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AND THE AMERICAN GUNSMITH ARCHIVE

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ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

GETTING TO KNOW THE CENTURY ARMS UC-9 CARBINE

HUNTING GUIDE WISDOM • RIFLE ACCURACY PROBLEMS AND THEIR SOLUTIONS • MAKING A CUSTOM CROSSBOW COC...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 095

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FROM THE ARCHIVE

Hunting Guide Wisdom

BY AMERICAN GUNSMITH EDITORS NOVEMBER 2011

ORIGINAL PP. 2

How relevant is organized range training to the hunting field? Can matches and classes and other Hunter Shooter events really help you become a better hunter? The following was sent to me by a retired professional big game guide. "I was never a famous name guide, but facts are facts and this is what I experienced.

I am extremely interested in the idea that hunters should have to "qualify" to get a license, I realize that may seem like an anathema to some but I guided hunting professionally and was so generally disgusted by the pathetic level of marksmanship displayed by a large percentage of my clients I quit. You are right about the importance of organized shooting. I shoot NRA and CMP Service Rifle.

I am not that great a shot, generally in the low "Expert" range, but I shoot these matches for precisely the reasons you push Hunter Shooter events: Competition and time constraints make you do funny things, unless you know how to handle the pressure (mostly from experience) and the problems that crop up. "I routinely invite friends, buddies, and shooting acquaintances to give matches a try. I always offer the use of a rifle and ammo and gear but have had only two people take me up on it.

One was a former High Power shooter, now back into it after his feet were rewet, and the other a complete newbie. "The old saw about 'can't hit a target but I never miss my deer' is pretty old and soggy in my book. I have never taken a competent shot out and had a lousy

performance from them in the field. I have taken plenty of 'good game shots' out and had them discover that animals move and there is no bench rest handy.

What can a guy say after seeing this type of thing over and over? "I call this the Rifle Problem. An Elk guide sees client's gun. If the gun is a .270, .30-06, or similar, everything will probably be OK. If the gun is a .30 Winchester/Weatherby/ Ultra/Super Magnum caliber of any sort, expect trouble. If the gun is a 338 Winchester/Ultramag or especially a 340 Weatherby, expect gross incompetence. "How can I make such generalizations? Experience. For example, .340 Weatherby ammo retails for about \$60 for 20 rounds.

If your client is going to be half competent with the rifle he or she had better put about 250 to 500 rounds through it before hunting season. If they don't reload that means 250 rounds equals \$750 and 500 rounds represents the price of the rifle at retail. So, either your client's got some bucks (and hopefully you get a big tip) or that half shot-up box of ammo he brought with him came with the rifle. "I always preferred guiding prairie goats because to me it was like chess.

Outthink and be where they WILL be with your hunter set up and ready. I'd have fellows set up for a 75 to 125 yard shot and most would guess it as 200 yards or more. Never let a client shoot over 200 because you don't have enough hours in the day to chase the cripples."

HISTORY

Getting To Know The Century Arms UC-9 Carbine

Anyone wanting more home defense firepower will be in the market for Century Arms Ultimate Carbine chambered in 9mm. Here's how to maintain this submachine gun look alike.

BY CHICK BLOOD NOVEMBER 2011

ORIGINAL PP. 3-7

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Back when the Thompson and Reising submachine guns were Government Issue, combat troops of World War Two used to double their capacities by taping two twenty round stick magazines together. When one was empty, it was ejected, flipped end for end and the loaded mag installed. Before one of our readers with military experience and actual combat jumps all over me regarding 50 and 100 round drum magazines, I admit to knowing of them. I further know fifty round drums were seldom worn by Thompsons.

They were too heavy, too bulky and rattled too much. The same was doubly true of the hundred round drums. Despite these problems both types of drum magazines became very popular on the streets of Chicago during the Prohibition years, earning the Thompson aliases such as the "Chicago Typewriter" or "Chopper." I've never seen a Reising wearing a drum magazine but two 20 round or, later, 30 round sticks come

close to exceeding, or actually did exceed, the drums. Both SMGs were formidable weapons.

It has been said that a drum-equipped Thompson or two could equal a nine man rifle squad at the point or bringing up the rear of a column on the move. No, the Century Arms UC-9 Carbine isn't a SMG. It doesn't fire from an open bolt and it can't be modified to do so. Nor are drum magazines housing 9mm ammunition available or produced for it. What does that's pretty mean protection. arrive with each UC-9 are two stick magazines capable of comfortably packing 32 rounds each.

Taping those two together like the WW II GI did equals 64 rounds. Backing that 64 up with two more magazines configured the same way results in a readily available 128 rounds! See what I mean about more firepower? Besides lacking open bolt operation, the semi-automatic UC-9 has something I've never seen on any gun that was capable of full auto fire—a grip safety.

Right about now I imagine at least one person reading this is has a question. Unknown Reader: "Justa daggon minute, Mr. Technical Editor.

How about a M1911A1?!" Technical Editor Response: You have kind of a point there, Unknown. The M1911A1 can and has gone full auto but only after its hammer/sear engagement angles have been so overworked that sear bounce sets in as soon as the first round is away. Then there's nothing to stop the remaining six or more from following it out faster than an exotic dancer can unsnap her G-string. Enough of such hedonistic images.

However vivid, they merely delay the task of field stripping the UC-9 and getting to business. Field Stripping The safety is located on the left side of the receiver and clearly marked with the letter "S." Move the safety thumb piece to align with that letter. At the bottom of the pistol grip is a serrated lever. It's the magazine

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catch. Press in on it then pull the magazine down and out of the grip. The cocking knob is on the top of the receiver. Retract it enough to confirm the chamber is empty. If you haven't already, put on your eye protection. Depress the barrel catch (3) and unscrew the barrel nut (1). Pull the barrel forward and out of the receiver assembly (8). Note how the flats on the stop lug (mid barrel) and the flats on the threaded lug on the front end of the receiver are oriented. Remember it.

To remove the receiver cover (28), hold it down as you depress the cover catch (13) extending from the front of the rear sight. Lift the cover upward and off the carbine. Pull the bolt assembly (parts 19-34) to the rear a short distance. Pull it along with the striker assembly up, then forward, to remove both from the receiver. The action (recoil) spring assembly (32) is separated from the bolt assembly to the rear. Do not remove the striker spring (33).

The UC-9 is now reduced to its seven major components: Barrel, barrel retaining nut, receiver body, receiver cover, bolt assembly, striker assembly and recoil spring assembly. It is ready for a thorough cleanup if necessary—and it most likely will be. Detailed Disassembly In any gun that hasn't been attended to as

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often as it should, the trigger mechanism is most likely to need cleaning. To remove it, drive the trigger housing pin (50) left to right and all the way through the housing.

Grasp the pistol grip then swing it downward and forward to separate it from the receiver. The extractor pin (20) is located in the bolt (19). Drift the pin from left to right then push the extractor (21) forward to remove it. Loosen the two hand guard screws (10) from their lock nuts (12) to free up both hand guards (11 and 9). Move on to the cover sub-assembly. Unhook the rear loop of the cocking spring (29).

Back out the operating handle screw (25) to release the handle (26), slot cover (27), cocking lug (30) and spring. Set them aside. Undo the two pistol grip screws (51) then pull off the left and right grips (52 and 58). The striker (24) should be in its forward position before you address the trigger mechanism. To assure that's the case, move the safety switch to its "F" position and pull the trigger. Take some time out. Commit how the sear (38), sear spring (37) and trigger interface to memory.

ONLY THEN, DRIFT THE SEAR PIN (44) LEFT TO RIGHT AND OUT OF THE HOUSING A

GETTING TO KNOW THE CENTURY ARMS UC-9 CARBINE CONTINUED

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(46). Separate the spring from the sear by disengaging the two rear ends of the spring. Follow this by pressing the front end of the trigger spring (41) down and away from the disconnecter (40) to relieve any pressure on the latter part. Drift the trigger pin (45) and disconnecter pin (39) out of the housing from left to right. At this point, the trigger, sear, disconnecter, sear spring, trigger spring and all associated pins should have been removed from the trigger mechanism.

Now for the grip safety (57) and spring (56). You have to remove the safety from the grip by inserting a small blade screwdriver to compress the spring enough to disengage it

from the safety before lifting the grip safety (57) upward and out of the grip. Let up slowly on the spring before removing it to the rear. A pin drift is the tool to work with when pushing out the magazine catch pin (55). The catch spring (54) and catch (53) are likely to fall from the magazine well once the pin has cleared the way.

Be ready to capture them. The safety selector (47) should be in its "F" position with the trigger pulled for the next step. Insert the The trigger housing pin has been removed while the grip safety remains installed. blade of your small screwdriver or similar instrument under the selector button (49) and into

the selector receiver groove. Carefully pry upward until both selector and button have disengaged the groove.

Use the same tool to press inward on the selector spring (48) and lift it from the A When the upper one is exhausted, the unit is extracted from the grip, inverted and the fully loaded lower magazine inserted. With practice, elapsed time can be less than two seconds. Dpistol along with the other related components. The UC-9 is available with a nonfolding, wooden stock. Most, if not all being shipped, have a collapsible metal stock like the carbine I received. The wood-stocked UC- 9, which is equipped with a butt



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Century Arms UC-9 (Specifications subject to change without notice) 1 Barrel Nut 2 Barrel 3 Barrel Retaining Catch 4 Barrel Catch Spring 5 Front Sight 6 Front Sight Detent 7 Front Sight Detent Spring 8 Receiver Assembly 9 Left Handguard 10 Handguard Screws (2x) 11 Right Handguard 12 Handguard Nut (2x) 13 Cover Catch 14 Rear Sight 15 Rear Sight Spring 16 Stock Connecting Nut 17 Cover Catch Spring 18 Rear Sight Nut 19 Bolt 20 Extractor Pin 21 Extractor 22 Firing Pin 23 Firing Pin Retainer 24 Striker 25 Operating Handle Screw 26 Operating Handle 27 Slot Cover 28 Receiver Cover 29 Cocking Lug Spring 30 Cocking Lug 31 Firing

Pin Retaining Pin 32 Return Spring Assembly 33 Striker Spring 34 Buffer Block 35 Stock Screw 36 Folding Stock Assembly 37 Sear Spring 38 Sear 39 Disconnecter Pin 40 Disconnecter 41 Trigger Spring 42 Trigger 43 Rear Sight Screw 44 Sear Pin 45 Trigger Pin 46 Trigger Housing 47 Safety Selector 48 Safety Selector Spring 49 Safety Selector Button 50 Trigger Housing Pin 51 Handguard Screw (2x) 52 Left Grip Panel 53 Magazine Catch 54 Magazine Catch Spring 55 Magazine Catch Pin 56 Grip Safety Spring 57 Grip Safety 58 Right Grip Panel 59 Magazine Base 60 Magazine Body 61 Follower 62 Base Catch 63 Magazine Spring

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latch stud, requires you to depress the latch stud and detach the stock from the receiver. A folding metal butt isn't quite that simple when fresh from the factory. There is a possibility that separating it from the receiver will loose a stream of invective from your mouth. The owner's manual instructions are to depress the release button just aft of the receiver on the left side of the stock. Lots of luck!

I found that button defied all efforts to push inward, rotate the stock down and access the stock screw (35) that firmly attaches the stock to the receiver. Though the UC-9 folding stock is made of stern stuff, I hesitated to bring a heavy hammer to bear on the problem. I chose instead a light, plastic headed one and tapped the stubborn release button three times. Whatever was seizing it stuck let go on the third tap.

A drop of good gun oil was injected around the head of the button to prevent future jamming and I went on with the disassembly. This meant backing out the stock screw

which seats in the stock connecting nut (16) that has a home in the receiver buffer block (34). Once the screw is out, the butt catch in front of the stock can be removed to the front. I didn't find it necessary to fuss with the catch. Above and The grip safety lever is at (A). You're not quite done.

There are still the rear sight, cover catch and barrel catch to deal with. Loosen the rear sight nut (18) then back out the rear sight screw (43). Reattach the nut to the screw to avoid losing both. Remove the rear sight (14) but leave its curved spring (15) which has to stay put for the moment. Prevent the spring's loss once the sight has been taken away by placing your small screwdriver blade against the front rim of the spring. Exert light pressure to the rear.

What you want to do is cause a slightly higher "hump" in the spring. Gradually ease your pressure. The cover catch (cocking lug, part 30) will disengage to the front. It's OK to remove it, along with its coiled spring and the rear sight spring. This leaves

the barrel catch (3) and its spring (4) behind but not for long. The barrel should already be off of the carbine along with the barrel nut. The catch extends out from under the front sight. Insert your blade screwdriver into the catch cut-out.

Carefully press down and lever the catch forward. Out it slides with the spring not far behind—if you're lucky. If you're not, the spring will have to be captured before it flies away. I didn't fire the UC-9. Admittedly, with the double stick mags full and installed it probably can't be considered a real lightweight. The trigger was a little stiff as well but this will lessen after a few hundred rounds have been run through.

Since I consider the primary purpose of this carbine to be a defensive in-home firearm, I personally found the UC-9 trigger rather reassuring. Light hits and the risk of no ignition have no place within a personal protection weapon. AG

MACHINING

Rifle Accuracy Problems And Their Solutions

Manufacturing and materials have improved greatly over the years but nothing is perfect. Here's how to deal with flaws found in your customer's rifles.

BY ROBERT K. CAMPBELL NOVEMBER 2011

ORIGINAL PP. 8-13

Despite the high standards of consistency possible in modern CNC machinery we often see a rifle that seems no different than the one made before it turn in exceptional accuracy. By the same token, the very next rifle will deliver measurably poorer results. No maker is immune. It is the rifle with poor results that finds its way to our shop. While many are mass produced rifles with known quirks, there are others that are sometimes even more difficult to diagnose.

Quite often these are high grade rifles that have been carefully assembled but somewhere something went awry. We may have built the rifle ourselves and went by the book and personal experience. Other rifles of the same make turned out just fine, yet one manages to give us problems. I have owned a number of troublesome rifles and worked on others. The standard steps do not always work but eventually something works. When striving for first class results the best products are always a good bet.

I began working with Fajen stocks, still remember the old Bishop types and have worked with quite a few of the excellent Kimber rifles. When I order a rifle barrel it is most often a Shilen but others, including the high-production, low-bid types, have also been addressed. Sometimes there has been a lot of shooting involved, which can become expensive and frustrating for the owner and the gunsmith, but there is no other way to test the end product.

When one of these rifles comes to the shop I ask the elementary questions. First, is the rifle a proven firearm that has gone

astray? Did it group just fine in the beginning of its life? Did it suddenly suffer a downgrade in accuracy? Is it still consistent but sometimes throws flyers? Simply tightening the action and scope mounting screws can be the cure for a rifle that begins having problems. We all know that every screw should be tightened on the rifle. Action screws work loose.

This results in a problem in what I call the key harmonic and the rifle begins to resonate poorly. Let's also not neglect cleaning. If a rifle comes into the shop with a complaint concerning accuracy the first thing we need to do is to clean the barrel. Heaped on copper deposits are terrible for accuracy. A pitted bore is sometimes terrible but might still produce fair results if cleaned often, however, a barrel with copper deposits simply isn't going to perform well. Get the bore clean.

Sometimes this is all that is needed. Regarding the barrel another spot to check is the barrel crown. The rifle may have ridden in the rack of a vehicle driving off road and was bumped hard enough to get a nick in the barrel crown. Ham-handed or ten-thumbed cleaning with the wrong types of rods can damage the crown or the rifling itself as well. Dings and dents in this area must be addressed. Getting the barrel cleaned, screws tightened and crown checked is the best first step to take with an inaccurate rifle.

Fire the piece and see how it goes. The next item to consider are the sights themselves. While loose screws can be a problem here, the opposite is also sometimes true. Screws may be over tightened. I have

examined several scopes that were literally dented by over tightening of the scope mounts. One, a Sighthron brand scope favored by experienced shooters, was literally crunched but managed to function as designed.

This is a quality optical sight that survived abuse but the Sighthron scope was cocked in the mount and I was not certain that we could make the dented scope set right in the mount. The customer was embarrassed by his poor home gunsmithing efforts, but at least he did not ruin the scope. A few episodes of this type and you have a customer who either learns to do simple things or always brings the rifle in for a correctly done job.

It is simple but not necessarily easy to properly mount a scope if you do not do it every day and have not been to the same church as other gunsmiths. I check the scope rings and mounts carefully on every customer rifle. I am sometimes asked what good accuracy is. In this age of off-the-shelf claims for accuracy we need to understand that a two-inch 100 yard group is just fine for most hunting rifles. A rifle that will group three shots from a cold barrel into one inch at 100 yards is still awfully rare.

Given a rifle with a custom stock that is well bedded, a good optical sight, a decent trigger and a quality barrel should group three

RIFLE ACCURACY PROBLEMS AND THEIR SOLUTIONS CONTINUED

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Just enough and not too much is ideal. The barrel and stock band area good place to start. shots of premium ammunition into one inch or less at 100 yards. Some will do better, a lot better, but this is the baseline. When working with custom stocks and rifles there is considerable room for error. Depending on skill and tools, some issues may be beyond our control to address but it is within our power to find and correct the problem.

As an example, no one expects a screw on a custom rifle to be too long—if they have never experienced the problem before. A too long forend, action or magazine screw will

play hob with accuracy. I check these simple parts first and occasionally there is a problem that needs to be address. Another problem with wood stocks is shrinkage. Look for wear on the contact points. If there is eccentric wear where it should not be then that is the actual, if not desired, contact point.

You will need to sand and shim or bed the stock to correct this problem. Wood shrinks when it becomes saturated with moisture. It may warp to one side or the other. This will ruin accuracy. There is no predicting whether a left warp will send the bullet left or any other predictor but one thing is certain a

warped stock produces horrible accuracy. The locking lugs show normal wear and the fit is good for a factory rifle. Sometimes a stock is just fine except for one small detail.

As an example a common problem is the magazine resonating against the action. A magazine should not press against the stock and there must be enough relief between them. Either the magazine should be filed to alleviate this problem or the stock relieved, whichever seems most expedient. This is a simple alteration to a stock if all else

RIFLE ACCURACY PROBLEMS AND THEIR SOLUTIONS CONTINUED

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This Howa rifle shows top notch fit and accuracy. This screw was a little bugged in the head but the threads are just fine for fit and finish. is looking good as far as contact points and bedding. A combination of a too long screw along with a poor magazine-box-to-stock fit recently came to my shop. This rifle, an inexpensive action built into a custom job, had suffered from a wandering zero and poor accuracy. We obtained another action screw, which was noticeably shorter than the screw in the rifle stock.

We also relieved the magazine box and adjusted its fit to the stock. Just because a custom stock company has turned out a hundred

good stocks doesn't mean you will not get one that is off spec. Clearance for the magazine box was easily checked with a jeweler's screwdriver. When all was said and done, the problem was fixed in less than an hour. A few words on ammunition. During the past few years of ammunition shortage quite a few foreign brands have gotten a foot hold on our soil.

They are produced as cheaply as possible to sell at a low price. This ammo is OK for getting on paper but not suitable for accuracy testing. The price is attractive for insuring the firearm goes bang but any serious accuracy work should be done with higher quality

ammunition. The common calibers are easy. Winchester White Box USA brand in .223 and .308 are an excellent resource for checking accuracy as is Winchester's Silvertip JSP rifle loads.

I often use my own proven handloads, most often using the Nosler Partition for best accuracy. In some calibers such as the 6.5 x 55 Swiss or the 7mm-08 there is no generic equivalent. We have to use first class match grade loads for checking the most accurate

RIFLE ACCURACY PROBLEMS AND THEIR SOLUTIONS CONTINUED

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The locking lugs have proper contact and the bolt glides relatively smoothly in the receiver. Having on hand other rifles of the proper screw length helps determine proper length. rifles. A resource I use for super consistent match grade loads is Setpoint ammunition. When you are testing a two thousand dollar rifle—and a two thousand dollar rifle is below the middle of the road for a custom rifle—then good match grade ammunition is a must.

Give Setpoint the specifics of your accuracy load and they will load it up for you and save you time at the loading bench. Another problem that crops up is a rifle without sufficient locking lug contact. This type of problem will reduce a custom rifle from a tack driver to a rack grade rifle. The problem is easily

checked once you suspect the locking lugs on the rifle are not making sufficient contact and the fix requires lapping the lugs that do contact until they all bear evenly.

Examining the lugs under magnification often shows a worked area where the lugs are in contact or an area with no wear on a lug that does not contact upon locking. You may smoke the bolt to check for contact to be certain your diagnosis is correct. Lap the rear of the lug that is in contact until the others ease into place. When performing this fix realize that working with the bolt lockup may create excess headspace.

Before beginning be certain that you are prepared to set the barrel back if needed, however, with careful lapping of the locking lugs

the process should not produce excess headspace. It is not worn and locks the bolt to the receiver properly. This is a modern extractor for the Winchester 70 from Williams Rifle Company. Bedding A warped stock due to improper bedding is a common problem. The Ruger M77 is possibly my favorite modern rifle as I like the Mauser extractor claw and the ruggedness of the Ruger action.

However, in my experience, it is almost an even bet there will be too much stock contact on the forend with these rifles. It is almost like a custom knife delivered with an edge almost sharp enough but not quite leaving the owner to finish the job up.

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This is a relatively uncommon tip off mount for the Savage 99 rifle. It is an even bet that the wear and tear on such a special mount is greater than that of standard mounts. These types should be checked often for tightness. This one is too tight. Take a piece of cardstock, such as a match book cover or business card, and check the forend for free floating. If the card does not slip under the barrel and over the stock then the barrel is not free floated correctly.

Proper bedding is pretty straightforward and a bit of study to rule out potential problems is always to your advantage. An inexperienced gunsmith or home tinkerer attempting a bedding job may fail to apply release agent to the receiver or doesn't to fill in the receiver cuts with clay to prevent the receiver filling with epoxy. Looking for these types of flaws may reveal problems when correcting a problem rifle. Another potential problem is bedding in rifle with along heavy barrel.

The bull barrel is very popular and certainly delivers good accuracy. As an example, the single most accurate non-custom rifle I own is a heavy barrel Howa 1500 in .223 Remington. Bedding a such a barrel-heavy rifle can be an exercise in frustration as the thick barrel tends to make the receiver dip under its weight and you must control this

orientation during the bedding process. There is away to achieve good results in spite of a heavy barrel. First, disassemble the rifle.

Bedding a heavy barrel rifle begins with applying release agent to any part of the barrel that will contact the stock. Next, apply bedding material to the tip of the forend and about three inches ahead of the rifle receiver. Remember, the barrel must be in contact with this bedding when the forend screw is tightened down so be certain adequate bedding material is used. The two pedestals will be about one and one half inches in diameter respectively.

With the bedding in place return the barreled action to the stock and tighten the action screws as you normally would. If any of the material is forced out of the stock, trim it now before it settles. Once the bedding material is hard disassemble the rifle again. This yields support for the barrel. In any bedding job be certain to not affect how the receiver sets in the stock. Remove wood from under the receiver as needed. When done carefully this relieves contact with the receiver and ammunition magazine box.

With this done, apply receiver bedding as the instructions dictate, allow to harden, disassemble the rifle again and cut away

the support pillars for the barrel. The barrel is now free floating and you have superior bedding without fretting about the heavy barrel tilting the receiver during the process. This process has a few more steps than might be necessary with a lighter barrel but this works with bull barrels and does not require several tries to get the bedding job done right.

Naturally, if you wish to work up a fully-bedded barrel the barrel bedding is done first. Pillar Bedding Pillar bedding, in basic terms, replaces the moveable, changeable wood with an inert synthetic material. This solves most bedding problems. Forends may still warp and the stock may twist but wood warping concerns as well as the compressibility of synthetic stocks are reduced by pillar bedding. Work with pillar bedding begins as a standard bedding job.

The full pillar bedding process deserves a report all of its own and we will provide that at a later date. This article has given you some insight into the standard procedure for checking rifle accuracy and common problems. I hope that it has been a help and will keep those hair pulling moments to a minimum. AG

FROM THE ARCHIVE

Making a Custom Crossbow Cocking Aid

Crossbows are often permitted for the older or disabled hunter but cocking these heavy pull weight bows becomes a great effort without some form of cocking aid. A rope cocking device can come to the rescue by reducing pull weight by half.

BY NORMAN E. JOHNSON NOVEMBER 2011

ORIGINAL PP. 14-15

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Over the past ten years the modern crossbow has increased tenfold in popularity. Much of this upsurge is due to conservation departments relaxing the regulations governing their use. Modern crossbows shoot arrows at velocities of more than 300 fps but such power requires bow peak weights exceeding 150-180 pounds pull weight. Hunters line up at sporting goods counters seeking that magic bow only to find out they don't have the strength to cock it.

Cocking aids are available in the form of hand crank for some crossbows or rope cocking aids in one form or other. The ensuing problem is many of these devices fail to work properly. This is exactly what brings some archers to my gunshop. Here I shall site a recent case where making a better crossbow cocking aid was the best solution. The customer purchased an older model PSE crossbow with no provision for a handcrank or standard rope cocking aid.

This crossbow also lacked a provision for an optical sight, a problem I addressed in the July 2011 issue. All rope cocking aids reduce pull weight by 50 percent and make it possible for many older and disabled hunters to continue hunting, so I looked into the possibility of making a workable cocking device to fit this older PSE crossbow. The hooks are stainless steel, bent, curved and polished. The assembly is completed with tool steel axles and pulleys.

MAKING A CUSTOM CROSSBOW COCKING AID CONTINUED

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The twist allows the pulley to be at right angles to the hook and clear the cocking mechanism of the bow. The T-handles are attached at correct length for the crossbow. Special Cocking Device There are certain mechanical issues that must be dealt with as a crossbow is cocked under great force. In using a rope cocking aid a pair of hooks are attached to the uncocked bowstring. These hooks are pulled with a rope via a pair of pulleys attached to the hooks held by a pair of T-handles.

The rope is then looped around an anchor directly to the rear of the crossbow cocking mechanism. As the hands pull evenly on each handle, force at the laterally opposing hooks draws the bowstring toward the bow's cocking mechanism. A problem often arises where the rope cocking aid hook and pulley mechanism doesn't reach freely past the bowstring cocking slot and safety lever. Each crossbow model is somewhat different as are the rope cocking mechanisms.

In some cases there is a mismatch of parts under force and this can damage the bow, the rope cocking mechanism or both. In the case of the older PSE crossbow brought to me, I designed a very different type of hook and pulley system that pulls the bowstring smoothly into the sear and trigger without a hitch. I still used the hook and pulley concept, but in an entirely different way. I began with a fl at piece of stainless steel 1/8" x 3/4" x 3".

The key was making a half-twist in the center of the fl at piece of steel and using a halfinch wide fl at nylon strap in lieu of the commonly-used cord to pull the bowstring. This required a small, fl at pulley at one end and a hook at the other end of the cocking mechanism. The 1/2" diameter pulley is attached to the clevis end via a 1/8" tool steel axle. The axle is attached with silver solder at the corners.

All corners and edges of the entire piece are rounded and smoothed to prevent cord abrasions or part binding. As the shooter pulls the handles, cocking pull force is reduced by 50%. Note how the nylon tape is hooked back around the cocking mechanism of the crossbow receiver. The secret to this design is the halftwist in the fl at steel, which guides the hook and pulley assembly smoothly past the bow cocking mechanism aided by the surface of the fl at cord instead of a thin rope or cord.

This concept worked equally as well on a few other crossbows, cocking them with ease. The captioned photos quite clearly show how this special cocking device is made and used. Conclusions If a vital piece of equipment can rescue an otherwise unusable crossbow for an elderly hunter, it is likely worth the effort. If the crossbow has an optical sight, a stock and trigger, the gunsmith should stand ready to work with it. AG

PISTOLS

Working The Webley Mk VI .455 Revolver

Ugly but durable, the Webley Mk VI is possibly the most reliable revolver ever to see service.

BY DAVID R. CHICOINE NOVEMBER 2011

ORIGINAL PP. 16-19

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The British Army started using Webley top break revolvers back in 1887 and by the time the first World War rolled around the .455 Webley had become a true icon of the Empire. The big Webs were possibly as well known and regarded as the Lee-Enfield rifle.

The final .455 Webley top break design that we will present here was the Mk VI and was introduced on May 24, 1915, just in time for “The Great War.” This rugged double action revolver quickly gained a reputation for being very dependable in harsh trench warfare conditions and the Mk VI continued to be used hard through World War Two and into the Korean War.

Actual production of new .455 caliber Webley revolvers ceased in 1926 and in 1932 the .455 was officially replaced by the .38 caliber Mk IV Webley, however, this big ugly brute continued on in service and was not officially retired until 1963. We will often see WWI Webley revolvers that have been converted to shoot more easily obtainable .45 ACP ammo because original .455 caliber Webley cartridges are becoming somewhat scarce.

The conversion 455 caliber Mk VI saw service with British commonwealth troops from 1915 through 1963. Big and ugly, the Mk VI was one of the most reliable revolvers ever built. Involves removing material from the rear face of the cylinder to accommodate the .45 ACP

cartridge in halfmoon clips. There is a downside to the conversions because the .455 barrels generally have .455 to .456-inch groove diameters so many of the Webs converted to .45 ACP are not known for their accuracy.

To begin, as with any firearm, we should always take steps to assure the revolver is unloaded before beginning any work. Grasp the gun by its grip, being careful not to touch the trigger (#9) while at the same time keeping the revolver pointed in a safe direction. Use your right thumb to push down on the barrel catch (#10). The lever for the barrel catch is located on the left side of the frame, just below and to the left of the hammer.

While holding the barrel catch down, use your other hand to push down on the front of the barrel (#2), allowing the barrel to swing open fully. While the barrel is in the process of being opened, the automatic extraction system will eject any ammunition and/or spent cases that may be present in the Top-break revolvers are easily unloaded. Depress the barrel catch lever with your right thumb while applying downward pressure to the top of the barrel.

As the barrel opens fully the revolver’s automatic ejection system will raise and retract the extractor.

WORKING THE WEBLEY MK VI .455 REVOLVER CONTINUED

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Notice its “V” shape and that the top leg is hooked to and powers the hammer via a conventional stirrup while the bottom leg is providing downward tension to the mainspring lever, acting as a trigger return and hand spring. cylinder chambers. For safety’s sake, please be sure to remove any ammunition to a separate location while you are working on any firearm. Now, remove the cylinder. With the barrel still in the open position, unscrew and remove the cam lever lock screw (#33).

This screw has a large slot and it was designed to be loosened with a three-pence, a former English coin that was commonly Take note of the extractor cam between

the barrel hinge as this part becomes free to fall out once the barrel is removed. available. Rotate the cam lever (#16) toward the front all the way until you feel spring tension. The cylinder assembly is now free and may be pulled (#5) off to the rear of the barrel. Disassembly instructions for the cylinder itself will be found near the end of the text.

To remove the barrel, unscrew and remove the cam lever screw (#32) from the left side of the hinge and lift off

WORKING THE WEBLEY MK VI .455 REVOLVER CONTINUED

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This action will depress the cylinder catch, allowing the cylinder to be removed to the rear. Remove the mainspring, mainspring lever and two screws and you have it all on the bench. the cam lever (#16), making careful note of its position for later assembly. Unscrew and remove the joint pin axis screw (#31) from the right side of the hinge and, using a small punch, push the joint pin axis (#29) out of the hinge from right to left. The barrel (#2) may now be lifted out of the frame hinge.

You may now use a small pick to reach up into the barrel hinge area and pull down the extractor cam assembly (#17). Be sure you take note of its orientation for correct assembly later. If needed, the cylinder catch (#15, the Brits sometimes call this a cylinder retaining cam) may be removed by first un-

screwing the two cylinder catch screws (#15A) located on either side of the barrel. The front sight (#28) is held in place in the barrel by across-screw (#28a). We can now dismantle the action.

Unscrew and remove the stock screw (#25) and lift off the stocks (#40, left and right.) Use a pair of strong needle nosed pliers to compress the "V" mainspring, while at the same time pulling the rear of it to the left out of its seat in the frame while sliding it to the rear. Carefully unhook its top from its connection with the stirrup (#8) and remove the spring. A quick note.

To reassemble the mainspring, engage the top hooks with the stirrup first, then compress the spring and slide it forward into the frame until the dowel in the spring can be

pressed back to the right and into its hole in the frame. Use a small screwdriver as a lever to pry the rear of the mainspring lever. The barrel catch spring is still in place on the rear of the frame's recoil shield. (#12) up out of its seat in the frame.

Remove the lever by working it out to the rear and notice its position for correct re-assembly later. Pull the trigger (#9) to allow the hammer (#6) to rise and fall while holding the trigger to the rear. Unscrew and remove the hammer screw (#26) and lift the hammer (#6) up out of its opening in the frame. Unscrew and remove the two trigger guard screws (#24) and pull the trigger guard (#3) off the frame. Unscrew and remove the trigger screw (#26) and pull the trigger (#9) and hand

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1 frame 2 barrel 3 trigger guard 4 extractor 5 cylinder 6 hammer 7 sear 8 stirrup 9 trigger 10 barrel catch 11 hand (pawl) 12 mainspring lever 13 mainspring 14 barrel catch spring (#11) as an assembly down and out the bottom of the frame. Be sure you make note of how these two parts fit together for later reassembly. The trigger also contains three separate parts (36, 37 and 38) that comprise the cylinder stop mechanism.

The movable cylinder stop (#37) mounted on the trigger acts to hold the cylinder in place only when the trigger is in the forward position. The barrel catch screw (#27) may now be unscrewed and removed, allowing the barrel catch (#10) to be slid toward the rear and off the frame.

When reassembling the barrel catch (#10) to the frame, use a pair of needle nosed pliers with leather padded jaws to partially compress 15 cylinder catch 15a cylinder catch screw (2) 16 cam lever 17 extractor cam assembly 18 extractor cam pawl (not

shown) 19 recoil shield 20 recoil shield screw (not shown) 21 extractor spring 22 extractor cam pawl spring (not shown) 23 butt swivel 24 trigger guard screw (2) 25 stock screw 26 hammer or trigger screw (2) 27 barrel catch screw the barrel catch spring and hold it out of the way while you install the barrel catch and its screw.

The barrel catch spring (#14) is held into the frame by a small dowel the fits into a hole in the right-rear of the recoil shield and it may now be lifted off the frame. If required, the butt swivel (#23) may be removed by first driving out its retaining pin (not shown) and pulling the butt swivel down and off the frame.

It is normally not necessary to remove the recoil shield (#19) from the frame but, if need be, the shield is held in place by one screw (not shown) that passes through from its face and into the frame.

You will notice the recoil shield is dove-tailed Webley Mk VI .455 Revolver (Specifications subject to change without notice)

28 front sight 28a front sight screw 29 joint pin axis 30 extractor rod 31 joint pin axis screw 32 cam screw 33 cam lever lock screw 34 sear screw 35 stirrup screw 36 cylinder stop spring screw (not shown) 37 cylinder stop 38 cylinder stop spring (not shown) 39 sear spring 40 grips (stocks) into the breech face of the frame and slides in from side to side.

To disassemble the cylinder, first insert six fi red cartridge cases into the cylinder for support. Hold the cylinder in a padded vise and insert a strong pin punch through the hole in the extractor rod (#30). The rod is a conventional right hand thread and may be unscrewed. Once the rod is off, the extractor spring (#21) is pulled out from the front and the extractor (#4) may be removed from the rear of the cylinder. Reassemble the revolver in the reverse order of above.

This will get you started with any Webley project if a customer brings one of these grand old war horses to you. AG

RIFLES

Enhanced Battle Rifle

M14-based blaster provides accuracy and rapid fire.

BY DEAN MEIER NOVEMBER 2011

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Imagine a rifle and its attendant training so good that Taliban forces have been forced to modify their tactics. The Designated Marksman program was officially implemented in 2003 by the US Army and has been in high demand ever since. A Designated Marksman is trained to deliver precise, long range rifle fire out to around 600 yards. Unlike a sniper, DMs maneuver with their squad as normal and can be tasked with long range shooting and overwatching as needed.

Much like the Combat-Lifesaver program, this additional training extends the ability within a squad. As implemented, the Designated Marksman program and qualification calls for as-issue rifles, either M16A2 with iron sights or M16A4 with optics. Effective long range shooting is more about marksmanship and know-how than equipment. Issue M16s shooting 5.56mm ball are more than capable of getting consistent hits at a half kilometer but enhanced gear helps.

Purpose-built M16-based Designated Marksman Rifles have been fielded with good results and help make getting those hits easier. A potential problem, especially at extended distances, is the lack of “oomph” the 5.56mm cartridge offers. DMs are charged with engaging enemy

targets out to 500 meters and standard-issue rifle ammunition might not cut it. Increasing to 7.62mm potentially affords greater range. It certainly hits harder.

While training some of the first units deploying to Iraq in 2004 at Fort Hood we had many Soldiers assigned as Designated Marksmen being outfitted with M14s. While this took care of the power issue, these were simply rack-grade M14 rifles with a mix of after market bolt-on bases and optics. Few current unit armorers had the tools and knowledge to keep them running and critical parts like magazines were scarce.

Since then, procurement of purpose-built 7.62mm self loaders, namely the M110 SASS (Semi-Automatic Sniper System), has begun. These rifles are accurate enough to be considered replacements for bolt action sniper rifles and the SR-25 on which they’re based is virtually identical to the familiar M16-series, greatly reducing training needs, but they’re expensive as issued and were intended for sniper teams, not to be used at the squad level. Enter the Enhanced Battle Rifle.

The M14 Resurrected Enhanced Battle Rifles are a modernized M14 Battle Rifle with an

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aluminum billet stock that bears a resemblance to the T25 prototype that the original M14 is based. The stock, manufactured by Sage International (sageinternational.com), includes an M16-type pistol grip, cantilever mount, Picatinny rails. The barreled actions from M14s are set into the new stock and tweaked for accuracy. A quality adjustable power optic from Leopold or Nightforce is included. Picatinny rails are set above the receiver and around the forend, allowing modular capability.

A variety of day/night optics, lasers, vertical hand grips, bipods and other accessories can be added. As a squad-level rifle the EBR can be handled effectively at close distances but is intended for long range precision work. Properly tweaked, EBRs routinely shoot M118LR ammunition at one MOA, the same accuracy standard as the M24 and M110. As an M14-based rifle the EBR is chambered for

the 7.62x51mm NATO cartridge and is semi-automatic. The effective range is out to 800 yards, similar to the M24.

EBRs are beefy, weighing in at just under fifteen pounds unloaded, almost 3.5 pounds heavier than a standard issue M14, with an overall length of 35 inches. EBRs affords infantry squads the volume of fire of a self loader with the range and accuracy of a sniper rifle. Making The EBR Manufacture of the EBR is managed by Rock Island Arsenal based on the Department of Defense's Operational Need Statement for along range rifle serving within standard US infantry platoons.

Sage International has been contracted to supply the stocks. Rock Island Armory officials report that, despite the fact the M16series has been official issue since 1965, there are nearly 100,000 M14 rifles remaining in US inventory. This means the barreled

M14 action This improves rigidity enough that a double lugged receiver is not necessary. that is the heart of every EBR has already been paid for, thus saving tax payer money. The M14 was a staple of National Match competition for decades.

Accuracy tweaks included bedding the action with a mirror fit to the stock via bedding compound and allowing the barrel to float without touching the stock. To eliminate the tendency for point of impact shifts as the rifle heats a gunsmith must check that the op rod can't touch the stock anywhere and that the handguard doesn't bind the receiver or temperature shifts may cause point of impact errors.

Some shooters claim that inconsistent gas cylinder tightness can alter point of impact up to eight minutes as the barrel heats up. M14 rifles are more inherently complicated to accurize than AR-

ENHANCED BATTLE RIFLE CONTINUED

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This used to be require extensive hand fitting and assembly. 15s and anything that improves consistency helps. The Sage stock engineers many of the hand fitting fixes into the design. Barrel movement is controlled by a Barrel Whip Control Screw, minimizing vibrations and overall barrel whip.

The Op Rod Guide Block adds another mounting point for the barrel at the op rod guide, removing the forward barrel mounting/tensioning point at the forend, making the barreled action more monolithic and mounted in the receiver more solidly. The precision, CNC machining of the all-aluminum stock includes a bedding block to provide consistent receiver-to-stock tension. Across the top of the receiver is a cantilever scope base.

In addition to providing a sturdy mount for optics, this adds rigidity to the action and eliminates the need for a double lugged receiver. EBR work is done by a handful of Rock Island personnel that were previously familiar with M14 gunsmithing. These rifles are hand assembled and tweaked individually at a rate of 300 per month. A new EBR takes at least eight rounds to settle and "like itself" so test firing is done on site.

The completed price of these sniper-accurate rifles is less than one-fourth of the M110. Using already paid-for components is a savings while still proving an effective platform. To date, Rock Island has assembled over 5,000 Enhanced Battle Rifles out of rack

grade M14 rifles and most of those have been dispersed to units that have filled requests for them.

Members of the USAR Shooting Team have been tasked to offer Designated Marksman training in the States and abroad to teach the thousands of Soldiers now armed with them. These 5,000+ EBR systems are in service with US Army forces in Afghanistan, typically with two issued per squad. The EBR has proven to be a cost effective modular platform that successfully fulfills the needs of a Squad Designated Marksman.

Making use of existing M14s keeps procurement costs low while breathing life into this still-viable warhorse. AG

PISTOLS

Reader Forum

BY AMERICAN GUNSMITH EDITORS NOVEMBER 2011

ORIGINAL PP. 23-24

Doug Spooner The Armorer's Bench It just might, Mr. Spooner, so we'll pass your tip along to those having trouble getting the front sight to let go of a slide. In the case of 1911 pistols we have found, more often than not, that locking the blade securely in a vise and rocking it back and forth until it breaks normally works. All that remains in the slot is a bit of the tenon which can be punched out downward into the recoil tunnel.

M1 Garand Tanker I have a customer's Springfield M1 Garand Tanker model which he purchased a number of years ago from Springfield Armory. He says that shortly after purchasing it he had an incident that involved the operating rod flying loose from the receiver track during firing.

Thinking that perhaps he had not assembled the rifle properly after an initial cleaning, my customer installed the operating rod back into the gun, but after several firings the rod came loose again from the right hand bolt projection as well as its track, flew back and hit him, injuring his hand. He says he was using standard military ball ammunition when the incident occurred. Because of this incident my customer promptly re-assembled the rifle, oiled it up and put it away.

I am now trying to deduce the problem five years later. I have completely disassembled it and inspected all parts for obvious problems to include any abnormal bending or "tweaking" of the operating rod. The operating rod track in the receiver is properly machined and without any deformations as is the rod projection that rides in the track. I can find no obvious problem areas. I

should mention that during my early years while in the Army this was the weapon of choice back then when it was general issue.

I have fired the Garand extensively and never encountered this problem myself but have heard of rare instances similar to this, however, I can not recall the causation. John Funk John's Gun Repair & Sales Fall River Mills, CA We checked in with Springfield Armory on this one and received three possible causes. One, the op rod has been improperly fit to the receiver track. Two, the op rod is worn out. Three, the op rod receiver rail is worn or out of spec.

Since you probably do not have milspec drawings or gauges to check out the Tanker's existing measurements we can only suggest you establish the present dimensions, write them down and contact Springfield for the proper ones. If the root cause lies in the receiver you will more than likely have to return the gun to Springfield for corrective action. We agree, this problem occurring with the Garand is indeed rare. General Patton was so right when he stated the M1 Garand as being the greatest battle implement ever.

Remington 700 Extractor I have a Remington 700 in .300 WSM that has had the extractor replaced. The complaint is now the bolt is much harder to close than before. The bolt will close and extract the case so I feel like the right part was used. Before I start working on it, is there anything you would suggest? Dennis R. Riley We suspect the extractor was improperly fit to the bolt head in the

READER FORUM CONTINUED

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replacement. There is some area of it that is protruding or ill-seated and, as a result, creating resistance when the bolt is moved forward into battery. An indicator fluid such as Dykem or even a black magic marker applied to a clean extractor can tip you off to exactly where the interference is occurring. Whether it is correctable or not depends on where it is present but you may have to remove and replace the extractor in the long run.

Shotgun Questions I have several questions about shotguns and ammunition.

To begin, I have a Winchester '97 pump and am wondering about the proper chamber length. I purchased a Walker gauge from Brownells to check the chamber length. After disassembling the gun and removing the bolt the the chamber gauged at 2- 5/8". This surprised me because I was expecting it to be either 2-1/2" or 2-3/4". Is this because of the roll crimp typically used on old paper black powder shotshells?

What references would you recommend on the history on shotshell length, development and the time line for the changes? Now that I know this shotgun's chamber is too short to use modern 2-3/4" ammunition, is it advisable to use a chamber reamer to increase the chamber length to accept standard length shotshells? Given that this action is in good condition is it strong enough to handle the pressure increase of modern factory ammunition over older 2-1/2" shotshells?

My other project gun with this same issue is on an old single shot shotgun with a KK on the side. I believe this stands for Keen Kutter made by either Crecent Arms, Hopkins and Allen, or J. Stevens. This gun has a 2-1/2" chamber as measured with the Walker gauge. Would it be advisable to ream this chamber to accept a modern 2-3/4" shell? I would like to be able to shoot these guns, safely of course, with modern factory ammo instead of having to find 2-1/2" ammunition.

Failing this, how can I obtain or make shortened 2-1/2" hulls and load them? OK, Stacey, it's pretty obvious what you intend to accomplish is the rechambering of

what you believe to be a black powder shotgun made by someone and converting it to use smokeless powder shotshells. Firstly, let's begin with some history regarding the Model '97. It was a Browning design—who else?—that improved on the Model '93, itself an improvement on the Spencer pump gun.

The '97 was chambered for 12 or 16 gauge in both 2-3/4" and 2- 5/8" smokeless rounds. It was never a black powder gun as that would leave too much tell-tale smoke even for close-in trench warfare. Browning's '97 eliminated the open-on-recoil problems of the '93 and could still be fired until the magazine was emptied by holding the trigger to the rear and repeatedly cycling the action. The M97 with which you're involved has a 2-5/8" chamber. Can it be lengthened to 2-3/4"?

The last time we looked, that equaled the length of a fired 2-3/4" hull so the answer is yes. Whether or not the gun should be fired with anything other than low brass ammo depends on the metallurgy of the receiver. Crescent Arms made and branded shotguns for anyone – even local hardware stores - who wanted their name on a shotgun. As far as we know, H&A and J. Stevens were more selective.

In any case, it would be wise to have the '97 on hand checked out, perhaps by a local university with a metallurgical lab equipped to do so, whether you intend your personal use exclusively or the sale of the gun to another. Even if the testing indicates no faults or weakening, magnum loads are to be avoided.

Chamber pressure comparatives between high brass, low brass and magnum loads can be secured from the Sporting Arms and Ammunition Institute (saami.org, Stacey Jones As for your request for references on shotshells themselves you can turn up many links and cross-links by keying in "Shotshell History" into your favorite search engine. AG

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