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INSIDE THE ARCHIVE

THE CAUSES AND CURES FOR DOUBLING ON KRIEGHOFF SHOTGUN

HOUSE PASSES "DISASTER RECOVERY PERSONAL PROTECTION ACT" • DISASSEMBLY/REASSEMBLY OF THE STEYR-MAN...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 035

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FROM THE ARCHIVE

House Passes “Disaster Recovery Personal Protection Act”

BY AMERICAN GUNSMITH EDITORS OCTOBER 2006

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” Law-abiding gun owners won another major victory today when the U. S. House of Representatives voted to pass H. R. 5013, the NRA-backed “Disaster Recovery Personal Protection Act.” Shortly before we went to press, the bill passed with abroad bipartisan margin of 322-99. “Law-abiding gun owners scored a significant victory in the House of Representatives today,” said Chris W.

Cox, NRA’s chief lobbyist. “The aftermath of Hurricane Katrina confirmed a fear long held by American gun owners: the day government bureaucrats declare our Second Amendment null and void, leaving law-abiding citizens defenseless in the midst of chaos and lawlessness. This was the second such win on this issue in less than two weeks. On July 13, 2006, Senator David Vitter’s (R-LA) amendment passed the U. S. Senate with a final vote margin of 84-16.

This amendment prohibits the use of funds appropriated under the Homeland Security appropriations bill (H. R. 5441) for the confiscation of lawfully possessed firearms during an emergency or major disaster. H.

R. 5013 amends federal emergency statutes to prohibit federal, state, and local authorities from confiscating lawfully owned firearms during times of national emergencies, as witnessed in the aftermath of Hurricane Katrina last year, when police and military confiscated firearms from law-abiding citizens. “No matter what the circumstances, lawful gun owners have the right to possess their firearms in their homes,” continued Cox. “And if forced to evacuate, they have the right to transport their firearms to a safe place.

Nobody has the right to disarm them. That’s what this legislation ensures. After witnessing the confiscation of firearms from law-abiding residents of the city of New Orleans, the states of Alaska, Idaho, Florida, Kentucky, Mississippi, New Hampshire, Oklahoma, South Carolina, Virginia, and Louisiana passed measures that echo the spirit of HR 5013. Cox concluded a recent statement with “On behalf of our four million NRA members nationwide, I want to thank Rep.

Bobby Jindal (R-LA) for introducing this legislation and the House Republican leadership for seeing that the “Disaster Recovery Personal Protection Act” got a vote on the floor of the House of Representatives. Editor Keith Lawrence Technical

RIFLES

Disassembly/Reassembly of the Steyr-Mannlicher 1895 Carbine

A straight-pull bolt design, this carbine resulted from Europe's sudden realization that repeating rifles deliver a distinct military advantage.

BY CHICK BLOOD OCTOBER 2006

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During the Russo-Turkish war circa 1877, a rag-tag army of Turks stopped the best that Czarist Russia could throw at them. It happened at the Battle of Plevna. After flanking their foe on both sides, Turkish soldiers poured a huge and unprecedented amount of fire into opposition ranks, causing upward of 30,000 casualties. If you were on the Russian side, it was a massacre. If you were Turkish, it was a great victory made possible by the Winchester Model 1866.

Suddenly, all the great powers of Europe realized the advantage of a repeating rifle in combat, and each raced to develop their own. Somewhere toward the center of the melee was an Austrian named Karl Friedrich Ferdinand Von Ritter Mannlicher. Impressed by the giant leap forward taken by Lee in 1879 with a removable box magazine, both Mannlicher and Paul Mauser entered into extensive study of the Lee design.

Perhaps due to European fascination with (or fear of) the tubular magazine (like the Winchester Model 1866), Mauser brought out a tubefed version of his Model 1871 which soon went into service with the German and Turkish Armies. It remained for Mannlicher to demonstrate the advantages of the box magazine, and he did so in spades by introducing a means of loading it with a clip in 1885.

Called the “en block,” the clip was inserted from the top and ejected from the magazine’s open bottom after the last round was chambered. Fast, the system was, but it had disadvantages: Primarily, the magazine could not be loaded without the clip, and its wide-open bottom allowed dust and dirt to enter the action. Regardless, the Austrian Army adopted the 1885 Mannlicher, which included a straight-pull bolt he had designed in 1884, exactly one year after the Swiss, Rubin, had introduced one.

Though the straight pull lacks the initial extraction power of most turnbolt actions, Mannlicher continued to perfect his design and in 1890 brought forth a bolt with a rotating head and two forward locking lugs. It was this bolt, with further improvements including a much smaller opening to the magazine, which became the basis for the Steyr-Mannlicher Model 1895. Seven million of them were employed in World War I, and the rifle or carbine served the military in several European countries until 1940.

The bolt of the Model 1895 has a separate bolt head with two locking lugs like the 1890 design. The head is inserted into the bolt body from the front, and the body has internal spiral-shaped ribs or rails. There are matching spiral cuts in the tail of the bolt head. The rails engage each oth-

DISASSEMBLY/REASSEMBLY OF THE STEYR-MANNLICHER 1895 CARBINE CONTINUED

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The magazine-spring screw at the bottom of the guard must not be removed until the floorplate is out of the guard. er, causing the head to rotate open when the bolt is drawn to the rear, then counter-rotate and lock the action when the bolt is closed. Beyond Basic Disassembly Once you're certain the rifle is empty, press the trigger forward, and open and remove the bolt to the rear. Essentially, that's all you have to do when nothing but bolt and bore need a quick cleaning.

But let us assume the gun on your bench has seen more than a little action afield and has not been fully attended to by its owner. There could be unseen damage and rust or dirt lurking almost anywhere, so you must go farther. The two barrel/stock bands are removed. The forward band wears a bayonet lug. Back out the band's screw and slip it off toward the muzzle. The other band has two screws, one of which captures a sling swivel.

Loosen the swivel screw, completely remove the second screw, and slide the band. When the bolt is reinserted in the receiver, the bolt head must remain fully extended. Bending down the tail of the extractor slightly helps to keep the head extended. off the handguard. The handguard is pulled forward to separate it from the receiver. Undo both triggerguard screws. Set them on your bench. The triggerguard now joins them. Lift the barrel and receiver from the stock as a unit.

Thus taken down, the Model 1895 can hold few dirty little secrets. Detailed Bolt Disassembly You'll need a nylon bench block. Lacking one, use a block of wood as you work your way through this. Compress the bolt (#10) by positioning the bolt head (#2) evenly on the block and pressing down firmly. Keep pressing while you pull the cocking piece (#9) to the rear and swing the safety

lever (#7) beneath it. The lever will serve as a "rest stop" or support to keep the cocking piece extended.

Turn the cocking piece counterclockwise until it can be lifted free of the threads on the firing pin (#3). Invert the bolt (cocking handle toward your bench) and press the threaded, protruding end of the firing pin down on your block. This should raise the bolt head and extractor (#1) up from the body sufficiently for separation purposes. If it doesn't, insert a punch in the rear of the bolt body and give the firing pin an encouraging tap forward. Grasp the bolt head and extractor as a unit and lift them free.

Separate the extractor from the head and stash both elements someplace where they won't get lost. The safety screw (#8) retains the safety lever. "Lefty loosey" backs out the screw. Check to ensure the lever is

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Steyr-Mannlicher Model 1895 Straight-Pull Rifle (Specifications subject to change without notice) 1 Extractor 2 Bolt Head 3 Firing Pin 4 Firing Pin Spring 5 Firing Pin Spring Retainer 6 Bolt Body 7 Safety 8 Safety Screw 9 Cocking Piece 10 Bolt Assembly positioned as shown in the photograph before taking it out of the bolt. The screw and lever should join all other components you have set aside. You haven't taken down the firing-pin assembly yet, so it's still under pressure exerted by the spring (#4).

No weak sister, this spring can put a dent in you or anyone standing nearby if you slip up during the next step. Place the back (threaded) end of the firing pin on your block and begin 11 Receiver 12 Barrel 13 Front Sight 14 Trigger and Bolt Stop 15 Sear Lever 16 Sear 17 Ejector 18 Ejector Pin 19 Sear Spring 20 Sear Pin 21 Clip Latch Spring 22 Clip Latch Screw 23 Clip Latch 24 Triggerguard 25 Magazine Floorplate Screw 26 Front Guard Screw to turn the spring retainer (#5) off the pin. Hang onto the bolt head.

You have to control the expanding spring, making sure it loses tension slowly, until you complete the removal of the retainer. When its internal threads have departed the firing-pin's external threads, the retainer will snap down smartly'm eaning with considerable force'on the block.

Afterwards, the spring and firing pin can be withdrawn from the head and the 27 Clip Latch Screw 28 Magazine Follower Assembly 29 Rear Guard Screw 30 Magazine Spring 31 Magazine Floorplate 32 Follower Pivot Pin 33 Magazine Spring Screw bolt has been detail stripped. Detail Stripping the Trigger Examine the relationship of the trigger and the sear/ejector assembly.

Make sure it looks the same way after reassembly. (The ejector faces forward; the tail of the sear lever engages the trigger.) Push out the sear pin (#20) from its smaller end. Pull out the sear (#16), sear lever (#15), and ejector (#17) as a

SHOTGUNS

The Causes and Cures for Doubling on Krieghoff Shotgun

Once you understand the three possible reasons for doubling on these high-end sporting guns, the problem can be eliminated with some relatively simple but necessarily precise modifications.

BY SERGEY LYALKO OCTOBER 2006

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The term “doubling” means that two barrels of a shotgun go off in response to a single trigger pull. So, the second shot is obviously unwanted and undesirable. Doubling occurs on all kinds of shotguns including over-and-unders and side-by-sides with both single and double triggers. Often the reason for this problem is a worn sear or hammer-notch edges. The sharpness of these edges ensures reliable hammer retention in the “on-cock” position under the pressure of the mainspring.

Gradual dulling of these edges in turn makes the hammer prone to slipping from the sear. In such cases, the stress created by the first shot is sufficient to “jerk” the second hammer from the sear even without a trigger pull. This malfunction is less likely on guns with parts that are precisely made out of good steel, but I have had to deal with doubling on Krieghoff’s over/under shotguns, which, ironically, are very precisely made out of very good steel.

In this article I’ll analyze the reasons for this problem and detail the methods for its repair using the fine Krieghoff sporting guns known as the models K-32, K-80, and K-20. Since 1886, Krieghoff has been a well-known German manufacturer of the highend European hunting guns including double rifles and combination guns. In America, the Krieghoff name became popular after the introduction of the competition over/under shotgun K-32 in the late 1950s.

This gun was based on the Remington 32 action with a modified Miller single trigger. The K-32 has earned a great reputation among clay-target shooters. Despite the age, this gun is still widely used. The K-80 was the second in the series, made since 1980. With the same basic design, it has a number of advantages over the K-32. Among them are better trigger mechanism, interchangeable and adjustable barrels, and improved engraving.

At the time of this writing, I strongly believe the K-80 has become the most popular over/under shotgun among competitive skeet, trap, and sporting-clays shooters. The K-20 appeared just recently. It is designed as a small-gauge competition gun. Currently it is produced in 20 and 28 gauges only. Frankly, I have not seen the doubling problem on this gun yet. However, I include it in the scope of our analysis because of its similarity to the first two guns.

In fact, the manufacturer describes it as a scaled-down K-80. From the standpoint of this article, all three actions are identical. In order to understand the reasons for doubling on these fine sporting guns, I’ll start with an analysis of the mid-pull and inertial mechanism on the double shotguns with the single-trigger action. For the sake of simplicity, the photos will be referenced as a figure and an item number.

For example, a reference to Figure 1-3 means item 3 on Figure 1, which in our case is the left sear. The Mid-Pull First, let’s

accept the fact that double guns with a single trigger are normally more complicated than their counterparts with double triggers. The reason is that, with a single trigger, there has to be some way of switching automatically from one barrel to the other. With double triggers, this switch is done by the shooter by simply moving his finger from one trigger to the other.

In other words, with a single trigger, the trigger link must move automatically from one sear to another. The trigger link in any gun is the part which mechanically connects the trigger with the sear. In Krieghoff’s action, the trigger link is a pear-shaped part (Figure 1-4) called a pearstud. Keep in mind that often the action with a single trigger should also accommodate the selector for choosing which barrel will shoot first. But this is not always the case.

The major difference between single and double-trigger actions is in the intermediate-pull arrest. This subject is seldom discussed, probably because it is a bit advanced for the everyday chat over the gunsmith’s workbench. However, we have to look at it closely in relation to Krieghoff’s doubling. Actually, our analysis also applies to any other single-trigger gun when it comes to the matter of doubling. Note that after each recoil generated by the shot, the shooter’s body generates counter-recoil.

Counter-recoil is an uncontrolled muscle reflex. It moves the gun forward in the opposite direction to

THE CAUSES AND CURES FOR DOUBLING ON KRIEGHOFF SHOTGUN CONTINUED

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This photo shows the position of parts on the K-80 during counter-recoil: pendulum (1), safety-post (2), left sear (3), pear-stud (4), right sear (5), hammer (6). The mid-pull is arrested by the pendulum (1) engaged with post (2). The trigger link (4) is engaged with the sear (3). This is the position of parts during counter-recoil when the trigger is released just before the mid-pull. The arrow shows the gap between the pendulum and post. recoil't o restore the initial body position.

The surprising feature of counterrecoil is the speed of its movement. In practice, it is hardly even noticeable, just like the recoil itself. Counterrecoil is also associated with another involuntary move. This is the so-called "intermediate pull," sometimes also referred to as a third or involuntary pull. I will call it "mid-pull" here for the sake of space and simplicity. This pull is a reflexive contraction of the trigger finger muscles during counterrecoil.

We can debate the reasons for this move but for our purposes here we'll just accept the fact that every time the gun moves into counter-recoil the finger unconsciously pulls the trigger again. As a reflexive move, the timing and strength of this pull varies from shooter to shooter. Double-trigger shotguns are indifferent to this move, because after the

shot the trigger is disabled. Single-trigger guns, however, are sensitive to it, since after the first shot the action has to be immediately ready for the next one.

If the mid-pull is not blocked and the action is ready for the next shot, then the gun doubles. Hence, something has to be incorporated into the shotgun action to disable this pull for the duration of the counter-recoil. I'll call it the "mid-pull arrest." Inertial Device and Pendulum The search for the most efficient mechanical device for arresting the midpull has never stopped since the very first single-trigger designs.

Great gunmakers competed for the best solution, and just within the years from 1880 to 1900 dozens of single-trigger mechanisms were patented in England alone. Among the most well known of them was the famous Jones- Baker mechanical three-pull system with a shifting bar. With this design, every pull of the trigger shifts the bar to the next position.

The first pull triggers the shot and shifts the bar so that the following mid-pull shifts it again without a shot, but enables the second shot in response to the next conscious pull. Robertson implemented a somewhat similar three-position rotating drum, which disabled the mid-pull after the first turn. Falford's action used a pneumatic cylinder for delaying

the engagement of the trigger with the second sear so that the mid-pull happens when the trigger is not yet touching the sear.

Greener's design of 1898 used an inertial block to make the switch and disable the mid-pull. This block is nothing more than a metal weight hinged at the top. Greener, therefore, called it a pendulum. Multiple designs that serve the same function often indicate there is a need for improvement. In this case, improvement meant a reduction in mechanical complexity and a simpler means for arresting the mid-pull.

Greener's inertial design finally won the competition, and during the last century it appeared in multiple shapes and variations on many different guns. The best feature of the inertial design is that it requires fewer mechanical parts than any other single-trigger mechanism. This design utilizes the energy of the recoil or counter-recoil and the inertia of the pendulum. Inertia is the tendency of any object to resist changes in its state of motion.

In other words, if the object is moving, it resists any stopping force; and when it is resting, it resists any moving force. This is the essence of Newton's First Law of Motion. Note that during recoil the gun moves backward and during counterrecoil it moves forward. So, when the

THE CAUSES AND CURES FOR DOUBLING ON KRIEGHOFF SHOTGUN CONTINUED

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gun moves forward into counter-recoil or backward into recoil the pendulum tends to retain its position and therefore rotates around the hinge. The energy of this rotation can be utilized for the switch from sear to sear or the mid-pull arrest or both. The pendulum is the core of any inertial device. This device, however, normally includes a couple of other parts such as the trigger link, spring, and plunger.

While most inertial devices, including Krieghoff's, utilize counter-recoil, some others successfully utilize recoil. The best example of such a gun is the Winchester Model 21. It locks the mid-pull during the backward motion of the gun. Practically speaking, it's not important whether the pendulum moves forward or backward. It's also not important whether the pendulum is hinged at the top or bottom. Important, however, is the timing of this device, which determines when and for how long the mid-pull is arrested.

Without diving into serious physics, let's summarize the function of the pendulum in this context. Simply put, the pendulum's timing depends on its weight, attached springs, and the speed of the gun motion. Both weight and springs have to be chosen by the manufacturer for the certain range of average speeds during gun usage. The speed of recoil, in turn, can vary depending on the shell's power, the shooter's body build, as well as recoil suppressors or other additions to the gun.

And there's one more factor to account for friction. Friction, which can be the result of rust, dirt, or dried-up oil, resists the pendulum's motion and can disrupt its work. Anyway, we'll assume that the action is clean and the inertial device can work properly within certain average limits of recoil. Note, however, that any significant reduction of recoil can diminish the efficiency of the inertial device and render it useless.

This is important to keep in mind since the natural tendency of any shooter is to reduce recoil by all means. This is why recoil suppressors, sub-caliber tubes, shock-absorbing stocks, and weak shells are seen

with increasing frequency. Taken together, these factors often greatly affect inertial devices. One wellknown example is the Browning family of over/under shotguns.

On these guns, the pendulum moves backward, disengaging the trigger-link from the sear and placing it at the rear of the action for the whole duration of counter-recoil. Disengagement consumes some energy of the pendulum. In many practical cases, there is not enough energy for the pendulum to accomplish this disengagement. The result is that the second shot doesn't happen, since the trigger link is still attached to the first sear rather than having been switched to the second one.

For this reason, many of these guns have been modified to accomplish sear disengagement mechanically, without inertia, but still using inertia for the mid-pull arrest. These actions often are casually called "mechanical," ignoring the presence and the role of inertia for the mid-pull arrest. The good news here is that the efficiency of the inertial device can often be improved by adding weight to the pendulum, reducing friction, and by changing springs.

Detailed description of such improvements for the Browning-type shotguns can be found in my article "Understanding Inertial Devices on Single-Trigger Double Shotguns" (American Gunsmith, September 2000). Unlike the Browning, the Krieghoff's action is designed to switch sears mechanically. So, it consumes the pendulum's energy only for the mid-pull arrest as is explained below. There is another important difference between these two gun families.

While the trigger on the Browning is completely disengaged from the sears during the mid-pull, the trigger on the Krieghoff remains engaged with the second sear (Figure 1-3) via the pearstud (Figure 1-4). The movement of the trigger however is locked by the pendulum (Figure 1-1) and post (Figure 1-2).

Here's the complete sequence of events ending up with the mid-pull arrest: After the shot, the gun first moves backward into recoil and then forward into counter-

recoil; the finger releases the trigger; the pendulum rotates backward, swinging underneath the safety post; the mid-pull is now taking place; the pendulum, moved by the mid-pull upward, meets the bottom of the safety post and stops, preventing further movement of the trigger and sear.

After that, the finger releases the trigger, the sear lowers down and engages with the second sear. The only distance the trigger can move during the mid-pull is determined by the gap (Figure 2-3) between the pendulum and the bottom of the post when the trigger is fully released. The same gap is determining how much the sear (Figure 1-3) can be raised above the hammer by this trigger pull. We'll discuss this important matter in the next section.

Note again that Figure 2 shows the gap when the trigger is released during the counter-recoil just before the mid-pull and Figure 1 shows the midpull in progress right after that. Reasons for Krieghoff's Doubling Having the trigger and sear engaged during the mid-pull presents some strict requirements to the timing and tolerances of the inertial device on Krieghoff guns. The first of these requirements is that the gap (Figure 2-3) between the pendulum (Figure 2-1) and the post (Figure 2-2) should be minuscule.

Otherwise, the mid-pull will be able to raise the sear far enough to drop the second hammer and cause a double shot. The action shown in Figure 1 has this gap enlarged and therefore the sear during the mid-pull has risen too far, almost releasing the hammer. Figure 3 shows a magnified fragment of Figure 1 with sear-hammer engagement. It is quite evident that despite the arrest of the mid-pull, the hammer has almost slipped from the sear. Now any stress can jerk the hammer and cause the double shot.

In my experience, the Krieghoff's doubling occurs mostly because of this increased gap. Even when the gap is properly adjusted during manufacturing, it gradually increases after thousands of shots. One of the reasons is that the mid-pull presses the

THE CAUSES AND CURES FOR DOUBLING ON KRIEGHOFF SHOTGUN CONTINUED

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This is an exploded view of the hammer-sear engagement shown in Figure 1. The Krieghoff's hammer is almost released by the sear during the mid-pull, despite the arrest of the trigger. Here, the switch to the second sear happened before the arrest of the mid-pull. pendulum against the post at every shot. As weak as it is, this pressure rocks and loosens the post. This is especially true for the K-32, since the K-80 and K-20 have improved safety posts.

Second, the hinged joint of the pendulum wears and loosens as well. As a result, the gap between pendulum and post slowly but surely grows. Hence, the first reason for the Krieghoff's doubling is an increased gap between the pendulum and the post. Mechanically, this is a result of either bad adjustment or wear and tear. Note that the gap

has to be validated with the trigger completely released. Let's return for a moment to inertia.

As we saw in the case with the Browning, reduction of recoil dramatically affects the efficiency of the inertial device, causing in many cases a conversion of the action to mechanical. The Krieghoff is less sensitive to recoil reduction, since it does not spend the pendulum's energy on the sear-switch. However, even that does not make Krieghoff completely indifferent to recoil reduction. One of the important characteristics of its inertial device is how readily the pendulum moves underneath the post.

If this motion is insufficient, the midpull may not be arrested at all or it can happen prior to its arrest. Both cases will end up with a double shot. On the other hand, as we have mentioned earlier, the pendulum's motion depends on the speed of recoil. So, everything

that slows down recoil also diminishes the pendulum's efficiency. On Krieghoffs, it happens The old safety post can be replaced with the new one.

Shown is the unfinished rod during its fitting into the frame slot. rarely, but can result from using additional weights, full-length inserts of 28 or 410 gauge, mercury or Gra Coil recoil suppressors, and light shells. So, the second reason for Krieghoff's doubling is inefficient motion of the pendulum. Mechanically, this results from slowing and reducing recoil. The third reason for Krieghoff's doubling is related to the timing of the trigger-link switch from the first sear to the second.

Particularly important is the position of the pendulum at the moment of this switch. Let's follow the dynamics of the action during the switch, starting with the first shot. First, the pear-stud (Figure 1-4) is

THE CAUSES AND CURES FOR DOUBLING ON KRIEGHOFF SHOTGUN CONTINUED

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engaged with the first sear (Figure 1-5). In the photos, the first sear is on the right side of the action. After the first shot, the finger starts releasing the trigger. It lowers the pearstud and the first sear until the pearstud swings underneath the second sear. This situation is shown in Figure 1. As soon as this has happened, the gun is ready for the second shot. The mid-pull is an individual reaction and therefore may happen microseconds earlier or later.

If it happens before the switch, it has no affect at all, since it raises the sear which does not hold the hammer anymore. If it happens after the switch, then the pendulum should be already under the post. Otherwise, the mid-pull is not arrested and will cause a double shot. However, in some practical cases, the switch happens when the pendulum is still not under the post. This situation is shown in Figure 4.

Here, the pendulum still has not swung under the post and therefore the trigger is not blocked; however, the switch from the first sear to the second has already happened since the pearstud is under the left sear after the first shot on the right side. The mid-pull at this moment will cause doubling. My observation is that this particular problem mostly happens after replacing the pearstud without proper adjustment of its height. Such replacement is quite often required, since the pearstud is prone to breakage.

So, the third reason for Krieghoff's doubling is improper adjustment of the pearstud height. Repairs For the first case (increased gap between the pendulum and post), we have to adjust the post. Note that in these situations the post is most prob- Here, anew heavier pendulum (1) was ordered to replace the old pendulum (2) on a K-32. Solder can be added to the flat surfaces of the pendulum to increase its weight. ably wobbling. So, the fix has to stabilize the post and also adjust its length.

I've found that making anew post may be more efficient than dealing with the old one. It boils down to increasing the diameter of the post for a tight fit into the frame hole, providing anew pin for locking the post in place, and adjusting its length for a minimal gap. The process of replacing the old post with anew one is shown in Figure 4. Clearly, the new post shown here still has to be shaped and adjusted in length.

The method of installing this post varies between the K-32, K-80, and K-20, but is quite straightforward (see Figure 5). The looseness in the Krieghoff's pendulum joint has to be eliminated by replacing its shaft or ordering anew pendulum or both. The second reason for doubling is reduced recoil, which diminishes the efficiency of the inertial device. There are a number of ways to increase recoil and make the pendulum work properly.

However, this is undesirable, since it reverses any previous efforts for reducing recoil. The problem should be solved me-

chanically for a given level of recoil. As I mentioned above, behavior of the pendulum depends on its moment of inertia. The moment of inertia, in turn, is proportional to the weight of the pendulum and the speed of the gun motion. Since we are not going to change the recoil, the speed of the gun motion is not changed.

However, we can increase the weight of the pendulum, which will increase the moment of inertia. Figure 6-1 shows a heavier pendulum, which can be installed instead of the old one (Figure 6-2) on the Krieghoff K-32 suffering from doubling. Replacing the pendulum is not always necessary. Instead you could solder a small amount of lead-tin compound on the flat surfaces of the old pendulum. This is shown in Figure 7. The third and final fix is a bit advanced.

The pearstud height should be adjusted to allow searswitch only when the pendulum is able to swing underneath the post (Figure 1-2) when the trigger is completely released. The standard pearstud has two cuts for the pin by which it is held in place. The cuts on the pear are at different distances from its top. This allows installing the pear with one of two heights.

Normally, this is enough to properly adjust the stud; however, in doing this job you have to be extremely careful, since the pearstud is hardened to a very fragile condition. I

PISTOLS

Smoothing the Thompson/Center Encore

The performance of the Encore, billed as “a gun for all seasons,” can be easily and safely enhanced with some judicious stoning and polishing.

BY ROBERT E. FRIED OCTOBER 2006

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The success of the Contender pistol led Thompson/Center to bring out a slightly larger version called the Encore with a longer, thicker frame and a redesigned trigger mechanism. At first glance, it might look like a larger version of the Contender. It's not. The Encore is one of the most versatile firearms available on the market today—it can serve as a pistol, rifle, muzzleloader, or a shotgun. Due to this versatility and popularity, it's a good candidate for action smoothing and trigger-pull work.

Although the manual states “Encore triggers are factory set to an optimal pull,” there's always room for improvement. A mechanism that will need your attention is the trigger, sear, hammer, and hammer strut. Before any work is performed at least two questions need to be answered: (1) What are the customer's expectations regarding triggerpull weight, and (2) will the firearm be used for hunting, target shooting, or both?

You will, of course, have to make the decision on what is a safe trigger-pull weight, so you'd better know your customer. There are four parts to the trigger. The trigger-pull weight should be tested prior to any work being performed so you can monitor your progress. But

before you do anything, keep in mind that you should not pull the trigger of this firearm with the firing pin and spring in place.

Doing so can cause the firing-pin spring to be compressed, and then when a live round is fired, the firing pin will not return but will become stuck in the primer. As a result, when the barrel is opened, it will bend the firing pin. To avoid that problem, follow this procedure: After making sure the gun is not loaded, remove the two screws on the forend, remove the forend from the barrel, tip the barrel open, and remove the barrel hinge pin by tapping it out (in either direction).

Then remove the barrel from the frame. To remove the firing pin and firing-pin spring, remove the socket-head screw directly above the firing pin using a 7/64-inch Allen wrench. This screw can be removed with or without the hammer in place. With the screw removed, push the firing pin from the hammer side to help remove the round plug retainer in the breechface that houses the firing pin and firing-pin spring. Place a rag between the frame and the hammer to cushion the hammer, and test the initial trigger pull.

TO COCK THE HAMMER, YOU WILL HAVE TO

SMOOTHING THE THOMPSON/CENTER ENCORE CONTINUED

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push the interlock “back” (by inserting your index finger down inside the front of the action on the right side) while cocking the hammer. The interlock’s function is to prevent the hammer from being cocked without the barrel being fully locked into the action. Finish the basic disassembly by removing the buttstock or pistol grip. Complete Disassembly For complete disassembly of the Encore you will need a punch, a straightblade screwdriver, and a small hammer. Using the screwdriver, remove the triggerguard pivot.

Once the triggerguard screw is removed, you can separate the guard from the receiver. Turn the action upside down, and you can see the relationship of the internal parts, particularly the trigger/sear spring and the interlock. The trigger/sear spring’s L-shaped leg points to the rear. Make a note of these parts and how they fit together. Remove the next three pins from the smallest to the largest. The smallest pin is the trigger-pivot pin.

Once it’s removed, unhook the trigger/searspring leg that engages the trigger and remove the trigger. The next largest pin is the sear-pivot pin. You’ll see apart with an angular end pointing to the front of the frame. This is the interlock. Observe the interlock and sear engagement. When removing the sear, slide it out and the in-

terlock will come out with it. Finally, remove the largest pin’t he hammer-pivot pin. The triggerguard return-spring strut can now be removed.

The hammer will drop down inside the frame and can be removed out of the bottom. The hammer strut and spring come out through the top of the frame. For any action work, this is all the disassembly required. Removal of the large-headed spring-loaded pin inserted through the trigger is not required.

Smoothing and Polishing the Parts Before you do any stoning or polishing, reposition the pivot pins into the frame and install the trigger, sear, and hammer on the outside so you can see where the parts come in contact with each other. This will give you a much better idea of what to do and where. For smoothing and polishing these parts, I use a fine-cut Diamond EZE lap (Brownells part #290-100-001). Be careful; it removes material very quickly.

I also use the FF-46 fine India stone (#657-246-246), black/M-fine ceramic stone (#080-721-604), and the white/X-fine ceramic stone (#080-721-601). Take your time, overdoing it can have dangerous results. When you do action work on the Encore, it’s best to do it in a sequence starting with the trigger, sear, and working up to the hammer and hammer strut. This

keeps everything in relative order. Starting with the trigger, observe the top rounded surface area. You’ll see where it has made contact with the sear.

Use the EZE lap here to even out the contact area while maintaining the original shape. Follow this with the ceramic stones using honing oil and putting a very smooth polish on the top surface. The sear, being located in between the trigger and hammer, has more contact areas and requires the most attention due to the sear notch that holds the hammer back at full cock. The areas to be smoothed and polished are noted in the accompanying photos.

Starting at the bottom of the sear, you can see the roughness left by the casting marks. This surface cams against the top of the trigger and needs to be smoothed and polished. Hold the sear in one hand with the side to be worked on facing up and lay it on the corner of your workbench. With the EZE lap held flat on the surface, smooth this area down. Check after each stroke and be aware where the bluing is being removed.

This surface is usually uneven and rough; remove all of the bluing maintaining the proper angle. Apply Dykem or use a marker as needed to maintain the correct angle. If there is a casting mark in the middle of this area, do not try to

SMOOTHING THE THOMPSON/CENTER ENCORE

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remove it completely. Again, after using the EZE lap, finish with the stones and honing oil. Check the sear notch. Is it rough or not making even contact? This notch will have to be polished, as it is the most critical part. Don't use the EZE lap here, only the stones. As with the other parts, maintain the factory angle of this notch, going slowly and checking your work often. Once again, use Dykem or a marker as necessary to maintain the angle and monitor your progress.

Start with the fine India stone, and progress to the white Xfine stone to put a bright polish on it. The sear notch must be horizontal or slightly more than horizontal. When using the stones, work in one direction, keeping them flat. Don't move them back and forth, as this will tend to create an arched surface. Aside note here on sear/hammer notches: The sear has a double function; besides releasing the hammer, it also acts as the hammer block.

So don't shorten the sear's hammerblocking arm or its trigger-contact arm. Sear angles and trigger-notch angles are critical to safe operation of any firearm. Most, if not all, trigger pulls have what is called "positive let-off." When you stone a sear or hammer notch, you can remove the proper angle or too much metal resulting in a negative let-off. In this case, the hammer falls before you

finish pulling the trigger through or you can push the hammer forward without pulling the trigger.

Either situation is very unsafe. If, after finishing, you find you have a negative trigger pull, you can recut the hammer-cock notch of the sear to a more horizontal angle. What you're doing when you stone a sear notch on the Encore is two things: (1) removing the rough edges (polishing), and (2) leveling it square. When you finish with this action work, the trigger pull should be smooth, crisp, and just a little positive. The radius on the hammer nose is the next area which requires some detailed work.

You will see there is a small area that has the bluing removed. Again, don't change the shape; you are only removing the roughness. After using the EZE lap working in one direction, follow by polishing with the ceramic stones. The last part to be smoothed up is the hammer strut. Mount it in a vise with the T-shaped portion, which contacts the hammer, facing up. Using a fine-grit sandpaper in a shoeshine motion, remove the roughness, then follow up with crocus cloth making it smooth.

Down each side of the hammer strut, use the EZE lap to remove the sharp corners where it comes in contact with the hammer spring. This completes the action work. Let's put it back together and check our progress. Before

final reassembly thoroughly clean and degrease all the parts. Then, to enhance what's been done on each part, apply Brownells Action Lube Plus (#083-050-002) to all contact points including the top of the hammer strut. You don't need much; a little goes along way.

Reassembly When doing any action work, disassembly and reassembly is performed throughout the process, checking and rechecking your progress. To reassemble the Encore, start with putting the hammer spring and strut into the hole in the grip/buttstock tenon. Move the hammer up into the frame, position the top of the hammer strut into its recess, and install the largest pin. Pull back on the hammer slightly.

If you don't feel any resistance from the mainspring, check and ensure the hammer strut is seated in its recess properly. Now lay the action on its right side, hammer to your right, and locate the interlock. It lies flat on the inside of the frame. Lay the interlock below the frame with the spring that is attached pointing downward and to your right. Set the sear into the interlock. The sear is installed with the cock notch facing the hammer.

Slide the two parts up into the frame with your fingers, and install a punch of appropriate size to hold it in place as you turn the action bottom up. With the frame bottom up and the rear of

SMOOTHING THE THOMPSON/CENTER ENCORE CONTINUED

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This angle must be maintained, as any change can result in an unsafe firearm. The action positioned forward, install the sear/trigger spring. The sear/trigger spring is installed by doing the following: Grasp the coils of the spring with needle-nose pliers with the L-shaped leg at the top pointing inside towards the hammer. Push the coil of the spring down inline with the sear-pivot-pin hole, and capture it with the punch.

Install the sear-pivot pin, transferring the spring from the punch to the pin as you drive it in. If you have access to a metal lathe a slave pin can be made, which makes the installation a lot easier. The slave pin should be .123 O. D. and .638 inch in length. You simply assemble the sear and sear/trigger spring and insert it in the frame with the interlock and remove the slave pin by driving in the sear pivot pin.

Install the trigger by slipping the hole in the trigger over the end of the spring and moving the trigger down to install its pin. The triggerguard return-spring strut is now installed. Push out the hammer pin just enough to insert the strut, and tap the pin back into position. Place the triggerguard return spring onto the strut, and move the triggerguard into position with the trigger in its opening and the strut at the rear of the triggerguard.

While holding this in place, align the holes for the triggerguard-pivot screw and install the screw halfway. Look inside the action and you will see a large headed pin in the trigger. Push this down while inserting the screw the rest of the way and tighten it with a screwdriver. Once you've reassembled the buttstock or grips, barrel and hinge pin, and the forend, you've completed the reassembly. Before moving on, do a function check to ensure it has been assembled correctly.

If the hammer fails to cock, something is awry and you'll have to go back and troubleshoot the problem. Safety Checks and Testing Now's the time to check your pull weight and perform the safety check. Again, you'll have to push back on the Encore's interlock until you can cock the hammer if the barrel is not seated into the action. Position a rag between the frame and hammer to help cushion the hammer blow, and check the pull weight. Cock the hammer again and push firmly forward on it. The hammer should not move.

If it does move, the sear notch will have to have more positive contact as I mentioned earlier. Next test for hammer rebound. Dryfire the gun. When you remove your finger from the trigger, the hammer should (and must) rebound back off from the firing pin and lock in position. If it doesn't rebound properly, a new sear/trigger spring

will be needed. When all of the safety checks are positive, you can finish with adjusting the trigger-stop screw.

Cock the hammer, reinstall your protective shop rag, and turn the trigger-stop screw with a .050 hex wrench until it touches the trigger. Apply pressure to the trigger while backing out the screw until the hammer falls, then back out the screw one-quarter turn and test this setting. If the hammer hesitates, back out the screw another one-quarter turn. Once you have finished dry firing, reinstall the breechface plug, firing-pin spring, and firing pin.

Reinstall the barrel, the forend, and buttstock or pistol grip if you have not already done so to complete the reassembly. **Conclusions** The Encore used in this article was a 209x50 muzzleloader model that came out of the box with a gritty trigger pull of 5-1/4 pounds. And the trigger-stop screw was not properly adjusted.

After the work was performed, the trigger pull was a crisp and smooth 2-3/4 pounds with no overtravel (although I'd be the first to admit that this pull weight could be considered too light for hunting in dense woods or rough country). The Encore is a gun that will be used in many applications, so it's imperative your final result is well matched to your customer and his requirements. I

PISTOLS

Tuning Revolver-Cylinder Lockup

Tuning Revolver-Cylinder Lock When problems arise on revolvers with the older-style two-point lockup, they can usually be returned to service with a simple “tuneup.”

BY ROBERT DAMOTH OCTOBER 2006

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By the term “old-style two-point lockup,” I’m referring to a design first used by Smith & Wesson in the early 1900s. In this design, the cylinder locked into the frame at two points—the tip of the ejector rod in the underlug and at the rear in the center-pin opening in the recoil shield. This type of lockup has been used on other revolvers as well, namely, Astra, Llama, Rossi, and a large number of the older Taurus revolvers.

If you were to take the time to do some research on these revolvers, you’d see a striking resemblance to the old S&W. General Overview Occasionally, I run into problems with this design. Some of the problems I’ve encountered are: hard to close, hard to open, failure to open, and loose or sloppy lockup at the ejector-rod tip. The revolver used for this article is a Rossi Model 720 in stainless steel, but the corrective steps I’ll discuss can be adapted to any of the above revolvers.

The original complaint was a cylinder that was hard to open, a condition that could be caused by several problems. Let’s take a look at what they are. Of course, you’re going to make sure the revolver is unloaded, and all loaded ammo is out of reach. Start

with some pre-disassembly troubleshooting and try to get a general idea of the problem and what might be causing it. Don’t get ahead of yourself and don’t overlook anything; the smallest detail missed could make a world of difference in the final analysis.

Continuing your detailed inspection throughout the disassembly process will save you time and aggravation. For disassembly instructions, I suggest you refer to *The Gun Digest Book of Firearms Assembly/Disassembly, Part II: Revolvers*, by J. B. Wood. Analysis and Correction A frequent problem that crops up in these revolvers, especially with the Magnums, is an ejector rod that has loosened under recoil.

If the rod backs out too far, it will compress the locking bolt in the underlug and bind up the cylinder to the extent that the cylinder will not open. The solution is to screw the rod back in and tighten it. Simple, you say, but it confounds many revolver owners (fortunately for us). Other reasons that can impair cylinder lockup or unlocking include a hand that’s too long, a bent ejector rod, a sticky ejector bolt, no bevel on the ejector rod, a bent yoke, or a center pin that’s too short.

All these problems can be found simply through a meticulously detailed inspection. The bolt should be flush with the recoil-shield face. As I mentioned, the Rossi that inspired me to write this article had a cylinder that was hard to open. It had me befuddled until I decided it was time to get back to basics. (I should have taken my own advice about not overlooking any small detail.) The Rossi checked out fine, except for one area—its cylinder-locking system which locks at both ends.

In the photo at the bottom of this page you can see where the center pin makes contact with the center-pin bolt in the frame. The bolt face should be flush with the recoil-shield face. If the bolt was too short, it would cause a problem and it would either have to be built up or replaced and refit. You can see that the center pin has left a mark on the bolt face which continues on across the shield. It looks ugly but hasn’t hurt anything yet.

I found that the center pin tip had a sharp point on it that wasn’t polished off at the factory. It was a simple matter to file off and polish. The sharp

TUNING REVOLVER-CYLINDER LOCKUP CONTINUED

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tip left a burr at the edge of the centerpin opening which can be seen in the photo at the bottom of the page. A fine Dremel-tool stone took care of it, but this didn't solve the unlocking problem. The next step was to remove the ejector-rod locking bolt in the underlug. This is where I got ahead of myself. The locking bolt looked good as did its spring, and the tunnel where the bolt and spring reside checked out fine with no abnormalities. With the locking bolt removed, the cylinder opened and closed smoothly.

But instead of going to the locking bolt in this sequence, I should have checked out the center-pin length first. They call this a rod check. With the cylinder fully assembled and the ejector rod tight, take a small-diameter object such as a dowel and push in on the center pin at the rear of the cylinder until it's flush with the ratchet. Now check the opposite end at the ejector-rod tip. It should be flush; i.e., the center pin has to be the same length as the total assembly.

Mine was just a little shy of being flush. Also, the bevel at the ejector-rod tip was absent, with its inner edge sharp and

ragged. If the center pin comes up short, a small amount can be filed off the rod tip, but first we must take one more measurement before taking that step. We have to make sure we have a good lockup with the locking bolt. (If the ejector rod is way too short, this might not happen, and it would have to be replaced and refit.) With the bolt in place, swing the cylinder up just short of lockup.

You should have about 1/8 inch or so of overlap. Just make sure you have enough overlap so you don't come up short. Referring to the photograph above, I used a small fine-tooth file to trim the ejector rod to length, and Dremeltool stones to cut the bevel. A shallow bevel is sufficient, which is then polished. In the center of the photo is the locking bolt and spring.

In this case, nothing needed to be done to the locking bolt and spring, but if you're working with a revolver that has seen a lot of use, replacement of these parts might be necessary to attain a good lockup. On the right is the ejector rod, trimmed to correct length. And in the center of the photo is the ejector-rod locking bolt. Conclusions/Recommendations The steps

taken above solved the problem with this Rossi. The cylinder now opens and closes smoothly with good lockup at the front.

There has always been a lot of controversy over this type locking system—one argument being that it doesn't really give any support to the front of the cylinder. If the locking bolt is worn out, if the hole in the rod tip becomes enlarged, or if the ejector collar is worn out, I would have to say the detractors have a point. Nevertheless, if the system is in good working order and the tolerances are held to spec, it does give good support. And it doesn't take much to keep it in working order.

All the revolvers listed earlier have a lot in common, both externally and internally. Although the parts won't interchange, they all function in basically the same manner. And while repair manuals for some of these revolvers are hard to obtain or nonexistent, there is a manual that can be very helpful when working on them. If you don't already own a copy, you'd do well to purchase *The S&W Revolver* by Jerry Kuhnhausen for your revolver-repair library. I

FROM THE ARCHIVE

Get the Lead Out!

Of three methods tested for removing lead fouling from a barrel, all are equally effective, but one method is cheapest, one is fastest, and one is easiest. You make the choice.

BY PAUL MAZAN OCTOBER 2006

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Chances are that the label on your favorite bore cleaner says something about “removing lead. Being the curious guy that I am, I began to wonder just exactly how bore cleaners manage to accomplish this trick. Lead is a pretty inert metal, and there isn’t much that can actually dissolve it. So just how does bore cleaner get rid of lead fouling in a barrel? If we think about it, there are only a few ways to remove lead from a barrel.

We could melt it out with a torch, but no one would want to take a torch to a favorite firearm. The three other ways to remove the offending metal are: (1) to penetrate under the lead to separate its bond with the barrel so that it can be pushed out, (2) use an abrasive to actually scour it away, or (3) to somehow break it down chemically.

Some old-timers have also told me that pouring mercury in the bore would remove lead, but since mercury is poisonous and can drive those who are overexposed to it insane, I think we can skip that method. Actually, each of the three other methods are commonly used, but I thought it would

be interesting to look at each method and weigh the cost against the work necessary to clean the firearm.

The traditional and most common methods use a combination of penetration and abrasion; in other words, the bore cleaner acts to loosen the lead and the bore brush scrubs it away. This is an effective method and has been used successfully for many years, but it can be labor intensive on a badly leaded bore and almost totally ineffective on a rough bore. A newer method is an electronic system called the Foul Out, introduced by Outers several years ago.

It breaks down lead electro-chemically and deposits it on a rod placed in the bore. As you can imagine, the cost and complexity varies quite a bit from the simplest to the most advanced of these methods. Thus, I thought it would be interesting to see how effective each method is. My wife and I competed all last summer in cowboy-action shoots. Each of us shot a pair of stainless Ruger Vaqueros with commercially cast lead bullets.

In order to experiment with the lead-removal methods, we didn’t clean the guns all season. (Oh, the things we do in the name of science!) The result was four filthy guns with heavily leaded barrels, perfect for my experiments. To establish a standard, I cleaned the first gun in the traditional manner using Hoppe’s #9. This product is still very popular despite the many competitors that have flooded the market, and it is still the old standby that most of us are familiar with.

After saturating a patch and pushing it down the bore, I let it sit for 20 minutes to penetrate under the lead. I then attacked the bore with anew bronze bore brush and lots of elbow grease. A few bright specs of lead came out of the bore, and then it seems I hit a wall where no amount of scrubbing seemed to produce any further result. I repeated the process five times until the bore was visibly clean and patches came out clean.

I then plugged the breech end of the bore, filled it with The end result will be clean guns ready for another season at the range or in the field.

GET THE LEAD OUT! CONTINUED

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the Foul Out solution, and plugged the unit in. The Foul Out system proclaimed the gun “clean,” and the first test was completed. Total time was one hour, 45 minutes of sweat and elbow grease (and the cylinder and the rest of the gun were still waiting for my attention). However, the cost was nothing beyond that of the cleaning materials I had on hand, and this appealed to my frugal nature. For the second gun, I used the Lewis Lead Remover.

This is a product that has been around for many years, consisting of a T-rod, a cone-shaped end for cleaning the forcing cone, and an expandable plug that accepts a brass screen. To use the tool, you put the rod down the bore from the muzzle end with the cylinder removed. You place the brass screen and

expandable rubber plug on the end of the rod, and expand the rubber until you have a tight fit in the bore.

By pulling the brass screen through the bore, the lead becomes embedded in the screen and is pulled out of the bore. The next step is to simply pull it through the bore. The process is simple and extremely effective. Lewis Lead Removers come as caliber-specific sets (Brownells) for around \$25, and replacement brass screens are about \$3 per package of 10. I made four passes through the bore and pulled large quantities of lead out on the first three.

The fourth pass produced very little lead, and on the fifth pass the brass screen patch was completely clean. After a quick swab with a patch soaked in bore cleaner and a few dry

patches, I was done. Once again, I hooked the gun up to the Foul Out system and found it to be completely lead free. The total time to delead the barrel was less than 10 minutes. The additional cost was roughly \$25. For the third gun, I went straight to the Outers Foul Out system.

My system is a first-generation system and is not as fast or as efficient as the third-generation systems on the market today. It is still, however, extremely effective at removing lead or copperjacket fouling from any firearm. The current Foul Out 3 system comes with the steel rod (electrode), control unit, AC adapter, bore plugs, O-rings, and both Lead Out and Cop Out solutions. The price ranges from less than \$85 (Midway USA) to about \$125 from other sources. To use this unique sys-

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tem, you to put a rubber plug in the bore and then hold the gun in an upright position. The rubber O-rings are placed on the steel rod to keep the rod from coming in contact with the bore, and the rod is placed in the bore from the muzzle end. The bore is then filled with either Lead Out solution, as I did in this case, or Cop out solution if you are removing bullet-jacket fouling from a rifle or pistol barrel.

The control unit is attached, plugged in, and turned on, and then you can work on another project while the unit cleans the gun. In my case, the leading was so heavy that when I checked it the first time the steel rod was so full of lead it had overloaded the system. I removed the rod, wiped the lead off, put it back in the bore, and let it go back to work.

Shortly thereafter, it had pulled enough lead off the barrel to overload the system again, so I wiped the lead from the rod again and put it back in the bore to finish the job. The next time I checked it, the unit indicated that the gun was clean. Removing the rod, draining the solution, and removing the bore plug showed a chemically cleaned barrel. A few more minutes and the barrel will be lead-free. When it stops cutting and is easy to turn, stop.

Pushing it hard can result in cutting more than just lead. without a trace of lead. Total time was 45 minutes and I spent most of that watching TV. This is by far the least labor-intensive lead-removing system I've ever used, but at a price of \$85 it is also the most expensive. Once the barrels were

clean, that left some very dirty cylinders to take care of. There are several products on the market that will clean them, but I've found the fastest and most effective for removing lead is a cylinderdeleading reamer.

Available from Brownells, these are quick and easy to use by simply inserting them into the back of the cylinder and turning them by hand. They are made to SAMMI specs and will cut the lead cleanly out of the cylinder. One word of caution is in order here: Keep in mind that these are reamers made to cut. I suggest turning them by hand and stopping once they stop cutting. If you drive them with a power tool and can't feel when they stop cutting, it's possible to cut steel as well as lead with them.

Made by both Manson and Clymer, they retail for around \$50. The remainder of the cleaning chores were handled in the normal manner and proceeded without incident. Overall, each of the methods discussed has good and bad points, and like most things in life there is some tradeoff. The solvent-and-brush method is by far the slowest and most labor intensive, but the end result is as good as the most expensive and sophisticated method, and the cost is almost negligible.

The Lewis Lead Remover was the fastest method, and again produced a result as good as the Foul Out. For a price of around \$25, it's reasonably affordable and not too labor-intensive. Its one weak point is the attachment of the brass screen. The screen is sandwiched between the end of the rod and the caliber-specific rubber plug with a

very small contact area. This requires that it be tightened down very snugly or it will simply tear out.

A caliber-specific rod would ensure a larger contact area in the bigger calibers and extend the life of the brass screens, but unfortunately the same diameter rod comes with all the kits, presumably to keep the cost down. The aluminum cone-shaped forcing-cone cleaner is also available in only one angle, and I found that the angle did not match that on my Rugers. This meant that it cleaned one spot on the forcing cone but was not in contact with the entire surface of the cone.

Don't misunderstand me; I think this is a good product, but it seems that nobody has taken the time to update it as guns have changed over the years. Last we have Outers Foul Out system. It is easily the least labor intensive of the three methods, and the one that actually tells you when you're done. Anything that works while I watch TV gets my vote, but it is also the most expensive system.

For the extra money, you get a system that is as effective on copper fouling as it is on lead, and one that will work on rifles as well as pistols. I never thought cleaning guns could be so easy. To sum up, solvent and brush is cheapest. the Lewis Lead Remover is fastest, and the Foul Out system is the easiest. From there it's your decision. Personally, I vote for the Foul Out. Now, where did I put that TV Guide? I have another gun to clean. I

SAFETY & COMPLIANCE

Reader Forum

BY AMERICAN GUNSMITH EDITORS OCTOBER 2006

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Anschutz 141 Disassembly I'm looking for a schematic for an Anschutz 141 (#509149). My customer has had this gun since the mid-60s and has never had it apart, even to clean it. The safety quit working properly and I need to disassemble the trigger group. Any information on where I can get info would be appreciated. I've been searching the internet and can't find much information.

A schematic for the 141 appears in Jack First's catalog of parts, Volume II Every gunsmith should have this catalog, because it's dedicated to obsolete and out of production firearms. We believe the present importer for Anschutz is Champion's Choice, in La Vergne, Tennessee. Anschutz, an offshore manufacturer, holds a deep and abiding dislike for anyone outside their organization who dares to touch their firearms'new or old.

Regardless of this possessiveness, you can still detail clean the rifle by removing the wood, field stripping it, and forcing mineral spirits repeatedly into its components with a rubber squeeze bulb. Use compressed air to dry out the parts, then lubricate lightly. If the safety is damaged and the cleaning doesn't free it up, you may have to arrange with Champion's Choice for replacement/repair. Speeding Up the 1100 I have a Remington 1100. The gas action runs normal.

I use the shotgun for bowling-pin competitions and sometimes shoot faster than the action will function, meaning I pull the trigger on an empty chamber. I thought I had read an article or a tech tip on away to make the 1100 action function a little faster. In the February 01 issue we ran an article on

the Sure Cycle recoil system for shotguns which claimed a 40-percent increase in cyclic rate for gasoperated guns.

Since yours is a Model 1100, its action-spring tube is an integral part of the receiver, which means you'll have to cut off the tube and weld on the Sure Cycle tube in its place. From there on, installation is very simple. SRM Performance Products make the Sure Cycle As reported in the article, the system works, but you should also check for signs of drag related to the actionbar assembly plus the link and actionspring tube.

Also, your action spring may have become weakened, in which case it should be replaced with anew one. Too bad you're not able to locate a working Winchester Model 12. Sure it's a pump gun, but you could hold the trigger back after the first shot, work that slide as fast as you can. Gas guns don't let you do that. Misfiring Mossberg I was given a Mossberg Model 88 Maverick, 12 gauge 2-3/4 to 3-inch shotgun to repair. The customer, a first-time gun owner, told me he purchased the gun in December of last year.

He fired a couple hundred rounds through it without problems. Then, he inadvertently fired off a 16 gauge shell. Of course, that stuck in the barrel. After that was fixed without damage to anything, he went through about 75 rounds and then the gun started to fail. He stated that he was able to fire only one out of five or six rounds. The next day, it wouldn't fire at all. He further stated the shells did not have any FP indentation. The ammo used was Winchester 2-3/4-inch target loads.

I've disassembled the gun and have found no problems. The shell stops are not bent or damaged. Everything seemed to work as it is

supposed to. I asked if he was sure that the gun was properly locked with the slide all the way to the closed/locked position. He stated that it was.

The only thing I have noticed is the FP spring is extremely stiff and the FP protrusion is not as it should be. The FP tip is not broken, and the FP seems to be straight. Any suggestions as to the cause? Bill Hewitt, Longmont, Colorado The Maverick 88 and Mossberg 500 are mechanically the same. First, fire the shotgun yourself (factory ammo) just to make certain the owner is locking the bolt fully forward as he claims. (Somehow, we doubt it.) If the light hits persist, remove, clean, and lubricate the extractors.

Check the boltslide position and bolt lock in the barrel extension. Make sure the firing pin is properly installed't he flat on its rear should be parallel to its retaining pin. If that doesn't solve the problem, replace the firing pin and its spring, and clear the firing-pin hole in the bolt face of any existing burrs. .22 Conversions I plan to build a .22 Long Rifle-caliber pistol for serious target shooting on a .45 caliber 1911 Colt frame.

I have seen advertising for Ceiner, Kimber, Marvel, and Wilson conversion units. Are there more units available? Do you know if any of these units are accurate enough for bull's-eye competition? Also any addresses, phone numbers, etc. would be appreciated. The best, most accurate .22 conversion ever made for the M1911 was designed and produced by Fred Kart. Unfortunately, he no longer makes them, and if you happened to find an

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(continued from previous page) owner willing to part with one, the cost would probably be somewhere between \$1,400 and \$2,000 dollars. In our opinion, worth it. We haven't checked out the Kimber unit as yet. We hope to secure one at the SHOT Show in February. Of those you've mentioned, Wilson or Marvel would be our recommendation as of this date. We'd hesitate on the Ceiner. It requires the use of highvelocity ammunition, which is not as accurate as standard velocity for bull's-eye competition.

Replacing Rem Mag Tube? Can you point me in the direction of info on how to remove an old and install anew magazine tube on a Remington 1100? From the looks of it, it appears that the tube is soldered into place in the receiver, but I haven't been able to find any information to confirm this observation nor data on how to make the swap. Thanks for your help. You didn't mention why you want to "swap" the mag tube.

If it's dented, the damage can be undone with a hydraulic dent raiser (Brownells) or by fabricating a wooden dowel so one end is rounded and the the dowel is a snug fit in the tube. By inserting the rounded or narrowed end, and rotating the dowel when it contacts the dent while continuing to push it into the tube, the dent can be raised. In any case, the tube of the 1100 is indeed soldered into the receiver. Silver-solder is used by the factory, so high heat would be needed to melt it free.

Such heat could damage or weaken the receiver, and at the very least the receiver would have to be reblued. If you can't raise the dent or if there is another problem with the tube, we suggest you send it to Remington Factory Service in Ilion, New York. Extractor Extraction I've subscribed to this publication for quite some time now and wanted to let you know what a excellent source of information it is. As for my question, I have a Colt Woodsman Match Target .22-caliber semi-auto pistol, serial #089710S.

I want to replace the extractor. (I've referenced two disassembly manuals and both have different procedures.) After rotating the extractor 180 degrees and then pulling out on the extractor, it hangs up when the base starts to come out. Is there another step I've overlooked? Thank you. There's nothing wrong with your method. Something must be hanging up the rear of the extractor. It could be a burr in the extractor tunnel of the bolt or on the tail of the extractor itself, or maybe a combination of both.

And there is probably some seriously impacted fouling that's helping to hold things up. You didn't mention it, so we assume the back end of extractor isn't bent out of shape or deformed. Disassembling the BAR I'm looking for instructions on the disassembly of a BAR with a removable trigger assembly.

I've worked on dozens of BARs on which you remove the trigger assembly and bolt out the back of the receiver, but now I have

one in the shop that has the "new, easily removed assembly." That part is true, but how in the world do you remove the bolt? It won't slip out the back, through the bottom, nor have I had any luck "beaming it out" with my grandson's Star Trek communicator/phaser/teleporter. I suspect the timing latch on the bolt is broken, but I can't get to it to see.

The rifle was built in 1992 according to the serial number (NY), but to my limited knowledge, this model didn't come out until 1993. (I realize this is close, so it could have been either one.) Any help? Danny Griner Norman Park, Georgia Your rifle is a Mark II Model. After speaking with Browning engineers, we learned that it's necessary to remove the cocking handle. After that, and with the stock removed, the bolt can then be pushed to the rear of the receiver and taken out the bottom.

BPS Feeding Problem Solved For the benefit of readers who have had feeding problems with the BPS, we've found that the problem often lies with the injection-molded feed-tube follower. It will warp and swell with heat. We make anew one out of acetal plastic (Delrin), with the small diameter a few thousandths smaller than the original and the spring seat shallower to give a little more spring force at the end.

This solves the problems of not feeding the second shot and not feeding after a few shots have heated up the gun. Harold Parks Minden, Nevada Thanks, Harold, for the tip.

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