frank Hoose and Quinn Dunki at Blondihacks.com. They both have many excellent videos that cover a lot of details and are very educational. They cover the basics on mini lathes as well as mini mills and show several projects start to finish. Quinn is an excellent teacher, has a great sense of humor, and isn’t afraid to show her mistakes in the videos and how she addresses them.

There are vids on how to install DROs as well. So, what was my first choice? For a reasonably priced and capable mini mill for the type of work I planned to do, my first choice was



the LMS Hi Torque 3990. It has the solid column, brushless motor, and the larger table and axis travel. In my opinion, that is the most bang for the buck. The Micro-Mark 84630 has a brushless motor and tilting column, however, according to the specs on the website, it had less travel than the Harbor Freight mill but was the same price as the Hi Torque mill. So, I decided to save some money with the Harbor Freight mill and use the left over cash for the tooling.

The specs for the three mills are shown in the comparison table. The costs are what were listed at the time when I bought my mill. Obviously, prices and availability are subject to change. As I mentioned earlier, my mill works fine, I was able to complete the intended project with no problems. I took my time in setting it up and learning how to use it, taking light cuts until I felt like I knew what I was doing. A machinist handbook was very helpful.

It explained the difference between “up milling” where the work is fed into the cutter opposite to the cutter’s direction of rotation and “down milling” where the work is fed into the cutter in the same direction as the cutter rotation, and why it’s important. It covered the best ways to clamp parts to the table, when to use two and four flute end mills, etc. Mini mills are very capable and versatile tools and can make all kinds of cool stuff. If anyone learns something from this article, it has served its purpose.

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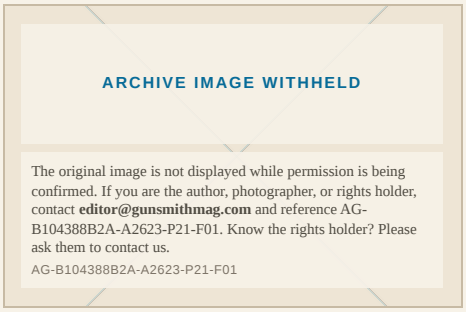
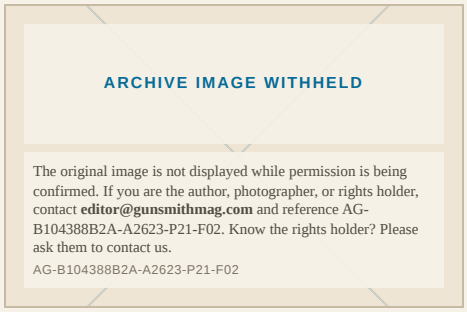
PISTOLS

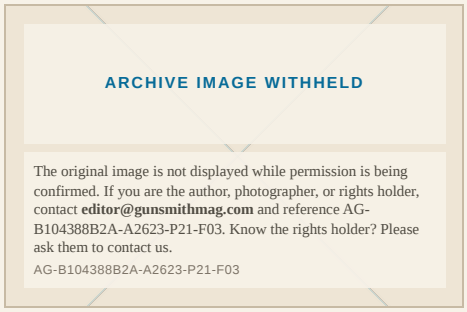
Shield Arms Glock Upgrade

Installing and using the Shield Arms Magazine Catch and Magazine Conversion for Glock 43X and 48 9mm handguns.

BY ROBERT K. CAMPBELL AUGUST 2023 ORIGINAL PP. 21–23







The Glock 43 has been a successful slim line 9mm handgun. Like all Glocks, it has proven reliable, which is the bottom line for personal defense. If a pistol cost more than the Glock, then be certain you are getting your money's worth; if the pistol costs less, it's possible corners have been cut somewhere. The Glock pistol is reliable asis and I don't like to mess with success making me cautious concerning any type of modification to defense pistols.

I generally don't recommend aftermarket triggers as they can be a liability on a defense gun for many reasons. Aftermarket sights area good thing, especially self luminous iron sights. The Glock 43X and Glock 48 introduced a ten-round factory magazine as an improvement over the original seven-round Glock 43. The new pistols also have a handfilling grip some prefer.

While ten rounds seems a good reserve for most defensive situations many concealed carry handgun carriers prefer a higher capacity pistol, however, most pistols housing fifteen round are much larger than the Glock 43X. Shield Arms (Shield Arms.com, has engineered an innovative and reliable system for upgrading the Glock 43X to a fifteen-round pistol in their patent-pending S15 Gen 2 magazine.

There are no grip frame or magazine well modifications necessary and these magazines are the same length as Glock's standard ten rounders. These are steel magazines, not polymer containing a steel inner frame as the Glock ten-round magazines are. Factory Glock magazines are reliable and rugged in operation and there would have to be a compelling motivation for a modification or aftermarket part and the product would have to represent a genuine improvement. Some aftermarket parts are not reliable.

In this case, after considerable research field testing and interviews with several shooters I have found Shield Arms magazines reliable. The metal bar is the Shield Arms magazine release. There would appear to be sufficient offset that the metal magazine catch does not wear on the polymer frame.

While the Shield Arms magazines fit and operate without changing the magazine catch, the wearing of a metal magazine against a polymer magazine catch would not be ideal and probably give trouble eventually. Shield Arms offers the Standard S15 Mag Catch, a metal magazine catch that is well designed. I found it dimensionally exact, requiring no modification or file work to fit and function in the Glock 43X test gun. The first chore in this project was to replace the factory Glock polymer magazine catch.

The first step is to be certain the pistol is cleared of all ammunition. Remove the magazine, rack the slide and lock it to the rear, placing a finger tip in the chamber and viewing the magazine well to be certain the pistol is unloaded. Then lower the slide and field strip the pistol normally. Looking toward the magazine catch, a bright light is good to have as you look into the magazine well. Illumination is necessary although I suspect some Glock specialist may do this by feel.

There is a leveraged spring in the magazine housing that holds the magazine catch and provides power for the magazine catch to return to position after pressing the magazine catch to release the magazine. Removing the magazine catch isn't difficult. Along hooked tool works well. Over the years I have made quite a few tools for express purposes. A tool that is simple and inexpensive is a dental pick; not a high grade tool that a Doctor of Dentistry would use but a simple drug store pick.

These things really get in some tight places. That or a hooked tool of some type works well. The spring is picked up and out of its notch in the magazine catch. Then you roll the catch out or wriggle it out to one side. This isn't difficult. The Shield Arms magazine catch is aluminum rather than polymer and the fit is exact, fitting easily into the Glock frame. Replacing the wire spring is simple enough, however, it sometimes takes a bit of play to get the spring locked back in place.

Some I spoke with actually remove the magazine catch spring and then reinsert and re-hook the spring after fitting anew magazine catch. I think that with the small frame gun removing the spring is easiest. The new metal latch isn't an extended type, which is all to the good when wearing a pistol concealed and close to the body. The Shield Arms magazine catch is well designed and positive in operation. The checkered control surface is positive in operation.

It seems that there is enough off set from the Glock polymer frame that wear of the metal catch on a polymer frame will not be a concern. I have noted that several high capacity magazines in compact and sub-compact pistols are very difficult to load to full capacity. The Shield Arms magazines feature strong springs but are not difficult to load to full capacity. I had on hand four magazines and tested them for fit and function, loading and unloading the pistol repeatably.

Function is good and the magazines area good fit. There is no problem in magazines locking in place. When the metal magazine catch is installed, however, the original Glock magazines stick a bit when released. They function normally and lock in place properly but when they are removed they do not drop free. Since the new magazines are the point in installing the metal magazine latch this isn't really a drawback. The Shield Arms magazines were loaded with full metal jacketed ammunition.

I had four magazines, (three blue finish and one stainless finish) on hand, a reasonably large test sample. I had one difficulty, finding the stainless magazine would not accept more than thirteen cartridges. The pistol was fired quickly through all four magazines a total of 58 car-

After the firing test this one is covered in powder ash internally. The Shield Arms parts work well. tridges. The pistol and the Shield Arms magazines never failed to feed, chamber, fire, or eject. I also loaded a magazine with a mix of 115, 124, and 147 grain jacketed hollow point loads. Cycle reliabil- WOOX Outdoor Wholesale WOOX Outdoors is offering a Dealer Program for their catalog items.

They have no Minimum Order Quantity and items have a 30-35% margin based on the company's Minimum Advertised Pricing with larger retailers eligible for additional discounts based on order quantity. ity is very important with different loads having a different recoil impulse and the pistol continued to function. The Glock 43 was also fitted with a Talon grip covering with good results. WOOX stock options combine the traditional look and feel of wood with modern design functionality.

Recently added is their new Mossberg 88/500/590 aftermarket furniture, including their buttstock, So far as I am able to determine the Shield Arms magazines and magazine catch conversion for the Glock 43X and Glock 48 are well designed and executed. I have confidence enough to adopt the modified pistol as part of my personal defense battery. The single magazine that did not accept fifteen rounds will be returned to the maker under warranty.

AG forend, stockless Shockwave-style club grip, with bundle purchase options available. For rifles, the Merica bolt-action chassis and stock from WOOX encompasses the classic look and feel of wood with increased utility. Handcrafted in Italy from genuine American Walnut and AA 7075 aircraft-grade aluminum, the rear stock has aggressive checkering on the grip, four quarter-inch spacers and a microcell butt pad, and a QD sling swivel.

The vented fore end of American walnut sports M-LOK rails located at the 3, 6 and 9 o'clock positions for mounting accessories geared to any application, from predator and big game hunting to competition shooting. Chassis op-

MEASUREMENT & INSPECTION

Reader Forum

BY AMERICAN GUNSMITH EDITORS AUGUST 2023 ORIGINAL PP. 24

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Winchester M59 I am having trouble getting a Winchester M59 12 gauge into proper adjustment. I have books that describe servicing this action throughout and I understand it, however, when I carefully set the plug in the rear of the action return spring according to instructions, the tube underneath the buttplate creates a tendency to jam.

Moving the bolt to its rearmost position, letting it remain locked open, adjusting the plug inward to contact the inertia rod, and then backing it off two and a half turns with the plug as instructed tends to lock it in place with the plug retaining spring and I get a bolt that jams before it locks in an open position. If I go further it jams even worse. However, if I close in on the plug at 1.5-2 turns from contact instead it seems to work fine. What am I missing?

Will using less than the recommended 2.5 turns damage something? Christian Stauffer The Winchester Model 59 was designed by David Williams based on patents by Jonathan Browning and produced by the Winchester Repeating Arms Company from 1959 to 1965 with 82,085 units produced. Directly from the Model 59 owner's manual, the factory recommendations were to pull the bolt open with cocking handle and allow it to stay locked open. Tighten buffer until it just takes up on the inertia rod.

To check this condition there should be a slight amount of movement in right slide to avoid jamming of parts. Then back off or unscrew the buffer plug 2 1/2 turns to the first set of holes for the locking clip to lock in closure spring housing and buffer plug. This will allow the slide handle to move between 3/32" and 1/8" reward from its normal locked open position. An indicator the timing is off is if the empty hulls are being thrown farther.

Make sure the stock is snug first (and don't over tighten) before making timing adjustments. Check if the shotgun was factory modified with a hole at the end of the bolt handle groove, a change that helps but still can allow the bolt to hit the back of the receiver, which can crack it back near the stock bolt attachment area if the spring is worn. Check the length of your spring; it should be between 11-13 inches. Anything less and no amount of adjusting can help the bolt from striking the receiver.

Lessening the timing adjustment is not recommended. If the spring is worn the receiver will eventually crack at the rear of the charging handle slot. Remington Model 121 I am searching for a detailed schematic and a source of parts for the Remington Model 121 22LR pump action rifle. Hillsboro, OH Joseph Fasano Numrich Gun Parts (Gun Parts Corp. com, has a detailed schematic. For a source of parts, Classic Firearms (CFNparts.com, and Homestead Parts (HomesteadParts.com, has them available. AG

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Archive index

Precision Arms Workshop

The American Gunsmith Archive

The complete searchable archive of a technical journal devoted to craft, repair, maintenance, machining, and restoration.

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