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INSIDE THE ARCHIVE

DISASSEMBLY AND TROUBLESHOOTING OF THE BROWNING .22 AUTOMATIC

HEARINGS SPOTLIGHT NEED FOR BATFE REFORM • CONVERTING THE RUGER 77/22 MAGNUM TO .17 HMR • THE LLAMA ...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 031

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FROM THE ARCHIVE

Hearings Spotlight Need for BATFE Reform

BY AMERICAN GUNSMITH EDITORS JUNE 2006

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Just before this issue went to press, hearings were held by the House Judiciary Committee's Subcommittee on Crime, Terrorism, and Homeland Security, focused on enforcement abuses by the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE). Opinions were also aired about anew bill intended to correct several issues in federal firearms law. First, the subcommittee heard testimony from people with firsthand experience dealing with BATFE.

Virginia lawyer Richard Gardiner, who has represented many gun owners and dealers, focused on the way BATFE handles cases against federally licensed firearms dealers, often seeking to revoke FFLs for "trivial, immaterial violations" based on "undefined legal standards." Gardiner described one case where a dealer lost his license even though BATFE itself agreed his records were 99.96 percent accurate, and the few errors posed no threat to public safety. Next, Lt.

Michael Lara of the Tucson Police Department recounted his personal horror story at the hands of BATFE. After buying a

gun as a gift for a friend, Lt. Lara found himself facing federal felony charges as a "straw purchaser." Lt. Lara lost his job, and didn't get it back before a three-month legal nightmare cost him more than \$200,000 in legal fees, lost pay, and other costs. BATFE never even interviewed him during its investigation, and the jury acquitted him in less than an hour.

At the second hearing, the subcommittee focused on H. R. 5005, Rep. Lamar Smith's (R-TX) bill to make various technical changes and corrections in federal firearms law. Anti-gun advocates have gone through the roof over one provision of H. R. 5005: a section that prohibits disclosure of firearms trace data outside of law-enforcement investigations. That language simply makes permanent a policy that Congress has enacted through annual appropriations riders for the past several years.

Yet at this hearing, anti-gun New York City Mayor Michael Bloomberg (R) hysterically denounced it as a "God-awful" bill that would "facilitate the shooting deaths of thousands of innocent Americans every

year." Of course, Bloomberg's real goal besides publicity in the Big Apple media is to use this confidential law enforcement information in the city's suit against the firearms industry.

Subcommittee Chairman Howard Coble (R-NC) and ranking member Bobby Scott (D-VA) agreed on the need to focus BATFE's efforts on enforcing current laws against serious criminals, while not pursuing petty violations or undermining civil liberties. To that end, the "Bureau of Alcohol, Tobacco, Firearms, and Explosives Modernization and Reform Act of 2006" will soon be introduced. This bipartisan bill will update the legal standards for disciplining violations by FFLs.

It also calls for a review of BATFE's enforcement practices, and clarifies BATFE's responsibilities to keep the Bureau focused on its core mission. Editor Keith Lawrence Technical

PEOPLE & COMPANIES

Disassembly and Troubleshooting of the Browning .22 Automatic

First made by FN in 1914 and later by Remington, the .22 Automatic remains a classic in Browning's line of rimfire rifles.

BY CHICK BLOOD JUNE 2006

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Reportedly the last of John M. Browning's small-bore rifle designs, the .22 Automatic was initially sold exclusively in Europe. Remington was granted U. S. rights and their version, the Model 24, was introduced in 1924. And eventually, Browning Arms Company brought out their own .22 Automatic in 1958. Because of the multiplicity of "Types" produced over the years, I'll note certain differences here to assist you in determining exactly which has found its way to your gunsmith workbench.

Type I was the Belgian FN version. It has its loading port on top of the buttstock, just forward of the comb. Types II, III, and IV, referred to as the Model 1, have side-of-the-stock loading and through-the-grip stock screws. The Type IV receiver is a little longer than the Type I, II, and III. So are the receivers of the Types Vand VI, or Model 2. The Type V came to be when the outer magazine tube had its diameter beefed up to lessen breakage problems where the tube joined the receiver.

At that time, the through-the-grip stock screws were eliminated and the stock was secured to the action at the rear with a nut (#46) that screws on the outer magazine tube. Type VI carries a modified trigger guard with heftier rails, which necessitated further changes to the receiver and breechblock to accommodate it. Production began on the Type V and VI in 1965. Parts for previous versions are no longer manufactured and thus require a search of the aftermarket.

Due to other slight modifications since 1965, all factory available parts must be ordered according to the serial number of the rifle. **Basic Disassembly** Remove the inner magazine tube (#30) by rotating it one-quarter turn in either direction. Pull it to the rear until it catches against the magazine-tube stop (#32). Give the inner tube an additional one-quarter turn and withdraw it from the stock. Hold the rifle inverted and move the barrel lock (#7) forward.

Draw the breechblock (#9) about 1/2 inch to the rear with your thumb. Grasp the receiver with one hand and the forend (#26) with the other. Position the rifle muzzle upward. Don't grip the receiver by the stock and risk breaking the wood. Move the forend up, give the barrel (#8) a quarter turn clockwise, and separate those elements from the receiver.

To remove the trigger guard (#24) and breechblock as a unit, push them forward about 1-1/4 inches, lower the rear of the guard, and keep both component assemblies together as you slide them out the front of the receiver. Getting the butt stock off depends on the rifle model. If it's a Model 1, the 22 Automatic is technically a takedown rifle. As you can see from this field-stripped rifle, the barrel and receiver are readily separated into an overall length of 19-1/2 inches for easy and compact transport.

DISASSEMBLY AND TROUBLESHOOTING OF THE BROWNING .22 AUTOMATIC CONTINUED

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The installation isn't as simple as it looks. stock screw is located in the bottom of the hand grip. If you're working with a Model 2, you'll need a special tool you can fabricate from round stock or, perhaps, abroad blade screwdriver. If round stock is your choice, drill a 1/4-inch through hole in its upper end to accommodate the rod you'll use as a "T-handle." This tool is used to crank off the stock nut, access the washer (#45), and pull off the stock.

Detailed Receiver Disassembly Position a small-blade screwdriver at the rear of the cartridge-guide spring (#13). Pop the spring out of its slot and lift it from the receiver. The cartridge guide (#14) is pushed forward to disengage its side rails from their receiver slots. The cartridge stop (#15) is lifted out with a pair of needle-nose pliers. This will leave nothing permanently attached to the receiver except the outer magazine tube. It should remain as is, unless there's a need for a replacement.

Detailed Trigger Guard/ Breechblock Disassembly These two components are still joined, or should be. With the safety "off," pull the trigger to allow the firing pin to move forward. Holding the guard assembly in one hand, place the heel of your other over the breechblock and push the block to the rear. Lift up the front end of the block to just clear the guard. Slowly relieve the spring tension by letting the block move forward.

Disengage the recoil-spring guide (#35) from the guard, taking care you don't allow the recoil spring (#36) or guide to sting

you, and slide them out of the block. Lightly grasp the firing-pin spring guide (#22) with needle-nose pliers and compress the spring (#23). Control the pressure as you lift the block at its rear to pull out the two parts. (Watch it. This spring and guide can sting, too.) After this, the breechblock can be taken off the trigger guard.

Take your 1/16-inch punch, drift out the sear-spring pin (#42), and lift the spring (#43) free. Follow this step with removal of the sear pin (#41) and sear (#44). A 3/32-inch punch is used on the trigger pin (#48). Push upward on the trigger (#50). It's lifted from the guard while still attached to the disconnecter (#17) and spring (#49). Unless these latter parts are damaged, there's no need to further disassemble the guard. **Detailed Breechblock Disassembly** Pull the firing pin from the block.

The 3/32-inch punch is used to drift out the extractor-retaining pin (#18) to free up the extractor (#21), its spring retainer (#19), and spring (#20). All these pieces are small and easily lost. **Detailed Barrel Lock Disassembly** On Types I through IV, remove the lock (#7), its spring (#6), and its plunger (#5) by pushing the lock toward the muzzle. The barrel-lock ring (#4) slides off to the rear. If it's too tight to slide easily, tap it rearward with a rawhide mallet.

The barrel-adjusting ring (#3) is unscrewed from the barrel. With Types Vand VI, the disassembly steps are the same except these types have two barrel-adjustment ring followers (#1) and two springs (#2). None of these are retained by anything af-

ter the barrel-locking mechanism is removed. Can they get lost easily? You bet. **Detailed Safety Disassembly** With the trigger, disconnecter, and spring set aside, secure the guard horizontally between protective vise jaws.

A 1/16-inch punch is used to depress the safety-spring plunger (#38). Push the safety button (#37) toward the "on" position far enough to capture the plunger and maintain pressure on the spring (#39) before backing off with the punch. Keep the pressure on with a small-blade screwdriver inserted in the left side of the guard, and push the button all the way out with the punch. Obviously, the spring could encourage the plunger to accompany it skyward until the button has cleared the guard and perhaps even afterward.

Assuming the spring and plunger haven't already flown away, you can remove them with tweezers. Please accept a few words of advice regarding detailed disassembly: Invent some means of identifying the many small springs present in the Browning .22 Automatic and its close relatives. This will make your life far less stressful when it comes time for reassembly—which is now. **Reassembly Details** The trigger guard is resecured horizontally in the vise.

Use tweezers or needle-nose pliers to position the safety spring and plunger in the guard. A right-handed safety button is introduced from the right side of the guard and will only function with a right-

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Browning .22 Automatic Semi-Automatic Rimfire Rifle (Specifications subject to change without notice) 1 Barrel Adjusting Ring Follower Spring 2 Barrel Adjusting Ring Follower 3 Barrel Adjusting Ring 4 Barrel Lock Ring 5 Barrel Lock Spring Plunger 6 Barrel Lock Spring 7 Barrel Lock 8 Barrel 9 Breechblock 10 Buttplate Screws 11 Buttplate 12 Buttstock 13 Cartridge Guide Spring 14 Cartridge Guide 15 Cartridge Stop 16 Disconnecter Pin handed trigger (having an extended arm on the left-hand side).

Conversely, a left-handed safety is introduced from the left side of the guard and works only with a left-handed trigger (which has the arm on its right-hand side). Keep this in mind if a customer ever wants his safety switched from right to left or vice versa.

A 1/16-inch punch depresses the 23 Firing Pin Spring 24 Firing Pin 25 Forend Escutcheon 26 Forend 27 Forend Retainer Stud 28 Forend Screw 29 Front Sight 30 Inner Mag Tube Assembly 31 Outer Magazine Tube 17 Disconnecter 18 Extractor Spring Retainer Pin 19

Extractor Spring Retainer 20 Extractor Spring 21 Extractor 22 Firing Pin Spring Guide plunger and spring until they're both retained by the button.

While keeping the button in its hold-down position with a small-blade screwdriver, push it through to its "off" position. Insert the trigger assembly downward into the guard. After placing the trigger spring (#49) over the rear of the disconnecter, compress the spring a little so it can be positioned under its 32 Magazine Tube Stop 33 Rear Sight Assembly 34 Receiver 35 Recoil Spring Guide 36 Recoil Spring 37 Safety Button 38 Safety Spring Plunger 39 Safety Spring 40 Scope Mnt.

Base Filler Screws 41 Sear Pin 42 Sear Spring Pin 43 Sear Spring 44 Sear 45 Stock Nut Washer 46 Stock Nut 47 Trigger Guard 48 Trigger Pin 49 Trigger Spring 50 Trigger housing at the rear of the guard. This should allow the disconnecter to settle itself slightly forward of the rearmost surface of that housing. After confirming that the front end of the trigger isn't above the front end of the trigger slot, align the trigger pin holes, install the pin, and check for free trigger movement.

STAKE THE PIN ON BOTH SIDES OF THE GUARD HOUSING TO

DISASSEMBLY AND TROUBLESHOOTING OF THE BROWNING .22 AUTOMATIC CONTINUED

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prevent it from loosening. Reinstall the sear and sear pin. The pin should be staked as was the trigger pin. And for the same reason. Begin reassembly of the breechblock with the extractor, extractor spring, and retainer in that order. Align all holes and use the 3/32-inch punch to reinstall the extractor retaining pin flush. Align the guide on the left side of the firing pin with its breechblock slot and insert the pin. Place the block on its trigger guard rails. Install the firing-pin spring guide and spring.

The rear end of the guide has to be located in the hole at the rear of the guard just above the sear. Insert the recoil spring and guide into their tunnel at the right rear of the block. Compress the spring on the guide while feeding both parts into the block. Locate the back end of the guide on its holding lug at the rear of the guard. You may need the assistance of a small punch to accomplish this. Note: When working with any of these block springs and guides you must use a gentle hand to avoid damage.

What you've reassembled so far should undergo a trigger and safety inspection. Right now 'not later on' so here's how the deed is done: 1. Press down on the breechblock and force it to the rear of the guard to cock the firing pin. Keeping the block under control, allow it to return to its Aforward position, and place the safety "off." Slowly pull the trigger to partially 'only partially' disengage the sear from the firing pin. Release the trigger. Do the sear/firing-pin surfaces regain full engagement? No?

Replace those parts and the sear spring. 2. Leaving the safety "off," fully recock the firing pin. Check the pull with a digital trigger-pull gauge (Brownells). Factory specifications are 4 to 5-1/2 pounds.

Assuming the firing pin disengaged during the pull test, recock it, and move the safety button repeatedly between the "on" and "off" positions to determine a positive detent. (What you want to hear is an audible click.) Now place the tip of the hooked rod of the triggerpull gauge on the center of the safety button to see how much force is required to move it from one position to the other. It should read out between 3 and 4 pounds. Any lighter than that calls for replacement of the safety mechanism parts. 3.

Again cock the firing pin. Push the safety button to "off" and lightly pull the trigger. Just before the firing pin is released, there should be .012- to .014-inch clearance between the back of the disconnector and the sear. If not, stone a small amount of material from the back end of the disconnector.

Since you'll probably do as I did and allow B When reinstalling the spring and guide in the block, remember to protect your finger tips with adhesive tape. the firing pin to let go the first couple of times in checking for this clearance, recock the pin and recheck. Place the safety "on" and pull the trigger. There ought to be .008- to .010-inch of travel at the rear of the disconnector toward its contact surface with the sear.

If not, take out the trigger and stone a small amount of material from the trigger surface that contacts the safety. Note: The clearance between the safety and trigger has to be less

than the .012- to .014-inch clearance between the disconnector and the sear, but remember that the .22 Automatic is just like any other self-loading firearm—it gets dirty quick.

Because of its ammo (high-priced rimfire is rarely used in anything but high-priced rimfire match guns), this little self-loader probably accumulates dirt more rapidly. When the dirt builds up between the trigger and safety button or between the front of the trigger and the guard, it can render the safety unreliable if not useless. Always look for and rid these areas of any fouling. All right? The inspection is done. Now there's the receiver and more awaiting reassembly.

Place the cartridge guide into the front of the receiver with the guide's open end toward the rear of the rifle. Seat the guide fully rearward. Fish the smallblade screwdriver out of whatever pocket you put it in; you'll need it when you engage the front end of the cartridge-guide spring and maneuver its rear end into its recess at the top of the receiver. Needle-nose pliers are used to reinstall the cartridge stop.

Hold the receiver muzzle end up in one hand, the trigger guard assembly with the other, and push back the breechblock with an index finger. Slide the guard into the receiver and release the block. Place the buttstock on the receiver and secure it with its attachment components. Make sure these parts, whether screw or nut, are tightened firmly. This will keep the stock from turning and possibly breaking off at the trigger-guard point. If the sights have been removed, secure the barrel horizontally, sight

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dovetails upward, in your vise and reinstall the sights right to left. After the sights are in (or if they haven't been removed in the first place), the barrel is secured with the forend-retaining stud upward. The beveled end of the barrel-adjusting ring must be toward the muzzle when you screw the ring onto the barrel as far as it will go. The barrel-lock ring protrusions should also point toward the muzzle, and you may need that rawhide mallet to drive it flush up against the adjusting ring.

Remove the barrel from the vise, and hold the receiver inverted on your lap in one hand with the barrel in the other. Pull back the breechblock with a thumb, and fully insert the barrel into the receiver. Align the barrel and receiver threads to mesh.

Holding the breechblock to the rear, turn the barrel 90 degrees clockwise, thereby orienting the receiver to its final position. (In that position, less than one thread width should exist between the barrel breech and the end of the cartridge guide.) You don't have to worry if the barrel ends up a bit too far into the receiver. You do if it ends up too far out. This produces a gap between the forend and receiver after final assembly, which causes a problem I'll discuss in a minute.

At any rate, after the barrel and receiver are aligned, release the breechblock and let the extractor enter into its barrel cut. Turn the receiver counterclockwise to the barrel until the movement is halted by the extractor seating in the cut. Tighten the barrel-adjusting ring firmly against the barrel-lock ring, place the barrel back in the padded vise, and

turn the receiver clockwise to align its slots with those in the barrel-lock ring. The barrel could be too loose at this point.

If it is, adjust the barrellock ring counterclockwise. If the barrel is too tight, meaning crowbar rigid, the adjustment is made clockwise. Any necessary adjustment should only amount to one or two notches in the lock ring. Once the barrel and receiver are aligned and joined together, install the barrel lock, barrel-lock springs, and plunger. Locate the rear of the forearm to the lock, press the wood into place, and tighten its retaining screw.

Cycle the action to test trigger/safety functions, install the inner magazine tube, and you're done. Troubleshooting: Cause and Cures Poor Accuracy. Unless the muzzle crown has been damaged, the barrel is probably loose because the adjustment ring has been improperly adjusted or there are locking parts missing. Ruptured Cases. The barrel is assembled too far out of the receiver. The tip-off is a noticeable gap between the forend and the receiver. Poor Extraction.

There's foreign matter jamming the extractor, the extractor is broken, or its spring is damaged or weakened. If an excessive number of .22 Shorts have been touched off in the .22 LR chamber, the latter may have suffered cavitation or fire cutting. This would result in the Long Rifle cases expanding. Chamber polishing can sometimes clear up this damage if it's not too severe. Serious chamber enlargement usually calls for a new barrel, but this particular .22 will never have to worry about .22 Shorts.

They won't feed in a rifle designed exclusively for .22 Long Rifle. Failures to Feed. What could be wrong? Let me count the ways. If the cartridge spring is too short, the nose of the round will droop down on its own and jam the action. If the spring is too long, it will catch and hold the round, preventing the breechblock from moving forward. It's best to replace the spring instead of cutting or attempting to "stretch" it. The list goes on....

A loose cartridge guide should be tightened by lightly staking the receiver on both sides of the guide. Burrs inside the outer magazine tube should be smoothed out. So should any burrs in the cartridge hole (located forward of the outer magazine tube) in the receiver, as well as any burrs on the top post of the trigger guard. Then polish your deburring work. If the gun owner took the rifle apart once upon a time, the cartridge stop could be missing or improperly installed.

Lack of a stop causes double feeding which causes jamming. And let us not overlook the possibility the rifle may have been dropped unceremoniously on an unyielding surface. This might break the outer mag tube, bend the inner mag tube and/or spring the rails of the trigger guard. This "rail-springing" creates a loose-fitting breechblock that fails to chamber around, but the condition can be corrected.

Anyone with experience working the slide rails/frame rails fit on a M1911 would have little trouble accomplishing the fix. Start with the trigger guard after removing it from the rifle. As a tool, I used an old 1-1/2-inch wood chisel with the cut-

DISASSEMBLY AND TROUBLESHOOTING OF THE BROWNING .22 AUTOMATIC CONTINUED

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ting edge rounded off. By inserting this handy-dandy "rail expander" between the rails on both sides of the guard, I was able to gently spread them apart. This formed a slight arc over which the breechblock would travel. After checking with a straightedge to see if the arc I was out to form did indeed exist, I inverted the receiver and lightly tapped its guard rails inward with a rawhide mallet. My overall objective was to raise the path of the breechblock higher within the receiver.

Any difficulty encountered reinstalling the modified guard in the receiver was overcome by slightly relieving the outer edges of the guard rails. Any binding of breechblock travel after reassembly was eliminated by the application of an indicator fluid to the top of the block, cycling it a few times, and stoning down any points of interference with the receiver. Avoid making large adjustments to the rails. You know, tap-taptap...spread-spread-spread...over and over again.

Work hardening of the material could result in breakage. There are other reasons a breechblock can bind. On rare occasions, there may be too much pressure on the rear of the trigger guard where the guard fits the stock. Correct this by removing a bit of wood from beneath the guard tang. The disconnecter could be the culprit by protruding too high. Check the bevel at the rear of the block for signs of contact, then either refit or replace the disconnecter.

Take a look at the alignment of the recoil-spring guide with its hole in the block. If the guide is out of line, remove a small

amount of material from the top or bottom of the guide's holding lug on the trigger-guard stud. Binding of the block on the housing at the rear of the guard is usually caused when the sear pin works loose. Restake the pin. Misfires. The first thing to suspect is dirt that's accumulated in the firingpin tunnel of the block.

After that's been eliminated and the tunnel polished, consider the presence of a weak firing-pin spring, broken firing pin, binding firing pin, an improperly adjusted barrel-adjusting ring, and a disconnecter failing to make contact with the sear when the trigger is pulled. In addition, the use of lousy ammunition should not be ignored. Ejection Problems. When fired cartridges get pre-ejected, it's a sure sign the cartridge spring is too long. Replace it. But don't blame all ejection problems on the spring.

Are the cartridge-guide rails (guiding surfaces) too rough or too far apart? You can smooth them up. When too far apart, it's better to replace the guide. Extraction Problems. Coming before poor ejection is poor extraction. I've already covered one possibility with my commentary on fire cutting. Most other problems with the extractor go away when the darn thing gets cleaned or replaced along with its spring.

Smackdown with a Recoil Spring As soon as you take this recoil spring out of the breechblock, you'll realize you'll have to wrestle it back in without crimping or otherwise damaging it. The spring and plunger measure 6- 1/4 inches. The block measures less than 2-1/2 inches. I promise

you, it won't be fun. The best way I found to get the job done goes like this: Place the block on the trigger guard, with the firing-pin assembly installed with the pin's spring guide seated in the guard stud.

Lay the guard flat on the bench with its tang to your right. Under the guard, place a small piece of carpet to keep it from sliding around. After spearing the spring on its guide, put one finger over the split end of the guide, and began feeding the spring into the block while simultaneously compressing the spring with the guide.

By continuing to do this, you'll eventually be able to maneuver the lead end of the guide into the block and push it plus the spring in further until you can slide the slotted end over its tab on the guard stud. My fingertips were very sore by the time I was finished. I reminded myself too late that some adhesive tape wrapped around them might have saved me the discomfort. And in Conclusion... Here's another cause of jamming I'll bet you wouldn't expect't oo light a trigger pull.

When that's the case with this rifle, here's what happens: The engagement surfaces between the sear and firing pin have been worn or butchered so badly they'll let go at the slightest jar. The firing pin, having no reason or desire to remain static, will poke its nose out the front of the breechblock, and get in the way of the next round being chambered. Don't dive in there trying to increase pull weight. Instead, replace the firing pin, the sear, or both. In the interest of safety, I'd replace both. I

PEOPLE & COMPANIES

Converting the Ruger 77/22 Magnum to .17 HMR

The Ruger Model 77/22 series of bolt-action rimfire rifles has a great reputation for accuracy and reliability. With the relatively easy installation of an extra barrel, it can also be highly versatile.

BY DENNIS A. WOOD JUNE 2006

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There's no doubt that the .22rimfire cartridge is at the top of the heap when it comes to recreational plinking, small-game hunting, and both formal and informal target shooting. One early attempt to challenge the .22 rimfire's status came about 35 years ago when Remington strayed from tradition with the introduction of the 5mm rimfire cartridge. This was the .22-rimfire Magnum necked down to accept a .20-caliber bullet.

Remington was the only manufacturer that produced rifles for the 5mm rimfire round, and interest faded overtime. A much more successful attempt came a few years ago when the .17 HMR (Hornady, Marlin, Ruger) cartridge exploded onto the scene; rifles chambered for this new round are now being produced by most of the major manufacturers. Barrel Choice Aftermarket .17 HMR barrels are beginning to show up on a regular basis to safely convert .22 Magnum rimfire bolt-action rifles to this caliber.

All of these barrels that I've examined are quite good, and the .17 HMR is proving to be an excellent cartridge with a flat trajectory and superb accuracy. The conversion I'm detailing here involves the Ruger M77/22 VMBZ in stainless steel with a

laminated stock and a Green Mountain .17 HMR barrel in blued chrome-moly steel. The idea is to produce a switch-barrel rifle that's easily converted from .22 Magnum to .17 HMR and back, using the same rotary magazine.

The Green Mountain barrel I ordered arrived contoured, rifled, chambered, and blued, with the barrel shank turned to size. The extractor cuts were in place, along with the half-dovetail cut for the clamp that attaches the barrel to the receiver. Stainless-steel barrels are also available. The only obvious difference in the Green Mountain barrel is its length'around 2 inches shorter than the original factory barrel of 24 inches.

Incidentally, the same style of aftermarket trigger and sear were installed on this rifle as I described in the article "Improving the Ruger 77/ 22" in the April 2006 issue. Removing the Barrel Start by removing the magazine and pulling the bolt out of the receiver. Verify that the chamber is empty and clamp the barrel tightly in your padded-jaw vise. If the rifle has a scope mounted, it would be a good idea to remove it.

The action screws can be removed with a #340-6 Magna-tip bit, and the barreled action is then removed from the stock. This

would be a good time to look over the inside of the stock area where the receiver fits for any signs of a mismatch in fit. Epoxy bedding will fill these voids and give the action a stable platform to work from. Scrape away any obvious spots of barrel contact in the barrel channel and seal these with two coats of finish.

There are two #12-24 socket-head 22 Magnum (left) is the parent case for the .17 HMR (right). The cartridge in the middle is the 5mm Remington. cap screws that hold the clamp maintaining the barrel to the receiver. These are removed with a 5/32-inch ballend hex wrench. The ball-end-style wrench will pivot a bit preventing any marring of the barrel finish. Once the barrel clamp has been removed, clean the barrel receptacle in the action and the barrel shank, removing any crud that has gotten into these areas.

Before installing the Green Mountain .17 HMR barrel, you must take a couple of important measurements. The first measurement will require that the bolt be reinserted into the receiver and turned down as though chambering around. Using a 0-1-inch

CONVERTING THE RUGER 77/22 MAGNUM TO .17 HMR CONTINUED

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depth micrometer, measure from the front face of the receiver down to the bolt face (where the cartridge face rests against it) and record this dimension. You will notice that there is a slight recess turned into the front face of the receiver where the original barrel-shank shoulder rests. Measure from the front face of the receiver down to this recess, and subtract this dimension from the previous dimension recorded. You now have a target dimension for fitting the Green Mountain barrel.

Insert a dummy .17 HMR round (a "go" headspace gauge would be better) into the chamber of the Green Mountain barrel and measure from the back face of the dummy round down to the shoulder at the front face of the barrel shank. Record this dimension. As a comparison, you can record the factory-set headspace on the .22 Magnum barrel using the same process. Setting Headspace The consistency of the rim thickness on rimfire cartridges has a lot to do with how well a rifle groups its shots.

SAAMI specifications for .22 WMR rimfire ammunition is .050 inch nominal, and can go minus by .008 inch. Because the .17 HMR uses the .22 WMR case as its parent, there's no reason not to use these same specs. I measured the rim thickness on a dozen CCI .17 HMR cartridges loaded with the Speer TNT bullet on an optical comparator, and found those case rims ranged

from .048 to .051 inch. Headspace specifications for .22 WMR-chambered rifles are .050 inch minimum and .056 maximum.

Minimum headspace would be the goal for maximum accuracy potential up to a point. We don't want to set headspace so close that the bolt face could crush the rim of the case. With this combination of rifle receiver and Green Mountain barrel, I came up with a measurement of .920 inch from the front receiver-face recess to the front face of the bolt where the firing pin exits. From the face of a dummy round to the face at the barrel shoulder on the Green Mountain barrel, I measured .910 inch.

Green Mountain provides a shim kit including five .002-inch washer-style shims that slip over the barrel shank and against the receiver in the event the barrel shank proves to be too long. Nevertheless, there's no provision for extending the barrel-shank dimension should it prove to be too short. Green Mountain has no control over the tolerances used at the Ruger factory; therefore, if the shoulder-face to receiver distance is too short, some lathe work will be required.

I set up the Green Mountain barrel in the lathe along with a dial indicator to record how much metal was being removed from the barrel shoulder face. In this case, the barrel shank measured .010-inch short, so I removed .008 inch from the shoulder face

that rests against the front receiver recess. If the barrel shank was left as delivered, most likely the rear face of the .17 HMR cartridges would set back as they were fired, and contact the boltface.

This would not be a good situation as the case will stretch somewhat and could split or rupture. We don't reload the fired cases, of course, but we don't want our good work pocked with tiny brass fragments either. Before installing the barrel, make sure the bore is cleaned with a solvent to remove any preservative oil. While installing this barrel, I found it best to secure the receiver in my padded-jaw vise with the bottom facing up and the bolt out of the receiver.

Insert the barrel into the front of the receiver and attach the barrel clamp, leaving the two screws a little loose so that the barrel can be rotated slightly from side to side. Install the bolt into the receiver, carefully pushing it forward to see if the extractor slot lines up with the bolt properly. Rotate the barrel so that it does, and then tighten up the barrel clamp.

Work the bolt forward with the dummy round in the chamber and rotate the bolt closed, striving to feel for any drag at the front of the bolt face and back face of the barrel shank. It may help to blacken the front face of the bolt with a black (continued on page 17)

CONVERTING THE RUGER 77/22 MAGNUM TO .17 HMR CONTINUED

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felt-tip pen to observe any rubbing. If rubbing is detected, one or more of the .002-inch shims may need to be added to the shoulder on the barrel shank. In the unlikely event that you need more shims, they will be sent free of charge from Green Mountain. Conclusions The stock on this rifle was

epoxy bedded only in the areas that support the receiver. Because I wanted the convenience of switching from caliber to caliber, no epoxy was used in the barrel channel.

This leaves a considerable gap around the Green Mountain barrel in the forearm channel. Both barrels should be stiff enough to

overcome much of the harmonic vibration caused when firing a .17 HMR round. Further testing of this combination will take place when the weather permits. If I detect excessive barrel vibration, my plan is to convert the front swivel stud into an adjustable barrel-dampening pad. I

PEOPLE & COMPANIES

The Llama 1911: Common Problems and Simple Solutions

The Llama can be challenging. While inexpensive to purchase, parts are difficult to find. And while it might prove reasonably accurate with one brand of ammo, it can be totally unusable with others.

BY ROBERT K. CAMPBELL JUNE 2006

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The company name is often mispronounced as Lahmah, though the proper pronunciation is Yahmah, which means “fire” in Spanish. Various “Spanish Ruby” pistols, purchased by the French army during the first World War at a rate of up to 30,000 per month, gave the company its beginning. The pistol was modest, but the total number produced was impressive. When the company was prosperous, its main source of prosperity was a line of pistols resembling the Colt 1911A1.

Most were chambered for the 9mm Luger or 9mm Largo cartridge, but those intended for sale in the U. S. were chambered for the .38 Super or .45 ACP. Over the years, the Llama was produced in some variations that appeared to be nearly identical to the 1911 Government Model, but differed maddeningly and significantly. Over the years, the quality of the Llama has varied from what I would call indifferent to absolutely dismal.

In my opinion, the Llama is best suited as a beginning or entry-level pistol for the owner who wants to see what a 1911 is like, but who cannot afford a better piece. While the pistol can be made serviceable, my guess is that most were meant to be dropped on our

shores among the unwary. This is strange for several reasons. Spanish gunmakers certainly know how to make a good pistol.

The various Stars have proven reliable, the CETME is a great rifle, and the single Ruby in my collection is a well-made and reliable if somewhat “utilitarian” pistol. Still, the Llama has allowed shooters to scope out the 1911 system on the cheap, and has certainly helped gunsmiths to stay in business. Providing work for gunsmiths is a good thing, of course, but I suspect that few owners of this marginal handgun will be willing to pay a high tariff for repairs and improvements to a Llama.

Oddly enough, I once fitted a six-inch Clark Custom barrel and other accessories to a Llama .45 for a fellow just beginning in competition. He used the Llama for a year or so before moving on to something better. Despite its shortcomings, we should all be familiar with the Llama. In this article, I’ll focus on what is similar to the 1911 and what isn’t, as well as some of the common problems and simple solutions. The Basics First, the basic design is very much John Browning’s locked-breech single-action pistol.

THE LLAMA USES A PIVOTING BARREL WITH A LINK IDENTICAL TO

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the 1911 in some regards. However, some will be found with non-removable links. The link pin is sealed in the slot. This means that some drilling and the making of a link pin would be required if the link and/or pin is broken. Most 9mms will have a Colt-like link, but the .45s may have either type. The barrel bushing is also like that of the 1911. Disassembly is straightforward, and in the 1911 style. The Llama's firing mechanism differs considerably in detail from the 1911. The slide is the main area of interest.

For illustration purposes, I chose a rather common Commanderlength Llama in 9mm Luger. This pistol is a true compact, however, rather than a short slide on a fulllength frame. The extractor is of the external type. There is no extractor tunnel in the slide and no firing-pin stop. While the elimination of the firing-pin stop and internal extractor may seem a good thing, if the treatment is not of high quality, then we have a problem.

I've personally never seen a broken firing pin in a Llama pistol, but my friends in the gun-parts business have sold quite a few. On the other hand, I have repaired numerous extractors. The steel seems quite soft and new replacements are not easy to come by (though Gun Parts Corporation and Bob's Gun Shop are places to start looking). I have recut and reshaped these extractors, sometimes convincing the part to last for a time. Let's attack the slide first.

As I mentioned, the barrel bushing of the 9mm type pistol is quite like the 1911. The extractor is much different. The extractor is held in the pistol by a roll pin. To remove

the extractor, the roll pin is punched out and the extractor simply pushed out. To repair the extractor, the extractor hook is carefully refilled and resharpened. I believe the most common cause of failure in the 1911-type pistol is that some shooters will drop the slide on a loaded chamber.

The extractor is designed to work in a controlled feed manner, picking up around from the magazine and feeding this cartridge into the chamber. When the extractor is forced to make a jump over a case rim, it stretches the extractor and can lead to problems. Be careful when replacing the extractor's roll pin; the pin can be easily bent. Extractor tension can be increased by bending the extractor, either by hand or by wedging the end that normally rides to the rear in a vise and using tools carefully.

Moving to the firing pin, the rear sight screw is removed and the sight drifted out. This is necessary to release the Llama's firing pin. A roll pin in the slide is tapped out as well. The rear-sight assembly governing the firing pin is faintly reminiscent of the Walther P38. Most of the Llamas I have examined feature an inertial firing pin. To check for an inertia pin, first check the piece to be certain it is not loaded. Next, lock the slide to the rear.

Place a pencil or some other object against the firing pin in the very back of the slide, until the pencil or tool is flush with the slide. Check the breechface to see if the firing pin protrudes. If it protrudes, you do not have an inertial firing pin; if it does protrude, you do. I believe that a skilled ma-

chinist could make a Llama firing pin from a Colt pin, but it would be a difficult job to do with files. The system of holding the firing pin in does not lend itself to dry firing.

If the Llama is dry fired and I well understand that dry firing is a cornerstone of marksmanship an STI Pro dummy cartridge should be used. Next, we move to the frame and more differences in mechanical features compared to the 1911. The first thing we notice is that the grips appear to resemble the Colt. But there's a pronounced swell at the bottom of the Llama's grips, and they will not interchange with the 1911.

Not only is the profile different, the grip screws are in a different area, spaced at a different distance apart. A handful of custom makers once offered custom grips for the Llama. To the best of my knowledge, the only readily available custom grips today come from Pachmayr. They're very good indeed, well suited to a rough-and-ready-type pistol. The Llama does not use gripscrew bushings, but rather the bushings are contained in the stocks and the grip screws fit into the grip frame.

Another difference between the Llama and the 1911 is the trigger action. The trigger bar is more of a straight bar than a bow, and neither is it a system of bars and pivots as found on the Star. This makes the action unique to the Llama and eliminates the possibility of fitting Colt parts to the 9mm Llama of this generation. This is not always true, however, as I have successfully fitted Colt parts to

THE LLAMA 1911: COMMON PROBLEMS AND SIMPLE SOLUTIONS CONTINUED

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later model Llama .45s, which are much more Colt-like. Moving upwards, we find that the grips fully support the plunger tube as John Moses Browning intended. The plunger tube is not staked on, however. The plunger tube features an extension for screw holes and is screwed into the frame rather than staked on. Considering the plunger and the front sight, I assume the year 1911 was during “the age of staking”—a system seldom used today.

Like most of us, I’ve seen broken plunger tubes on 1911s over the years and have replaced quite a few. The Llama plunger tubes seem to work loose rather than break. I’ve examined several in need of tightening, but have not seen any that were broken. The safety on the particular model shown here seemed tight and crisp enough, with good fitting. Doing the traditional check of the fit of the safety, I placed the safety “on,” pressed the trigger, and released the safety.

The hammer did not move, the sear didn’t “click,” and the hammer did not drop. I’m certain Llama engineers thought they were improving upon the 1911 in some regards, although there is a greater possibility the slight changes had more to do with circumventing patents. The safety and grip safety were retained and work well enough. There

are no grip-screw bushings in the frame; instead, the screws thread through bushings in the grip and into the grip frame.

The screw-on bushing could simplify maintenance in some cases. There is no firing-pin stop and no extractor to protrude from the rear of the slide. The main problem faced by anyone working with the Llama is parts. Some parts are available, but with the maker out of business, others are in short supply. The very last Llamas made area different story, as they are much more like the standard 1911. For example, the later models accept GI magazines. The first Llamas used a magazine much more European in appearance.

Then, in the 1980s, Llamas began to appear that would take either the specially designed Llama magazine or the Colt, and finally the latest versions came with a standard GI-type magazine. The 9mm magazines have always been peculiar to the pistol, and Colt types will not work. I was fortunate to have been able to obtain a Llama 9mm magazine from Gun Parts Corporation. The original magazine had seen better days, but the one I purchased is well made of good material.

The pistol shown here worked well enough, though the owner complained of slow function. After wiping a decade or so of caked-on

powder residue and crud from the piece and lubricating it liberally, I check its function with Black Hills 115-grain full metal case and 124-grain round nose. In firing 50 rounds, function was fine, with no failures to feed, chamber, fire, or eject. To test feed reliability, I keep a box of assorted hollowpoint loads that were left over from dozens of pistol tests.

I found that most factory hollowpoints would not feed, and some wouldn’t even feed the first round from the magazine. Even old generation Remington hollowpoints and the proven Winchester Silvertip wouldn’t feed. Often, these pistols don’t function because they’ve not been cleaned or lubricated. Typically, the inexpensive pistol is fed the cheapest ammunition available, often unreliable corrosive surplus or third-rate foreign-produced ammo that burns dirty and leaves considerable ash behind.

Leadbullet handloads with soft bullets are also a possible culprit. The owner purchased the Llama as an inexpensive defense pistola “truck gun,” if you will, so the failure to digest loads commonly found at Wal-Mart is a problem. I gave him two options: to carefully polish and radi-

MAINTENANCE & REPAIR

The Case of the Malfunctioning Magazine

BY FRANK COIRO JUNE 2006

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I bought a used Llama .22 LR in brushed chrome. It was one of the "new style," manufactured after 1986, and I was fascinated with its beauty and workmanship. It looks like a miniature 1911A1, and it breaks down the same way. This one was in near mint condition, except for the magazine. After cleaning it up and checking it out mechanically, I decided it was ready to test fire. I put five rounds in the magazine and readied it to fire. The first round chambered and fired, but the second round failed to chamber.

I pulled back the slide and manually chamus the feed ramp and chamber, or to order ammunition such as Cor Bon Pow RBall, which is around-nose expanding bullet that usually feeds in pistols that won't feed anything but hard-ball FMJ. I tested a miserly amount of Pow RBall five rounds and function was perfect, with the blast and recoil reminding me that the 100-grain bullet was traveling at 1400 fps. He elected to leave the barrel throat and polish for a later date. As for accuracy, the pistol could be erratic.

But with Black Hills ammunition, among the most consistently reliable and accurate ammunition available, results were better than bared the next round. It fired, but again the next round did not chamber. I spent a considerable amount of time trying to ascertain the cause of the problem; even-

tually, I came to the conclusion that the magazine was the culprit. Have you ever tried to locate factory new magazines or parts for a Llama?

After about two months of searching and frustration, I felt extremely fortunate to locate a parts dealer with two factory new magazines in shrink-wrap. After receiving them, I began to compare the new and old. There was no difference that was obvious. Upon inserting the new magazine and at-what's typical of older 9mm military pistols. The 115-grain bullet produced five-shot groups of 2-1/2 inches at 25 yards, while the 124-grain lead load went into 3 inches. This is gratifying accuracy.

Conclusions Despite the differences between it and the Colt, when the Llama pistol stops working, it's usually for one or more of the same reasons why a high-quality 1911 stops working: Either it's dirty, the magazine is bad, the recoil spring is dying out, the extractor has given up, or the firing pin is broken. The plunger tube doesn't seem to give tempting to fire, I learned that the new magazine didn't function at all. I quickly realized that the new magazine did not engage the magazine catch.

This is definitely a factory defect. Again, I began to compare the new magazine with the old one. I noticed that the old magazine's lips had been filed down to make the

catch engage with the slot (see photo below left). It did engage the catch, but the magazine still had feeding problems. I removed the grips in an effort to make the engagement between the magazine catch and the magazine slot on the magazine more visible. It was evident to me that the modification to the old magazine was not the correct way to go.

I took measurements between the two, and came to the conclusion that the modification should be made to the slot on the magazine rather than to the lips. I determined that I needed to file the top side of the magazine catch slot (see photo below right) in order to make the magazine engage the catch properly. With this simple correction, feeding is now flawless. trouble, and you'll never have a Llama in the shop for repair of a strippedout grip-screw bushing.

The safety and hammer seem to be durable as well, and I've yet to see a shot-out barrel. Something else will probably give up first. Overall, the Llama is an interesting piece of history, from a day when Spanish makers turned out tons of ironmongery along with a few excellent handguns. With an understanding of the differences in the Llama, by using the same principles used to repair the 1911, we can usually solve problems with this interesting variation on the Browning pistol. I

RIFLES

Making a Quick-Detachable Barrel-Band Swivel Base

This unique barrelband sling-swivel base easily adapts to a switch-barrel rifle with barrels of slightly different diameters.

BY NORMAN E. JOHNSON JUNE 2006

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Sometimes a custom gun part is well worth the time and effort needed to produce it. So it was with a unique barrelband sling-swivel base I made recently for a special switch-barrel rifle. The scoped rifle, complete with stock, weighed 9-1/2 pounds, and was quite a good candiscope ring with a #10-32 sling-swivel stud was used in making the quickdetachable, barrel-band swivel base detailed here. date for carrying with a sling.

The challenge came from the fact that the gun sported three different barrels of slightly different diameters and had a very short

forend. Perhaps I could have gone out and purchased a barrel-band swivel set, but the only ones I found in catalogs appeared to lack the versatility and application I had in mind. I decided, therefore, to make my own, using a Redfield Jr. split-type high-scope ring and a sling-swivel stud with a #10-32 thread. The end result is neat and sturdy, and is easily adaptable to each barrel.

I started by purchasing a Redfield Jr., oneinch-diameter, high-front-dovetail ring and a #10-32 sling-swivel stud. Other types of scope rings are also easily adaptable, but I

chose the Redfield high ring with its steel shank under the ring for its solid swivel-screw thread attachment. The basic part could be made by simply drilling and tapping the ring base for the #10-32 threaded swivel stud and an inner ring shim to fit the gun barrel.

Though functional in this way, the part would lack the aesthetic quality that evolved with a little more shop time. Here's how I did it. I chose to

MAKING A QUICK-DETACHABLE BARREL-BAND SWIVEL BASE CONTINUED

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reduce the end-to-end thickness of the scope ring to make it more compact. This was accomplished by clamping the ring halves to a section of one-inch rod to hold them securely in a mill vise. I also reduced the oneinch inside diameter of the rings by milling the inner flange mating surfaces of each ring half by approximately 0.060 inch. This permitted the ring screws to be drawn down, leaving only a slight gap between both rings, and it didn't interfere with the screw holes or threads.

The dovetail was removed from Below left and the ring bottom and the surface milled flat. The ring was then clamped to a short section of pipe and installed in a four-jaw lathe chuck. From here, I turned the remaining ring shank in three steps to fit the base diameter of the #10-32 threaded sling stud. While in the four-jaw chuck, the ring base was drilled and tapped for the #10-32 threaded sling stud. The sling-stud threads were later cut to the depth of the ring base, which is around 0.250 inch.

The parts were then buffed and blued. Since the finished part is clamped to the barrel, I used some bondednylon shim stock to prevent metal-tometal contact on the barrel. By using varying thicknesses of shim stock, the sling-swivel attachment can be adapted to most barrel sizes. The finished part works very well and adds a touch of class to the gun. The cost was minimal'under \$15. The rest was shop time, which matters little when a special custom part is needed. I

PEOPLE & COMPANIES

Working Colt's Model 1877 Double-Action Revolvers

Known in .38 caliber as the Lightning and in .41 caliber as the Thunderer, the complicated design and less-than-robust construction did nothing to diminish the popularity of these revolvers.

BY DAVID R. CHICOINE JUNE 2006

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Colt's first double-action revolver was their model of 1877, a six-shot, rod-ejector pistol capable of both double and single-action operation. The revolver was designed in 1876 by a well known Colt employee, William Mason. The 1877 pistols were built on a medium frame, and used a small birds-head-shaped grip. They were initially chambered only in the .38 Long Colt caliber, though the .41 Colt caliber was added later.

Small numbers were also manufactured in .32 Colt caliber. "Lightning" was the nickname given to the .38-caliber versions, while .41-caliber revolvers came to be known as the "Thunderer." These revolvers were made both with and without an ejector and in barrel lengths that ranged from 2 to 7 inches. The Model 1877 has a three-position hammer featuring a so-called "safe" position, a halfcock or loading notch, and a full-cock position.

The '77 has a frame-mounted loading gate, a feature shared with the famous Colt Single Action Army of 1873, which this one is in .41 Long Colt and sports a 6-inch barrel. Author photos. was also a William Mason design. Other features shared with the SAA are a two-piece removable grip frame, a removable center-mounted cylinder pin, and an ejector rod mounted on the barrel side. The similarities give the 1877 the appearance (except for the grip shape) of a Single Action Army in miniature.

Appearances are where the similarities to the familiar Peacemaker end, however; the mechanical operation of the 1877 is far more complex than the SAA. Colt made almost 167,000 Model 1877 revolvers from 1877 through 1909. While the large number of weapons is impressive, also impressive is the percentage of these revolvers that will be found to suffer from mechanical problems.

Experience has shown that these handy-sized double-actions were mechanically delicate and much less dependable than their single-action cousins. Because of that, I'll add this note of caution: The mechanism used in these Colt revolvers is as delicate as it is intricate, and many of its critical components are prone to breakage. Basic Repair Considerations If you haven't already guessed, I'll tell you in no uncertain terms that this is not a design that I regard very highly.

Due to its mechanical shortcomings, you'll want to think long and hard before agreeing to attempt a repair on one. I proceed, Ed Cox offers good quality of the more complicated internal parts for the 1877. Because of his vast experience with this model, he's probably the best person to contact for replacement works. Works carries goodstop tension springs and replacement cylinder

WORKING COLT'S MODEL 1877 DOUBLE-ACTION REVOLVERS CONTINUED

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Far pins. They also carry a raw-cast cylinder stop that can sometimes be made to work. One area that is often found to be worn and is pretty easy to correct is the cylinder axis. Just like the SAA and the Model 1878 Double Action Army, the cylinder cannot have excess looseness if the revolver's cylinder is going to time and index correctly. Many revolvers that have had hard use will show it with symptoms of incorrect cylinder indexing and poor cylinder lockup.

These problems can often be traced directly to the relationship between the hand and the ratchet. Lost motion or unintended movement of the cylinder on its axis (the cylinder's axis is the base pin) allows the cylinder's ratchet teeth to move forward, away from the hand. That sort of play can quickly cause an 1877s cylinder to misbehave.

When an 1877 is working well in all other areas, repairing cylinder looseness is often all that's needed to It fits over the cylinder pin in front of the cylinder, and its thickness is determined by the amount of front-to-rear play or end-shake in the cylinder. restore correct timing. That said, removal of excess headspace and cylinder end-shake are the first repair steps to be taken, along with stabilizing the cylinder on its base pin.

If your 1877s cylinder has excessive headspace, then the ratchet teeth are also too far away from the hand; moving the cylinder rearward and holding it there will restore their correct relationship with the hand and will likely restore the timing. If we were working on an SAA, we could install anew base-pin bushing, using the added material at its front to help us get the cylinder pushed back where it belongs.

Unfortunately, Model 1877 cylinders don't have a removable base-pin bushing, so to accomplish that sort of repair you have to do one of two things. One is to make a hardened-steel disk-shaped shim to fit over the base pin that will be located in front of the cylinder to push the cylinder backward. Or you could lathe-ream the cylinder to accept a shop-made, latheturned base-pin bushing similar to the bushings used on the 1878. While you're checking this area, test the cylinder for any wobble (side-to-side looseness).

Apart of the solution to timing problems is often the elimination of wobble at the cylinder axis, so this, along with the headspace repair, should be made before moving on to the rest of the mechanism; in

WORKING COLT'S MODEL 1877 DOUBLE-ACTION REVOLVERS CONTINUED

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other words, always deal with cylinder-rotation issues first. The wobble is caused by two things: the cylinder being loose on the base pin and/or the base pin being loose in the frame. Repairing a wobbling cylinder is done by reaming the base-pin holes in the frame and the hole through the base-pin bushing to a just slightly larger than standard size. By reaming the holes we are also making the worn holes round again. I use hand-chucking reamers for this job.

These are available in decimal sizes in increments of 1/1000 of an inch. Begin by selecting a reamer that is just a thousandth (.001) larger than the original cylinder pin, and ream both cylinderpin holes through the frame. Now measure the holes to see if the reaming operation has made them round. If not, select a reamer .001 inch larger than the first, and continue to increase the size in .001-inch increments until the frame holes are again perfectly round.

This may involve reaming to .003 inch larger than the standard cylinder-pin hole diameter. The cylinder-pin bushing (if you have a custom-made one) and the base-pin hole through the cylinder have to be reamed to this new size. Finally, you will fit anew cylinder pin to the frame. You can purchase an aftermarket pin or, depending on the oversize needed, custom-make one in the lathe that's sized to be a slip-fit in the newly oversized holes.

Takedown Instructions As I stated earlier, this unusual revolver design has a reputation for being extremely intricate, and certain of its parts are complicated and known to be highly prone to breakage. Therefore, disassembly is recommended only for skilled professional or talented amateur gunsmiths. Also, please note that the parts drawing included here is from *The Gun Digest Book of Exploded Firearms Drawings*, 2nd edition, edited by Harold A. Murtz (DBI Books Inc., 1977).

The drawing was altered, renumbered, and edited by the author. Safety First. Keep your fingers away from the trigger during this entire operation. Always check first to make sure this weapon is unloaded by opening the loading gate (#13) and pulling the hammer (#29) slowly to the rear until you hear two audible clicks. This should place the hammer in the half-cocked (or loading position) where the cylinder (#8) spins freely in a clockwise direction.

To make sure the chambers have no cartridges in them, rotate the cylinder two full revolutions by hand while examining the cylinder chambers through the opening presented by the opened loading gate at the rear of the frame (#9). Removing the Cylinder. The hammer should still rest in the half-cocked position and the loading gate should still be open. The Model 1877 cylinder rotates on the base pin, also known as the cylinder pin (#7).

This pin has to be removed from the front of the frame before the cylinder can be taken out. Depress the cylinder-pin lock screw (#10) to actuate the cross bolt which passes through the frame to unlock the cylinder pin, then pull the cylinder pin (#7) straight out the front of the frame. The cylinder is now free to be carefully rolled sideways out the right side of the frame. Removing the Grips and Grip Straps.

Unscrew and remove the grip screw (#51) from the center of the left grip and then remove the two grips (#49). Unscrew and remove the two backstrap screws (#42) from the rear of the backstrap (#41) and the butt screw #43 from the bottom of the backstrap. The backstrap (#41) can then be lifted off the frame to the rear. Loosen the mainspring-tension screw (#47) at the front, inside-lower area of the triggerguard (#44).

Remove the mainspring screw (#40) from the lower inside of the triggerguard, unhook the mainspring (#39) from the hammer stirrup (#33), and lift out the mainspring. Unscrew and remove the two triggerguard screws (#45) and the front trigger-guard screw (#46). The trigger guard (#44) is now loose and will pull down toward the bottom. Disassembling the Action. Pay careful attention to the relationship of the parts you are about to disassemble. Unscrew and remove the sear screw (#28) from the left side of the frame.

THIS WILL FREE THE SEAR (#27) AND THE

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hand/cylinder-stop tension spring (#35) and they can be removed from the frame bottom. Unscrew and remove the hammer screw (#32) from the left side of the frame and disengage the trigger strut (#25) from its seat in the hammer while pulling the hammer (#29) down from the bottom of the frame. Loosen the trigger-spring screw (#37) and then remove the trigger screw (#19) from the left side of the frame. Both the trigger (#18) and the hand (#17) can be pulled out together through the bottom of the frame.

The cylinder stop (#38) can now be pulled from its seat and taken out the bottom of the frame. The trigger-strut spring (#22) and the hand spring (#23) can be removed from the trigger by removing the hand/trigger-strut spring screw (#24) from the top front of the trigger (#18). Disassembling the Peripherals. Once the ejector-tube screw (#3) is removed from the front of the ejector tube (#2), the entire ejector-tube assembly is pulled to the side by its front until it moves slightly away from the barrel.

At this position, the assembly is pulled forward and off the barrel.

The ejector rod (#4), the rod head (#5), and its spring (#6) are removed by pulling Colt Model 1877 Double-Action Revolver 1 Barrel 2 Ejector Housing 3 Ejector Housing Screw 4 Ejector Rod 5 Ejector Rod Head 6

Ejector Spring 7 Cylinder Pin (base pin) 8 Cylinder 9 Mainframe 10 Cylinder Pin Lock Screw 11 Cylinder Pin Lock Screw Spring 12 Cylinder Pin Lock Nut 13 Loading Gate 14 Loading Gate Catch 15 Loading Gate Catch Spring 16 Loading Gate Catch Screw 17 Hand 18 Trigger 19 Trigger Screw them straight back and out of the ejector tube.

Removing the Loading Gate. Under the frame in the right-side frame rail you will find the gate-catch screw (#16). Remove the screw, its plunger 20 Trigger Roll 21 Trigger Roll Pin 22 Trigger Strut Spring 23 Hand Spring 24 Hand/Strut Spring Screw 25 Trigger Strut 26 Trigger Strut Pin 27 Sear 28 Sear Screw 29 Hammer 30 Firing Pin 31 Firing Pin Rivet (not shown) 32 Hammer Screw 33 Stirrup 34 Stirrup Pin 35 Hand/Cyl.

Stop Tension Spring 36 Trigger Spring 37 Trigger Spring Screw 38 Cylinder Stop 39 Mainspring 40 Mainspring Screw 41 Backstrap 42 Backstrap Screws 43 Butt Screw 44 Trigger Guard 45 Trigger Guard Screws, rear 46 Trigger Guard Screw, front 47 Mainspring Tension Screw 48 Grip Pin 49 Grip 50 Grip Escutcheons (not shown) 51 Grip Screw 52 Recoil Plate (not shown) (#14), and spring (#15) out through the same hole. The loading gate (#13) is removed by pulling it out toward the front of the frame.

REASSEMBLE THE REVOLVER IN THE REVERSE ORDER OF THE ABOVE. I

PEOPLE & COMPANIES

Reader Forum

BY AMERICAN GUNSMITH EDITORS JUNE 2006

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Browning Lockup I have taken a Browning Citori O/U in because the top lever is now left of center, and my customer wants anew lockup installed to bring it back to "right of center". I have not done this particular job before on a Browning. Does this involve buying new parts and installing them? Is there much or any fitting involved, and what parts would I need to get? Thank you. Ask your customer if he has been retarding the return of the top lever with his thumb.

Assuming the response is along the lines of "no way," see if the cocking lever is bent. If so, straighten it by comparing it with anew one, harden with Kasenit, and reblue it. This is far easier than taking on the hand fitting required when installing a replacement, and incidentally this is the recommended repair according to the Browning field service manual on the Citori.

The parts needed to replace the top-lever assembly are the spring-retainer screw, spring retainer, top-lever spring, top lever, dog screw, and dog. A check should also be made of the locking bolt. The recess there for the dog could be worn, which is a more serious problem; the locking bolt is restricted to factory fitting. Misfiring Stevens M77B I have a Stevens M77B pump shotgun in my shop that is causing me to lose sleep at night.

My customer brought it in complaining that it would not fire, and every time he worked the slide the shells would spit right out the bottom through the loading port. The problems seemed obvious—a broken firing pin and a cartridge stop problem. Indeed there was a

broken pin and a broken right-side cartridge stop. Both parts were replaced, and I ran out to the range to test fire it. Now this is the problem that is keeping me up at night: The shotgun has developed a feeding issue.

When the bolt is at a halfway point between lockup and cocking, the cartridge stops activate, allowing a shell to be released from the magazine and become lodged up under the bolt face. Sometimes it happens just opening the action to the halfway point; the rest of the time it happens after the action is fully opened and closed to the halfway point. With nothing in the magazine, it appears that it works like it's supposed to.

When shells are inserted in the tube (I am using dummy rounds for this), it starts doing this again. I am stumped why this is happening. Hopefully, you'll have some idea what's going on. (I am glad I have a patient customer.) The shotgun is a hand-me-down and the customer would like it restored so he can hand it down later on. American Gunsmith is a great magazine, I read it cover to cover every month.

Thank you for your time. ry Along time Savage/Stevens gunsmith who knows well the Model 77B, last made in 1971, wonders whether there is any rearward pressure being applied to the slide in the process of firing the shotgun. Misfires will result. He further believes that the shell dropping is related to one or both of two situations: 1) The cartridge stop must fit tightly up against the inside of the receiver with no side-to-side slop. Tightening the stop-pivot screw to the stop nut accomplishes this.

The nose, or muzzle end, of the stop could require a bending inward in small increments. 2) The lifter may be hanging down too far inside the receiver or even showing below it. You might try bending it upward very cautiously. If bending lifters on old guns makes you as nervous as it does us, take the assembly off and locate a "dimple" at its back end.

Using a prick punch, you can make the dimple protrude more so the lifter can't droop as much. This is a fine-line adjustment, meaning you only get one chance to get it right. Be prepared to disassemble, tap the dimple, reassemble, and try with dummy rounds, until you get it right. Fiberglass Removal Followup I saw the letter in the April issue concerning how to remove fiberglass from an old Bishop stock.

As a retired gunsmith and amateur lapidary, I often have had to "unglue" things such as metal from stone and metal from metal. The best product I've found is one used in the jewelry/lapidary trade called "Attack Adhesive Remover." It will remove epoxy and cyanoacrylate adhesives without damaging most surfaces. It will also work on cured epoxies! It's relatively inexpensive, costing \$6.95 for an 8-ounce can, and available from stock #206-051 from this company, but have used the product to my complete satisfaction.

Needless to say, it pays to try it out on something similar or in an area that won't be visible in the event that it reacts with something in your stock that you aren't aware of. For me, it works great in

READER FORUM CONTINUED

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removing metal from stones (precious and semi-precious). Also, ordinary household vinegar, white or cider, will remove the sticky epoxy or fiberglass polyester resins before they kick off if used liberally. Follow up with a good scrub with ordinary detergent soap. Hope this helps. Thanks for the tip, Bob.

Locked Up Remington A couple of months ago a guy gave me a Remington Model 572 pump-action .22-caliber rifle. I tried to pay him, but he said that he was just glad to get it out of his basement after 20 years. Well, I tore it down and found some missing parts, which prevented it from firing. I ordered parts from Numrich Gun Parts Corp., and I installed them.

If you look at their web page for this gun, or if you look in catalog #26, the parts I ordered are the locking bar (#46), locking-bar retaining screw (#47), locking-bar spring (#48), and the locking-bar spring stud (#49). I took the rifle out and test fired it. I got about three shots off when the action locked up. I had to remove the trigger assembly to see that all the parts I had installed had fallen out.

I reassembled the new parts and seated the stud until I couldn't pull it off the locking bar with just my fingers. Well, the rifle fired about 25 times with no problems; then it started what I call intermittent lock-ups. The parts I installed are still in place and seem to be where they belong. My questions are: The locking-bar spring has a straight end and a hooked end; where do they go? Does the hook end fasten onto something in the trigger assembly, or does it just lay where it hits?

Does the straight end go on top of the locking bar or on the bottom? Where can I get a detailed disassembly procedure for

this rifle? The only "guidelines" I had were the exploded view on the Numrich page. Is there anything else I may be overlooking regarding the lock-ups? If you pull the forend hard, about four or five times, the action will finally unlock and cycle right. Sometimes it only locks up once in 10 shots. Other times it locks up every other shot, and sometimes it locks up every shot.

I know this is along-winded question, but I figure the more info I can give you, the better the answer you can provide. You haven't steered me wrong in the past, and I do appreciate your help. Nothing appears in the Remington Field Service Manual for the 572 other than to insist it be returned to the factory when problems arise. That said, the rear tail of the disconnecter must be under the forward tip of the left connector—not over it.

Beyond that, the number-one cause for failures to unlock is identified as too little headspace, meaning the barrel is too far to the rear. With this rifle, headspace is adjusted via the receiver bushing. This part is eccentric in form. The barrel-locking screw hole in the bushing can literally be relocated to move the barrel forward or aft. Remove the locking screw, reposition the barrel, rotate the bushing to realign its hole with the screw hole in the forend hanger, and reinstall the locking screw.

Check headspace with go/no-go gauges, and readjust the barrel if necessary. Choke Tube Removal I recently had a 183 D-C Mossberg .410 bolt-action brought into my shop for a cleaning and check up. Cleaning it up was relatively easy until I tried to remove the screw-on choke. It had a hole in it for a spanner wrench, but no wrench. I tried several ideas to no avail. I placed the

barrel in a vise and kept putting Kroil in the choke's hole, hoping to loosen it enough for removal.

After several days of soaking and trials, I took a 3/4-inch nut and bored it out to slip over the screw-on choke. I then measured the hole diameter in the choke and bored a same diameter hole in one side of the nut. By placing the nut over the choke and inserting a short piece of rod through the nut and into the choke hole, I was able to place a wrench on the nut and remove the choke from the barrel. Worked great.

And if the rod has a tendency to slip out, it can be shortened to be flush with the face of the nut and trapped in with the jaws of the wrench. This seems simple, but it was effective. John Treu Milford, Nebraska Thanks, John, and bless you for your perseverance. Brownells shows five different "universal" choke wrenches in their latest catalog. One of them is inserted and expanded to make solid contact with the interior walls of a badly stuck choke.

No damage to the interior of the barrel will result, but the same can't be ensured for the overly stubborn choke tube. Balking Broomhandle I have a bit of a technical problem with a C96 "Broomhandle" Mauser. I acquired the gun earlier this year, and didn't get a chance to fire it until a couple of weeks ago. Every time I try to load it, it jams. By reducing the number of cartridges in the clip, I can get it to function, but even then it "chokes" frequently.

The gun is an 1897 vintage "Cone Hammer" that someone in the past has converted from 7.63 mm Mauser to 9 mm Parabellum. I had a suspicion that whoever did the conversion didn't change the magazine follower, which I understand is necessary with such a

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(continued from previous page) conversion because of the difference in the case type (straight vs. bottleneck). I compared the follower with the one in a "Red 9" and against the one in an "Italian Navy Contract" and found that the follower in the Cone Hammer is identical to the one in the Italian Navy (7.63 mm), but there are differences with the one in the "Red 9." This tends to confirm my suspicion that the follower in the Cone Hammer was not replaced.

I've tried Sarco, GPC, and several other parts suppliers and have been unable to locate a 9 mm follower. Is there anyone you can suggest? The problem could be the ammo itself. The 7.63 is more powerful than 9mm duty rounds (115 grain). Try the more powerful 129-grain 9mm. In seeking a follower, contact Tom Forrest. He sells magazines of every description and may have one from which you can extract a Red 9 follower if he can't supply a loose one.

Battered Win Receiver I have a problem with a Winchester Super X, Model 1, that I hope that you can help me with. A customer brought this gun in with the complaint that the bolt was stuck back into the receiver and that it would not cycle shells. The first examination revealed that the tube and receiver were rusty and the buffer was missing. It appeared that the bolt had battered the rear of the receiver so much that a new buffer would not fit unless the area was relieved.

After I completely broke down this gun and ultrasound cleaned it, it would not function with 2-3/4 or 3 dram target loads, only with 3-1/4 dram. This gun was fitted with a skeet choke barrel, and as I understand it, it was used to shoot skeet. I replaced the action-tube spring and cleaned out the gas ports on the barrel. The gun still only functions with the 3-1/4 load. If I cut, by trial and error, the action spring, will the gun function? How much can the gas ports be enlarged?

I've used this method on 1100s to fire light loads, but I'm not sure about this one. Did Winchester make an action spring for the skeet grade? Thank you for any suggestions. Don't cut the action spring. Clean out but don't enlarge the gas ports. If you haven't already, install a new buffer. Then call Browning/Winchester and get a copy of the Super X owner's manual.

In reading it, you can see how the recoil-system rings are properly installed for target loads. (They can also answer your question about a skeet barrel.) We suspect the rings may have been incorrectly installed by the gun's obviously neglectful owner, and that the gun has been used with highbrass/hunting loads (in spite of what you were told). This would account for the receiver battering and destruction of the original buffer.

Steyr Extractor I am forced to make an extractor for a Steyr straight-pull rifle. (I've tried to buy one, but they are just not available.) Considering the design, I know that it must be turned from one-inch bar stock.

After slitting, I would end up with about six of them. Could you advise what kind of steel should be used, and after hardening to what RC should it be drawn down to? I would appreciate some advice. Thank you. In Roy F.

Dunlap's Gunsmithing (Stackpole Books), the author writes at some length on the forming and heat treatment of springs. We're not familiar with the shape of a Steyr straight-pull extractor, but we can safely assume it's flat in configuration, wears a hook, and should be quite strong. Dunlap suggests the use of .030-inch flat drill-rod stock or its equivalent.

He goes on to say that a pattern for the finished piece should first be made from thin box-strapping metal, fitted into the rifle, and adjusted for curvature and other dimensions. The new extractor is then fashioned to conform to the pattern. Your flat stock should be heated to between 1480 and 1500 degrees prior to bending it. After bending with the aid of a vise and smooth-jaw pliers, the workpiece is reheated to about 1400 degrees, and hardened by quenching in a bath of lukewarm oil.

If you're going by color for tempering, buff off the workpiece and reheat to a bluish purple. Generally, this is hot enough (about 700 degrees) to burn off a couple of dip-pings into common motor oil. If you lack fancy heat-treating equipment, you can use Tempilac (Brownells) to establish when the temperatures mentioned here have been reached.

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