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EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

04

ARCHIVE ISSUE NUMBER

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HILL COUNTRY RIFLES

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ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 220

DIGITAL ARCHIVE EDITION

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PEOPLE & COMPANIES

Midwest Industries

BY AMERICAN GUNSMITH EDITORS APRIL 2022

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Midwest Industries makes a variety of accessories and parts for firearms, including the AR, AK, FN, Henry, Kel-Tec, HK, Marlin, SIG, Remington, Steyr, Benelli, and others. They also makes tools for gunsmiths. Their newest tool is a multi-use block for working on AR-15 firearms. The AR-15 Lower Receiver Block (MI-LRB, \$39.95) is designed to work with mil-spec AR-15 forged lowers and the .308 AR Lower Receiver Block (MI-LRB308, \$44.95) is designed to work with SR-25 magazine pattern rifles.

Described as the Swiss army knife of AR building, the Midwest Industries Lower Receiver Block has numerous features. In addition to the obvious magazine well block to secure the lower receiver via vice clamping, the MI Block is also a versatile bench block. It has a built-in gas block tool for pin installation, block for fire control pins, section for trigger guard installation, and a tray to retain small parts.

The MI Block is made of high-strength polymer to make it impact and chemically resistant, has mounting holes for attachment to your bench or alternative work surface, and parallel edges for vice use, allowing the lower to be held for multiple aspects of assembly. It weighs

12 ounces and is 6.5x5x1.25 inches. For upper receiver work, MI offers their Upper Receiver Rod, as the MI Upper Receiver Rod (MI-URR, \$104.95) and MI Upper Receiver Rod .308 (MI-308URR, \$134.95).

This secures an upper receiver for installing or removing stubborn or seized barrel nuts without damaging the upper. It also secures for muzzle device installs without risk of damaging the index pin and can be used to install forward assist/port door covers. The Rod is compatible with forged and billet upper receivers and is machined from 4140 Ordnance grade steel with a black oxide finish.

It can be secured horizontally or vertically in a bench vice, works with any standard M4/M16 barrel extension, and sights can remain mounted in use. Finally, the Professional Armorer's Wrench (MI-ARAW, \$59.95) works with 5.56 and 7.62 AR platform rifles and handles encapsulated and pin style barrel nuts, including the GI style nut. The drive end is compatible with free float barrel nuts, and the 3/4-inch wrench works muzzle devices and suppressor mounts. It is constructed from 4140 heat treated steel.

PISTOLS

Hill Country Rifles

Custom-built guns are the pinnacle of the gunsmithing art. Here's how the gunsmiths at Hill Country Rifles make them.

BY ROBERT KOLESAR APRIL 2022

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Original caption: Top: Matt Bettersworth, General Manager of Hill Country Rifles, standing next to a rack of completed HCR rifles that have been test fired and ready for shipping. Each custom job receives this kind of personal attention. the critical difference. HCR spends in excess of \$60,000 yearly for premium factory ammunition for use in testing.

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It doesn't get much better in the shooting world than a custom gun. Owning a hand-built rifle, shotgun or handgun is Nirvana to the hardcore gun-lover. While most of us can't afford anew (or used) Bentley, a custom rifle or pistol is achievable, if you really want one. I guess it all depends on your priorities. Of course, a lot depends on the gun you want. An English stalking rifle hand-made by John Rigby in London is probably out of the question (\$15,000 on up).

And it's not really appropriate for the kind of shooting most Americans do. Building something stateside that the major U. S. manufacturers don't offer is something else, though. A purpose-driven rifle or pistol that's tailored to your specifications by a custom shop is common today. Serious riflemen using custom-barreled actions set in fiberglass stocks are the new norm in the hunting world. So is a pistol hand-built for competition like PPC or Precision Pistol (bullseye).

If you compete, you'll be using a hand-built gun if you're serious about winning. Some of the best custom guns I've seen and used come out of a shop in New Braunfels, Texas. Hill Country Rifles (HCR, HillCountryRifles.com, is unique in the custom rifle world—they actually shoot the customer's rifle before it's shipped. If it doesn't meet their accuracy standards it doesn't get out the door.

Most places guarantee an accurate rifle and will stand behind their product, but Hill Country shoots the completed rifle with premium factory ammo before sending it out. That's

Every rifle built or accurized must meet their 1/2" three-shot standard after completion. An on-site 100-yard underground range is busy testing finished rifles daily.



There’s an upside to doing so much shooting. Minor issues not noticed during assembly show up, functioning is verified, and quality control is looked at again during handling and firing. If the customer sent in a telescopic sight, it’s tested and then zeroed on the customer’s rifle. Sometimes even expensive

scopes have issues. It’ll be spotted and corrected before shipping. The buyer gets a hand-built, reliable, very accurate rifle that’s fired and certified to perform like it should.

More expensive HCR built several 1911s that were gorgeous, match-pistol accurate, and dutyreliable. Unfortunately, HCR isn’t build-

ing 1911s now. than a store-bought gun, but if you’re going on a \$20,000 hunting trip, it’s worth it. Plus, a Hill Country rifle will look pretty good, too. Hill Country Rifles made their name a couple of decades ago by

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All work, including the Cerakote finish, is done in-house. Drop and wind drift at 300 yards mimics a 308/7.62mm centerfire at 1,000.

A controlled-feed rimfire that has full control of the bullet from the magazine into the action, minimizing any damage or distortion to the rimfire lead bullet. offering an accurizing service for standard production bolt action hunting rifles; factory barrels and chambers were checked, muzzles crowned, triggers tuned, and the barreled actions glassed, pilared, and the barrel channels free-floated. The rifle was then test-fired for accuracy with factory ammo before shipping.

And all for a pretty reasonable price, considering the amount of handwork and testing that goes into each rifle. HCR doesn't do a whole lot of these accuracy jobs now. Matt Betterworth, General Manager of HCR, told me that the quality of the barrels made by many gun manufacturers today just won't meet Hill Country accuracy standards.

HCR will still accurize your factory rifle, but it might mean anew barrel, properly fitted, chambered and trued to the action that will This is a Ruger 77 that got a rebarrel and accuracy tune up. guarantee the accuracy level that Hill Country demands. Rebarreling a factory bolt-action hunting rifle takes a fairly quick accuracy and tuning job into the semi-custom build realm. Some customers still

want it (I had one done and it's well worth it), but it can be a lot of money spent on a factory gun.

It does give a customer another option besides a full-blown custom. And options are what a good rifle builder is all about. Besides building custom bolt rifles to the buyer's specifications, HCR offers several grades of hand-built rimfire and centerfire rifles that are ready to ship. This is about as close to instant gratification that a shooter wanting a custom-built firearm can get. All gunsmithing and testing is done in-house by HCR's 11 person staff. That includes metal finishes and stock painting.

IN FACT, HCR OWNS PALADIN COATINGS (PALADINCOATINGS.COM, THAT DOES

HILL COUNTRY RIFLES CONTINUED

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Top row: What a first-class bedding job looks like, with pillars. This is a Remington 700. Bottom row: Perfect work on a rear and front sight installation for a 375 H&H Magnum dangerous game rifle. Cerakote finishing, laser engraving, stippling, and stock finishing. Best thing I can recommend is to look at the HCR website and give Matt a call to discuss what you're thinking about. The rifle

you've been planning may very well be sitting on the HCR completed rack, ready to purchase.

I would also advise doing a package deal with scope and rings—mounted, tested, and zeroed with your preferred ammo. All the hard work is done... just unpackage your rifle and go shoot. I like that. Again, a call to HCR can firm up the details of what scope and mounts will work best on your new Hill Country ri-

fle. Shooter Demand Something I found very interesting while talking with HCR is what shooters are ordering today in anew build.

Centerfire tactical and hunting rifles are still number one in the custom gun market, but other types of firearms are becoming increasingly popular. HCR is building many premium rimfire rifles. Some would say a high quality 22 Long Rifle is an expensive toy, but it makes sense in today's shooting environment. Rimfire ammo is

HILL COUNTRY RIFLES CONTINUED

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easier to locate and cheaper when you find it. Twenty-two caliber rifles can be fired just about anywhere, from a 50 foot indoor range to most any outdoor club. Noise restrictions usually don't apply to a rimfire, especially with subsonic ammo. And you can fire thousands of rounds without worrying about barrel wear. The HCR staff is shooting their rimfires out to 300 yards (and beyond) with superb accuracy; drop at 300 yards simulates a 7.62mm/308 Winchester at 1,000.

A great way to practice long range shooting without the expense, recoil, and inevitable bore wear that happens when using a centerfire. Plus, it's mucho fun! Hill Country currently offers two rimfire rifles for sale. The RPR is a highly modified Ruger bolt rifle that is certified to shoot under an inch at 100 yards with selected factory ammo. It's available in 22 Long Rifle, 22 Magnum and 17 Hornady Magnum Rimfire. HCR tunes the trigger, crowns the muzzle, deburrs all metal edges, and smooths the bolt travel.

A PT&G Bolt Handle from Pacific Tool and Gauge is fitted for better function and looks. The stock is fully adjustable for length of pull and cheek height, and a bipod rail is added to the forend. Around a thousand bucks for a nicely tuned rimfire that's guaranteed to shoot less than 1" groups at 100 yards is a pretty good deal. Usually HCR has these RPRs in stock, ready to ship.

The other HCR rimfire is a fullblown custom, built on a V-22 barreled action from Vudoo Gun Works that replicates the size and feel of HCR's centerfire short rifle actions. It's the only controlled round-fed rimfire made which guarantees feeding and extraction reliability. Also, the bullet never touches the feed ramp as it enters the bore, ensuring no deformation of the soft lead bullet; perfectly centered rounds that aren't battered up when entering the chamber result in superior accuracy.

The Vudoo is an awesome shooter; HCR guarantees 1/2" groups at 100 yards with tested ammo; pretty impressive. The barrel is threaded and ready for a suppressor and the stock is the same "Rifleman" stock used on

HCR's Tactical Course Rifle and the magazines are full-sized 10-rounders that mimic Accuracy International centerfire mags. While expensive (about \$4,100), you're getting a fullsize rifle with the best action, barrel, and stock available.

The barrel will never overheat, wear out, or need to be cleaned constantly like a centerfire to maintain accuracy. If you shoot regularly, the money saved in ammo and barrel work will pay for a Vudoo eventually. If you want one, check with HCR; they may have what you want on the "Ready To Ship" page of their website. Unlike most expensive custom rifles that end up sitting in a safe, a Vudoo-actioned rifle is designed and built to be shot and used often.

The best part about a custom build is always in the planning and speaking with the future builder is a critical part in the process. The HCR people are always ready to talk with shooters about rifles, accuracy, and hunting big game. Give them a call if you're in the market for a superb, hand-built rifle. AG

FROM THE ARCHIVE

Fixing AR-15 Magazine Issues

The magazine is critical to any self-loading firearm and the AR-15 is a very popular self-loading rifle. Here's how to maintain magazines for your and your customer's rifles.

BY ROBERT K. CAMPBELL APRIL 2022

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A few years ago at Gun Tests magazine we did an exhaustive test of AR-15 magazines. This included soaking magazines in water and mud, throwing loaded magazines a distance, and running over them with a vehicle. I learned a great deal about magazines. Some highly touted magazines were made to sell, not function in a harsh environment while others cracked and failed. Interestingly enough, feed issues were few. Load and insert the magazine and they ran; it was hard use that did them in.

The tests began with a properly lubricated AR-15 rifle. Loading was done with the bolt locked to the rear and a loaded magazine inserted, then the bolt was released. I went back and consulted this test and the original text recently when a good friend had problems with feeding issues with his AR-15. This wasn't a cheap rifle but among the best manufactured. I checked my notes and found that, strangely enough, most issues occurred with high end rifles.

The cheaper rifles may not be accurate and the butt-stock may rattle but they accept just about any old magazine and function. I suppose loose tolerances are at

play. Still, this isn't a definitive conclusion. It was time to delve more deeply into the problem. The rifle itself must be clean and well lubricated. There may be issues due to the construction of the rifle. A few years ago—and this may be hard to believe in present times—there was a glut of AR-15 rifles.

Many anticipated another Most magazines are not as long lived. "AR ban" if Komrade Klinton had been elected but this did not come to pass. Some folks were left with stocks of rifles that they speculated on and which did not sell. Little did they know panic buying would put them back in the black! I don't like to bet on the Devil and I am a shooter, not a speculator. Just the same, it seems some rifles were built pretty quickly. At one time a major maker offered a base AR-15 rifle for \$399.

It wasn't the greatest rifle built as you may imagine. Build quality and tolerances and clearance certainly play a factor in reliability. The same is true with magazines. Once you inspect the magazine and find no obvious damage then

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This gauge is well made and an essential tool. It stands to reason if the rifle malfunctions only with this magazine the magazine is the problem and should be discarded. Magazines are a renewable resource and wear more quickly than a bolt or barrel. They may leave the factory with a defect. If you measure the various magazines you may have in the shop you will find variations in the magazine body, feed lips, and overall dimensions. Despite this, most work very well in most rifles.

One friend found his rifle only worked with aluminum magazines. While I felt it should run with everything he left well enough alone and did not use PMAGs but stuck with Brownells aluminum magazines. Proper load-

ing cannot be stressed enough. When you fill an AR-15 magazine, load three to six cartridges, tap the rear of the magazine on a boot heel or wooden table. Continue until the magazine is filled. This will ensure the cartridges are properly seated to the rear of the magazine.

When you load the magazine into the rifle it will be difficult and perhaps not possible to seat a fully loaded magazine against a closed bolt. The AR is designed for the magazine to be loaded into a rifle with the bolt locked to the rear and the bolt then released. If you keep the rifle at ready with the bolt down and chamber empty, download the magazine two cartridges. Maintenance The AR-15 magazine

is very easy to clean and maintain, yet few shooters take the magazine down and clean it.

The interior may pick up grit, particularly if you practice speed loads and drops. The interior should be brushed out. Magazines are compressed in storage and manhandled. The magazine lips are the most obvious area to check for dents. In my experience plastic magazines may crack while metal magazines will dent. Some magazines spread over time if left loaded. The best cure for this is to discard these magazines. I have encountered very few AR magazine

FIXING AR-15 MAGAZINE ISSUES CONTINUED

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The tab that locks into the magazine latch is a more likely wear spot. problems with folks simply firing and using the magazine but I have encountered some. Sure there is a big difference in which magazine works after a hard fall with a full load of cartridges or being ran over but for range use all seem to work well. Lets look over some exceptions. A failure to drop free when the magazine release is hit is fairly common.

Most of the time all that is required is to grasp the magazine and tug it from the magazine well. Here is what is happening. The small shelf below the magazine lips may need to be lightly tapped Left and This sometimes has an effect on reliability. or hammered to bring it into specs. Do this a little at a time. With a polymer magazine a file is taken to the same area to reduce its size. A friend tells

me that his magazine release needed adjustment as it was screwed in too tight. I can see this as well.

When I stack up a few AR magazines for the range they are usually well worn magazines that I have used for years. I have the greatest confidence in them. Conversely I would never trust a magazine broken out of new packing for critical use. Anew magazine sometimes

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has tight feed lips or even sharp feed lips. Using the magazine is the best cure but lightly polishing some feed lips may be necessary. I am not certain I would make this polishing a standard procedure but it cannot hurt. If the magazine once worked and starts to give trouble the feed lips have probably been damaged. The magazine body may also be damaged. At the present price of magazines—very cheap to affordable—I would simply discard a dented aluminum magazine or offspec polymer magazine.

I am conservative by nature and sometimes save broken parts or assemblies for possible use and a follower or magazine spring may be salvaged. I may need a photo for a new book or something of that nature. I have a bin of parts marked “JUNK” for that reason. Some are in the bin in an envelope marked “BAD” so they aren’t inadvertently used. For the professional trainer or law of-

ficer, discarding these defective devices may be the better program. A related problem is a stiff magazine catch.

This usually occurs when there is some dimensional conflict between the magazine and the latch/catch mechanism. It cannot usually be detected unless the magazine is fully loaded. Look carefully at the top edge of the magazine latch where it meets the lockup point on the magazine. The magazine catch is first removed from the rifle. The latch is easily removed right to left, with the attitude facing the sights. At the very top of the magazine latch is the area that meets the magazine itself.

Very lightly polish this area. Falls Church VA 22041 There may be burrs. Even the best rifle may have a bargain basement part—they should not but sometimes they do, particularly home builds. Also, do not neglect to lubricate the bolt of the rifle. Don’t let a lack of lubrication confuse the issue. I

am also leery of steel cased ammunition. While cheap, or at least once cheap, steel cases aren’t as resistant to the elements as I like and a poor choice for long term storage.

Often enough, a failure to feed or an extractor problem leads back to steel cased ammunition. A handy tool well worth the price is the Brownells AR-15 Magazine Lip Gauge which offers a go/no go check. This gauge allows you to quickly check the proper feed lip specs. Slip the gauge over the back of the magazine and lightly press the gauge between the magazine feed lips. If the gauge passes through the feed lips then the magazine is off spec.

Brownells also offers a magazine feed lip tool which may be used to repair the magazine feed lips. I have no experience with this tool but it seems a good idea. I have used the Magazine Lip Gauge often and it is a neat tool. AG

MAINTENANCE & REPAIR

Daniel Defense MK18 Replacement Parts Schedule

Daniel Defense shares their parts replacement schedule to ensure that your AR-15 is being maintained to the point of zero failures due to part wear. Here is what you need to know to work on them.

BY STEPHANIE A. MARTZ APRIL 2022

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The civilian gun industry can be called the Wild West when it comes to specs on various AR components. There are no rules due to many of these companies not holding binding contracts. There are no verifications due to many consumers not having the knowledge nor the tools to check those specifications. While some companies uphold the correct specifications on their parts, some do not. Then comes tolerance stacking, parts wearing out, etc.

Due to these specifications being all over the place, parts need to be replaced in different intervals. The Colt M4/M16 platform is the most looked at as far as “the standard” due to their technical data package (TDP) being over 40 years old, the Army buying that TDP, and their parts holding true in even the harshest conditions. Many consumers will follow Colt’s or the Army’s replacement schedule for most AR parts even if it is from a different company.

Most companies also do not even push out a replacement schedule. While the Colt M4/M16 platform is known as being the long-standing standard, the Daniel Defense MK18 is fast becoming known to keep that standard. The MK18 is ran by many special Army, Air Force, Navy, and Marine units. Larger entities run it as well such as the Department of State and large Department of Defense units. Both of these companies, Colt and Daniel Defense, have pushed out a replacement schedule for various AR parts.

These schedules are meant to catch the part before it fails. It is maintaining the gun so you don’t get to the point of malfunctions or safety issues. Sometimes these parts are to be replaced at a certain round count, or other ways of checking/failing it such as measurements or failure. These part schedules will vary widely on speed of firing, cleaning cycles, ammunition, etc. Round count schedules and annual checks have been what most military and federal agencies have adopted.

Annual checks of all of these parts will usually show the parts needing replacements. Replacement Schedule Let’s go over the main parts that will need replacements and their schedule. Gas rings area common part that comes up when talking about replacements within an AR. Whether you believe that these are as important as put on or not, Daniel Defense states to replace gas rings in 5,000 round intervals. The bolt/gas rings can be checked before the 5,000 round mark in two ways.

One, strip the bolt carrier group, then put the bolt into the carrier and hold upside down. If the bolt stays put under its own weight your rings are still working as prescribed. Another way without stripping the carrier is to push the bolt to the unlocked mode within the carrier then flip upside down and stand on a table, bolt face to table. If the carrier does

DANIEL DEFENSE MK18 REPLACEMENT PARTS SCHEDULE CONTINUED

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not fall, the rings are still making a proper seal. The firing pin problem areas will be the tip of the firing pin; i.e., protrusion. This can be checked with a gauge if you have one rather than around interval. The round interval replacement standard is 5,000 rounds. With a gauge you will have a max and minimum limit. When replacing the firing pin or the bolt, the firing pin protrusion should always be checked with that matched bolt due to bolt face wear.

The action/buffer spring will wear just like any other spring. Daniel Defense states to check the length after 5,000 rounds. The full length of the spring should NOT be shorter than 10.25". Therefore, a minimum length of 10.25". Do not stretch the spring to get it to that minimum length. This will only make it weaker; just replace it if it is short. After a 5,000 round check it should then be checked every 1,000 rounds or annually, whichever is more prevalent.

The bolt cam pin should be replaced every 10,000 rounds as stated by Daniel Defense. To check this before 10,000 rounds, check for material to start rising.

Normal wear marks on the cam pin are normal, however, if you drag your fingernail on the cam pin and feel that mate- Daniel Defense MK18 Lower Receiver: Mil-Spec with Enhanced Flared Magazine Well and Rear Receiver QD Swivel Attachment Point Upper Receiver: Mil-Spec with Indexing Marks and M4 Feed Ramps Barrel: Chrome Moly Vanadium Steel, Cold Hammer Forged, 1:7 Twist, 10.3" Government Profile, Carbine Gas System, Chrome Lined, MP Tested, Mil-Spec Heavy Phosphate Chamber: 5.56 NATO Gas block: Daniel

Defense MK12 Flash hider: Daniel Defense Flash Suppressor (1.875") Bolt carrier group: Mil-Spec MP Tested, Properly Staked Gas Key Buffer: H Buffer Sights: Sold Separately Handguard: Daniel Defense RIS II MK18 (Flat Dark Earth or Black) Buttstock: Magpul MOE Buttstock & Mil-Spec Receiver Extension Magazine: Magpul 30-round PMAG Weight: 5.71 pounds Length: 26 3/4" (Collapsed) rial, go ahead and replace.

Cam pins have been known to break due to consistent force back and forth as the firearm cycles. The bolt assembly in its entirety should be replaced every 10,000 rounds, as stated by Daniel Defense. This is for multiple reasons such as a worn bolt face, worn ejector/ejector spring, ejector possibly having debris in the channels, gas rings, extractor lip being worn down, extractor spring and buffer being worn, the lugs being worn/hair-line cracks that aren't seen by operator.

All of these things go into your firearm cycling correctly and much can be missed when just looking at the bolt with the naked eye. Remember, if replacing the bolt only, your barrel has worn with that bolt. When installing anew bolt the best practice is to throw a headspace gauge in and ensure that the headspace gauge passes. The gas tube should be replaced every 10,000 rounds. When thinking of this replacement schedule also be thinking about the barrel due to the gas port.

If the gas tube is wearing down, eroding, or letting extra gas run off, the barrel could be doing the same thing. This can cause malfunctions, however, before that this can be seen by looking around the gas block. If you see gas

DANIEL DEFENSE MK18 REPLACEMENT PARTS SCHEDULE CONTINUED

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If metal is raised on that wear line it is time to replace the pin to prevent total failure. This can help find ejector issues before a malfunction. The ejector should be just about flush with the first edge of that ridge right before the lugs. The wear patterns shown are normal. run off/leakage from the outside of the block, it is probably time to replace the barrel. Also, if you have a borescope, when looking at the gas port you will see long black streaks that look pitted.

If the streak extends and spreads out for an abnormally long length throughout the barrel, that is gas leakage/port erosion and it is time to replace the barrel. Daniel Defense states to replace the hammer and trigger

springs at 10,000 rounds. Having worn springs Far On the right side of the port you see some carbon fouling.

If that black portion shown begins to elongate and become pitted, that can be from too much gas leakage and the barrel will need to be replaced. within the trigger group could allow which can be dangerous. Worn disconnect springs can also lead to hammer follow. This issue was seen on old M16A2 rifles; when going to reset the hammer wouldn't catch, causing the gun to fire. This article was not at all intended to be a "go out and buy a Daniel Defense MK18" advertisement.

It merely demonstrates that they want your firearm to run efficiently and that they will openly share their knowledge to do that. If you follow these replacement schedules you can also use that as additional information if another malfunction is seen when talking to Daniel Defense or other manufacturer. Mind you, they have a full warranty on their firearms no matter the issue.

Keeping up on the maintenance on these seemingly small parts will only aid in not having to replace the much larger and more expensive pieces of your firearm. More importantly, they will ensure that you don't see malfunctions due to something that could have been prevented. AG

FROM THE ARCHIVE

Collecting Firearms

Many gun owners accumulate—not collect—guns. Here's a guide to get started with an investment-grade firearm collection, for yourself or your customer.

BY PAUL MAZAN APRIL 2022

ORIGINAL PP. 15-17

Lately, I've had several friends ask me about firearms collecting and what I thought might be a good place to start. Well, I don't own a functioning crystal ball but after a lot more years in the game (more than I would like to admit) I'll tell you what I think. As a gunsmith, numerous guns will pass through your shop and the desire to own and collect them is almost unavoidable. The answer to the question of where to start is dependent on what your goals and interests are.

If you are interested in a type of firearm, like single-action revolvers, lever action rifles, or 1911 pistols, that is where you will want to put your money. An interest in a particular kind of firearm will encourage learning more about it, which leads to better recognizing rare and valuable examples. On the other hand, if you are looking at it strictly as an investment, your choices might be governed by what you think will evaluate the fastest and the most.

For example, Winchester and Colt firearms have been the target of collectors for so long that their prices are high. Although they will surely continue to increase in value, I do not expect them to outpace the rate of inflation by very much, if at all. The reason is simple: supply and demand. Every major gun show I attend has more Winchesters and Colts for sale than the dealers can hope to sell.

The prices are out of the reach of most beginning collectors and the serious money folks already have most of the models they are interested in and are looking for examples in better condition than those they have or for rare variants. Over the years I

have found military firearms in as-issued condition to be a solid investment. In the past 20 years or so prices on military Mausers have gone wild. Mausers that I bought for \$250 back in 2000 are now selling for \$1,200 and up.

Russian Mosin Nagants that were selling for \$125 are bringing \$700 today. The same kind of increase is true of SKS and AK-47 rifles as well as many military handguns. In the 1990s, large numbers of M1 Carbines came home from Korea and for a short time they flooded the market. I bought an IBM and an Underwood M1 Carbine for \$125 each and a Rock-Ola for \$200. Today they seem to be bringing over \$1,000. So, okay, you missed the boat on those deals.

The lesson to be taken from these missed opportunities is to be alert to the market. American military firearms like the M1 Garand and M1 Carbine will always be in demand in this country. Although the days of spectacular price increases are probably over, they should remain a safe, solid investment. The market for the 1903 Springfields and Krag-Jørgensen rifles has matured, however, the 1917 Enfield has always been underpriced and these are just now starting to increase in value.

These Enfields might prove to be the one U. S. military rifle worth collecting with the hope of making a good return on your investment. If the military-owned Beretta 92 pistols (M9) are ever released from government stockpiles and made available for purchase, I guarantee I will jump all over one. Not because I am a fan of the Beretta

92 but because I feel so strongly that whatever initial price I pay for one will be the cheapest it is ever offered at.

I bought my M1 Garand from the old DCM (Department of Civilian Marksmanship, now the Civilian Marksmanship Program) in the 1980s for \$150. Take a look at what M1 rifles sell for today and you'll see what I mean. Last I checked, the least expensive CMP Rack Grade (Fair) M1 Garands start at \$700. I have been repeatedly asked about AR-15s. In my opinion, they are great rifles. Accurate, adaptable to any type of shooting you enjoy, from plinking to hunting to formal target shooting.

They are extremely versatile but as an investment? At one time I counted over 120 different manufacturers of lower receivers listed for sale on Gunbroker. Those lowers have been offered in alloys, synthetics and steel so what are the chances any of them are going to become collectible? To my way of thinking, if I were hoping to see an increase in value on an AR platform I would confine my collecting to those marked Colt.

American Revolutionary War and Civil War firearms, like Colts and Winchesters, have become very expensive as have Pennsylvania/ Kentucky Rifles but still remain a solid choice if you can afford them. They are all an important part of American history and should represent a good investment. I have never really been interested in collecting shotguns so I don't have much to say about them. Naturally, any U. S. military shotgun will be collectible as are

COLLECTING FIREARMS CONTINUED

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Firearms of this period are still relatively affordable. Top, 1812 Contract Musket. Bottom, Eli Whitney-made contract musket. some of the classic makes of sporting shotguns. I have owned several Parker shotguns and have never lost money on any of them but I can only afford to play in the shallow end of the pool and confine my collecting to Trojan, VH and G Models. There are also avid collectors of A. H. Fox and L. C.

Smith guns, but again, once you get past the field grades the prices get out of my ballpark pretty fast. Now, we have covered a lot of ground and beaten the subject to death without ever hitting it in the head. The real question is, where should you or your customer

start? In other words, what do I think I can afford to start collecting and hope to make money on? My guess and the place I am putting my money right now is in guns produced between the wars.

Flintlock and percussion muskets and rifles from the first half of the 1800s, after the Revolution and before the Civil War. They are more affordable than those before and after that time period and I find it interesting to own a musket made by Eli Whitney or Harpers Ferry. This includes guns used in the War of 1812, a war that hasn't attracted as much collector interest yet.

I'm hoping that as the prices go up and up on Revolution- Two collectible guns of that era are the Trapdoor Springfield (top) and the Remington Rolling Block (bottom). Great Britain developed first in the Snider (top) and Martini (bottom). ary and Civil War pieces, interest will start to focus on these guns that have been largely ignored. Skipping the Civil War years we come to the early cartridge era when every country was developing breechloaders. Remington Rolling Block rifles have caught my interest lately.

They were sold to military forces around the world and are an interesting gun to collect. I have an 1870 Navy model chambered in 50-70 as well as a carbine

COLLECTING FIREARMS CONTINUED

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Full stocked with no fancy nose cap, inlays, or carving, this would have been a farmer's friend and companion. chambered in 50-45 and these were sold to each country chambered for their own proprietary caliber. The 43 Spanish is very common, 43 Egyptian is reasonably easy to find, and 8mm Lebel as sold to the French is a much harder chambering to come across. In addition to the rolling blocks, there are numerous interesting foreign guns of that era.

The Snider and Martini from Great Britain, 1871/74 Mauser from Germany, Werndel from Austria, Berdan from Russia as well as the Tabatière, Chassepot, and Gras from France, just to name a few. As with any investment strategy, don't go out and sell the farm on my ideas of what I think will be good investments. Do your own research and spend no more than you can afford. The goal was to give you some idea of where you might start collecting with the goal of actually making money over time.

Even if you make decisions that don't pan On top is a Mauser 71/84 hinting at what was to come. On bottom, a Polish 1930s version of the 98 Mauser. On top, an old Parker Hammer gun. In the middle is the opening price point in the Parker line, the Trojan. On bottom, a VH grade Parker. out, you will learn a lot about the development of firearms. After all, how many things can you buy where you get to use the item for years and then sell it for as much or more than you paid for it? AG

SAFETY & COMPLIANCE

Lessons Learned

Making mistakes is guaranteed. Learning from them is optional. Here is some of the learning I've earned.

BY GLEN CALVERT APRIL 2022

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Lessons learned the hard way tend to be remembered the longest. The lessons and advice that I offer here are nothing new to most of the readers. No great revelations, just some wisdom accumulated over the years. If anyone gleans something useful from this article, it has served its purpose. Safety First We all know that eye and ear protection is a no brainer when operating firearms. How about when you're working on them?

I wear eye protection when working on firearms, whether disassembling, cleaning, modifying, or reassembling them. I learned years ago (it took more than one lesson, unfortunately) that things can get into your eyes even when you're being careful, like grinding steel while only wearing safety glasses instead of a face shield. Or when you least expect it, like raking leaves on a windy day. Ever have an errant nail or spring fly past your ear?

I saw a safety seminar photo many years ago of a guy with a ten-penny nail sticking out of his eye, long before Photoshop was invented. I knew a young man who stabbed himself in the eye when the screwdriver The dimensions are roughly 17x14x12" and the holes in the sides of the box are covered by thin plastic taped to the inside of

the box, with the plastic pieces taped at the top and at 3 and 9 o'clock. These keep parts from getting past your hands. The plastic front cover flips up to access the inside of the box.

The LED light is suspended from the wood block on top. he was using as a pry bar slipped while working on the suspension of a sports car. Having anything removed from an eye is not pleasant. I wear eye protection whenever I'm working in the shop, around the house or outdoors. I never wore eye or ear protection when hunting with my dad when I was kid. Nobody did back then. I never wore ear protection over many decades of using power tools, mowing the grass, etc.

I'm paying the price now; hearing aids are surprisingly expensive. I started wearing ear protection many years ago to slow down the amount of hearing loss. Safety glasses, gloves, and sometimes a mask or respirator are needed when using chemicals such as cleaners, solvents, oils, bluing liquids, etc. Cold bluing is an easy and simple method to improve a faded finish and gloves need to be worn to protect the hands and to keep skin oils from contaminating the surface before bluing.

I wear gloves and long sleeves when welding. I have seen guys weld bare handed; I am not good enough to do that. I have a bad habit of inadvertently touching heated objects before they cool. Patience I guess we all have had an experience with a project that should only take a few minutes, something that's fairly simple (simple doesn't always mean easy) and it just doesn't seem to go right. Whatever it is, it's not coming apart or going back together like it should.

Maybe we tried to do the job when we had a spare moment but now we're running out of time and need to be somewhere or do something else. When you're ready to start throwing tools, stop before you screw something up. I have learned the best thing to do is put down the tools, walk away, and try to relax. Get some fresh air or sit down and have a beverage. I know it's easy to say "don't get in a hurry, take your time". Easy to say, harder to do.

So, step back, take time to think about the issue, and maybe come back to it later. UFOs This article was prompted by one UFO—Unrestrained Flying Object. Specifically, it was the flight of a retaining clip into a far corner of my workshop. I looked for it but knew

LESSONS LEARNED CONTINUED

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it was useless. Fortunately, the clip was easy to replace, requiring just another trip to the hardware store. But what if it was apart that was no longer available? Could you make a duplicate part without the original? I knew better than try to assemble the clip without containing it. It was a simple, two-minute job, so what could go wrong? Famous last words. Maybe because the part was inexpensive and easily replaced, I didn't take the time and precautions needed.

Granted, this was not a firearm project, just a home repair, but the point is the same. Take your time, do it right. I have a small, enclosed workspace made from a cardboard box I use just for this scenario. I took a medium size box, cut off the top flaps, laid it on its side, cut a small hole in the top for a light, cut holes in the sides for my hands and taped apiece of clear plastic to the open front. I made it because I was installing a handgun trigger kit with a difficult to assemble spring.

It took me three attempts to get the spring installed and this simple box kept the spring from disappearing no matter how hard it tried—and trust me, it tried. The short amount of time it took to make the box more than paid for the benefit. Depending on the complexity of the assembly, a clear plastic bag may suffice. Why didn't I take the time to find it and use it this time? Sometimes, lessons need to be relearned.

Work Practices I do most of my disassembly and reassembly on one work bench and all my fabrication, metal working, filing, grinding, etc. on another. This keeps any metal debris from getting into the padding on the first bench and scratching the metal or wood of firearms. Make sure any light fixtures above your bench are high enough to clear the muzzle of the 32" barrel shotgun you're holding vertically.

Taking photos while disassembling a firearm or other device can Lessons learned the hard way tend to be remembered the longest. Don't ever overlook safety, patience, and consistent work practices or Murphy will pay a visit! be useful when putting it back together, especially if any amount of time elapses before reassembly. This is especially important if you are not familiar with the assembly or have a poor memory like me. Cell phones have great cameras and make it easy to record and send images.

You can document the problem, broken parts, and areas that need repaired. We know that using the correct size screwdriver is required for firearms screws. An improper screwdriver can round off the slot in a screwhead or put a scratch in the finish when it slips. I've seen sloppy work where the firearm owner did not have the correct screwdriver or didn't take the proper care in performing the work. Applying penetrating oil to a tough screw and letting it soak in for a few hours generally works well.

You may need to repeat the process if the screw is stubborn. Applying heat can help especially if thread locker is present. I have found placing the screwdriver or hex head wrench in the head of the screw and heating the shank of the screwdriver or wrench with a heat gun will transfer the heat into the threads and help loosen it. Taking the time to do this can prevent a headache or two. The finish on the metal or wood can be protected with a few layers of painter's tape.

A rubber floor mat (sometimes referred to as anti-fatigue) can make along day on your feet more bearable. It will also protect parts that you drop or roll off your work bench. To keep small parts from disappearing under my benches, I installed a slightly recessed toe board that extends from the

bottom of the lower shelf to the floor. Beats crawling around on your hands and knees with a flashlight.

Wood/Metal Refinishing Never use petroleum products for cleaning or surface preparation; they leave a film that prevents a good finish. Instead, use denatured alcohol, acetone, carburetor cleaner, or brake parts cleaner; they evaporate quickly and leave a clean surface. If a wooden stock is oil soaked, the oil must be removed before glue or any finish is applied. Submerging the oil-soaked area in acetone for a few days works well. After removing the stock from the acetone, dry it with cloth or paper towels.

Using a heat gun on the wood drives out the remaining oil quickly. Wipe off the oil and use the heat gun again. It may take several applications of this process to remove the oil. Removing dents from a wood stock typically involves applying heat to the dent with a laundry iron applied to a wet towel placed on the dent. Small dents, roughly 1/4" diameter or smaller, can be raised by using the flat tip on a soldering gun on the damp towel. It localizes the heat well and the gun is easy to maneuver.

One last safety tip; place solvent, stain or oil-soaked rags, towels, etc. in a small metal container with a tight-fitting lid to prevent spontaneous combustion. Usually, solvents like acetone evaporate quickly and aren't a problem but better safe than sorry. I know a family who lost their home to a fire started by oil-stain soaked rags left in the garage. They lived out in the country, so it took the fire fighters 20 minutes to get there and by then it was too late to save the house.

When starting anew project, especially a major project or one that could result in an injury or worse, take time to think about what could go wrong and the corresponding actions needed. Remember, Murphy never sleeps. AG

RIFLES

Bad Ace Tactical No-Drill Mounts

Bad Ace Tactical offers no-drill, no-tap scope mounts for many classic rifles.

BY DEAN MEIER APRIL 2022

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For many years, sporterization projects were a much more popular gunsmith project than they are now and for good reasons. One primary reason, numerous military-issue rifles were available as surplus for very low costs. “How to Buy a Good Used Gun” by Edward Matunas (Popular Mechanics, November 1963) notes that, at the time, Russian surplus rifles could be had for \$12.95, Italian surplus rifles for \$15, and a surplus Enfield Mk IV with scope could be had for \$49.95.

Classified ads from the era listed standard issue Enfield No.1 and No.4 rifles for \$12.95 or less and the U. S. M1917 Enfield for less than \$30. Mauser 98k rifles cost Germany \$28 each. The U. S. M1 Garand rifle cost \$83 each and dropped down to \$31 each by 1945 due to cost-reduction engineering efforts. This was much less expensive than buying anew rifle off the shelf. For comparison, a Winchester Model 70 or Remington 700 had a starting retail prices of over \$100 at the time.

While that certainly seems like a great deal now after years of inflation, the ability to buy about 3-5 surplus rifles chambered in a huntingsuitable cartridge for the same money appealed to many, especially the cash strapped. However, unlike more modern firearms, both sporting rifles and military issue arms, none of these

surplus arms had any provision for mounting optics as none available back then were suitable for hard field use as a general issue item.

Rifles built for sporting use were typically drilled and tapped for bases and rings from the factory, which was still a bit more work than the plethora of ready-mount rails available today, but there weren’t any easy option for surplus arms. Given that surplus arms were so available and cheap, they made an ideal basis for gunsmithing projects, especially as a first project. After all, it makes more sense to try your hand at a metal or woodworking firearm project on a \$10 rifle instead of one costing \$100+.

This coupled with a lack of customization options added up to make sporterization projects a great idea. Of course, this meant that some of those projects would range from very good, to less than stellar, down to outright awful. Given the amount of options we enjoy today and the fact that those surplus arms are now historical classics demanding ever-rising prices and decreasing availability, such sporterization projects are not nearly as practical.

More recent commenters have labeled sporterization as “abhorrent”—especially when poorly done—but that’s a myopic outlook that ignores the previous situation.

BAD ACE TACTICAL NO-DRILL MOUNTS CONTINUED

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Heavy and permanent modification of a classic service arm no longer is as practical as it once was. Still, some people that own such arms may want to modernize their classics. What's needed is a workable optic mounting option for a sporterization project that doesn't require drilling. Bad Ace Tactical (BadAceTactical.com) is a Canadian-based firearms accessories business offering NDT (No-Drill-Tap) scope mounts for classic rifles.

Their scope mounting solutions provide a low-profile design that does not require permanent modifications to legendary firearms that carry historical and sentimental value. The company specializes in scope mounts for historical and classic rifles, such as M1A, M1 Garand, Mauser K98k, Mosin Nagant, SKS, Lee Enfield No.4, Swiss K31, Swedish M38 and M96, and more. Installation is simple and only requires a few simple steps.

Bad Ace scope mounts provide a Picatinny rail that can be added to any compatible rifle using the rifle's rear sight base as the anchor point. The base features a precision-milled steel base nut that replaces the original rear

sight with a Picatinny rail. The entire installation process requires no holes to be drilled or tapped and rifles can be restored to the original iron sight setup in about a half hour.

The company CNC mills all parts, rails, and base nuts from whole blocks of steel or aircraft-grade aluminum alloy for maximum rigidity. Tests have confirmed that when installed properly the mounts are solid and don't lose zero. The Bad Ace low-profile design allows optics to mount on the receiver as low as possible. They also allows the user to disassemble and clean the rifle without removing the optic or mount.

The company also offers a short version of the scope mounts at lower prices compatible with long eye relief scopes. The company recently extended the product line to be compatible with 15 more types of classic rifles. Choosing A Mount At the time of this writing, Bad Ace lists 23 items in their catalog. The main reason is that each of the seven main rifle options they support have multiple sub-options depending on type. Many classic service rifles had various redesigns.

As previously mentioned, the M1 underwent a redesign for cost saving purposes. Wartime production efforts would have multiple companies and factories producing items and they might institute design differences as well. For that reason, Bad Ace makes variations of their mounts to accommodate such differences. Let's look at some examples. Some Mosin Nagant M91/30 rifles have a hexagonal receiver.

If so, regular eye relief optics would use a Bad Ace Gen 4 Mosin Nagant NDT Scope Mount M9130 Hex Receiver and long eye relief scopes would use a Gen 2 Mosin Nagant NDT Scout Mount. However, with around receiver Bad Ace makes a different mount as well as a regular and long eye relief scope option for the Finnish Mosin Nagant M39 which has "ears" at the rear to protect the leaf sight.

The Mauser Karabiner 98k has a flat sight leaf on a tangent base on German, Russian Captured, and Israeli-converted Mauser K98k rifles along with shorter handguards that start in front of the rear sight.

PEOPLE & COMPANIES

Reader Forum

BY AMERICAN GUNSMITH EDITORS APRIL 2022

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BSA Magazine I have a BSA Supersport Five, a 22 Long Rifle bolt action rifle made by the Birmingham Small Arms Company Limited in England. I acquired the rifle without a magazine and cannot find one. BSA began in June 1861 and was defunct by 1973. John Knibbs, in his comprehensive book about BSA civilian rifle production called BSA— The Golden Century, describes the Sportsman Fifteen as “perhaps the most successful .22 calibre sporting rifle ever produced by BSA”.

He quotes the total production figures for the Sportsman Single at 33,434 between 1947 and 1955, Sportsman Five at 58,534 between 1948 and 1955, and the Supersport Five far enough that they may interfere. This isn't a problem with the mount, just that some regular eye relief optics will be in the way. The fix there is to use along eye relief scope (8-12 inches eye relief) on an appropriate mount. This will provide plenty of clearance and leave the action area open for using stripper clips.

Burris makes their Scout Rifle scope with 2-7X magnification and a Ballistic Plex featuring four aiming marks in addition to the standard reticle crosswire. Burris and Leupold also offer smaller low magnification, fixed scopes as well. It's worth mentioning that the tail of Bad Ace's full-length scope mounts are free floated and vibrate during shooting. However, all scopes vibrate due to the recoil and quality

scopes are designed to withstand the recoil force that is far more violent than the up/down vibration.

The most powerful impact to an optic is the back/ forward motion after the round is fired. This vibration does not affect the accuracy because Bad Ace at 7,197 total rifles between 1955 and 1967. For parts, try John Knibbs International, Shawbury Ln, Shustoke, Birmingham B46 2RR, United Kingdom (AirgunSpares.com, contact information omitted in this digital edition). They stock all the spare parts for old BSA rifles, including Supersport rifles made in Britain and Spain. Also, T. W.

Chambers & Co., Unit 12B, Evanton Industrial Estate, Dingwall Ross- Shire, IV16 9XJ, Scotland (Gun Spares. co.uk, contact information omitted in this digital edition). Finally, Southerton Guns, 1b Station Road, Habrough, Nr Immingham, DN40 3AP (contact information omitted in this digital edition , SouthertonGuns.com). e Bay. com also lists BSA parts. Robert Farrow Newark, OH Browning Challenger II I own a Browning Challenger II 22 Long Rifle pistol that is in like new scope mounts go back to the same position after every shot.

This is the same with the rifle barrel—the barrel vibrates (barrel whip) during shooting but returns to the same position after, the reason why free floating a barrel is a

good idea. In tests by the company, shooting 240 rounds of 7.92x57mm with a K98k scope mount and more than 300 rounds of 7.62x54R with the Mosin Nagant scope mount found both rifles held zero. In both cases a Vortex Crossfire II 4-12x40 AO was the optic used.

In addition to being a solid mounting option, the best feature is Bad Ace units require no modification to the rifle. This allows for the provision to sporterize a classic and possibly now rare military rifle while retaining its as-issue status. The best of both worlds! Bad Ace offers a ten percent discount to military members. They also offer gunsmith discounts for ordering in mounts for your shop. Orders over \$119 are shipped free in the United States. AG condition.

However, the magazines are worn out and I've been unable to find replacements, rendering the pistol unusable. The issue is the cartridge rims wore a notch at the top rear of the magazine, causing the cartridges to stove pipe in the chamber. Browning lists the magazine body as part number PO50505 and a complete magazine as part number PO50556. Are replacement magazine bodies or complete magazines available? If not, how can I repair them?

Tim Lauing Downers Grove, IL The Challenger II series .22 Caliber Pistol was introduced in 1976 and ceased production in 1982. The Challenger II evolved into the Challenger III in 1983. In 1975 Brown-

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ing standardized its serial number identification which it followed until 1998. The Challenger II went from 1976 to 1982. The Challenger III went from 1983 to 1985. For serial numbers, the Challenger II or III pistol is coded as 655. The date of manufacture is a two digit code: Z=1, Y=2, X=3, W=4, V=5, T=6, R=7, P=8, N=9, M=0. For example, a pistol with a serial number of 655RT01001 indicates a Challenger manufactured in '76 with the serial number 01001.

Original magazines and parts are difficult (and expensive) to find and usually from individual sellers at auction. Triple K (TripleK.com, offers a Browning Challenger II/III ten-round aftermarket magazine. Brownells currently lists them for sale. Gunclip Depot (GunClips.net, also has replacement magazines and Midwest Gun Works (Midwest-GunWorks.com, lists replacement parts, including magazines.

Remington 513T I'm working on a classic Remington 513T 22 Long Rifle target rifle and found "Remington 513T" by Gary Yee in the March 2017 issue. My 513T came out of the U. S. Army arsenal around 1941. Are all the clip retention parts the same as on retail models? I can't find a serial number anywhere. Attached is a picture showing my problem. The magazine plate has no hole in it to attach the clip. The old one was soldered on sometime before I acquired it.

Do I need to order more parts or drill and tap the mag catch that I have? Getting it in the right place might prove to be a challenge. Butch Augspurg Gary Yee responds. The Remington 513 bolt action rifle is the target version in Remington's line of 22 LR bolt action rifles that included the Model 510, Model 511, Model 512 (tubular magazine fed), and Model 514 (single shot). Starting with the progenitor of this line, the Model 510 was introduced in 1939 as an inexpensive, single shot bolt action rifle.

The receiver started as flat stock that was punched out, then formed and welded at the bottom. All these rifles have some slight variation in parts. As Remington's mid-line priced rimfire target rifle, the 513T was between the lower end Remington Model 521T and Remington's top-of-the-line Model 37 that was Remington's response to the Winchester Model 52. Produced from 1940 to 1967, production was discontinued when Remington introduced its 580 series.

You won't find the serial numbers on the receiver since they were stamped on the bottom of the barrel and is hidden by the stock. I have not found any difference between what the Army bought and what Joe Target Shooter bought so should be compatible. It's been years and I don't have a 513T any longer. As to your picture, I would suspect that it isn't attached to the floorplate but to the receiver.

Fix It Sticks Fix It Sticks are portable and modular maintenance tools for field work that use a T-handle to provide shop-level function in a light package. They're offering new tools to their line, including the Brass Pin Punch Set, Extended Action Bits, Brass Hammer Head bit, and 140 Inch-Pound Torque Limiter. These new items increase the functionality of any Fix It Sticks tool system as well as perform as stand-alone products.

The Brass Pin Punch Set is useful for drifting sights, removing trigger group pins, or any other disassembly or assembly of firearms or equipment requiring pin removal and reinstallation. The punches are in 1/16, 3/32, 1/8, 5/32, 3/16, and 1/4-inch sizes. Machined form solid bar stock, these have steel inserts in the base to work with magnetic drivers The Brass Pin Punch Set works with the Fix It Sticks tools as well as any other 1/4 hex driver. MSRP is \$30.

The Extended Action Bits are designed to work on hard to reach screws. Made with a ball end hex head to allow maximum access to screws, the Extended Action Bits are available in 3/16" for Remington 700, AICS and similar, 5/32" for Ruger 10/22 V-Block and similar, 1/8" for KIDD, and T30 for numerous Precision Rifles (T30 is not a ball end). The shaft of bit is 0.1875 x 4.0" long for hard to reach screws.

These integrate with the Fix It Sticks tool system as well as work with any 1/4" hex driver and have an MSRP of \$8 each.

READER FORUM CONTINUED

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The Brass Hammer Head is designed with a steel insert to work with magnetic drivers and intended for light hammer strikes. MSRP is \$8. Finally, Fix It Sticks Torque Limiters have an audible click when the listed torque is reached and then spin to prevent further tightening. These accept any standard 1/4" bit and fits into any standard 1/4". Accuracy is +/- 6% which is retained for 20,000 cycles. Small torque limiters range from 4 to 55 inch-pounds for \$40 and runs from 60 inch-pounds to 140 inchpounds for \$45.

For dealer and consumer inquiries contact call or visit Fix It- Sticks.com. Polymer80 AFT Kits Polymer80 (Polymer80.com, is a Dayton, Nevada manufacturer founded in 2013 building firearms and accessories. They offer parts kits for building your own firearms. Their newest is the Polymer80 AFT Kit. Each Assemble For Thyself kit contains all the necessary components to build a complete, serialized PFS9 or PFC9 pistol.

This includes a serialized pistol frame, complete pistol frame parts kit, complete slide assembly, Locking Block Rail System and Rear Rail Module, magazine, and a hard-sided black pistol case. Polymer80 PF-series handguns are compatible with Glock parts and include improved ergonomics, high-strength reinforcement, polymer construction, a Picatinny accessory rail, a double

undercut trigger guard, extended beavertail, right and left thumb rail, a 1911 grip angle, and PTFX texture pattern.

The Polymer80 AFT Kit is fully customizable, so you can easily make changes to suit your individual needs. Made with the new gun builder in mind, AFT Kits are pre-drilled to require a minimum of hand tools to complete a serialized firearm. "The popularity of building your own firearm continues to grow exponentially," said Loran Kelley, Polymer80's founder and CEO. "We have had customer requests for a kit that offers a little less work and a serial number. We are happy to comply with our customer requests.

The AFT Kit provides them with an easy way to build their own high-quality handgun from the ground up, which meets their requirements and still creates a tremendous sense of pride in their completed firearm." Polymer80 offers a wide array of build components, from 80 percent pistol frame kits, AR parts & magazines, pistol barrels, slides, pistol parts kits, pistol magwells, holsters, and more, as well as completed PF-Series handguns.

They run a dealer program for gunsmiths and shops that are Federal Firearms Licensees. Metalworking History I was impressed with "Metalworking History" (January 2022). The author really did his homework. Charlie Briggs AG

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