Converting Military Rifles to Sport (#)
Lesson: 2178

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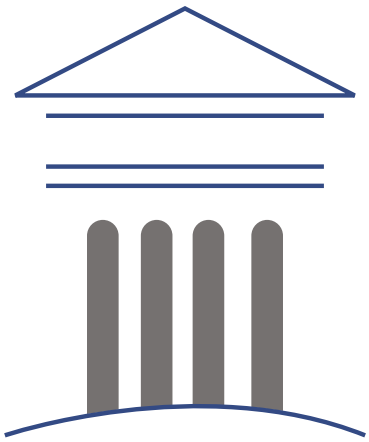
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Objectives

After completing this lesson, you should

1. Be familiar with the procedure for shortening the barrel of military rifles.
2. Understand how to smooth the action of military rifles.
3. Know how to lower the rails of a Colt 1911 pistol.
4. Know how to polish the lug area of the slide for a Colt 1911 pistol.
5. Know what is used to true the slide of a Colt 1911 pistol.

Introduction

The National Rifle Association (NRA) is largely responsible for enabling gunsmiths and shooters to obtain obsolete military rifles, such as the .30-40 Krag rifle, during the early twentieth century. With the cooperation from the Director of Civilian Marksmanship (DCM), each NRA member could purchase an issue .30-40 Krag military rifle for $1.50, and 1200 .30-40 cartridges for an additional $12.00. Furthermore, each member was allowed to buy one additional rifle each year (for the same price) as long as the supply lasted. This gave thousands of shooters the chance to practice with centerfire rifles and to become expert riflemen. Many gunsmiths also tinkered with these cheap rifles and obtained much of their training by tearing up and rebuilding these military rifles.

The U.S. Model 1917 Enfield was the next model to be offered to NRA members through the DCM. The price of these jumped to $5.00, but the stronger action and the ability of the Enfield to be chambered to practically any centerfire cartridge of the day made this a desirable model on which to build custom sporting rifles. It is still a popular model.

At the end of World War II, many enterprising organizations began importing the millions of captured military arms. German Mausers, Japanese Arisakas, and millions of other military arms flooded the United States. Some of these were used for hunting; others were converted into suitable sporters. The practice continues today.



Figure 1: *This custom rifle was commissioned by the American Custom Gunmakers Guild and the final result was a joint effort by gunsmiths Stephen Heilmann, Stan McFarland, Ron Smith, and Max McFarland. Marvin Huey built a matching rifle case.*

Many military bolt-action rifles are still available at comparatively cheap prices. Those that are in excellent condition should be preserved for their collector value, but

those that have accumulated many battle scars are good candidates for practicing your gunsmithing skills. They are also good for converting into practical sporting rifles.

This lesson shows you how to take a bulky military rifle and turn it into a thing of beauty — an accurate, usable hunting rifle that anyone would be proud to carry in the field.

To demonstrate how one military bolt-action receiver was converted, look at the rifle in Figure 1. Following is a brief explanation of how this military rifle was customized.

Not too long ago, the American Custom Gunmakers Guild commissioned selected craftsmen to create a presentation quality firearm to be raffled at the annual Guild Exhibition. The first criterion of creating the rifle was that it be built with an " African heavy rifle" theme and be fully functional.

Metalsmith Stephen Heilmann began the project by tuning and hand-polishing a 1909 Argentine Mauser action inside and out. After enlarging the internal dimensions of the receiver, he fit and chambered a heavy-weight barrel to fit .458 Winchester bores. Front and rear square bridges were made and welded to the receiver and a quarter-rib with a single standing blade rear sight was fitted to the barrel. A ramp front sight with an $^1/_8$" ivory bead and scalloped base pad was then manufactured and started the theme of the scalloped metalwork.

Other Heilmann metalwork features include an upper tang extending down the length of the wrist and over the comb, a spade-shaped trigger guard/floor plate assembly in front with a rear tang down the pistol grip to the grip cap, a shotgun-type trigger shoe, thumbnail panels at the base and knob of the bolt handle, and matching pedestal swivel bases. After each of these parts was machined from bar stock, the action was heat-treated.

Stockmaker Stan McFarland then took over and was inspired by the general theme introduced by Heilmann's craftsmanship. He continued the theme by making a scallop-edged buttplate that completely caps the butt of the stock. The buttplate's upper extension is spade-shaped to follow the shape of the front of the trigger guard. A scallop-edged trap grip cap was made to complete the hardware.

McFarland then studied early English bolt-action rifles and the finest contemporary American work before designing the stock. The double-hooked cheekpiece, long open-grip curve, and short ebony-tipped fore-end follow British lines.

Inletting the elaborate metalwork was quite a challenge, especially the long upper tang that extends to the comb of the stock and the scallop-edged buttplate. For practicality, McFarland pillar bedded the action and installed a hardened crossbolt at the rear of the receiver for added strength.

The elaborate metalwork provided a challenging canvas for engraver Ron Smith. Much of the extensive coverage is in Smith's version of the English style with well-shaded overlapping scrolls. The barrel, quarter- rib, receiver, and all border work follows this style and is surrounded by gold wire inlay. The trap grip cap lid and floor plate latch are sculptured with acanthus leaves in relief.

The floor plate is a masterwork of the engraver's art. The face-on central figure is a bull elephant. A delicate combination of extremely fine lines and dots portray the grey folds of the animal's hide and give a strong sense of light and shade. The bull's tusks are inlaid in pure silver for a natural ivory appearance against the darker areas of his body.



Figure 2: *The scalloped edges of this buttplate provide a perfect surface for this type of engraving. The trap lid features a Cape buffalo with a white egret on its back.*

The frame surrounding the scene is done in a style originated by Smith, which he calls "Bulino Gold Scroll." This work gives the appearance that the leafy scrolls have two sides and fold over themselves. One side of each scroll is engraved steel, the other side is 24K gold, and the background is removed and matted.

Coupled with fine line shading, this style heightened the sense of dimension, and at first look the engraving appears to have great depth and relief.

The scalloped edges of the buttplate and grip cap provide a perfect surface for this type of engraving. The trap lid of the buttplate features another game scene: a Cape buffalo with a tiny white egret on his back. Likewise, this scene is surrounded with Smith's Bulino Gold Scroll (Figure 2).

Max McFarland, Stan's son, checkered the stock with 26 LPI point pattern. Five panels of checkering, separated by ribbons, encompass the grip and a single panel wraps around the fore-end. Mullered borders outline the many points of the checkering pattern.

The stockwood is California English walnut furnished by Davis Hardwood. McFarland commented that it was a hard, dense black wood with excellent color and fiddle back grain.

The travel case for the .458, made by Marvin Huey, is ash framed and has a cowhide exterior. The case is fully French fitted inside with burgundy ultra-suede. Also included is a complete cleaning kit including rod, oil bottles, etc. The finishing touches are an American Custom Gunmakers Guild case label identifying the collaborators of the project and an external canvas cover to conceal and protect the contents.

The final result of this work appears previously in Figure 1. This is merely one example of taking a $50 military rifle action and turning it into a fine custom firearm worth over $10,000.

You will not be expected to accomplish such a feat at this time. It takes much practice to hone your abilities to be able to perform such work. However, this previous example is something to shoot for. In the meantime, let us see how you should begin your training so you can eventually work up to the status of the artisans who built the custom .458 rifle just described.

The Model 1917 Enfield

There is a good centerfire sporting rifle just underneath the rough military exterior of the Enfield rifle. In general, all you have to do to convert it to a basic sporting rifle is remove the barrel cover, cut away a portion of the stock, and take off an 1/8" or so of wood here and there. These minor alterations will provide a neat and serviceable rifle on which can be mounted almost any sighting equipment suitable for big-game hunting.

However, before doing any work, there are several points to consider. First of all, if you encounter a Model 1917 Enfield in perfect condition—especially one manufactured by Winchester Repeating Arms Company — the original condition should be preserved. This rifle is worth more to collectors in its original condition than if it were remodeled. Such perfect specimens should be set aside and another one that is not quite as good should be converted as described in this lesson. Later lessons will deal with identifying and appraising firearms.

Once you have a suitable rifle in hand, consider the amount of fore-end to remove first. Some shooters have a longer reach than others and they grasp the fore-end well forward, especially when taking quick, off-hand shots at running game. You should take this point into consideration before cutting the fore-end to length. Ordinarily a fore-end one-half the length of the barrel will be about right. Also, if you want to install a barrel band for a forward sling swivel you should consider the position of the band in relation to the fore-end length.

Another point to consider is the height of the comb at section B-B in Figure 3. Although the Enfield stock is quite straight, the comb height at this point might be a little low for some shooters. You can either build it up by flattening the stock from the grip back to the heel and gluing on a matching piece of wood, or shape it as indicated and then raise the comb to the desired height with a fabricated cheekpiece pad.

First disassemble the rifle using the exploded view in Figure 4 and the following instructions:

- Open bolt and pull bolt stop (part #19) outward, holding it out while removing the bolt toward rear of rifle.
- Insert a drift punch in the hole at the rear of the magazine floor plate, and depress the floor plate latch. Slide the plate slightly toward the rear, and remove it downward, along with the magazine spring and follower. The spring is easily detached from the floor plate and follower by sliding it out of its mounting slots.
- Remove the cross-head screw (#9) in the front barrel band (#7) and slide the band toward the front. Take off the front upper handguard wood.
- With a drift punch, remove the crosspin in front of the rear barrel band and move the band forward off the stock. It may be necessary to also loosen the sling loop cross-head screw at the bottom of the band. The rear upper handguard can now be moved forward and upward for removal.
- Remove the screw on the underside, in the front tab of the trigger and magazine housing (#45). Remove the screw on the underside at the rear of the trigger guard (#46), and separate the action from the stock. The magazine box (#48) can be removed from the stock, and the guard and magazine housing (#41) can be taken off downward.

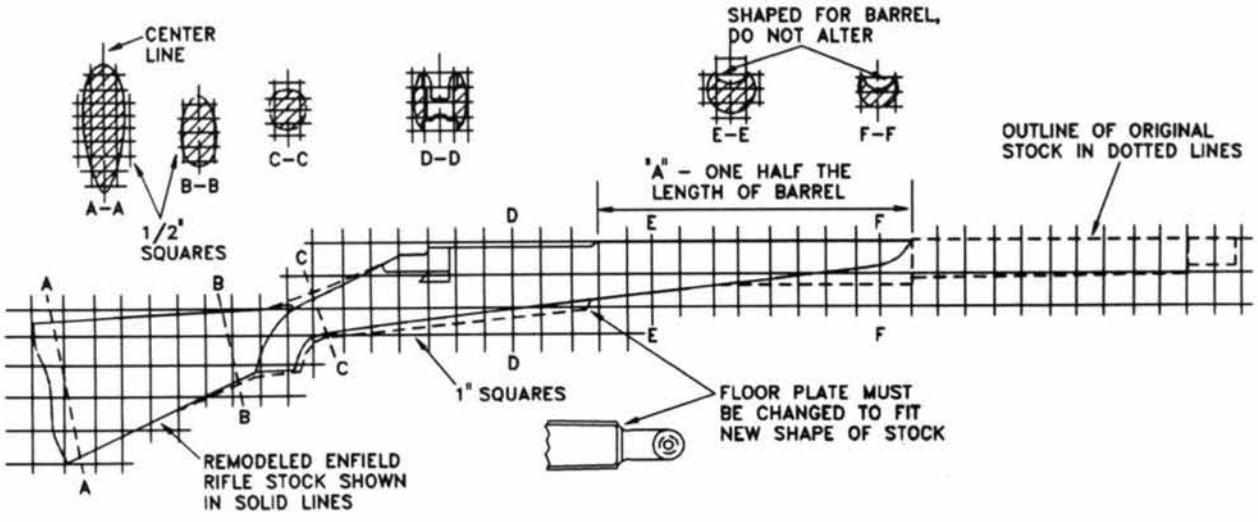


Figure 3: Profile and sectional drawings of dimensions and methods used to convert a U.S. Model 1917 Enfield rifle to a useful sporter. The wood along the dotted lines will be removed.

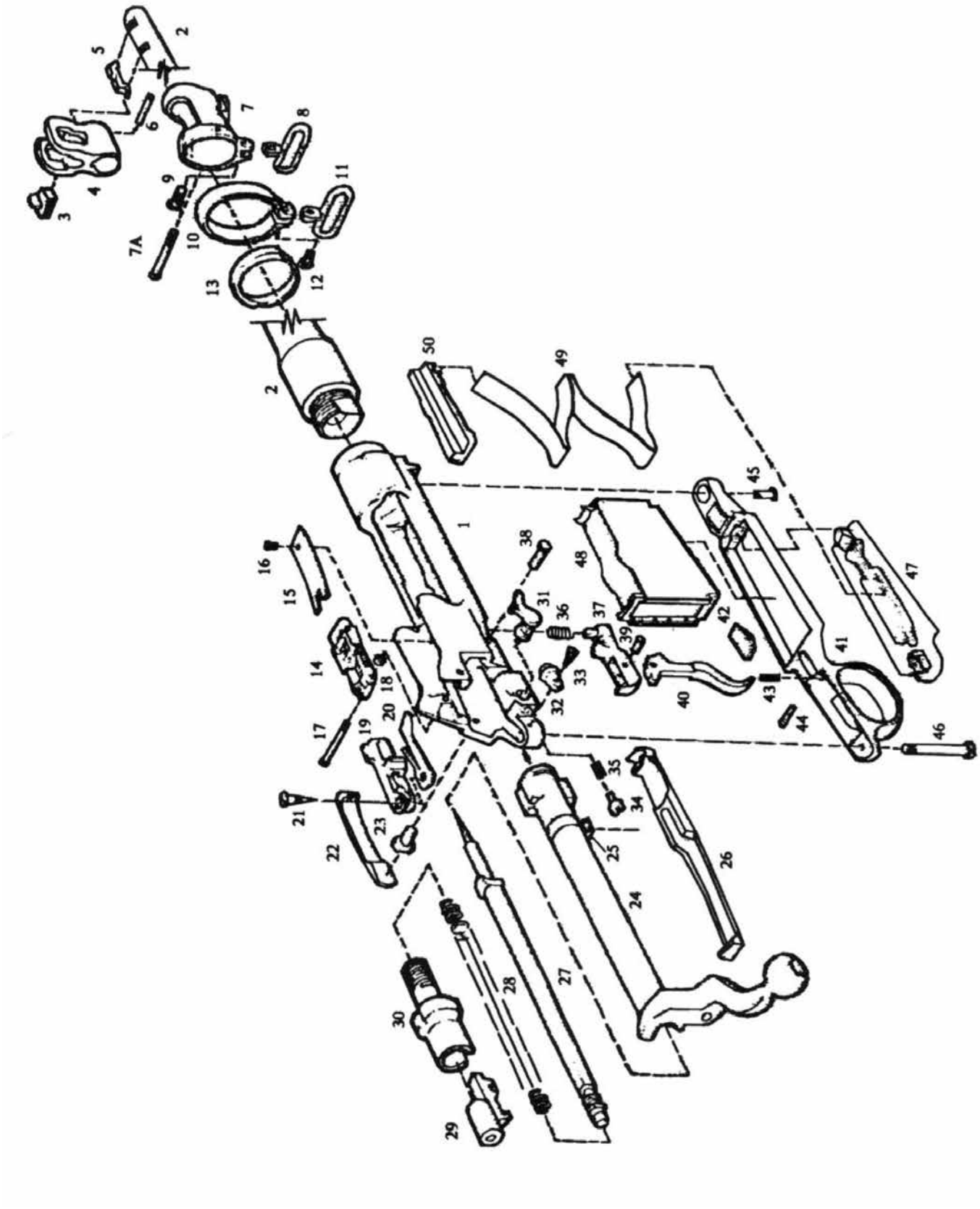


***Figure 4**: Exploded view of the parts for the U.S. Model 1917 Enfield rifle.*

- Remove the crosspin (#44) in the guard before removing the magazine floor plate latch and its spring (#43).
- Remove the crosspin (#6) in the front sight and remove the entire front sight assembly (#4). This sight assembly is usually very tight and will probably need some additional help. Use a hammer and brass drift punch to tap the sight toward the muzzle. In doing so, take care not to lose the front sight key (#5), which will be released as the sight is removed. The front band, rear band, and the rear upper handguard ring (#7, #10, #13) can now be taken off the barrel by sliding them off at the muzzle.
- Remove the vertical screw (#21) that retains the bolt stop, at the left rear of the receiver. Take off the bolt stop and ejector assembly (#20) toward the left. The spring rest plug (#23) can also be taken out toward the left.
- Tip the rear tail of the bolt stop spring (#22) inward to free the front hooks from inside the stop. Remove the spring and ejector toward the rear.
- Remove the small cross-head screw (#33) at the rear of the receiver, and take off the safety lever retainer (#32) toward the rear.
- With the safety lever in the on-safe position (toward the rear), insert a small-diameter drift punch to depress the safety plunger and spring (#34, #35) before removing the safety (#31) toward the right. In doing so, restrain the plunger and spring, and ease them out. As the safety is moved toward the right, the drift must be removed to allow the crosspiece to pass. It is then reinserted to restrain the plunger and spring.
- With a punch, remove the sear crosspin (#35) toward the left. (In Figure 5, it appears that this spring is removed to the right. This is not correct.) Exert upward pressure on the front of the sear (#37), and the crosspin can be pushed out more easily.
- Remove the sear, trigger, and sear spring downward (#37, #36, #40). Remove the trigger crosspin (#39) and separate the trigger from the sear.

STOCK WORK

Once the rifle is completely disassembled, make a full- size template of the stock profile, like the one shown in Figure 3. Also make templates of sections A-A, B- B, C-C, and D-D.

Saw off the fore-end square at the point determined. At some points where considerable wood is to be removed, you might want to use a belt sander. This is faster than a wood rasp. Regardless of the method used to remove excess wood, check frequently with the sectional templates to be sure that you do not cut below the curves. Do not try to finish to exact dimensions with a sander. Cut down only part way to remove most of the excess wood; then finish up with a fine wood rasp and sandpaper.

You cannot remove all of the finger groove on each side of the fore-end without getting the wood too thin at the breech ring. Consequently, your finished stock will still show some of this finger groove.

When examining the profile of the reshaped Enfield stock, you will notice that the underside of the grip and the top of the tang are cut down considerably from the original profile. You must be careful here, because you are working directly across the grain and at an angle with it in a comparatively small area. A strip of fine-grit abrasive cloth about 1" wide is ideal for finishing the rounded surfaces.

METAL WORK

To give smoother lines to your project, the magazine floor plate is altered, as shown in Figure 5, so it will fit flush with the new profile of the stock. If you do not have a welding outfit at the moment, you can do the cutting with a hacksaw and then have the pieces welded by an expert welder. However, before sawing the floor plate, transfer the location of the two holes to a piece of flat steel. Later, after sawing, this will serve as a welding jig. Both parts can be bolted to it. The floor plate must be refinished after welding as described in earlier lessons.

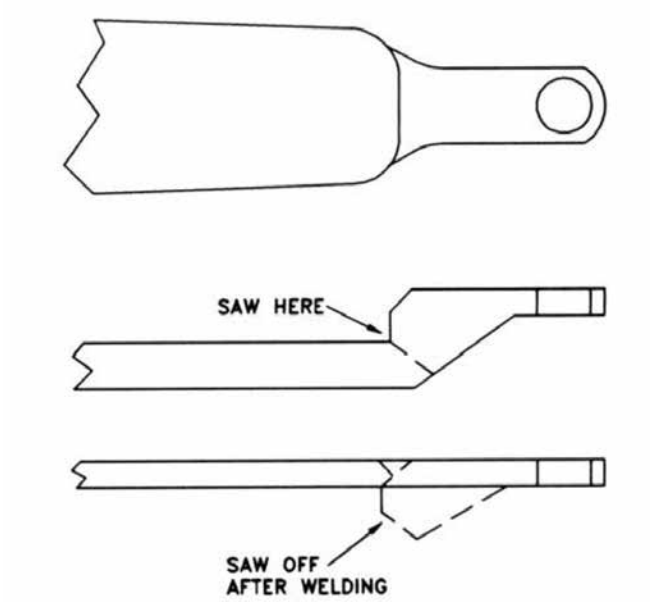


***Figure 5:** Altering the floorplates on the Enfield will make the finished job have smoother lines.*

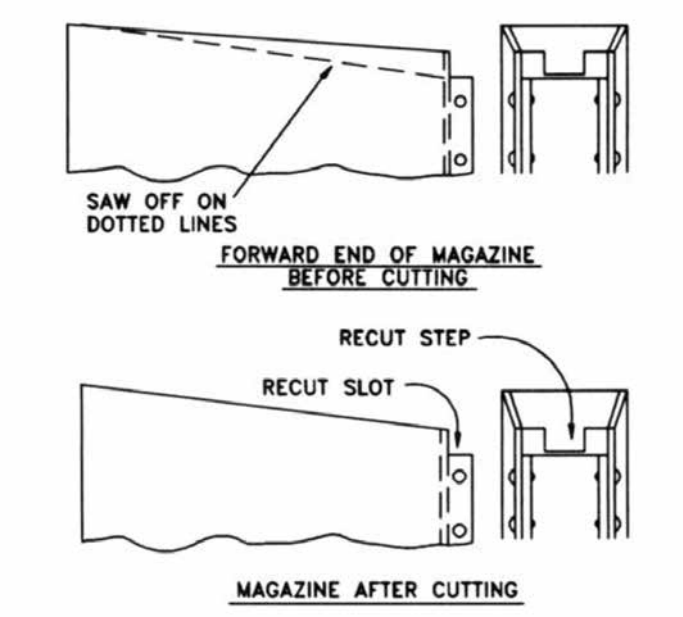


Figure 6: *The magazine is first marked then sawed as shown.*

Next, the magazine is altered as shown in Figure 6. Mark the lines on the magazine, clamp it in a bench vise, and then use a hacksaw to cut off the required metal accurately. A new slot is then cut in the altered magazine with a metal file. The step will also have to be recut. The final alteration is *chamfering*, or *rounding*, the step at the rear end of the magazine follower so that the bolt can be closed easily when the magazine is empty.

Many people leave the barrel its original length, but others prefer a shorter barrel of about 22-24 inches. The 24" length will give a better sighting radius with iron sights than a 22", but if a telescopic sight is to be used on the rifle, barrel length will not make any difference in the accuracy. However, you should remember that as the barrel grows shorter, the recoil and muzzle blast are more pronounced.

The barrel can be cut off with a hacksaw, but make certain the cut is absolutely square. Try to make the hacksaw cut as smooth and accurate as possible, and then true up the muzzle with a metal cutting file, checking often with a square, as shown in Figure 7. Once the muzzle is square, remove the file marks with fine abrasive paper wrapped around the file.

To get an appearance of lathe crowning, lay a strip of fine-grit abrasive paper on the muzzle and press the ball of the thumb on it tightly against the muzzle. Then turn the paper around the bore. This will give a circular polishing pattern that is very attractive.

Countersink and crown the muzzle to ensure accuracy. This can be done on a lathe with a crowning tool, or if a lathe is not available, it can be done with hand tools. The outer edge of the muzzle may be smoothed and rounded by taking the end of a strip of fine abrasive cloth and sawing it back and forth over the muzzle. Use a countersink to break the edge of the bore, and then chuck a muzzle-crowning ball in a hand drill as shown in Figure 8 on the next page. Coat the ball and muzzle with a commercial polishing compound (valve grinding compound is okay), set the ball on the end of the bore, and grind it in to get a sharp edge. After the ball spins, the handle of the hand drill should be rotated at the same time. This double motion will prevent the ball from scoring and cutting a matching score pattern in the barrel. Do not use a power drill for this operation because they cut too fast.

Before firing the rifle, check the headspace with a Go and No-Go gauge. If the bolt closes on the No-Go gauge, the rifle is not safe for firing. The barrel will have to be set back and rechambered. This operation will be covered in a later lesson.

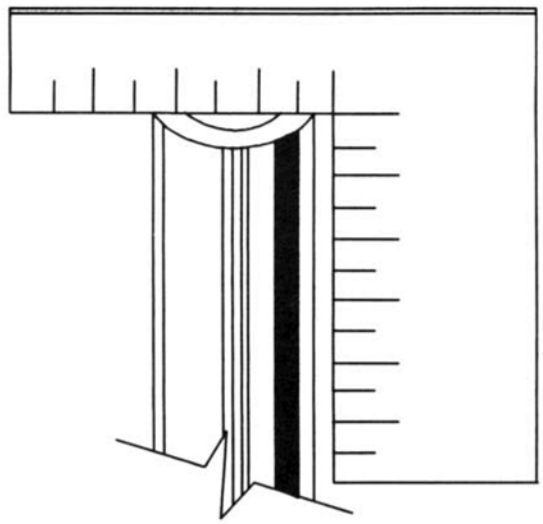


Figure 7: *The muzzle may be trued with a metal file and a square.*

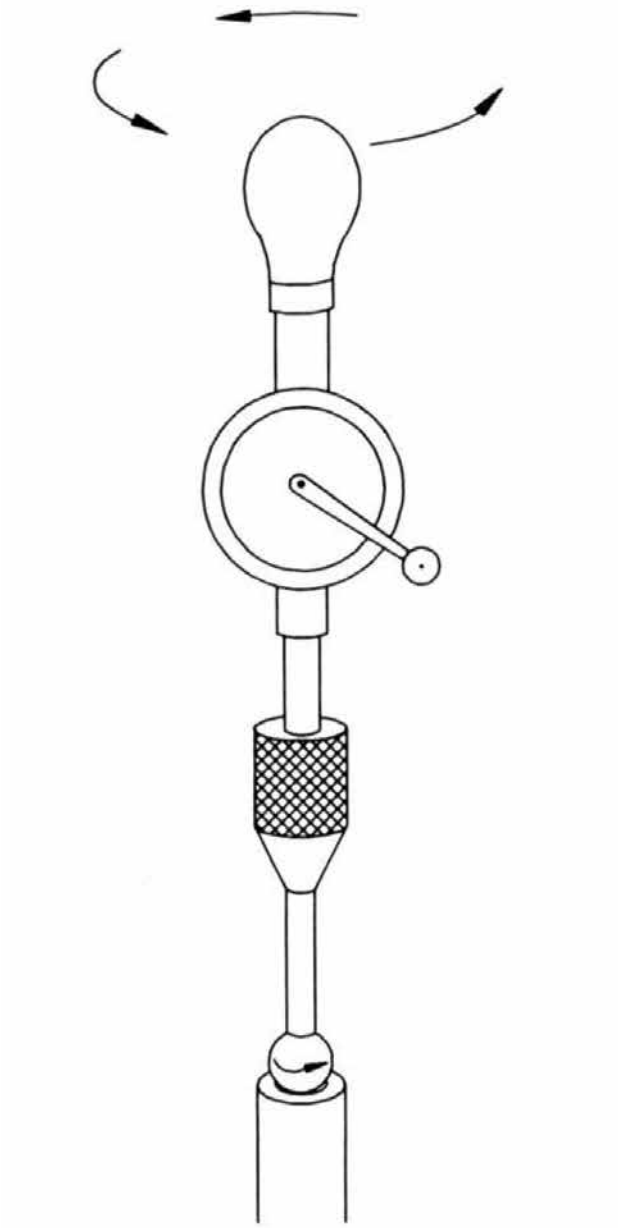


Figure 8: *A hand drill, muzzle-crowning ball, and some lapping compound are required to recrown a barrel muzzle. The double motion prevents the ball from scoring the barrel.*

SMOOTHING FIREARM ACTIONS

Almost any rifle, shotgun, or handgun can be improved by polishing and honing certain parts to provide a glass-like smoothness among the moving parts. The majority of custom rifles are honed to improve bolt travel and overall functioning and feel.

In general, the technique requires that a set of polishing and honing stones be used on the action parts to remove any rough spots, burrs, and machine marks. If circumstances permit, these same parts should also be polished to a mirror finish, and then each may be jeweled as described in a later lesson.

The first part to polish is the bolt, using a fine-grit silicon lapping compound. When complete, all parts should be cleaned thoroughly with kerosene or another solvent because the polishing compound will continue to cut if it is not completely removed.

The extractor collar should be checked and all rough edges removed — either by hand or with a Dremel Moto-Tool using abrasive wheels.

Then, polish all contact points carefully until smooth. However, be extremely careful around the locking lugs of the bolt so as not to remove too much metal. Hone and polish the top and bottom surfaces of the lugs to allow the bolt to pass back and forth over the receiver accesses without dragging. The receiver accesses should also be smoothed, removing all burrs and rough edges.

Besides a set of honing stones and a Dremel Moto-Tool with abrasive wheels, wooden dowels are often used with abrasive paper wrapped around them to smooth certain round or circular portions of a rifle or shotgun receiver.

A rule of thumb to use when smoothing firearm actions is to first operate the action to see where work is required; that is, if the bolt catches halfway down the ways, mark this spot for later honing. Then disassemble the entire receiver and inspect each part, making notes of contact surfaces. At this stage, the size grit to use depends on the condition of the metal. For example, if the machine marks are prevalent with deep rough edges, then a relatively coarse grit should be used. However, if the bearing surfaces are relatively smooth, then a much finer grit size is needed.

Now, using the honing stones, abrasive paper, or abrasive wheels on the Moto-Tool, start polishing all rough surfaces inside of the action, or where moving parts make contact. Those that are visible once the receiver is reassembled could be jeweled for a pleasing appearance. The main thing to watch for is not to remove too much metal; merely polish it.

BOLT-BENDING

Many military receivers are used to build custom rifles and in nearly all cases, the bolt handle will have to be altered to accept the mounting of a telescope sight. One method is to cut the original bolt handle off and then weld another in place at a different angle to allow it to pass the scope sight without touching it. However, the most popular method is by forging using bolt-bending blocks (Figure 9). The following gives a brief description of how this is done.

To bend a bolt for use with a telescopic sight, you will need a set of bolt-bending blocks, a bolt insert, an oxy-acetylene torch, a heavy bench vise, a 12 oz. ball-peen hammer, a bench grinder, and a polishing setup. Once you have gained experience, a complete job can be turned out in about 30 minutes and you can charge $40 to $60 for your work.

Strip the bolt completely; that is, remove all internal and external parts from the main bolt handle and body, including striker, striker spring, etc. Then proceed as follows:

- Locate the bolt in the bolt-bending blocks by the safety lug on the bolt, so that the locking lugs are parallel with the floor. The space between the bolt handle and the end of the blocks must not be over ¼ inch (Refer again to Figure 9). The various cutouts are for different bolt types. For example, A is for Mauser bolts, B is used for Springfield bolts, and C is used for bolts on Winchester Model 54 bolts.

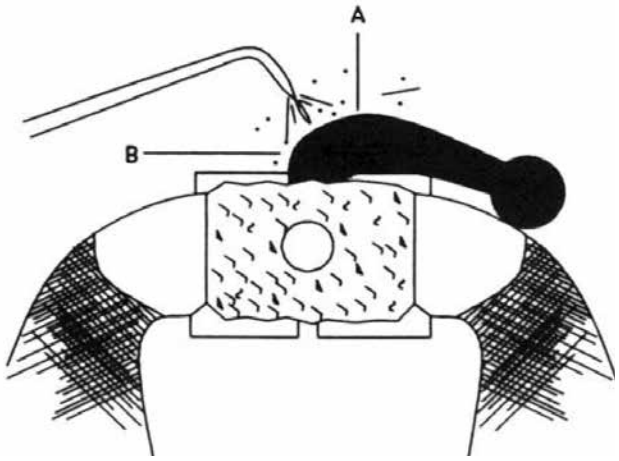


Figure 10: *Begin by bending the bolt handle until the ball touches the vise jaws.*

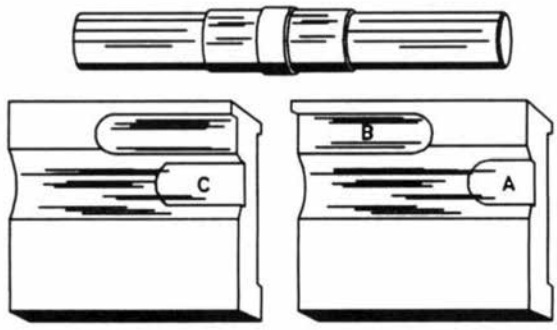


Figure 9: *Bolt-bending blocks are used to alter bolt handles to accept telecopic sights.*

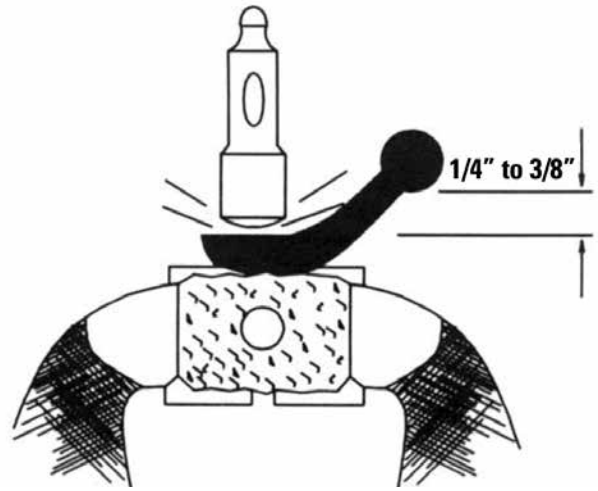


Figure 11: *Forge the heated bolt handle with light blows with a ball-peen hammer.*



Figure 12: *Rough grind excess metal once the bolt handle has cooled.*

- Pack wet asbestos around the bolt and also plug the inside of the bolt body with wet asbestos.
- Heat the base of the bolt handle to bright red with an oxyacetylene torch using a large-lip flame until the metal begins to flow slightly. This must be done as quickly as possible.
- Bend the bolt handle down to the vise jaws as shown in Figure 10.
- Forge straight down with the ball-peen hammer with light, rapid hammer-blows as shown in Figure 11, all the while applying heat to the bend. Continue the hammer-blows until the metal is even with the top of the bolt-bending blocks. When done correctly, the heat color will not "run" more than $^1/_8$" on the bolt body.
- Work excess metal out in a mushroom shape. Now bring the bolt handle ball back up to about ¼"- $^3/_8$" above the bolt-bending blocks and kink the bolt handle to the rear about ½ inch.
- Allow the bolt to cool in the bolt-bending blocks. Do not submerge in water to cool.

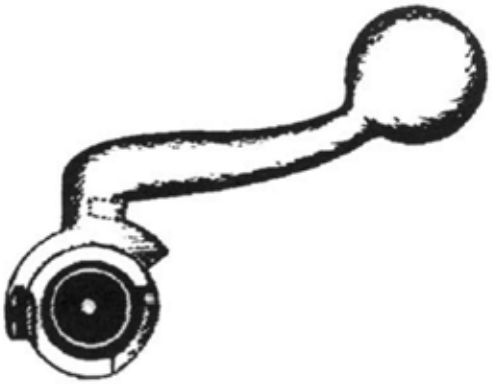


Figure 13: *Bolt handles for Winchester Model 54 rifles should be undercut before the forging process is started.*

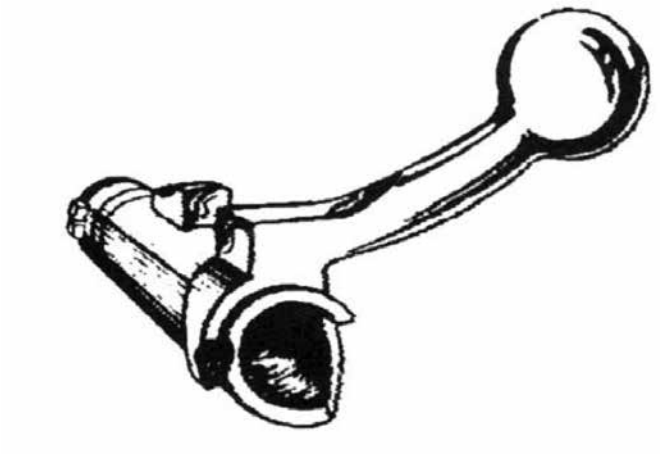


Figure 14: *After forging and polishing, the bolt handle should look like the one shown here.*

After the bolt has cooled to room temperature, rough grind the bolt handle to remove excess metal as shown in Figure 12 on the next page. A belt sander, using a ½" wide belt is ideal for polishing the handle. Then, buff to the desired luster.

When using the bolt-bending blocks on a Winchester Model 54 bolt, first undercut the bolt as shown in Figure 13. To alter Enfield bolts, cut off the bolt knob $^1/_8$" back. Then straighten the bend in the bolt handle. Taper the end of the handle and drive the bolt handle ball back on, but in a reversed position. Now drill a $^1/_{16}$" hole through the bottom of the ball to let air out of the pocket. Weld the ball back on the handle. The finished bolt handle should appear as shown in Figure 14.

Bolt-bending is one gunsmithing operation that cannot be taken lightly. If heat is wrongly applied and colors run into the bolt body, the entire bolt could be weakened, causing the bolt to let go upon firing. This could injure or kill the shooter. Therefore, be extremely cautious when bending bolts on military rifles, and seek professional advice if you are in doubt about any of the steps.

SELF-TEST QUESTIONS

Please check your answers on page 22.

1. ***True or False.*** **A military collector rifle, in perfect condition, should not be converted to a sporting rifle.**
2. **Before starting to convert a Model 1917 Enfield rifle, as discussed in the lesson, what should be done?**
3. **What is the purpose of altering the floor plate and cutting the magazine on the Model 1917 rifle?**
4. **What are two things that normally happen when a military rifle barrel is shortened?**

Customizing the Colt Model 1911

NOTE: A word of caution to introduce this text involving custom gunsmithing. Any such custom modification deviates from standard procedures and factory specifications and in so doing, exposes you to additional liability. Therefore, proceed with extreme caution and maintain the highest quality of workmanship governed by a carefully contemplated and stringent set of principles. Do not compromise yourself or the quality of your work in an effort to meet a price. Also, most of the following procedures require the use of specialized equipment. Some of the modifications can be performed without this equipment; however, many of the procedures need to be performed as a group in order to be effective.

EVALUATION

Before any work is done, the shooter's predetermined concept of the finished weapon should be well defined. In this area of determination, the advice of an experienced gunsmith is invaluable to the novice or amateur as well as the experienced shooter. By clearly understanding the intended use of the weapon, you will be able to establish the shooting requirements and determine the production specifications. This process of evaluation will determine the classification and establish the grade of the intended weapon.

The custom pistol concept encompasses two basic classifications: *combat*, which includes service pistols, duty guns, self-defense weapons, and IPSC competition guns; and *target*, which includes bull's-eye shooters, club competitors, and game hunters.

In each of the above classes there are two grades of accurization available: *utility*, involving basic modifications to attain acceptable accuracy with improved function for a moderate investment; and *competition*, entailing highly refined modifications specifically designed to create a very specialized weapon.

Therefore, to effectively perform your first function as a custom gunsmith, you must determine the exact needs and wants of your customer.

CONTRACT CONSIDERATIONS

Accuracy and function are the two primary factors considered when improved performance is desired from a standard weapon. When addressing these initial areas of refinement, a third related factor—cosmetic appearance—must be taken into consideration. In this area, form should follow function and any alteration should be visually appealing. The extent of refinement or modification is directly governed by a fourth control factor: cost.

These four basic factors represent the criteria you must consider when formulating a contract proposal. Your ability to evaluate them accurately will enable you to apply your professional skills and effectively produce a contracted product exhibiting a high degree of quality and workmanship. The balance of this lesson deals with the techniques and procedures required to attain that quality and workmanship. Your mastery of these methods will ensure both your professional and financial success.

WORK CATEGORIES

With the details of the custom project finalized, the work which will follow can be grouped into one of three categories. The first category is *refinement*, which involves improving the performance by reworking the existing components, such as a trigger job. The second category is *modification*, which entails altering the original design to improve function, such as *swaging*, or tapering, frame rails. The final category is *enhancement*, which includes replacing or adding components of superior design to expand capabilities, such as installing custom sights.

There are two basic approaches in producing a custom gun. First, you may be contracted to improve the function and performance of an existing weapon. Or, you may be requested to build a match-grade pistol from selected components. Since the first situation is more likely to be encountered and offers a wider range of possible approaches, we will deal with it first.

When presented with an existing firearm, you may be asked to develop it in stages to satisfy your contract and still conform to cost factor restrictions. This *progressive* development method is best addressed through refinement techniques.

Both target performance and mechanical reliability may be improved effectively through appropriate trigger work. This initial refinement usually will yield the greatest improvement in performance for the least investment. Next, through the enhancement techniques with the installation of appropriate custom sights, the shooter's ability to shoot the gun effectively will greatly improve. Both of these improvements, when implemented, will stand alone and are not dependent on other work to be effective.

Generally, the above are the first areas considered when progressively upgrading a reliable weapon and the suggested improvements are those most frequently sought after. Additional refinements may be considered. However, you will find that they will exhibit a smaller impact on accuracy. In fact, they may not even be discernible to the shooter unless basic modifications are first implemented. In this case, your customer may become disappointed and abandon the project. Or even worse, the shooter could become disillusioned with your work and seek assistance elsewhere. Avoid this situation by explaining this up front.

Inform your customer that a certain project will only add to the accuracy if other operations are performed first.

The alternate procedure for developing a custom pistol from an existing weapon is the *comprehensive* method. This development technique involves one concentrated and organized effort to produce a completed project. The following is an outlined procedure for a typical accurizing activity. The methods and techniques discussed are presented in a sequential order to suggest a natural progression in the development of a match pistol.

COMPONENT SELECTION

First, be selective when choosing basic components or upgrading existing ones. For example, there are three types of suitable hard slides available from Colt: the National Match, the Standard Issue, and the Commercial slide. To aid in identification, the National Match slide is stamped on the left side with the part number NM 7791435. The standard issue slide is identified by the part number 7790314. All Commercial models produced after the end of World War II were also fitted with a hard slide also. However, avoid the older 1911 model Colt slides and all slides distinguished by part number 7790353. Also avoid pre-series 70 Gold Cup slides. All of these units are too soft to maintain the close tolerances required to achieve good accuracy. A Colt Model 1911, shown in Figure 15, will be used as our example for customizing.



***Figure 15**: The Colt Government Model 1911 pistol is a favorite for competitive shooting and will be frequently encountered by the gunsmith for customizing.*

IN-SERVICE AND USED COMPONENTS

Inevitably, you will be requested to consider working with used components. On occasion, you may determine that it is necessary, and with careful selection you may even find it to be beneficial. But, never consider it to be the only option. Be selective!

When examining available frames with varying degrees of modification, be exceedingly cautious. When working with such units, you may find yourself limited by the qualifications of those who preceded you. Components that have been modified improperly require you to first correct the modifications. This is both time-consuming and counterproductive. Avoid it!

In-service and used components are a necessary and sometimes valuable source for parts. Carefully examine those to be considered for use to ensure that their quality or lack of it will not compromise your standards or limit the quality of your work.

COMPONENT SURVEY

When presented with an existing firearm for accurization, first check its functional characteristics and determine the existing tolerances. Disassemble the pistol and examine all components. Discard any parts that do not satisfy the established requirements. Check all upgraded and custom parts for comparability.

WORK LAYOUT

To initiate the accurizing process, prepare a project layout. Consider all machining operations and fitting procedures to determine the most appropriate work sequence. The order of presentation of the text that follows is offered as a basic guide. After considering the recommendations of the manufacturers of "After-Market" components which you are using, adjust your procedural approach as required.

SLIDE PREPARATION

The irregularities of hard slides are best corrected using a vertical mill fitted with a carbide end-cutter. This process is intended to true the existing dimensions of the slide to ensure that the bearing surfaces are both flat and parallel.

To prepare for this machining operation, secure the slide in the machinist's vise on the mill table. This setup is based on the slide's rail slot (dimension A in Figure 16), to position it level for a long pass. To check this, insert an adjustable reference plate (B in Figure 16) in the rail slot. Using the set screws in the plate, elevate the plate to the top of the slot. With a dial indicator set up on the mill head, check the surface of the reference plate as it passes under the spindle. If required, reposition the slide to insure that it is both level and parallel to the cutting head. With this setup established, remove the reference plate and indicator before proceeding.

To true the slide to eliminate any irregularities, position the head above the rail and raise the table until the cutter engages any high spots that may exist. Then, using multiple light cutting passes, remove the remaining irregularities to true the top surface of the rail as indicated by A in Figure 17. The adjacent rail may now be cut to the same dimension. Advance to the recoil spring plug housing (B in Figure 17) and as the lateral pass is made any surface irregularities that exist in that area will be eliminated.

NOTE: This entire procedure is intended to true existing dimensions but not to alter them, so proceed with caution. Next, check the inner wall surfaces of the rail shoulders. If significant irregularities are found, proceed with a similar dressing operation for both opposing surfaces.

CAUTION: Check to ensure that these surfaces are parallel before this machine procedure is attempted. If any run-out is detected, do not continue this machine operation. Instead, use a manual stoning process to true this area. This procedure may be incorporated into the final phase of the slide bottom preparation, which involves redressing all of the areas previously machined, using a fine India stone. Proceed with caution. Remember, once the metal is gone, it cannot be replaced.

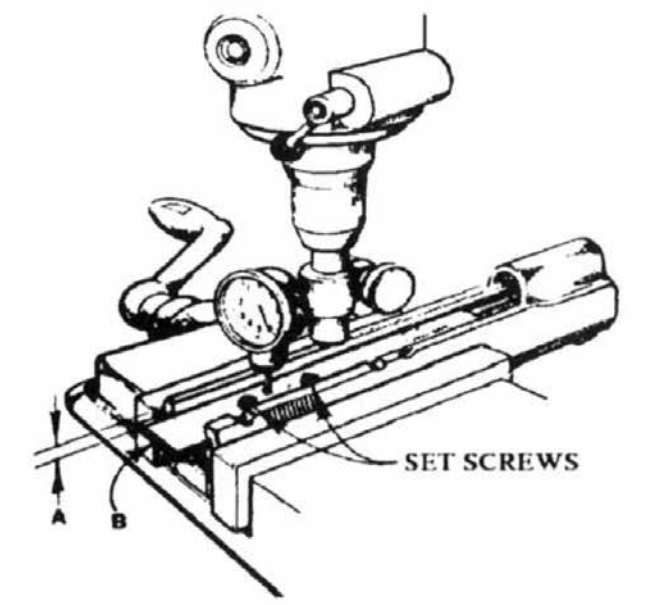


Figure 16: Securing slide in milling-table vise prior to truing with a mill cutter.

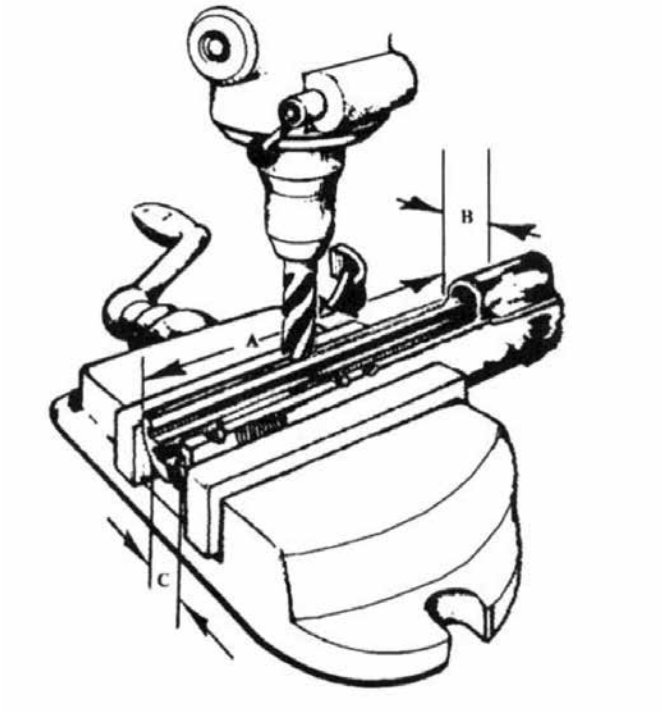


Figure 17: Using a milling machine to true a Colt Model 1911 slide.

INTERNAL SLIDE PREPARATION

First, check the bushing seat in the muzzle end of the slide to ensure that it is true and free of irregularities. Deburr and polish as required. Next, make a visual inspection of the locking lug area, shown in Figure 18. Limited polishing should be required in this area if a proper inspection was made during component selection.

Complete the prefit preparation by honing the lug area of the slide. This operation may be performed using an extension shaft fitted with a drum mandrel sized to the lug profile (Figure 19). The function is a polishing process and may be accomplished with 600-grit abrasive.

NOTE: If using an in-service slide and you suspect that the lugs were previously re-dressed, determine that a minimum of 0.055" lug slot depth is available.

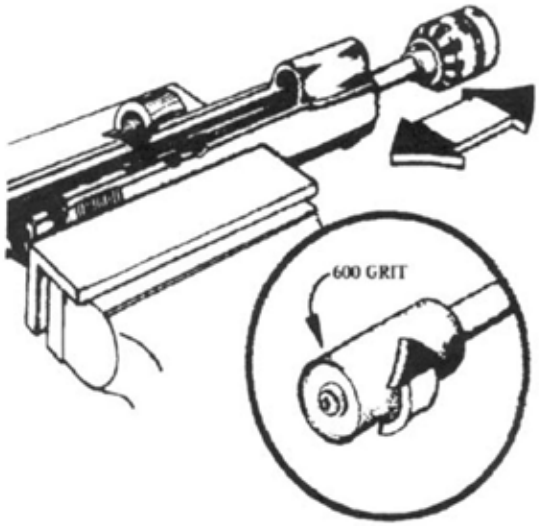


Figure 19: *Internal slide preparation using a rotary sanding drum with 600-grit abrasive.*

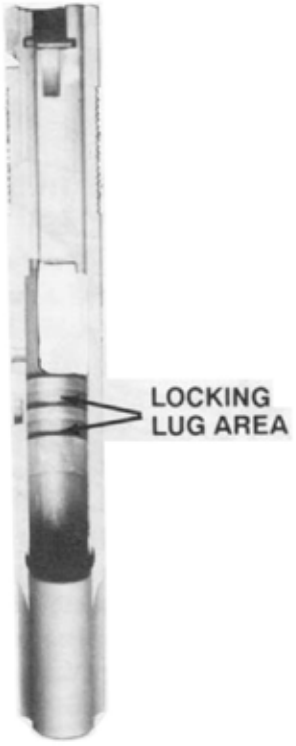


Figure 18: *The locking lug area of the slide of a Colt Model 1911.*

DETERMINING THE SLIDE RAIL HEIGHT

Next, reinstall the reference plate, shown as B in Figure 20, to make note and record the finished dimensions, which you have attained thus far in the preparation of the slide. Measurement A will determine the dimensions, which you must achieve as a slot measurement in the frame rail lowering process. With this established, you may now select an appropriately sized parallel plate or fitting bar to begin the rail lowering procedure.

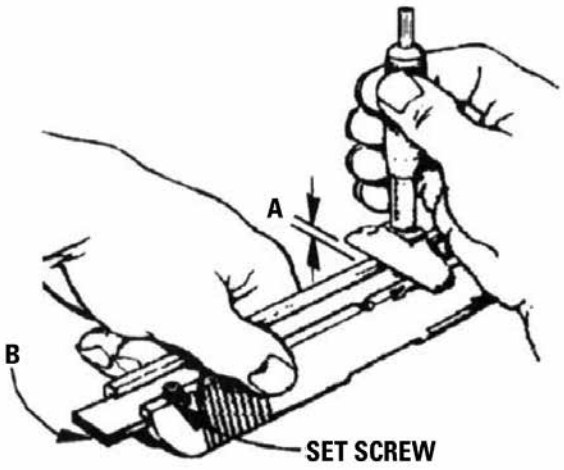


Figure 20: *Determining the slide rail height with a depth micrometer.*

FRAME PREPARATION

When lowering the frame rails, address only the shaded areas indicated as A and C in Figure 21, at the extreme ends of the bearing surfaces of both rails. Area B indicates the section of rail ledge adjacent to the magazine well and should be left unaltered to avoid distortion or damage to the frame.

There are two methods which may be employed when lowering the frame rails. *Peening*, considered an acceptable method, will be discussed first. Secondly, swaging will be offered as a comparable method to illustrate the difference in technique.

Peening the rail ledges is a recommended method of rail lowering to obtain closer tolerances and improved fit. This procedure is intended to limit and control vertical slide movement. Lowering the frame rails by the exact amount of vertical tolerance that exists between the slide rail and frame slot effectively eliminates the free play. This is accomplished by causing the underside of the lowered section to become a bearing surface for the slide. The precise dimension required for the frame rail slot was determined from the slide rail measurement taken in the previous step.

To prepare for this procedure, the frame is positioned between two frame plates and secured in a heavy bench vise, as shown in Figure 22. The illustrated setup utilizes the threaded stock screw bushing holes to locate and secure the frame with four Allen screws. An accessory filler block is inserted in the magazine well to reinforce the frame and prevent distortion damage under the pressure of the vise. The frame plates are designed with an outer lip which rests on the top of the vise jaws for vertical support. The initial lowering process is begun with a slightly oversized fitting bar inserted in one rail slot. Using a ball-peen hammer with a smooth, polished face, begin to peen the ledges of the frame rail. With controlled, light blows, peen only those areas previously indicated. After establishing a feel for this forming process, progressively increase the force of

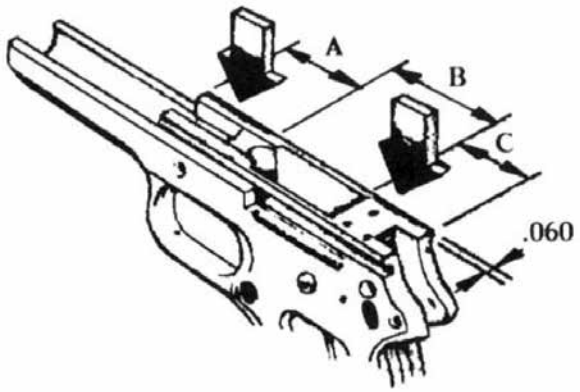


Figure 21: *Areas to concentrate on when lowering frame rails.*

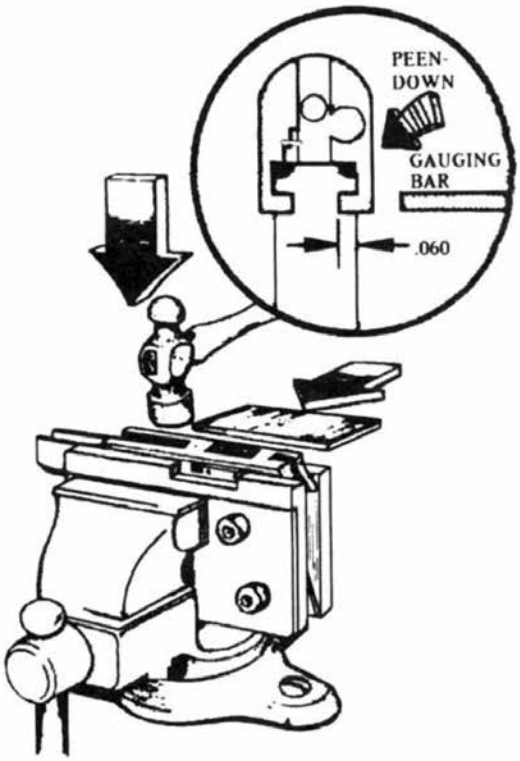


Figure 22: *Peen and displace the rail ledge to a uniform width of 0.060 inches.*

impact to lower the frame rail uniformly. Avoid impact marks and distortion by peening only the outer portion of the ledge. However, do not bevel the rail so that only the lower edge or extreme outer comer becomes a bearing surface. This is not an acceptable method and will result in premature wear and limited service.

To avoid this, peen and displace the rail ledge to a uniform width of 0.060" to complete the first lowering phase. Next, make final measurements and select the appropriate fitting bars to bring the rail slot to the desired dimension. This final lowering operation also refines the newly formed rails so they require very little truing. Use an India stone for light truing touch-ups.

Swaging the rail ledges is the preferred method of frame rail lowering and is shown in Figure 23 on next page. This procedure employs the same setup, utilizing frame plates and a heavy bench vise as holding fixtures and fitting bars to establish the desired tolerances. However, the forming method differs in that swaging concentrates more intense impact energy to a specific area of the rail. This energy is generated by the use of a heavier hammer and transferred to the rail through a specially designed punch.

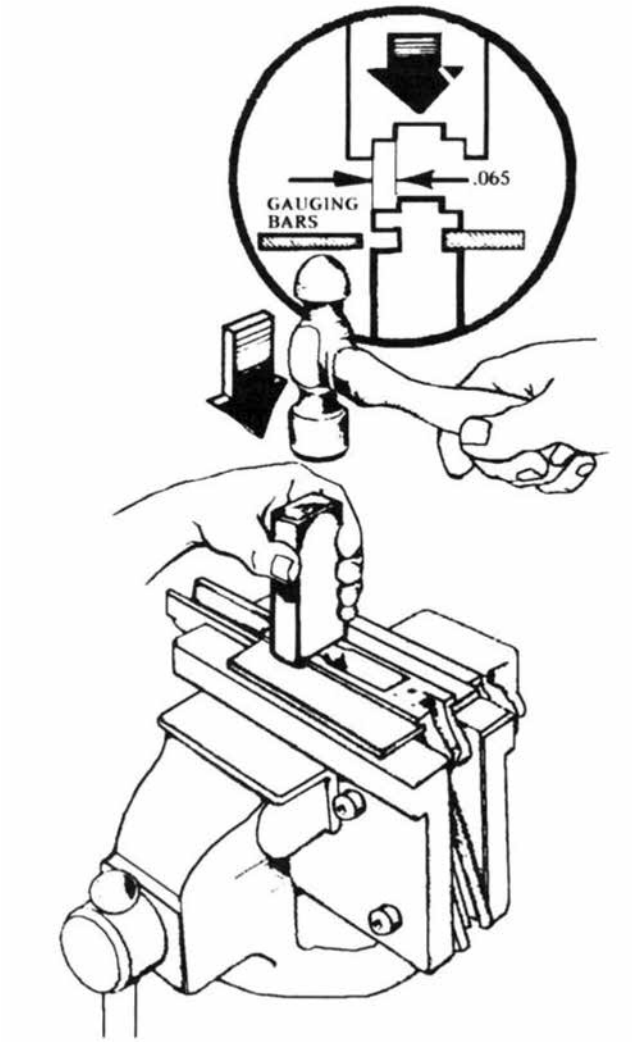


Figure 23: Swaging the rail ledges is the preferred method of frame rail lowering.

This swaging punch is formed from hardened bar stock with the center section relieved to create two outer legs. The inner surface of each leg is notched to form a 0.065" offset. This punch is placed on the frame in a vertical position with the notches straddling the rails. As in the peening method, only the extremities of the rail ledges are lowered and this is done in two stages. First, using slightly oversized fitting bars, the rails are swaged down. Because greater force is applied and concentrated in a specific area, you may find it advantageous to use protective inserts to avoid marking the frame. In most cases, the modified frame will be refinished anyway, but this precaution will limit the surface preparation time and reduce the labor required. As with the alternate procedure, use controlled blows and strike only those areas previously indicated. After establishing a feel for this forming process, progressively increase the force of impact to lower the frame rails uniformly.

NOTE: During the entire swaging process it is essential that the forming punch be positioned correctly to avoid impact marks and distortion. Therefore, as the rail lowering proceeds, it is advisable to check the slide fit frequently to avoid binding. If a resistance or a bind is detected, layout fluid applied to the suspected area will quickly identify the contact point. Once the area is established, careful stoning will alleviate the problem. Continue this procedure until the first swage-down stage is completed. Then, replace the oversized fitting bars with those of the desired finished dimension and proceed as before until the lowering process is completed. Continue to dress and polish the rails with a manual stoning procedure and remove any slight burrs or irregularities if they exist.

TRUING THE FRAME RAILS

Having achieved the desired dimensions in the newly formed frame rails, check the entire area of the opposing bearing surfaces (dimension W in Figure 24) to insure that they are parallel. If irregularities exist, redress the outer surfaces of the frame rail skirts to achieve a true, parallel relationship. This operation may be accomplished by a milling machine procedure followed by manual stoning, as shown in Figure 25. Or, since the frame does not exhibit the same degree of hardness as the slide, a manual filing procedure using properly fitted file guides will suffice for this operation, as shown in Figure 26.

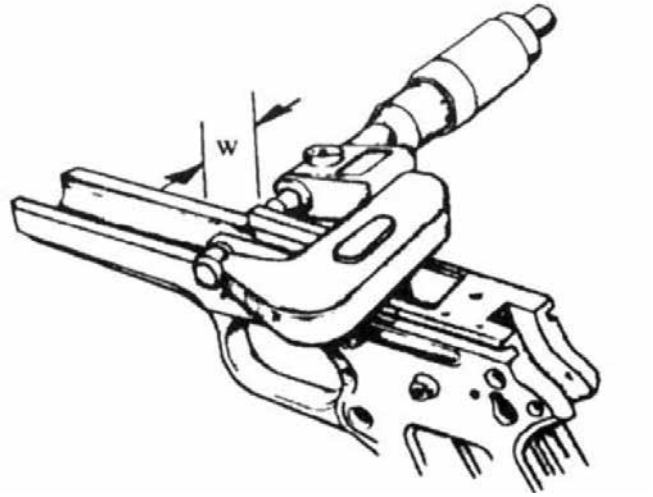


Figure 24: Check the entire area of the opposing bearing surfaces to ensure they are parallel.

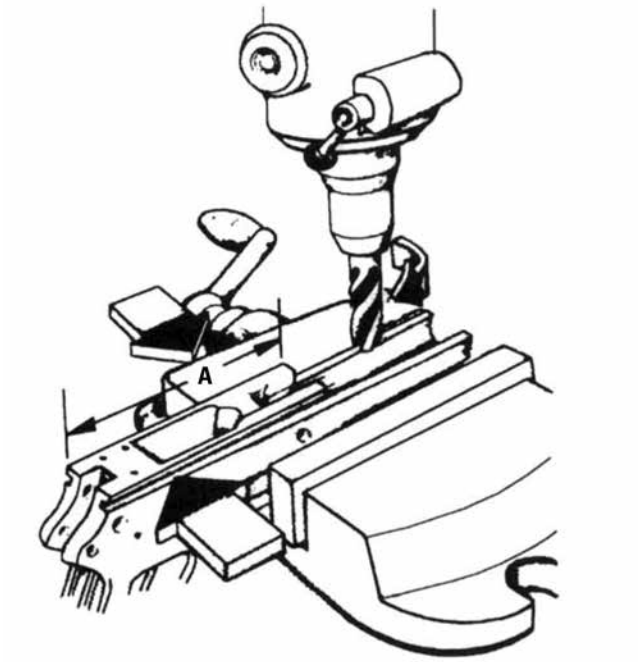


Figure 25: Dressing the frame rail skirts may be accomplished with a milling machine; hone afterwards.

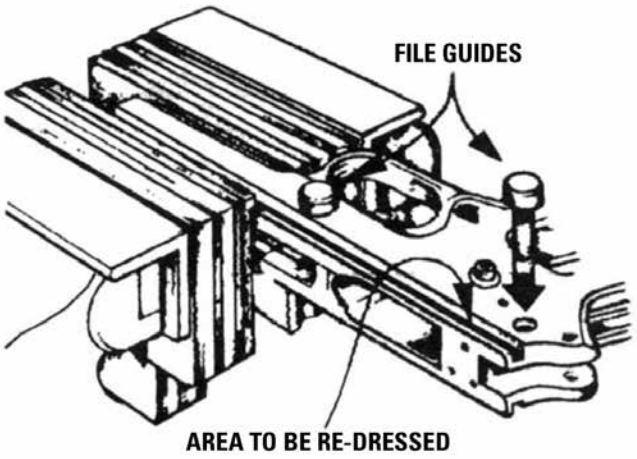


Figure 26: Dressing the frame rail skirts may be accomplished with a milling machine; hone afterwards.

File guides may be turned from 5/8" brass round stock. Two are required with support shafts of different diameters to fit the holes in the frame for both the safety lock and the slide stop. These shafts are turned back to diameters of 0.156" and 0.200" respectively and should be 1" in length, as shown in Figure 27. These guides are then positioned in the frame and a safe-edge file is used to redress the frame rails.

NOTE: This procedure is necessary to limit the final lapping to a honing process of two closely mated bearing surfaces. If any run-out exists, the lapping procedure will require a course compound to produce the required cutting characteristics. As a result the overall tolerances will be increased as the bearing surfaces are reduced. This result creates excessive lateral movement which will adversely affect the accuracy potential.

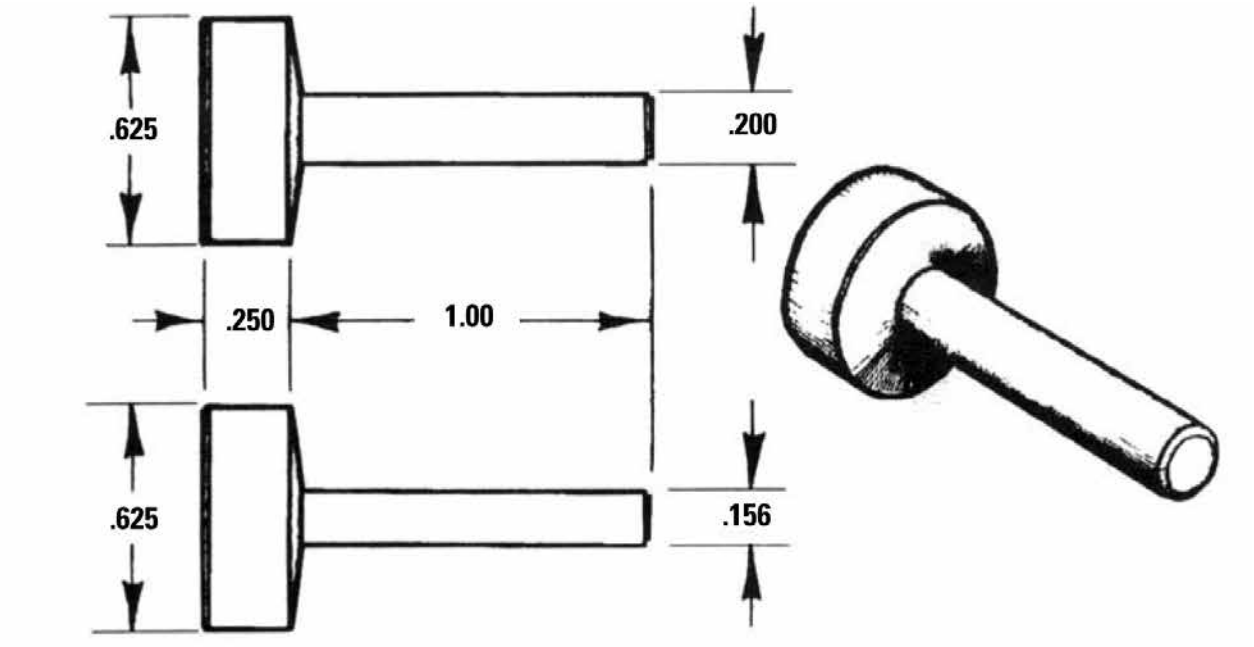


Figure 27: Detail of the guides used for truing the frame rails of the Colt Model 1911 semi-automatic pistol.

SLIDE-TO-FRAME REFIT

With a true, parallel relationship established between the frame rails, the slide-to-frame fit can now be enhanced. This process employs a controlled compression method to eliminate any excessive lateral tolerance (Figure 28). The compression fixture is set in a heavy bench vise. The specially designed side-plates function as auxiliary vise jaws and are machined with angular notches to support the slide. The internal, lower ledge retains an adjustable spacer that limits the compression movement in increments of 0.010 inch. To promote evenly applied pressure, insert appropriately-sized shims in the finger groove areas of the slide. This precaution will further ensure that the slide remains straight and true under compression.

The initial closure should be set at 0.020" under the established frame rail dimension (measurement W in Figure 24 on page 18). The compression should be held for a period of 15-20 seconds before stress- relieving the slide by hitting the vise housing with a heavy hammer. Release the pressure and remove the slide to check the results and make a trial fit to the frame. Take measurements of the full length of the slot to ensure that the slide remains both true and parallel. If the slide dimension indicates additional closure is required, increase the movement an additional 0.010" and repeat the operation. If any irregularities are detected, apply additional shim material to the appropriate areas to alleviate the problem.

NOTE: If you experience an over-closure problem, a slide expander may be employed to correct it (Figure 29).

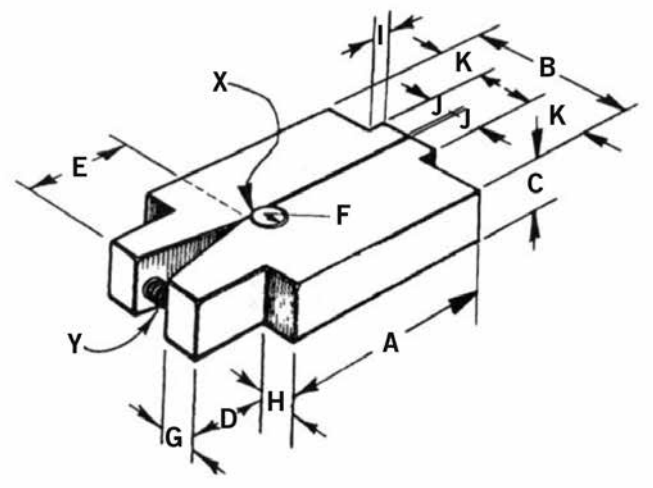


Figure 29: *Slide expander to correct over-closure.*

The slide expander is a corrective tool and should be used sparingly. Avoid using it by working both carefully and precisely when applying closure pressure to the slide. By over-tightening and then expanding the slide to correct your mistake, you could weaken and possibly damage this component, rendering it useless. However, if some small discrepancy does exist, the expanding tool may be useful in salvaging the situation. Even so, this should be used as a last resort remedy only. The professional gunsmith should strive to do the job correctly the first time.

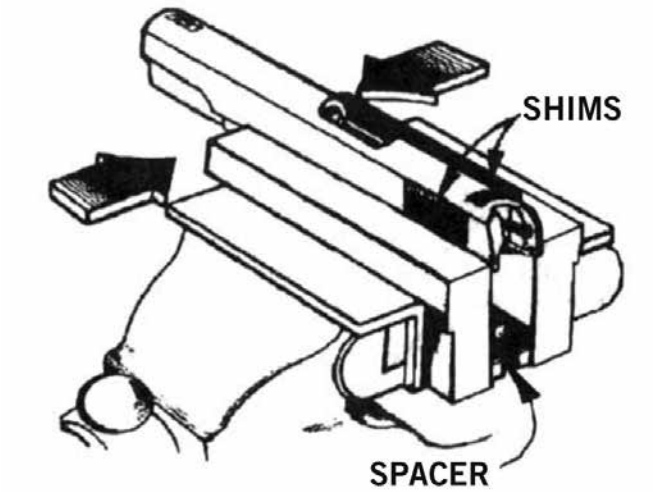


Figure 28: *Bench vise is used in combination with a spacer and shims to close slide rails.*

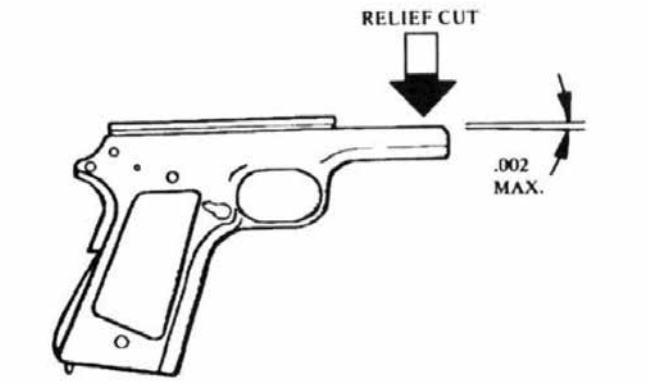


Figure 30: *A relief cut is sometimes used to eliminate drag.*

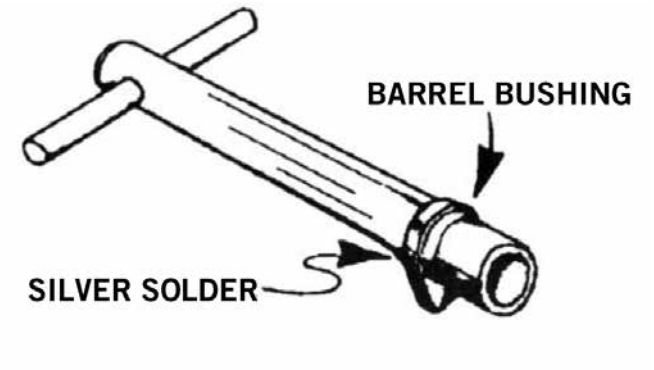


Figure 31: A slide T-handle is useful for lapping the slide of the Colt Model 1911.

LAPPING THE SLIDE

During the initial fitting of the slide to the newly formed rails, be sure that any drag encountered is not caused by the slide contacting the forward, unrailed portion of the frame. If this situation is encountered as a result of the slide being lowered, a slight relief cut to this area, forward of the frame rails, as shown in Figure 30, will correct this problem.

When the desired dimensions are achieved, the slide must be lapped to the frame to reduce drag. Apply a light lapping compound to the suspect areas.

NOTE: You should stock a variety of cutting grades for lapping, but all lapping compounds should be a non-charging type so they do not impregnate the metal surfaces. For slides that have been pretightened correctly, a 600-grit will be adequate.

A slide T-handle, shown in Figure 31, is useful when performing the lapping procedure. This convenient tool facilitates this operation by allowing the slide to draw back and forth easily. When this tool is used in the lapping procedure, you can easily make full-length strokes without exerting pressure downward against the lapping compound. Continue this operation to eliminate any minor irregularities. To check your progress, remove the slide and clean all surfaces to ensure that they are free of any residual compound.

Then, oil the surfaces and check the fit. If additional lapping is required, repeat the process until the desired results are achieved. Again, clean the slide and frame and then oil all bearing surfaces to begin the final honing process.

This final hand-fitting procedure should ensure that the slide bears evenly on the frame from the slide stop recess to the rear of the slide, as shown in Figure 32. Check this by supporting the frame at a 45° angle and the weight of the fitted slide should cause it to move freely but gradually down the rails. Invert the frame to an opposing 45° angle and if the slide slowly descends to the lower extremity of the frame, the honing process is complete. This smooth and consistent slide movement over the complete length of the frame rails confirms that the slide bears evenly on the frame and has been fitted correctly.

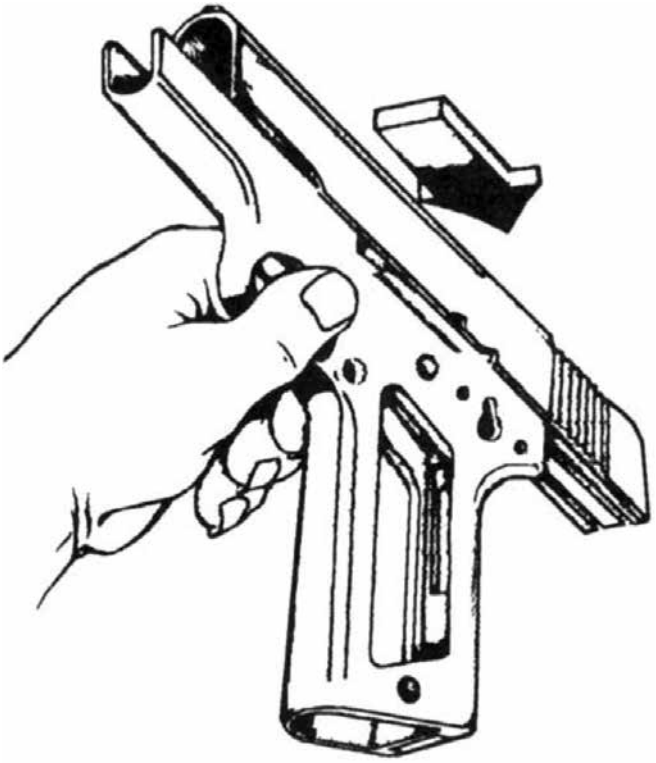


Figure 32: When held at a 45° angle, the slide should fall freely down the frame rails.

SELF-TEST QUESTIONS

Please check your answers on page 22.

5. **What measuring instrument is recommended for determining the slide rail height to a reference plate on the Colt Model 1911?**
6. **What special tool is useful for lapping the slide on the Colt Model 1911?**
7. **What machine tool is best for correcting irregularities of Colt Model 1911 hard slides?**
8. **What is the preferred method of lowering frame rails on the Colt Model 1911?**

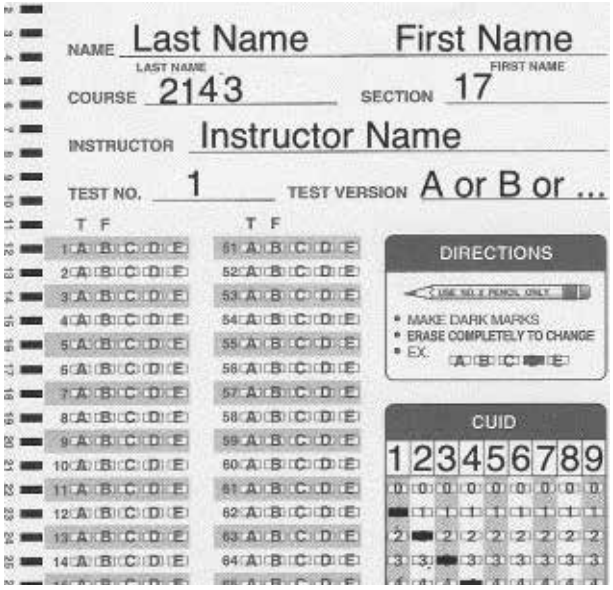
Answers to Self-Test Questions

1. True.
2. The metal parts should be separated from the stock.
3. To give the finished rifle smoother lines.
4. The recoil is greater and the report (muzzleblast) is louder.
5. A depth micrometer.
6. A T-handle.
7. A milling machine with ball cutter.
8. Swaging.

Lesson Questions

THIS IS LESSON NUMBER 2178.

Make sure you print your name, student number, and lesson number in the space provided on the Lesson Answer Form. Be sure to fill in the circles beneath your student number and lesson number.



REMINDER: A properly completed Lesson Answer Form allows us to evaluate your answers and send the results and additional study material to you. Do not hold your Lesson Answer Forms to send several at one time. You may run out of study material if you do not send your answers for evaluation promptly.

You may also complete your exam online at www.sdi.edu, click on the *online exams* tab.

1. **What is the best method to true the slide on a Colt Model 1911 pistol?**
   a. Use a drill press and a bastard file.
   b. Use a mill file and honing stones.
   c. Use a vertical mill fitted with a carbide end-cutter.
   d. Use a T-handle.

2. **When truing the slide on a Colt Model 1911 pistol, how should the cuts be taken?**
   a. A series of light cuts.
   b. One heavy cut.
   c. Alternate between heavy and light cuts.
   d. Several heavy cuts.

3. **What measuring instrument should be used in conjunction with a reference plate to determine the slide rail height on a Colt Model 1911 pistol?**
   a. An electronic caliper.
   b. A ting gauge.
   c. A depth micrometer.
   d. A trigger pull gauge.

4. **The lug area of the Colt Model 1911 pistol may be honed using an extension shaft, fitted with a drum mandrel sized to fit the lug profile. What size abrasive grit should be used for this operation?**
   a. 80-grit.
   b. 120-grit.
   c. 240-grit.
   d. 600-grit.

5. **What is the purpose of a slide-expander tool for use on the Colt Model 1911 semi-automatic pistol?**
   a. To dress the frame rail skirts.
   b. To check the area of the binding surfaces.
   c. To correct over-closure problems.
   d. To loosen the bushing.

6. **One method that may be used to lower the rail ledges on the Colt Model 1911 is:**
   a. Honing.
   b. Peening.
   c. Jeweling.
   d. Tacking.

7. **What must always be used in conjunction with a metal-cutting file when truing the frame rails on a Colt Model 1911 pistol?**
   a. File guides.
   b. Template.
   c. Bastard-cut file.
   d. Second-cut file.

8. **When an original, collectible military rifle in excellent condition is encountered, what should be done?**
   a. It should be modified immediately.
   b. The original condition should be preserved.
   c. Only the stock should be altered.
   d. Only the metal parts should be altered.

9. **When a military rifle barrel is shortened, what must be done to the muzzle to ensure accuracy?**
   a. It must be rebored.
   b. It must be crowned.
   c. The rifling should be lapped.
   d. It should be blued with instant bluing solution.

10. **What is one popular way of smoothing rifle actions?**
    a. Smooth certain parts by honing.
    b. Smooth certain parts by sandblasting.
    c. Smooth all parts, inside and out, by polishing.
    d. Smooth all parts with a barrel-crowning ball.