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H&R 900 SERIES REVOLVERS

PASSAGE OF MARKSMANSHIP TRAINING SUPPORT ACT • BORESIGHTING WITH A LASER • REVOLVER SIDEPLATES, CLEA...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 105

DIGITAL ARCHIVE EDITION

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SAFETY & COMPLIANCE

Passage of Marksmanship Training Support Act

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2012

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The House of Representatives recently passed the Target Practice and Marksmanship Training Support Act (H. R. 3065), which will ensure that shooters and hunters have high-quality public facilities at which to participate in recreational shooting sports and to learn about firearms safety. The bill was included as Title XII of the Conservation and Economic Growth Act (H. R. 2578), which the House passed by a broad bipartisan margin. Sponsored by Rep. Heath Schuler (D-N.

C.), the Target Practice and Marksmanship Training Support Act amends the Pittman-Robertson Act to provide state game and fish agencies with more flexibility and discretion to be able to utilize Pittman-Robertson (Wildlife Restoration Trust Fund) funds for the creation, enhancement and maintenance of public shooting ranges. The bill is badly needed to respond to a significant decline in recent years of opportunities for recreational and competitive shooting on public lands.

The findings of the bill reads, "Congress finds that the use of firearms and archery equipment for target practice and marksmanship training activities on Federal land is allowed, except to the extent specific portions of that land have been closed to those activities.

In recent years, preceding the date of enactment of this Act, portions of Federal land have been closed to target practice and marksmanship training for many reasons and the availability of public target ranges on non-

Federal land has been declining for a variety of reasons, including continued population growth and development near former ranges.

Providing opportunities for target practice and marksmanship training at public target ranges on Federal and non-Federal land can help to promote enjoyment of shooting, recreational, and hunting activities and to ensure safe and convenient locations for those activities." "This is an important victory for all sportsmen, target shooters and firearms owners, as well as for future generations of participants who will need public facilities to enjoy the shooting sports," said Lawrence G.

Keane, senior vice president and general counsel of NSSF, the trade association of the firearms, ammunition, hunting and shooting sports industry. Susan Recce, NRA Director of Conservation, Wildlife and Natural Resources noted, "We expect that the changes to the Pittman-Robertson Act will prompt state fish and wildlife agencies to build ranges to accommodate the growing numbers of people who are participating in the shooting sports, whether it be competitive shooting, recreational shooting or hunting.

In Western states especially, population expansion to the borders of once remote federal public lands has resulted in closures of open space for people to target shoot." This is a nice win for all of us. Now, what sort of activities shall we host and attend to make good use of this?

PEOPLE & COMPANIES

H&R 900 Series Revolvers

Sturdy, well made and reasonably accurate, despite going out of business in 1986, H&R .22 revolvers might likely cross your bench.

BY WENDELL DEANER SEPTEMBER 2012

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Harrington and Richardson was in the business of making firearms from 1871 to 1986. From the period past the First World War to the end of its manufacturing run, the company produced many variations of .22 revolvers with model numbers ranging from 900 to 999. Some of the very similar firearms it produced had no model numbers (for a time) or were labeled with a name, such as the Sportsman. These little guns were sturdy, well made, and reasonably accurate.

Many are in use today and you may find an example coming into your shop for repairs at any time. Fortunately, the 900s are not difficult to work on. Many parts are still available but some may be easier than others to obtain. Brownells has a few and Bob's Gun Shop (gun-parts.com, fax: seems to have a good selection. Use Google to search "H&R gun parts" will bring up more suppliers. For revolvers that were manufactured from 1934 to 1986, finding parts is not the chore that one would suppose.

The good news is that the most likely suspects, cylinder pins and mainspring assemblies, are fairly easy to find. The barrel is pinned and screws out. Dedicated action wrenches for this gun would not be easy to find as would barrel vises. That being said, something from most shops could probably be rigged to twist off the barrel. Most of the time this is not necessary but I have seen some of these guns with loose barrels you could actually shake with hand pressure.

There are three main ways for the solid-frame revolvers to carry a cylinder. The first is simply a pull-out pin which allows the cylinder to fall out of the frame to be divested of its empty cases. The pin should be used to push the ejector rearwards and

empty the empties. The next mechanism allows the shooter to pull out on the cylinder pin, allowing the pin and cylinder to drop out as a unit. The pin is then pushed to eject the empty cases.

The third idea was a swing-out cylinder on a yoke, again released by pulling on the cylinder pin. The 999 Sportsman series are break-top revolvers with an automatic ejection feature. These revolvers are still very popular and prices are going up. Although I think it's ridiculous, I recently found a Sportsman with an asking price of \$700.00 online. I think \$350.00 is more reasonable at this time, however, this just goes to show that these guns have a following.

Many of them are passed down from generation to generation and are deserving of respect when brought in for repair. I have found the two most common problems presented with these revolvers are missing cylinder pins (from the models that have an uncaptured pin) and a broken mainspring yoke.

The customer may complain that his revolver is "out of time" because the malfunctioning yoke sometimes allows the guns to fire reasonably consistently in single-action mode while shooting double action will cause misfires of half, or more, in a nineshot cylinder full of cartridges, at least until the broken yoke actually falls off the mainspring guide. This piece is made of a plastic material and is not particularly long lasting.

Numrich Gun Parts Corporation (gun-partscorp.com) has a plastic and a steel replacement part that is usually available. Be careful to order by model number as these parts are slightly different even though they function and are replaced the

same way. Replacement of a lost cylinder pin is easy as dropping it in, provided you can find the part.

The mainspring yoke can be replaced by removing the grips and partially cocking the revolver until a small pin, such as a paper clip, or brad can be inserted into the hole in the end of the mainspring guide. This relieves the tension and allows the whole assembly to be lifted out of the grip frame and replaced with the new assembly.

I have found that sometimes the mainspring that is supplied by the after market companies is not strong enough to give adequate power for the firing pin to consistently cause the cartridge to fire. A call to the supplier, use of the original spring or scrounging a spring that will do the job may be necessary. Miscellaneous coil spring sets are offered by Wolff Gunsprings but they are expensive and not necessarily specific to this job. I never throw any kind of springs away.

You never know when one can be used again. I believe the popularity of these revolvers was due to their ruggedness of design, simplicity of operation and modest price. I have three of these revolvers in my shop at the moment. The first is a model 900 that was offered from 1962 until about 1973. Mine has a serial number prefix starting with AD indicating it was manufactured in 1967.

My 1964 edition (No. 55) copy of the Shooter's Bible lists the model 900 as a nine-shot solid-frame revolver chambered in .22 caliber long rifle, long or short, standard or high velocity. Mine has "Model 900" stamped on the barrel along with ".22 Cal." It is listed as single and double action with an exclusive "Snap-out cylinder." The finish is H&R Crown-Lus-

H&R 900 SERIES REVOLVERS CONTINUED

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Above, the Model 949, in the middle, the Model 900, bottom, the Sportsman. Quick and easy. tre blue. Mine has a lot of tool marks showing but is a nice blue. The grips are supposed to be checkered "Cling- Fast" white Tenita, whatever that is. Mine has some kind of black hard plastic on the handle. The serial number can be found on the bottom of the grip frame. In 1964 this little gun retailed for \$32.25, but was probably available in the real world for a lot less.

This revolver is loaded and unloaded by pulling on the cylinder pin which releases the cylinder from the frame and allows it to fall into your hand. The pin is pushed which engages the star ejector popping out the empty cases. The cylinder is then reloaded with fresh ammo and reinserted into the frame.

The whole process only takes a few moments and actually isn't too bad of a system for a .22. The model 900 sports a hammermounted fixed firing pin.

The weight of my gun is 28 ounces, which is two ounces more than the nominal 26 ounces Shooter's Bible lists for a six inch barrel. The second revolver is an interesting variation on the theme in that it has a flat loading gate behind the cylinder and around housing and spring-loaded ejector rod screwed onto the right side of the barrel to facilitate loading and unloading. When the hammer is moved to half-cock the cylinder can be rotated freely to the right.

The cylinder also drops out of the frame when the spring loaded button on the left side of the receiver is pushed, unlocking the

cylinder This was listed as a "frontier" feature in 1975 advertising. The broken plastic yoke can be seen beneath gun. This is the main problem you are likely to encounter. pin to allow it to be removed. The cylinder does not have a star ejector, but empties can be pushed out one at a time with the cylinder pin.

The model 949 also boasts a framemounted firing pin and transfer bar ignition. This gun has a serial number on the bottom of the grip frame prefixed with "AM" indicating it was manufactured around 1975. Western look alikes were popular then and that would explain the quasi-Colt SA appearance of the grip frame and loading gate. In fact, the No. 66 edition of the 1975 Shooter's Bible describes the gun, "H&R's Forty

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After cocking the hammer, insert end of the paper clip here and you may then remove the whole assembly quite easily. Unfortunately, many amateurs have discovered this fact. This locking system is plenty strong for the .22 cartridge. Niner is a modern 9-shot .22 caliber revolver with frontier features." It is listed as retailing for \$56.00 or as the model 950 if nickel plated for \$62.00. The front sight is around blade and the rear is a pretty nice square notch adjustable for windage by drifting in its dovetail.

This gun came to me with—guess what—"timing" problems in the form of a broken plastic mainspring yoke and a split set of one-piece grips. Both are available from Numrich and have been ordered. The last gun in my collection is a nine-shot break-open Sportsman. This gun was offered in various configurations starting around 1932 and continued until the demise of the parent company in 1986. After H&R/NEF was acquired by Marlin the model 999 Sportsman continued to be offered in different guises until at least 1998.

Mine has an "A" prefix on the serial number indicating the gun was manufactured in 1940, the first year the company used letter designations for the year of manufacture. My gun also does not have a model number and is stamped as "Sportsman" on the left side of the barrel. The serial number can be

found on the inner front strap of the grip frame as the bottom of the frame is covered with the one-piece grips. The right side of the barrel has the company name and address at Worcester Mass., USA.

Just ahead of the cylinder the gun is marked ".22 long rifle ctg." Very faintly, on the cylinder itself, patent numbers 1904 and 2034 are barely visible. I believe these may relate to the "automatic ejector" feature and possibly the style of grip frame. The sights area square Patridge type in the rear adjustable for windage with some very tiny screws. The front sight is a fairly square blade that shows up as a post and is adjustable for elevation by loosening a screw in the front of the barrel.

The gun is "broke open" by lifting the hinged locking piece that also houses the rear sights and pulling the barrel down. The automatic ejector pops out the empties in the nine-shot cylinder and then snaps back into battery to reload the cylinder. A small rectangular button on the left side of the frame in front of the cylinder can be pushed to release the cylinder from the frame. With the cylinder removed the serial number is revealed, sans the A prefix stamped on the underside of the top strap.

The mainspring is accessible after removing the single screw in the rear of the one-piece grips. The grip frame is the "Rice" type attributed to Mr. Renzi Rice who obtained

the patent #2034632 on March 17, 1932. This is simply a "bird's head" design which enabled the manufacturers to use a variety of grip styles. The hammer still has a little color case hardening on it after all these years and sports a fixed-blade firing pin.

In my estimation, there is very little to distinguish this pistol from the other pre-war examples of firearms such as S&W and Colt as far as workmanship and finish are concerned. The '64 edition of the Shooter's Bible lists a 999 Sportsman with walnut stocks for \$54.50 and weighs a nominal 30 ounces. My gun has a hard rubber grip, almost likening to Gutta-percha, and weighs two pounds even.

The 1998 edition number 89 of the Shooter's Bible is telling in that it lists a ventilated rib Sportsman 999 for \$279.95 retail. I believe this gun could be popular today with the shooting public, but with manufacturing costs as they are it would probably be too expensive to be feasible. Fortunately, these guns can still be found on the used market, at least for now. During late January 2008 Remington acquired the Marlin Firearms Company, having purchased the H&R, New England Firearms (NEF), and L. C.

Smith brands in 2000. On May 31st, 2007, Remington was acquired by Cerberus Capital. During 2000, Marlin purchased the assets of H&R

H&R 900 SERIES REVOLVERS CONTINUED

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1871, Inc., and the name was changed to H&R 1871, LLC. Brand names include Harrington & Richardson, New England Firearms and Wesson & Harrington. Letter Prefixes Unfortunately, accurate records from the company concerning dates of manufacture and even model numbers are hazy at best. Many of these revolvers were made in a variety of configurations and styles while basically remaining the same gun.

The company started to use letter designations on their serial numbers in 1940 and here is the most up-to-date list I can find. Beware, as it may be off a year here and there. H&R started using letter prefixes for the years after 1940 starting with A. They skipped the letters I and O to avoid confusion with one and zero. Provided they also skipped AI and AO, this should be accurate.

A 1940; B 1941; C 1942; D 1943; E 1944; F 1945; G 1946; H 1947; J 1948; K 1949; L 1950; M 1951; N 1952; P 1953; Q 1954; R 1955; S 1956; T 1957; U 1958; V 1959; W 1960; X 1961; Y 1962; Z 1963; AA 1964; AB 1965; AC 1966; AD 1967; AE 1968; AF 1969; AG 1970; AH 1971; AJ 1972; AK 1973; AL 1974; AM 1975; AN 1976; AP 1977; AQ 1978; AR 1979. Disassembly of the basic H&R 900 series solid-frame revolvers starts by removing the cylinder pin and cylinder.

The other guns with a fixed pin area are a little different but basically the same gun. The extractor on the ones with removable pins can be separated by pulling the extractor out as far as it will go and then rotating it a half turn in either direction, freeing it from the cylinder. Inspect for rust and polish the shaft if need be for good function. A little Break Free applied here doesn't hurt. Further disassembly is initiated by driving out the front guard pin and the sear pin which is located below the hammer stud.

These pins are knurled on the right side and should be removed from left to right using a cupped punch. Remove the main-

spring assembly by partially cocking the revolver until the hole at the bottom of the mainspring guide protrudes below the mainspring seat, allowing the end of a paper clip to be inserted in the hole. This will take the tension off the spring when the gun is uncocked and the whole assembly can then be easily removed. Check that the yoke end of the guide is not broken or missing!

This is usually the area of most trouble with these guns. It should be replaced the same way it came out, with the wider end of the yoke up to fit in the hammer slot. Remove trigger guard, cylinder stop and spring, sear and spring, center pin plunger spring and plunger from the main frame. Drive out the knurled trigger pin from left to right and remove the whole trigger assembly noting its position. The assembly includes the trigger and spring, the lifter and its pin, and the lever and spring.

Remove the hammer screw from the left side of the frame and drive out the hammer stud to remove the hammer. On some of the newer guns there is only a pin here. I think it is a rare occasion that any of these little guns will need this complete of a breakdown, but we've all seen guns that have been used hard and not taken care of. Cheap .22s like this are notorious for that kind of abuse. Fortunately, there are still some parts floating around out there to replace anything broken.

Putting the revolver together again we start backwards, as usual, with a couple of caveats. After replacing the hammer, the sear spring, sear, and trigger guard must be assembled before reinstallation in the frame using a slave pin through the sear and trigger guard. The pin should be 3/16 inch long, not exceeding the width of the trigger guard, and 1/8 inch in diameter. Also, the cylinder stop spring must be inserted into the seat provided in the trigger guard before assembling the guard to the frame.

For the trigger assembly to be reinstalled the trigger spring must be in line with the spring seat in the bottom of the trigger guard slot in the frame. It's a little tricky, but you can guide the lifter into position between the hammer and the frame with a small screwdriver, pressing the whole assembly up into the frame until the pin holes line up. Replace the pins, driving out the slave pin with the sear pin. These little guns have been in use as plinkers and trail guns for generations.

Many thousands have been produced, and they can be found in dresser drawers and closets all over America. They turn up at estate sales and many times are brought to the gunsmith after granddaddy passes on. Inspect these revolvers carefully before accepting them for trade in and resale. Chances are, the only problems you will uncover will be with the mainspring housing and broken yokes or missing parts. This is the easiest area for amateurs to access and screw up simply by removing the grips.

The yokes are available in either plastic or metal. I was a little leery about using the metal type due to excessive wear on the trigger mechanism. I tried one on my Sportsman, and, so far, it has given excellent service. A little grease here doesn't hurt anything. Numrich sells the plastic assemblies in packs of six for less than sixty dollars, which is not as much as half the price of the single item. I think that says something about the frequency they may show up on the gunsmith's bench.

I have to recommend the heaviest mainspring you can find and will fit to facilitate double action function. The after-market springs are sometimes just too weak for 100% reliability. Don't cut coils from a heavy spring to lighten the trigger. You will just be asking for trouble. These revolvers make fine plinkers and trail guns and last for many years if treated well. AG



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1 Barre & Quill Assembly 2 Barre Catch 3 Barre Catch Pin 4 Barre Catch Pivot Pin 5 Barre Catch Pivot Pin Retainer 6 Barre Catch Spring 7 Barre Catch Spring Follower 8 Cylinder & Extractor Assembly 9 Cylinder Catch 10 Cylinder Stop 11 Cylinder Stop Spring 12 Extractor Extension 13 Extractor Spring 14 Firing Pin 15 Firing Pin Retaining Pin 16 Firing Pin Spring 17 Firing Pin Striker 18 Frame 19 Front Sight 20 Front Sight Pin 21 Front Sight Adjusting Screw 22 Front Sight Spring 23 Grip, Left 24 Grip, Right Harrington and Richardson 900 Series Revolver (Specifications subject

to change without notice) 25 Grip Pin 26 Grip Screw (2) 27 Hammer 28 Hammer Pin 29 Hook 30 Hook Slide 31 Joint Screw 32 Joint Screw Stud 33 Lever & Spring Assembly 34 Lifter 35 Lifter Pin 36 Mainspring 37 Mainspring & Guide Assembly 38 Mainspring Guide Rod 39 Mainspring Guide Seat 40 Rear Sight 41 Rear Sight Screw (2) 42 Sear 43 Sear Spring 44 Trigger 45 Trigger Guard 46 Trigger Guard Pin (Front) & Trigger Pin (2) 47 Trigger Guard Pin (Rear) & Sear Pin 48 Trigger Spring

PISTOLS

Boresighting With A Laser

We walk you through scoping a hunting rifle from start to finish.

BY CHICK BLOOD SEPTEMBER 2012

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Krypton is a rare chemical element with an atomic number of 36. It is Superman's worst enemy. Since you are not Superman, Krypton can help you make a name for yourself as a wizard at zeroing rifle scopes and electronic handgun sights. Krypton is one of the light amplifiers that make a laser a laser. It emits a green beam. Other amplifiers produce a blue or red light. There are gas lasers, chemical lasers, solid state lasers, infra-red lasers, UV lasers, X-ray lasers, pulsed lasers and constant wave lasers. Great.

But what is a laser and who dreamed it up? Suffice it to say the invention of the laser was definitely not a one-man operation. Do you remember Bell Laboratories? At one time it was the primary think tank of AT&T and operated like the legendary Skunk Works at Lockheed. That was before the Federal Government, who hasn't managed to do anything right since the Manhattan Project, broke up AT&T. The Nobel prize-winning brains that had developed and patented so much were derailed at least temporarily.

Among their contributions up to that time were the transistor and later, at General Electric research centers, the laser diode. Try operating a laser printer, listening to a CD or watching a DVD without one. In 1953, Bell Labs Charles Townes, James P. Gordon and Herbert J.

Ziegler produced the first microwave amplifier. It boosted microwaves instead of visible radiation but operated on the same principle as a laser which, basically, works by exciting and amplifying light.

In 1958, the Labs filed for a patent on its "maser." The following year, a Columbia University Grad Student, Gordon Gould, while working on his Doctorate thesis, first coined the acronym for laser: Light Ampli- On the bench in front of the kit are the adapters that screw in to the internally threaded end of the unit to secure it in the barrel. fication by Stimulated Emission of Radiation. (Go Lions!

I remember well the day our Light Blue pigskin warriors snapped the great Army team three-year winning streak with a 21 to 20 come-from-behind victory at old Baker Field. Manhattan Island reverberated with "Roar Lions Roar," the school fight song, for over a week thereafter.) Though precisely who invented the laser remains an open question, Doctor Theodore H. Maiman is credited with operating the first functioning one in 1960.

It employed a solid state, flash lamp pumped—meaning stimulated—synthetic ruby crystal grown for the purpose by Union Carbide. I had the honor and extreme pleasure of a lunch with Dr. Maiman

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to discuss the possible future uses of his laser. His answer to my question was, "It's a solution in search of a problem." To say he was modest in his response would go beyond understatement. Lasers has become an integral part of people's lives. Applications include consumer electronics, information technology, science, bloodless surgery, heavy and light industry, entertainment, law enforcement, smart bombs, a multiplicity of other military uses and, lest I forget, the shooting sports.

The lattermost is where you all can get into the action thanks to an outfit based in Cottonwood, Arizona called Laser Lyte. If the name is new to you it probably shouldn't be. The company was established 25 years ago and is considered the innovative and technological leader in civilian firearm laser applications. The initial one of those applications on my menu is using a laser boresighter to zero a scope already mounted on a rifle. Let's back up to look at how that scope should be mounted first.

If the gun has been factory pre-drilled for a scope base you don't have to be concerned about the screw holes being perfectly aligned with the bore. If otherwise is the case, making certain said alignment exists is totally on you. The bench you work on has to be leveled true. No tilting in any direction permitted. Wobbling is also outlawed. A rifle or barreled action is going to be placed on that bench after being clamped into a rifle vise. Both the vise and its contents must be trued.

A bubble-equipped Dead Center Finder (Brownells) will be used to place a mark just aft of the muzzle. Another mark will be placed on the receiver as close to the barrel breech as possible. Both marks must be

made without disturbing the position of the rifle. The same is true of the line you are to draw connecting those marks for it will indicate the center bore of the barrel. I recommend using a sharp, soft lead pencil for the line. It won't mar the barrel. The laser is shipped ready to go including batteries.

As with any laser never point it toward your own or anyone's face as permanent eye damage could result. and cleans off easily with detergent and water. Cut yourself two lengths of duct tape long enough to encircle the base and receiver. Assuming the base is a four holer, an advised choice for heavier recoiling rifles, determine and mark its center point both fore and aft. Measure the overall length of a loaded cartridge in the intended caliber.

A point on the bore center line starting at the chamber mouth and exceeding the case mouth length of the cartridge should be pencil-marked. That point indicates the primary positioning of the forward base holes. While maintaining base position with the bore center line, mark its rearmost holes on the receiver. The base should be long enough to accommodate this. Why are these location marks so vital? You do not want to drill into the chamber or the barrel extension. Not no way, not ever.

You must keep the base holes positioned over the marks. Wrapping the two strips of tape around your workpiece helps assure there'll be no movement. I choose to gain additional assurance by using small C-clamps or large spring clamps to further secure the base to the barreled action. Once you are confident the base has been immobilized, mark the holes to be drilled using the base pre-drilled and threaded holes as your locators. You're ready for the next step.

Remove the barreled action from the rifle vise and replace the vise with a Forster Universal Sight Mounting Fixture. The Forster is a substantial tool I've worked with for over ten years. One reason I favor it is its durability. Others include the hardened steel 10-32, 8-40, 6-48 and 3-56 bushings provided with it that have always eliminated run out during drilling operations and the bushing coming into play during tapping that prevents cocking or breaking a tap.

I have even risked the use of a handheld power drill with my Forster and suffered no mishaps. I do prefer and here recommend transfer of the fixture to a drill press or milling/ drilling machine, however. There's no sense risking any tainting of my wizard status. For the same reason, I further recommend hole depth limiting stops be placed on a drill despite the fact the machine tool involved is equipped with a depth-limiting feature. Back it up with a collar or other limiting means.

Take it from an old fella who'd like to keep the privilege wearing of his hard-earned, overly tall, sharply pointed headwear with the stars, crescent moons and pins that look like guns on it. There's nothing to equal a mindless drill bit tearing up more metal than it should to knock it right off my head. That fate, of course, would never happen to all you practicing wizards and those studying to become one, so I shall continue.

Use ample cutting fluid when drilling, withdraw and clean the tap of chips frequently when threading the hole drilled. When installing the scope base screws follow the X-factor

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The level can also be used to true up the rifle after the scope base has been installed. The dot is off center and blurred because the author feared the optical system of his camera might refocus the beam into his eye. To avoid this, the camera was switched from auto focus to manual, deliberately misfocused and tapped on one side as the photo was snapped. method. First, screw into left hand front hole. Second, screw into right hand rear hole.

Third, screw into right hand front hole and finally, screw into left hand rear hole. Tighten each progressively and in the same order. When the time comes later on use a blue thread-locking fluid to finish the process. Do not use any color but blue. The red stuff is so strong after curing it can jam a bolt closed permanently. Permanently, that is, until the bolt has been heated up enough to defeat the seal.

Usually, this is also hot enough to defeat the ability of any springs in the bolt to continue acting like a spring. More must happen before you bring on the laser Your customer has to shoulder the gun and bench rest it as though about to fire. The individual's head should be tilted so the cheek is in contact with the butt stock. Make sure this positioning is all very normal, comfortable and readily maintained. No cramping or straining is permitted as it results in unintended movement.

The dominant eye is focusing over the scope base and straight down the barrel. This focus remains constant as you pro-

ceed. Buy or make a thin, flat stick along the order of a paint stirrer. Place one end on the scope base. With the pencil, start at the bottom of the stick and move it up until the end of the pencil interferes with the shooter's line of sight. Mark that spot. Measure from the bottom of the stick to the spot you made.

Congratulations, you have just established the center points of the scope rings you'll be installing. Scope ring height is selected accordingly. After the ring posts have been screw mounted to the base following the X-factor method, rest the chosen scope on them and loosely cap the scope with the upper ring halves. Enlist the customer again. Move the scope forward or backward until a full view of the reticle totally dominates the picture being presented through the eyepiece.

Make certain the eyepiece of the scope doesn't sit so far back it presents any danger of recoil driving the scope back into the shooter's face. Eye injury is possible if the precaution is ignored and a nasty cut on the bridge of the nose almost assured. Tighten down the ring halves. Do not apply thread sealant at this time. Don't become frustrated with all the measurement details I'm dishing out and don't rush them any time during this scope mounting process.

James Purdey and Sons take over 14 measurements before starting to fashion a stock custom fit to the purchaser of a Purdey's Best shotgun. Each of those measurements is checked and rechecked during

the making of the stock even though the buyer of the firearm may have to be flown in for a checking. No wonder a Best costs so much. How much? If you have to ask, don't ever think about owning one. Laser Boresighter The instrument is contained in the Mini Bore Sighter (MBS) accessory kit available from Laser Lyte.

It will come out the sturdy case of the kit containing batteries. The laser emits if the switch is rotated to the on position. Do not point the large end of the laser towards anyone's eyes as the dot from the beam will be red, intense and can do permanent damage. The only green laser made by Laser Lyte these days is their Picatinny-mountable K-15. While chances a hunting rifle will have a Picatinny rail are slim, it will undoubtedly have a barrel.

The thin end of the MBS fits into the muzzle of that barrel wearing a caliber-specific adapter. Four adapters, ranging .220 to .270, .280 to .349, .350 to .439 and .435 to .50 all have "leaves" on the order of the older, and no longer favored, Series 70 1911 collet barrel bushings, so the adapter required for the rifle you're sweating over will be in the kit.

So will extra batteries, a bubble level doubling as a gun or scope leveler, a ring for attaching the bubble level to the business end of the MBS, a very small Allen wrench and four screws. The shorter screws are intended for the lower caliber adapters and the longer screws for the higher caliber versions. In practice, the screw is

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The gain medium (1) has the ability to amplify light. Energy to amplify, or “pump,” light is delivered to the medium (2) with an electrical current, light of a wave length differing from the light to be produced, a flash lamp or even another laser. The high reflector (3) is a true mirror. The output coupler (4) is also a mirror but made with properties that allow some light to exit. Every time the light is bounced back and forth between the two mirrors it passes through the medium and is further amplified.

Eventually the light will escape through the output coupler as a beam (5) which produces the familiar dot. turned through the adapter and into contact with the internal threads in the small end of the MBS. As the screw is tightened, the leaves become spread to both fill the bore and help secure the MBS in the barrel. Run a check on whether or not the scope is dead level. No, it’s not too late. You couldn’t do it previously anyway because the MBS wasn’t installed in the barrel.

Now that it has been made snug by gently pressing the MBS into the muzzle – which should be accompanied with a clockwise/counter-clockwise motion—loosen the rings enough to allow rotation of the scope. Get out

your gun vise, level and resecure the rifle. Assure it and the MBS are both level by placing the ring inside the bubble fixture. If required, reposition the rifle until the bubble centers between the lines. Pick a spot on the wall about seven feet distant and turn on the laser.

Rotate and adjust the scope until its cross hairs intersect the dot. The scope is level. Turn off the laser. Apply a bit of Blue thread locking compound and tighten the rings. For the initial sighting in phase, distance from muzzle to target is 25 to 30 yards. Ideally, the range should be 100-yards for making final scope adjustments. Install the MBS, snug it into the barrel and “fire” the laser at the target. Hold the dot at the point of illumination and adjust the reticle to cover it.

The rifle is not only bore sighted, the scope is operating along dead center bore. Now REMOVE THE MBS, back off to 100 yards, bench and bag the gun and go for a three shot group forming a cloverleaf. Failed the first time? Try a few more rounds. Didn’t quite do it, eh? Well, put on your wizard hat and head back to the bench. There’s something wrong with the rifle a laser can’t cure.

MAINTENANCE & REPAIR

Revolver Sideplates, Cleaning And A Surprise

Proper revolver maintenance requires learning disassembly and that means avoiding sideplate damage. This overview also features a classic revolver with a surprise.

BY ROBERT K. CAMPBELL SEPTEMBER 2012

ORIGINAL PP. 12-15

When a handgun comes into the shop one of the most basic steps is to determine if it's sufficiently clean or if dirt, lint and/or clotted oil has interfered with functioning. Often, a cleaning will unstuck apart and restore reliable function. The revolver is certainly not immune to malfunctions and when working with them surprises may be waiting. Cleaning a revolver is important and even after 170 years of use there are issues found. As one example, not long ago I examined a Taurus .38 caliber revolver.

The double action trigger simply did not function properly. Yet the woman, a widow, told me that her husband had purchased the revolver in the 1970s and it had worked fine. They did the typical homeowner test seen too often. There was only one firing session with less than a box of ammunition and the four inch .38 was kept at the ready for some thirty years. I was examining the revolver for a possible estate sale. As it turned out, the only thing wrong with the revolver was that it needed cleaning.

Evidently, the owner had simply squirted oil into the piece year after year and the rest is history. My experience with this revolver gave me much hope in a later experience with a Smith and Wesson but it turned out the Smith could not be repaired so easily. Whenever a malfunctioning revolver is identified the first step is cleaning thoroughly and properly, and procedures must be understood. One of the first steps is removing the sideplate.

I have seen sideplates pried off with a screwdriver, seen the barrel smacked against a table top and any number of abuses over the years. Sideplates are fitted precision parts and fitting varies among makes and models. Some Smith and Wesson revolvers are almost seamless, the definition of a precision fit. Those not appreciating this sometimes remove them in a haphazard manner, causing warping or bending.

I have seen the screws removed with no regard for their return to the original holes and then the sideplate pried loose with a screwdriver blade. The proper means of removing the sideplate is to carefully remove and line up the sideplate screws. Unless they are to be replaced with new screws, I put them back in the same hole they were removed from. Some of the revolver types use the front screw to retain the crane and it is often worn to fit the crane.

In any case, I am always careful to keep each screw in its rightful place. The first step in removing the sideplate is to remove the retaining screws carefully using a proper tool such as the Smith and Wesson screwdriver set from Brownells. Place the revolver sideplate up and hold the revolver frame stable, watching for movement in the sideplate as the task is performed. Tap the grip frame with a wooden handle or short piece of board. The plastic handle of the Brownells tool works as well.

The sideplate will move out of its position in the frame and may be lifted off. There is little movement but the sideplate usually

moves to the rear and out of the beveled top notch on modern pieces. With the action exposed you will wish to disassemble the revolver for a thorough cleaning. The flat spring of the revolver is removed first. Completely loosen the strain screw in the front strap. The flat spring then may be unhooked from the stirrup on the bottom of the hammer.

Alternately, some revolvers feature coil springs, such as the Jframe revolver. In this case the action is cocked with the hammer at the fully rearward position. A pin is placed in the hole in the spring, the hammer is lowered and the spring is lifted out. Lift out the rebound lever, being careful not to lose the rebound spring. A screwdriver may suffice but if you are going to perform this chore more than once a purpose-built Brownells tool is a nice thing to have.

Next, will cock the hammer and lift it off the frame and its pivot pin. The rebound bar and the trigger and hand lift out of the frame with little difficulty. The bolt requires more attention to detail but do not let it frustrate you. The bolt is a small part that must be managed with a small pick or punch and perhaps studied under magnification. The bolt is pressed down against the spring with one tool and the other pulls the bolt up off of its shaft.

The second tool is placed carefully under the bolt during this operation. After a thorough and careful cleaning with attention to the bear-

REVOLVER SIDEPLATES, CLEANING AND A SURPRISE CONTINUED

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38-44 Outdoorsman frame. Note the additional positioning studs in this frame that serve as a hammer stop and a trigger stop. This is excellent work. This was later eliminated with the modern sideplate levers in place. ing surfaces, the revolver is reassembled. First, the bolt is replaced in the frame. The bolt slides on the shaft until the spring catches and holds it in place. To replace the trigger on its slot, slide it down onto the pin while holding the hand to the rear and secure the trigger.

With the trigger in place, move the hand into its proper place. Next, the cylinder release is pressed and the hammer is placed on the

hammer pivot pin in the full cock position. You also need to keep the trigger pressed to the single action position at the same time. With a little practice it is not quite as difficult as it sounds. Next, release the trigger and press the hammer into the hammer down position. The rebound block will now be fitted into the back of the trigger.

The rebound spring is down, replaced behind the stud that retains the rebound. The safety or rebound lever down is placed into its pin on the rebound block. With the revolver reassembled we move to lubrication. The rule is less is more. A drop of oil on the internal parts that contact the other is indicated, in-

cluding the hammer, hammer pivot hole, pivot surface of the double action sear, stirrup on the mainspring Be certain it is persevered in order of disassembly. and hand.

I also like to oil the cylinder shaft or center pin. Too much oil attracts lint and unburned powder. When working with magnum revolvers, particularly those with short barrels, there will certainly be unburned powder and it must be cleaned from time to time. As an aside, the old pinned revolvers with recessed cylinders are particularly bad offenders

REVOLVER SIDEPLATES, CLEANING AND A SURPRISE CONTINUED

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Care should be taken at this point. This is the illustration of the usual movement. for collecting unburned powder under the case rim and may accumulate enough over time that chambering the cartridge becomes difficult. Be certain that this problem is addressed during the cleaning operation. Recently, a remarkable revolver came across my path. The Smith and Wesson .38-44 Outdoorsman is a relative rarity and is arguably among the finest ever manufactured.

An inordinate amount of hand fitting went into the Outdoorsman and remains in very good shape for 1931 production. However, the story was that at some point the piece had been converted to single action operation. The double action trigger could be

pressed but it did not cock the hammer, although the hand moved the cylinder. The piece was found at a pawn shop at a bargain price and there was very little story behind it other than the warning that the internals were given no warranty.

No one claimed to have converted it to single action, that was simply the assumption. The revolver could have been broken or cut up in any manner, however, upon examination the Outdoorsman was very crisp in the single action mode. This revolver also was fitted with a set of Jay Scott grips and a trigger shoe. The single action press on this Outdoorsman is possibly the finest I have ever encountered

on a Smith and Wesson revolver. While an interesting period piece, the real interest was internal.

Thinking that perhaps the pistol was only stuck in the single action mode and needing a through cleaning, the side plate was carefully removed. Initial examination confirmed that the action was the same as the 1917 Smith and Wesson and parts were on hand, however, significant observations made gave me pause. First, the action was not stuck. The piece was indeed intentionally converted to a single action operation only.

There would have been little difficulty in converting the piece back to double action, at least that is where our first appraisal led us. It appeared only

REVOLVER SIDEPLATES, CLEANING AND A SURPRISE CONTINUED

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Reader comments are welcome. the sear would have to be replaced but once the revolver was stripped something else was apparent. Two pins had been sweated into the frame. The job looked as if it were a factory job but Roy Jinks, Smith and Wesson historian, confirmed that the revolver left the factory in standard double action configuration. The pins act as a hammer stop and trigger stop. No wonder the single action press is so perfectly crisp!

Here was a revolver converted by a true craftsman and converted in order to give the user an advantage in long range shooting. The .38-44 designation means .38 Special on a .44 frame. Predating the .357 Magnum, the .38-44 was designed heavy handloads. These revolvers set a number of long range records including a high percentage of hits on 200

yard silhouette targets. No doubt the shooter decided to set this revolver up for long range use and the work done is flawless.

The pins are very well done and perfectly located. I cannot believe that this is the only time the workman performed this modification. Adding to the mystery, the revolver features an unusual non-standard long spur hammer. The hammer is obviously original as there are no weld lines or anything of the sort. It is marked "Registered Patent" but with no patent number. My research has failed thus far to locate any description of the hammer. Of course, this Outdoorsman had to be test fired.

Loading Black Hills .38 Special 148 grain wadcutters yielded 15/16 inch groups at 25 yards. A Winchester 158 grain RNL loading

of 1967 vintage gave 1.5 inch groups, same This is a Dan Wesson revolver. distance and shots. Using a handload consisting of Tennessee Valley Cast Bullets 190 gr. Flat point over #2400 powder at 890 fps, the revolver shot 1.0 inch groups, same conditions. What is to be done with this revolver? It has been cleaned thoroughly and checked for defects. There were none.

The primary wear is on the finish. The original case hardened hammer and trigger are in fine condition. The bore is sound. The revolver was put back together exactly as it was. To remove the pins and "restore" the piece somehow seems absurd, at least until we learn more about the modification. AG

MAINTENANCE & REPAIR

Pillar Bedding The Remington 700/40X

Controversy remains over the usefulness of adding a third pillar to a rifle action but I no longer question this method of bedding.

BY NORMAN E. JOHNSON SEPTEMBER 2012

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By now I have added a third bedding pillar to over a dozen rifles and in no case has this worsened the level of accuracy. Rather, the most encouraging result has shown a measurable accuracy improvement in more than half of these rifles. I have logically concluded from this that a third pillar is likely to improve or at least help maintain accuracy.

My experience has covered a representative sampling of makes and models including the Remington 700 and 40X series, Savage Models 112 and 12, Ruger Model 77, Winchester Model 70. Improvement is almost assured in conjunction with a really sturdy one piece Picatinny scope base. This treatise will cover the addition of a third pillar on a short action Model 40X Remington rifle positioned in the front trigger guard screw hole.

This work will involve the replacement of the front Filister head wood screw which aligns perfectly with an existing screw hole

in the receiver just forward of the trigger housing. This smaller screw hole is drilled and tapped for a larger 10-24 size screw. The main front and rear guard screws on this short action Model 40X Remington span 6 1/2 inches with the newly added forward guard screw just 5/8 inch short of center position, providing for a solid auxiliary pillar.

In the models 700 and 40X series Remington this presents a good third pillar location. On a few I have placed it more centrally, adding a stock escutcheon and new receiver screw hole. In preparation for setting the stock pillar hole, a larger threaded hole is drilled and tapped to replace the smaller threaded hole just forward of the trigger housing. I used a 1 5/8 inch 10-24 hardened Allen Head screw. The screw head is countersunk into the front of the trigger housing screw hole at an 82 degree angle.

A modified aluminum pillar, The tap seen at left is later used to tap the new screw hole. made by Score High Gunsmithing, extended to 1.165 inches in length, is used as a central pillar spanning between the action and the trigger guard. A 5/8 inch diameter through hole is cut through the stock using a piloted counter sink guided by a headless screw placed in the newly tapped central guard screw hole just forward of the trigger housing. The hole is about 1.175-inch in depth.

The formed pillar is then attached to the rifle action and tested for proper alignment and length as the action is lowered into the stock. Any binding of the new pillar along the sides of the newly drilled hole must be relieved. The attached pillar must be cut to length for a flush fit with the underside of the trigger guard. With the pillar properly fitted, apply release agent to the receiver and radius end of the central pillar.

PILLAR BEDDING THE REMINGTON 700/40X CONTINUED

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The modified pillar from Score High Gunsmithing is also shown here. Solid attachment to the action is necessary to assure perfect alignment with the other two stock pillars. Don't get any release agent to the sides of the pillar. The pillar is then bolted to the receiver exactly as it will be and perfectly aligned with the already-installed front and rear pillars. These three pillars will then form a precise coincident axis with even bearing surfaces as the action is bolted to the stock.

With the stock held level in a padded vise and the central pillar ready to be set into position, have the front and rear guard screws ready to hold the action firmly into the stock. You won't be able to use the trigger guard, so have a washer or a drilled-out nut ready for the rear action screw. Lowering the action into position one more time is advised before mixing up the pillar bonding material.

Be sure the recoil lug is snugly against its mortise and, if the barrel is free floating, shim the front to level position to avoid a tipping of the action. I use Brownells Steel Bed as a bonding agent as it isn't too thin and doesn't migrate like less viscous materials. It hardens like steel and shrinkage isn't a problem. Coat both the attached pillar and the pillar hole walls with bedding material and lower the barreled action squarely into the stock.

I then start the action tang screw until it makes light contact followed by the recoil lug action screw. Tighten both evenly and with about the same torque as action screws. Allow the bonding material to set several hours until very firm. I usually remove the action from the stock before the bonding material is totally set. Its dimensional stability is

such that you won't have to worry about it. The tang pillar (rear) was positioned before the central pillar was added.

The central pillar adds an element of precision and rigidity to the overall bedding system. With the trigger guard absent you are able to see the new pillar protruding through its hole. Here you will want to clean up any excess bonding material flush with the stock and pillar. While the Steel Bed is nearly hard, a very small, sharp chisel can be used to shape things up at this juncture. You should be assured of a hundred percent success without complications.

Where optimal precision and accuracy is your goal, a properly installed central pillar is almost certain to help you. AG

MAINTENANCE & REPAIR

AR-15 Gas Systems

Are piston-driven or direct impingement-based gas systems better?

BY DEAN MEIER SEPTEMBER 2012

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Our Department of Defense might soon begin issuing a replacement for the M4 carbine and, if some people get their way, the entire M16-series as well. Considering most of the proposed replacements are quite similar to already-issued equipment it would be the first time the US military replaced small arms without an obvious improvement or change associated with the new device. The Trapdoor Springfield used breech-loaded metallic cartridges and supplanted muzzle loaders.

The Krag repeater replaced single shot rifles. Springfields and Enfields were much faster to reload and fired a more powerful cartridge than the .30-40 Krag. The Garand gave us semi-auto capability and the M14 more than doubled capacity. The last change made was to the AR15/M16 and probably the most controversial. The thinking was that troops measure “firepower” in volume, not individual hits, and can’t reliably hit point targets past 300 meters on the range, much less in the field.

A full power rifle cartridge is considered needlessly powerful and cuts down on volume while a light cartridge and rifle lets the trooper carry more. There are valid reasons to agree and to disagree with this concept, however, if this is the basis of chosen doctrine, the M16 is a good fit. Most of the proposed replacements to the M16-series, our longest serving rifle, involve changes to the gas system, specifically going from a direct impingement-based design to a piston driven arrangement.

Let’s look at the two systems and how they compare. AR-15 History Research conducted by the US Army Operations Research

Office (ORO) about small arms effectiveness concluded that the most desirable infantry small arms should be of .22 caliber, select-fire and with high velocity bullets effective up to 300 meters or so. This led to Project SALVO in the 1950s and requests to the Armalite Division of the Fairchild Aircraft Corporation to develop a suitable weapon.

Eugene Stoner, then at Armalite, began to develop a rifle based on his previously-designed 7.62mm AR-10 while Remington began work on anew .22 caliber cartridge based on the .222 Remington. The newly christened AR-15 was demonstrated to then US Air Force Vice Chief of Staff, General Curtis Le May, who procured about 8,000 AR-15 rifles for Air Force security forces to replace aging M1 and M2 carbines.

Shortly thereafter, US Do D Advanced Research Projects Agency purchased 1,000 AR-15 rifles and sent them to the South Vietnam for field trials. The Army initially contracted for an additional 85,000 rifles (the XM16E1) adopting it as a limited standard rifle to fill the niche until the forthcoming Special Purpose Individual Weapon system was completed.

The SPIW never passed the prototype and trial stages and in 1967 the US Army adopted the XM16E1 rifle as “US Rifle, 5.56mm, M16A1.” Every gun crank is aware of Vietnam horror stories with the newfangled “Matty Mattels.” The causes for malfunction during the first mass issue were due to excessive fouling by ammunition (originally-specified IMR powder was replaced by ball powder with insufficient testing), the lack of a chrome-lined chamber, no issued cleaning

equipment and the fact that the initial “space age” M16 rifles were promoted as needing no maintenance.

These issues were addressed and remedied by 1970 but stories of the original problems from over four decades ago still carry traction. The HBAR (top) is direct impingement-based in A2 trim while the 6940P (bottom) is piston driven using Colt’s Articulating Link Piston. The 6940P is Colt’s offering to replace the current M4. The big “problem” with the AR-15 today is the gas system.

Standard AR-15s use a type of direct gas operation, the origins of which can be traced to experiments conducted by a French firm, Manufacture d’armes de Saint-Étienne, or MAS, in 1901. Early service rifles based on the design include the MAS-49 rifle and the Swedish Agm/42. In 1956 Eugene Stoner patented a similar design that utilized a gas tube acting on the bolt carrier itself. In effect, the bolt acts as a fixed piston and the bolt carrier contains a movable cylinder.

Gas is routed into the bolt carrier and pushes on the bolt inside, unlocking it and pushing it rearward. In Stoner’s primary patent for this system (Patent Number 2,951,424) the reasons stated for this approach are low weight, an inherent simpler mechanism by using the bolt and carrier instead of separate components in the gas system, and an inline recoil. Based on the ORO specs, the design called for the most compact and lightest rifle possible.

Direct gas systems like Stoner’s have a number of things going for it, including light weight, simple construction with little to wear in the gas system, and

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The key of the 6940P (right) is solid and is the point where the operating rod actuates it, as opposed to letting gas flow inside it, as in a standard AR-15 (left.)) Not surprisingly, the piston-driven 6940P bolt is noticeably less fouled. the ability to free float the barrel as only the small gas tube with no moving parts is there to interfere.

Direct impingement-based self-loading designs have been found to really shine in longer-barrel (18" and up) usage where accuracy, particularly at longer ranges, is the goal. As with the design of any integrated system, there are compromises. Regardless of marketing hype, gas piston systems still need maintenance and the additional parts can fail.

If ammo is going to create fouling with a direct gas system that same ammo will foul any gas operated system.

Yes, the direct gas flow to the bolt and carrier means fouling is going to end up there. Guess what? If you are burning powder that fouling is going to end up somewhere. One benefit of the AR is that the entire carrier and bolt can and should be kept moistened with lube and occasionally wiped off. Often, manufacturers will recommend keeping internal gas system parts dry to prevent excessive fouling requiring dry scraping.

Anyone who has maintained M240 or M249 machine guns is aware of this and the special) The piston, attached to the spring-loaded

operating rod, fits inside the piston sleeve. The entire assembly slides in through the front sight base and the sleeve is held in place by a self captive retaining pin (shown here fully extended.) Colt engineered this to make backwards and upside down assembly impossible. tools that were created to accomplish it.

By keeping the "piston" (bolt and the inside of the carrier) of an M16 moistened, the bulk of this fouling can be wiped away. Yes, there will be some remnants of fouling, but this causes no harm. You do not have to scrape it all off.

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As these parts show, the bolt behind the gas rings in the 6940P has no fouling but the piston and sleeve does (left) while the bolt and firing pin of a standard AR-15 are more fouled. A number of high level High Power competitors have documented going an entire season of shooting their AR-15s without cleaning, just keeping the parts wiped down and dropping in some lube between shooting sessions.

Members of various military shooting teams maintain issue M16A2 and A4 rifles in the same manner and only remove the bolt from the carrier for cleaning annually. Typical maintenance after alive fire session is to pull out and wipe down the fully-assembled bolt and bolt carrier, upper and lower receivers with a rag, run a single wet, then dry, patch through the bore and place a drop of lube on each rail on the carrier and inside each drain hole. The entire procedure takes two or three minutes.

With a proper functioning AR-15 this will yield absolute reliability and needs to as competitions shot with issue rifles allows no abilis. A drill sergeant/instructor might freak at such a "dirty" rifle but it continues to function flawlessly. This approach mirrors the maintenance advice directly from Armalite in their Tech Report Number 29 and by TACOM, the folks that write Technical Manuals for the US Army.

Neither recommends scraping away every last remnant of fouling and states that improvised metal tools and picks remove the finish and cause damage. Wipe or brush away enough fouling so the mechanism continues to function. Clear it, pull out the carrier, wipe it and the insides of the receiver out with a rag and brush, relube as per the TM and reassemble. Two minutes, done!

Colt ALP In 2010 the Congressional Research Service released a report written by Andrew Feickert entitled The Army's M-4 Carbine: Background and Issues for Congress. In this report, issues about the M4 were addressed and officially released to our elected officials in Congress.

It was noted, "The Army is undertaking both the M4 Carbine Improvement Program and the Individual Carbine Competition, the former to identify ways to improve the current weapon, and the latter to conduct an open competition among small arms manufacturers for a follow-on weapon." One major study published by the United States Special Operations Command and cited in this congressional report (M-4A1 Carbine and Related Systems Deficiencies and Solutions: Operational and Technical Study With Analysis of Alternatives) claimed that the M-4A1 design was fundamentally flawed—due primarily to the shorter gas tube and barrel—and that a variety of factors "led to alarming failures of the M-4A1 in opera-

tions under the harsh conditions and heavy firing schedules common in SOF training and operations." SO- COM has since concluded that the M4-series carbine currently as issued did not meet special operations forces requirements.

Mr. Feickert's CRS report suggestions for potential improvements, dubbed the M4 Carbine Improvement Program, include replacing the direct-gas system with a piston gas system, strengthening the rail system and a heavier barrel for better performance during high rates of fire, among others. Colt's entry for this improvement is the 6940P, a modular, 5.56mm, piston-operated, lightweight magazine fed carbine with a one-piece upper receiver.

Colt's first piston design, the 1020 (M5 Piston Carbine), used the rear portion of the carrier to prevent carrier tilt. The 6940P, similar to the 1020, incorporates Colt's Articulating Link Piston operating system that reduces the inherent stress in the piston stroke by allowing for deflection and thermal expansion. The ALP is specifically designed for ease of cleaning, disassembly, and assembly of parts.

While the company seems to be less enthusiastic about piston designs than other manufacturers, labeling them "Alternative Operating Systems" in marketing literature, Colt is not new to the concept. They fielded a pistondriven AR prototype in the late 1960s as the model 703.

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Colt's ALP design is an improvement on gas systems found in their previous M5 and 1020 releases that is designed to increase mechanical accuracy while reducing stress on the components during the cycle of operation. Inherent stress in the piston stroke is reduced by allowing for deflection and thermal expansion and claiming less wear than that seen in competing piston-driven systems.

The ALP consists of a hardened piston sleeve surrounding the piston which reduces the cyclic rate and reinforces reciprocating parts, thus extending service life.

The modified bolt carrier features a stout contact for the piston where the gas key was previously and reinforcement of the carrier's rails ("skids".) Also reinforced is the piston sleeve retaining Colt 6940P Articulating Link Piston Rifle (Specifications subject to change without notice) 1 Charging Handle 3 Bolt Carrier Assembly 13 Takedown Pin, Lower Receiver 23 Buffer

Assembly pin that further reduces wear to the cam pin slot in the upper receiver. Colt redesigned the extractor, making it stronger.

The pivot forward design increases purchase on the rim of the cartridge case. Extraction issues have been a common problem in current M4s suffering reliability problems and this should alleviate them. Barrel life is listed at over 15,000 rounds. Any change to issue equipment will require retraining on use. To Colt's credit, this will be very minimal with the 6940P. The only change is in operator maintenance as there are additional parts—the piston system—that need to be removed for cleaning.

The ALP is held by a single, self-captive retaining pin that works just like the pins securing the upper and lower receivers. Pressing the retaining pin allows the entire ALP gas 42 Piston Sleeve Retaining Pin 43 Piston Sleeve 44 Front Sight Base 52 Sling Swivel, Detachable 24 Action Spring 27

Takedown Pin, Lower Receiver 29 Upper Receiver 32 Lower Receiver system to slide out through the front of the front sight base.

The piston and piston sleeve pull easily apart and are cleaned just like the gas ring area of the bolt and bolt carrier in a standard AR-15. For routine maintenance the operating rod can stay attached to the piston. If they should separate, snap the piston onto the operating rod and slide the piston inside the piston sleeve. Slide the entire piston assembly in through the front of the piston sleeve hole (inside the front sight base) until the piston sleeve is seating inside the sleeve hole.

Push the piston sleeve retaining pin into the front sight base until flush with the right side. Cleaning these additional parts is offset by a bolt that is now carbon free. With all the fouling contained in the ALP piston and sleeve, the bolt and 56 Piston 57 Operating Rod 70 Barrel

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carrier receive none. Reassembly is just as simple and the parts are machined to make backwards or upside down reinstallation impossible. The direct impingement-based gas system found in full length AR- 42 Piston Sleeve Retaining Pin 43 Piston Sleeve 44 Front Sight Base 55 Piston Assembly 15s can be utterly reliable with proper, minimal maintenance. It is the basis of winning rifles in High Power Service Rifle, practical 3 Gun and our nation's longest serving rifle.

However, good piston-driven systems might just 56 Piston 57 Operating Rod 58 Piston Sleeve Hole prove more reliable yet, especially in short barreled weapons

like the M4, and Colt's ALP is a solid contender there. As with any quality firearm, learn how to take care of it and it will take care of you.

AG Colt 6940P Articulating Link Piston Rifle (Specifications subject to change without notice) Colt 6940P Articulating Link Piston Rifle (Specifications subject to change without notice) 14 Bolt carrier 16 Firing Pin 17 Firing Pin Retaining Pin 18 Cam Pin 19 Extractor Pin 20 Extractor 21 Bolt 21a Bolt Lugs, Face 21b Bolt Lugs, Rear 21c Locking Lugs 26 Bolt Carrier Key 33 Gas rings 43 Piston Sleeve 56 Piston 57 Operating Rod

PEOPLE & COMPANIES

Reader Forum

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2012

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Colt Revolver I have a Colt Police Positive .38 Special Serial # 252XX in my shop that has a cocking issue. When attempting to cock the hammer or fire in double action the hammer will come back about a quarter inch, then stop. The process seems bound up someplace, however, the pawl or hand can't even come out enough to contact the cylinder. If I swing open the cylinder the firing process in both single and double action works fine. Once I close the cylinder again the pistol can't be cocked.

It doesn't appear that the bolt is catching on the cylinder. We recommend the appropriate Shop Manuals written by Jerry Kuhnhausen. Each covers in great detail the problems faced by and corrections for troubles gunsmiths encounter with revolvers, pistols and some rifles. All are available from Brownells. Among the manuals you'll find there's one on Colt wheel guns. Just how useful are Jerry's writings and drawings?

Each time this respondent has attended the Smith & Wesson Armorer's School—five at last count—the class has collectively been told by the chief instructor as he held up Kuhnhausen's manual on S&W handguns, "If you think you'll forget anything we've told you, get this book." For your specific revolver, it sounds like it's experiencing more than one difficulty. We suspect all are internal with the possible exception of cylinder end shake.

Rexio RC Series Handgun Referring to the schematic on page 7 of the November 1999 issue American of Gunsmith, part

number 2 is referred to as the barrel. This component appears to be made of two parts. The actual barrel and what we can probably call the monoblock or trunion. How are these parts are connected? I can envision 4 different attachment methods: Shrink fit, press fit, screw threads and some type of adhesive.

I acquired this gun chambered in .22 WMR for use as a project gun and want to replace the six inch barrel with a 10.5 inch barrel. I am capable of doing work of this type once I know how to remove the old barrel without destroying anything. Daniel P. Horn Huron, SD Joseph E. Deering You left out the possibility of the barrel being pinned in. Regardless, when we covered the RC in the '99 issue it was being imported by VAM Distribution, Wooster, OH.

It seems that VAM is no more, their remaining inventory was purchased in July 2009 by Century International Arms. The latter is where you can get your question answered but you must speak with Steve Kehaya, Matt Nodine Ithaca X-15 I am working on an Ithaca X-15 clip fed .22. The extractor spring and plunger seem to be stuck and there is no pressure on the extractor. Despite trying penetrating oil I can't get them out. Prentiss Brown This rifle went out of production in the mid-1960s.

One thing you could try is inserting a small tool in front of the plunger and push it to the rear to remove the extractor. Ease off on the plunger, reposition the tool to behind the plunger and push it out to the front. It sounds like there's no "spring"

left in the extractor spring—at least not enough to apply pressure on the plunger and against the extractor—but there may be enough to allow the spring to become visible after the plunger is removed.

Being very careful—and unless you've dug up a replacement spring in the parts aftermarket you'll have to be—nudge the spring to the front with the same tool you used on the plunger. If you stretch or damage the spring and have no replacement on hand, retain what's left and send it to Wolff Gunsprings (gunsprings.com) requesting a suitable replacement. Chamber Polishing What is the best way to polish a chamber after reaming?

Zane Andonna Purchase two chamber-specific mops from Brownells along with some fine and super fine polishing compound. J-B Bore Bright can be used instead of the super fine compound. Charge the mop with the fine compound and chuck it in a lathe or, lacking that, a variable speed hand drill. Making sure the drill is level with the bore, insert the charged mop in the chamber and turn on the drill at moderate speed. Move the mop into and almost all the way out of the chamber while turning.

Withdraw the mop and thoroughly clean the chamber with a high quality solvent using clean

READER FORUM CONTINUED

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patches. Charge the second mop with the super fine compound or J-Band repeat the steps taken with the fine compound. Clean the chamber again, then lightly lubricate it. J. Stevens .22 I have a .22 built by J. Stevens Arms & Tool Company. The top of the receiver is marked "Trade mark FAVORITE, Reg Us Pat Off Xfgn." On the left side of receiver is an "O" with an "I" inside. The serial number is 74X2 marked on the bottom tang/trigger guard. The chamber is eroded and bore is dark. I am thinking of rebarreling.

Is the rifle worth more as original or is it just an old shooter that a rebarrel job would make for fun shooting? As to the worth of the rifle, check the Blue Book of Gun Values. If it's an original Stevens Favorite it could be worth much more as is, despite the erosion and darkened bore. To a member of The Single Shot Rifle Association, for example, the value of its still-worthy parts should not be ignored by you. Instead of rebarreling we suggest a relining/rechambering job.

True, it would no longer be an original rifle, but you could end up with not only a fun shooter but a fun and accurate shooter. Savage, by the way, produces a fine imitation of the old Stevens. With the exception of a hammer block integrated as a extra safety measure, their M30 is a ringer for the Favorite. 1895 Mauser Guiderails I have a M1895 Mauser rebarreled to .243 Winchester. It's an excellent shooter but does not feed due to the difference in shoulder diameters of the original 7x57 and the .243.

Is there a guide or formula for redoing the bottom of the receiver? Can it be done with a Dremel tool or is a mill necessary? Wiseguns What you have in mind is considered remanufacturing by ATF since it involves the receiver. Unless you have a manufacturer's FFL don't attempt it. We know of an excellent custom gunsmith up in New England who has such a license. His name is Kieth Billado.

Contact him about the rework at Savage Series 67 And Master Index What issue did you cover working Savage Series 67 shotguns and H&R single shots? I have copies of American Gunsmith since 1993 but no master index. Burt Franke We have an index for topics covered since 1993 that is updated every month. Visit americangunsmith.wordpress.com/index Our records indicate no article on this Savage. To receive more input, write to the Savage-Stevens official historian: John Callahan, Westfield, MA 01085.

In the October, 2003, issue we covered the NEF Pardner and were delighted to learn that its disassembly/reassembly mirrored most or all other NEF and H&R single shots. Hopefully, you have a copy of that issue for reprints may no longer be available. The text enters into a fairly lengthy description on hammer spring reinstallation. Briefly, you will require more than one cross pin, slave variety.

One slave captures the lever/lifter/spring/barrel catch stuff which you push out of the way when installing the hammer to a point where it has passed through its slot atop the receiver. After aligning all associated holes, start in another cross pin slave. Spear the hammer spring on it. The short leg of the spring must seat on the integral hammer stud before pushing the slave out with the real cross pin.

The longer leg of the spring must be pushed over, inward and to one side where it can engage the ledge from which it was disengaged during disassembly. For this you'll find a simple tool we made to come in vary handy. The tool is a small screwdriver with a notch wide enough to capture the spring cut or filed into the driver blade. In finished form it resembles a two-tined dinner fork with very short tines. AG Eugene Miller Aurora, SD

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