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AR-15 FLIERS, PART 3

1911 PARTS KITS • RUGER 22/45 MARK III • IMPROVED MOSSBERG MVP • EXTENDED FIRING PIN FOR AR-15 IGNITIO...

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ARCHIVE EDITION 208

DIGITAL ARCHIVE EDITION

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MACHINING

1911 Parts Kits

BY AMERICAN GUNSMITH EDITORS APRIL 2021

ORIGINAL PP. 2

Here are some kits and parts for building custom 1911 handguns. American Weapons Components (AmericanWeaponsComponents.com, is offering their 1911 80% Government Kit for building a personalized and custom 1911. As an unfinished (80%) frame, this is a not an FFL item and is not a complete frame as it requires machining to be done. 1911 Parts Kits All AWC 1911 parts and accessories are made with high quality materials and manufacturing.

The kit includes a 80% lower frame, barrel, slide, all internal components, and a frame end mil fixture and tooling kit for finishing the frame. The parts kit includes all small parts and are machine grade stainless steel; no cast or MIM parts.

This includes the 80% 1911 forged 416 stainless steel Series 80 frame, Series 80 to Series 70 conversion shim, forged 416 stainless steel Series 80 slide with Novak sight cut, match grade barrel, one-piece guide rod, match barrel bushing, plunger tube, internal extractor, skeletonized three-hole aluminum trigger, beavertail safety, mainspring housing, fire control parts, and spring and pin kits.

The 1911 80% frame is finished in four operations: Decking the top (done first), hammer hole, sear hole, slide rails, and beavertail safety fitting to your personal

preference. The end mill tooling kit contains all the end mill tooling to cut the frame rails and to drill sear and hammer pin holes, including #22, #35, and #1/16 (left handed) drill bits, and high speed steel 7/64 key cutter and 1/2 4 Flute end mill bit. Hand fitting to the final dimensions is recommended.

The entire kit with jig and tooling sells for \$1,399.99. 1911 DTS Nighthawk Custom (NighthawkCustom.com, offers their Nighthawk Custom Drop-In Trigger System. The DTS is an all-in-one unit that replaces the hammer, hammer strut, sear, disconnecter, and sear spring. The existing sear pin and hammer pin holds the DTS in place but no other parts are necessary for installation as a steel housing secures the unit.

The traditional three-pronged sear spring is no longer necessary as the springs for the disconnecter and sear are built in, including a singleleg grip safety spring. All internal components are machined from bar stock 416 stainless steel. The DTS works with 1911 models in Series 70, Series 80, and Swartz Style, as well as 2011 models. Minimal tools are required to complete installation, letting you get a clean and crisp 3.5-3.75 pound trigger pull in minutes. The DTS sells for \$299.99.

MAINTENANCE & REPAIR

Ruger 22/45 Mark III

How to reassemble a Ruger rimfire handgun from a box of parts.

BY GLEN CALVERT APRIL 2021

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If a survey was taken on which rimfire handgun was most likely to be brought to a gunsmith in pieces, I'm guessing it would be one of the Ruger rimfires, such as the Mark I, II, or III, or one of the 22/45 versions. The owner of the 22/45 in this article was honest and said he disassembled it for cleaning. He followed the instructions in the manual but just could not get it back together and functional.

It was the well-known issue with the main-spring housing and hammer strut that has frustrated owners for many years and led Ruger to change the design and eliminate the problem with the Mark IV models. I appreciated the owner's honesty, rather than giving a lame excuse like blaming a friend or brother-in-law. William B. Ruger, Sr. is well known for his innovative gun designs and manufacturing processes. He and his partner, Alexander Sturm, formed Sturm, Ruger & Co. in 1949.

Sturm, an artist and author, designed the heraldic eagle medallion for the handgrips and it became the official logo for the corporate literature and advertising. Sturm

also provided the start-up capital for the company. It could have been worse. What is less well known, in 1938 Ruger started on a design for a light machine gun for the U. S. Army. In 1940, the U. S. Ordnance Department issued a Request For Procurement for anew light machine gun to replace the M1919 Browning.

They were looking for anew design, not just a warmed-over version of the M1919. Ruger saw the RFP but did not have any manufacturing capacity so he approached the Auto-Ordnance Company for help. Auto-Ordnance thought Ruger's design had merit and agreed to build a prototype to submit for the RFP. After just five or six months they were able to provide a prototype for the tests. There were four other competitors, three of them (Springfield Armory, Rock Island Armory, and Colt) offering revised versions of the M1919.

Part of the test requirements was to fire ten thousand rounds without failure. The Ruger design did not pass the test and generally demonstrated poor reliability. The updated M1919s passed the tests but the

Ordnance Department rejected all of the competitor's designs, still wanting something better. The Ordnance Dept. liked Ruger's overall design, saw the potential in it, and ordered a second round of tests in 1943.

Ruger and Auto-Ordnance revised their design and submitted a second prototype but it proved even less reliable than the first. While this was going on, the Infantry Department was looking for a lightened version of the M1919 for use by paratroopers. Their testing and development efforts resulted in the M1919A6, which also met the requirements from the Ordnance RFP, so the M1919A6 was adopted across the board.

Ruger learned some valuable lessons from the experience, his design abilities were recognized, and he did further work with Auto-Ordnance and Springfield Armory before starting his own business. Ruger's first commercial success was the iconic Ruger Standard Model .22 semi-auto pistol that went into production in 1949. To reduce costs, the pistol frame was

RUGER 22/45 MARK III CONTINUED

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The bolt is rotated 90 degrees to show the recoil spring assembly and hole for the bolt stop pin, made from two steel stampings that were welded together with the weld seam ground smooth. The receiver was steel tubing and the barrel threaded into the receiver. The magazine held nine rounds. It was similar in size and shape to the P08 Luger, which added to its appeal, and it pointed and shot well.

The Standard Model had a tapered 4.75" barrel; a Target Model was later introduced with a 6.0" barrel and an adjustable rear sight. During 1950 and 1951, minor changes were made to the design, primarily to reduce production time. After that, the basic design remained unchanged until 1982. Alexander Sturm died in November 1951 at the age of 28. Ruger changed the color of the medallion from red to black in honor of his partner and friend. One million of the pistols had been sold by 1979 after 30 years of production.

In 1982, the Mark II was introduced. Design changes included a ten round magazine, a bolt hold open lock, and scallops cut into the rear of the receiver, making it easier to grasp the bolt. Blued steel and stainless steel versions of the standard and target models were available. The 22/45 model was introduced in 1992. It was a variation on the Mark II with a Zytel polymer frame and a grip angle similar to the 1911 pistol.

The grip panels were molded into the frame and the magazine release button was moved from the bottom of the frame to the left side of the grip. These changes permitted a price that was lower than the standard Mark II, though the Mark II continued to sell in high volumes. The Mark III was introduced in 2004. The magazine release was moved from the bottom of the frame to the left side of the grip (like the 22/45) and a loaded chamber indicator and magazine disconnect were added as safety features.

Stainless steel Hunter and Competition models were offered. In 2016, the Mark IV was introduced. It has a much simpler takedown design; pushing a button on the rear of the frame allows the receiver to be tilted forward and removed from the frame. Reassembling the action is just as easy. It has ambidextrous safety levers that are easier to manipulate than the previous design. The original two-piece welded frame was replaced with a one-piece frame in aluminum, stainless steel, or polymer.

Combined volumes of the various Mark models total more than four million produced and sold. Bill Ruger died in July 2002 at the age of 86. His many designs over the years included not only rimfire handguns and rifles, but innovative centerfire handguns (revolvers and autoloaders), rifles (single shot, bolt action, and autoloaders) and O/U shotguns. He is regarded as a genius in the design, engineering,

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This view unfortunately cannot be seen with the receiver installed on the frame. and manufacturing of firearms, in the same league as Samuel Colt and John Browning. Sturm, Ruger & Co. has produced over 40 million firearms since 1949, which is quite an accomplishment. About the only complaint on the Mark I, II, and III Ruger pistol design is the difficulty in reassembling the mainspring housing and bolt stop pin into the frame, and getting the hammer strut correctly positioned.

The same issues apply to the 22/45 models but the assembly procedure is slightly different and that's what I'll address in this article. Disassembly If you are starting with an assembled gun, remove the magazine and make sure the chamber is empty. Install an empty mag to disengage the magazine safety. Pull the trigger to drop the hammer and then remove the magazine. All the disassembly and assembly is done with the safety in the "fire" position.

The mainspring housing assembly (52) is located in the rear of the grip. It is removed by pulling the latch (60) downward using a paper clip or similar tool to hook the end of the latch. The housing will swing out of the grip and then it is pulled downward to remove it from the frame. The mainspring housing can be stubborn so it may be necessary to tap on the bolt stop pin where it protrudes from the top of the receiver with a plastic tipped hammer and a short wooden dowel.

With the mainspring housing removed, the bolt is removed by sliding it rearward. The receiver and barrel assembly is pushed forward and lifted off the frame. Light taps on the rear of the receiver with a plastic or rubber mallet may be required. The frame, receiver, bolt assembly, and barrel on this 22/45 had been cleaned fairly well. The bolt had not been disassembled so I removed the recoil spring assembly (22), the

firing pin retaining pin (18), firing pin (21), and the rebound spring and its support (19 & 20).

I cleaned these parts and the bolt. I checked the tip of the firing pin for any wear or deformation; it looked fine. The extractor (25) moved freely, having good spring tension and a sharp corner, so I did not remove it. I did some additional cleaning of the frame and then proceeded to reassembly. Reassembly The hammer (36) must be in the horizontal (cocked) position initially during reassembly.

If the hammer has been rotated too far forward and can't be rotated to the cocked position, insert the mag, cock the hammer, and then remove the mag. Install the barrel and receiver on the frame with the lug on the frame aligned with the recess in the receiver. Push the receiver rearward until the end of the receiver extends slightly past the Far

RUGER 22/45 MARK III CONTINUED

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end of the frame. If hand force is not sufficient to do this, put the muzzle on a padded surface and tap lightly on the rear of the frame with a plastic or rubber mallet. The bolt is reassembled in reverse order. When installing the bolt in the receiver, the bolt stop button must be in the released (downward) position. It is easy to move it to the hold open position without realizing it when handling the pistol and then wonder why the bolt won't go all the way in.

Check that the rear of the disconnecter (39) is pressed down and the hammer is still in the horizontal position as well when installing the bolt. Ruger 22/45 Mark III (Specifications subject to change without notice)

Now for the fun part: reinstalling the mainspring housing. To do this, the hammer must now be fully forward. Insert an empty mag, point the gun downward, and pull the trigger. Push the hammer all the way forward with a small tool through the slot in the rear of the frame.

The bolt stop pin in the mainspring housing is inserted into the rear of the frame and pushed upward through the hole in the bolt. It helps to hold the bolt forward while doing this. If the pin won't go completely into the receiver, lightly tap the bottom of housing until it does. Make sure that the hammer strut is still pointed downward as the end of the strut fits into a socket on the housing.

Holding the pistol with the muzzle pointed upward, pull and hold the trigger and push the housing into the frame.

It should be almost fully closed at this point. Release the trigger, remove the mag, and fully close the housing into the frame. The latch should snap closed, flush with the frame. Insert a mag with snap caps and perform a function check. If the bolt cannot be fully retracted, the strut is not in the socket. Open the housing, check the strut position, and repeat the steps as needed. I explained this procedure to the owner. We'll see if he remembers it the next time. AG

FROM THE ARCHIVE

AR-15 Fliers, Part 3

BY JOE CARLOS APRIL 2021

ORIGINAL PP. 7-11

Let's move on from basic AR design flaws and ammunition into other contributors to fliers. The first of these are iron sights that fail to track, have lags in tracking, or dead spots. I have been shooting Stoner firearms ever since the 1960s Viet Nam era. The early versions started out with fairly coarse sight adjustments. As time went on adjustments became finer by substituting parts with finer threads, with current iron sights down to 1/4 minute clicks these days.

It seems to me that finer threads of modern sights wear out much sooner than coarser threads. I believe the finer threads are also more susceptible to debris causing temporary and permanent issues. Ray-Vin makes a stellar iron sight checker but it must clamp onto a carry handle so it may not work with some of the backup sights on the market today. Wear out of rear sight parts was so common that in my decade as match Armorer for the Army Reserve Shooting Team it was my number one repair chore.

Issues with scopes is next. If you suspect a problematic scope, begin checking the mount and rings for tightness. Parallax is another issue. A scope that is parallax free (or nearly so) at one distance can exhibit lots of parallax at some other distance. I ask the shooter early on if he is having more fliers at a given distance. This obviously assumes using the same ammo at all distances.

In some shooting disciplines it is common to shoot magazine-length ammo at shorter distances and then switch to long seated ammo at longer ranges. If the shooter's problems coincide with an ammo switch that points to the need to check both parallax and ammo at the distance the shooter is having problems with. Scopes lacking parallax adjustments should have a parallax-free distance in the owner's manual.

If the bread crumbs are leading to a parallax issue, the scope will need to be field tested at all distances with emphasis on the range where the shooter is having

greatest problems. After ensuring that the firearm is clear and on safe, I set the upper in a solid support, find a distinct aim point down range, and naturally settle the crosshairs on it. Then, without touching the upper or sight, I move my head right to left and up and down while watching the center of my crosshairs.

Apparent movement of the crosshairs in relation to the target indicates parallax at that distance. If the shooter observes parallax at distances that the factory literature says shouldn't be, there isn't much that a gunsmith can do and it is best to contact the manufacturer.

On the other hand, if the shooter is experiencing parallax at other distances, the easiest fix is better application of shooting fundamentals, specifically, being keeping the head and eye in the exact place and aiming perfectly straight through the scope. A more consist stock weld may be all that's needed. I find the original AR stock just fine if the optic is mounted on a flat top.

Scopes mounted on a carry handle offer a challenge in getting a proper stock weld because the head is too high and the cheek weld likely compromised. Of course, it helps if you spent the last half century with your cheek "welded" to AR stocks. If you do not find this natural, aftermarket stocks with adjustable or raised cheek pieces can be had. Check your rulebook to ensure they're allowed. How does the shooter know prior to firing a bad shot that his eye is not lined up with the center of a scope?

A dark shadow anywhere on the outside edge of the field of view is a reliable clue. Shots fired with a quarter moon shadow will often lead to a flier. Always check there is no shadow prior to firing. There are scope covers (Accu Cover and Ray-Vin make examples) that assist with keeping centered. While we are on the general topic of stocks, good marksmanship dictates keeping the butt in the same position in the shoulder for each shot.

AR-15 FLIERS, PART 3 CONTINUED

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Gunsmiths need to check that the buffer tube is tightly screwed into the receiver and that the top screw on the butt is tight. Try to wiggle or rotate the stock; a lack of movement indicates the stock mounted right. Cheaper adjustable stocks have too much play in them, given the same effect as mounting the stock differently every shot. Shim stock may help, but I recommend getting a quality adjustable stock. The Magpul UBR is a good option.

Top end scopes often have adjustable parallax to dial in the target distance. If you are testing such a scope and note a little parallax, move the adjustment knob both a little more or less of the manufacturer's recommended setting as they might not be perfectly spot on. Lags and dead spots also happen with optics. Diagnosing requires shooting groups while noting how well the click adjustments track. Dead spots or lags require the optic to be returned.

One technique that seems to lessen adjustment issues is to go past, then return to the desired setting. Say three clicks of adjustment are needed, I'll put on six, and then return back three. Finally, I can not over emphasize the importance of buying the highest quality optic you can afford. Yes, this may require taking out a second mortgage on your

home. And, yes, you can easily spend as much on a quality scope as you spent on the upper or entire rifle itself.

Magazines Grab any AR in your gun safe that has a regular carrier in it. Clear it, place it on safe, let the bolt go forward on an empty chamber leaving the ejection port cover open, and point the muzzle in a safe direction. Take any 20 or 30 round magazine that you may have and charge it with a few dummy rounds. Carefully watch the front section of the bolt carrier that is visible through the ejection port as you slowly push the magazine up.

Just as, or a little before, the magazine locks into place you will see the bolt carrier move up. There are dimensional differences between magazines so it is entirely possible that one magazine may give more or less lift than the next. Your eye is likely not precise enough to see these differences in lift but your gun will notice these differences which can move the impacts of rounds fired from various magazines. Far When locked in place it is very rigid. I didn't invent this.

I was aware from decades past that National Match pistol shooters used machine rests to check magazines for any shifts in point of impact. Military shooting teams were doing the same thing with M14s. However, when I was

a firing member of the Army Reserve Shooting Team during the M14 era we didn't have a machine rest and were in the dark about this. When I became the Armorer I had my own rifle machine rest for a variety of tests, including magazines. The results were eye opening, shown in the target scans here.

My December 2015 article highlighted this important topic. Bore Issues I'm certain you're aware of the importance of bore cleaning. After every range session, clean the bore, including using a chamber brush, and the bolt carrier assembly. For storage longer than a few days, use an anticorrosion product on the bore, such as Boe Shield or WD-40. My January 2015 article goes into detail. Barrel lands are paper-thin and easily damaged during cleaning.

Stainless steel is in particular risk as it's softer than chrome-moly steel. 5R lands are also easily damaged. Bore guides are supposed to help but some of them are not perfect. My June 2018 article describes a two-piece cleaning rod guide from PMA Tool that is a recommended improvement. Almost all rifles will shoot one or two fliers (fouling shots) right after cleaning. This should be expected, although the severity will vary between firearms. Unfortunately, I don't know

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how to prevent this. If any of the 14 people who normally read my articles have discovered some elixir or method to eliminate first round fliers, please contact me and I'll contribute the fix to help all readers. Uneven land start points. Most gunsmiths trying to diagnose fliers will eventually grab a bore scope. I begin my observations by looking for fouling. This is especially important in instances where the gun owner says his gun just mysteriously started shooting fliers.

It is also important when customers say they are having a sudden problem with pressure. Either issue can be caused by a buildup of fouling just in front of the chamber. In both examples I almost always admonish shooters to take the gun home and, "J-B the heck out of the back of the barrel".

J-B Bore Cleaning Compound won't harm the lands by itself, however, since the owner is reversing the direction of travel of the patch inside the bore, it is super important to use a highquality bore guide like the two-piece PMA guide. The second priority for my borescoping observations is the start point for the lands just in front of the chamber. These need to be even, which they are when the barrel is chambered.

The hot gasses formed when cartridges are fired will erode the land start points forward as the gun ages, but those start points will remain even. The only thing I have found that will cause one or two land start points to appear forward of their siblings is damage to them caused by cleaning rod flex. Rod flex in small caliber firearms is a big deal!

There is so much flex in the cleaning rod I use to clean my Anschütz squirrel rifle chambered in 17 Hornady Magnum Rimfire

that I can't even push a bore patch through the barrel. Instead, I have to carefully insert my cleaning rod in the bore, attach a patch, then pull it carefully through the bore. Cleaning rods of .22 caliber are little better. The lands only stick up above the grooves by about the thickness of a sheet of paper and it is super easy for rods flexing into them to wear those lands down.

Stainless steel is softer than chrome-moly and more susceptible to damage. Uneven starting lands normally indicate the barrel is toast! Fat groups and fliers will result and there is no quick fix. Gun owners will often have a hard time accepting this because they will not have felt the rod flex, especially when it occurs at a low round count. As discussed with ammunition issues, one of the first hints that land start points have been damaged is erratic length-to-lands readings. A bore scope can see this.

While you have the bore scope out, I suggest looking for bore pitting. Pitting results from storing guns without cleaning and a rust preventative. A lot of deep pitting in the bore will usually permanently ruin accuracy. Pitting at the muzzle and crown is particularly destructive to group sizes. Mild pitting can sometimes be salvaged by recrowning.

Stainless steel resists corrosion better than chrome moly, the reason stainless was first accepted by the hunting fraternity, but chrome-moly barrels average 9.6% tighter groups sizes. My preferred corrosion protection salt bath nitride processing. Note, a barrel must be properly broken in before nitriding and remove the barrel extension before sending. When the barrel is returned,

re-time the extension using 150 foot-pounds of torque as originally applied. My September 2013 article details this further.

All barrels, including stainless and nitrided, need a rust preventative burnished into the bore for storage. Add a good spray in the chamber and muzzle face as well. A quality, preferably two-piece, guide rod is the best damage preventative. For you grownups, they also make one to fit the AR-10. Quality bore guides are like studded tires, air bags, and seat belts in cars: All are good insurance but not a guarantee. Also, clean often, every time you shoot the firearm.

Don't allow fouling to build up to the point that you have to aggressively scrub it out. Walkers This usually begins with a cold barrel. The first shot lands outside of where the shooter expects, the second a little further, usually in the same direction, and the next even more. Eventually, the gun warms up enough to shoot a kinda/sorta group. All rifles can exhibit this.

Since Stoner rifles connect dissimilar metals in the barrel and upper, I suspect walkers may be more severe, although I confess to have not conducted any scientific studies to verify my suspicion. The observations I have made of this abnormality are that it usually occurs in button-rifled stainless barrels. Quite often I see it in "low bid" barrels that are rapidly cranked out of a few plants. Button rifling puts a lot of stress in a barrel and that must be removed.

IF THIS STRESS RELIEVING PROCESS IS RUSHED, SOME BARRELS MAY

AR-15 FLIERS, PART 3 CONTINUED

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leave the factory displaying a tendency to walk. In fairness to barrel manufacturers, it is possible that many of them are turning out barrels that have been properly stress relieved only to have it reintroduced by someone else. If the outside dimensions of a button-rifled barrel are changed it is possible the inside dimensions are also changed. Any outside machining, such as contouring or fluting, can cause this.

If a gunsmith rushes a cutting or machining process and that produces excess heat, stress could be reintroduced. When I was the USAR Armorer I had success fixing such machining-induced stress problems via cryogenics, as detailed in my September 2016 article. Obviously, the best way to deal with barrel stress is to avoid introducing it in the first place. Some barrel makers offer to perform services like contouring or fluting right at their factory before the barrel leaves.

That way they can perform final lapping, stress relieving, and inspections to ensure quality control. The cut rifling process induces far less stress to a barrel and my studies indicates better accuracy on average. Brux, Satern, Krieger, and Bartlein all perform cut rifling and I have never encountered a chrome-moly cut rifled barrel from any of these plants that turned out to be a walker. Loose flash suppressors or barrels unscrewing from their extensions both create similar symptoms.

I have had this happen twice to personally owned firearms. The first happened to a Colt Python at around the 200,000 round count with impacts tracking left on target. I adjusted the rear sight and resumed shooting only to have the impacts begin tracking left again. Being the slow learner that I am, I repeated this scenario a couple more times until I was near to running out

of windage. Finally, I started going over the pistol and discovered that the barrel was unscrewing from the frame.

I removed the barrel and degreased the barrel and receiver threads. After drying, I applied a heavy dose of red Loctite and hand screwed the barrel on to the limit of my strength. After a couple of days of letting the Loctite set up, my next ranges session showed my zero returned to normal.

I still have the revolver and the barrel has remained firmly in place, having since killed a nice Pennsylvania six-point buck and earning my first (Police Combat) of three Distinguished gold marksmanship medals, so I would say that quick repair job all those decades back was time well spent! Later in life while shooting an AR-15 with iron sights I started to observe impacts moving to the left, similar to the incident with my Python.

I must have learned something with the pistol experience because it took me less time to diagnose the problem. The fix was the same and the return to normal zero was similar to the Python. The rifle barrel remained in place until it finally shot out. This brings us to a discussion of torque. Decades back, smart guys discovered that AR flash suppressors installed with too much torque caused large groups and fliers.

I have a military technical manual that recommends 15-20 foot-pounds and had a custom suppressor come in my shop recently that recommended 30-35. Ugg! When I see uppers come in my shop for repairs and they have a crush washer, I just shudder. Crush washers contribute to fliers and I recommend doing away with them. Custom gunsmiths over-reacted to heavy torque and started putting the suppressors on hand tight with red Loctite.

After time, many of those hand-tightened suppressors came loose and fliers were often the result. I use a torque wrench set to three foot-pounds with plenty of red Loctite and haven't had any units come loose. A flash suppressor that is unscrewing will not necessarily cause bullets to walk in a well-defined direction like a loose barrel; they will cause fliers and loss of zeroes, however. Loose suppressors are usually easy to diagnose by just grabbing the unit and trying to rotate it.

Obviously, this test needs to be conducted after completely clearing the rifle! Around the same time as hand tightening of flash suppressors was briefly in fashion, the same idea got transferred to attachment of barrel extensions. Nearly all of those extensions came loose. Extensions call for 150 foot-pounds of torque. I put mine on to that standard and have never had one come loose. Recoil Reducers Recoil slows recovery time between shots.

Dealing with recoil is critical when firing multiple shots in a tight time limit. Both of the Service Rifle models that I used to compete with had cavities in the buttstock where battlefield soldiers stored segmented sections of cleaning rods and related equipment. Way back in the day competitive shooters learned to place rolls of change in some of these cavities to add weight in an effort to reduce recoil.

I later learned to embed mercury recoil reducers in the stocks of both the M14 and AR-15 to perform recoil reduction. For decades resourceful companies have made devices that replace the standard AR buffers. Many of these recoil reducers strongly resemble scaled-down versions of automotive shock absorbers. They are usually spring

AR-15 FLIERS, PART 3 CONTINUED

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loaded and act to slow the bolt carrier at the rear most portion of its travel. Without such a replacement buffer the carrier and stock buffer will slam to a stop, jarring the rifle and adding to felt recoil. Either adding weight or one of these tricked out buffers are both invisible so guns equipped with one or both outwardly look stock and pass the muster of most Service Rifle match rules. I have used both approaches and feel that they helped me.

My first experience with the controlled venting of gas to control recoil and muzzle rise was with Mag-na-port. They used electrical discharge machining to cut little trapezoidal holes in pistol barrels up on either side of the front sight. The theory was that by directing some of the gas up into the atmosphere the muzzle of the firearm would be pushed down not unlike a jet airplane. These trapezoidal cuts could also be applied to rifles and shotguns.

I performed machine rest tests for group sizes of pistols before and after porting and couldn't find any degradation in accuracy. Smart hombres started to install match barrels to 1911 pistols that were an inch or so longer than stock to add threaded devices. Eventually, baffles were machined into these compensators and pistol shooters swore that the upward muzzle flip of pistols were lessened.

Ground breaking of this work in pistol preceded such attempts in rifle, but AR shooters soon began to experiment with similar devices, attaching them to the existing threads where a flash suppressor normally screwed on. Since this approach obviously is an external modification, this wasn't legal in Service Rifle but could be used elsewhere. In years of machine rest testing of these contraptions one thing has really jumped out.

Almost all of them cause fliers and bigger groups than equipping the same gun with a regular A2 flash hider. The lone exception is the Harrell's Precision AR-15 Tactical Tuner Brake, especially the model

with two ports located at three and nine o'clock. Once the device is in place, the shooter must fire test groups, tuning it to a sweet spot. This can be a daunting and time-consuming task. Using a machine rest, it can take me the better part of a day.

Pistol machine rests became affordable decades ago but rifle machine rests have never been affordable and are much less available. That is unfortunate because jobs like this are made so much easier and more precise by the use of a machine rest. Conclusions We have just proven that diagnosing and correcting AR-15 fliers is a matter of protracted discussion.

I can easily see where many of you may find the whole topic to be intimidating, especially general gunsmiths who may only get a couple of ARs in the shop each year. The one thing that all gunsmiths can do is to perform due diligence and make darn certain that we never turn out guns that shoot fliers. Each rifle build begins with the selection of a barrel, detailed in my July-August 2017 articles. Important highlights, chrome-moly barrels out-groups stainless by 9.6%.

Don't chamber a rifle to jump bullets further than necessary. Don't over spin bullets; use the minimum twist rate necessary. The taller 0.218" lands out shoot the industry standard 0.219" in every AR I've tested. Barrels rifled using the cut rifling method out shoot button rifled. Gain twist barrels with the proper rate of gain shoot the tightest groups and the least number of fliers (detailed in my November-December 2013 and December 2016 articles).

Clean barrels shoot tighter groups with less fliers than those with fouled bores. What is a good starting point when a customer brings a gun to you with complaints of fliers? As previously stated, gas tube misalignment and ammunition concentricity are among my first checks. While examining the customer's ammo I also look at the rims for tears or deformations as

well as the bullet tips. I usually bore scope the rifle in question fairly early on and follow that with actual range testing using the machine rest.

The object is to shoot a group with customer-provided ammo and a second group with a known lot of your ammo. If I notice fouling in the bore when I scope it I fire the gun just the way the customer brought it in. If the group is nasty I thoroughly clean the bore and shoot the group over. Almost always the clean bore group will be tighter and have less fliers. I mark the location of the first and second shots after cleaning so the customer can see how far out these fouling shots go.

I realize those that have to travel to a public range won't be able to take a half day out of the shop to perform range testing and that is unfortunate. Absent this range step you really don't know if you have a gun problem or an ammo issue. I usually set up the chronograph when I am machine rest testing. The consistency of velocity tells me something about the care that the customer has used in his loading process.

Rounds that chronograph significantly slower than sibling cartridges will land their bullets lower on target than other rounds at longer distances of 600 yards and beyond. If you haven't found the cause of the customer's fliers after the above, I would advise referring to Part 1 of this series and checking for those design shortfalls that have been present since the invention of the rifle. I would also be asking the customer all the questions I suggested throughout this article for a hint.

Those of us who have learned to shoot this rifle had to train for countless hours on hot, dusty ranges to sharpen our marksmanship skills. Diagnosing the causes of fliers is not that much different. The more you practice that skill, the better you will get! Feel free to email me at to discuss this or any of the articles I've written. AG

RIFLES

Improved Mossberg MVP

The Mossberg MVP Patrol is a 5.56mm hybrid scout rifle. Here's how I fixed cartridge feed problems and improved it.

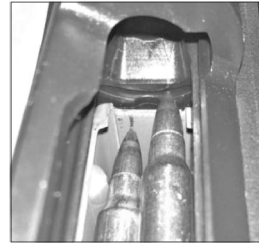
BY BRIAN R. SMITH APRIL 2021

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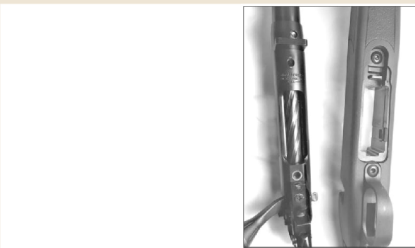
Above: Mossberg's MVP Patrol is a budget-priced modern take on the 40-year-old scout rifle concept, featuring a Picatinny rail, flash hider, open sights, a textured polymer stock, and the ability to accept AR-15 STANAG-pattern magazines. Right: USGI aluminum magazines were a loose fit in the MVP Patrol's magazine well. Loaded magazines would tilt down at the front, causing the bullet tip to "catch" below the feed ramp.

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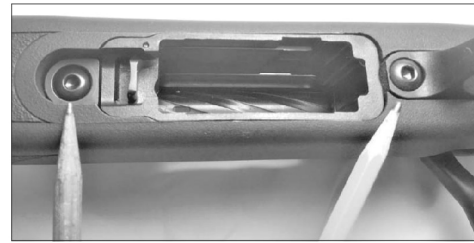
Below: Pencils indicate the two guard screws that are removed to withdraw the barreled action. The screw at the rear of the trigger guard (not shown) does not engage the receiver and is not removed. Right: Underside of the MVP Patrol's barreled action beside the stock.

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ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED

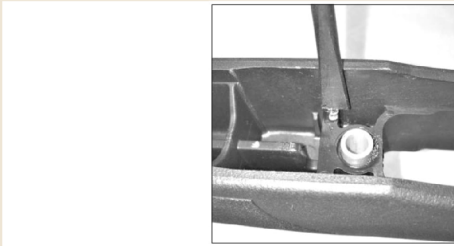
Mossberg 5.56 MVP Patrol Rifle's AR-15 polymer magazine well was considerably larger than it needed to be and cartridges would not feed from USGI magazines. Fortunately, the aftermarket rode to the rescue. The Mossberg MVP Patrol 5.56 is a sort of hybrid "tactical scout" rifle chambered for 5.56x45 NATO and accepting NATO STANAG (Standardization Agreement) AR-15 magazines.

In addition to the chambering and the ability to use the ubiquitous AR magazine, the appeal of the Mossberg MVP Patrol is that it is bolt-action, features a polymer stock, and is lightweight. I ordered one to use in dispatching coyotes and other pesky varmints. The 5.56 MVP Patrol is built on a short action receiver, similar to The screw at the rear of the trigger guard (not shown) does not engage the receiver and is not removed.

Loaded magazines would tilt down at the front, causing the bullet tip to "catch" below the feed ramp. series, and Zastava M85. A unique feature of the 5.56 MVP Patrol is a hinged "jaw" on the lower section of the bolt face which serves to drop "Mini Mauser" rifles such as the old Interarms 10X, current CZ 527

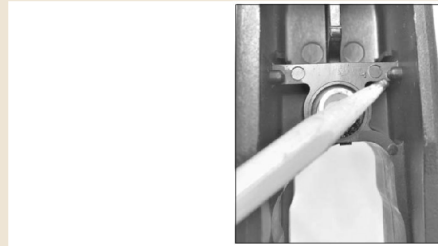
IMPROVED MOSSBERG MVP CONTINUED

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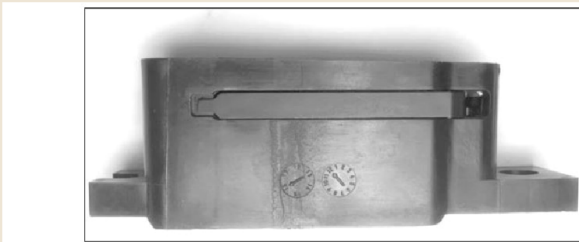
Far left: The pencil shows one of four "nubs" that help to locate the ends of the factory polymer magazine well but interfere with the wider Tromix replacement well. Left: A chisel is used to pare away the four "nubs" from the stock, permitting the Tromix magazine well to seat properly. The subject MVP Patrol exhibited satisfactory accuracy without bedding of the Tromix magazine well.

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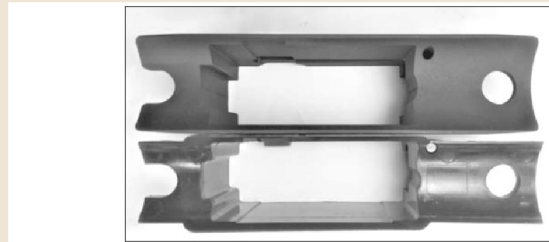
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Below left: The polymer Mossberg magazine well removed from the stock, showing the pivoting magazine catch in its recess. Below right: The anodized aluminum Tromix replacement magazine well above the factory polymer magazine well. Note the fuller width profile at the ends of the Tromix component compared to that of the Mossberg magazine well.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Below left: The polymer Mossberg magazine well removed from the stock, showing the pivoting magazine catch in its recess. Below right: The anodized aluminum Tromix replacement magazine well above the factory polymer magazine well. Note the fuller width profile at the ends of the Tromix component compared to that of the Mossberg magazine well.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED

down when the bolt is cycled to facilitate stripping of cartridges from the magazine. This jaw is just sufficiently wide to pass between the feed lips of an AR magazine, and it engages the head of the top-most cartridge in the magazine on the feed stroke. The jaw and its hinge pin are necessarily small and not particularly robust-appearing, but one assumes that Mossberg thoroughly fatigue tested the design before going to market.

The MVP Patrol features an adjustable trigger with a Glock-like trigger safety blade, a textured polymer stock, open sights with a red light-gathering front sight insert, a Picatinny rail for optics mounting, an A2-type flash hider, and a large, conical target-style bolt knob—the latter I could do without. The excitement of a new firearm quickly wore off

when the 5.56 MVP Patrol all but failed to feed using 30-round USGI aluminum AR magazines.

With the supplied Magpul magazine the MVP Patrol fed reasonably well, but there were some random instances of a cartridge failing to be stripped from the Magpul magazine and fed into the chamber by the bolt. I tried a few 20-round USGI magazines, but I had no luck with them either. What's the point of a rifle featuring acceptability of AR magazines if they don't function?

The USGI aluminum magazines rocked fore-and-aft to a large degree, but the Magpul magazine Far The subject MVP Patrol exhibited satisfactory accuracy without bedding of the Tromix magazine well. exhibited far less play. If I manipulated the bolt while pushing the lower end of a USGI AR magazine forward, rounds would strip from the magazine

and chamber most of the time. But missing a third arm and hand, this technique was impractical for shooting.

Given we're 1/5th of the way through the 21st century, I do what most people do when faced with a problem: I turn to the Internet. Sure enough, my MVP Patrol was not the only one with this feed issue. In fact, it's been a known undesired feature of the Mossberg MVP 5.56 since Day One, and the problem has spawned a number of "fixes" documented on video—viewer beware, in most cases.

While some of the YouTube "garage remedies" result in functional cartridge feeding in an MVP Patrol, they are not what I would consider technically or professionally acceptable. I often find that people who engage in such "repairs" become future customers.

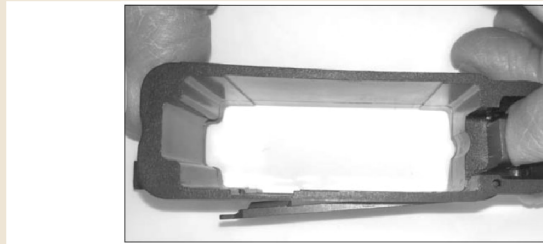
IMPROVED MOSSBERG MVP CONTINUED

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Right: The pivoting magazine catch shown activated by a finger, with the catch surface completely clearing the magazine housing wall. The small diameter end of the mag catch is a stop that prevents the magazine catch from swinging too far into the magazine well. Far right: Removing the magazine catch pin with a punch. The pin is stepped, and is pushed out from the bottom of the magazine well towards the top.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Right: The pivoting magazine catch shown activated by a finger, with the catch surface completely clearing the magazine housing wall. The small diameter end of the mag catch is a stop that prevents the magazine catch from swinging too far into the magazine well. Far right: Removing the magazine catch pin with a punch. The pin is stepped, and is pushed out from the bottom of the magazine well towards the top.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED

The small diameter end of the mag catch is a stop that prevents the magazine catch from swinging too far into the magazine well. Far The pin is stepped, and is pushed out from the bottom of the magazine well towards the top. In investigating the feed issue online, I discovered that Tony Rumore of Tromix Lead Delivery Systems (Tromix.-com, offers a magazine well for the MVP Patrol that eliminates the feed issue.

It is made of machined aluminum that is hard coat anodized and black dyed available for \$75.00 plus tax and shipping. I figured at this point I was already in for a pound and another 7,500+ pennies would yield a bolt-action “tactical scout” rifle in 5.56 suitably functional with USGI AR magazines, so I placed the order to Tromix. The Tromix magazine well arrived within a week and was well-packaged.

There were no instructions supplied with the unit, but an examination of the replacement magazine well and the original Mossberg polymer part showed that the magazine release lever, pivot pin, and return spring would need to be removed from the Mossberg polymer magazine well and installed in the Tromix replacement. Further, there are four “nubs” molded into the Mossberg polymer stock that must be reduced or removed in order for the Tromix magazine well to be installed at the proper elevation in the stock.

If the Tromix replacement is placed into the recess in the stock without removal of these nubs, the replacement sits too high in the stock and the barreled action cannot be properly installed in the stock. This is due to the Tromix well being wider at each end than the factory Mossberg well. The first step in the magazine well replacement process is disassembly. Remove any installed magazine and withdraw the bolt to verify the rifle is unloaded. Depress the bolt latch and withdraw the bolt from the action.

The barreled action is separated from the stock by removing the screw in front of the magazine and the screw directly in front of the trigger guard. The rear most screw can be left in place as it serves to attach the trigger guard to the stock. Once those two screws are removed, lift the barreled action out of the stock. The Mossberg polymer magazine well can be lifted up and out of the stock after removal of the barreled action. It may help to push up on the bottom edges of the magazine well to get it started.

With the Mossberg magazine well out of the stock, attention is directed to two features. First, the previously-mentioned four nubs in the stock essentially at the corners of the magazine well opening. Second, the magazine catch lever in the front and side of the magazine well. As mentioned previously, these four nubs need to be reduced

or removed in order for the Tromix mag well to seat properly in the Mossberg polymer stock.

This is easily done with a small wood chisel, paring the plastic nubs away a bit at a time. The flange portion of the Tromix mag well is just a bit thicker in section than that of the OEM mag well, requiring removal or reduction of the nubs. The magazine catch lever is to be transferred from the OEM mag well to the Tromix replacement. This is accomplished by removing the pivot pin using a small pin punch. The pivot pin is stepped and installs only one way, from the upper side of the mag well toward the bottom.

To remove, push the pivot pin out from the bottom up. Swing the magazine catch lever into the mag well and lift it upwards to remove it. Note that there is a coil spring in a slot at the front of the mag well; take care that it is not lost and that it is relocated to the replacement. A tip: The magazine catch lever in contact with the hard coat anodizing of the Tromix mag well exhibited fairly high coefficient of friction.

Considerable force was required “just so” on the magazine catch thumbpiece to release a magazine. While the rifle was apart, I removed the magazine catch lever and polished its surfaces that come in contact with the mag well and polished the mag well’s contacting

IMPROVED MOSSBERG MVP CONTINUED

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Left: Withdrawal of the magazine catch requires a bit of “gymnastics” in sliding the catch to the front so that the stop at the end of the magazine catch clears the slot in the magazine well, then rotating the magazine catch into the magazine well and twisting to remove it from its slot. Above right: The magazine catch spring is shown in the slot at the outer end of its recess. On the subject MVP Patrol there was some friction holding the spring in place, but take care to ensure that it is not lost during disassembly.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED



Left: Withdrawal of the magazine catch requires a bit of “gymnastics” in sliding the catch to the front so that the stop at the end of the magazine catch clears the slot in the magazine well, then rotating the magazine catch into the magazine well and twisting to remove it from its slot. Above right: The magazine catch spring is shown in the slot at the outer end of its recess. On the subject MVP Patrol there was some friction holding the spring in place, but take care to ensure that it is not lost during disassembly.

ORIGINAL ARCHIVE IMAGE • PERMISSION CONFIRMED

On the subject MVP Patrol there was some friction holding the spring in place, but take care to ensure that it is not lost during disassembly. surfaces, too. Predominantly that’s both sides of the long slot in the side of the mag well. These were polished and the sharp edges removed by ever-so-slight chamfering of the slot using a rubber polishing tip. The polishing noticeably improved the working of the magazine catch lever and reduced the force required to activate it.

Of course, a very light film of RIG on the parts also made releasing a magazine easier. Once polished and assembled, the replacement mag well was installed into the stock and the barreled action screwed into place. In keeping with customary practice, both guard screws were tightened to the beginning of resistance and the front guard screw was then fully tightened before fully tightening the rear guard screw.

To correctly state the oft-misquoted adage, “The proof of the pudding is in the eating,” 223/5.56 snap caps fed from both 20 and 30-round USGI metal magazines without issue. It was then time for a range trip. Twenty rounds were loaded in both magazines as well as ten rounds in the Magpul magazine that came with the rifle. All rounds fed from all three magazines without issue. This was in stark contrast to the first range outing when rounds would not chamber at all from a USGI magazine.

While at the range, I took the opportunity to sight in the MVP Patrol, adjusting the rear sight for elevation. Windage was dead on from the factory. The MVP Patrol turned out to be very accurate when fired offhand. With the open rear sight I was able to repeatedly dust standard diameter clay birds sitting on edge at the 100 yard berm using 55 grain Prvi Partizan FMJ, Federal XM193, and South African surplus 55 grain ammunition. I set some birds on the 200 yard berm and fired from a rest, same ammo and sights.

The red front sight insert covered the clay birds and then some, but the MVP Patrol broke 6 out of 10 on the first 10 rounds fired. I didn’t touch the adjustable trigger as it broke at 3.3 pounds out of the box. This is sufficient practical accuracy that I did not bother with glass bedding the magazine well or action. Others may not be so lucky.

Despite USGI magazines acting like a broomstick in a bathtub in the MVP Patrol’s original magazine well, in the course of remedying the subject problem I learned that Mossberg still adheres to the principles that grew the company and are embodied in their historic slogan, “More Gun for the Money.” This is a rifle designed for mass production. The MVP Patrol exhibits above average fit and finish. The

cylindrical receiver is machined from utilitarian barstock and not a more costly forging.

The polymer stock is solid and not at all slippery in the hands, either dry or wet. The sights appear to be perfectly level and not canted. A Picatinny rail is factory mounted on the receiver but is sufficiently low that the MVP Patrol can be sighted with the open sights if an optic is not mounted. My only complaint is the bolt knob is styled like those used for Benchrest rifles, large and conical.

I could have done with a smaller, lighter, and more simple knob, like that of the Model 70 or Model 700, but that’s a project for a later time. The Mossberg MVP Patrol was the first factory-new bolt-action rifle that I purchased in probably decades, simply because I wanted a bolt gun that accepted AR magazines, particularly USGI aluminum ones. In making the purchase, I relearned an important lesson—always do due diligence on an unknown product, particularly one that’s relatively new to market.

The MVP Patrol is about ten years old, maybe more, but compared to a Winchester 94, this Mossberg is still an infant. And with infants come teething problems. Because I did not check reviews, the MVP’s magazine well “teething problem” bit me, but fortunately Tromix and an hour or so of my time took the pain out of that bite. AG

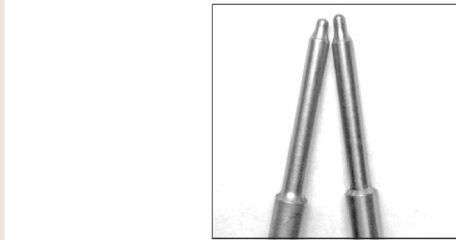
PEOPLE & COMPANIES

Extended Firing Pin for AR-15 Ignition Woes

Some imported ammunition use hard primers that can fail to ignite AR-type firearms. Here's a quick, reversible, and inexpensive remedy for ignition woes.

BY BRIAN R. SMITH APRIL 2021

ORIGINAL PP. 16-18



Right: Standard AR-15 firing pin tip at left, extended firing pin at right. The increase in length is about 0.012".

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The AR platform has become ubiquitous, with examples available in pistol and rifle form and in a seemingly growing number of chamberings. The most popular chambering is, of course, 223 Remington or 5.56 NATO.

While I don't envision the 223/5.56 ever being supplanted as the king of the AR cartridges, thanks to the influx over 35 years of once-inexpensive steel-cased 7.62x39 ammunition along with SKS and AK rifles and now pistols from China, the former Soviet Union and Com Bloc countries, and domestic manufacturers, the AR has long been offered in models and barreled uppers chambered for that versatile round.

Even before the ammunition panic induced by Covid-19 and the 2020 election politics, firearms enthusiasts looking to save money would purchase and shoot relatively inexpensive steel-cased ammunition from Wolf and the various "Bear" brands of both 223 The increase in length is about 0.012". and 7.62x39.

In some cases, shooters have experienced problems with steel-cased ammunition ranging from stuck cases, weak extraction and ejection, unburned grains of powder, hard primers, or primers seated deeper than customary in U. S. ammunition. Recently, two acquaintances approached me a few weeks apart with identical problems. Both had purchased quantities of steel-cased 223 ammunition, the "Golden Tiger" brand manufactured by the Amur Cartridge Plant- Vypel in Russia.

Speaking parenthetically for a moment, it is recognized that many manufacturers of ARs and AR barrels recommend against the use of steel-cased ammunition due to potential problems with case sticking and reliability. The modulus of elasticity of soft steel for deep drawing is indeed different than that of cartridge brass and that does affect how steel cased ammunition expands against the chamber, how much it expands permanently, and for how long it expands elastically.

Therefore I won't get into a debate here about one's choice to use steel-cased ammunition in ARs. Suffice to say that these

two gentlemen were handed lemons and I wanted to help them make lemonade. The complaint was that their ARs would not ignite the ammunition reliably. They wanted to install higher-force hammer springs because they both read on the Interwebz (there it is!) that stronger hammer springs were one way to fix it.

These are two different gentlemen who likely don't know each other with nearly identical stories. I told them that hammer force is but one possible corrective action but the problem needed to be better defined. Requesting some ammo from the first friend along with his AR, the rifle was examined. It was clean, properly lubricated, and the fire control group was properly installed.

Firing pin protrusion checked out with a military firing pin protrusion gauge (part 7799735) and measured exactly 0.031" with a digital depth gauge, well within the standard specification range of 0.028" minimum and 0.038" max. Federal XM193 cartridges fired 30



Left: Black Rifle Arms Enhanced Firing Pin.

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EXTENDED FIRING PIN FOR AR-15 IGNITION WOES CONTINUED

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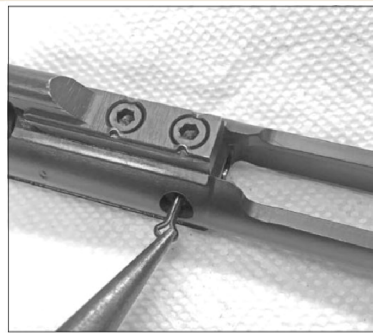


Left: One of the attractions of the AR is its simplicity. Break open the rifle by pushing the rear takedown pin to the right, rotate the two receivers apart, pull out the charging handle part way, and withdraw the bolt carrier.

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for 30 without issue. Primer seating depth ranged between 0.002" and 0.004" below the case head. On the other hand, the steel-cased Vypel Golden Tiger ammunition had a seating depth between 0.0045" and 0.0075". Roughly half of the Golden Tiger failed to fire. It was confirmed that the firing pin was made of steel and not titanium. Titanium pins are significantly lighter than steel firing pins, the touted advantage being faster lock time.

The trade-off can be erratic ignition because of the lighter firing pin, unless a higherforce hammer spring is installed. Some imported steel case ammunition has been reported to have military-grade hard primers to resist accidental discharge from bolts slamming shut when chambering around. It is quite possible that primer cup thickness or hardness were contributing factors but I had no means of measuring this variable to confirm it due to Berdan primers in the ammo.



Left: Use of needle-nose pliers or a hook facilitates removal of the firing pin retaining pin from the bolt carrier.

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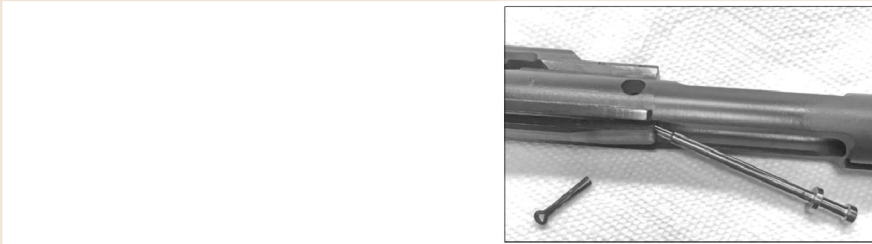
They are difficult to remove without damage and the proper equipment like a hydraulic punch, and measuring fired primers is invalid due to the change in the primer cup from the firing pin indent.

After a consult with some friends who are serious AR fans whom I knew to run steel case ammunition in their rifles and pistols, I discovered that inconsistent ignition was somewhat of a problem. Break open the rifle by pushing the rear takedown pin to the right, rotate the two receivers apart, pull out the charging handle part way, and withdraw the bolt carrier. a known problem with ARs chambered in 7.62x39 and less so for those guns chambered in 5.56/223.

Stronger hammer springs did work in some cases but the most reliable fix was an extended-tip firing pin.

EXTENDED FIRING PIN FOR AR-15 IGNITION WOES CONTINUED

ORIGINAL PAGE 18



Left: Once the firing pin retaining pin is removed, the firing pin is withdrawn readily from the center of the bolt carrier.

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Extended firing pins for ARs have identical or slightly similar parabolically-shaped tips compared to those of standard AR firing pins, except the length of the tip “body” is approximately 0.012" longer, depending on manufacturer or sales outlet literature. This slight bit of lengthening is represented as being sufficient to account for the increased primer depth and/or harder military-spec primer cups found in steel cased ammunition, but the increased length is said to not cause pierced primers.

After consulting with the first acquaintance, I suggested we try an extended firing pin and received his approval. An Enhanced Firing Pin was ordered from Black Rifle Arms (BlackRifleArms.com, BRA Enhanced Firing Pins are primarily intended for 5.45x39 or 7.62x39 ammunition. The label on the firing pin received states, “AR- 15 Firing Pin 7.62x39/5.45x39 Enhanced Firing Pin”. On BRA’s current website there are two distinct item numbers, one for the 5.45x39 cartridge and one for the 7.62x39.

It is suggested to call or email Black Rifle Arms to discuss your particular needs for an extended firing pin, particularly if 5.56 ammunition is involved. There is also a customer review on the BRA website mentioning Golden Tiger 223 having a 40% failure to ignite rate prior to installation of a BRA Enhanced Firing Pin and 100% ignition following 130 rounds fired without a primer piercing. Many readers are familiar with basic field stripping of an AR but I’ll cover the basic steps anyway.

First, remove any magazine, retract the charging handle, and confirm that the chamber is empty. Leaving the hammer cocked,

push the rear disassembly pin out to the right and open the rifle like a double barrel shotgun. Pull back the charging handle slightly and grasp the rear of the bolt carrier, then withdraw the bolt carrier assembly fully from the upper receiver. With the bolt carrier on the bench, use a hook or needle nosed pliers to pull the firing pin retaining pin from the left side of the carrier.

Pull the firing pin to the rear and down to remove it. Set that firing pin aside and take up the extended firing pin. Apply a drop or two of your preferred lubricant to its shaft. Insert the extended firing pin into the bolt carrier and replace the firing pin retainer pin. Replace the carrier assembly in the upper receiver, seat the charging handle forward, rotate the receivers closed, and push the rear takedown pin home.

Tip protrusion with the enhanced firing pin installed measured 0.042", 0.004" in excess of the upper specification limit. I wasn’t concerned about that amount of excess because it was sort of the point of the exercise, wasn’t it? Further, the firing pin protrusion of my Mossberg MVP Patrol in 5.56 measured 0.049" and it hasn’t punctured a single primer in nearly 300 rounds.

I gathered up the customer’s cranky Golden Tiger ammunition along with some surplus South African M193 and commercial 223 of my own to try it out. Two 30-round magazines were filled with each of the three types of cartridges for a total of 180 rounds. The rifle was secured in a home-built wood rifle vise with elevated saddles which was clamped to the shooting bench. The vise saddle elevation allows for installing 30-

round magazines in ARs and AKs, and 35-round magazines in Galil rifles for test firing.

I fashioned a brass catcher using a plastic tarp and squeeze clamps. Equipped with safety glasses and hearing protection, I stood to the side and used a 1/2" diameter 30" long dowel to trip the AR’s trigger. The result? Success on two fronts. First, the cranky Vypel Golden Tiger steel-cased ammunition touched off 60 for 60 with nice primer indents and no piercings. The South African M193 also ran 60 for 60 without piercing, as did the Federal American Eagle rounds.

The indents in the M193 and Federal AE were visibly deeper than if fired with a standard firing pin, but there was no sign of partial piercing such as black smudging in the dimple or soot radiating away from the dimple on the primer cup. The BRA Enhanced Firing Pin was an effective solution for my one acquaintance’s problem of what to do with 3,000 rounds of steel-cased ammunition with very spotty ignition. The second acquaintance hadn’t invested so deeply into his lot of hard-primed 5.56.

When he purchased a BRA Enhanced Firing Pin directly and installed it himself, his experience with faultless ignition and no pierced primers mirrored mine. What’s more, the extended firing pin is an easily reversible solution if a shooter chooses to switch back to ammo with softer primer cups as a safety measure to avoid the potential for pierced primers. AG

SHOTGUNS

Glass Bedding Shotguns

Repair of inlet problems in shotgun stocks, repairing cracks, repeating splits, metal-wood looseness, and similar can be resolved with glass bedding.

BY SERGEY LYALKO APRIL 2021

ORIGINAL PP. 19-21

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The writing of this article was triggered by recent discussion posted in American Gunsmith by one of the gunsmiths. The question was how to fix repeating breakages of a shotgun inlet. In other words, when a wooden piece breaks off of the inlet, is glued back together, then breaks off again at the shot, how should you fix it? If the piece of inlet is breaking repeatedly should the stock be discarded or there is some potential?

Stock replacements are expensive, especially for the high grade shotguns, so my tendency is to do everything possible to save the broken one. Is repeating gluing of the broken piece a sufficient way of fixing the problem? Gluing is needed but probably not sufficient. Before talking about solutions, let's look into physics of these breakages. Why does one piece but not another break off? Obviously, it is a result of some force acting upon that part of inlet which is exceeding the strength of the wood.

This force consists of two parts. One is The saved piece needs to be glued in place with minimal visibility of the edge outside. The broken piece on part A shows old glue, so this was not the first break. Part B shows the broken piece is lost. the pure recoil—when the charge goes forward, the whole metal of the gun moves back and the receiver hits the wooden inlet. The other part is related to the motion of the shooter's body. In particular, the torso of the right-hand shooter swings to the right or clockwise.

At that point in time, the barrel, having significant weight and inertia, resists this swing and creates pressure on the left part of inlet. This is why for right-handed shooters certain breakages are typically on the left side. For left-handed shooter, the right part of the inlet is more vulnerable. There are other forces associated with body motion which can explain cracks of the inlet in different locations.

Note that after the shot, the body moves into counter recoil with barrel inertia resisting this move as well. Altogether, the inletted part of the receiver is forced into pushes, pulls, twists, and turns, all of which can be complex and difficult to describe. The wood of the inlet, sometimes quite thin, is the only resistance to all these movements. If the particular part of the inlet receives a breaking force, then it means that the other, adjacent parts did not provide sufficient support for the moving action.

Sometimes we say that the breaking part has a "high point". There are three major conclusions to make at this point about the breaks of inlet. First, the receiver does not have equal support of the stock inlet at all points around the metal. In other words, there are high and low points, where the high points are taking the beating and the low points are excluded from supporting the receiver.

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The arrow points to the breakage with deep wood removal. Filling this recess with epoxy will make this part of inlet stronger. Second, there is a movement of the receiver in the inlet during the shot, even if it is not detected otherwise. Without this movement no part of the inlet can be moved and broken off. Third, the strength of the wood is not sufficient for taking the hit.

For preventing damage and breaks of the inlet we need to exclude movements of the receiver, provide equal support of the metal all around the inlet, and increase the wood strength. A good way of doing that is by glass bedding. Since the 1960s when epoxies came to wide use, glass bedding This gel allows 30 minutes for distributing around the inlet and removal of the external runs. was finding more applications in gunsmithing, mostly in rifle accurizing.

In essence, the hard epoxy is used to build a bed for the receiver eliminates empty spaces under the metal, prevents movement there, and provides a strong base in different to moisture and temperature while excluding wood squeeze. This is exactly what we need for saving a

shotgun inlet. I'll use an example of how I've made this repair. First, the area with the breakage has to be degreased. This is especially important for the inlet as this part of the stock is often saturated with oil from the mechanism.

I use laundry detergent with hot water in mild cases and an industrial strength detergent for really heavy grease. Easy-Off Heavy Duty Oven Cleaner is one of the best. Drying the stock after washing should be gradual to avoid warping. After drying the broken piece, glue it in place. If the broken piece is lost, make a replacement matching the grain and type of wood to the original stock. At this point we have an option to shape the piece for better resistance to the shock.

For gluing I normally use the heavy viscosity superglue with a 20 minute setting time. It is important to have excess glue coming out of the break to make sure that all the empty spaces are filled up. After applying pressure, by whatever means, the excess glue should be quickly removed from outside. After glue has dried, shape the wood outside and inside for inserting the

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Some internal cleaning is still in order. receiver into the inlet. The shaping outside is quite rough at this point; we will return to it later. Now we're ready to start the glass bedding by removing the wood inside the inlet where metal is touching it. I perform this wood removal with Dremel tools. The cuts go all around the inlet but not touching external surface of the stock. Doing this ensures that the glass bedding will be invisible outside.

The amount of wood removed inside is your choice, however, since all of the removed wood will be replaced with a high-strength epoxy, the more wood removed yields a stronger final result. This is especially important when removing wood at the place of the breakage as that point is a known weakness. Prior to putting epoxy into the prepared space, take care that all parts of the receiver touching epoxy has a thorough application of release agent all around it to prevent gluing to the stock.

This release agent is a spray which makes application very easy. All screws for attaching receiver to the stock have to be covered as well. Missing any spot of receiver-to-epoxy contact with will glue the receiver "dead" to the stock and lead to disaster. My preferred release agent, Brownells Acra-

Release Aerosol, does not require a drying time and the receiver can be immediately put in and touch the epoxy.

There are a number of useful epoxy options provided it has two qualities—it is a gel and it becomes really strong after hardening. I prefer Lam Lock Rocket Gel as it gives about 30 minutes before hardening and then quickly becomes very hard. This makes it easy to work with for about a half hour and then hardening continuing for several hours. Packing the prepared spaces with gel should be excessive to achieve complete filling of all empty spaces.

Gently squeeze excess epoxy all around the contact, quickly removing the external excess that oozes out. The 30 minute setting time helps with easy removal. When that is done, secure the parts together to allow sufficient time for curing—and hope enough release agent was used so that permanent gluing is only between the wood and epoxy, not the metal.

After hardening and allowing the set gel to take a perfect and strong mirror image, the receiver can be carefully installed into the inlet with all attaching screws tightened. Extracting the receiver from the stock after the epoxy is hardened should be done carefully. Excessive force may damage the

stock. Epoxy excess inside inlet needs to be removed, making sure that springs and other parts are not glued anywhere.

Sometimes, after removing the action from the stock there may still be empty spots where the epoxy created an air bubble. These spots have to be filled with epoxy again, the action again thoroughly coated with release agent, and the process repeated. Remember that we are trying to reach the full support of the action all around the inlet with no empty gaps. When the epoxy-bed of the receiver is built to our satisfaction, we can take care of the external surface of the break.

If done properly, nothing should be visible outside. Conclusion Cracks and breakages of the shotgun inlet happen often and sometimes make the stock unusable. This problem can be explained by the complex movements of the receiver during the recoil and counter-recoil. Insufficient contact between action and inlet exacerbate the situation. These damages can be fixed (or even prevented) by glass bedding.

Building a layer of epoxy all around the receiver strengthens the wood, eliminates movements of the receiver, and provides a solid base. This epoxy base, unlike the wood, is indifferent to moisture, temperature, and oil. AG

MEASUREMENT & INSPECTION

Firing Pin Gauge

Measuring firing pin protrusion can identify one reason for light primer strikes and misfires. Here's how I made my own gauge.

BY ROY SEIFERT APRIL 2021

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In American Gunsmith January 2021, RK Campbell's article "Firing Pin Logic and Mechanics" discussed firing pin protrusion as being a potential cause of misfires and light primer strikes. If the firing pin does not strike the primer deep enough to crush the priming compound against the anvil and cause ignition, a misfire occurs. If the firing pin protrudes too far it can pierce the primer and cause blowback or other problems.

SAAMI defines firing pin protrusion as, "The distance the firing-pin protrudes from the breech face when it is in its most forward position." Brownells provides some general rules for firing pin protrusion. Centerfire rifles and handguns usually measure between 0.050-0.060", shotguns between 0.055-0.065", and rimfire guns between 0.028-0.035". These may vary depending on the make and model of the firearm.

The type of firing pin, such as inertia firing pins as found in the 1911 and similar models, slanted pins in over-and-under shot-

guns, and other Notice the center of the aluminum tube is drilled and tapped for the 8-32 set screw. designs can also see variations in these dimensions. These other designs may provide exceptions to these rules and be more difficult to measure. I recently purchased a used Ruger Redhawk double action revolver that has a transfer bar.

This particular model has a history of light primer strikes caused by a short firing pin or misaligned transfer bar. I wanted to measure the firing pin protrusion to ensure I would not have this problem. Required Materials To make the firing pin protrusion gauge I used a one-inch piece of 1/4-inch diameter aluminum tube. The inside diameter of this tube was 1/8-inch. I used the shank of a broken 1/8-inch milling bit ground to the same length as the aluminum tube.

A broken drill bit, 1/8-inch welding rod, or any other 1/8-inch rod stock will work. I used along 8-32 set screw as a lock for the gauge. If you have a manual caliper, write down this measurement. I drilled the cen-

ter of the aluminum tube with a #29 drill bit, tapped the hole with an 8-32 tap, and installed the set screw. I inserted the 1/8-rod in the tube and locked it in place with the set screw and then ground both ends of the assembled gauge flat and square so the inside rod was flush at both ends.

This is important to get an accurate reading. Measuring Pin Protrusion Safety first; ensure the firearm is unloaded. This procedure requires the cylinder of a revolver be removed or open, or the rifle bolt removed. When measuring firing pin protrusion, it is important to note that the firing pin must be in its normally extended or fired position and there needs to be enough space to use the gauge.

For my Ruger Redhawk that meant I had to have the cylinder open and be able to pull the trigger so the hammer was against the transfer bar and the firing pin was extended beyond the breech face. For a rifle, the bolt

READER FORUM

Reader Forum

BY AMERICAN GUNSMITH EDITORS APRIL 2021

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Joe Carlos Articles I was flipping through the recent American Gunsmith while “monitoring” a remote work telecom. I’m a retired Air Force Combat Controller and always been a gun nerd and tinkerer. While not a gunsmith, I subscribed back in the 1990s when I first learned of it. I remember reading about Bill Laughridge’s 1911 course while sitting in a hooch in Asadabad in 2002 and found time to attend a year later.

Over the years as I’ve helped buddies build or tweak their ARs, built different ones for family, and just changed stuff on mine because I could. I’ve found the articles by Joe Carlos to be on par with books by Glen Zediker and Patrick Sweeney. After seeing his email in his articles, I sent a message. Thanks for replying and for sharing all of your hard earned and extensive knowledge. You share info like a “graybeard” in the Team Room; not pontificating, just, “This is what and why. Feel free to use or not.

If you prove me wrong, please up my game as well.” against the tip of the firing pin so the rear of the gauge touched the breech face. This caused the center rod to extend beyond the far edge of the gauge. I turned the set screw to lock the center rod, then measured the gauge with my caliper. Because I had zeroed the gauge before

pressing it against the firing pin tip, my caliper now measured the exact amount of firing pin protrusion.

If using a manual caliper, measure the gauge with the rod centered and I look forward to all of Joe’s articles. Even as parts and reloading components become like unicorns for the foreseeable future, knowledge is powerful and persistent. Stephen “Duke” Danforth A. F. Reserve Command Test Center Joe Carlos responds. I can’t thank you enough for your kind comments! We are paid for our articles but receiving mail from readers means more to me.

I started writing these articles years ago so that guys like yourself wouldn’t have to reinvent and rediscover ways to make your rifles shoot better. It is nice to know that someone is profiting from all the effort it takes to put these articles together. Walther PPS M2 I recently purchased a Walther PPS M2 LE in 9mm and it has a terrible trigger. It arrived with an eight-pound pull and is an unsmooth six pounds after 600 rounds and lots of dry fire. I sent it back to Walther and they replaced the trigger group.

The new trigger is 6.5 pounds and nasty. write down this value. Measure the gauge again after pressing it against a protruded firing pin and subtract the first measurement from the second measurement to ob-

tain the amount of protrusion. Summary This gauge is easy to make and a valuable addition to any gunsmith’s toolkit. It can help identify ignition problems caused by a short or long firing pin. AG Any advice? I have rebuilt my share of Smith revolvers but have no previous experience with one of these.

The Walther people have been easy to deal with but haven’t offered any suggestions. Maybe this is normal but 6+ pounds seems awfully heavy, even for a striker fired pistol. Maybe the times have passed me by. I have fired hundreds of thousands of rounds in Precision Pistol shooting, even building a revolver for a Camp Perry competitor, but this offers a whole new challenge. Does anyone make a good double/single trigger for a compact handgun chambered in a suitable defensive cartridge?

I’ll stick with my 357 Magnum in the mean time as my Commander is a little heavy for my purpose. I hoped the Walther might have been fixable. From RK Campbell. This handgun will never have the smooth trigger break as you experienced with S&W revolvers or tuned 1911s. The Walther is a good personal defense handgun 050" which is within the general specification. If using a manual caliper, subtract this measurement from the zero measurement to obtain the amount of protrusion. Mike

but not a target gun and that trigger action that is about as good as it gets. There are aftermarket parts, same as for the Glock, but I'd never use them in a handgun intended for personal defense. I've had some luck with Permatex Anti-Seize Lubricant (Permatex.com, in coating the action. Weight isn't usually decreased but the compound seems to help make the action smoother. For plastic striker-fired pistols, Glock and SIG 320s can be set up with usable triggers.

Military shooting teams have modified both into ball guns for Service Pistol competition. Shotgun Chambers I read "The Long and Short of Shotgun Chambers" (February 2006) to fix my pre-1960s Cooney Model 84 .410 bore shotgun my grandfather gave me. Twice now upon shooting grouse I was left holding the barrel in one hand and the stock in the other. At the time I was firing a 2.5" shotshell with a 1/2 ounce of #6 shot.

That article mentions using heavy modern shotshells can lead to anything from hard recoil to burst barrels. I understand the barrel can be reamed but I'm not sure if that is the answer or post a letter to Falls Church, VA 22041. For subscription questions or mailing problems contact American Gunsmith

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