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09

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INSIDE THE ARCHIVE

WORKING S&W .22 PISTOLS

WALTHER VIDEO MANUAL • MORE ON RUNNING THE 1911 • DOVETAIL SIGHTS AND MEASUREMENTS • RIFLE GROUPING...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 189

DIGITAL ARCHIVE EDITION

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PISTOLS

Walther Video Manual

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2019

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Walther Arms and Panteao Productions collaborated on a Walther PPQ Armorer's Bench video. This full-length presentation gives a detailed look and thorough review of the Walther PPQ series of pistols.

Larry Vickers from Vickers Tactical and Bret Vorhees, Vice President of Strategic Development at Walther, review the variants of the PPQ pistol, naming of the pistol, the modular backstrap system, field disassembly, cleaning and lubrication, reassembly and safety function check, cycle of operation, maintenance and troubleshooting, magazine maintenance, complete detailed disassembly, and accessories.

Larry Vickers demonstrates field use of the PPQ series including proper grip, drawing from a holster, shooting skills, clearing malfunctions, and a range drill to hone skills. Each Walther PPQ pistol will include a copy of this video on DVD providing the owner of the PPQ with a detailed review of the pistol. Segments from the video are also available to view on the Walther website. The full video will be available on DVD, digital download, and streaming from Panteao Productions.

DVDs are also available from Walther Arms. "Most folks who purchase a handgun rarely go through the printed owner's manual thoroughly. We wanted to come up with a video that would walk the owner of the new Walther PPQ through everything we feel they should know, or at the very least, have at their finger tips if they ever need it," said Fernando Coelho, President of Panteao Productions. "By listening to our customers, we wanted to give them everything they needed to know about the PPQ."

Walther is the performance leader, and what better way to show this to our customers than by explaining everything the PPQ consists of and what it can do," said Cody Osborn, Marketing Manager of Walther Arms. Since Walther doesn't offer an Armorer's Course to civilians, this video is the best resource for the disassembly, troubleshooting, and maintenance of a Walther PPQ.

This video-based owner's manual providing information about the gun and how to use it is a great approach that hopefully more gun companies will embrace.

MAINTENANCE & REPAIR

Working S&W .22 Pistols

Many people ignore the first generation S&W “budget” .22 LR pistols, but those who own and shoot them tend to keep these reliable and accurate pistols. Chances are likely that you will see one.

BY BRIAN R. SMITH SEPTEMBER 2019

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Above: Models of the S&W 422/622 family of .22 LR pistols include (T-B) an all-stainless 6" Model 2206, a blued/anodized 4" Model 422, and the aluminum alloy and stainless 2213 pocket pistol.

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Below left: The S&W 422/622 and derivatives trace their basic design concept to the 1908 Pieper Bayard pistol, which featured the recoil spring over the barrel and the recoil spring guide “keyed” to the slide by the removable front sight assembly. Below right: The familial predecessor to the Models 422/622 was the short-lived S&W Model 61 Escort of the early 1970s. Compare the Model 61 to the 1908 Bayard—the ejection port and extractors appear strikingly similar.

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Twenty years passed from the end of production of Smith & Wesson’s budget Model 46 .22 “field” pistol in late 1966 or early 1967 until the company introduced a competitive, low-cost replacement. The Model 46, introduced in 1957, was a “nothing fancy” version of its venerable Model 41 .22 target pistol. The Model 46 was not particularly successful, judging by only 8000-some examples made over a 10-year period in three barrel lengths.

Consumers either went for the much prettier, high-polished Model 41 at one end of the spectrum, or the inexpensive Ruger Standard Model pistol at the other.

In between were High Standards, Brownings, and Colt Woodsmans. 1987 saw Smith & Wesson introduce the low-priced Model 422/622 pistols in both 4" and 6" barrel lengths to compete directly in Compare the Model 61 to the 1908 Bayard—the ejection port and extractors appear strikingly similar. the marketplace with other value-priced blow-

back .22 semiautomatic handguns. These “budget” models also included the Model 2206, 2213, and 2214.

Early 422/622 production was performed in Springfield, and later pistols were made at the then-new Houlton, ME plant that featured circa 1990 state of art PLCcontrolled production machinery which increased production rates and cut costs. Unfortunately for Smith & Wesson, the 422-series pistols were a case of “too little, too late” because the Ruger Mk II pistol was firmly established as the market leader, and significant demand for the 422 and its siblings never really materialized.

Sales of the 422 family tapered off in the middle 1990s such that S&W management decided to end production in 1997 after only a 10-year run and use the production capacity at Houlton for the even less expensive S&W Model 22 LR pistols include (T-B) an all-stainless 6" Model 2206, a blued/anodized 4"

Model 422, and the aluminum alloy and stainless 2213 pocket pistol. 22A and other new pistols it was planning to produce there.

The 422 had a blued steel slide and dark anodized aluminum alloy frame, and the 622 featured a stainless steel slide and a silver anodized alloy frame. Both models were offered with fixed or adjustable rear sights.

Two to three years later, the 422/622 line expanded to include a rare ventilated rib model designated 622VR, an all-stainless version known as the 2206, two shortbarreled/short gripped versions marked as the 2213 (stainless slide, silver anodized alloy frame), and the 2214 (blued carbon steel slide and black anodized alloy frame). In a sense, the 2213/2214 “pocket” models actually took the 422-series family full circle back to their progenitor, the S&W Model 61 Escort.

The little Model 61 was a .22 LR pocket pistol offered by S&W from 1970 to 1973 following approxi-

WORKING S&W .22 PISTOLS CONTINUED

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Above: Chamber flag/takedown tool positioned between the front of the recoil spring guide and the frame with the recoil guide plug shown removed from the slide. Above right: Recoil spring and guide being withdrawn from the front of the slide. With the slide fully toward the rear, the recoil spring guide must be pulled out to the frame, then tilted upward as much as possible in order to clear the frame during disassembly and assembly.

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Above: Chamber flag/takedown tool positioned between the front of the recoil spring guide and the frame with the recoil guide plug shown removed from the slide. Above right: Recoil spring and guide being withdrawn from the front of the slide. With the slide fully toward the rear, the recoil spring guide must be pulled out to the frame, then tilted upward as much as possible in order to clear the frame during disassembly and assembly.

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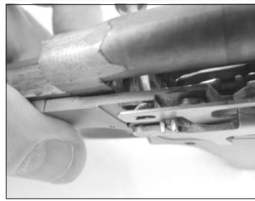
Below left: Screwdriver points to the slide stop spring, which is pried out and removed. Control the spring to prevent a "launch" into the far reaches. Below center: The E-clip retains the slide stop shaft; pry off with a jeweler's screwdriver taking care to control the clip and not scratch the frame even though it is covered by the grip. Below right: A screwdriver or punch is needed to push the forward arm of the spring plate away from the frame so the J-shaped retainer is free to allow the spring plate to rotate upward.

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With the slide fully toward the rear, the recoil spring guide must be pulled out to the frame, then tilted upward as much as possible in order to clear the frame during disassembly and assembly. mately five years of development using the 1908 Pieper Bayard pistol as inspiration. S&W designers and engineers borrowed heavily from the sixty-year-old Belgian pocket pistol, using such features as a rigidly-mounted fixed barrel and a recoil spring and guide rod located over the centerline axis of the bore.

The ejection port was thus low and towards the rear of the right side of the slide, and the low axis of the barrel significantly reduced recoil. The 1908 Pieper Bayard held a five round magazine, and the handle section of the frame was particularly abbreviated, making it a "trig- Control the spring to prevent a "launch" into the far reaches.

Below center: The E-clip retains the slide stop shaft; pry off with a jeweler's screwdriver taking care to control the clip and not scratch the frame even though is it covered by the grip. ger finger

plus two" sort of grip that was not a favorite of shooters. The front sight of the Bayard doubled as a disassembly "key"—push back on the recoil spring rod and lift up the front sight to remove it and the recoil spring rod and spring to further disassemble the pistol.

The above description mostly fits the S&W Model 61 Escort to a T. The Escort itself is a subject for another article, but its essential design was dusted off in the late 1980s as the basis for the value priced S&W 422/622 family of .22 LR handguns.

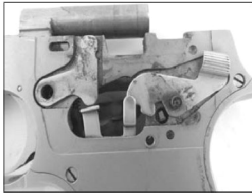
The 422/622 family was built on lightweight aluminum alloy frames and made use of a number of inexpensive overlapping and interleaved stamped steel levers and coil springs in the fire and safety controls, reminiscent of smaller versions of similar features in the older SIG P-series pistols. The near-vertical grip angle resembles that of the 1911 pistol, and an all-stainless 4" Model 2206 makes a fair approximation of a .22 LR 1911 target pistol.

Another design feature of the 422 family is that the lower end of the mainspring guide serves as a cocking indicator protruding protrudes from the bottom rear of the butt when the hammer is cocked. A very thoughtful and useful feature indeed. S&W engineers thoughtfully made use of the proven S&W Model 41/46 magazine in the new Model 422/622 family of pistols, except that the magazine catch slot was widened across the front of the magazine tube for the 422 family.

Note that original S&W Model 41 magazines have a narrow magazine catch slot towards the right side of the magazine tube, and these will not retain in any of the 422 family pistols. However, magazines are backwards compatible in any Model 41 or 46 chambered for 22LR. With the exception of the early Model 41 magazines, commonality of later-production magazines with a wide retaining slot was a feature of interest to Model 41 and owners alike. The came with 12round versions thoughtfully fitted

WORKING S&W .22 PISTOLS CONTINUED

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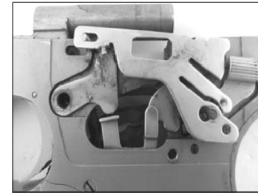
Above left: The spring plate is shown released and tapped to the rear so the oblong hole in the spring plate no longer retains the hammer pin, indicated by the screwdriver tip. The slide stop, spring plate, disconnecter, and safety lever can now be removed. Above center: The slide stop has been removed, showing the spring plate free to be withdrawn and allowing access to the disconnecter and safety lever. Above right: The spring plate has been removed, showing the disconnecter (L) and safety lever (R). Combusted .22 LR external lubricant and powder is much in evidence; one of the failure modes of the 422 family is excessive schmutz buildup.

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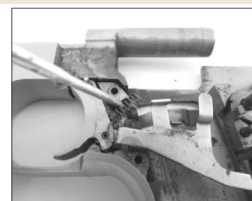
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Below left: Magazine safety lever spring is shown unseated from the frame at top. The spring is fairly stiff; exert care to control the spring during removal and installation to prevent loss. Below center: The screwdriver tip points to the combination trigger reset/magazine catch spring just unseated from the top of the black polymer magazine catch in the background. This photo again illustrates how filthy these pistols can get, requiring detailed and time-consuming cleaning. Below right: Once the trigger reset/magazine catch spring is removed, the rolling-pin-shaped trigger pivot pin can be pulled with pliers and the unitary trigger/sear lever assembly withdrawn.

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Combusted .22 LR external lubricant and powder is much in evidence; one of the failure modes of the 422 family is excessive schmutz buildup. by S&W with orange polymer followers to differentiate them from 10-round Model 41/46 magazines, but with the advent of magazine capacity bans first in California and then nationwide in 1994, away went the 12-round magazine in favor of a 10-round unit with a black plastic follower.

The 422-series pistols feature a low-mounted fixed barrel held fast to the frame at the front by a The spring is fairly stiff; exert care to control the spring during removal and installation to prevent loss. Below center: The screwdriver tip

points to the combination trigger reset/magazine catch spring just unseated from the top of the black polymer magazine catch in the background.

This photo again illustrates how filthy these pistols can get, requiring detailed and time-consuming cleaning. barrel nut, which have made the pistol family extremely popular with suppressor enthusiasts. Aftermarket barrel nut/adapters with forward-projecting suppressor mounting threads are readily available, and the low barrel axis centerline allows any of the 422-series pistols to be fitted with a small-diameter suppressor and still use the factory pistol sights.

The low bore axis significantly reduces muzzle climb, benefiting accuracy. Models feature the recoil spring and guide rod of the Pieper Bayard and the Model 61 Escort, located overbore. Instead of the front sight keeping it all together

as with the Bayard, a U-shaped block in the top of the slide is the “key” to disassembly of the S&W pistols. Models pistols shipped with an orange plastic Tshaped chamber flag with doubles as the takedown tool.

Fortunately, if the takedown tool/chamber flag should become lost, a simple fired .22 LR case also serves as a completely functional tool. Disassembly To disassemble a 422 family pistol, first remove the magazine and pull the slide (50) to the rear to insure that around is not chambered in the weapon.

Holding the slide to the rear about an inch open, insert the takedown tool (or the head of a fired .22 LR cartridge case) against the exposed front end of the recoil spring guide rod (30) visible in the front of the slide. Slowly close the slide allowing the front of the take-

WORKING S&W .22 PISTOLS CONTINUED

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Above left: Black polymer magazine catch is removed by pressing out its axis pin. The pin is very small (~0.064") in diameter, requiring the special tool shown. Above right: Sear spring is stamped, blued sheet metal that surrounds the mainspring assembly and has a "finger" extending upward to the rear of the sear. It is removed by lifting the tab at the bottom end from a recess in the frame and swinging the spring forward and out of position.

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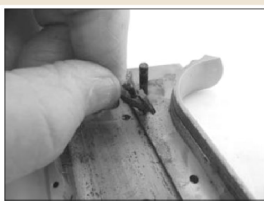
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Below left: Cocking the hammer partially until the hole in the mainspring guide is visible permits insertion of a screwdriver/paperclip to keep the mainspring compressed. Release the hammer, push the hammer axis pin toward the right side of the frame, and withdraw the hammer/mainspring assembly. If the hammer engages the sear, pull back on the hammer and trip the sear with a screwdriver or punch. Below center: After the hammer and mainspring assembly are removed, lift out the sear and its axis pin. Note its orientation for future reassembly—flat side forward, arched side to the rear, prongs facing up. Below right: With the hammer/mainspring assembly and sear removed, push out the hammer axis pin toward the right side of the frame to allow for the magazine safety lever to be removed.

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The pin is very small (~0.064") in diameter, requiring the special tool shown. It is removed by lifting the tab at the bottom end from a recess in the frame and swinging the spring forward and out of position. down tool (or .22 LR case mouth) to come to rest against the "wall" of the frame, thus holding the slide open about 5/8 of an inch. The recoil guide plug (29) can be lifted straight out the top of the slide.

Pay attention to its orientation as you remove the recoil guide plug; it is directional and can be reinstalled only one way. Pull the slide to the rear and withdraw the recoil spring guide rod and spring from the front of the slide, angling it upward to Release the hammer, push the hammer axis pin toward the right side of the frame, and withdraw the hammer/mainspring assembly. If the hammer engages the sear, pull back on the hammer and trip the sear with a screwdriver or punch.

Below center: After the hammer and mainspring assembly are removed, lift out the sear and its axis pin. Note its orientation for future reassem-

—flat side forward, arched side to the rear, prongs facing up. clear the frame. Lift the slide from the frame. Remove both grip panels (55, 56). At this stage I recommend taking pictures for reference as to how the many stamped links and levers are located and where the three springs are placed.

Such reference photos are handy when the inevitable phone call or doorbell interruptions occur. Next, remove the slide stop spring (52) from the slide stop lever/ejector (51) on the left side of the frame. Pry off the E-clip (32) from the slide stop pivot shaft, located on the right side of the frame at the lower right corner of the ejection port, taking care not to lose the E-clip or scratch the finish around it.

Remove the spring plate (15) by pushing its J-shaped retainer out of the frame using a small slotted screwdriver or a punch, accessing from the ejection port on the right side of the frame. With the spring plate detent out of the frame recess, lift the spring plate up, and slide it rear-

ward so that the plate clears the hammer pivot pin (12) at its lower right. Lift off the disconnect (3). Lift off the safety lever (28).

Insert the magazine into the frame to disable the magazine safety (21), restrain the hammer (11), pull the trigger (58), and slowly release the hammer into the fired position. Remove the magazine. Using a punch, push the sear pin (46) about a 1/8th of an inch toward the right so it is no longer engaged in the left sideplate (48). Do not push the sear pin completely out of the frame.

Remove the three screws that hold the left sideplate to the frame, then push the hammer pivot pin just through the sideplate, and lift the sideplate from the frame. It may help to tap the right sideplate with a hammer handle from underneath to assist the left sideplate in releasing from the frame. Try to lift the sideplate equally, rocking it back and forth if necessary. Restrain the trigger so that it does not come off with the sideplate.

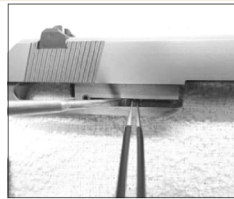
WORKING S&W .22 PISTOLS CONTINUED

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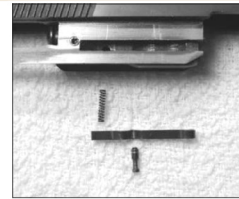
Above left: The stamped extractor is removed using a small screwdriver or punch (L) to push the extractor "in" towards the slide and grasping the dumbbell-shaped extractor pin with needle-tipped tweezers. The extractor pin is held in place by the extractor body resting in the small-diameter section of the pin. The extractor must be pushed in towards the slide just right to allow the pin to be slid toward the bottom of the slide where it can be gripped with pliers and removed. There is no spring behind the extractor pin. Above center: The 422 series extraction system bits are shown below the slide in approximate relative position, extractor spring, extractor, and dumbbell-shaped extractor pin. Above right: A factory S&W 422 firing pin is shown in the in-service position with the semi-circular retaining groove facing down. Factory firing pins are relatively brittle and are known to break at the tip and sometimes at the retaining groove.

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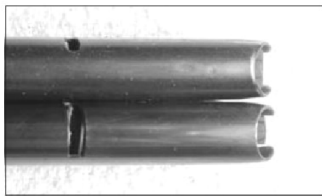
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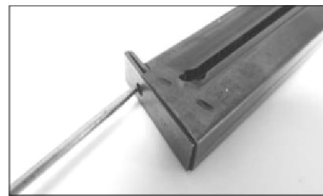
Above left: The stamped extractor is removed using a small screwdriver or punch (L) to push the extractor "in" towards the slide and grasping the dumbbell-shaped extractor pin with needle-tipped tweezers. The extractor pin is held in place by the extractor body resting in the small-diameter section of the pin. The extractor must be pushed in towards the slide just right to allow the pin to be slid toward the bottom of the slide where it can be gripped with pliers and removed. There is no spring behind the extractor pin. Above center: The 422 series extraction system bits are shown below the slide in approximate relative position, extractor spring, extractor, and dumbbell-shaped extractor pin. Above right: A factory S&W 422 firing pin is shown in the in-service position with the semi-circular retaining groove facing down. Factory firing pins are relatively brittle and are known to break at the tip and sometimes at the retaining groove.

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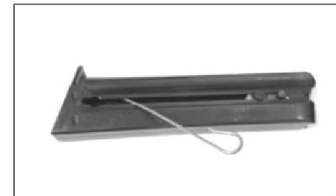
Below left: Difference between an early S&W Model 41 magazine (T) and S&W 422/622/2206 magazine (B) is the location and width of the magazine catch retaining slot. The 422-series magazine is backwards compatible with the S&W Model 41 and 46 pistols, but an early Model 41 magazine will not latch in a 422-series pistol. Below center: Begin magazine disassembly by depressing the floorplate keeper plunger at the bottom front of the floorplate, pushing the plunger out of engagement with the floorplate and off to one side to allow the floorplate to slide forward. Below right: Alternatively, a rigid hook inserted through the slot in the side of the magazine engages spring coils to withdraw the floorplate keeper plunger from the floorplate.

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The extractor pin is held in place by the extractor body resting in the small-diameter section of the pin. The extractor must be pushed in towards the slide just right to allow the pin to be slid toward the bottom of the slide where it can be gripped with pliers and removed. There is no spring behind the extractor pin. Above center: The 422 series extraction system bits are shown below the slide in approximate relative position, extractor spring, extractor, and dumbbell-shaped extractor pin.

Factory firing pins are relatively brittle and are known to break at the tip and sometimes at the retaining groove. Remove trigger spring (62), trigger (58), and trigger bar (59) as an assembly. Push out the magazine catch pin (18) to the right with a small diameter punch, finishing nail, or paper clip, and remove the magazine catch (17).

Push out the sear pin (46) to the right and remove the sear (45), noting the The 422-series magazine is backwards compatible with the

S&W Model 41 and 46 pistols, but an early Model 41 magazine will not latch in a 422-series pistol.

Below center: Begin magazine disassembly by depressing the floorplate keeper plunger at the bottom front of the floorplate, pushing the plunger out of engagement with the floorplate and off to one side to allow the floorplate to slide forward. orientation of the sear for correct reassembly. Move the hammer slightly rearwards until a paper clip or other wire can be inserted into a small hole at the bottom of the mainspring guide/hammer strut (27).

This compresses the spring on the mainspring guide allowing the hammer assembly to be removed. Once the hammer spring is compressed, the hammer can be allowed to rotate forward and the hammer/mainspring guide assembly and the sear spring (47) can be removed from the frame. Once the hammer is out, remove the magazine safety spring (22), then the magazine safety lever (21).

The barrel (1) can be removed if necessary by first unscrewing the barrel nut (2) using either an aftermarket wrench from EWK Arms (EWKarms.com; \$24.00) or a shopmade wrench consisting of a piece of hardened sheet metal that fits the grooves in the barrel nut and to which torque may be applied. Slide disassembly entails removal of the extractor and the firing pin.

Remove the sheet metal extractor (4) by pressing it toward the slide against extractor spring force near the extractor pin (5) using a small punch or screwdriver. Using fine-pointed tweezers, pull down on the extractor pin while maintaining force to the extractor as above. Ordinary needle-nosed pliers are too large to fit the extractor groove in the slide. The tweezers you use need to have a fine point and be serrated or have a thin coating to facilitate grip on the extractor pin.

It may help to apply cleaning solvent to the underside of the slide and the extractor pin itself to help remove carbon deposits that may be binding the extractor pin in its recess. The extractor pin is dumbbell

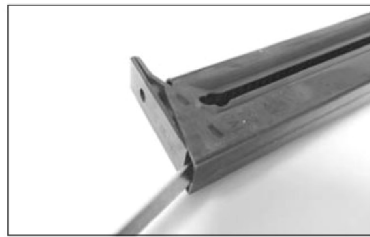
WORKING S&W .22 PISTOLS CONTINUED

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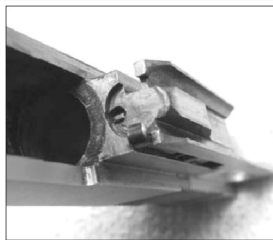
Above left: A small slotted screwdriver inserted between the floorplate and the rear wall of the magazine body acts as a lever to start the floorplate forward and out of the magazine. Above right: Magazine shown fully disassembled. Top to bottom, body, spring with floorplate button, floorplate (L), follower (R), follower thumb button.

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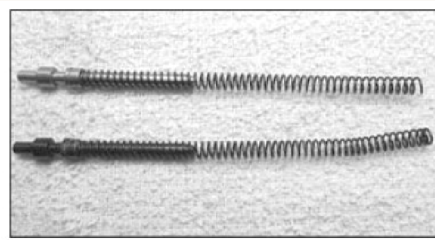
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Far left: Business end of a Model 622 slide exhibiting an arc section of .22 LR combustion products shown to the left of the breechface. Dirt buildup in this area of a 422-series pistol can prevent the slide from going into battery and the pistol from functioning. Left: Model 622 recoil spring and stainless steel guide is shown above a damaged 422 recoil spring and its blued guide. In many cases a 422-series pistol may be unaffected by such a damaged spring, but if sufficiently deformed the slide will not strip cartridges from the magazine or feed them properly. Wolff lists recoil springs under "422/2206" in their website.

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Top to bottom, body, spring with floorplate button, floorplate (L), follower (R), follower thumb button. shaped, and the extractor body fits in the reduced diameter section of the extractor pin to hold it in place. Pushing the extractor inward toward the slide takes the extractor out of the path of the extractor pin, allowing the pin to be withdrawn from the bottom of the slide.

Once the extractor pin is removed, ease up on the extractor to keep control of the very fine coil extractor spring, set the extractor aside, and using tweezers or small pliers remove the extractor spring (6) from its recess. To remove the firing pin (7) and its return spring (9), drive out the spiral roll pin (8) from right to left and withdraw the firing pin and spring to the rear of the slide, noting that the notch in the firing pin faces down.

Reassembly Reassembly is in reverse as the saying goes, but here are some useful tips. First, make sure the notch in the firing pin is aligned downward. It helps to partially install the firing pin roll pin ahead of time so that the firing pin can be pushed forward with one hand while tapping the pin further in place with a hammer held in the other.

Alternatively, an object such as a block of Styrofoam, wood, or a rolled section of corrugated container can be employed to push the firing pin forward against its return spring's force to allow the retaining pin to be seated. Second, if you've disassembled the hammer spring from the hammer spring guide, first reassemble those components and partially compress the hammer spring on its guide so that a paper clip can be installed in the hole in the bottom end of the guide.

Third, install the stamped levers on the left side of the frame in this order: Safety lever, spring plate, disconnecter, and slide stop lever. When installing the spring plate, align the spring plate such that its hook-shaped detent is above the surface of the left side of the frame and that the larger part of the double hole aligns and slips over the hammer pivot pin.

Push the plate's spring finger towards the frame at the hammer pivot pin and slide the spring plate forward so that the notch in the pin is the smaller diameter end of the oblong hole in the spring plate. Finally, place the slide on the frame, reinstall the recoil spring and guide assembly in the slide, and rest the front tip of the recoil spring guide against the takedown tool (or .22 LR case).

Push the slide forward on the frame and reinstall the recoil plug once the slide and the notches in the recoil spring guide are aligned. Pull the slide slightly to the rear to allow the takedown tool to drop free. The S & W models have a well-deserved reputation for dependability and accuracy but are known for a few problems. The most infamous issue is breakage of the tip of the brittle factory firing pin. It's not a question of if the factory firing pin will break but when.

A broken firing pin would sideline a 422-series pistol when S&W could not keep up with demand for replacements and later when S&W quit support of the platform altogether, resulting in gunsmiths needing to fabricate replacements. Fortunately, robust aftermarket firing pins are available from EWK Arms and Numrich Gun Far 22 LR combustion products shown to the left of the breechface. Dirt buildup in this area of a 422series pistol can prevent the slide from going into battery and the pistol from functioning.

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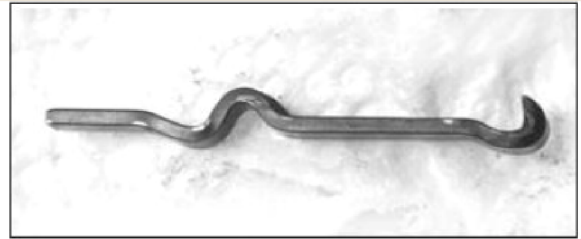
WORKING S&W .22 PISTOLS CONTINUED

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Above: A 422-series stamped extractor shown with the paper towel used to wipe combusted powder and lubricant from it, again testifying to the need for a thorough cleaning of any 422-series pistol to visit your shop. Above right: A verschmutzt Model 622 sideplate interior wall sprayed with G96 and set aside to allow the cleaner to work its magic. An ultrasonic parts cleaner with a neutral pH (6.5-7.5) water-based detergent followed by a hot rinse, or a solvent type cleaner is also useful in cleaning 422-series pistol components.

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An ultrasonic parts cleaner with a neutral pH (6.5-7.5) water-based detergent followed by a hot rinse, or a solvent type cleaner is also useful in cleaning 422-series pistol components. Parts, although they may not always be in stock due to demand. Almost as severe a problem is dirt buildup causing faulty function, but this is by no means exclusive to these S&W handguns.

A 422-series pistol with a high round count that's been "rode hard and put up dirty" without cleaning accumulates a prodigious quantity of .22 LR cartridge schmutz that can cause all kinds of failures. Such dirt can prevent springs in the fire control group from actuating their respective levers, the firing pin can get sticky in its bore, and the force required to blow back the slide can become too great for a given cartridge to properly cycle the pistol or for the recoil spring to return the slide into battery.

Also note, factory recoil spring force is sometimes too great for target-grade and the weapon won't cycle. Problems in the 422/622 finish department include the silver anodizing applied to the frame of S&W Model 622 pistols may turn a slight gold color with age, in which case it no longer aesthetically matches the silvery hue of the bead-blasted stainless steel slide. Unfortunately, this is often a function of silver-colored aluminum anodizing as it ages.

The stainless steel slides of the Models 622, 622VR, and 2213, and the stainless steel of the entire Model 2206 pistol can be prone to rust if the owner is not careful to keep free iron away from the stainless. The stainless

steel used in firearms is martensitic, and free iron can promote pit corrosion under the right environmental circumstances.

For example, if an owner uses steel wool to clean surfaces of stainless steel firearm components (never do this!) he will be facing a corrosion situation at some point from fine, microscopic particles of free iron on the surface or embedded in the surface of the stainless steel. The only effective way to remove free iron from stainless steel is to acid passivate the stainless with a blend of nitric and sulfuric acids or a strong citric acid specifically compounded for passivation.

Passivation requires knowledge, proper protective equipment, and safety practices and is the subject of a completely different article. The use of oxygen-blocking rust inhibiting gun care products can in forestalling corrosion in stainless and carbon steel firearm components.

Two products I have had positive experience with are Corrosion Technologies Corrosion X (CorrosionX.com, and EEZOX (EEZOX.com). Another potential source of problems in a S&W 422-series pistol (and common to many pistols) is magazine condition and cleanliness. As previously mentioned, the 422 family uses the basic S&W Model 41 magazine design which is generally robust, but performance of these magazines can suffer from weak or damaged springs, contamination, or bent feed lips.

The latter is a bit uncommon as the Model 41/422/622 magazine is fabricated of fairly thick heat treated sheet metal, but a four-

foot drop to concrete can still have a damaging effect. Being a fan of the Model 41 as well as the 422, 622, 2206, 2213, and 2214 models, I have purchased a large number of used Model 41 and 422 magazines at gun shows and from firearm dealers; I rarely pass one up if reasonably priced. Experience has taught that any used magazine should be disassembled and cleaned upon acquisition.

The spring is replaced if found to be bent or have taken a set, demonstrated by being substantially shorter than that of a brand new, unused Model 41 magazine that I keep as a standard for comparison of others. To disassemble a 422/622 magazine, first remove all cartridges. Using a small screwdriver or punch, depress the floorplate keeper plunger at the bottom front of the floorplate, pushing the button out of engagement with the floorplate and off to one side to allow the floorplate to be slid forward.

An alternative method is to use a dental pick or similar hooked tool through one of the slots that run the length of both sides of the magazine body to pull the magazine spring coils and floorplate plunger towards the follower and away from the baseplate. The spring can be held in this position for the next step, or a makeshift stopper can be inserted into the magazine body to keep the spring plunger from reengaging its recess in the butt plate.

While restraining the magazine spring and plunger above the baseplate, slide the baseplate forward off the maga-

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1 Barrel 3" 1 Barrel 4 1/2" 1 Barrel 6 2
Barrel Nut 3 Disconnect 4 Extractor 5
Extractor Pin 6 Extractor Spring 7 Firing
Pin 8 Firing Pin Retain Pin 9 Firing Pin
Spring 10 Frame 3" 10 Frame 4 1/2" 10
Frame 6" 11 Hammer 12 Hammer Pin 13
Hammer Stirrup Pin 14 Lockwasher 15
M/S Springplate ** Magazine Assembly (8)
** Magazine Ass'y (10) 16 Magazine Butt
Plate 17 Magazine Catch 18 Magazine
Catch Pin 19 Magazine Follower 20
Magazine Pin 21 Magazine Safety Lever 22
Magazine Safety Spring 23 Magazine Spring
24 Magazine Spring Plngr 25 Magazine
Tube (8 Shot) 25 Magazine Tube [10] 26
Mainspring 27 Mainspring Guide 28
Manual Safety 29 Recoil Guide Plug 30
Recoil Guide Rod 31 Recoil Spring 32
Retaining Ring 33 RS Body 34 RS EL Cl.
Target 35 RS EL Screw Target 36 RS Leaf
Screw Target 37 RS Leaf Target 38 RS
Plunger Spring 39 RS Plunger Target 41 RS
Retaining Spring 42 RS Slide Target 43 RS
Windage Nut Target 44 RS Windage Screw
45 Sear S&W .22 Pistols (Speci ications
subject to change without notice) 46 Sear
Pin 47 Sear Spring 43 Sideplate 49

Sideplate Screw 50 Slide 51 Slide
Stop/Ejector 52 Slide Stop Spring 53 Slide
Stud 54 Slide Target 55 Stock LH 56 Stock
RH 57 Stock Screw ** Stock Ass'y, LH
Target ** Stock Ass'y, RH Target 58 Trigger
59 Trigger Bar 60 Trigger Bar Pin 61 Trigger
Pin 62 Trigger Spring 65 Front Sight-
Pinned 65 Front Sight-Dovetail 66 Front
Sight Pin 67 Trigger Stop Screw zine body.

Sticky baseplates can be assisted off with a brass punch and urethane hammer, or jaw-protected pliers. Release the restraining force on the spring and remove the spring and plunger from the magazine body. To remove the magazine follower, slide the follower down until the follower thumbpiece pin aligns with the round hole at the bottom of the slot. Push out the thumbpiece pin and withdraw the follower.

The majority of Model 422 family pistols that have found their way to my bench required either a thorough cleaning or a replacement firing pin. Magazines are another typical issue. For example, I had customers bring in a 422 and a 2206 with the complaint that the magazine would not latch. Upon questioning it was determined that in

both cases the problematic used magazine was an early Model 41 example recently acquired.

Being a huge fan of the Model 41, I offered to simply trade "even up" for a 422 compatible magazine from my stash for the early Model 41 magazine and the owners went away happy. In another case, a 4" 422 arrived in a gallon-sized Ziploc bag. I observed to the owner that "some assembly required" would be needed which he acknowledged with a grunt. As it happened, a few missing parts were needed too, and Numrich and Jack First took care of that.

Firearms dealer friends and acquaintances of mine here in Pennsylvania generally wince when they are approached by a customer who wants to trade or sell a S&W 422-family pistol. One close dealer friend has a saying, "They are the best, inexpensive S&W .22 pistols that no one wants to buy." In my experience, once purchased and fired, owners tend to keep a member of the S&W 422 pistol family because they are at once very accurate and dependable. They can be quiet, too, as fans of suppressed guns will tell you. AG

MAINTENANCE & REPAIR

More on Running the 1911

Additional tips on everyone's favorite Browning design.

BY ROBERT K. CAMPBELL SEPTEMBER 2019

ORIGINAL PP. 11-13

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During the past few months I have ran into a number of problems and malfunctions with the 1911 handgun that even at this stage took a bit of time to figure out. Some were operator error caused by a lack of basic knowledge on the shooter's part. Others needed a deeper look. I have regarded the 1911 as artwork in steel and also as Old Ugly—depends on the moment. Regardless of mood, a properly set up 1911 should be good for at least 600 rounds between cleaning and with minimal addition lubrication along the way.

Incidentally, all of the problems and fixes encountered and discussed here occurred with good quality 1911 handguns. None were Philippine or Turkish guns nor were they parts guns or old GI guns. This brings us to the first lesson. A shooter brought in his Springfield Loaded Model. The problem, he stated, was that the piece would fire fifteen to twenty cartridges just fine then began to short cycle. He had began with Mec-Gar magazines and Remington UMC ball ammunition.

He switched to Wilson Combat magazines and Fiocchi 230 grain ball and had the same results. I examined the pistol and the

prognosis was good. The pistol seemed well put together. The problem was that he was running the piece dry. Firing a few rounds resulted in good function but after the pistol became heated it was a no go. I gave the young man a Foremost among these, in the author's experience, are recoil springs and extractors. schooling on properly lubricating the 1911.

With lube in the slide rails, on the barrel hood, and the barrel where it meets the barrel bushing I ran one hundred rounds of Remington UMC 230 grain ball without incident. The primary billing was for the ammunition and an easy but embarrassing lesson. The second lesson was more complicated. A shooter had purchased the then-new Kimber Custom II 10mm. He was experiencing short cycles with both Remington UMC and Sellier & Bellot ammunition, however, with Hornady 180 grain XTP the piece ran smoothly.

This was interesting. Since his Kimber was delivered with only one magazine, he had ordered two Mec-Gar 10mm 1911 magazines. He really liked the trigger action, sights and accuracy of the Kimber. Also, he claimed this pistol seemed to have less felt

recoil than his previous 1911 10mm for some reason. Unlike the first lesson above, this pistol was properly lubricated. It took one range trip and examination to find the answer.

The Remington UMC and Sellier & Bellot FMJ ball loads were clocking 1140 to 1160 feet per second over a RCBS Ammo Master Chronograph. This is hotter than the .40 S&W but far below full 10mm ballistics. The Hornady 180 grain XTP clocked 1269 fps over the same chronograph. The previous 10mm pistol the shooter owned probably used a 18.5 pound recoil spring as it is standard for the .45 ACP. This spring allowed function with generic ammunition while also working with full power loads.

The shooter reported that the previous 10mm sometimes "beat him up" in recoil while the Kimber did not. While there is no easy way to precisely measure recoil spring poundage, but the Kim-

MORE ON RUNNING THE 1911 CONTINUED

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.45 ACP extractor. The .38 Super, 10mm, and .45 ACP extractors differ as do those for Series 70 and Series 80 pistols. ber appeared to be properly sprung with a 22 to 23 pound recoil spring. While full power loads weren't difficult to manage, this was too much for lighter loads to operate. The answer? If the shooter wishes to fire mainly generic ball ammunition he must use a lighter recoil spring. This isn't difficult and gunsmiths have been using this concept with the .45 ACP and Precision Pistol loads for decades.

The fix was a simple seven dollar recoil spring. The magazine release, barrel bushing, and extractor are common replacement parts. While generally regarded as useful for the .45 ACP 1911, they have proven useful in properly gauging the 10mm 1911 as well. Other fixes required more time. As an example, a 1911 should eject at the proper angle, throwing cases over the shoulder of the shooter.

The case ejects to the right with the extractor as the fulcrum. Problems occur when the extractor is too loose.

The cartridge must feed into the chamber, fire, and eject in a controlled and smooth manner. During the feed cycle the cartridge case ejection cut is grabbed by the extractor. This occurs with the cartridge case feeding up from below, never with the extractor snapping over the chambered cartridge case. The cartridge feeds into the chamber and headspaces on the cartridge case rim. The pistol fires and the cartridge case begins to move to the rear as it is extracted.

The extractor pulls the cartridge case from the chamber and the cartridge case bumps into the ejector, sending it flying into the air. The extractor needs good tension to feed and extract the cartridge case. On the other hand, a too-tight extractor will present some diffi-

culty in feeding the cartridge into the chamber. I recently fitted an oversize firing pin stop to a Springfield Armory Mil-Spec that had given the shooter problems. Evidently, the fit of the firing pin stop wasn't perfect from the factory.

The pistol functioned but the firing pin stop was loose and he simply did not like it. I don't blame him. There were no malfunctions in firing thousands of cartridges, but it wasn't a correct fit. The firing pin stop must fit into the extractor groove when the extractor is fitted. Be certain the firing pin stop slides into the extractor groove as you install the extractor. You may need to file and modify the slide stop if the fit is too tight. If too loose, be certain the extractor cannot "clock" or rotate.

THE EXTRACTOR CANNOT HUG THE BREECHFACE TOO TIGHTLY OR THE CARTRIDGE-

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es will not feed properly. The consensus as to the proper clearance for extractor to breechface is 0.0625 inches. If your extractor hook is too tight for good function, look to the rear section of the slot or cut out in the extractor. In some cases you may elect to file the extractor hook, but in my experience the superior course is to work in the relief slot for the best fit. It is also important that sharp edges or burrs be dressed down.

Caliber Differences My experience with 9mm, .38 Super, 10mm, and .45 ACP 1911s indicate that there are different considerations for each chambering. With the .45, the lower part of the extractor hook should be polished to a bevel if it doesn't exist as issued. The cartridge case rim of the .45 ACP rides up on the belly of the extractor. The .38 Super and 9mm differ. The edge of the hook of the 1911 extractor is catching the rim on these cartridges properly.

The bevel on the extractor should match the individual caliber's bevel on the extractor groove. This is a Kimber Pro Carry. Adjusting extractor tension is sometimes needed. I do so as a matter of course on my personal 1911 handguns. I remove the complete slide assembly and then remove the barrel. I place the cartridge under the

extractor and slip it into place. The extractor should grasp the cartridge firmly but it should not have to be shoved into place.

If excess pressure is needed to snub the cartridge into the breechface tension is too tight. Bending the edge one way or the other may increase or decrease pressure on the cartridge case. This is seldom needed but sometimes works well. I run across low tension more often than too tight. Take your time on this adjustment. There are several points of discussion on the ejector. I do not recommend an extended ejector for safety reasons. This is particularly true of Commander-type handguns.

In normal firing the extended ejector isn't a problem. When unloading a handgun with a chambered cartridge there is a chance that the extended extractor will strike the primer of the cartridge and ignite it. This is bad news and may result in serious injury. I was consulted on once such case. While the shooter's injuries were not life threatening they were bad enough, especially because they can be avoided. It is true that the longer ejector ejects rounds sooner.

You may even modify the ejector to control the angle the spent case is ejected at. Begin at the top of the ejector and then create a bevel at perhaps a ten degree angle. Also be

certain that the ejector doesn't come into contact with the first cartridge up in the magazine. Another concern that I ran across again lately is the use of Shock Buffs. These are okay for some uses and they cushion the gun in recoil, but I think intelligent recoil spring choice is more important.

I have examined a pistol that had pieces of the buff chewed up in the dust cover. Luckily, the pistol still functioned. The real problem is that the Shock Buff impedes rearward movement of the slide. With GI-type guns the rearward movement is limited to the point that a spent case ejects fine but it is very difficult to enjoy normal ejection in administrative handling with a loaded cartridge. The magazine must be removed and the slide racked carefully to angle the loaded cartridge out the bottom of the slide.

This seems to invite bumping the primer against the ejector and should be avoided. The 1911 design is rugged and reliable but even the best made examples sometimes exhibit a problem. Often enough it is a misunderstanding with the operator that has resulted in a malfunction but sometimes not. It is our job to sort out and make it right. AG

MEASUREMENT & INSPECTION

Dovetail Sights and Measurements

Typical dimensions for installing and working with sights dovetailed into pistol slides.

BY ROBERT K. CAMPBELL SEPTEMBER 2019

ORIGINAL PP. 14-16

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The dovetail notch is simply a cut in the firearm that sets perpendicular to the bore and allows the sight to be fitted to the firearm. The notch is widest at the base and this is the sight degree. The degree allows the wedge to stay in place. Dovetail sights and their dimensions are very interesting. They are not that difficult to cut and it isn't difficult to install dovetail sights, but attention to detail is needed.

When you have to cut a dovetail you must dress up the cut, burrs, and parting lines as you finish the job. The final cut must be polished and beveled properly. It isn't just about the dimensions of the sight but also about

the angle. The job isn't something that is learned quickly, but with care a credible piece of work may be done every time. Most dovetail sights are manufactured oversize with the base flared. This requires some fitting to be done even if the pistol is originally cut for a dovetail.

These are radioactive tritium insert types. These are good sights. The Bomar cut was once standard. Most modern 1911 handguns are supplied with dovetailed sights. The Kimber, Novak, and EGW are common types. Rifles are quite different. The old 3/8 inch dovetail was standard with the front sight 1.5

inches from the muzzle almost all of the time. Dovetail pistol sights are another matter.

GI slides or gunsmith slides such as those from Caspian that are supplied without sights or cuts require cutting to our dimensions. Rear dimensions vary in width, from the LPA found on the EAA Witness at 0.450 wide to the Bomar on an older Colt at 0.350. Any custom project demands deciding which sight will be mounted on the handgun prior to any cutting. Quality cutters can be obtained from Brownells, Numrich Arms, Novak's Gunshop, and

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Top Bottom similar reputable sources. The cutters are numbered and the proper dimensions are listed by the maker for cutting the

slide and installing dovetail sights. As an example, here are several useful cutters listed with Numrich Arms parts numbers: 080 621 300, 60 x 300; 080 621 330, 60 x 330; 080 621 359, 60 x 359.

DOVETAIL SIGHTS AND MEASUREMENTS CONTINUED

ORIGINAL PAGE 16

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Two punches to the slide kept the sight tight. While not elegant, it worked. The front sight is factory while the rear is an aftermarket unit the author fitted some time ago. The Glock dovetailed rear sight is rather pinched in dimension. If you were to cut a Glock-size dovetail it need not be so pinched and straight would work well. The Glock dovetail is 0.250 by 0.79 deep with a 74 degree angle. It would not be difficult to machine your own high visibility rear sight for the Glock.

Cutters aid in machining a different dimension dovetail into slides such as a standard GI, modern Rock Island Armory, or Springfield Mil- Spec. The cut must clean and exact with the cut squared on the slide. After the cut, the sight is installed.

It isn't an easy fit and must be filed a bit to properly install the sight into Dovetail Sight Measurements Part Dimensions Angle Width Depth Heinie 60 degrees 0.300 0.060 Wilson Combat 60 degrees 0.300 0.070 Government Model 60 degrees 0.300 0.070 Officers Model 65 degrees

0.330 0.060 EGW 65 degrees 0.330 0.070 Novak 65 degrees 0.330 0.060, 0.070, 0.075 Kimber/XS 65 degrees 0.330 0.075 the dovetail slot. I usually lubricate the slot well and then tap from left to right. This works for me.

Dovetail Repair When a dovetail is damaged it isn't difficult to repair, providing it hasn't been completely wrecked. When the old sight in the dovetail proves difficult to remove, the slot may be too tight. If the new sight moves too easily then you need to address the fit. The procedure is simple enough. Perhaps the simplest is also usually the most effective. By using a small hammer and a flat tip brass punch the dovetail may be peened.

Hammer the punch lightly into several places inside the dovetail and slot, raising an area in the dovetail. A sharp prick-type punch raises divots in the bottom of the dovetail slot. After the punch work, the sight is inserted from left to right. The divots in the bottom of the dovetail slot will result in a tightened slot and should yield a

good fit. Another approach is punching up a divot on the bottom of the sight itself instead of working the dovetail slot over.

Note, sights are usually made of softer material than the hardened slide, so this isn't ideal but it can work. For those that find a dovetail slot that is truly troughed out, a small shim may be placed in the bottom of the dovetail under the sight itself. Never attempt to hammer or bend the dovetail inwards on itself as this simply damages the dovetail. Another fix that works sometimes is to fill the dovetail with Loctite. This works if the dovetail is a fairly tight fit with the sight.

The Loctite will not harden for some time, making it possible to move the sight about and adjust it in place before the Loctite hardens. When the slide recoils there are dynamic forces and cyclic loads in force. The sight may take a beating but Loctite accomplishes an excellent bond and may be used if the sight doesn't need to be adjusted for windage later. AG

RIFLES

Rifle Grouping Problems, Perplexing Solution

Sometimes solving an isolated shooting problem with our rifles will demand all the study and analysis we can put into it.

BY NORMAN E. JOHNSON SEPTEMBER 2019

ORIGINAL PP. 17-20

Every once in awhile we may be faced with a gunsmith/shooting situation that turns out to be more elusive than anticipated. I had built a rifle chambered for the 6x45mm cartridge as one of a quadruple switch-barrel set up. The chosen barrel was a Criterion six groove with a 1:8 twist which would stabilize bullets to just over 100 grains.

I went with a Model 700 Remington short action, originally chambered for .221 Remington Fireball, circa 2008, as my choice in building a super accurate, medium-weight rifle capable of extreme accuracy. The sear at center shows where the firing pin cocking piece engages when ready to fire. Following my customary diagnostic procedure, the action was precision bedded into a Bell and Carlson Medalist varmintweight stock without floor plate, but a magazine cutout did exist.

A bedding pillar/loading ramp was bonded to the magazine cutout as an integral unit replete with central action screw. Sighting equipment left nothing to guess work with a Talley Picatinny mounting system and a well-proven 32X target scope. There were no compromises. From the outset, including the bore break-in, the rifle displayed ordinarily fine accuracy with a number of good bullets and loads. But there was a lingering concern.

Along with the near perfect groups there were some questionable fliers and groups that didn't quite measure up. As I dry fired the rifle one day, with the bolt handle fully down, the bolt handle The firing pin cocking piece race is clearly pictured here immediately forward of the rear tang screw hole. jumped upward—enough to toss a penny a half inch upward. This left me with the nagging concern that this may be initiating a level of vibration sufficient to cause changes in the otherwise fine accuracy of this rifle.

Anyway, it set the stage for some serious investigation on my part with special emphasis on the bolt and firing mechanism of this rifle. Perhaps over-simplified, the basic cocking and firing of a common bolt action rifle could be described as follows: As the bolt handle is lifted upward, the internal firing pin and cocking piece is withdrawn from its spring-loaded forward position in the bolt through a camming action within the bolt plug, approximately 0.280 inches travel on the Model 700 Remington.

The forward rounded end of the firing pin cocking piece cams into position in a notch at the rear end of the bolt, allowing the cocked bolt to be released and withdrawn from the receiver. As

RIFLE GROUPING PROBLEMS, PERPLEXING SOLUTION CONTINUED

ORIGINAL PAGE 18

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As the bolt handle is pushed forward and lowered, the firing pin cocking piece engages the sear ready for firing. The flat surfaces of the bolt plug effectively control and limit the rotational function of the bolt and cocking piece. This clearly shows the flat surfaces of the bolt plug and firing pin cocking piece.

The lower bolt required fit and function enhancement referred to in text. the bolt handle is pushed forward and lowered into the receiver, the spring loaded cocking piece is in direct alignment in its slot, directly above and rearward of the trigger sear. During this stage the opened bolt handle is positioned directly above its slot in the receiver.

The rifle is then cocked by a firm push A 0.035" shim placed between bolt handle and mortise proved useful in earlier accuracy evaluation. and clockwise turning thrust of the bolt handle as the firing pin cocking piece engages the trigger sear. The bolt handle can

then be partially or fully lowered into position to its normal fire position. Typically, as a rifle bolt is fully closed, as viewed from behind, there should be a perfectly perpendicular engagement and alignment of the cocking piece and sear.

But weird things can take place within the bolt rotational tolerance as the bolt is fully closed, particularly where such tolerances are deemed excessive. I noticed some free play here earlier in the aforementioned bolt, but didn't pay much attention to it until later during further experimentation. As I viewed the action from directly behind, I raised and lowered the bolt handle a few degrees in each direction.

There was considerable rotary tolerance or movement by the cocking piece and bolt plug surrounding the firing pin assembly. With the bolt handle fully down on an empty chamber, the unrestricted bolt handle would rise a full

3/16th inch from its bottom-most position on firing. With a cocked rifle it could actually cause the cocking piece to separate from the sear through repeated partial raising and lowering of the bolt handle.

Further Searching My next course of action was an attempt to re-create the intermittent poor grouping by manipulating the bolt rotation to varying positions during actual shooting. For this experiment I chose a couple of my well-established loads. Please remember these tests were being performed on a highly accurate rifle, not an ordinary hunting rifle.

I began by shooting a few groups with the bolt handle in the normally closed, but not forced down, position on cartridges that chambered with little felt resistance on the bolt face. This essentially allowed the bolt full freedom against the headspaced cartridge. The first two groups were excellent at around 0.265 MOA average

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Both the bolt plug housing and firing pin reflect these changes, which led to a need for corrective action. Shims begin as 0.035" thick stainless steel. using 65 grain Berger bullets and 24 grains of Accurate 2015 powder. I then used the same load to record a 0.495" group that displayed vertical stringing of the shots as the bolt had been manipulated to different positions for each shot for this group.

At the conclusion of these earlier tests the rifle was definitely sending me messages, as guns so often do, and we fail to get the picture. I must point out here that test results such as these could only be concluded with a rifle capable of extreme accuracy. This is perhaps the last place one may look to as a cause of accuracy defects in a rifle. Accuracy with groups well under half minute of angle, shot with a perfect benchrest technique.

I finally concluded that full closure of the bolt handle on easily-chambered cartridges were the most likely to cause a bullet to

stray from the group. I could readily duplicate this condition, which told me I was on the right track. Analysis Into The Problem As was noted by observing the position of the firing pin head and bolt plug assembly on full closure of the bolt, a malalignment of the parts was obvious.

The right-hand side of the bolt plug (part that surrounds the firing pin assembly) made contact with the receiver while the left-side was raised a full 0.060". Meanwhile the firing pin cocking piece is engaged into the sear, ready for firing—albeit not truly square. Then, on firing, the parts tend to change alignment as the bolt plug rotates and falls back 0.016" toward normal, thereby creating a negative effect.

Such motion creates a moment disturbance within the bolt and receiver sufficient to cause a ripple effect or barrel vibration and ensuing erratic bullet grouping. Manipulation of parts immediately prior to firing clearly bore this out. In my previously published work on barrel and action vibra-

tion and dynamic motion I alluded to methods of identifying and controlling various aspects of these insidious processes.

Some of these included the general fit of parts critical to the makeup of a rifle, all the way from barrel fitting to action bedding, which can set up unpredictable motion about the action and barrel affecting bullet departure, hence poor grouping. While we could get lost in this discussion, we could also correctly argue that barrel motion can, indeed, originate in the action of a rifle.

Making Corrective Measures As an experimental corrective measure I first placed a thin metal shim in the slot where the bolt handle engages the receiver cut out. This did not interfere with full closure of the locking lugs as the bolt assembly assumed a more square and vertical position. Bolt handle bounce on dry firing was much reduced in this way. Further, as I chambered a cartridge I raised the bolt a few thousandths of an inch,

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The pair of targets on left show a level of accuracy readily acceptable by most before measures taken to further improve it. Both targets on right show measurably improved accuracy following corrective measures. These are just a few of the many representative groups that were used in the analysis and correction of this unusual grouping problem.

Loads shown here were made up with Berger 105 grain Hybrid bullets ahead of 21.5 grains of Norma 203 powder, thereby eliminating or reducing the possibility of rebound bounce on firing and hopefully gaining some fractional improvement in grouping. Groups noticeably improved with virtual elimination of fliers. During this procedure it is important to see that the firing pin head is positioned perpendicular and square within the bolt plug, which aligns the firing pin cocking piece to rest squarely over the sear.

I believe this is extremely vital to uniform lock time—the time interval between sear release and firing pin impact. Variance in lock time can, indeed, affect rifle accuracy where extreme accuracy is being sought. Another point worthy of mention is this rifle is a switch-barrel with the added bolt of .308/.30-06 size. These switch barrels are chambered for the .22 PPC, .257 Ackley Improved, 6x45mm and .221 Remington Fireball.

The also fits the smaller bolt face but wasn't quite prepared for me to fully evaluate its performance relative to the trouble-

some bolt. The bolt used for the .257 Improved and the .22 PPC performs remarkably well with good bullets. The two bolts measure out exactly the same from bolt face to the posterior surface of the locking lugs with my bolt face/locking lug comparator.

Locking lug surfaces are perfectly symmetrical, as are the bolt face surfaces on each bolt—which rules out this aspect as a causative or contributing factor of inaccuracy. The secondary bolt used on this rifle differs also in that it remains perfectly static as the rifle is dry fired with the bolt handle fully down with no rotational movement of the bolt plug and firing pin assembly as the bolt handle is lifted and lowered.

This told me that alleviating bolt plug and cocking piece rotation on the offending bolt could be the logical solution in solving the problem... and so it was. As I more carefully studied the cocked action directly from behind, while lifting and lowering the bolt a few degrees, both the bolt plug shroud and the integral firing pin cocking piece assembly rotated together—but not to the same degree. I immediately saw a solution to of putting the bolt to sleep.

The lower margin of the bolt plug would clearly raise and lower from the bolt locking lug races. A properly fitted shim on each lower margin of the bolt plug should clearly stabilize the excessive rotational effect with a reduction or total elimination in vibration being transmitted from the bolt and action, right through to the barrel. The

work was rather straight forward. I simply measured the bilateral spaces between the undersides of the bolt plug and bolt locking lug races in preparation for the shims.

The fitted shims would be bonded to the undersides of the bolt plug on each side. I found some stainless steel of proper thickness, fitted the parts to proper dimensions and bonded them in place with J-B Cold Weld. A short session of fine filing and polishing and the job was done. Sometimes a sort of stop-gap effort or temporary expedient will guide us on our way in problem solving as my earlier efforts did.

I was very pleased to experience more consistent precision performance from the rifle along with a large measure of satisfaction. Conclusion Few aspects surrounding extreme accuracy performance of a rifle are more thought provoking than the effects of barrel motion and the causative factors in dealing with it. Vibrations, however minor, originating in the rifle action/receiver, can, indeed, be transmitted throughout the entire rifle resulting in erratic bullet impact.

While identification and correction of these, sometimes transient, problems may defy our detection for awhile, observant analysis will often pay off. There can be a great deal of satisfaction in discovering the answer... even though this road may be our longest walk. AG

FROM THE ARCHIVE

To Be or Not To Be!

BY BILL SMITH SEPTEMBER 2019

ORIGINAL PP. 21-22

No, I am not going to quote Shakespeare. Hell, I don't even understand him let alone quote him much—guess that makes me a peasant or something. To open a full-time shop or not to, that is the question. More than likely you started gunsmithing part time. After spending so many nights and weekends your business has grown and your wife is threatening divorce.

If the later is true, let her do it before you do open a shop and get into a six or seven figure annual income bracket (ha!) Many gunsmiths suffer from too much desire to be full time, be their own boss, or listen to the wrong people. To open a full time shop one should realistically look at several things so that you don't have to add a second line such as sharpening lawn mowers just to keep beans (let alone steak) on the table. One should know the market for gun repair in a very cold clear light.

The size of your immediate area should be considered. How many other gunsmiths are there and how busy are they? What are you qualified to do that the existing gunsmiths can't do, if anything? Other contributing factors are how much experience you have had so that if you are honest with the public and yourself you have some idea of what you can offer. How much more machinery do you need? You sure are going to need more than a hobby-size drill press and a Unimat. What about bluing services?

If there is another (or more) gunsmith in your area, look at what business they have, check their prices, quality, and the area of gun repair that they cover. What is their turn around time for an average job? If there are other gunsmiths you have got to be able to not only compete with them but find a reason that will bring people to you. Consider advertising or other marketing; how much and where.

Once you have convinced yourself that you are the Second Gun Messiah (I'm the first, just so you know...) stop and think about actual operating costs. Where will you locate? When I first started out in my area I could lease a small but sufficient business space of sufficient size (barely) for about \$500.00 a month. It will likely be more expensive in your area now.

Figure in lights, insurance, legal fees, water, phone, advertising, web site, and anything else and even with a reasonable lease you will soon find out that you are looking at a \$250 to \$300 nut per week. At \$10.00 an hour you can't make it, so don't start. If you charge a shop rate of \$30.00 an hour you are going to have to work 10 hours just to pay the weekly nut and this is you working alone before you can pay yourself; forget about hiring anyone else, at least right now.

Your next consideration—and a vital one—is how much business is in the area? Can you realistically book \$800.00 of fees every week? Or is it more like \$400 or less? You better have a good projection based on fact, such as what you have already been doing during your part-time nights and weekends work and whether or not you have a backlog of business for you to get started or you just might find that the bubble has burst after the first month in your new shop.

It takes constant business to stay afloat and if that is not there then you are in the "not to be" classification. The ideal situation would be if you were certain the business would be there so you could eagerly go ahead. Or if you had an amount of money saved up and were willing to gamble it so that it could be used to ride out the first year so you could possibly make it. Your wife will raise hell about that one! Opening a gunsmith shop is not magic.

You have to be a businessman that understands costs, turn around time, off season slumps, and being prepared to ride them out. If you presently area part timer let me suggest you review all your past jobs and buy an account book or software and log every job as to dollars made as well as time and expenses spent by the month. Keep a cost sheet where you can be honest with yourself and list every expense. By very simple bookkeeping you can tell each month how profitable your business is.

Apply a minimum \$1,000 overhead cost to your operation, adjusted for what shop lease and other expenses will be in your area. Can you still make money if you have such a nut to crack? If the financial reality indicates this isn't currently a viable option, don't get discouraged. There are a couple of things you can do. When you reach the point where over a year part time you can equal or better the income from your present job you can start thinking about full time. A two year period would be better.

Forget the high class store or shop and look around for something that would cost less per month and spend a little more advertising effort. If you have what the gun public wants they will find you—after all, they found your house or garage shop, didn't they? Lesser quarters may not satisfy your ego but you will be able to go to Mc Donald's... occasionally. There is still another approach. If there is a good gun store in your area and they have no gunsmith, talk to them.

See what arrangements can be made to lease part of their building. Convince these people (they should not need convincing) that if you are there two things will occur. First, their store becomes a full service store. This could mean much to them because it makes their cus-

TO BE OR NOT TO BE! CONTINUED

ORIGINAL PAGE 22

tomers more dependent upon them. No need to go anywhere else. Second, work out a deal with them as to whether or not they will carry the mounts, recoil pads, sights, etc. If they want to carry these you would get the labor of mounting—that's all. The lease arrangement can be based on a 10% of the work you do as well as a 10% credit of any mounts, etc. that are sold by the store and fed through your shop for installation, thus you would "pay" 10% of the mount price which costs you nothing and 10% of your labor bill.

This type of arrangement lets you get started full time at a minimum cost. You have no layout of money for a stack of sights and mounts or other parts. Your regular customers should not mind bringing their guns to the store and all in all, it works well. In lean months you pay little and in fat months you make up for it. Then too, you are always pricing your labor with that 10% in the back of your head.

If you like this arrangement but the store owner is not quite convinced, try this approach: "Look, I have been doing your guns for you and you mark them up a little and are happy, right?" He can't deny this. You suggest that he check the total amount of repair sales that he did last year. If you come into the business you are going to be adding your present volume so that the total amount of repair business is going to be several times that of what he did. Now, assume that the dealer had that amount in the bank.

Can he get 10% on his money? Of course not. He is going to find all that lease money but best of all you will be giving him the opportunity to sell new guns or used ones to the people you bring in. You have presented a good argument that is going to be profitable to both of you. If he still stays stupid, look for something else. What most gunsmiths who start out as part timers fail to fully consider is the "what if" part of going full time. Again, we have to work with hypothetical cases.

You have a good job(?)—or at least you have a job. It probably has fringe benefits. It feeds and clothes you and makes house and car payments. Your part-time shop brought you in, say, \$15,000.00. You know you could at least double or perhaps triple that amount. You would be doing what you want to do (or think you want to) and you are going to be your own boss. Wonderful, but "what if" you're wrong? You have to be aware of losing the benefits you have to get your own health, fire, etc. insurance.

You have to fully understand the true costs of operating your own shop and be prepared to stay in it during the slow times and still maintain the level of living that you now have. If there are other shops in your area, check them out. Try to estimate how much they are doing and ask yourself this: "I am now taking \$15,000.00 a year away from them. This means they are still surviving even though they have lost the potential based on the amount of part-time business I am doing.

Can I take away from these old established shops double or triple the amount I am now doing so that I can afford to make this move to full time?" In other words, will the horse I bet on win or fall dead at the starting gate? You better know this, don't fool yourself. You may have a better mousetrap but will the public beat a path to your door? Likely not. Going full time is only done after you have been part time long enough to build a business and 15 or 25 thousand isn't enough.

Your business will be built on repeat customers who do not always repeat every six months. Even if they did, you would need a large enough customer list to make the repeat business strong enough to support a full-time operation. Your old customers will bring in new customers as well as your advertising will bring in new customers but this all takes time. What I really am trying to say is, don't jump, don't fail. Be sure you know as much about business as you do gunsmithing.

If you are not a good gunsmith you can forget the whole thing anyway. Don't give up the day job until you are sure you can match or better it. When you think about all of these things that I have said plus some I failed to bring up, then and only then can you start to think about the American Dream. What does all this leave us with? Do we make the move to success or failure or...? You have been working at home, either in the basement or the garage.

It is cramped, you have to put up with the dust from your buffing operation and neither you nor your wife really enjoys people running in and out, especially at dinner time. If you are working at home then you must be in an area where you are not violating zoning ordinances. If your municipality frowns on cottage industries, there you are on borrowed time. They will stop you eventually.

Assuming you can continue where you are you might better close off half of the garage, panel some walls and fix up a real workshop. If you have to cut aside door in, do it and make the place as efficient and neat as you can and then be happy for awhile. If it is the basement put a separate bell on the door, fix up part of the basement by a dividing wall so that the wife doesn't have to have someone watch her do the laundry and get your shop organized.

Whenever it is possible, keep the buffing and bluing away from your shop proper. It's dirty at best. This is not always possible and if it isn't then you are going to spend a lot of time cleaning up. Stay with your "house shop" as long as you can for this is the least expensive operation you can be in and you should never be late for dinner. In the meantime, look for an older building, perhaps at the edge of town, that needs fixing up.

Strike a lease deal with the owner and start building when you know you're ready. AG

READER FORUM

Reader Forum

BY AMERICAN GUNSMITH EDITORS SEPTEMBER 2019

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H&R Trapper Have you a schematic for the Harrington and Richardson Trapper? Harold Freeman The H&R Trapper Model was manufactured between 1924 and 1941 and offered with a 6-inch octagon barrel Doug Marable Quemado, NM and two-piece walnut grips. We know of no serial number records for pre- WWII H&R models but Trappers appear to be in the same serial number series as the Model 1906, its parent model, as the numbers appear to be a single series starting at 01 and going up.

William Stokes Casper, WY The Model 1906 was one of anew series of H&R revolvers introduced first in 1905 with the large frame model 1904 followed by the medium frame Model 1905 and Model 1906. Catalogs never included a schematic and just listed the parts along with a picture. H&R Trapper revolver has parts similar to the Model 922. [Gun- PartsCorp.com/gun-manufacturer/ hr](http://Gun-PartsCorp.com/gun-manufacturer/hr) and Gun-Parts.com/harringtonrichardson has more info.

Ithaca Shotgun I have an Ithaca Single Barrel Victory shotgun in my shop for repair of a separated vent rib. The solder joint has failed and someone tried to repair

it with epoxy, with similar result (photo attached). I'm not sure, at this point, that I can get it clean enough to re-solder and I don't want to destroy the existing bluing. Would it be OK to drill and tap for 2, 6-48 screws, finishing the screws flush to the inside of the barrel?

I believe that resoldering would be the preferred fix, but with just that short section that has broken loose, getting the area clean and retinned will be a challenge. Jeffrey M. Lagendyk JL Custom Rifles From Sergey Lyalko. First, to respond to your question, absolutely do not drill and tap the barrel in any number of places. The rib has to be heated up to about 250F to unlock the epoxy and completely remove the rib from the barrel.

Then surfaces of barrel and rib have to be cleaned, tinned, and put together by soldering. My article "Rib Work on Double Shotguns—Principles and Procedures" in the August 2004 issue has more information. As an alternative, the rib can be soldered using a number of ways. The proper way, though, is to solder the rib. It is not difficult but takes some preparation and tooling. See also bit.ly/2WsKD4r.

READER FORUM CONTINUED

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Parker Brothers Shotguns As author Paul Mazan was describing how to refinish an oily and greasy stock (Parker Brothers Shotguns, Part Two, February 2019), he suggested that one soak it in paint thinners, mineral spirits, etc., and leave it for extended times. I have found that Brownells has a product called Old Fashioned Whiting (083-032-100AU) that mixed with mineral spirits speeds up the process and minimizes toxicity. It takes several tries and some elbow grease but takes some hard work out of the project.

Author Paul Mazan replies. There are several methods of degreasing oil-soaked stocks taking different degrees of elbow grease and yielding good results. Your mention of Whiting compound is indeed one of them. Having used many of the methods, my experience has been that most will give you a satisfactory result on stocks that are moderately saturated, including most sporting arms.

I have settled on the soaking method in the article because it has given me satisfactory results on old military stocks that have been packed in Cosmoline for years and are literally black and soaked all the way through. I have used it successfully on stocks that have been degreased by other methods, including oven cleaner, mineral spirits, heat, and combinations of them, only to have them turn dark again after weeks or months as the oil held deeply in the wood slowly leached to the surface.

So far the soaking in turpentine has never let me down or caused me to have to do the job a second time. I'm delighted you have been successful with the method you employ. As long as it gets the job done for you on the guns you have worked on it's exactly what you should be using. In many cases, soaking is probably overkill but I really dislike having to redo a job so I use it because it works for me. John A.

Reichel Fixed-Sight Revolvers This May 2019 article makes some good points but the approach to "moving the barrel" (took me a second to figure out what that was, but never mind) by cranking away on the frame with a large walking stick while holding the barrel in a vise is a little concerning. I'd not recommend this as it's too easy to warp the frame, especially in the inexpensive revolvers referenced, and risk losing the gun altogether.

This would be especially true when using around stick; it applies all the force in the middle of the cylinder "cutout" in the frame and that's the worst possible place; more leverage for the frame-warping forces. Some revolvers have very tight barrels indeed (Ruger comes to mind) and the use of a speciallymade frame wrench would be much safer for the frame.

There is also the issue of the front and rear revolver sights being in two different vertical planes, which would seem to cause inaccuracy; that condition is certainly one we

try to avoid in rifles. Further, what is special about regulating single-action revolvers? As far as the frame and barrel are concerned there would seem to be no difference between single and double action. Finally, since the writer brings up calculations: How many degrees do you typically have to rotate the barrel?

And how do you precisely control that? Just "marking" the frame and barrel will likely not be anywhere near precise enough. Nick van Vonno From author RK Campbell. These are good points, however, the barrel moving technique outlined has been in use ever since revolvers have been in general use. Solid frame revolvers (double or single action) are similar but single action revolvers—even modern Rugers—seem to be out of zero more often than double actions. Brownells offers a chart for rules in adjustment.

Less is better and minimum testing should be 25 yards. As for calculations, the "by God and by gosh" method works with experience and I have never wrecked a frame wrecked this way. I did my first about 1979 on a Colt Lawman using pretty rough tools. It worked on the first try. Marking the barrel is essential—not necessarily to predict the movement needed but to have a register of how much the barrel moved. AG

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