The Colt .45 Automatic

A Shop Manual

Volume 1
In the Kuhnhausen
M1911 Pistol Series

Jerry Kuhnhausen

"MK IV Series 80" Government Model"

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The Colt .45 Automatic, A Shop Manual

(Volume 1 in the Kuhnhausen M1911 Pistol Series)

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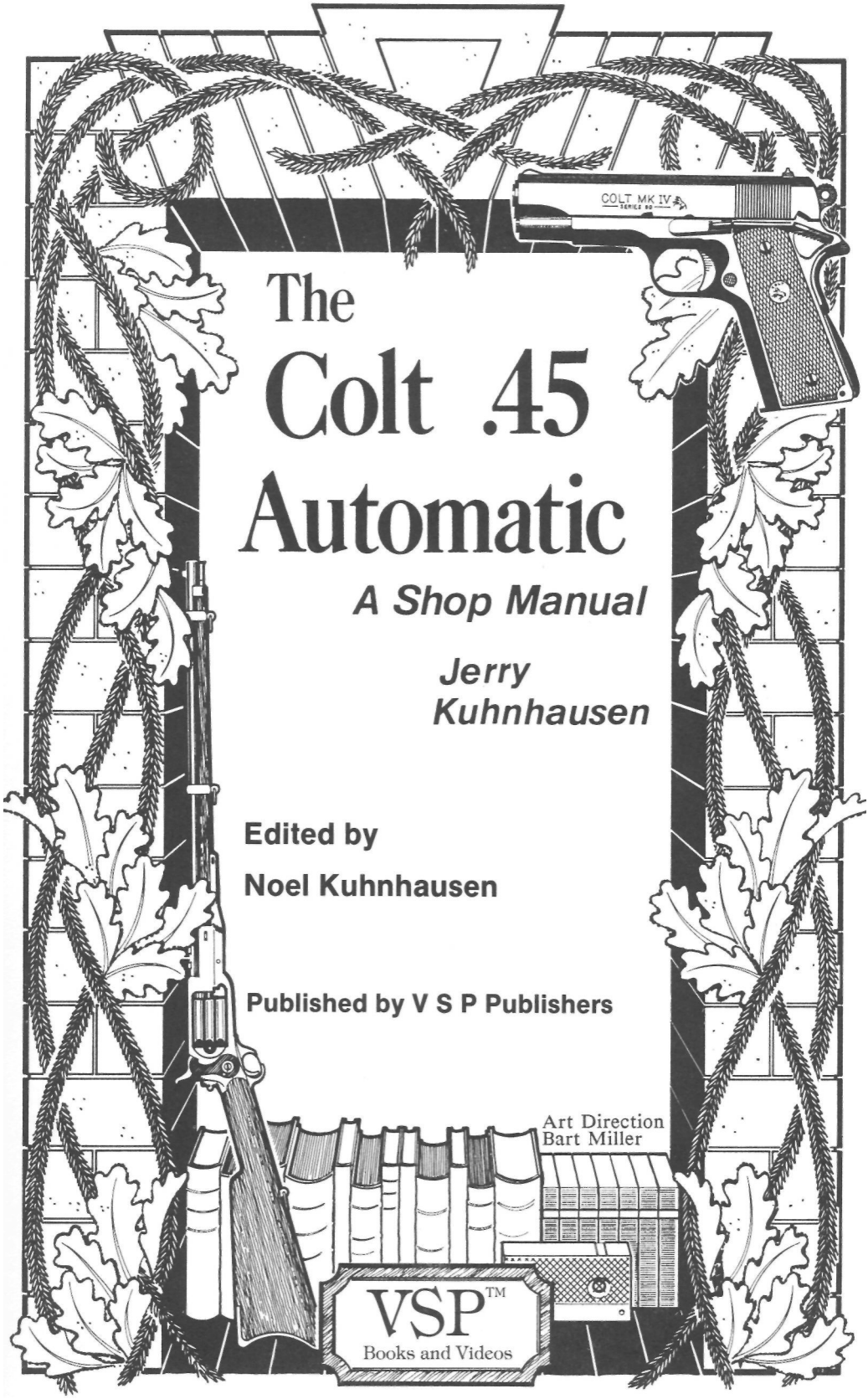

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A Shop Manual

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Acknowledgements . . .

A special thanks to the following manufacturers who were generous enough to contribute items of reader interest, including: photographs, artwork, illustrations, exploded diagrams, parts diagrams, and technical data.

Colt Industries Inc., Firearms Division

Bo-Mar Tool and Manufacturing Co., Inc.

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Millett Sights

Ransom International Corp.

Springfield Armory Inc.

Colt Firearms Division publishes basic user safety/instruction manuals for their specific firearm models. It is suggested that armorers, pistolsmiths, gunsmiths, and all others who own, use, or handle Colt firearms read the appropriate model user safety and instruction manual. Colt safety and instruction manuals for users are available from Colt Firearms Division, P.O. Box 1868, Hartford, CT 06102. When ordering manuals, specify exact firearm model.

Colt has not published shop manuals on the mechanics or repair of their semi-automatic pistols, perhaps in the belief that field availability of basic mechanical information might allow the untrained and/or unqualified to "fix", or otherwise tinker with, Colt firearms which were not in need of repair in the first place. But, with or without books on the subject, (and the necessary cautions and safety warnings contained therein) tinkerers, being irrepressible, will tinker, just the same. In the absence of detailed, specific model training programs, we believe that professional armorers, pistolsmiths, and gunsmiths will be better served by the data in this shop manual than they would be if no data was available at all. The professional may be helped even more by the safety warnings, cautions, maximum-minimum specifications, and limitations that are given. Additionally, as we see it, it's also only fair that nonprofessionals have ready access to, and benefit of, as many of the very same cautions, safety warnings, and specifications as possible. In this way, perhaps, a caution might be read and heeded before the fact of an unsafe act, mishap, injury, etc. Hopefully, insight into the mechanical complexity of this subject might serve to convince the nonprofessional to take his pistol to a Colt qualified armorer or pistolsmith for repair, or send it to factory service, if, or when, repair might be needed.

These days, U.S. manufacturerers are under a heavy liability load. The problem is even greater for manufacturers with independent field repair networks. That field repair stations exist to offer regional customer service provides the manufacturer no relief.

The Colt .45 Automatic, A Shop Manual

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INTRODUCTION

As has been noted under "About the Author", this book has been excerpted and reprinted from the actual loose leaf shop training manuals written by gunsmith Jerry Kuhnhausen for the original purpose of shop training and use by his personnel.

For reader convenience, the printer has resized the manual to standard book size using the author's original photographs, illustrations, and instructions.

The manuals were assembled with shop training in mind, but became particularly valuable as an easy reference when questions came up at the bench. They are arranged in a logical "how you would go through it in the shop" sequence, and are a package of ready information.

The Colt .45 Automatic is a practical repair manual. The first section, or Book I, covers disassembly, inspection, basic checks, parts identification, and interior servicing. Then, Book I moves on to reassembly, refitting, further parts checks, and includes basic repairs. A complete "What's wrong with it?" troubleshooting guide is included. Safety and common sense are continually stressed.

The heavily detailed second section, or Book II, covers the most often requested shop and custom work, including some of the more advanced bench gunsmithing techniques. In this part, the author gives extensive coverage to mechanical accuracy work, sometimes called accurizing. Basically, this amounts to making methodical and precise mechanical adjustments, including: refitting slide and frame rails, tightening of certain tolerances, match barrel installation, trigger, hammer and sear work, etc.

This shop manual covers just about everything worth knowing on the subjects of repairing, accurizing, trigger/sear work, action tuning, springs, bushings, rebarreling, and custom .45 modifications. It is the most complete work on the Colt .45 automatic we've seen to date.

Also, the author has made available copies of his original shop training videocassette, Gunsmithing the Colt .45 Automatic. This professionally made companion videocassette adds motion, depth, and a chapter to the book, and puts you there at the gunsmith's bench. Pop one of these videos in your VCR and you'll see it all.

So, whether you are a professional, or a do-it-yourself gunsmith, get this book. And, if you don't have the videotape, available in VHS and Beta, get it too.

-The Editors

ABOUT COLT'S .45 AUTOMATICS

The Colt Model of 1911 .45 semi-automatic pistol has its' roots in several earlier pistol designs which date back to John Browning's original inventions of 1894-1895. In 1896, Browning assigned to the Colt Firearms Company the manufacturing and sales rights to his first four pistols. Although they were never produced, all were the design forerunners of the Colt Model of 1900 .38 Automatic. The ingenious, but simple, M1900 was the first semi-automatic pistol produced in the United States, and is the linear ancestor of, and design basis for, the Colt Government Model .45.

The very first Colt civilian/military semi-automatic .45 was the Model of 1905, which was produced and sold from 1905 to 1911. The legendary Government Model of 1911 followed. Its' main patent was granted on February 14, 1911, and a second patent, having to do with the mechanical safety system, was granted August 13, 1913. First production of the military model began in December of 1911. This was followed by a commercial version of the military pistol in March of 1912.

Major variations to date:
1924- M1911A1 introduced
1929- .38 Super introduced
1931- .22 Service Ace introduced
1933- .45 National Match introduced
1933- .38 Super National Match introduced
1941- Commander L.W. introduced
1949- Combat Commander introduced
1957- Gold Cup National Match introduced
1984- Officer's Model introduced

Minor variations since 1970:
Series 70 variation introduced
Series 80 variation introduced
Stainless steel Government .45 introduced
Stainless steel Officer's Model introduced

Since production began, examples of this incredible, durable design have survived the ravages of saltwater, mud, snow, and sand. At the looser military production tolerances, the pistol functions, and continues to function, when all others have become terminally inoperative. But, when mechanically tightened, properly clearanced, match barrel and sights installed, and trigger lightened, this very same design becomes a superbly accurate match pistol.

Approximately 2,695,200, or so, Model 1911 and AI's were produced by the end of World War II. If we total all U.S. production, including contracts with foreign governments, Colt's civilian production, domestic and foreign copies, and variations manufactured to date, the number may easily run between four and five million units.

The M1911 has been the single most copied semi-automatic pistol in the world. This record will probably stand.

Figure A- Shows the Colt M1900 which was the first semi-automatic pistol commercially produced in the United States. Manufacturing began in 1900. In total, 3500 pistols were produced. All were marked "AUTOMATIC COLT CALIBRE .38 RIMLESS SMOKELESS" on the right side of the slide, signifying chambering for the .38 Colt Auto cartridge. This pistol used the original double link locking system, as can be seen above. In the direct evolution of the link-lug design from the M1900 to the now famous M1911, the double link system was replaced by the single rear link/front barrel bushing system which became standard with M1911 production.

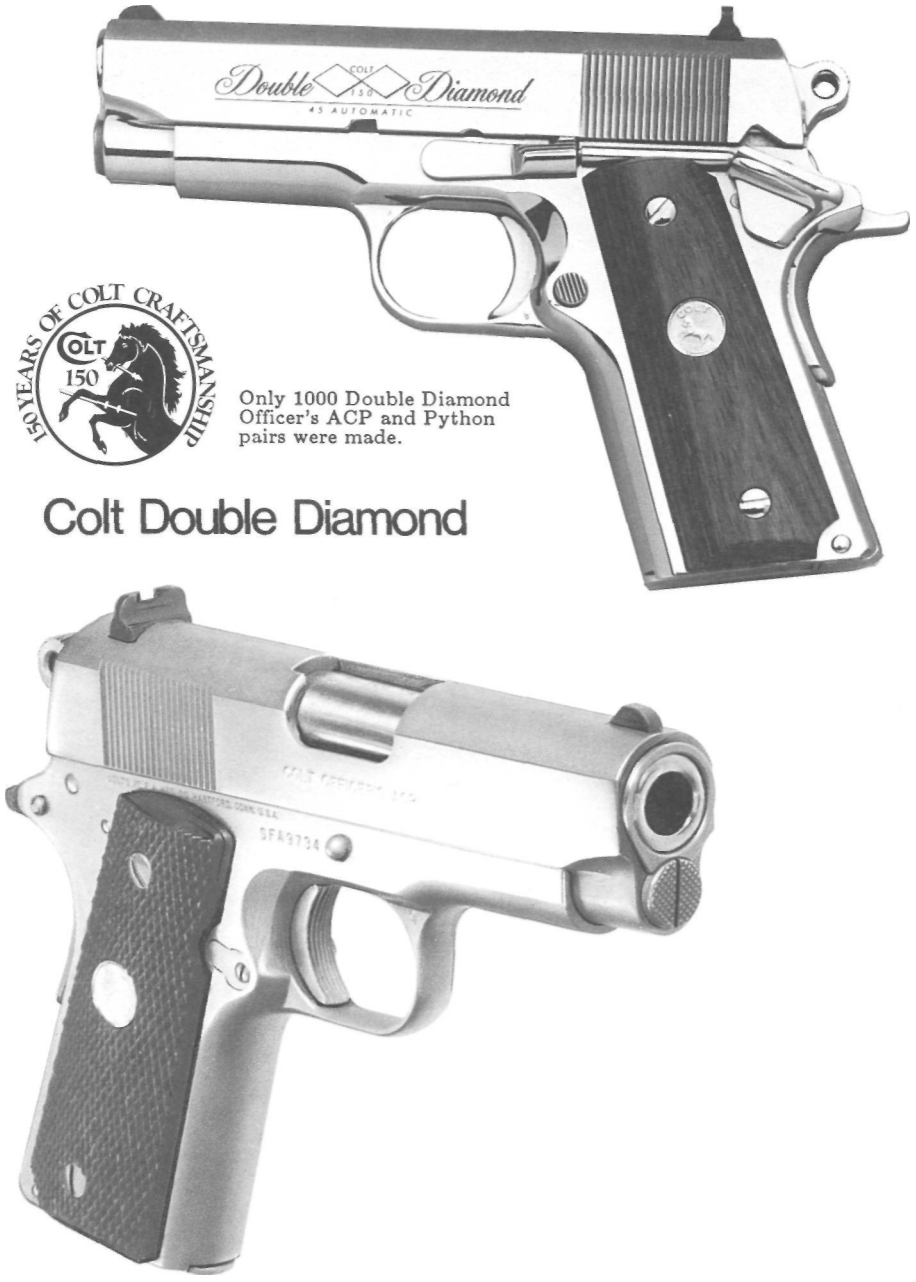


Figure B- Shows two versions of the Colt Officer's ACP. The Double Diamond special limited edition, at top, is in highly polished stainless steel and marks Colt's 150th year. The standard stainless production model is shown, in three quarter view, at bottom. The Officer's ACP is the latest M1911 variation, at the time of printing. Barrel length measures 3 5/8". Overall dimensions are 7 1/8" long and 5 1/8" high. With its' conical front barrel section and special bushing, this excellent defense pistol is pleasingly accurate- just as it comes from the factory box. The decision to produce this compact model was, undoubtedly, motivated by the marketing success of Detonics and Star pistols. The name is reminiscent of the M15 General Officer's Model, built at Rock Island Arsenal.

ABOUT GUNSMITHING AND THE COLT .45 AUTO

When you think about it, it is really surprising how very little basic and detailed information has been published on the subject of bench and shop gunsmithing during the past 50 years. This applies all the more in the specialized field of pistolsmithing. And, when it comes to troubleshooting information, basic repair data, and instruction, the Colt .45 semi-automatic pistol is no exception. Except for a few military training manuals, which belabor the word "brief", to say the least, most of the material published to date has discussed only those aspects of custom pistolsmithing work which were of popular interest at the particular time.

Very few books on basics, that is to say on the actual **"nuts and bolts"** of the subject, seem to be available. Perhaps they are locked away under a foot of dust in the archives in some factory basement, or perhaps they were never written in the first place. When you discuss this matter with working pistolsmiths, you will find that, in spite of this lack of information, most have learned their craft over the years, a bit here and there, largely trial and error, and with an occasional insight provided by the interaction of ideas from an older or fellow pistolsmith. To a man, they will tell you that there should be a single, detailed book on the Colt .45 auto, but that, sadly, there isn't. Many of these craftsmen and masters guard their hard earned knowledge, having little inclination towards sharing it. And to most, writing or teaching is less rewarding and more demanding than just doing the work and being done with it. This lack of inclination, however, does not assist the next fellow interested in learning the craft.

This observable void is precisely the reason that this book was written.

When breaking a subject down for explanation, sooner or later it becomes noticeable that it has natural subdivisions. This holds true in .45 automatic pistolsmithing. Some with previous .45 experience may group these subdivisions a bit differently. But since I have the job of explaining the subject, kindly see it my way for awhile. And, keep in mind that, when discussing or explaining something, it must be organized in a logical, mechanical, "nuts and bolts" sort of way. Otherwise the presentation doesn't follow and can't make sense. For these reasons, the book is laid out as follows:

The first section, or Book I, covers:

1. Safety, basic disassembly, check-out, servicing, and reassembly.
2. Troubleshooting, general repairs, replacement of worn parts, etc.
3. Rebuilding, which amounts to refitting as necessary to compensate for wear and slight dimensional variations amongst the parts.

The second section, or Book II, covers:

4. Mechanical fitting and adjustments to increase mechanical accuracy i.e., accuracy work or accurizing.
5. Mechanical adjustments to increase reliability of function.
6. Custom work to make shooting easier, enhance mechanical accuracy work already done, or for improvement of appearance, etc.

ABOUT GUNSMITHING AND THE COLT .45 AUTO

In my experience, the .45 automatic is best understood by familiarizing yourself with the actual operation and interaction of the working parts. And, operation is easiest thought of, or seen, by first dividing the pistol's function into sections, and then visualizing and understanding the mechanism one section at a time. This applies to the barrel and bushing, the locking lugs, barrel hood and slide, link and pin, recoil spring and follower, and etc. Picture the interaction of the working parts in a series of freeze-frames as the pistol operates- until you know exactly what each section of the pistol should and shouldn't do. Then refine this understanding, adding precision later on. At a point, you will easily visualize entire pistol function, down to the smallest detail. This makes troubleshooting very simple.

To make training easier, we bought a cut-away training pistol for shop use. The cut-away idea worked so well as a training aid that we modified another two pistols. Working on the basis that if a little metal cut away was good, and a whole lot was even better, we left almost as much of both pistols on the floor as remained behind for display. One was hard chrome plated and is used in photos throughout this book. Cut-away training aids are so beneficial that I strongly suggest their use in all gunsmith training.

REALLY NOW, WERE YOU GOING TO SKIP THIS PAGE?

A Gunsmith's Safety Rules- or how to stay out of trouble, and possibly out of court, at the same time.

1. **NEVER alter, or remove, a safety feature from any gun. If the owner insists, let him do it- then it's strictly his liability, not yours.**
2. **DON'T work on any gun with a safety part removed- unless the work includes reinstallation of the safety.**
3. **WHEN working on Series 80 models- make 100% sure the internal safety linkage, firing pin, plunger, etc., are correct, in place, and fully operational.**
4. **FOR your protection- always keep records of work done.**
5. **IF you begin work on a gun that you determine is not reliably repairable or inspect a gun you determine is not in good working order- always write a shop ticket, and: "WARNING- NOT SAFE TO FIRE" on the ticket.**
6. **DON'T do patch-job repairs- do it right or skip it.**
7. **DON'T work for those who insist on substandard work.**
8. **NEVER trust anybody- THE GUN IS ALWAYS LOADED!**
9. **NEVER hand (or take) a gun- unless you have personally checked its chamber(s).**
10. **NEVER point any gun- except at a target.**
11. **NEVER believe what someone says about the condition of any gun- always fully inspect it yourself.**
12. **LIMIT .45 auto dry firing- no matter who says it's O.K.**
13. **NEVER forget to check for barrel obstructions or bulges. Just do it- it's only common sense.**
14. **WEAR safety glasses and ear protection when needed.**
15. **HEED cautions when using solvents or chemicals.**
16. **DON'T permit live ammunition in the work area.**
17. **FOLLOW these safety rules- after all, the life you save could be your own.**
18. **THINK it through first- you'll always save time later.**

If you violate these simple rules- you will, sooner or later, pay the price for it.

BEFORE DISASSEMBLY

Don't waste a valuable opportunity to learn something about the pistol you intend to take apart, for servicing or repair, by getting ahead of yourself and beginning disassembly before gaining some idea of what might be right or wrong- or what might be needed.

Experienced pistolsmiths always take the necessary few minutes needed to precheck a semi-automatic pistol, generally following the list given below. This makes it possible for them to focus on the part, or parts, that may be causing a problem, before the slide is removed and the rest of the gun is disassembled. Just a few minutes in the beginning will save a lot of time later.

BEFORE DISASSEMBLY: A PRE-CHECK LIST

1. Remove magazine, check magazine release. Sticky? O.K.?
2. With finger off trigger, cycle slide back and thumb lock slide open.
3. Always check the chamber; empty and clear. Unloaded?
4. Inspect chamber and ramp condition. O.K.?
5. Inspect crown and bore condition. Bore unobstructed? O.K.?
6. Inspect recoil face and extractor hook condition. O.K.?
7. Close slide and install empty magazine. Magazine catch O.K.?
8. Cycle slide and check lock open on empty magazine. O.K.?
9. Close slide and short link check by applying light thumb pressure at top of barrel hood. Barrel still holds locked position? O.K.?
10. Thumb pressure unlocks barrel easily? Short link?
11. Check barrel/bushing and bushing/slide fit. Loose? O.K.?
12. Cock hammer, check sear release. O.K.? Trigger O.K.?
13. Recock hammer, check thumb safety operation. O.K.?
14. Recock hammer, thumb safety off. Depress trigger without touching either safety. Hammer must not drop. O.K.?
15. Gravity check. Repeat above test, pistol pointed down. Spring must hold grip safety. Hammer must not drop. O.K.?
16. Sear bounce test. Lock slide back, then release quickly. Repeat with trigger depressed. (But not grip safety.) Hammer must not drop. O.K.? **
17. Draw slide back, cocking hammer. Squeeze trigger, depress grip safety, and return slide forward. Hammer must not drop. O.K.?
18. Now, release trigger and resqueeze. Hammer should now drop. O.K.?
19. Series 70 and earlier - check captive half cock over engagement notch by squeezing trigger in that position. Hammer must not drop. O.K.?
20. Series 80 - half cock notch is not captive. Trigger will ease the hammer off. This is normal.
21. Check sights. Tight? Undamaged? Visibly centered?
22. Check exterior condition. O.K.?
23. Check slide vertical tolerance. Excessive? O.K.?
24. Check slide horizontal tolerance. Excessive? O.K.?
25. Check ejector stud slide/hammer clearance. O.K.?

** This safety check may batter or damage a finely tuned competition sear and should be done only when absolutely necessary on tuned competition pistols.

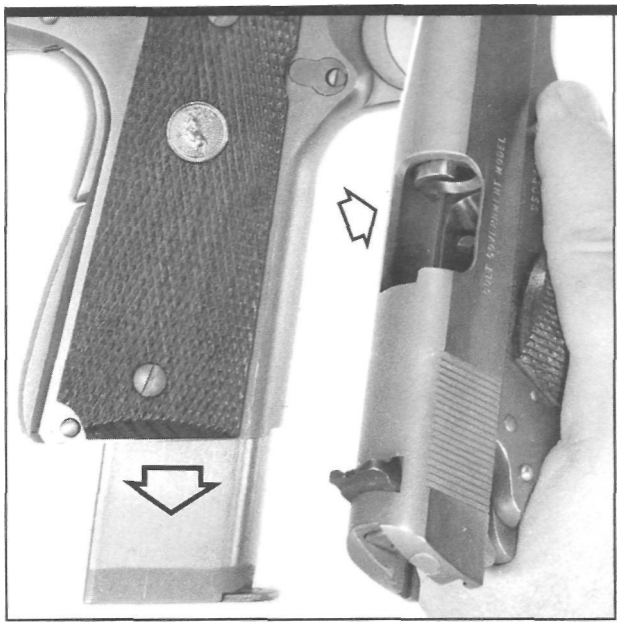


Figure 1- Shows removing the magazine and then locking the slide assembly back. **Warning: always unload and clear a pistol or revolver before inspecting, handling, or doing any kind of work, whatsoever.** Visually, check the chamber. Double check by inserting the tip of your little finger, if lighting is poor.

Figure 2- Shows typical wide slot, military type grip screws used in .45 autos. Always use a screwdriver that is properly ground to fit these oversized slots. To prevent grip panel damage, stone dress the edges of the screwdriver until it is slightly undersized. Disfigured screws are an outward sign of poor craftsmanship.

Begin Disassembly

Always start with a clean bench. Eliminate any sharp chips that may be left from drilling, milling, or filing. Carefully remove polishing grit and any other surface damaging material. Customers and friends rightfully become quite irate when scratches accompany repair work, even when they are free. For finish protection, the best bench covers are: reversed leather, felt, or 3/16" outdoor carpet. All are fine, but only if kept clean. **Place all parts in a box as you disassemble:** otherwise, mated parts can be mixed up, and springs, pins, and screws lost. **Warning:** Always clear and recheck all firearms before beginning work. See figure 1.

Remove Grips

I suggest that you make it a practice to remove the grips before beginning work. And since grip panel screws are highly visible, it follows that extra care should be taken to protect them as well.

1. Grip screw slots can run as wide as .050" to .060". Use correct screwdrivers. Adjust blade thickness and width to fit, and then dress the edges as required.
2. If grip screws are stuck or resistent, first pre-oil the thread ends from inside the magazine well.
3. Then, hold firm down pressure on the screwdriver while rapping the top of the handle sharply, impact driver style, while twisting the screw out of the bushing.

Remove Recoil Spring

At this point, we are dealing with the standard M1911, A1, and civilian pre-1970 Series pistols. These all use the same type barrel bushing and spring retainer plug as originally designed.

The easiest way to remove this recoil spring system is as follows:

1. Remove the magazine. Clear and recheck the pistol. Then close slide on an empty chamber. Ease, don't drop.
2. Cock the hammer and put the thumb safety on.
3. Place back of pistol butt and grip safety extension down on bench.
4. With the muzzle up, depress the spring plug.
5. Then twist the barrel bushing to the left, clearing the top of the recoil spring plug.

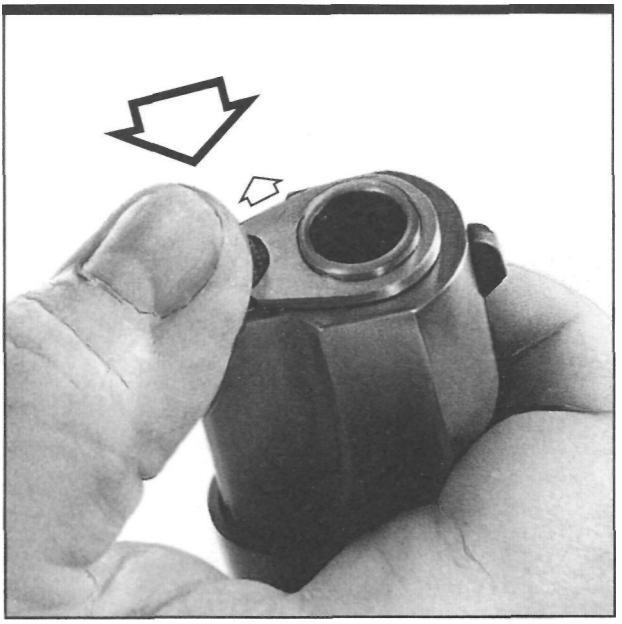


Figure 3- Shows depressing the M1911 type standard recoil spring plug, and then releasing it by rotating the barrel bushing to the left. As you can see, the bottom fingers of the barrel bushing act as retainer for the spring plug. Maintain sufficient down pressure on the plug to prevent accidental and sudden departure.

Release Spring and Plug

Use caution. Fingers are usually oily when working at the bench. The combination of a 22 or 24 lb. recoil spring and plug, when released and accelerated unexpectedly, has been known to break fluorescent bench lights. So, it's always a good idea to cover the recoil spring and plug with your other hand, just before releasing it. In this way, if one slips by, you won't get it in the eye.

Figure 4- Shows decompressing a Government Model recoil spring and releasing its' stored energy. Use your thumb for this job. Springs can vary from a standard Government Model 16 lbs. up to 24 lbs. for maximum hard ball loads. Similar loads in Combat Commander pistols may require spring weights up to 26 lbs.

Tight Bushings

You might find a barrel bushing that resists turning by fingers. It may be a replacement accuracy type requiring a bushing wrench for movement.

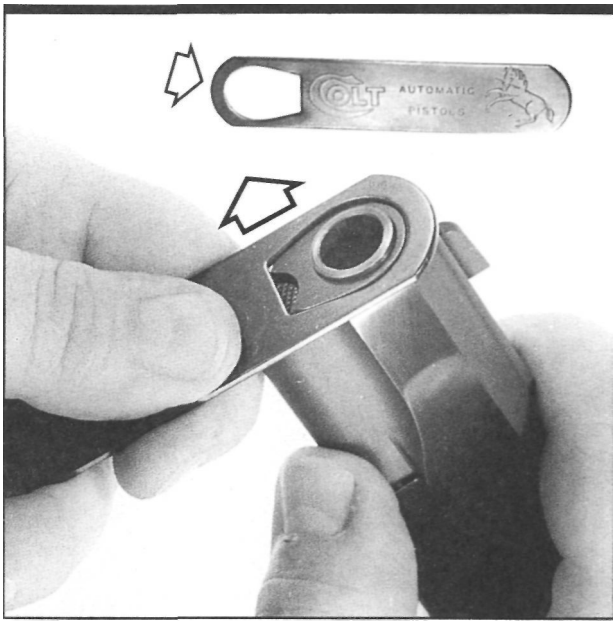


Figure 5- Shows using a bushing wrench to remove tight fitting accuracy type bushings and collet style barrel bushings. Wrench use can leave wrench marks on the face of the slide and also the bushing. There are tough plastic wrenches on the market which will, except for the tightest bushings, eliminate this problem.

Figure 6- Shows the optional slide set-back disassembly method. The theory is that friction is eliminated between both barrel and collet by holding the slide back approximately 1" to relieve tension before turning. To improve view of the collet, the recoil spring and plug have been taken out. Also see Option 2, Fig. 14.

Accuracy Type Bushings

Recognizing that accuracy is improved by installing tighter fitting barrel bushings, .45 owners, historically, have had only this and trigger work done to maximize duty and service use of otherwise stock pistols. Watch for these tighter, "accuracy" bushings. They are fairly common on pre-Series 70 pistols.

If properly sized, a tightened accuracy bushing should fit into its' individual slide to a light, or moderate drag fit.

Generally, these bushings can not be turned with fingers, particularly when the slide is closed and the barrel is in the locked position.

1. To prevent possible wrench marking, first try a plastic bushing wrench.
2. If this fails, use the standard steel wrench.

Series 70/80 Collet Bushings

Without the barrel, collet style bushings usually fit somewhat loosely in their slides. With the barrel in position, the stepped up area [about 1/2" back from the muzzle] loads and expands the fingers of the collet to contact the inside of the slide. Production variations create differences in the fit of these collets. Thicker, tighter fitting collets will friction mark barrels more than others. Some gunsmiths believe that, sooner or later, disassembly rotation will wear the barrel and collet finger junctions. They advocate disassembly using the set-back method shown in figure 6. Both methods work, you can be the judge.

Officer's Model Bushing

Being even shorter than the Commander, this new model required a revised barrel, bushing, and recoil spring system. As a result, slide disassembly is a bit different than with standard Colt .45 autos. Takedown is just as simple when the function of the recoil spring plug's retaining lug is fully understood. See figures 7 and 8.

Disassemble as follows:

1. Push the recoil spring plug in to a point just below the slot in the slide where the bushing's lock tab rotates - **or in about 1/2".**
2. While holding the plug at this point, rotate the bushing counterclockwise about 1/8 turn, until the bushing's lock tab is in the clear and just in front of the spring plug.
3. Then, draw the bushing up and out with your fingers.
4. Now, using a short, wide screwdriver, hold the plug in about 3/16". Then, rotate the plug about 180 degrees to its' inside release point, next to the barrel. See figure 8.
5. On release, absorb spring pressure, then withdraw the plug and both recoil springs.

Note: Both the spring plug lug and its' receiving slot at the bottom of the slide can be seen when the pistol is fully reassembled. On this model, always verify that the recoil spring plug retaining lug is correctly engaged.

For accuracy, bushings on the shorter Officer's Model fit somewhat tighter than Commander bushings. Do not alter or loosen.

Figure 7- Shows a Colt Officer's ACP Model bushing and recoil spring plug,, ready for removal. The spring plug is held in about 1/2" so the bushing [and lock tab] can be rotated counterclockwise in front of the depressed plug. With this done, the bushing can be drawn up, and out. These bushings run tight when new.

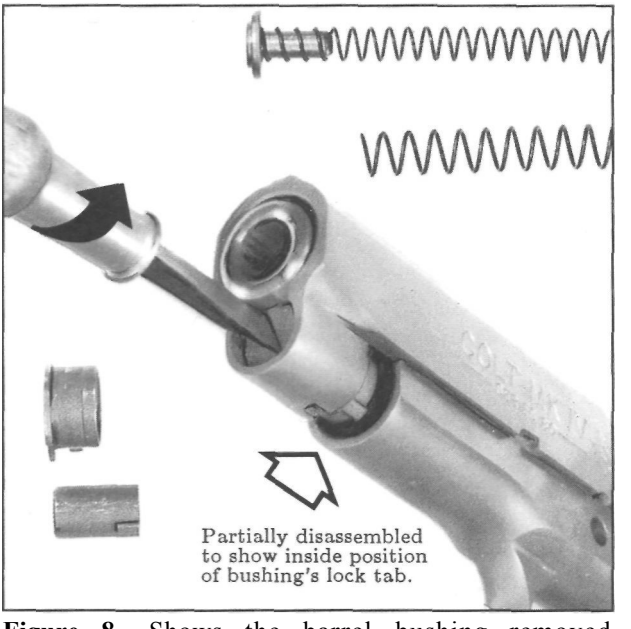


Figure 8- Shows the barrel bushing removed and the recoil spring plug pushed in and ready to rotate to its' release point at about 180 degrees, or 1/2 turn. Use caution: this short, double spring system releases abruptly. The recoil spring plug and the two special recoil springs are shown separately above.

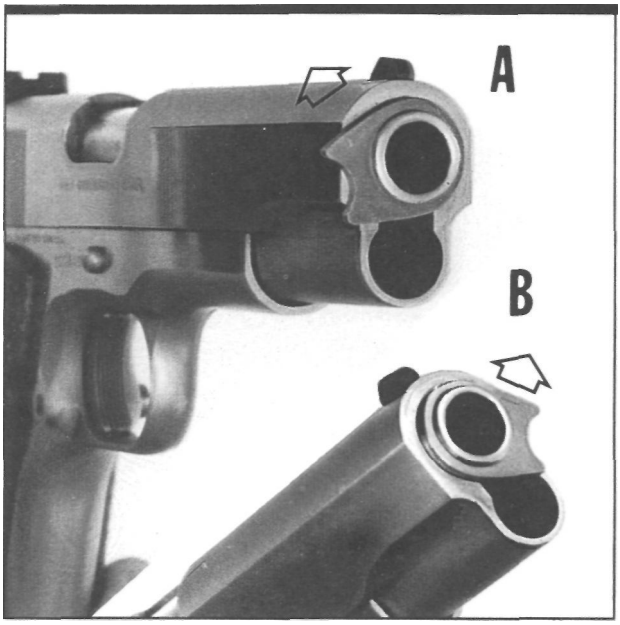


Figure 9- Shows barrel bushing disassembly positions for all M1911 through series 80 models. The only variation is the Colt Officer's Model, shown earlier. A clockwise 1/4 turn to the position shown in "A", above, releases the recoil spring plug, and an 1/8th turn, counter-clockwise from center, unlocks the bushing.

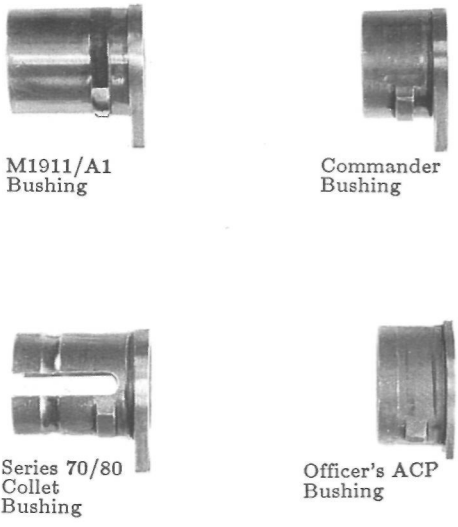


Figure 10- Shows barrel bushing variations from the original M1911 to date: M1911, A1, Commander, Series 70 and 80, and Officer's Model. Except for the Officer's Model bushing, which is shorter and larger in dia., these cross fit into all other slides. The shorter Commander uses a cut-off standard bushing.

Remove Standard Barrel Bushing

Original, standard M1911 type bushings, were designed and machined to a somewhat looser barrel and slide fit by military specification. As a result, this particular barrel bushing is very easy to remove. Standard procedure is to remove it at this time, although it can be done later. See figure 9. During the time before the easy availability of tighter and better fitting replacement and accuracy bushings, the military type original bushings were expanded by gunsmiths for better slide fit. Some were then sleeved to improve barrel contact. Usually, these are identified by a thin silver solder ring where the sleeve joins the mouth of the bushing.

About Barrel Bushings

From the beginning, it has been known that M1911 accuracy could be improved by uniformly controlling the closed and locked position of the barrel in the slide. Naturally, this control would start at the muzzle end, with closer bushing to slide and bushing to barrel tolerances. This costly hand work would make production pistols much too expensive. But, nonetheless, the buyer was demanding greater accuracy. This market requirement is probably what influenced Colt in the adoption of the collet type bushing which became standard with the Series 70 Models.

Remove Slide Assembly

Once recoil spring tension has been released, the slide assembly can be removed from the frame. You will find that some recoil springs are coil reduced and overly tight at the inside, or spring guide end. Some springs will almost defy removal from the front, and can be distorted or stretch damaged if taken out with force. Avoid damage by removing the spring and follower from the back after the slide has been removed from the frame. Then, the spring and follower can be easily separated.

To remove the slide, proceed as follows:

1. Make sure the hammer is in the cocked position.
2. Move the slide back and align the round, milled relief slot in the slide with the slide stop's retaining tip.
3. Apply a drop or two of oil at the tip of the slide stop, spring, and plunger.
4. Press the rounded end of the slide stop cross pin up from the back of the frame.
5. Using only your fingers, and with a slight wobbling motion if necessary, draw the stop up and out of the frame.

Note: Sometimes a damaged stop plunger, dented plunger tube, and/or a slide stop that has been overly end dimpled to prevent false, or premature, slide lock-back, will offer resistance when removing the stop. In these cases, close the slide, snap the thumb safety up, and free the plunger by inserting a thin, dull knife blade between stop and plunger.

Figure 11- Shows the slide stop lever and half round, milled relief slot in the slide. This slot allows removal of the slide stop by providing clearance for the retaining tip on the back side of the stop. The relief slot in the slide must be aligned with the raised tip of the slide stop retainer before the stop can be drawn out.

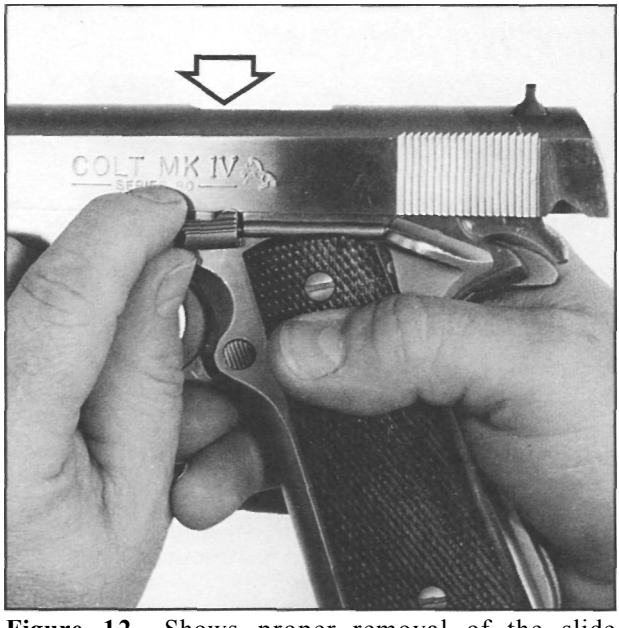


Figure 12- Shows proper removal of the slide stop, after aligning the stop retainer tip with the relief cut in the slide. Press the rounded end of the cross pin up from the back side, drawing the slide stop lever up and out of the frame with fingers. **Caution:** Don't pry. A drop of oil usually frees a stuck slide stop plunger.

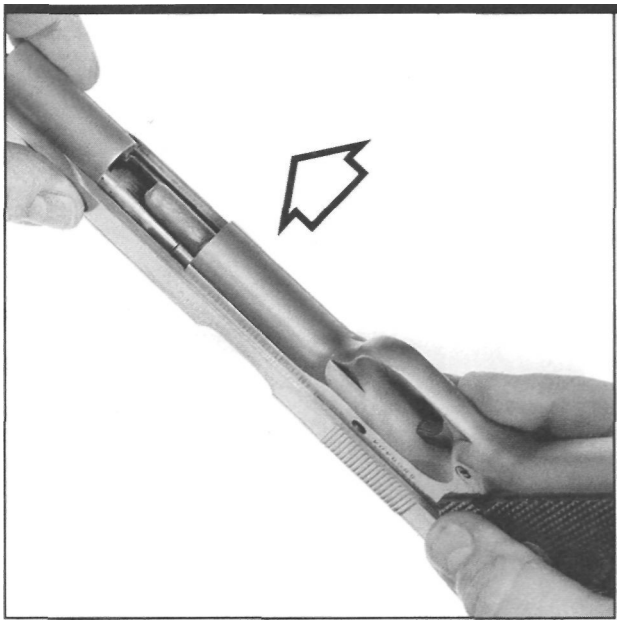


Figure 13- Shows the correct upside down way to remove the slide assembly from the frame. Get into this habit because it will prevent loss of spring guides [followers], guide buffers, etc. You may find that some pistols will have undersized and unstaked link pins which may fall out causing the loss of the link and pin.

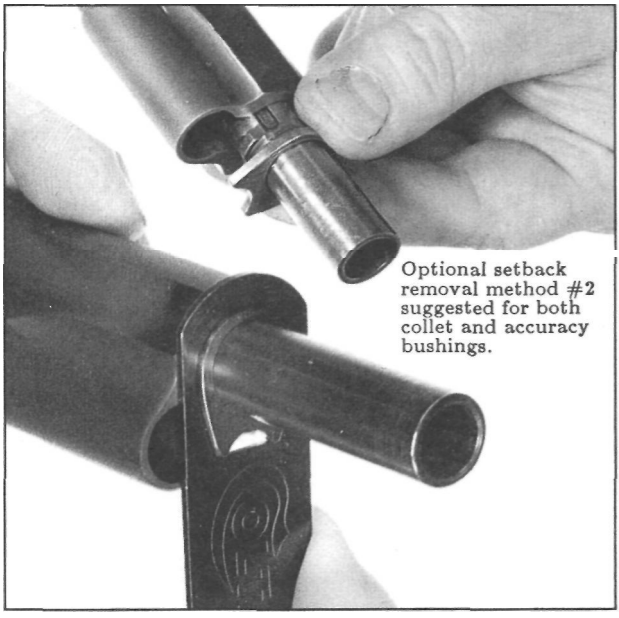


Figure 14- Shows finger turning the barrel-tight series 70 and 80 barrel bushings to release position after the slide has been removed and barrel set to intermediate position. The wrench removal method is shown applied to slide-tight accuracy type bushings. Bushing twist-out in this unstressed fashion eliminates friction wear.

Slide Removal Caution

Potentially, it's true that every slide you remove may contain surprises. I have seen pieces of bottom barrel lugs, broken links, link pins, and collet fingers fall out as slides were taken off their frames. Also, and worse, I've occasionally found a half of something broken, and then wondered what happened to the rest. In view of this, the only correct way to remove a slide assembly is to turn the pistol upside down, place the slide on your bench top, and then take the frame off the slide. See figure 13.

More About Series 70/80 and Accuracy Type Bushings

When a tight fitting part and/or surface under tension rides on, or moves against another surface, a certain amount of wear will result. This is particularly true with barrel bushings. When pistols are disassembled frequently, barrel contact surfaces and the bearing fingers of collet style bushings can wear more from disassembly rotation than from lock-up. Wear also occurs with tight accuracy bushings where the bushing skirt fits inside the slide.

Technically, the possible wear discussed here would be seen only after quite a number of take-downs. Some may disagree on this. But, rather than argue the point, keep in mind that it's always better to develop a procedure that works well in all cases. A workable, simple approach would be to remove these bushings using the method as shown in figures 14 and 15.

Remove Series 70/80 Collets From The Barrel

Variations in both collet and final barrel dimensions can make some combinations just a bit barrel snug. Evidence of this is seen in the outer surface markings on barrels at the points of collet finger contact. Fully tensioned disassembly twisting wears these contact junctions even more. The best way to minimize this disassembly wear is:

1. Remove collets only when the barrel is in the looser contact, forward position.
2. Then, disconnect the collet from the slide.
3. Draw the collet straight forward and off the end of the barrel with your fingers.

Remove The Barrel

1. Rotate the link forward to clear the spring plug housing at front of the slide. See figure 15.
2. Unlock the lugs and draw the barrel forward and out.

About Two Piece Barrels

Some gunsmiths are surprised when they spot one of these brazed, two piece barrels for the first time. At a glance, the quite visible joint can seem to be a crack or defect. That there are two kinds of these barrels is more the result of differences in available tooling than in design theory. In my opinion, this kind of barrel is only acceptable for service use, and not for match purposes. For competition, use only one piece barrels machined from forgings or bar stock.

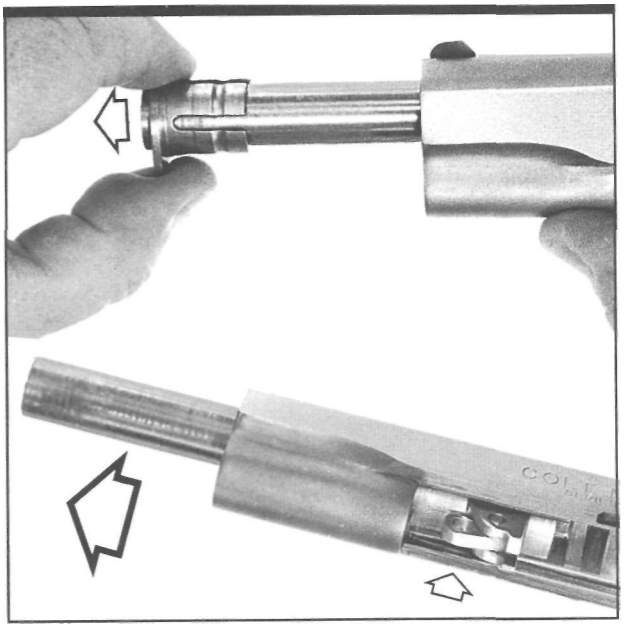


Figure 15- Shows the correct removal of a series 70 or 80 collet style bushing, by drawing it straight forward and off the extended barrel with your fingers. The barrel is also set up for removal from the slide. The link is shown rotated forward until it rests horizontally on the barrel in front of the bottom lug.

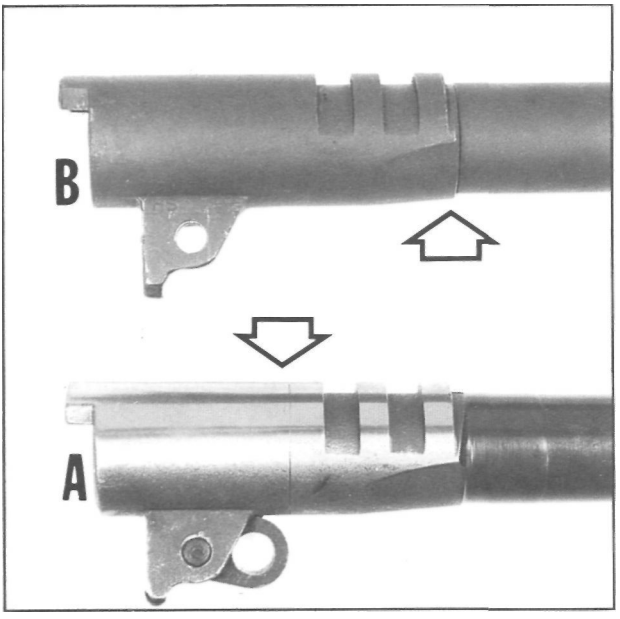


Figure 16- Shows two different examples of M1911 type sleeved block, or two piece, barrel construction. **"A"** is a typical example of the half lug type sleeve, and **"B"** is a sample of the more common full lug variation. This easier method of barrel construction economically resolved a number of manufacturing problems.

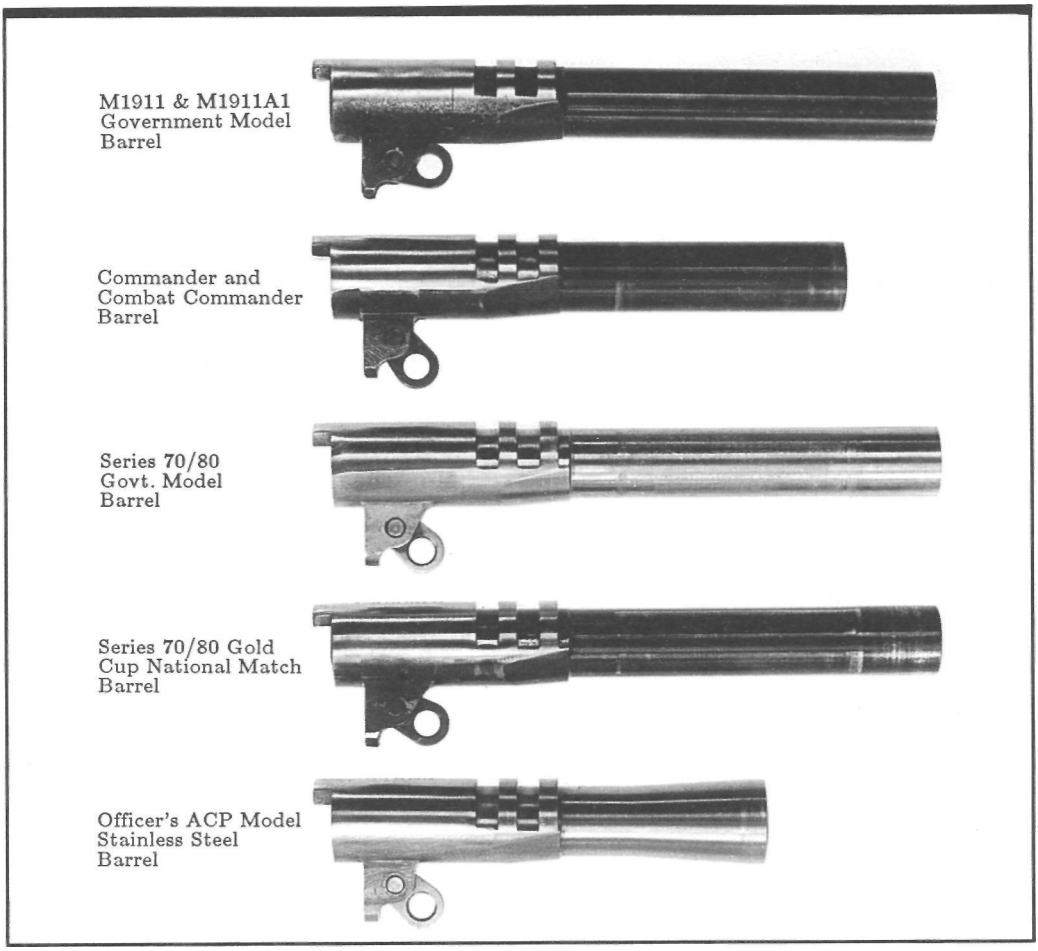


Figure 17- Shows the five most common .45 caliber production barrels, starting with the venerable, originally manufactured Model of 1911, pictured at the top, and then downward to the latest model variation at the bottom.

M1911, M1911A1, and Commander models all use the original, straight tube design.

Barrels for the much later production 1970 Series and 1980 Series Government Models and, as well, Series 70 and 80 National Match Gold Cup Models, all use the collet bushing system. This is made evident by the stepped-up, slightly larger diameter collet bearing surface at the front of these barrels.

All Government Model barrels are 5" in overall length, when measured from hood to crown while the slightly shorter Commander and Combat Commander barrels are 4 1/4" long.

Colt's production National Match Gold Cup slides are manufactured with narrower hood receiving slots than standard Government Model pistols. So, you will notice that barrel hoods, once fit to these slides, will have a somewhat narrower hood extension, usually measuring just at .375" wide.

The Colt Officer's Model barrel has an even shorter 3 5/8" barrel, and is easily identified by its' conically shaped forward section. This barrel requires a larger diameter and particularly short bushing.

Remove Firing Pin

The firing pin stop plate is retained inside the slide by the detent, or stepped down portion at the very back of the firing pin, under pressure of the firing pin spring. Once the stop plate has been removed, the firing pin and extractor can be taken out.

1. Depress the firing pin just enough to clear the bottom of the stop plate.
2. Holding the punch at this depth, move the plate out of the slide. See figure 18.
3. To prevent firing pin bounce out, place your finger over the firing pin just as the stop plate clears the pin.
4. Remove the firing pin, place it and the stop plate in the parts box.

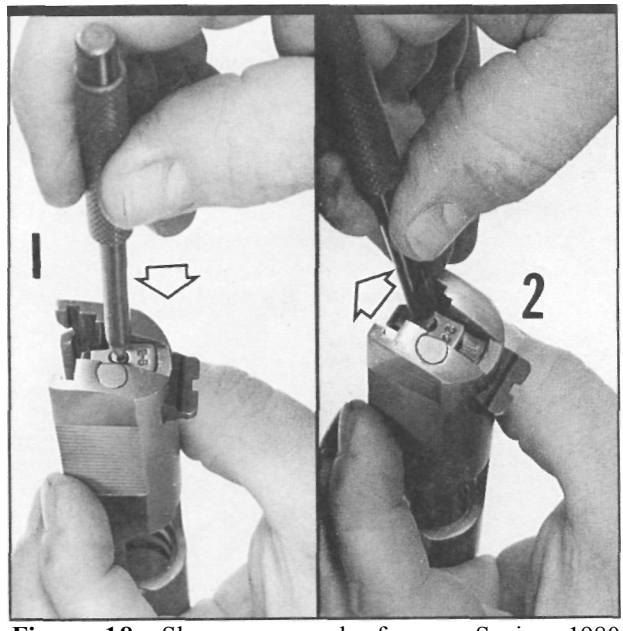


Figure 18- Shows removal of a pre-Series 1980 firing pin stop plate using a small punch. The hammer side of the firing pin is slightly stepped down where it goes through the stop plate and actually retains the plate. Once the firing pin has been depressed, the stop plate can be slipped out and the firing pin removed.

Remove Series 80 Firing Pin

Removing Series 80 firing pin stop plates requires that the firing pin lock plunger be depressed before the firing pin can be moved. See figure 19. Once the retainer plate has been removed, the firing pin can then be drawn out by continuing to hold the firing pin lock plunger in at the released position.

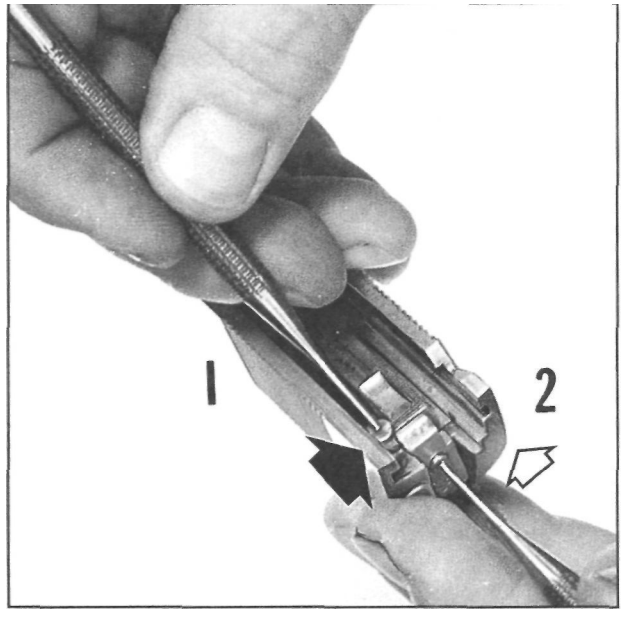


Figure 19- Shows the removal of a Series 1980 firing pin stop plate using a small punch as shown in figure 18 above. The difference is that the firing pin lock plunger [see arrow] must be depressed first in order to move the firing pin forward enough to allow the firing pin stop plate to be drawn out of the slide.

Damaged Stop Plates

Now and then, you will find a stop plate that is stuck or frozen in the slide. If oiling doesn't help, remove it with a brass drift. The usual cause of this problem is either a mis-fit or edge peened stop plate. Peening a loose stop plate is never a correct repair, and, if overly done and driven in, can damage the slide.

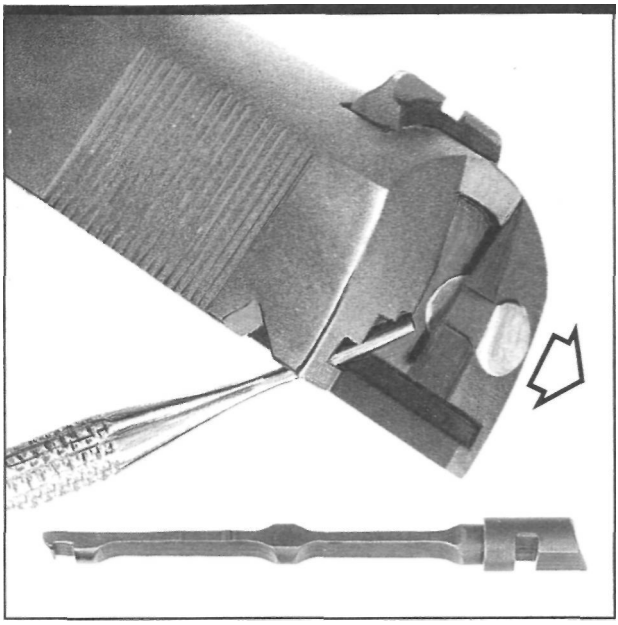


Figure 20- Shows, at bottom, the original Colt M1911 type extractor as used in all models up to and including the 1970 series. Also, an extractor head is shown in place in the slide, ready for removal. Usually, extractors are easily removed by inserting the tip of a small punch into their head slots, and pulling straight out.

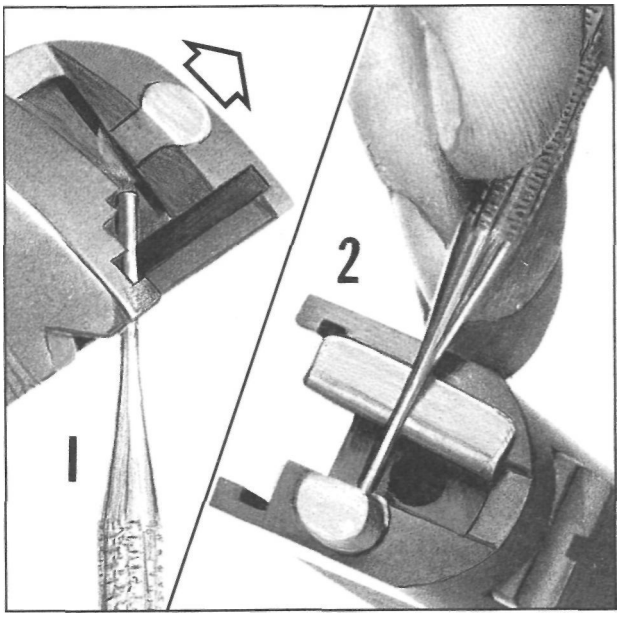


Figure 21- Shows a small punch being used with protective pads to withdraw a poorly fit or damaged extractor from the body of the slide. In worst cases, position 1 provides better starting leverage. Position 2 picks up from position 1 and is also useful by itself for removing excessively tight extractors.

Remove M1911 through Series 70 Extractors

Once the firing pin stop plate has been removed, the extractor is no longer held in the slide and can be taken out. Having disassembled a fair number of Colt and military pistols over the years, I can tell you that extractor fit will vary from fall-out loose to stuck or frozen in place.

Caution: In removing an extractor, never use force or pressure on the cartridge hook end. Apply leverage only to the slot, or retaining cut, at the head end.

1. If the slide shows evidence of rust, immerse in a thin mixture of solvent and oil before further work.
2. Otherwise, simply insert the tip of a small punch into the head slot [see figure 20] and pull the extractor out. Don't contact, or mark, the slide with the punch.
3. If the extractor is resistant or stuck, use small aluminum or brass protective pads beneath the punch, then apply leverage from the two points shown in figure 21.

Warning: Don't let the punch bear directly on the slide without the use of protective pads. This will either indent or mar finished surfaces, depending on the hardness of the slide.

4. If the back of the slide has been dented near the extractor tunnel enough to crimp the extractor head in place, the outside surfaces may require dressing before applying any leverage to the extractor head slot.

Remove Series 80 Extractor

Once the firing pin locking plunger has been disengaged from the retaining lip, or stud, of a series 80 extractor, the Series 80 extractor can be taken out, in the same way as with previous models. The plunger, spring, and extractor are removed as follows:

1. With the firing pin stop plate and firing pin assembly already removed, carefully push the Series 80 extractor hook to the rear. Do this by hand, using a brass drift.
2. As the extractor reaches the point of about .020-025" setback, the plunger retaining stud will clear and allow easy removal of the firing pin lock plunger. See figs. 22, 23.
3. Once released, draw out both the plunger and plunger spring. Store in a parts bag.
4. Then, remove the Series 80 extractor just as if it was a previous model type.
5. Sometimes, small burrs in the slide's passages can make plunger removal difficult. If this happens, impact drive the plunger out by rapping the bottom of the slide on a plastic bench block.

Safety warning:

I've seen several cases where firing pin plunger removal was made difficult by punch mark damage inside the slide around the plunger hole. Likely, this damage comes from non-gunsmith efforts to eliminate this safety feature by attempting to stake the plunger in place. The firing pin lock safety would be defeated if the plunger was stuck in the "up" position.

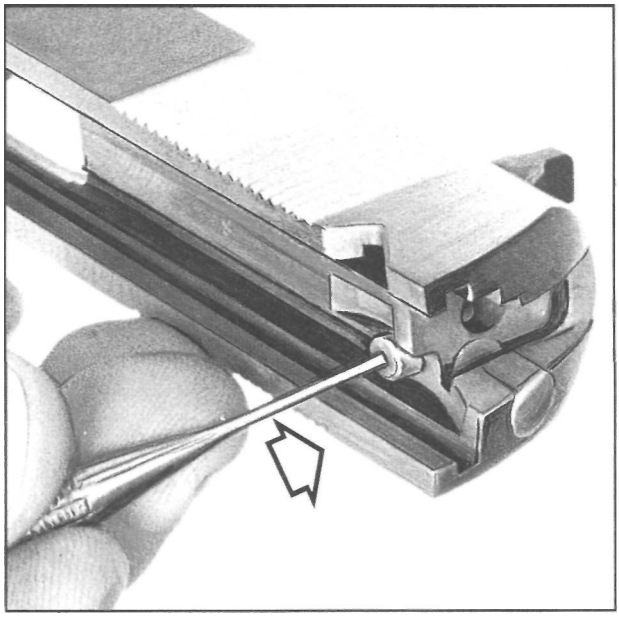


Figure 22- Shows the Series 80 firing pin locking plunger, the only outwardly visible slide difference between Series 80's and older Colt models. This spring loaded plunger serves as an automatic firing pin block. Trigger actuated frame linkage depresses the plunger, unlocking the firing pin just before hammer drop.

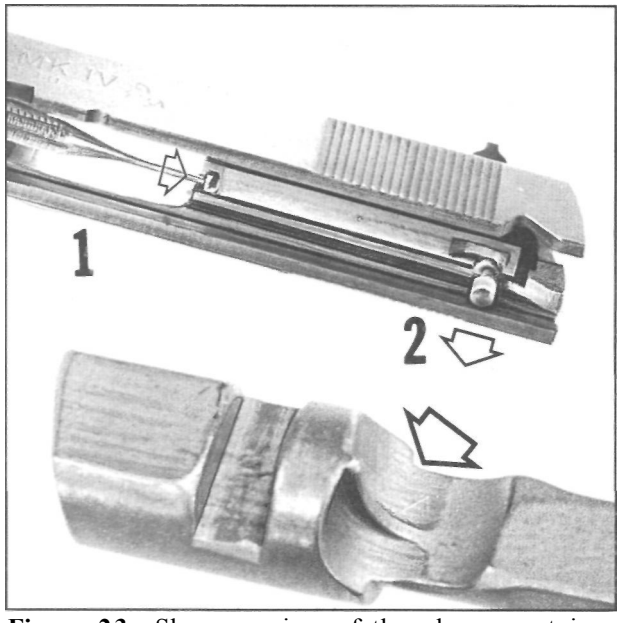


Figure 23- Shows a view of the plunger retainer stud machined into a Series 80 extractor. When the extractor is in the installed position, the plunger retainer stud is forward, keeping the plunger captive. When the extractor is moved slightly back, the retainer stud disengages, allowing the plunger and spring to be removed.

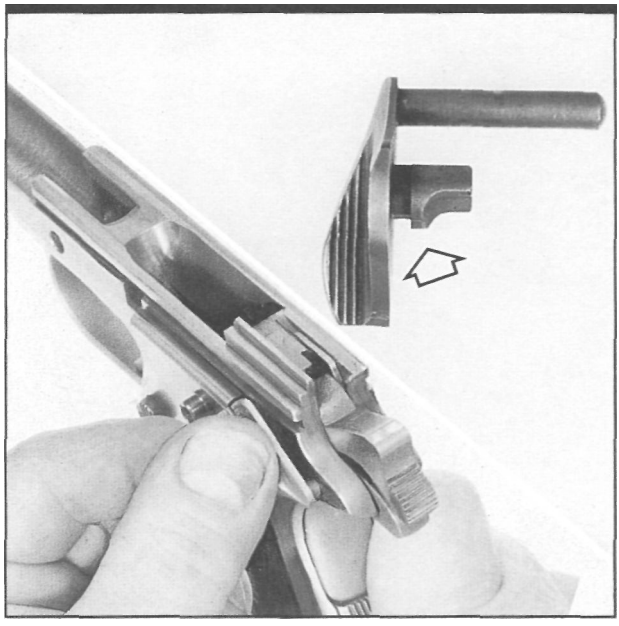


Figure 24- Shows the hammer pre-positioned at full-cock. This is the first step in removing the thumb safety from the frame. The thumb safety is held in the frame by engagement of its' shoulder recess [see arrow] and the frame wall. When in the forward position the hammer body prevents movement of the safety.

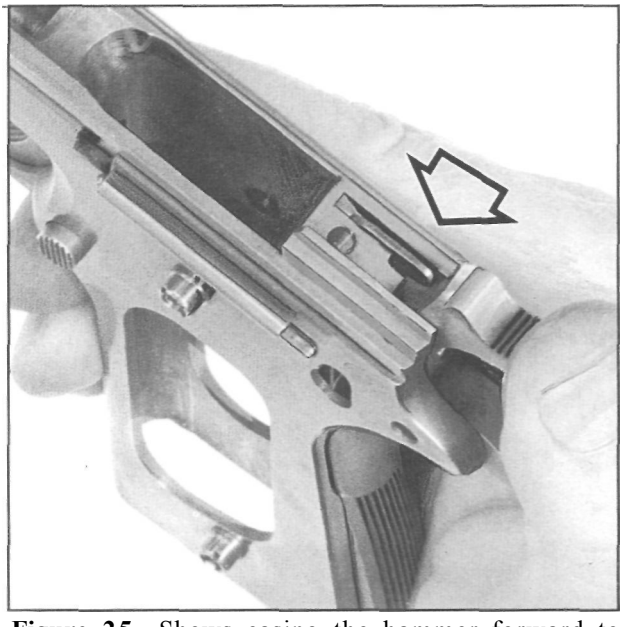


Figure 25- Shows easing the hammer forward to unload and de-tension the main spring, after the thumb safety has been removed. **Caution:** Never allow the hammer to strike the thin area of the frame just in front of the hammer. Strikes peen damage the frame and raise a metal edge that may interfere with slide movement.

Disassemble Frame

Although there are several ways to begin frame group disassembly, the following traditional way is best.

Remove Thumb Safety

1. Cock the hammer back into the full-cock position.
2. Firmly grip the thumb safety lever. Then slowly elevate to about the half-way point between off and on.
3. Begin drawing out as you elevate the safety lever.
4. At almost half way up, the retaining shoulder of the sear block should clear the frame and allow the safety to be pulled out.
5. Sometimes burrs, or an extra tight fit, will make removal of the safety resistant. In these cases, it must be returned to the off position and then raised slowly and wobbled slightly just as the release point is reached.

Return Hammer Forward

The cross pin retaining the main spring housing in the frame should be removed only after the hammer has been returned forward, and the main spring [hammer spring] unloaded. See fig. 25. **Caution: Don't drop the hammer.** The usual tendency is to simply release the trigger and snap the hammer forward. In a very short time, this will damage and raise the thin frame area just in front of the hammer. Even the slightest amount of raised material in this zone will cause interference with slide movement, particularly when frame/slide combinations are vertically tight.

Remove Hammer Pin and Hammer

Once the thumb safety lever has been removed, the small, beveled retaining head of the hammer cross pin is exposed. Now, the pin and hammer can be removed.

1. Remember, the hammer pin is not a driven pin.
2. Using an undersized punch, push the hammer cross pin out- from the right side of the frame.
3. Push only from **right to left.** See figure 26.
4. Lift the hammer and strut up and out of the frame as the cross pin clears.
5. Since hammers and sears are mated, be sure that you place the hammer in the correct parts box.

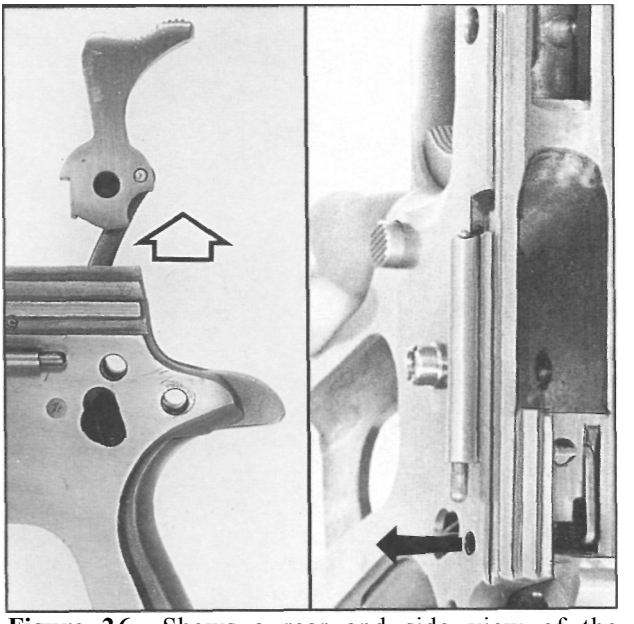


Figure 26- Shows a rear and side view of the frame and hammer. The hammer cross pin must be pushed out to the left [see arrow]. Use a small punch. This pin has a slightly beveled head, recesses into the left side of the frame, and is retained by the thumb safety lever. At left, the hammer is drawn out of the frame.

Series 80 Hammer and Plunger Lever

There have been some machining changes made in Series 80 hammers. Unlike all previous models, they no longer have a captive 1/2 cock notch. The Series 80 Government and Gold Cup Models continue to use slightly different hammers. They both have new style half-cock notches, which are used only to stop **a** hammer follow-hrough resulting from sear bounce. The hammer cross pin is removed in the same way as the previous models. But, it is suggested that the frame be turned upside down above the bench before removing the hammer and cross pin so that the firing pin plunger lever [see figure 27] is not dropped inside the frame.

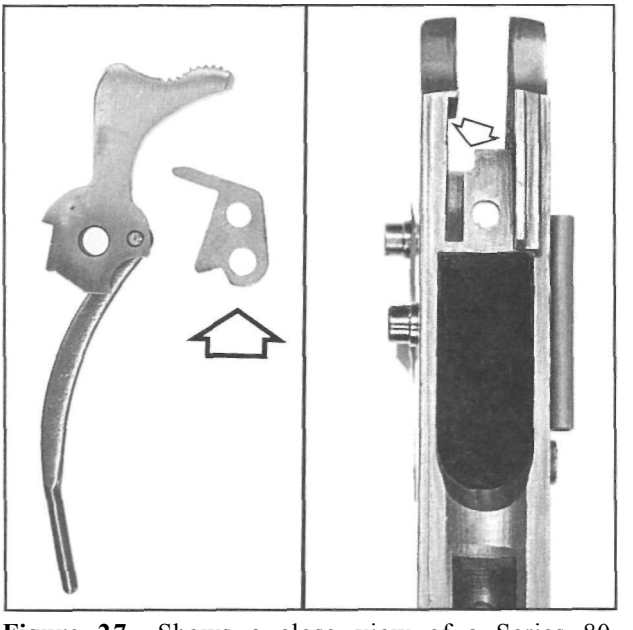


Figure 27- Shows a close view of a Series 80 Government Model hammer and firing pin plunger lever. The lever rides inside a slot milled in the right side of the frame and on the hammer's retaining cross pin. This slot is the only visible difference between Series 80 and earlier frames. Make sure the lever isn't lost.

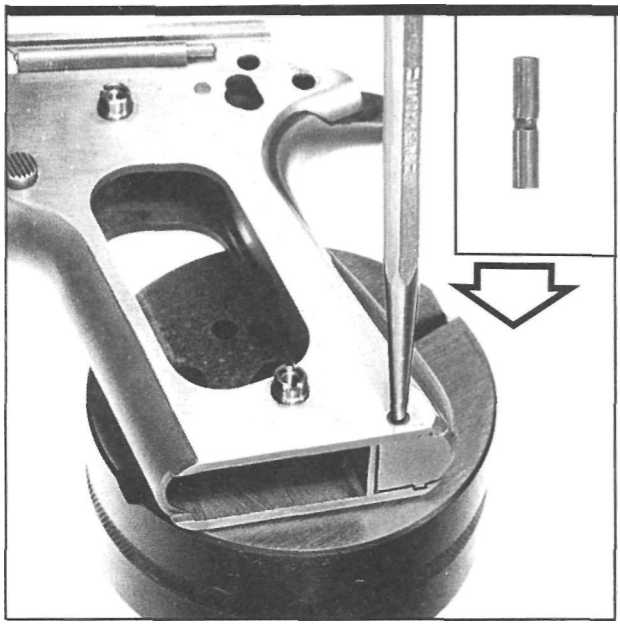


Figure 28- Shows the frame positioned on a bench block, and ready for removal of the main spring housing pin. Select a punch with tip sized small enough to fit the dimple in the cross pin. The main spring housing pin is held inside the frame by downward pressure of the pin retaining plunger, at bottom of the mainspring.

Figure 29- Shows the main spring housing being removed by drawing downward and out of the frame. Part way down the main spring housing clears and releases the bottom tab of the grip safety. Then, the sear spring is disengaged as the housing passes the bottom of the spring and its' frame retaining slot.

Remove Main Spring Housing

With the hammer and strut assembly removed, the main spring [or hammer spring] is now externally unloaded. This, in turn, relieves frame pressure on the cross pin holding the main spring housing in the frame. Remember that there is still internal mainspring down pressure exerted on the plunger retaining the main spring housing cross pin. This pointed plunger is located at the bottom of the main spring tunnel.

Warning: The main spring housing cross pin is a push pin, not a driven pin- and it must be removed with the hammer either fully uncocked or, preferably, out of the frame. I have seen frames damaged by foolish attempts to drive this pin out with the hammer in the cocked position.

1. When removing the main spring housing, use a bench block under the frame. To prevent marring of better finished civilian frames, I suggest using either a nylon or aluminum pad on top of the steel block.
2. Once the pin has been removed, slide the main spring housing down and out of the frame.
3. If the housing is resistant and the frame shows damage or signs of rust, apply oil and tap the main spring housing out, using a dowel as a drift.
4. The grip safety and three fingered sear spring are released as the main spring housing is removed.

Remove Spring and Plunger Assembly

The safety detent-slide stop, double plunger and spring assembly can be taken out of the plunger tube at any time providing the thumb safety has been removed. But, I suggest making it a habit to remove it at this point in disassembly. With the better access, work is now easier, and especially when denting or tube resistance is present.

1. Depress the slide stop plunger with a small diameter punch, and begin moving the assembly to the rear.
2. As the plunger emerges on the safety side, grasp it and draw the entire spring and plunger assembly to the rear and out.
3. Where the plunger tube is slightly end dented, the tunnel mouth may require opening with a punch.
4. When the tube body is damaged to the point that plunger travel is restricted, the tube must be replaced.

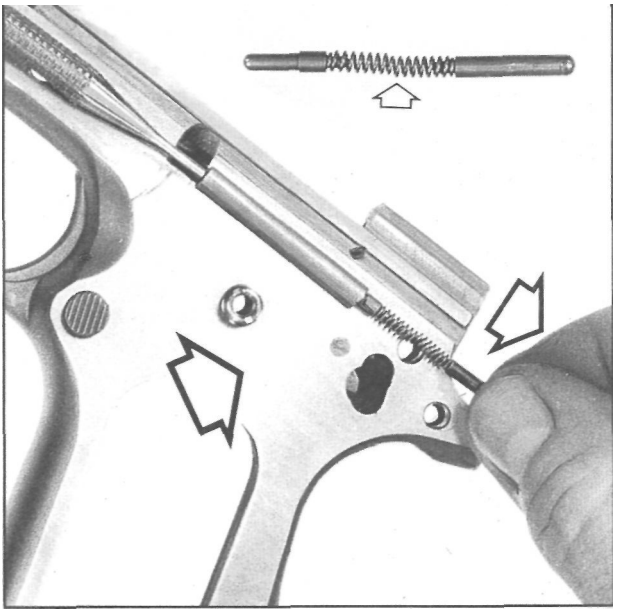


Figure 30- Shows the slide stop and safety lock double plunger and spring assembly as it is removed from the plunger tube on the frame. Correctly manufactured plunger tabs and spring ends are undersized to interlock into each other. Then, the spring is offset, or dog-legged, at center. This feature helps prevent loss.

Remove M1911 to Series 70 Sear and Disconnector

The sear and disconnector pin has a small beveled head which fits flush into a frame recess on the left side.

1. Push the sear pin out of the frame from right to left. This is not a driven pin. See figure 31.
2. Lightly grasp the disconnector with needle nose pliers and lift it and the sear out as the sear pin clears.
3. Since the sear is a mated part, place it in the proper parts box.

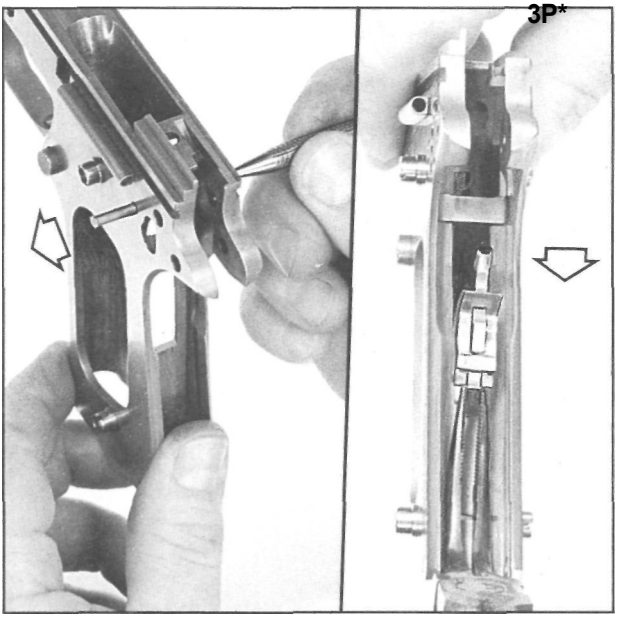


Figure 31- Shows the sear pin being removed from the frame with a 1/16th" punch . As with the hammer pin, this is a non-driven, push only, pin. In series 70 and older models, only the sear and disconnector ride on this pin. Sear and disconnector are also shown being lifted out with needle nose pliers.

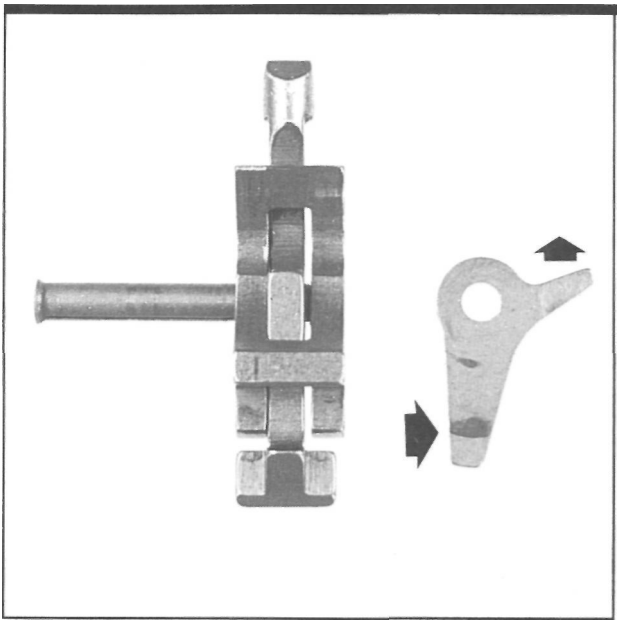


Figure 32- Shows the disconnector, sear, and trigger bar lever in a Series 80. In operation, the trigger bow actuates this lever, which, in turn, operates the plunger lever on the hammer cross pin. Both levers fit into a recess milled in the right side of the frame. This combination then unlocks the firing pin plunger.

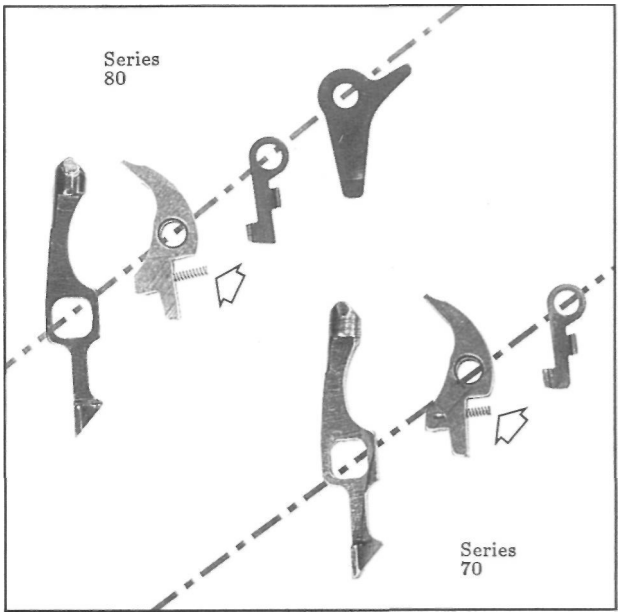


Figure 33- Shows a close view of a Series 70 and Series 80 Gold Cup sear and disconnector sub assembly. Both use the Colt Gold Cup sear, recessed for a small, extra, coil spring that acts against an additional sear depressor lever to add more sear engagement pressure, minimizing or eliminating "sear bounce" hammer releases.

Series 80 Disconnector, Sear and Trigger Bar Lever

The parts and part numbers for Series 80 disconnectors and sears are the same as for previous Government Models. Part of the difference in the Series 80 system is that it includes use of an additional, trigger actuated lever. See figure 32. This small lever rides on the right side of the sear in a slot milled into all Series 80 frames. The slot is for this lever, and also for the plunger lever, which is positioned on the hammer crosspin to the right of the hammer. When the trigger is squeezed, this combination operates, unlocking the firing pin safety system.

Warning: If the trigger bar lever is mis-installed or, by mistake, left out, the pistol becomes inoperative. Become familiar with both location and position of this part.

Gold Cup Sear Depressor and Spring

Caution: Watch for the very small sear depressor and depressor spring as you remove the sear pin when disassembling Gold Cup-National Match Models. I suggest placing spring and depressor in their own parts bag to prevent loss. Note the position and inter fit of these parts for later reassembly. See figure 33.

Series 80 Gold Cup Models: Position of the Series 80 trigger bar lever is the same as for standard Series 80 Government Models. See figures 32 and 33.

Remove Magazine Catch Assembly

This little assembly is typical of John Browning's design genius. The catch body has only one part, plus a spring, and does multiple duty as the magazine catch, the button to operate the release, and then serves as its' own assembly-dissasembly device as well.

The only real shortcoming with this marvel is that people occasionally shear off the catch lock, trying to twist it out, incorrectly assuming that it is a threaded screw.

Remove as follows:

1. Make sure the magazine has been removed.
2. With adjustable triggers, loosen the set screw for extra working clearance.
3. Depress the magazine release button, holding it in just at flush with the frame.
4. Then, with a small screw driver, turn the catch lock counterclockwise 90 degrees, until it engages the body. Then, drop the assembly out.
5. If the catch lock seems resistant, or won't turn, don't force it. Instead, slightly adjust the amount the button is being held in.
6. If dirt impacted, rusty or stuck, apply penetrating oil and rap the frame with a wooden hammer handle. Then, repeat steps 4 and 5.

Figure 34- Shows the magazine catch assembly depressed and pre-positioned, ready for unlocking. At this point, the catch lock Jlooks like a screw] is turned counter-clockwise to disengage its' lock stud from the frame and re-engage it with the body of the magazine catch. This frees the assembly from the frame.

Remove Trigger

1. Push the trigger back through the frame and draw it out with your fingers.
2. If resistant, lightly tap the trigger body or push it out of the frame with a dowel.

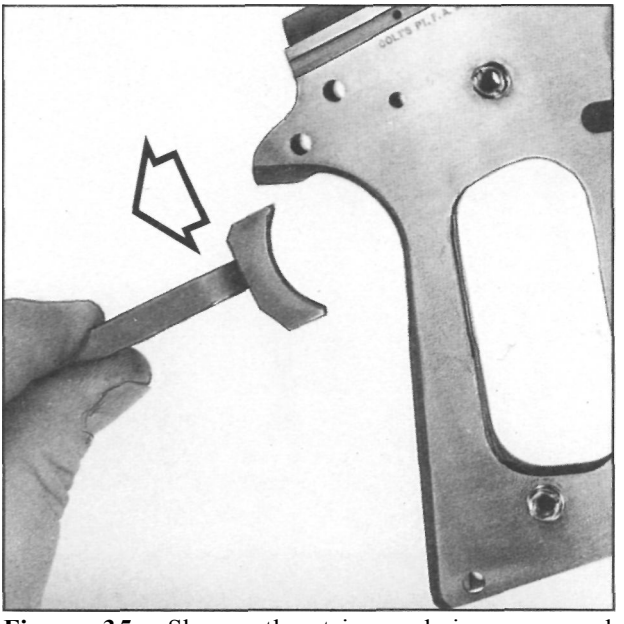


Figure 35- Shows the trigger being removed from the frame. With the body of the magazine catch no longer in place, the trigger and trigger bow assembly are free to slide in their recesses milled inside the frame. This assembly should slide easily out, yet be fit well enough so that vertical movement is minimal.

Figure 36- Shows the frame fully stripped, except for the ejector stud, plunger tube, and stock screw bushings. Unless replacing one of these, or detail polishing the sides of the frame, there is no need to remove these items. Now in preparation for inspection, the frame should be thoroughly cleaned with solvent and brushes.

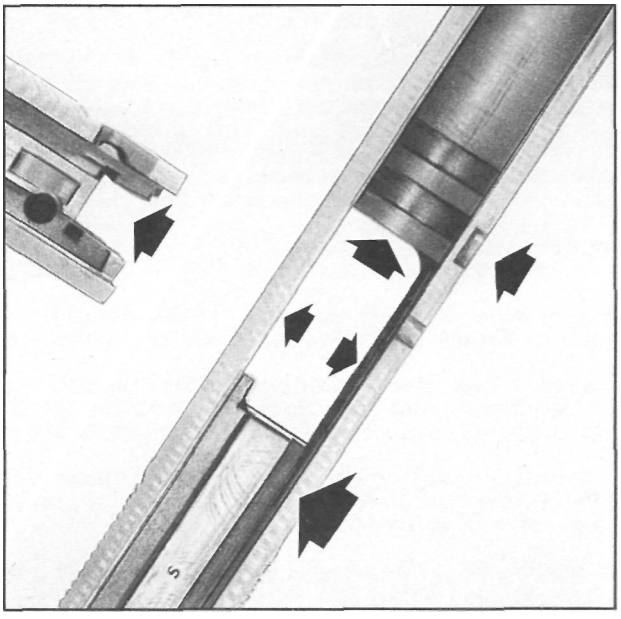


Figure 37- Shows a view of the inside of the slide and locking lugs. Since locking lug engagement is only about 60% or 70% in the average .45 auto, the lug recesses can be heavily impacted with dried oil residue, dirt, and carbon, and must be detail cleaned. Clean all other recesses; a toothbrush does a fine job.

Detail Clean Frame for Inspection

It isn't necessary to further disassemble the frame unless one of the staked or semi-permanent parts is to be replaced, or in cases where the frame is to be polished before rebluing. See fig. 36. Using powder solvent and brushes, detail clean all areas of the frame with particular attention to the following:

1. The milled trigger and trigger bow slots inside the frame.
2. The rear action recess and main spring channel.
3. The magazine well and feed ramp.
4. The link area and tunnel forward of the barrel bed.
5. The magazine release recess.
6. Inside the plunger tube.

Detail Clean Slide for Inspection

Burned powder residue and dried lubricants usually build up more in the slide than inside the frame. Carefully clean the slide with attention to these important areas.

1. Locking lugs. With limited engagement, the bottom of the locking lug slots tend to build up with a combination of carbon and dried oil over a period of time. See figure 37. Watch for this in older pistols.
2. Recoil face, corners, and the extractor slot.
3. Inside the firing pin well.
4. Inside the frame rail slots in the slide.
5. Inside the firing pin stop retaining slots.

BEGIN REASSEMBLY AND PARTS CHECKOUT

This section covers basic reassembly, refitting, replacement, and checking of parts as the pistol is put back together, just as if it was being reassembled with all new parts. When done with maximum precision, this work could be called rebuilding or blueprinting.

The data given in this section covers all production Colt .45 automatic pistols from the original M1911 to 1980 Series production.

To date, military M1911 and M1911A1 pistols have been manufactured by seven U.S. manufacturers, and replacement parts have been made by even more military contractors. And, a lot of replacement parts and even complete copies of the pistol have been made by other producers.

For this reason alone, a lot of variance can exist in critical dimensions, tolerances, heat treat, slide hardness, and parts wear factors- from assembled pistol to pistol. This is particularly true in the military, where pistols have been through arsenals, depots, and various armories a number of times, and are reassembled with frames, slides, and other parts of different ages, origins, and wear conditions, etc. Remember, military production ended with World War II.

This section covers the basic and originally designed M1911 type military and civilian production pistol. Where later manufacturing and model differences exist, extra illustrations and descriptive sections showing these differences are included. These cover special Series 70, 80, and Officer's Model features.

Naturally, civilian pistols, particularly those manufactured by Colt, are, in most respects, closer toleranced than the military version. From the civilian viewpoint, certain kinds of problems are found in government issue models: generally looser tolerances, softer slides, less carefully fit and, by now, overly worn parts. But, keep in mind, that this design, adopted more than three-quarters of a century ago, is still the most copied and reliable automatic pistol in the world.

Figure 38- Shows **Colt Model of 1911** through **Series 70** safety features exposed inside the cutaway gunsmith training pistol, at the top. Critical action safety parts, including those used in the **Series 80** firing pin lock safety update, are shown in a closer, more detailed view in the inset illustrations, below. In basic function, all safety components fall into either of two categories: they operate positively and directly, or are of a secondary or back-up nature. These features are discussed at this point to call attention to their importance. **For those not yet familiar with the internal workings of the M1911 type pistol, it is necessary that location, function, and interaction of these parts be fully understood before reassembly and parts checkout begins.**

1. Grip safety- blocks trigger movement when not depressed- but allows safety bypass and trigger operation when depressed.

2. Thumb safety- the sear blocking stud immobilizes the sear when the hammer is cocked and the thumb safety is placed in the "safe" position.

3. Disconnector- disconnects sear and trigger when cycled by the slide into the down position. It must be understood that this critical part acts also as the reconnector when cycled back into the upper firing position by the sear spring.

4. Half cock notch, M1911 through Series 70- this is only a secondary, or back-up safety. This notch would stop the hammer in the event of a "sear bounce' hammer release, preventing the firing of a chambered round.

4a. Half cock notch, Series 80- secondary nature is demonstrated since the factory no longer makes this notch captive, as with earlier models.

5. Firing pin lock plunger, Series 80- secures the firing pin in the slide and prevents inertial movement and potential discharge if the unlikely combination of a loaded chamber and sufficient muzzle impact to inertially fire a chambered cartridge were to occur. The trigger must be depressed to fire a Series 80.

6. Sear spring- is supportive, but directly maintains the "safe" grip safety position while maintaining positive sear engagement and trigger return pressures.

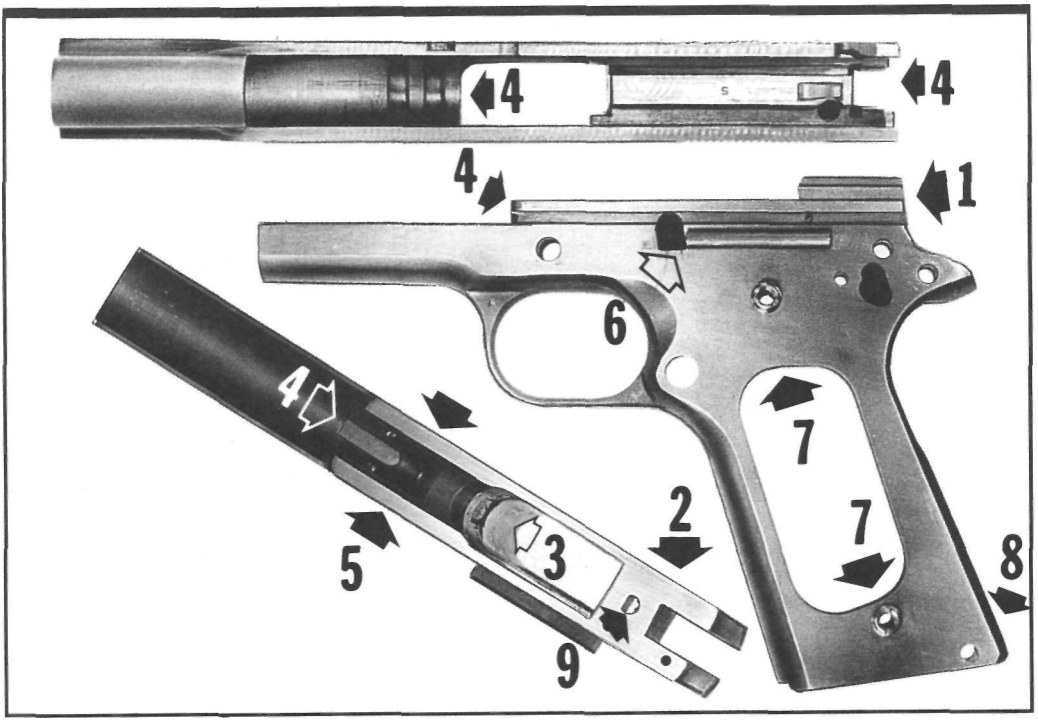


Figure 39- Shows the frame completely cleaned and ready for close inspection and detailing before reassembly. Carefully inspect the areas listed below and detail as necessary. Rusty, bent, damaged, and otherwise substandard frames will not produce a high quality end product, and should not be used.

1. Ejector stud and retaining pin- inspect for bend, straighten as necessary. Stone burrs and raised areas to flush. Seat pin to flush inside the rail slot.

2. Hammer well- inspect the top of the frame, just forward of the hammer well, for raised material caused by snapping the hammer without the slide. If there is no other damage, stone this area back to level, removing other raised areas or burrs at the same time. Do not lower the top of the frame.

3. Feed ramp and barrel bed- inspect both surfaces, make certain that the ramp angle has not been changed and that barrel bed has not been altered. If either have been modified beyond light polishing, replace the frame.

4. Battering- inspect the areas shown for signs of battering. If rail end battering is found, dress and reshape ends to match the contour of the stop area inside the slide. This problem is seldom caused by the frame, and is discussed later.

5. Frame rails- inspect for dents, edge nicks, or burrs. Lightly stone and level any burrs and raised areas, then break the sharp outside rail edges with a light pass of the stone. Do not lower the top of the frame or make rails narrower.

6. Plunger tube- inspect for tightness, dents, or nicks. If slightly nicked, retrue edges and dress inside. Later sections deal with restaking and replacement.

7. Grip screw bushings- check threads, tightness, and over extension into the magazine well. Stripped bushing replacement is dealt with later.

8. Frame tail- check for bend, denting, or nicks. Straighten as required, retrue and parallel the sides, then dress the edges as needed.

9. Disconnector tunnel- inspect closely, making sure the tunnel has not been elongated, enlarged, or otherwise modified- if so, replace the frame.

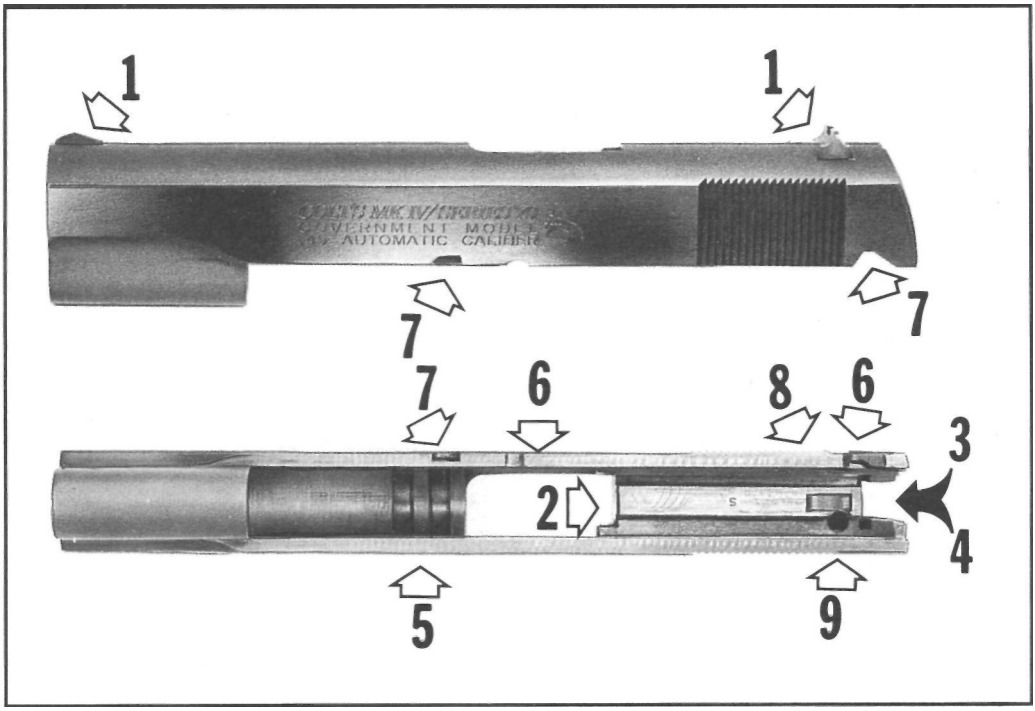


Figure 40- Shows the slide body fully cleaned, ready for final inspection. As with the frame, closely inspect and detail the areas listed below. Naturally, an excellent frame shouldn't be mated to a slide in anything less than top condition.

1. Sights- check condition and tightness in the slide.

2. Recoil face- check condition, lightly stone raised areas. Do not undersize.

3. Firing pin and extractor recesses- check for edge burrs or deformation. Retrue edges, lightly stone as necessary. Inspect interior passages.

4. Firing pin stop plate recess- check for burrs,nicks, pry marks, etc. Retrue and lightly stone nicked or deformed corners. Do not oversize this recess.

5. Locking lugs in slide- inspect for raised edge flanging, burrs, excess wear and/or battering at the bearing edges of the lugs. If excessively worn or battered [more than about the first 10% of engagement] replace the slide. Otherwise, clean and dress the top lug area inside the slide, removing raised flanging and edge burrs. Lightly polish this area.

6. Slide rail slots- inspect for evidence of previous welding repairs at safety notch and ejection port, etc. Then, check for galling, attempts at tightening, excess wear, nicks, burrs, and etc. If distorted or overly worn, replace the slide.

7. Slide stop and safety slots- inspect condition. Remove flanging at the bottom of the slide stop notch and disassembly notch, if present.

8. Disconnector recess- inspect the milled disconnector recess. Make certain that it hasn't been lengthened, then dress the disconnector rail. Don't undersize.

9. Lock plunger tunnel, 80 Series- make sure that this opening has not been enlarged. Carefully remove any burrs in this or the firing pin passage.

Frame and Slide Cracks: Frame welding usually produces small, and very easily corrected warpage. But slides, and particularly the harder civilian versions, are somewhat warp prone. I prefer replacement rather than welding.

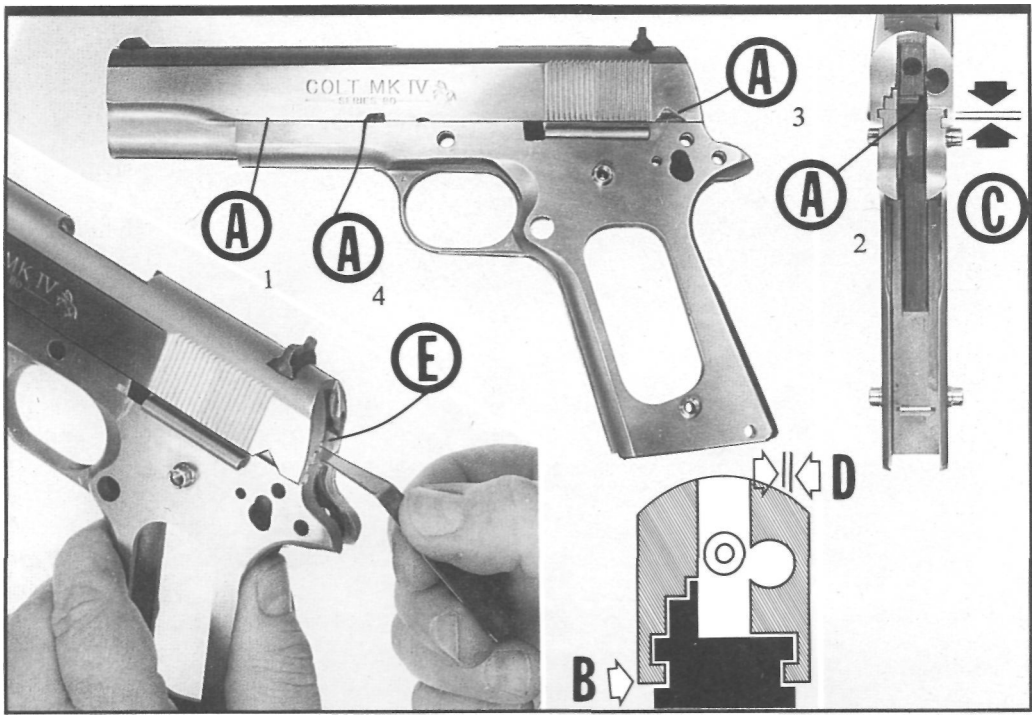


Figure 41- Shows slide and frame fit check points. After frame and slide have been individually cleaned, inspected, and hand detailed, they must be assembled and checked for correct interaction and fit. See check list below.

A1. Frame drag- check the top, forward edges of the frame tunnel. If drag marks show, lightly stone the entire top, and recheck, just eliminating contact.
A2. Frame drag- check and dress any raised areas at the top and rear of the frame. Remove high spots only, do not lower this surface.
A3. Frame drag- check ejector stud and pin. Remove drag or high spots.
A4. Frame drag- inspect for rail stickiness, or wedging, when at the full-back, or slide stop, position. Lightly dress rail end contours until wedging is gone.

B. Slide bottom drag- check for slide bottom contact against the corresponding shoulder of the frame rail slot. If drag or resistance is present, examine slide bottom and dress as necessary for clearance. If the slide shows warpage beyond a very slight downward curve at the rear of the slide, I suggest replacement.

C. Slide/frame rail vertical clearance- this measurement varies considerably, and will be found to exceed .010" in a fair number of pistols. Ideal clearance here depends on use. For general service use, .004 to .005" is near optimum, while less than .001" is desireable for competition.

D. Slide/frame rail horizontal clearance- another variable measurement, and found in excess of .015". Again, ideal clearance depends on use. For general service use, best at .005 to .006", and competition, again, less than .001".

E. Disconnector rail to frame clearance- measured with the slide pushed down and against the frame. This measurement can be found at greater than .008". Minimum recommended is .001 to .0015" and maximum is .006". Remember that vertical slide clearance adds elevation to this basic measurement.

About Ideal Slide/Frame Fit: Adjusting to ideal, or closer tolerance, slide to frame fit, serves to maximize accuracy for a given use, but, being labor intensive and expensive to produce, is not recommended for ordinary use. This amazing pistol design was adopted by the military with original tolerances now considered excessive by competition shooters, yet it still continues to function reliably and well. So, don't modify it unless needful of the modification.

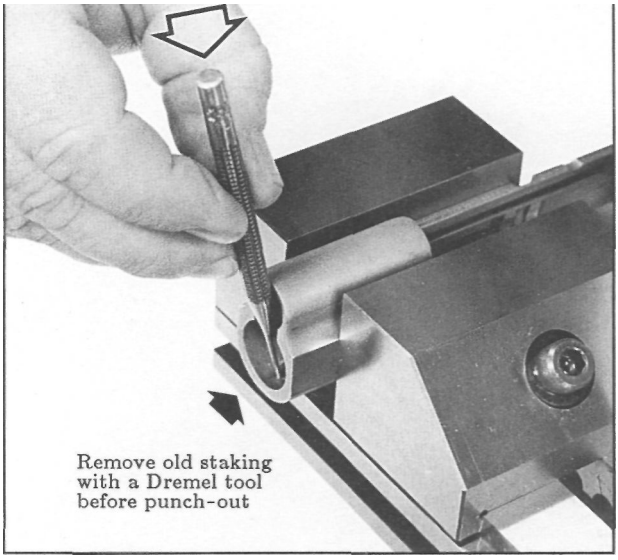


Figure 42- Shows the front sight being removed using the original punch-out method. Punching the sight out from the inside prevents exterior finish damage. Sights can be removed from the top, by the faster draw-out method, with vise grip pliers and a copper leverage block, but the potential for finish damage is much higher.

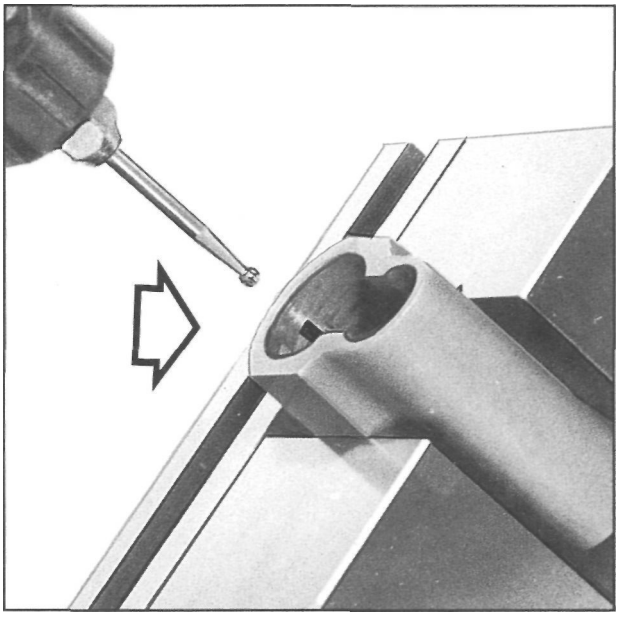


Figure 43- Shows where an indent must be cut around the sight stem passage inside the slide. A Dremel tool and a .125" round ball cutter is used for this job. Just enough material must be removed so that the soft sight stem has room to flow into the slide. The stem is then flared and riveted in place with a sight staking tool.

Begin Reassembly and Parts Checkout

Now that the frame and slide have been fully inspected and found to be in either good or serviceable condition, parts checkout and reassembly can begin. Refitting work always starts with the slide, followed by the frame. The two are then assembled and tested. With close attention to detail, the final product can exceed blueprint specifications.

Front Sight Blade

If the sight blade was found to be flanged, damaged, or bent on earlier inspection, the blade must be replaced.

1. Place the slide upside down between lead pads in **a** bench mounted drill press vise, or in a toolmaker's vise.
2. Allow only the front sight to extend from the vise jaws. Always remember to put a protective lead pad under the slide to prevent damage.
3. Grind the old staking away with a Dremel tool.
4. Once the sight stem is visible, tap it out with a small punch. See figure 42.
5. Insert a .125" diameter round ball cutter in the Dremel tool. Then, relieve the area just immediately surrounding the sight stem passage to a depth of slightly over 1/32", or about .04".
6. Next, carefully dress the slide's sight stem passage to take the replacement sight. For maximum strength, don't undersize the sight stem.
7. Then clean the stem and passage with degreaser.
8. Now, insert the sight and tap it into final position.

Stake New Front Sight

A correctly staked front sight blade is fully as strong as a brazed blade, with the additional advantage that the finish and heat treat are not damaged. Also, misapplied brazing heat has been known to warp a slide beyond use.
The front sight blade must have inflexible back-up and be held in alignment during the staking, or riveting, process. Otherwise, the sight stem will not fully expand into the slide recess and, likely, the junction will be weak. This is probably the reason many replacement blades come off. See fig. 44.

1. Secure the slide in the vise between soft lead pads as shown, making sure the blade is fully bottomed.
2. Add two drops of "red" Locktite compound around the sight stem. Then, allow two minutes penetrating time.
3. Begin staking the sight stem with light taps, while moving the flaring head from side to side, until the stem is fully and evenly flattened.
4. When staking is complete, carefully grind away the excess staking material. See figure 45. Lower this area only enough to allow barrel bushing clearance.

Restake Front Sight Blade

Restaking isn't recommended when a sight blade loosens, since it seldom holds the second time. Keep in mind that the original cause for loosening is still there. But, if you plan to restake just the same, clean the area and apply Locktite first.

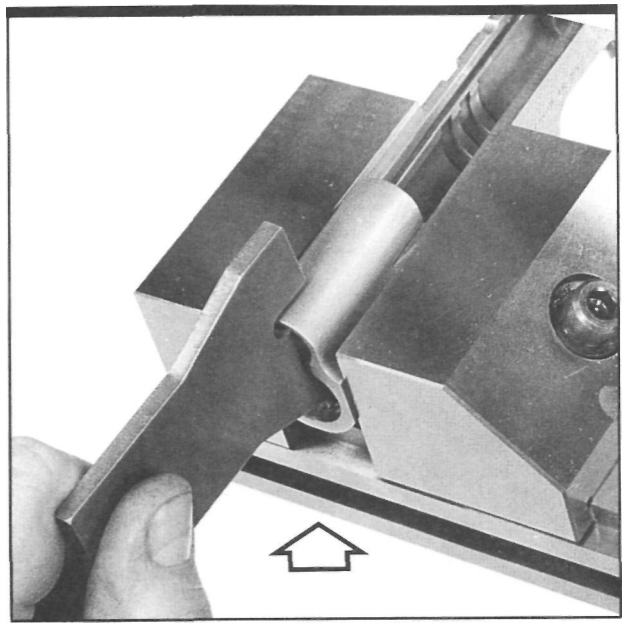


Figure 44- Shows the slide pre-positioned inside the vise, with a blade alignment block underneath. The sight staking tool is also shown in the correct flaring position, with the mouth opening clearing the slide. **Caution:** Do not overstrike. The sight stem must be slowly expanded until it fills the ground-in recess.

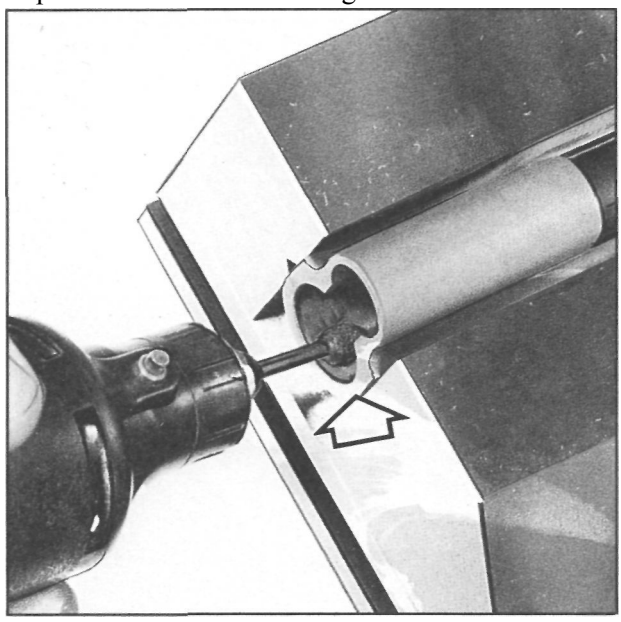


Figure 45- Shows the newly staked sight stem being ground to flush inside the slide. Use a Dremel tool and a tapered or conical grinding head. **Caution:** Remove just enough material to allow free movement of the barrel bushing, beyond this point, too much of the rivet may be removed, weakening the connection.

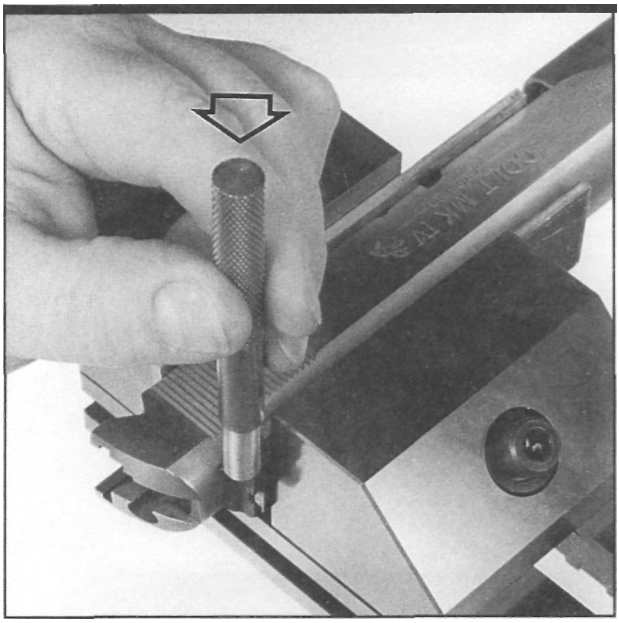


Figure 46- Shows a slide in a toolmaker's vise, secured between soft lead pads to protect the finish, ready for rear sight removal. A brass or aluminum block placed under the slide will help focus impact energy, and makes removal a lot easier. Use a brass drift for this job. Drive the sight blade out from **left to right,** as shown.

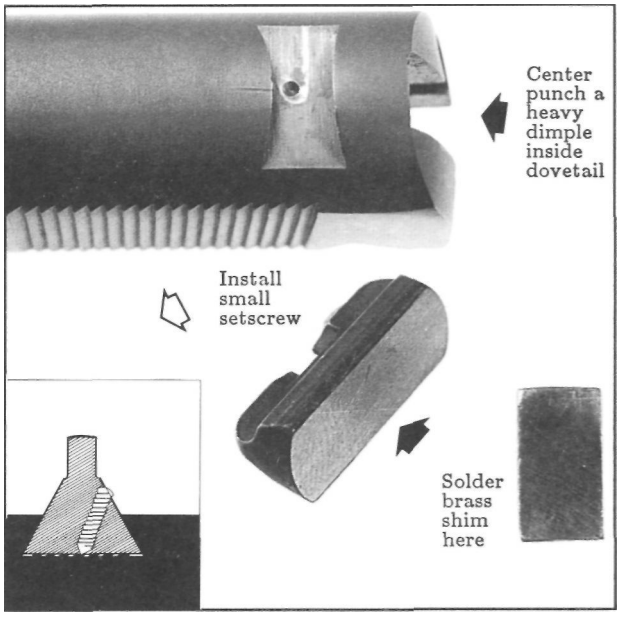


Figure 47- Shows several ways to elevate and tignten a loose rear sight blade in cases where it is important to retain the original or standard sight, and when a tighter, original style sight blade is not available. Otherwise, it is much faster and easier to replace it with an accessory type sight that has gib locks or Allen set screws.

Remove Rear Sight Blade

This section applies to fixed, dovetail rear sights, and especially in cases where the sight was found to be loose on a previous inspection, or has loosened before. This problem always begins with an incorrect mechanical fit, and has two basic causes: either the dovetail slot is oversized, or the rear sight blade is undersized.

Caution: Don't try to tighten a loose rear sight by staking, indenting, or compressing the top of the slide dovetail with a punch. This may work in a few instances, but the risk of disfiguring the slide is great. And, most blades that are tightened in this way will rapidly loosen again.

Loosening Caused by Undersized Sight Blades

Here, the best remedy is to remove the rear sight and select a wider, better fitting blade. When correct, the blade will fit snugly and require drifting to position. Dimple the inside of the dovetail and set the blade in red Loctite. Drive the blade in from **right to left.**

Loosening Caused by Oversized Dovetail Slots

Loose dovetails are found by trial and error. If, after trying various blades, none will fit tightly enough, the only conclusion can be that this is an oversized dovetail. The most economical solution in these cases is to heavily dimple the inside bottom of the dovetail or replace the sight with an accessory type having locking set screws.

Bushing Fit in Slide

During production, a certain amount of plus and minusing of parts tolerances is to be expected. For this reason, bushing and slide fit varies considerably, and is generally much looser than necessary. Ideally, for best accuracy, the bushing should be hand fit to the slide, and be just a bit tighter than can be turned without a wrench. But, not all uses require this kind of precision, and fast take down is made almost impossible. Although there is no standard for this category, I suggest adjusting bushings in service duty pistols to an approx. .001" slide clearance, thus achieving improved accuracy and retaining ease of take-down. You will often find bushing to slide clearances in excess of .004 and .005"- and sometimes more on older .45 autos. But, even with these clearances, many older pistols are still kept for personal defense, where use would be at very short range and the error factor wouldn't add up to much.

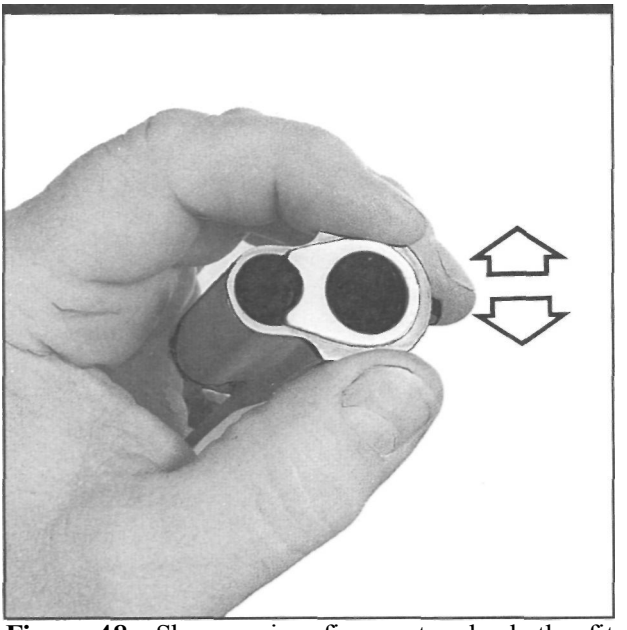


Figure 48- Shows using fingers to check the fit of the bushing in the slide. Ideally, there should be little or no play at this connection. Keep in mind that a variation of .001" at the muzzle equals 1" at 100 yards, or 1/2" at 50 yards. Much of accuracy is determined by how well the barrel and bushing fit in the slide.

Bushing Expanding

Since the subject is refitting, we will first cover expanding the original bushing, and discuss replacement later on.

1. If a tapered expanding punch is used, enlarge the rear of the bushing skirt just enough to contact the slide.

2.. If swaging expanders are used, increase bushing size one step at a time. These expanders are sized at .624, .626, .628, and .630".

3. Then, dress the outside of the skirt to a .001" clearance.

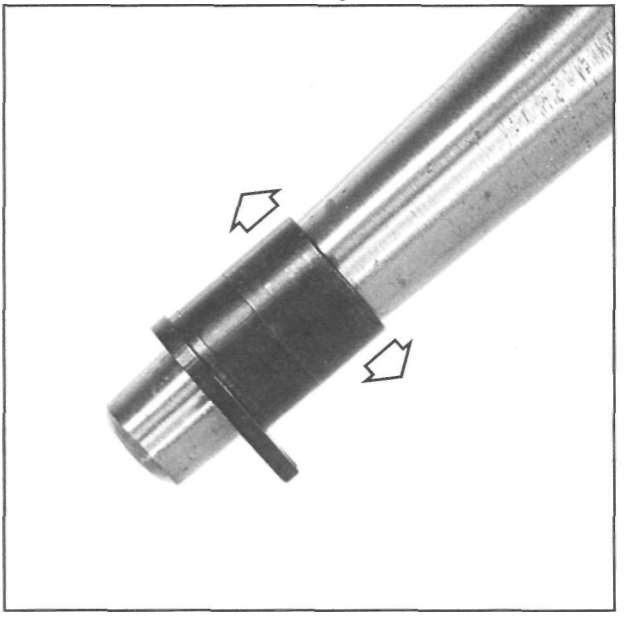


Figure 49- Shows a bushing skirt expanded on a tapered expander punch. This is the standard way to tighten bushing fit inside the slide. Reducing bushing movement improves overall accuracy in service pistols. For match use, barrel to bushing clearance also must be reduced, requiring an accuracy type bushing.

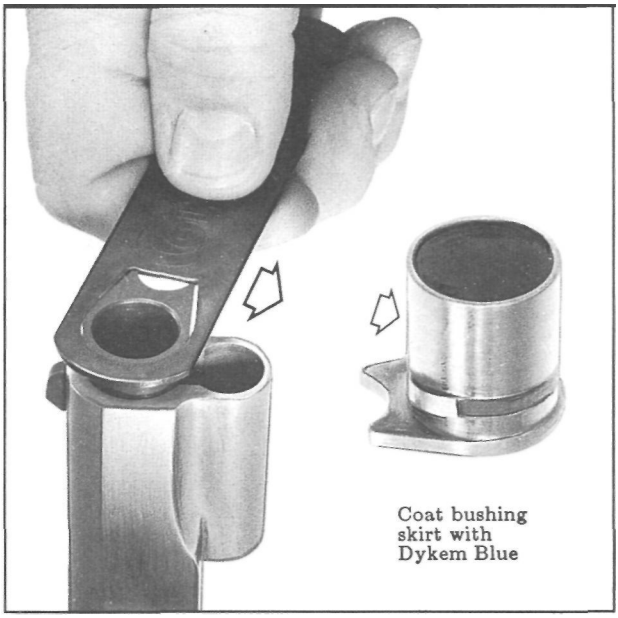


Figure 50- Shows the hand adjustment method for fitting tighter or expanded bushings to an individual slide. Binding high spots are stoned and rechecked until the desired clearance is reached. Use Dykem Blue on the bushing skirt to detect high or bind spots while trial and error fitting to the inside of the slide.

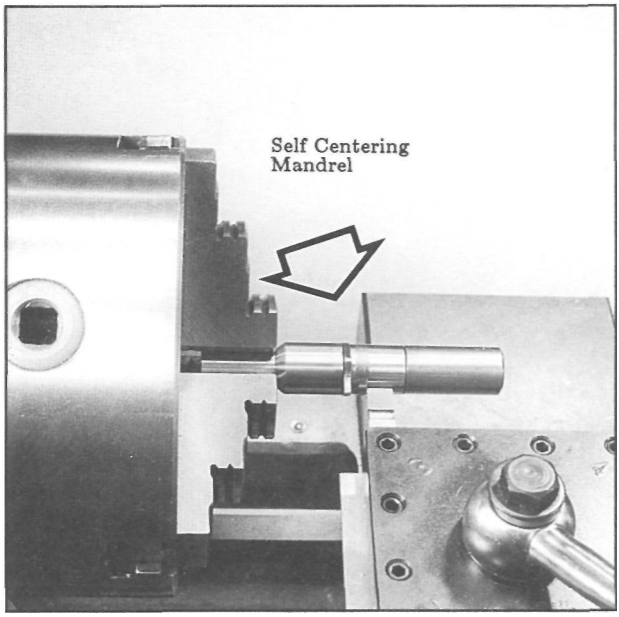


Figure 51- Shows a larger or expanded bushing set up on a self centering mandrel and chucked in the lathe. Alignment is checked with a dial indicator. In this way, the skirt is kept round and on center. Always use the rule of halves when reducing diameter: remove only half of the estimated amount, and then recheck fit.

Hand Fit Expanded Bushing

This original and inexpensive adjusting method has been used both in custom refitting and in armory work. See fig. 50. Although slide fit is improved, the shortcoming is that the inside of the bushing doesn't fit the barrel better. This method is still practical in general and service pistol use in that it eliminates half, or more, of front end barrel movement. However, when maximum accuracy is needed as in match or competition use, the old bushing must be replaced with a larger and tighter bushing. The larger, accuracy type bushing has an undersized barrel passage. Caution: When dealing with tightened bushings, always verify that the barrel still goes into the fully locked position without vertical bind or springing. See figure 59.

Lathe Fit Oversized Bushing

This is a faster and better way to size both expanded and oversized accuracy type bushings, and gives uniform results while ensuring that the bushing is kept perfectly round and concentrically aligned. Make sure the slide recess has been deburred.

1. Set lathe spindle speed low, or at about 100 rpm.
2. Center the bushing on the mandrel. See figure 51.
3. Measure bushing against slide I.D., then remove about half of the difference.
4. Recheck bushing fit.
5. Repeat steps 2, 3, and 4, until desired fit is reached. Warning: Be sure the bushing locking tab is not damaged.

Seat Oversized Bushings

There is some difference of opinion on the subject of just how tight a bushing should be for best accuracy. A good answer is that it should be slightly tighter than can be moved with fingers alone- and that it should stay that way. To this end, after hand polishing the skirt, I suggest carefully lapping the skirt to the slide. Use an extremely fine compound such as J.B. Bore Compound, followed by a final seating with oil. Commercial anti-seize oils are also useful. When seated, the bushing will feel solid in the slide and yet will move easily with a wrench. If in doubt, slightly too tight is better than a bit loose.

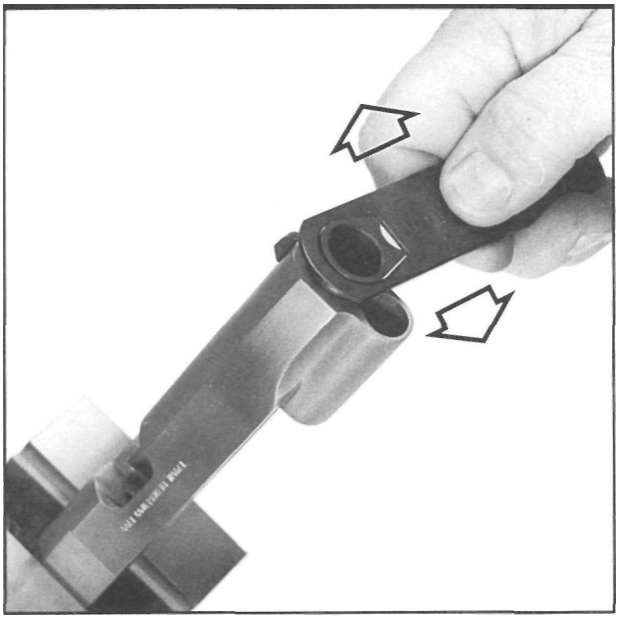


Figure 52- Shows hand seating a newly turned and dressed competition, or accuracy type, bushing. Use a steel bushing wrench for this job. Prevent finish damage to the slide and bushing by applying a protective layer of masking tape to the face of the wrench. Work in with J.B. Compound and final seat with oil.

Check Collet Fingers

Without barrels, collet type bushings usually fit loosely. Collet bushings were adopted as a production means [non-hand fit] to better accuracy. They work by grasping the barrel at the step-up point, and then simultaneously expanding the outer surface of the bushing [fingers] about .003" just as the slide closes, and in this way improving both contact and fit of barrel and slide. The paired combination of series 70/80 Gov't Model barrels and bushings will retro-fit into all earlier Government Model slides.

1. Inspect the collet fingers at or near the flex line [see figure 53] for possible signs of fatigue or cracking.
2. If the fingers do not feel rigid, are bent, Or show signs of fatigue, replace the collet.

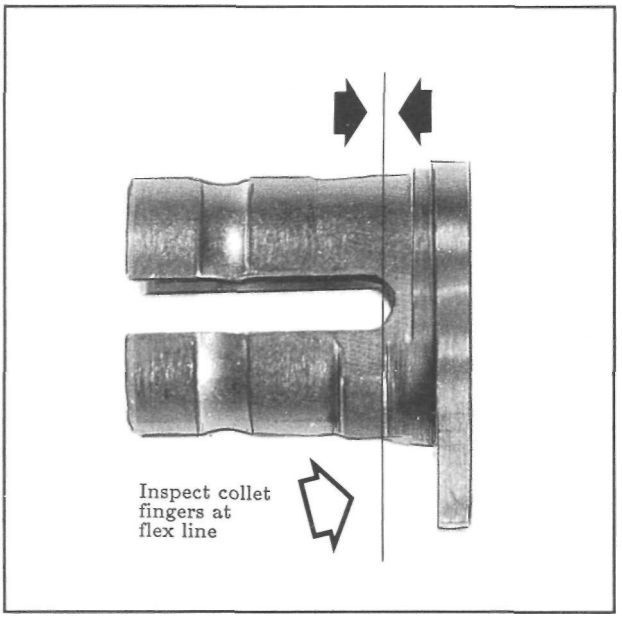


Figure 53- Shows a close view of a collet type barrel bushing, capable of increased accuracy over standard production bushings. Collets have a tendency to break fingers in certain slides, always along the flex line shown above. All the facts aren't yet in, but it seems breakage is related to collet finger **O.D.** versus slide **I.D.**

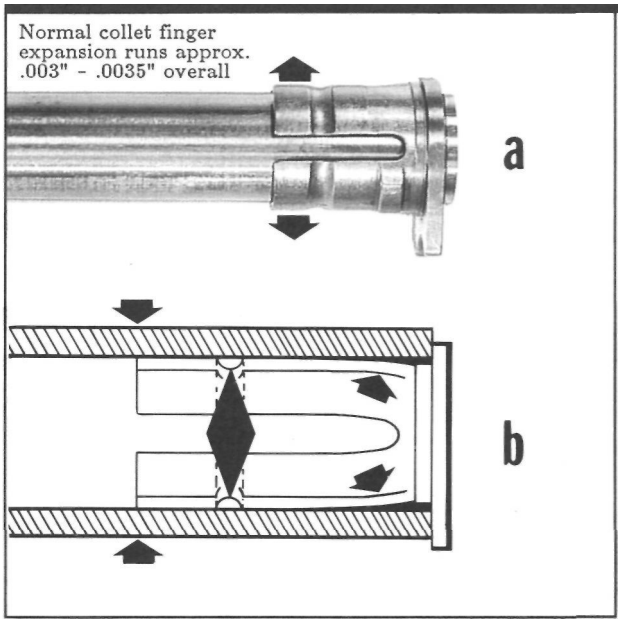


Figure 54- "A" shows normal collet diameter expansion, which results when the bushing's finger contact pads are cammed or ramped up by the bevelled back edge of the barrel as it changes O.D. **"B"** shows the reversed fulcrum effect created when the slide's inside clearance is too small. This stresses and bows the fingers.

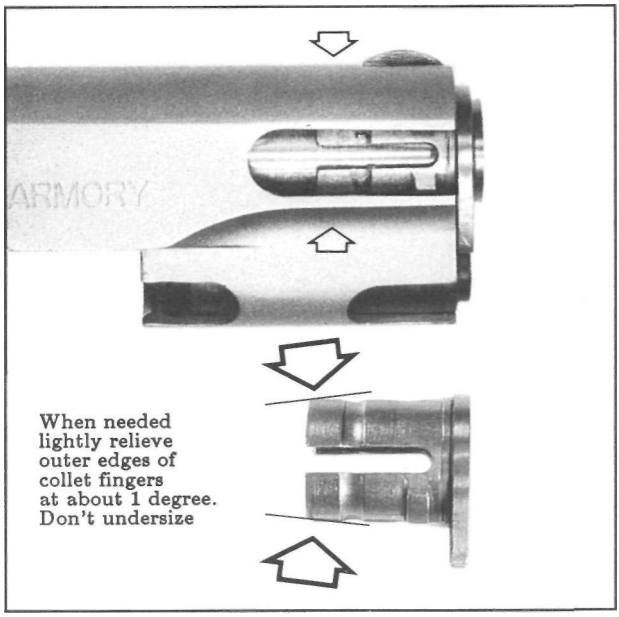


Figure 55- Shows a cutaway slide with bushing in view. Arrows indicate the areas inside the slide where all machining high spots should be polished and removed. Approximate bushing relief, or clearance, angles are also shown. This angle is shallow and should agree with the slide when the bushing is fully expanded.

How and Why Collets Break

Technically, these well made, heat treated collets should last almost indefinitely. But not so, with some. A number will break before they have had a chance to wear. And, when replaced, more than half will break again. Some believe that squareness, or the lack of it, at the front of the slide contributes to this breakage, and that may be so. But the primary cause [see figure 54] is the reversed curve, or bow, created at the front of the fingers by lack of inside slide clearance for the expanding bushing skirt. **This lack of clearance can have three contributors:** inside slide diameter, barrel outside diameter [at step up], and collet finger O.D. The net effect is: the collet fingers fatigue and break.

Correcting the Problem

1. Remove any high spots or machining ridges that are found inside the slide where the collet fingers bear.
2. Recheck barrel and collet fit inside the slide. Don't reassemble slide and frame.
3. Hand test. If the barrel feels springy when going into full lock-up, replace the collet with another measuring slightly smaller in O.D.
4. If springiness is still present, angle clearance the collet fingers. See fig. 55.

Caution: Estimate angle and stone carefully, using Dykem blue for contact reference. Overcutting will destroy the bushing. **See figure 59 for more information on barrel springing.**

Fit Undersized Bushing To Barrel

At this point, fully inspect the barrel- before fitting the bushing to it. If the barrel is not in excellent condition, it must be replaced. It would be a waste of both time and the bushing, otherwise. See fig. 62 for barrel inspection.

For Service Duty Use:

1. Before cutting, prevent tool chatter by securing the bushing between lead pads.

2. Use an adjustable reamer, or, otherwise, ream in several steps, until the barrel will almost fit in the bushing, but not quite.

3. Hone the bushing until the barrel fits, and .001" total clearance remains.

4. Then, lightly hand seat.

For Maximum Accuracy:

1. Hone as above, until the barrel almost starts.

2. Next, hand polish until the barrel moves freely, but with zero clearance or play.

3. Hand seat with oil.

Relieve for Barrel Swing

When bushings are fit to very close tolerances, no room is left for vertical barrel swing. The barrel binds and can't move into or out of lock-up. Solve this problem by cutting relief angles into two areas of the bushing. See figure 57.

1. With a hand broach, take off a little material at a time until the barrel will lock and unlock without binding or springing. See figure 57.

2. Then, lightly dress the relief cut areas, removing burrs, but no other material.

Note: See figs. 59, 60 and 61.

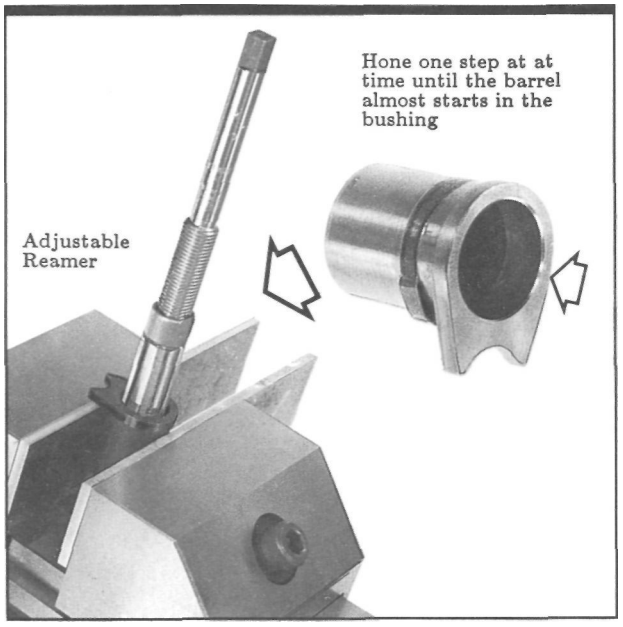


Figure 56- Shows opening the inside diameter of the bushing by reaming one step at a time, to slightly under barrel O.D. size. Bushing material is carefully removed until the barrel almost starts into the reamed opening. Then, the bushing is honed until it just allows the barrel to fit through, but without extra clearance.

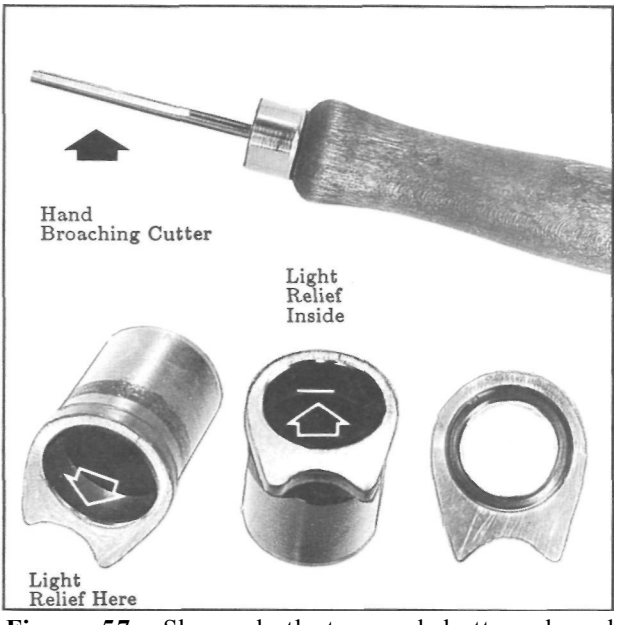


Figure 57- Shows both top and bottom barrel relief areas, or swing clearance areas, made necessary when bushings are very closely sized. These relief angles are best cut with a hand broach. Care must be used so that only enough material is removed to allow full barrel lock-up and unlock without springing or drag.

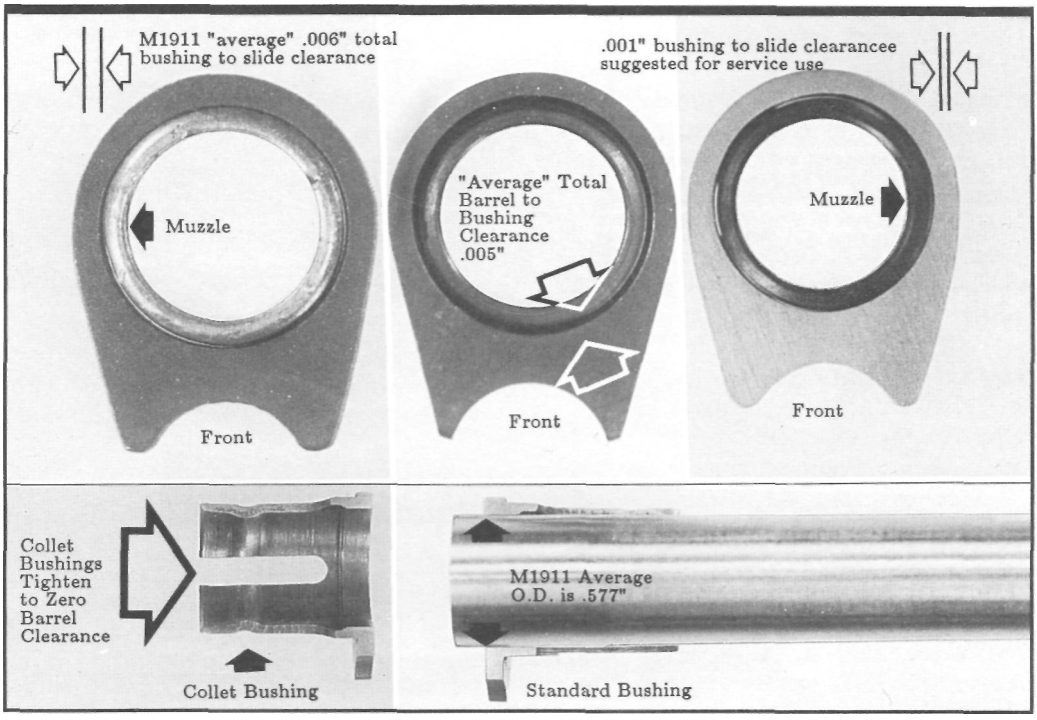


Figure 58- Shows "average" slide/bushing and bushing/barrel clearances in M1911 and civilian pistols. With collet type bushings, forward clearance measurement is not as important, since barrel contact is further back and inside the bushing. See inset. By this time, probably a lot more than four million M1911, A1, and civilian versions have been produced. With age, wear, and the diversity of manufacturers, a fair amount of dimensional variation can, and does, exist.

While it's extremely variable, I have found **bushing to slide** clearance to measure .002" to .004" per side. On an "average" basis, this would amount to .003", per side. And, .003" X 2 sides would equal .006", as an "average" total.

Usually, most **non-collet bushing to barrel** clearances measure .002" to .0025" per side, with .0025" being much more common, in my experience. Using the more frequent .0025" X 2 sides equals an average total of .005" clearance.

Barrels in pre-Series 70 models are found to measure from slightly below .577" O.D. at muzzle, to around .583" with some replacement barrels. But, a number large enough to be called "average" will be found measuring between .577" and .5775". Series 70/80 barrels usually run .5785" to .579" at muzzle step-up.

As an example of averages- consider that two thirds of the pistols in use measure .006" slide/bushing total clearance, and another .005" in bushing/barrel clearance. This gives a grand total of .011". When the pistol is machine mounted, this amount of variation by itself could, perhaps, produce a maximum spread of 11" at 100 yards, 5 1/2" at 50 yards, and 2 3/4" at 25 yards. Here, we have roughly described the mechanical accuracy potential of the "average" pistol. This potential is easily in the control of the pistolsmith.

Recommended clearance for general service use is .001" slide/bushing total, plus .001" at bushing/barrel, or .002" grand total. Using the above example, this would produce a 1/2" spread at 25 yards. For competition, reduce these clearances to as close to zero as possible.

The fact is- that slide/bushing/barrel clearances are by no means the full cause of mechanical inaccuracy. Rear barrel movement is a large part of it, but both are at fault. Keep in mind that a loose bushing is half the problem, because it adds to and permits rear barrel movement.

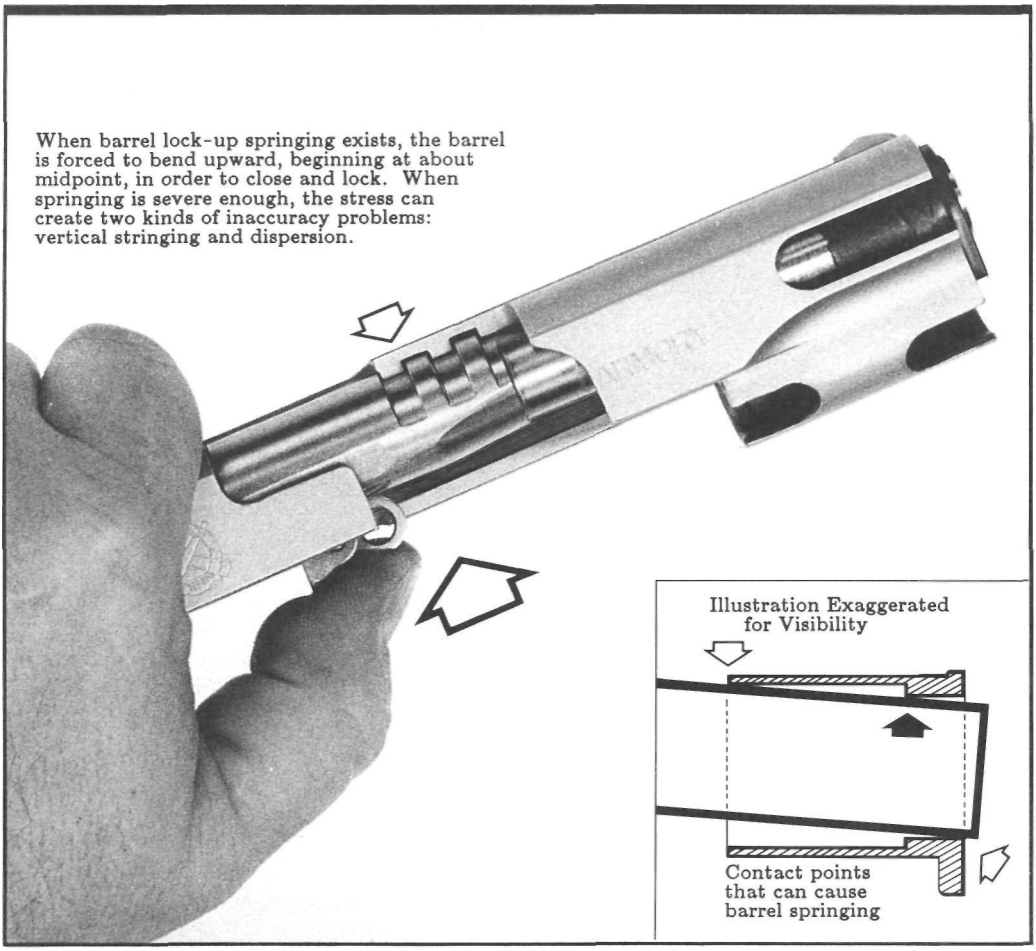


Figure 59- Shows the test for barrel springing, done by thumb depressing the barrel and lugs into the fully locked position in the slide. As you do this, carefully feel to determine whether or not the barrel has to be sprung [slightly bent] in order to go into full-lock. When springing is present, the barrel feels somewhat like a leaf spring. As the barrel fully locks, it should become solid in the bushing, having taken up all vertical slack and without binding or springing.

Springing places the barrel in a condition of stress, creating inaccuracy and vertical stringing. Springing also causes collet fingers to fatigue and break.

Barrel springing is caused by insufficient barrel/bushing vertical clearance, to the point that the bushing actually interferes with lock-up. This condition can be found with either standard or collet style bushings. It's simply a problem of not enough barrel swing clearance.

In standard bushings, this problem is easily solved by increasing the top inside and bottom front bushing clearances, and sometimes by additional barrel and skirt clearance, as shown above.

With collet bushings, springing occurs when the expanded collet fingers make firm contact with the inside of the slide before the barrel is fully locked. This is caused by a lack of clearance, resulting from possible combinations of a tight inside slide diameter and either a slightly larger barrel O.D. [at step-up] and/or a larger outside collet diameter. This is remedied by increasing the clearance at the junction of the collet fingers and the slide. Sometimes, replacing the collet with one slightly smaller is workable. But, usually the collet fingers will require dressing and clearancing to allow the usual .003" expansion without binding.

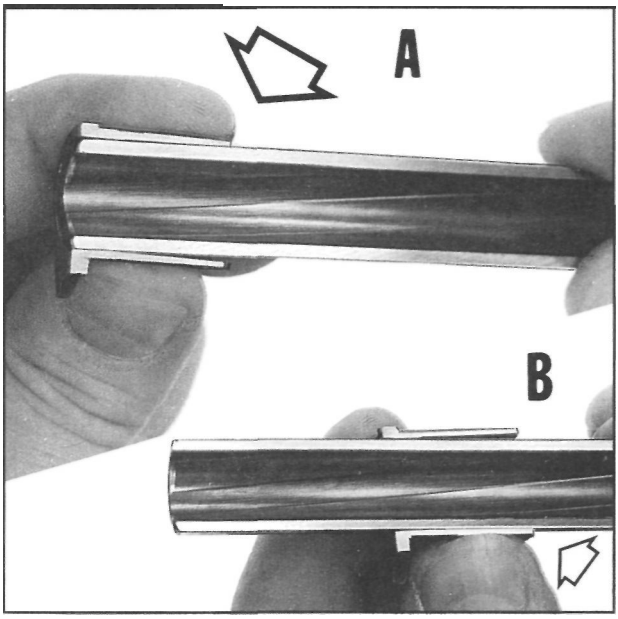


Figure 60- **"A"** shows a possible bushing/barrel inside bind area found when larger diameter replacement barrels and tightened bushings are used. And **"B"** shows the bottom contact, or drag, area which is usually present when top contact is found. Bind or friction must be removed by clearancing the barrel and bushing.

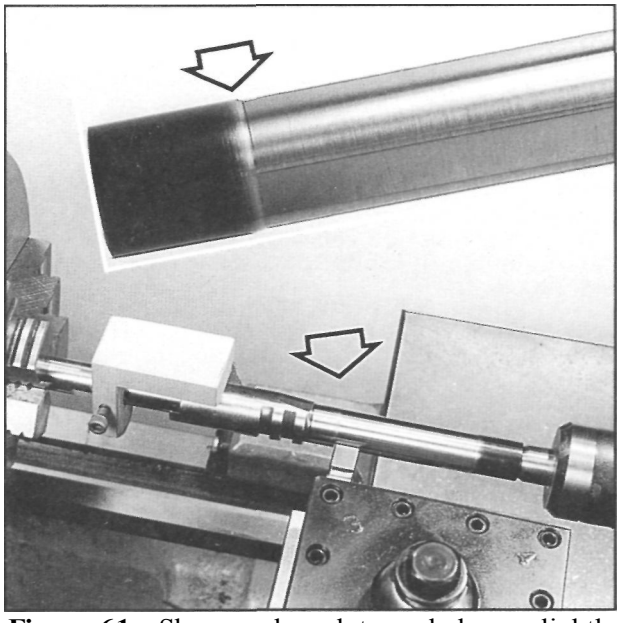


Figure 61- Shows a barrel turned down slightly to provide bushing skirt cycling clearance. Typical dimensions are given in the column at right. To prevent catching, the lower surface of the barrel must taper upward as it rejoins the original front diameter. Lathe set-up uses a barrel aligning fixture and a live center.

Bushing Skirt Bind

Some larger diameter military type replacement barrels can run .583" O.D., and slightly over. Also, many custom match grade barrels will measure .585" O.D. and even larger. These barrels, when combined with a tight fitting bushing, can bind or drag inside the bushing skirt. This contact, or bind, occurs as the slide cycles, and is found at the rear of the bushing. It isn't the same as lock/unlock bind at the front of the bushing. See figs. 60 and 61. To remedy this condition:

1. Coat both the barrel and bushing with Dykem Blue to confirm contact location.
2. Chamfer the bushing skirt opening about 45 degrees to a depth of about 50%, then recheck. **Caution:** There is a temptation to bore out the bushing skirt for clearance. Don't do it. This makes the bushing much too thin.
3. If skirt bind or contact still exists, reduce the barrel diameter to about .575" O.D. beginning about 1/2 inch back from the muzzle. This small reduction provides cycling clearance. See fig. 61.
4. Although reducing .577" or .578" diameter barrels by a few thousandths can be hand done- it is better done on a lathe, particularly with larger diameter barrels. Reducing diameter, beginning just at 1/2" from the muzzle back to 2.65" from muzzle, handles most bushing combinations.
5. Remember to taper the diameter change gradually, so the barrel moves easily and does not catch the bushing.

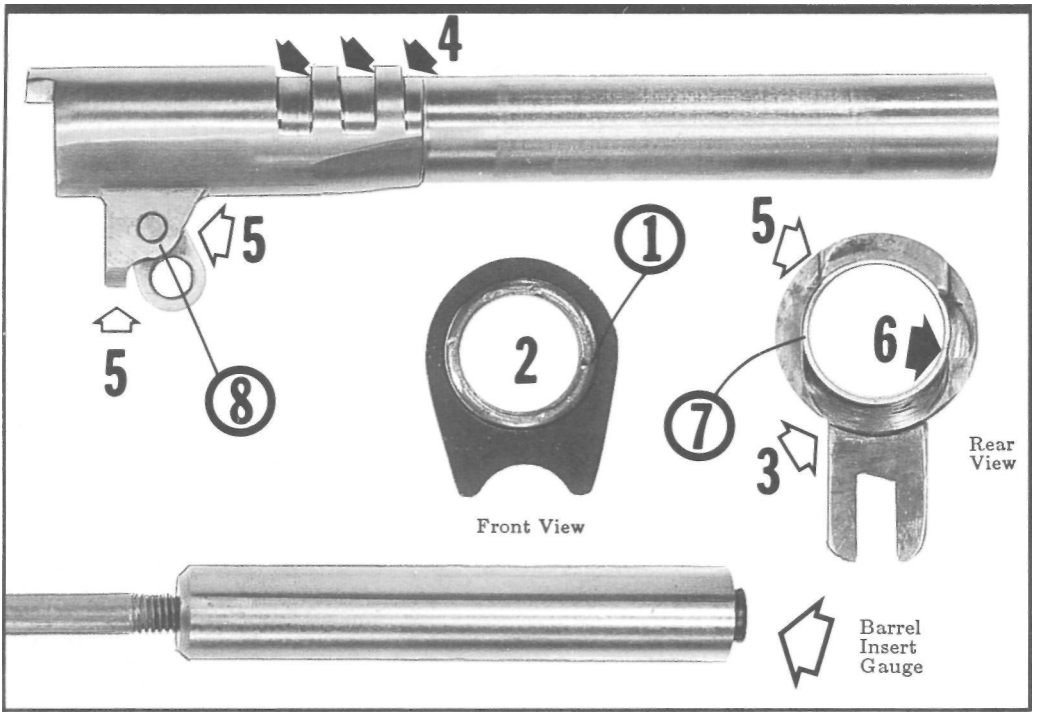


Figure 62- Shows barrel inspection points and, also, a standard service diameter insert gauge, or plug gauge, used to check bores for internal irregularities. Unlike times past, .45 barrels are now in very abundant supply. So, it's foolish to "make dp" by using a barrel in anything less than excellent condition. The present availability of barrels makes welding, remachining, and etc. unnecessary.

1. Check crown- if nicked or dented, it may be recut, providing that the new muzzle level is not taken below the bushing face. Otherwise, replace the barrel.

2. Inspect bore- if the bore looks good after a detailed cleaning, install an insert gauge, running it through from the back, or chamber side, of the barrel. Check for any area of restriction or irregularity. Remember that insert gauges detect irregularities only; they do not measure bore diameter. Build-ups such as new parkerizing residue, lead, copper, and etc., must be removed before gauging. If the bore shows pitting, excess wear, bulging, or cannot pass the gauge test [after crown de-burring, etc], replace the barrel.

3. Inspect ramp, throat, and chamber- if the barrel has been modified non-standardly, if the chamber has been enlarged, or if the throat and/or ramp have been overcut, replace the barrel.

4. Check top lugs- if the lug top/barrel hood area has been reduced to an overall height of less than .050", measured from the bottom of the rearmost lug slot, replace the barrel. If the lugs are more than 10% corner battered, or their edges have been flanged and pulled back by more than 10%, replace the barrel.

5. Check for cracks- at hood and bottom lug. If present, replace the barrel.

6. Inspect for battering- at the rear barrel face. If face battering cannot be cleaned by stoning the barrel face and angling the bottom slightly forward, replace the barrel. See detail above. **Warning: This adjustment can be made on a one time only basis.**

7. Check headspace- if excessive, replace the barrel. See section on headspace.

8. Check link pin hole- if oversized, replace the barrel. See barrel sections.

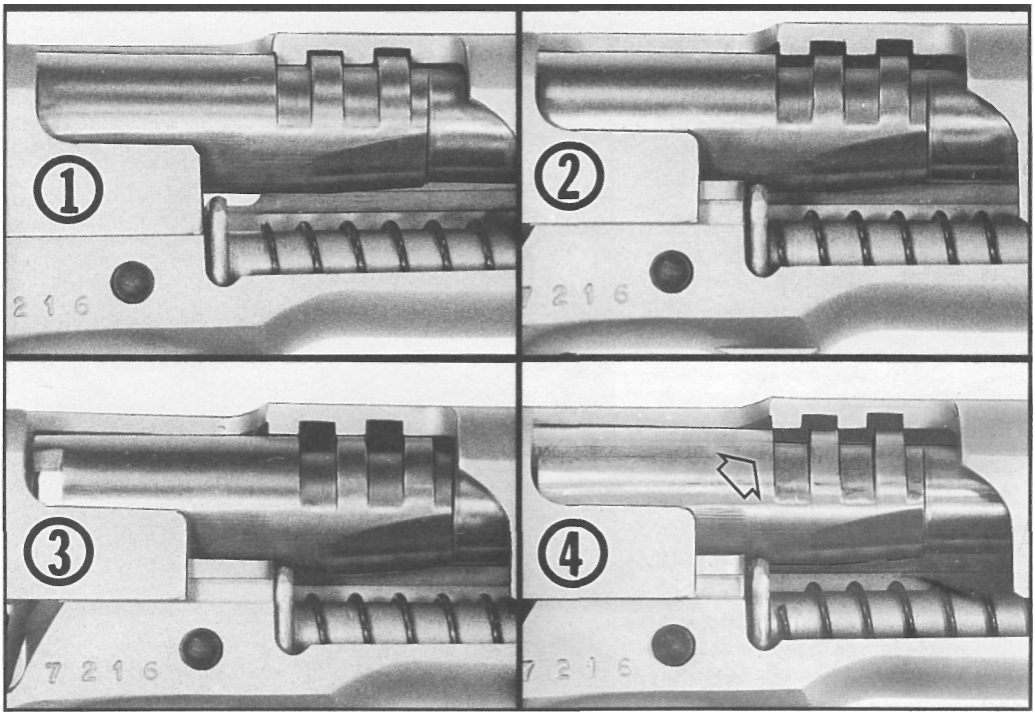


Figure 63- Shows a close cut-away view of the unlocking sequence in three normal steps, plus a fourth, where lug drag is present during unlocking. Being able to see the full unlocking sequence in a cut-away pistol is an invaluable shop training aid. The steps shown above are described in number sequence below:

1. Both barrel and slide move rearward together, remaining fully locked for up to approximately the first 1/8" of slide travel.

2. As the slide continues back from 1/8" to about 1/4", the barrel is quickly drawn down by the link, and out of the locked position.

3. By around 1/4" to 3/8" of rearward slide travel, the lugs are already in the clear, and the barrel continues to draw down to the frame bed. This leaves only light barrel top/slide contact. Lug drag and flanging are not present.

4. Here, the barrel also links down. But- the forward edges of the barrel's locking lugs corner drag and have difficulty clearing the rear edges of the slide's lug slots, as the barrel tries to draw down and out of full-lock engagement.

The problem of locking lug corner drag, and the related corner drag flanging of the lug edges, is basically caused by small set-up errors when the lug slots are machined in a slide. This condition, which amounts to a barrel/slide mis-timing problem, is mostly present in military pistols, and seldom in civilian models.

In a cut-away pistol, it can be seen that contributing causes are: incorrect link length, mis-machined barrel lugs, slide softness, and irregular vertical dimensions- all these affect link-down.

In the normal cut-away views, we can see that there is some unlocking clearance at the front of the barrel lugs- **at the moment of link-down**. In this case, the fronts of the barrel lugs are not under load as they disconnect from the slide. Also, this timing allows the lugs of this particular pistol [which measure .057 high] to be in the clear as the slide moves over the tops.

A certain amount of variation, in slide lug position and clearance, exists in all production pistols. With softer slides, small variations are easily compensated for, in most pistols, by use of a shallow 45 degree chamfer at the disconnecting edges of both the slide and barrel lugs. This provides extra timing clearance as the lugs pass. However, there is a limit to chamfer depth. See figs. 64 and 65.

Barrel/Slide Fit

With use, barrel hood and lug tops become friction marked, nicked, and sometimes a bit rusty, requiring dressing.

1. Stone, re-level, and dress the tops of the barrel lugs and hood, keeping the top surface parallel with the barrel. See figure 64.
2. New barrel lug depth typically measures .058-.060". Removing .002 to .003" will usually clean the surface.

Warning: In no case should lug height be reduced to less than .055". Do not cut or lower the lugs in the barrel.

3. Recheck lug fronts after the tops have been dressed. If fronts are at 90 degrees and show little wear, they are acceptable as-is.
4. If lugs show no more than about 10% flanging, corner contact, or drag marking, the barrel is useable after the upper lug edges have been 45 degree relief chamfered. See figure 65. Hand broaching is the easiest way to do this.

Some gunsmiths chamfer lug faces as much as 25%. This could be a serious mistake- if not enough lug engagement, or lug overlap, is left, and especially if the barrel has not been re-linked higher. As an extreme example, let's take a loose pistol, with standard link and full lug height of .060"- but with only 50% lug engagement [or .030 of overlap]. Now, if 25% of the full .060" lug height [or .015"] is subtracted by over chamfering, only about .015" engagement [or 25%] is left. You can see this would be very unwise.

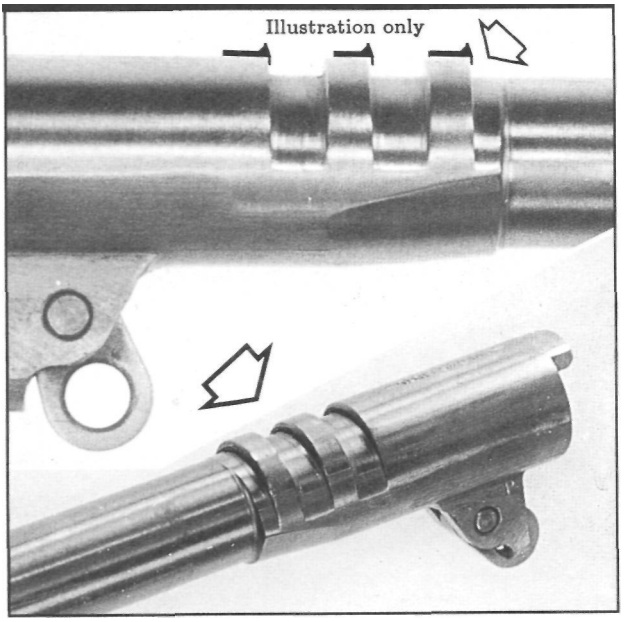


Figure 64- Shows front barrel lug areas where lug drag and drag flanging can occur. This condition is mostly found with softer military production [and Colt copy] slides. Colt civilian slides are much better dimensioned and well hardened, virtually eliminating this problem. When dressing, do not lower lugs below .055".

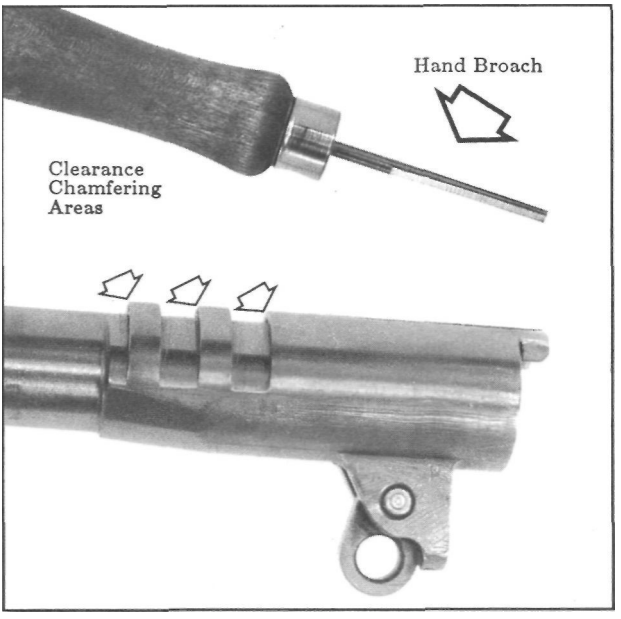


Figure 65- Shows lug areas requiring clearance chamfering when slide disconnect timing causes excess drag, flanging, or corner hits. Warning: Don't remove any more than about 10% of lug height, or a maximum of .005", with most lugs. Depending on actual lug engagement, even this small amount may require a longer link.

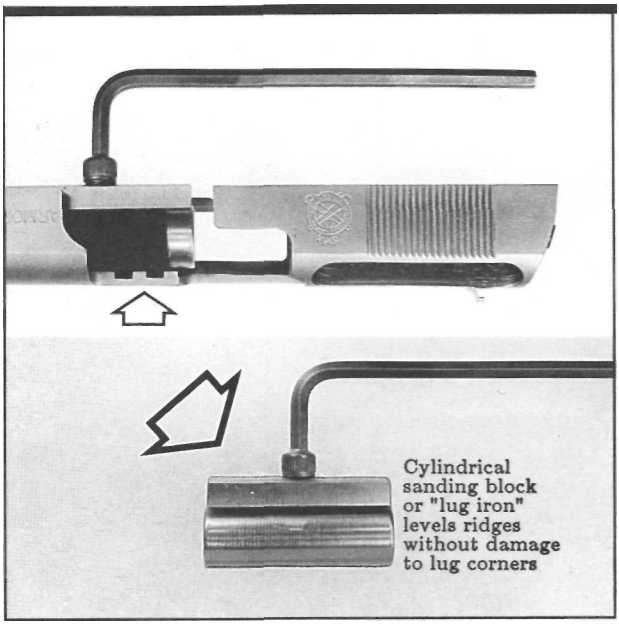


Figure 66- Shows a .650" round brass sanding and truing block, or "lug iron", being used to level the slide lug area. The theory is that machining ridges and flanging are better leveled by first truing and polishing at 90 degrees to the lugs. Thin #240 wet-dry automotive paper, followed by #320 grit, is best for this job.

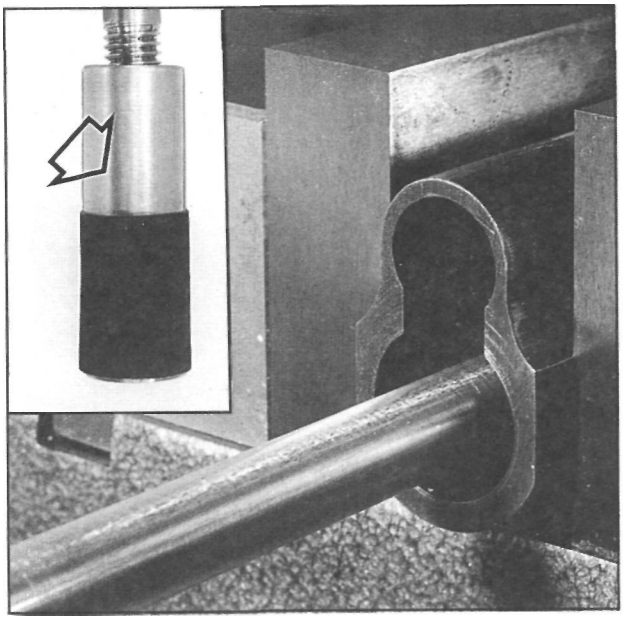


Figure 67- Shows final polishing the slide lug area with a rotary sandcloth hone. Use #400 sandcloth and feather the area, beginning with the ejection port, forward to about mid slide. Elevate the hone very slightly as shown. Don't lower the surface by more than .002" during the combined truing and polishing operations.

Dress Slide Lug Area

Even after considerable use, many slides will show tool ridges on the inside. The softer slides also exhibit a certain amount of additional ridging or flanging at the lug edges. These areas add to barrel friction. Flanging, if excessive, can also interfere with lug engagement. For this reason, the area above the slide's lug slots must be leveled and polished forward.

1. Level the lug area by removing all ridges with a "lug iron" as shown in fig. 66.
2. Remove just enough material, generally .001" to .002", to true the surfaces.
3. Then hone the trued areas as shown in figure 67.
4. Make sure that the slide rails and rail slots are not contacted or reduced during this process.
5. Hand broach any slide lug corners that are drag flanged - up to the same .005" limit as with the barrel's lugs.

Warning: If this is an older slide, it's possible that this work may have been done a time or two during previous refittings. Original lug slot depth runs .058" to .068" on the average, and shouldn't, in any case, be reduced below .055". Measure slide lug slot depth before and during this work. Lug engagement is the real amount the lugs overlap, and should be kept at a minimum of 70%, or about .042". But, for general or service duty use, a minimum of 75 to 80%, or .045" to .048", is suggested, and, for maximum accuracy, as close to 100% as possible.

Measure Lug Engagement

In any M1911 type pistol, the actual amount lugs engage, or overlap, depends on vertical clearances, rail/slot positions, previous fitting, and barrel link length. Some copies and military models measure less than 50% engagement. Lug engagement can be checked to about a .001" accuracy in just a few minutes by using modeling clay, as shown in figure 68. This measurement will determine the actual lug engagement, and whether the barrel lugs must be elevated, linked-up, or are O.K. as-is. Also see figures 176-177.

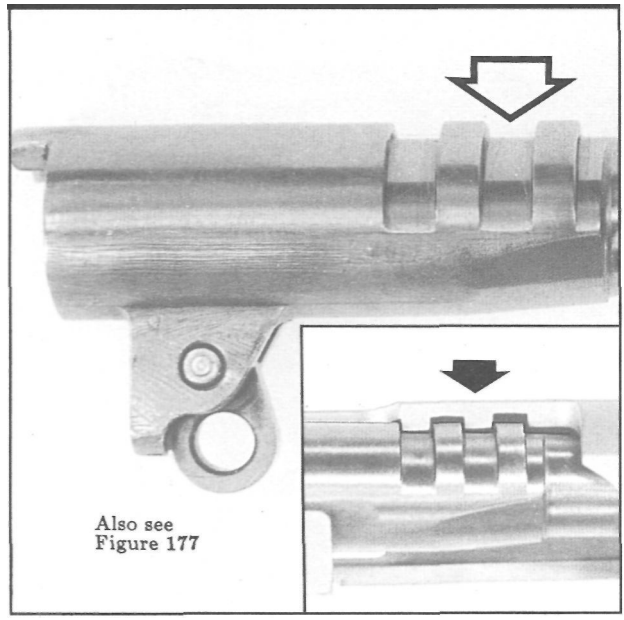


Figure 68- Shows the fast way to approximate and check barrel/slide lug engagement. 1/8" dia. strips of modeling clay are pressed into the lug slots, and compressed to final level by the barrel as it links-up. Measure lug tops down to clay level with a small depth gauge, or caliper bottom. Talc or graphite helps prevent sticking.

Increase Link Length

Standard barrel links measure .278" hole center to center. Standard replacement links raise lug height .003" per step up to .012". National Match type links provide elevation increases of .013", .017", and .021". A shortcoming with linking-up a standard barrel is that the bottom barrel lug is in contact only with the back of the crosspin, and has no extra vertical support. See fig. 69. Also, keep in mind that the original .278" link was not vertically supported either. Vertical bottom lug support is an essential in competition pistols, but in general and service duty use, it's a plus- but not required. At a point, as the link height is raised, barrel top drag and [with some slides] lug striking, may begin. Replace the slide if a .005" slide/barrel lug corner chamfer does not correct any corner striking problem.

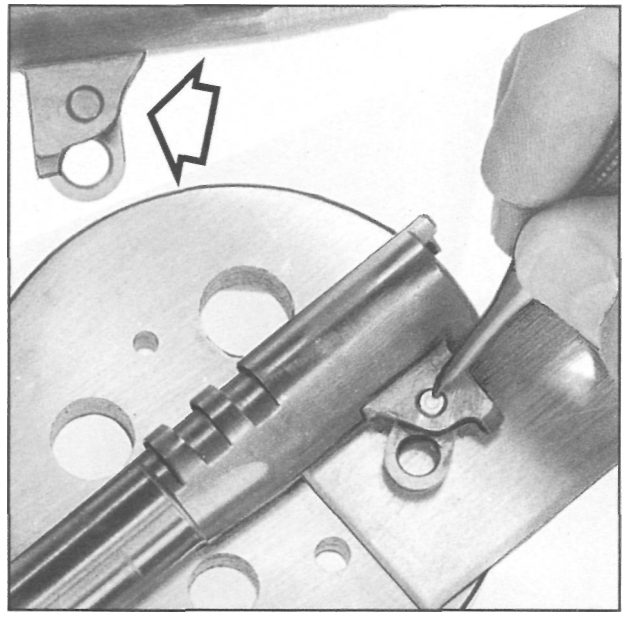


Figure 69- Shows increasing lug engagement by re-linking the barrel to a next longer link size. Replacement links are regularly available in seven basic lengths, allowing the barrel and lugs to be raised from the first step of +.003" to +.021". It may become necessary, at a point, to adjust the bottom barrel lug. [See long link.]

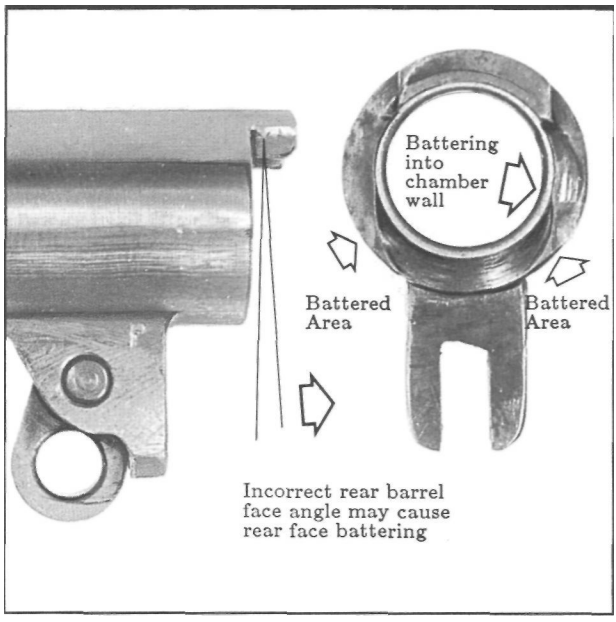


Figure 70- Shows rear barrel face battering on a standard, unthroated M1911 military barrel. When severe, the chamber mouth can be peened and damaged. Battering shown is deeper at the bottom, usually indicating an incorrect barrel face angle. However, always make sure that a high spot in the slide hasn't caused the problem.

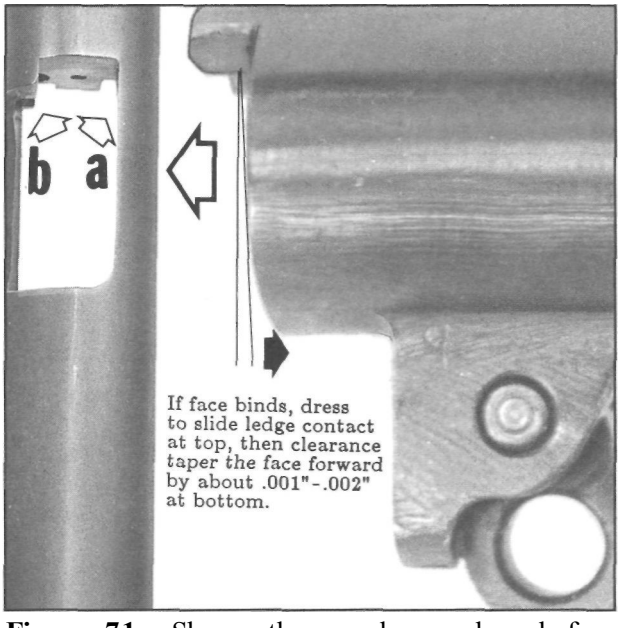


Figure 71- Shows the usual rear barrel face dressing angle. In the fully locked position, the barrel face should be parallel with the slides' ledges. And, it is this position that determines the final face angle. When the barrel has been linked higher, or when battering is found, the rear face angle is usually not correct.

Rear Barrel Face Battering

Well fit barrels usually show only flat contact marks where the rear barrel face slides into position against the slide ledges. Most civilian pistols I have checked measure an average clearance of .008" to .010" at point **"A"** [see figure 71]. The port side, or **"B"**, runs about .001"-.002" looser for extraction clearance. Military pistols are usually looser. Either wrong angles, incorrect clearances, or the combination, can create a slapping or peening effect on barrel faces during cycling.

1. Install the barrel with a loose bushing and check face clearance and angle.
2. If the clearance is not excessive, dress the barrel face slightly. Use a 1/2 x 1/2" fine stone and polish the face from near zero at the hood to about .001" forward at the bottom. This also provides angle improvement where longer barrel links have been installed.
3. If the chamber or throat edges show battering to the extent of being slightly peened, dress carefully - but don't alter throat angle or depth. See ramping and throating section and fig. 71.
4. If throat condition makes it necessary, use a chamber finishing reamer- but do not lengthen the chamber since headspace will be increased. See headspace section.
5. In cases where an extractor dent shows in the port side barrel face, check extractor position and dress the extractor tip back to flush with the slide ledge.

Always Check Headspace

Some gunsmiths brush aside the question of headspace in auto pistols, believing the subject applies only to rifles. But the same rules hold true- safety and accuracy are just as important. Measurements slightly shorter than .898" **["go gauge"]** are not always a short chamber indication. The chamber may be slightly tapered from use of **a** dulled finish reamer. The effect is much the same: chambering is resistive. The taper isn't visible, but is detectable by gauge. Recut these chambers carefully with a new finish reamer. This work requires **"go/no-go"** headspace gauges.

Excess Headspace and Safety

With the very generous .022" longer than **"go"** given by the 45 ACP **"no-go"** gauge [.920"] you might not expect larger headspaces. But this idea vanishes when you gauge a large number of pistols. The **"no-go"** gauge is always used in barrel fitting, but is much too seldom used as part of routine bench check-out. Excess headspace and/or over ramping can bulge or blow cases, venting 17-19,000 psi down the magazine well. And, soft, import brass with hard ball loads makes this almost a sure thing. With luck, only the magazine will be blown out. Otherwise, the grips may be splintered. In the worst of cases, hot combustion gases could ignite and explode the shells in the magazine. This could result from over-ramping alone, but excess headspace vastly multiplies the risk.

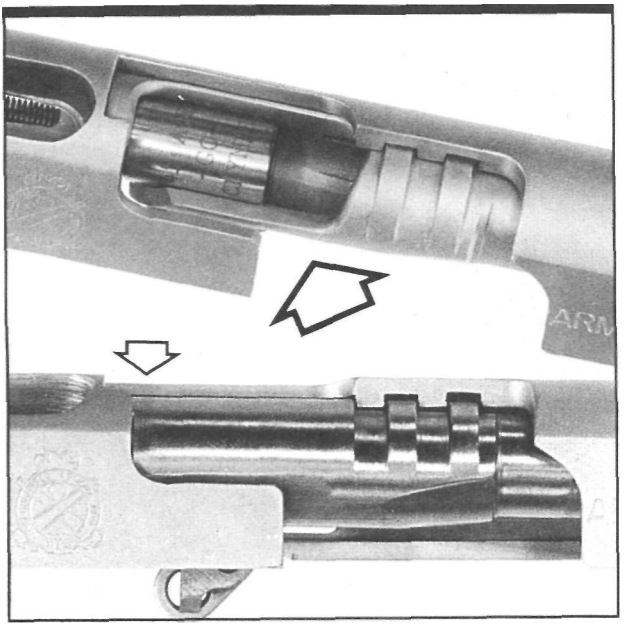


Figure 72- Shows a commercial "go" headspace gauge installed in the chamber. In the .45 ACP, headspace is measured from the case mouth back. The slide must close easily on a "go" gauge, which measures .898" in length, the same as maximum case length. On final fitting, check all replacement barrels with a "go" gauge.

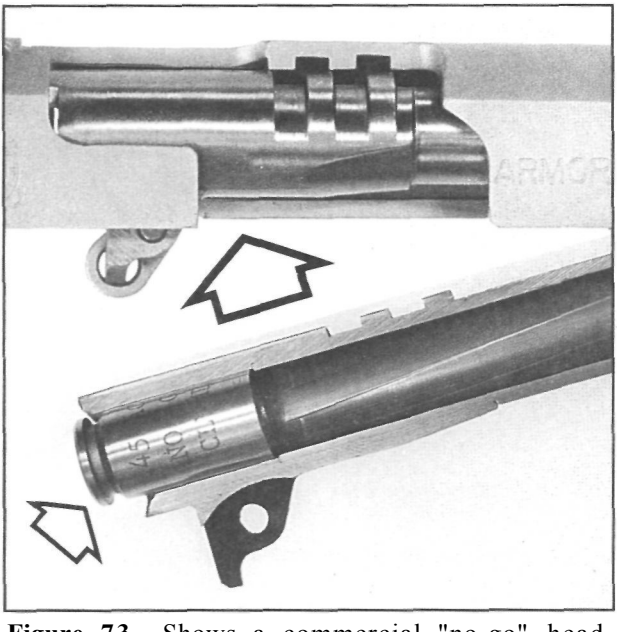


Figure 73- Shows a commercial "no-go" head-space gauge in the chamber. This gauge measures .920", which is .022" longer than "go". Barrel/slide combinations that will close and lock on this gauge have serious problems. The issue here is safety and responsibility. **Don't fail to make this critical test when fitting.**

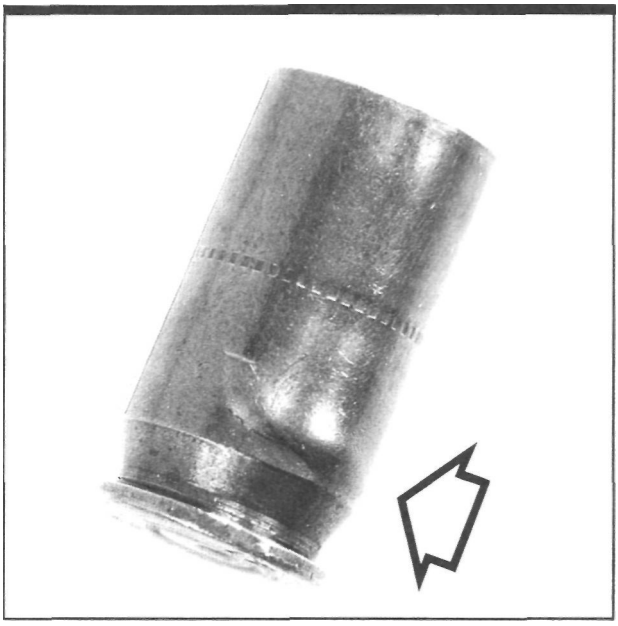


Figure 74- Shows a fired .45 ACP case with a bulged lower wall- **a danger sign.** This was not caused by overloading. In this example, the brass case tried to pressure form downward into an unsupportive barrel ramp area- a classic example of barrel over-ramping. Fortunately, a moderate load and high quality brass was used.

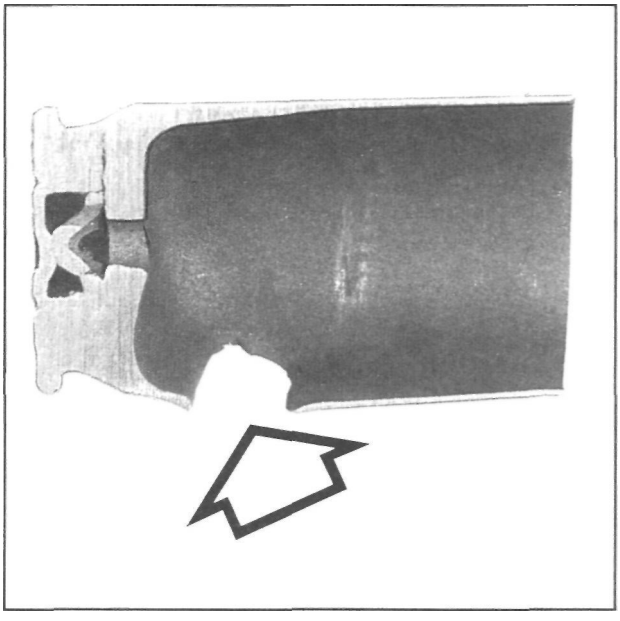


Figure 74A- Shows a blown soft [import] case. The soft brass wall has drawn back toward the pressure vent. The metal insert built into the shooter's Pachmayr grips saved his hand when the magazine blew out. Somehow, the remaining cartridges didn't explode. Primary cause was **headspace**- secondary cause was **over-ramping.**

Examples of Headspace and Over-ramping

The bulge shown in figure 74 was detected during resizing, and was caused by barrel over-ramping, made worse by a long headspace. This pistol would not close on a .920" "no-go" gauge, and measured just at .918" [.020" over "go"]. Ramp point **"A"** was found to be at .122". This means that, by the formula in figures 98 and 99, .122" of brass is exposed ahead of the extractor bevel. That's asking for problems.

In the example shown in figure 74A, **headspace is the primary problem,** although this pistol was also over-ramped. The pistol closed on a "no-go" gauge + .004", and was over-ramped about .017". So, with an average ramp depth of .075", + an over-ramp of .017", + .026" over "go" gauge, [same as "no-go" + .004"] we have .118" of exposed brass ahead of the extractor bevel. While this is slightly less than fig. 74, the forgiveness factor of higher quality brass is missing. It's a miracle that no one was hurt. The .45 auto design is most forgiving, but you can not ask the impossible. Headspace and ramp dimensions must be kept fully within safe limits, **because the following data is not often known:**

1. Just how work-hardened, or soft, is the brass?
2. How thick near the base?
3. In the case of imports, is alloy and heat-treat O.K.?
4. How much brass can be exposed before rupturing?

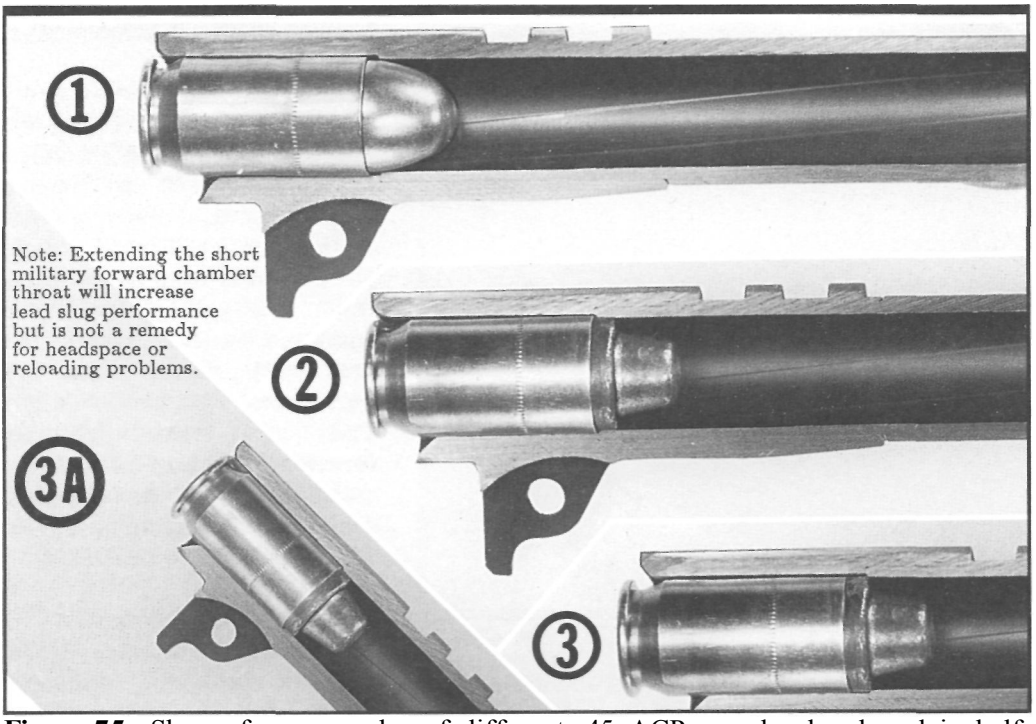


Figure 75- Shows four examples of different .45 ACP rounds chambered in half-sectioned barrels with varying amounts of headspace.

1. The basic excess headspace problem- here the slide closed easily on a "no-go" gauge, and measures .002" over "no-go" [this is .024" past "go"]. Ammunition is standard FMJ ball. What happens is something like this: a worn, or poorly fit extractor receives and loosely holds the shell rim as the round chambers- the round hangs on the extractor, and cannot headspace on its' mouth, since the chamber ledge is .022" to .024" forward. The cartridge is not centered, and is held differently by the extractor on each cycle. The inertial firing pin strikes a slightly different primer anvil location each time, and with different pressure, since the cartridge can move forward somewhat as the pin strikes. This amounts to variable ignition and a variable pressure curve. The bullet uses the remaining chamber as free bore, and skids forward, deforming as it strikes the chamber ledge. Probably, the bullet deforms even more when it is slowed down by sudden contact with the rifling and its' motion is partially translated to rotation.

2. Another problem- In this example, the slide just closes on a "go" gauge. Headspace measures "go" plus .004", or slightly shorter than the average pistol. Due to improper seating/crimping die adjustment, the reloaded soft lead SWC bullet has been seated overly long. During reloading, the bullet's shoulder was slightly over-expanded and deformed in front of the case mouth. However, the cartridge will chamber and allow the slide to close, but the bullet crush fits into the chamber's forward throat, upsetting the bullet and forcing it into the barrel.

3. In this example- Headspace is at **"go"** plus the usual .008" to .010", typical of many civilian pistols. Here, the bullet is seated with about .020" of exposed shoulder in front of the case mouth. Also during seating, the bullet was deformed and expanded to a diameter of about .473" [the same as case diameter]. The combination of an .898" maximum case length- and the added length of the crushed shoulder, makes a cartridge that is .010" too long to chamber correctly and too large in diameter to crush fit into the forward chamber leade or throat.

3A. In this case- Headspace is the same as #3. But, the bullet has been properly seated, without expansion or deformation, [at .012" to .015" exposed shoulder] and the case has been lightly taper crimped. Bullet shoulder diameter remains at .452" and does not interfere with headspace and does not crush against the chamber's leade. It is ready for smooth engagement with the rifling.

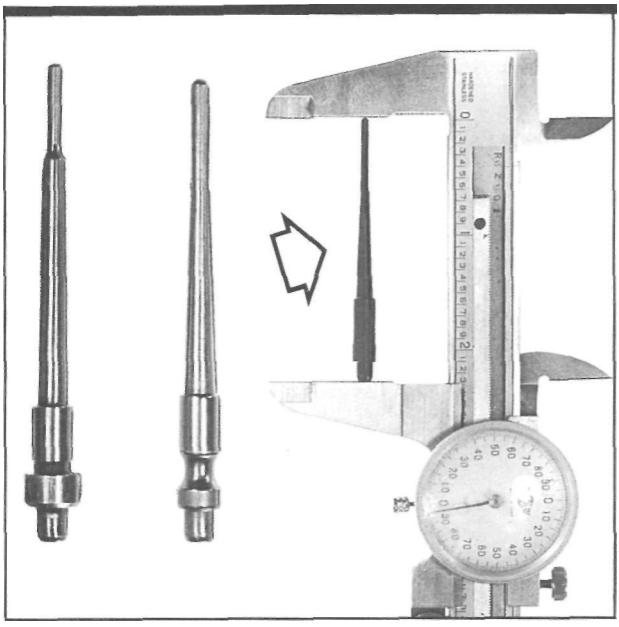


Figure 76- Shows measuring firing pin length with a dial caliper. In theory, inertial firing pins are designed shorter than their recesses, providing extra safety clearance. These firing pins must over-travel to contact the primer. Excess length may be dangerous in the event the pistol is dropped. Always check length.

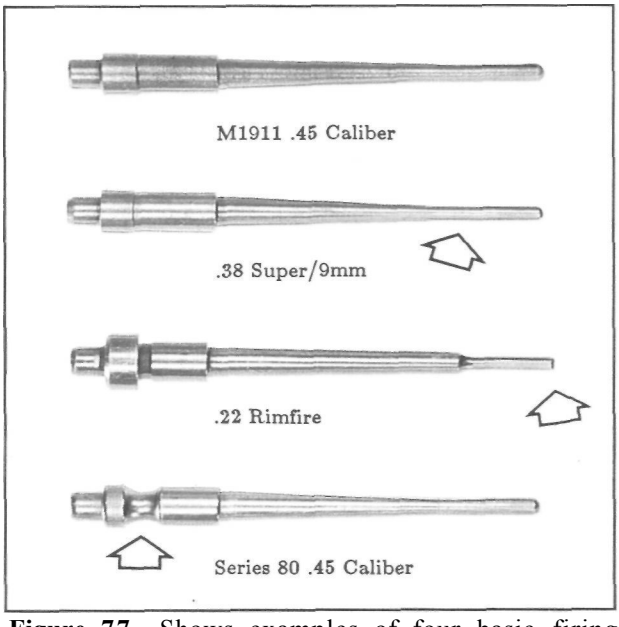


Figure 77- Shows examples of four basic firing pin variations, M1911, to date. You will notice that the 9mm and .38 Super firing pin has a narrower .070-.071" tip, and that the .22 Ace and .22 conversion firing pin is for rimfires. Series 80 firing pins are shorter than earlier models, and are relieved for the stop plunger.

Inspect Firing Pin

In inertial firing pin systems, firing pin length is important and should be checked when refitting. Some differences will be found. For example, standard M1911, A1, through Series 70 firing pins usually measure between 2.290" and 2.296" with the average at 2.295". Replacement pins are sometimes found as long as 2.310", and must be dressed to length before use. In Series 80 production, firing pins are shorter, and usually measure 2.262" to 2.265".

Firing Pin Diameters

The standard tip diameter found on .45 caliber firing pins, including Series 80 production, runs .095" to .096". The .38 Super and 9mm pin measures .070" to .071" at the tip. Watch for the careless substitution of smaller tip diameter firing pins in .45 caliber slides.

Firing Pin Springs

Colt currently catalogs one firing pin spring as standard for all production to date, including the Commander model and the Ace .22 and .22 conversion unit. Factory springs run approximately 1.70" in length, and must not be shortened. A longer and slightly heavier spring would be better and safer than a shorter or otherwise weaker spring. Examine the spring for evidence of end wear or drag marks resulting from diameter enlargement caused by **incompetent mishandling.**

Inspect Firing Pin Stop Plate

In most civilian pistols, firing pin stops are well fit at the factory. Not many will need replacement. A few will not have been properly fit. And others will have been worn from heavy range use. Many more will be parts mixed or substituted, as with military pistols. And you will find a few with undersized or modified replacement parts.

While there is no accepted specification, the rule is that stop plates should be wide enough to engage both slide and extractor without side play. And, the tabs should be thick enough to contact slide and extractor slots without play or the tendency to fall out, even without the firing pin. When stop plates are loose, the extractor head is not held firmly, allowing it to move during operation.

Firing pin bounce at the end of slide travel, made worse by a weak or shortened firing pin spring, can allow a loose stop plate to slip, creating the following problems:

1. The firing pin head bounces out of place and partially releases the plate, which then slides downward. Still being captive, the stop bottom catches on either the hammer or the frame as the slide tries to close.

2. As above, the firing pin bounces out, but its' spring is either so short or weak that the firing pin can't catch the falling stop, and the firing pin and spring fly out. This also tells us that a full strength firing pin spring is important.

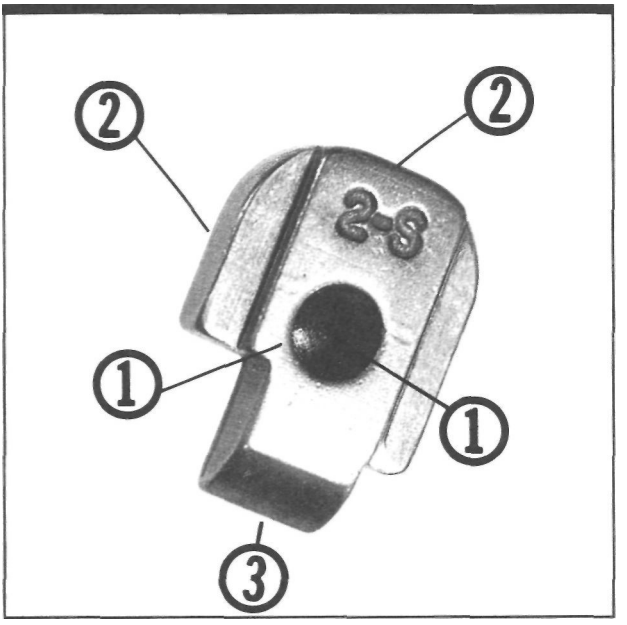


Figure 78- Shows 3 firing pin stop inspection areas. **1.** Look for plate cracks, indenting, or alteration of the firing pin port. **2.** Examine both back and edges for peening, punch marks, or other inexpert attempts at tightening the stop. **3.** Make sure the bottom is not undersized, and is even with the slide's disconnector rail.

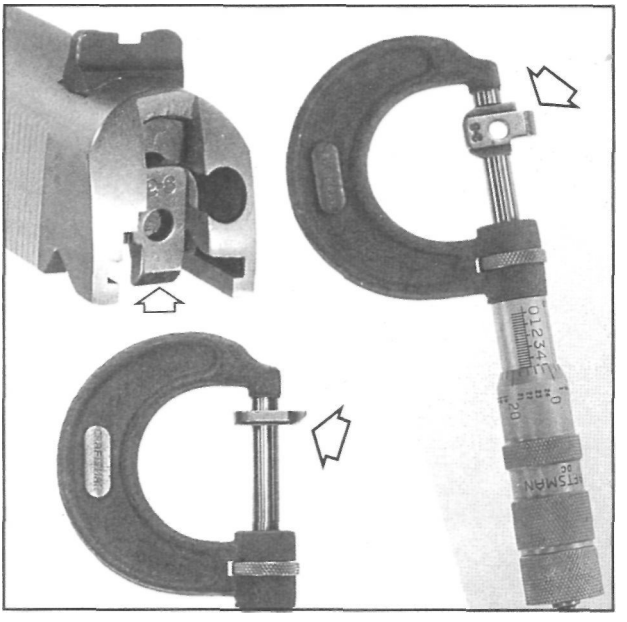


Figure 79- Shows reference measuring a loose firing pin stop plate, after checking its' fit in the slide. Finding tab size, overall plate width, and thickness, is useful in fitting replacement stops. It's wise to keep a good supply of firing pin stops on hand [currently three part numbers listed] since they vary considerably in size.

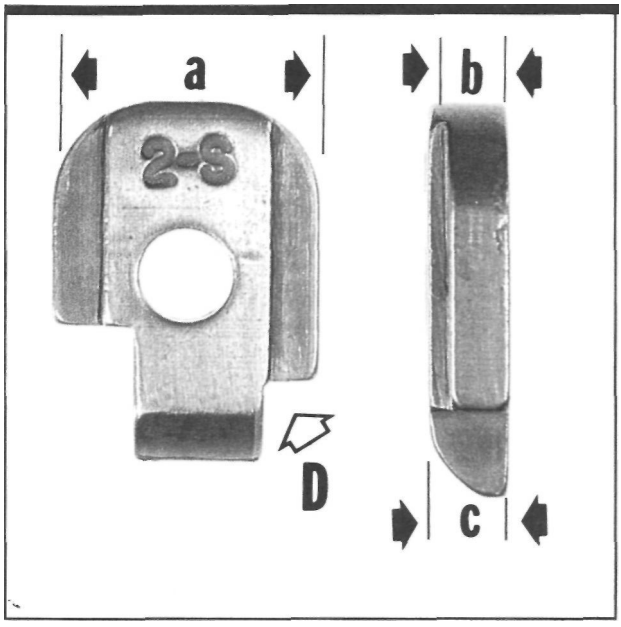


Figure 80- Shows differences in Series 80 firing pin stop plates. Series 80 stops [stamped 1 and 2] will retrofit previous models, but have the added plunger lever clearance notch at **"D"**. Firing pin stop #1 is widest at **a, b,** and **c** dimensions. Stop #2 is closer in size to the original #50219 used through the Series 70's.

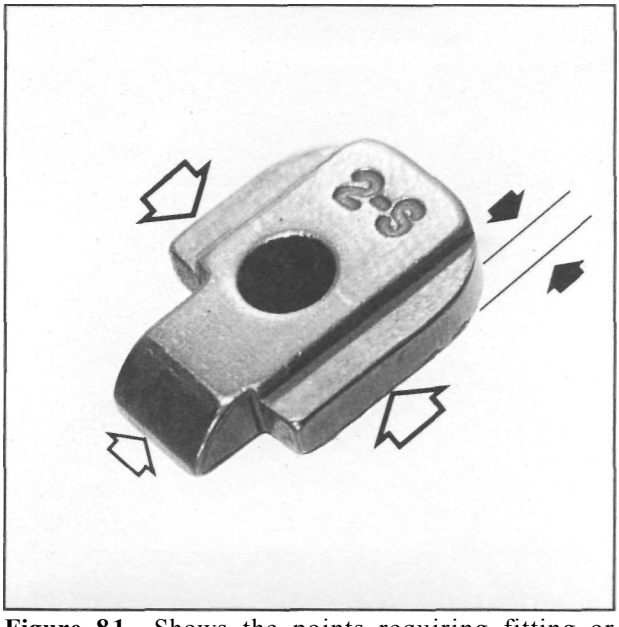


Figure 81- Shows the points requiring fitting or dressing when the stop plate selected for replacement is too tight. In these cases, coat the entire plate with Dykem Blue and carefully stone and clearance visible contact areas, a little at a time. Polish to a light contact fit and do not drive or force into position.

About Firing Pin Stops

At this time, there are three basic part numbers listed for production firing pin stops:

#50219- original type, and fits M1911, M1911A1, and civilian production through 70 Series, and Ace .22 and .22 conversion unit slides.

#567571- originates with the Series 80 production, and has an extra clearance notch on the right side for the plunger lever, and retrofits all earlier models. These stops are all identified with an imprinted number 1 [standard steel] and a 1S [stainless steel]. This part is comparable to the earlier oversized stops used in refitting or rebuilding, and averages .477" across and has tabs .0095" to .010" thick.

#567572- this stop also originated with Series 80 production and has the same extra clearance notch, and will also retrofit all earlier models. These are marked with a number 2, and 2S for stainless steel. No two of these number 2 stops that I have measured are the same. Generally speaking, they are sized closer to the original M1911 type stops, but are just slightly larger.

Other Stop Problems

Occasionally you will find a stop with a too-large or off-center firing pin hole, which allows the bottom of the stop to contact or drag against the top of the hammer. These must be replaced.

Inspect Extractor

Extractors are plentiful and inexpensive, so there is no real need to save one that is anything other than perfect. Replacement extractors vary more than you might think. See figure 82. The careful fitter can turn this to advantage by selecting an extractor suitable for his needs. The slide passage, or tunnel, also varies slightly in both position and diameter. So, ideally, extractor fit should be as folows:

1. The extractor head should fit snugly into the slide tunnel and be firmly retained by the firing pin stop plate so that it cannot move. In this way, it makes little difference what the middle of the extractor does, as long as hook tension is correct.
2. What is important is that the cartridge rim fits into the extractor hook and that the right amount of pressure or tension is exerted on the rim.
3. There must be sufficient hook tension to hold standard ball rounds with about 3 1/2 to 4 1/2 lbs. of rim pressure and lighter wadcutters at about 3 1/2 to 4 lbs. See figure 83.
4. Also, the front edge of the hook must not interfere with, or climb, the rim relief bevel. See figure 84.
5. The inside bottom edge of the hook slot must be angled and then polished in order to cam the rim into position without excess pressure or resistance. See figure 85.
6. To provide engagement and extraction relief, the bottom corner of the hook must be dressed. See fig. 85.

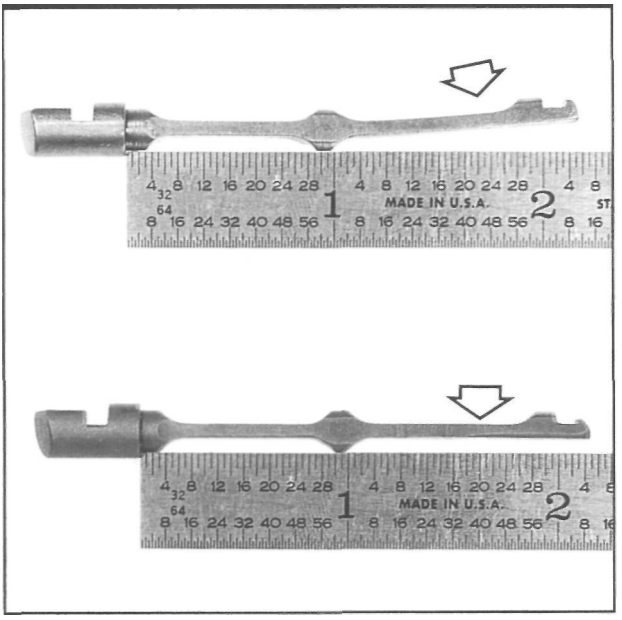


Figure 82- Shows two examples of finished extractors from an independent manufacturer. In an order of fifty, no two were the same. When ordering and replacing extractors on a one time basis, there is a tendency to install the new part "as-is", on the reasoning that, since it's a new part, it won't likely need fitting. Not so.

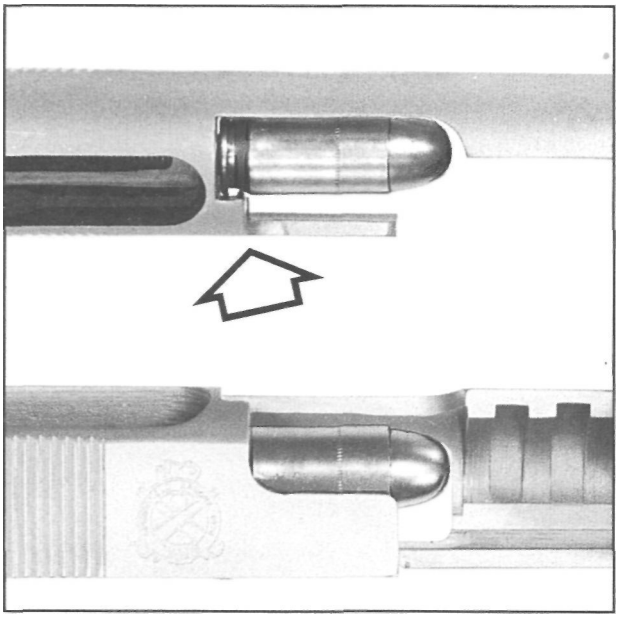


Figure 83- Shows a top and side cutaway view of a ball round being held in the slide by about 3 1/2 to 4 1/2 lbs. of extractor pressure on the cartridge rim. Without enough rim pressure, or tension, extraction can be erratic. And, with an excess amount, the rim can't cam upward into proper position without friction or hesitation.

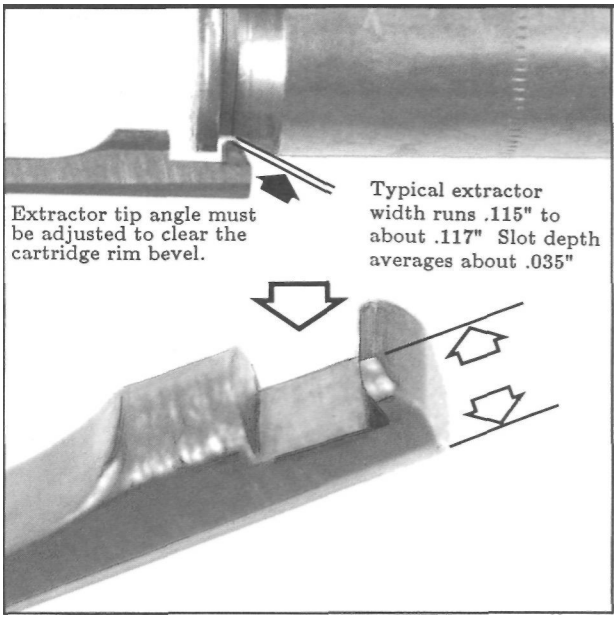


Figure 84- Shows the correct relief angle at the front of the extractor hook. The tip must not apply pressure inside the shell recess- correctly, tension is exerted on the rim by the extractor slot wall. Most finished extractors will measure .115" to .117" as shown above, with average slot depth at about .035" deeper than the hook tip.

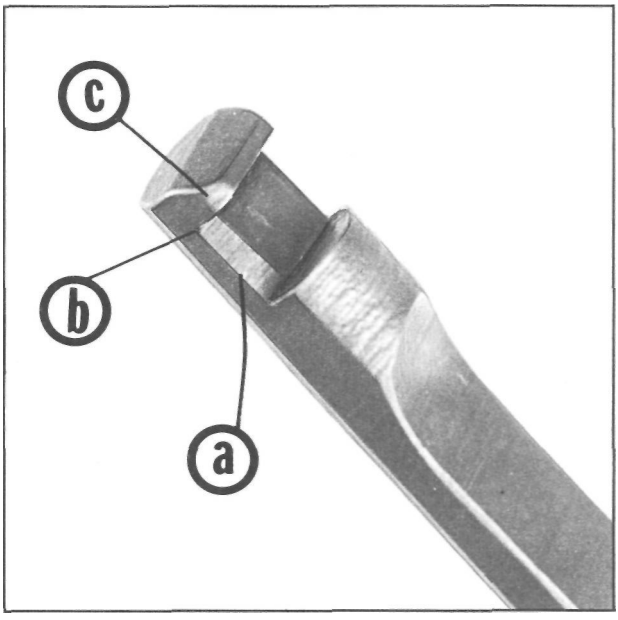


Figure 85- Shows the three bottom extractor areas requiring fitting and polishing. Cartridge pick-up is made easier by adding a 45 degree camming, or ramping, surface at slot position **"A"**. And forward relief at **"B"** helps start rims into the slot, while relief at **"C"** provides empty shell tip-up and rim clearance during ejection.

Check Extractor Hook and Forward Clearance

Slide dimensions vary, so an extractor can't be fixture fit, and must be adjusted and final fit on its' own slide.

1. First test for rim tension, make certain that pressure is not being applied by the pointed tip of the hook.
2. If tension is incorrectly applied by early extractor tip engagement in the rim recess, dress the tip. Tension should be exerted only by pressure to the cartridge rim.
3. If incorrect tension is caused by extractor bend, carefully adjust bend until correct tension is reached.
4. If incorrect tension is caused by the front of the extractor trying to ramp or climb the bevel in front of the cartridge rim, adjust the front angle [see figure 84].
5. If rim tension is not enough to hold the cartridge in the slide, as shown in figure 83, carefully reshape the extractor by increasing bend from the mid-alignment guide forward. Then recheck steps 1 through 5.

Extractor Bottom Relief

Once the proper rim tension, forward relief, and clearance have been set, then fit the bottom of the extractor. See figure 85. Most important of the last three fitting steps is cutting a rim ramping bevel at the bottom of the extractor notch. This will already be done on some extractors, but not on most. Once all fitting steps are done, lightly polish the face and bottom corner of the extractor.

Final Slide Detailing

Before the extractor, firing pin, and firing pin stop **are** installed, a number of small dressing and detailing steps should be done. See figures 86 and 87.

Firing Pin and Extractor Reassembly

1. Recheck and dress the edges of the firing pin and extractor tunnels. Make sure that the passages are clean and free of polishing grit.
2. With Series 80 slides, also clean, dress, and deburr the area around the firing pin lock plunger recess, and be sure there are no burrs or rough edges inside where the plunger recess and tunnels cross connect.
3. After inspecting both pin and spring, assemble the firing pin and spring, then check for spring bind in the tunnel.
4. Install the extractor and the firing pin stop plate.

Series 80 Firing Pin and Extractor Reassembly

Series 80 models require a slightly different assembly procedure.

1. First install the extractor, and position it at the plunger release point. Then, install the firing pin lock spring and plunger. Retain the plunger by pushing the extractor head forward.
2. Then, depress and hold the firing pin lock plunger.
3. With the plunger at the clearance point, install the firing pin, spring, and firing pin stop plate.

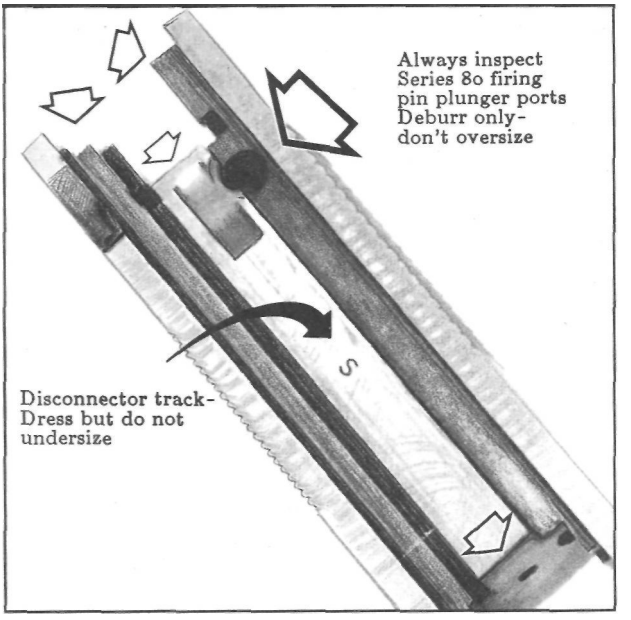


Figure 86- Shows final inside slide detailing points. Arrows show where burrs, nicks, and raised edges should be dressed and eliminated before the slide assembly is installed on the frame. When fitting, there is a tendency to skip these small details, but this professional touch makes slide operation much smoother.

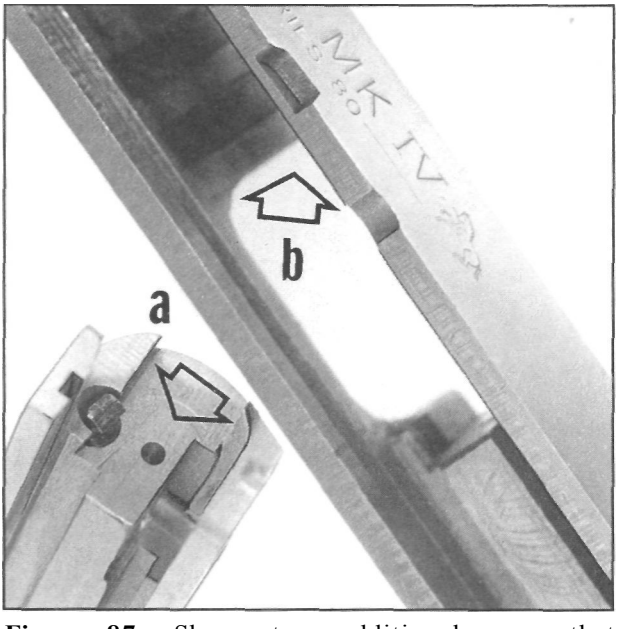


Figure 87- Shows two additional areas that sometimes require dressing and that should be checked before the slide assembly is considered complete. Check for raised edges or burrs at location **"A"** and slide stop flanging at **"B"**. In the event that flanging exists, the slide stop must be checked before final assembly.

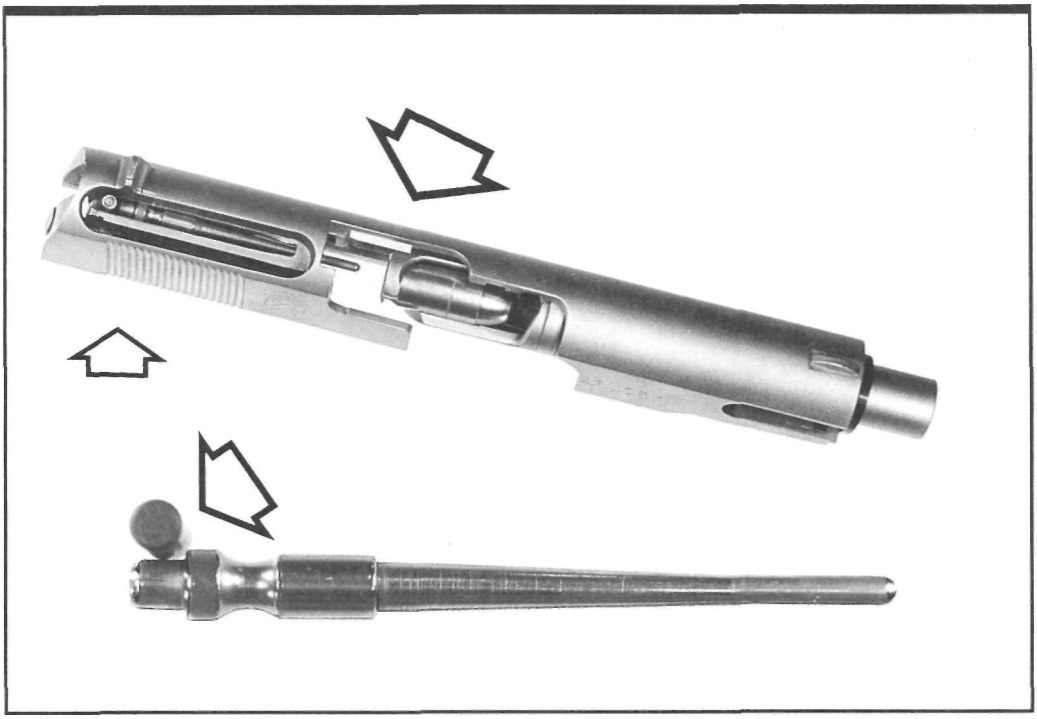


Figure 88- Shows a cutaway view exposing a Series 80 firing pin which has been locked in the full forward position. This is not easy to do, and can be done only by first depressing the firing pin lock plunger to release the firing pin. Then the firing pin must be pushed all the way forward with a punch and held at full spring compression while the stop plunger is released. This screwy combination locks the firing pin in an otherwise impossible position with about 5/32" of its' tip ahead of the recoil face. The mispositioning of both firing pin and plunger is shown separately below.

This is a safety warning about the safety features in a Series 80 slide.... and how, once again, persevering fools have overcome true engineering genius:

There were several versions of this story going around the industy about a year or so ago, you've probably heard it. It's the one about the character who inventedand very scientifically tested the workability of the above combination by killing his wife's new side-by-side refrigerator.

Now, thinking about this, you will realize that the extended firing pin would block a cartridge in the magazine, making it impossible to chamber a round from the magazine. So, to get around this small technical problem, this ingenious fellow had to place a live round in the chamber first, and then drop the slide.

Although by now I have heard two variations on the same story, I can tell you first hand that I purchased the pistol mentioned above at a give-away price. The storyteller said he was faced with either divorce or selling the gun. Throughout the conversation, he maintained the pistol was defective, even while showing me just how he did it. Of course the pistol was not defective. And, except for the scratches around the firing pin lock plunger, where the ex-owner fumbled with it, there was no evidence the gun was not in perfect condition.

Now, this is the stuff law suits are made of. Had this fool harmed himself or another, it would not be a refrigerator story. So I caution you to check all safety systems whenever you handle a customer's firearm or perform even the simplest cleaning or gunsmithing job. And never work on any firearm having an altered or removed safety feature. If you inspect only, and do not charge for the inspection, protect yourself by marking the invoice "Not Safe To Fire" and keeping a record including the date, your notes, and comments to the customer.

Inspect Slide Stop/Crosspin

1. Closely inspect the slide stop for signs of wear, bend, or undersizing, particularly in the area where the barrel link and bottom lugs ride at the center of the crosspin.
2. Measure the crosspin at both ends, and in the middle where the link and barrel lugs rest. Most new crosspins measure just at .200". And, a few will run just a tad over.
3. In general or service duty use, the slide stop must be replaced if crosspin undersizing in the link and lug bearing area is .196", or less.
4. For competition use, or when maximum accuracy is required, select larger stops, and replace if evidence of any undersizing is found.

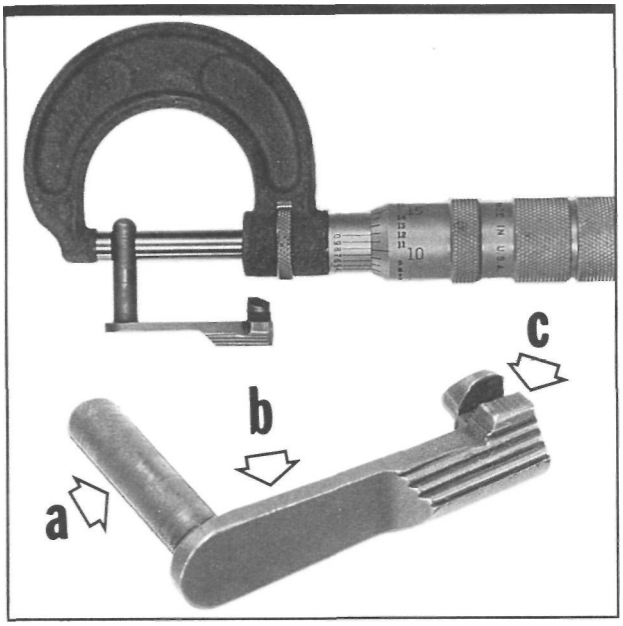


Figure 89- Shows measuring the diameter of the slide stop crosspin at the link bearing point. Below, slide stop inspection points are shown: **"A"** shows the link wear point at the center of the crosspin, **"B"** shows where to look for bend resulting from attempts to pry off the stop, and **"C"** shows the slide stop engagement corner.

Check Slide Stop/Frame Fit

1. Make sure the stop lever is not bent, and fits fully down, and against the frame.
2. Measure clearance where the top edge of the slide stop meets the bottom of the slide. Clearance at this point should run between .015" and .020" with the clip removed.
3. To prevent false locking, and/or stop hesitation at the disassembly notch in the slide, very slightly radius the upper engagement corner of the stop lever. Don't overcut.
4. In cases where premature slide locking persists [locks back at the second to last round] cut a .010" deep, oval, small **horizontal** dimple into the rear face of the stop, just where the plunger rests. For this job, mill or use a Dremel tool with a 1/16" cutter.

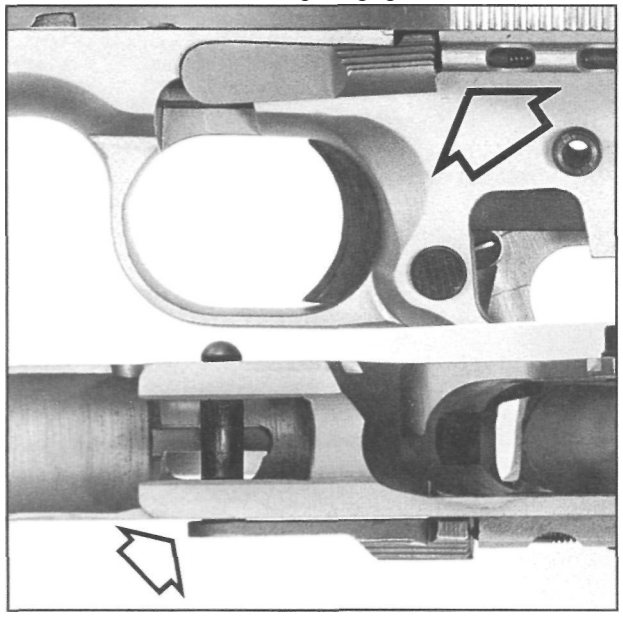


Figure 90- Shows checking slide stop fit in the frame and where to check slide stop clearance. To prevent excess drag and the main cause of false lock-back, make sure the top of the stop clears the bottom of the slide by .015" to .020" [magazine out]. Radius the top locking corner to eliminate catching at the disassembly notch.

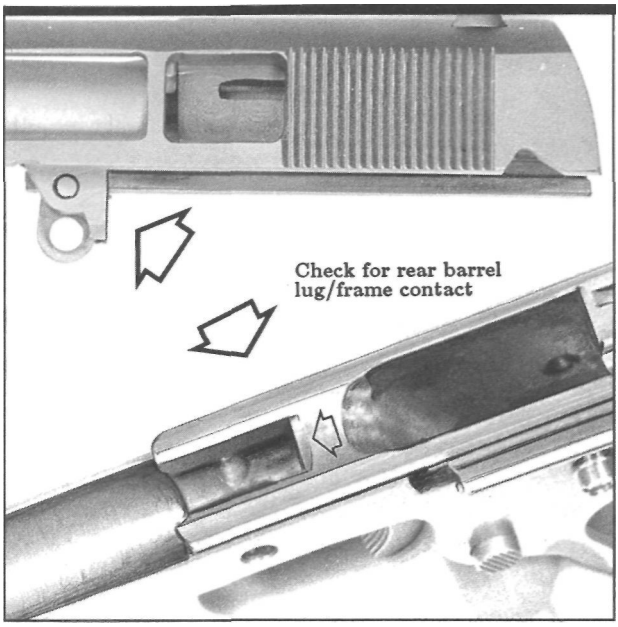


Figure 91- Shows the slide assembly completed except for the link-down check, [also called a long link check]. When longer barrel links have been used to increase engagement of the upper lugs, the back of the bottom barrel lug may contact before the barrel can fully link down to position in the frame's barrel recess, or bed.

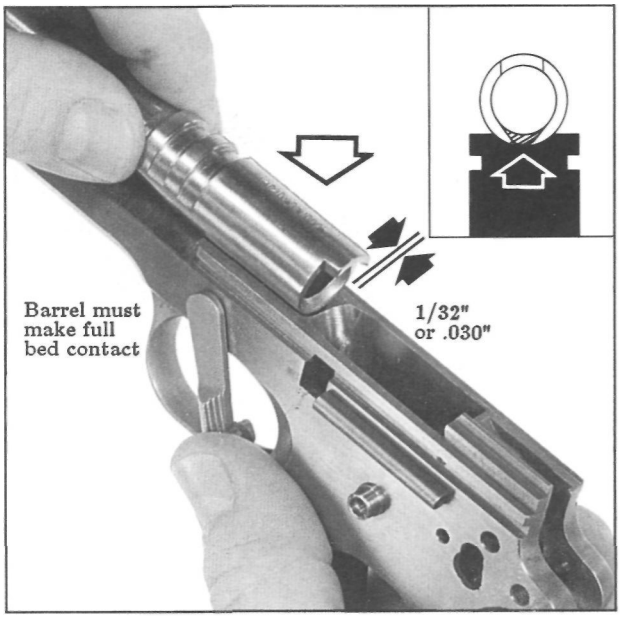


Figure 92- Shows the barrel being link-down tested in the frame. The barrel must come to rest against the top of the frame, with full bed contact. A space of about 1/32" [.030" or more] should remain between the rear position of the barrel ramp and the top front edge of the frame ramp. Slightly over 1/32" is better than less.

Long Link and Link-Down

Before the slide assembly can be finally mated to its' frame, the assembled barrel and link must be tested for correctness of position when linked-down into the ready to load position. See figure 92. This is very important when upper lug engagement has been increased and/or maximized by substitution of a longer link than the .278" standard link, as discussed in figures 68 and 69. While it's true that mating can be done any time before final frame and slide assembly, this is the logical time for the job.

Mating Check

Jam potential is increased when the barrel ramp is too far to the rear and connects, or overhangs, the frame's ramp. In this case, bullet tips may catch or shave on the edge of the barrel ramp.

1. Place the barrel in the frame as shown in figure 92.
2. Install the crosspin in the frame, picking up the link as it would be when assembled.
3. Slowly link the barrel down, watching for rear lug contact with the frame as the barrel begins to bed.
4. If the barrel links down into frame position without lug contact, and about 1/32" of the frame's barrel bed remains between the barrel and where the frame ramp begins, the barrel, link, and frame are properly mated.

But, if link-down is stopped, incomplete, or less than 1/32" [about .030"] of the frame's barrel bed is exposed, mating work is required. See figures 93 through 98.

Check Lug/Frame Contact

Determine which part of the barrel lug is making primary frame contact by inserting 3/8" strips of carbon paper between the lug, lug radius, and the frame. In this way, the primary and secondary contact areas, as shown in figure 93, can be detected and clearanced. Since the tendency is to remove too much material, sometimes even from the wrong surface, always start work by dressing contact indications at the top corner of the frame bed and the lug radius. Then, when done, proceed downward to the back of the bottom lug.

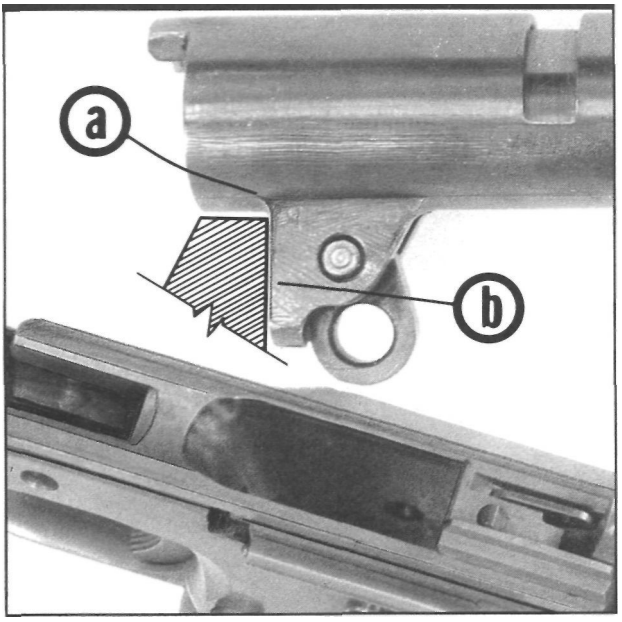


Figure 93- Shows the two usual lug and frame contact points resulting from increased link length. Since frame and barrel lug dimensions vary, there is no way to predict just what link length will produce lug contact. Sometimes, the lug/barrel radius will contact first at location **"A"**, but usually contact will be at location **"B"**.

Bottom Lug Rear Adjustment

The use of 3/8" carbon paper strips will also show frame contact areas at the back of the bottom barrel lug.

1. Mill or carefully file about .002" off the rear face of the bottom lug, keeping the surface completely square and parallel with the original back lug surface.
2. Reinstall barrel and link on the crosspin, and recheck for contact with a carbon paper strip, as before.
3. Remove .002" at a time, until the barrel just links down into full contact with the frame bed. The rear lug face should not be in contact with the frame at this point.

Warning: Do not remove any more material than necessary. And, do not attempt to lower the level of the frame bed- **altering the bed will destroy the frame.**

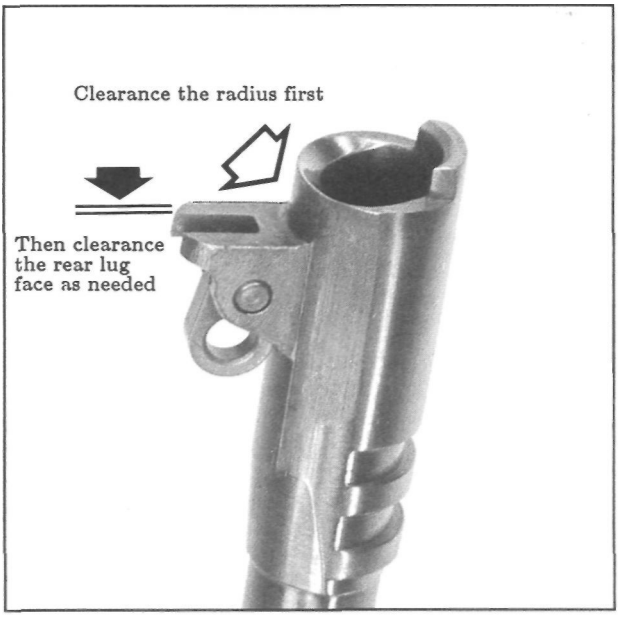


Figure 94- Shows the two bottom barrel lug dressing areas. In cases where the lug/barrel radius makes contact with the frame first, be sure that the leading edge of the frame's barrel bed has been 45 degree chamfered, then square the radius for additional clearance. Otherwise, slightly reduce the back bottom lug surface.

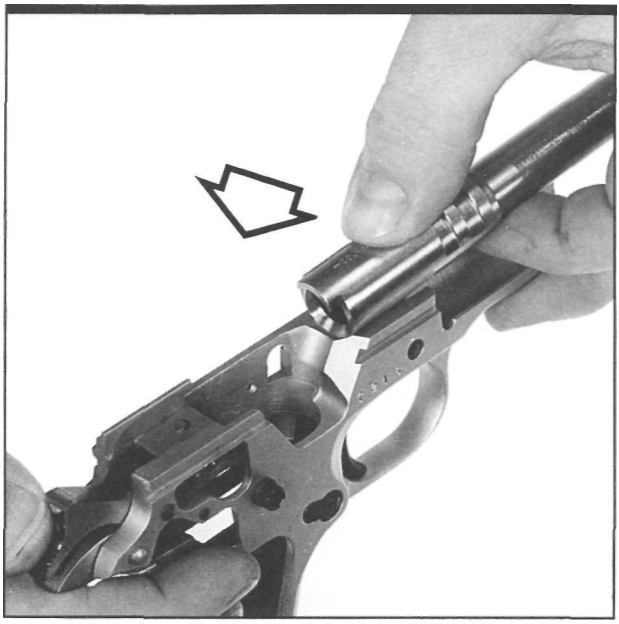


Figure 95- Shows checking the new linked-down, full contact barrel position against the frame's barrel bed. Distance between barrel and frame ramps will have changed as a result of bottom barrel lug trimming and set-back. If necessary, adjust the rear edge of the barrel ramp back to about 1/32". See figure 96.

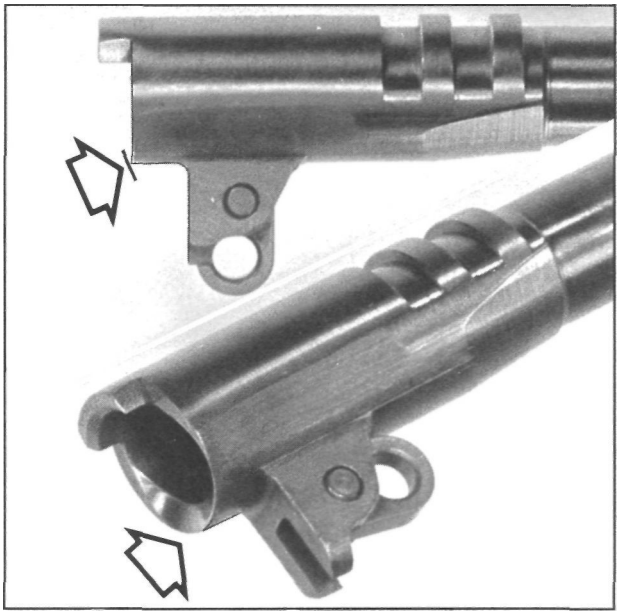


Figure 96- Shows the approximate barrel face dressing angle necessary when the barrel ramp must be moved slightly forward to provide clearance between barrel and frame ramps. It is not adviseable to move or clearance the entire barrel face, since the upper surface is needed when the barrel is in the locked position.

Recheck Barrel Ramp Position

With bottom lug trimming work completed, the barrel can now swing down on the much longer link, and into full contact with the frame's barrel bed surface. But, the barrel ramp will be found to have shifted slightly to the rear. The new location can run from as little as .002" to over .020" set-back.

1. Clearance trimming of the lower barrel face and barrel ramp is not necessary when the space, or gap, remaining between the frame and barrel ramps measures at least .025" or greater in width.
2. If the distance remaining is less than .025", the lower barrel face and ramp should be dressed forward to the desired 1/32" gap, or about .030". See figure 96.

Clearance Trim the Bottom Barrel Face

This clearance step is needed when remaining gap is less than .025".

1. Do not remove material from the entire rear barrel face when providing ramp clearance.
2. Only the lower approx. 1/8" of the barrel face requires trimming. This is done at a very shallow angle. See figure 96.
3. Remove lower barrel face material carefully, a little at a time, until the correct 1/32" frame bed/ramp gap measurement is reached.
4. Once the rear barrel face has been adjusted, the barrel ramp can be refinished.

Minor Barrel Ramp Correction

When the bottom barrel face has been adjusted forward after bottom lug work and installation of a longer barrel link, some ramp polishing is usually needed. In certain instances, surface adjustment of the ramp face is necessary. See figure 97. Just how much adjustment is needed depends on how much of the surface was removed from the back of the barrel, and where point **"A"** at the top edge of the ramp is now located.

About Ramp Adjustment

The most important rule in ramping is that, for safety reasons, ramping must not be excessive. Brass cartridge cases must be correctly supported under firing pressure. A second point is that the forward location of the top of the ramp [point "A"] is more important than the exact angle of the barrel ramp. The safety restriction is that point "A" cannot be moved too far forward.

Being .075" deep, the usual factory .45 caliber barrel ramp exposes .075" of the shell case just ahead of the extractor bevel. This .075" measurement is added to by the amount of extra head space a given barrel and slide combination has over the .898" "go" gauge. See fig. 98.

For example, if a barrel and slide measure at "go" gauge plus .010", then the total amount of shell case exposed ahead of the extractor bevel would be .075"+.010"=.085".

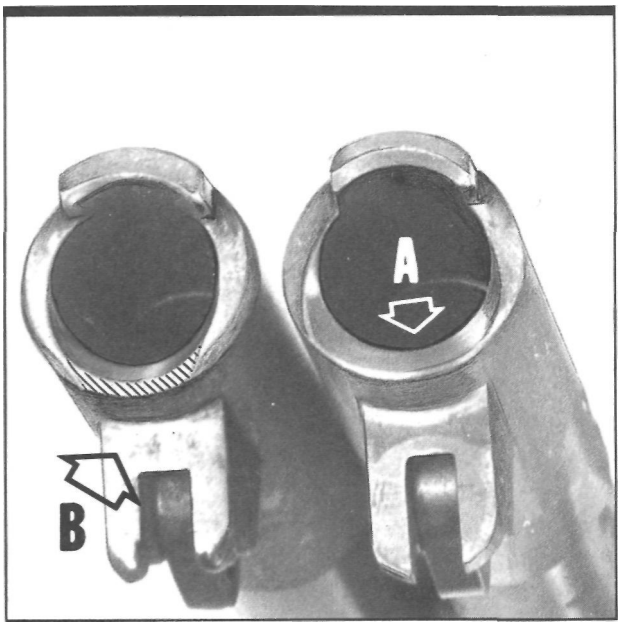


Figure 97- Shows the bottom barrel ramp area at **"B"**, after the usual amount of dressing. In cases where the ledge created by moving the bottom of the ramp forward is less than .010", only light ramp polishing may be necessary, followed by a small and very careful rounding off at **"A".** Don't radius **"A"** more than .001".

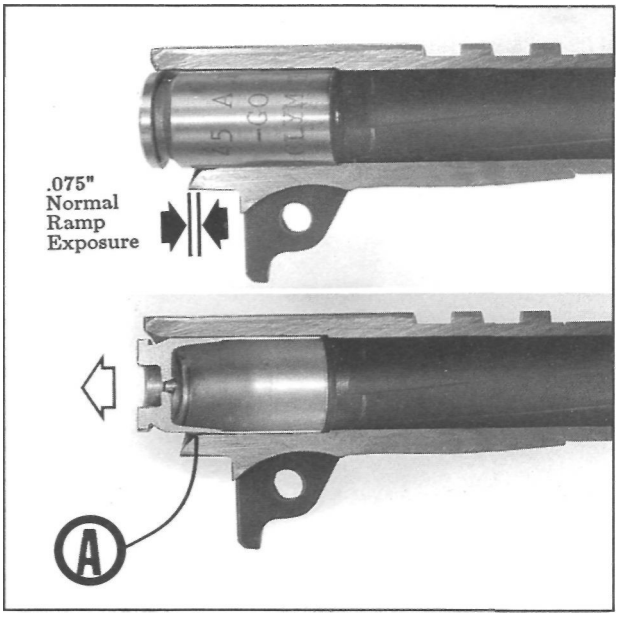


Figure 98- Shows bottom shell case exposure increased as it would be under firing pressure. The case head is pushed back against the recoil face, adding to the .075" normal ramp exposure just ahead of the extractor bevel in the case. **Caution: Cartridge case exposure begins at point "A", which makes this location critical.**

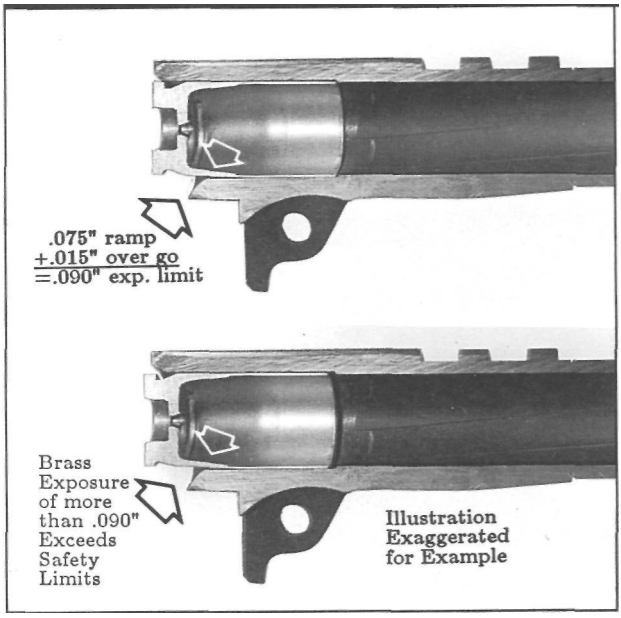


Figure 99- Shows brass exposure limits based on the formula of "go" plus .015" additional headspace when the slide and barrel are fully locked. If normal ramp exposure is .075" and headspace is "go" +.015", by this system, the amount of shell case exposed in front of the extractor bevel would be a maximum of .090".

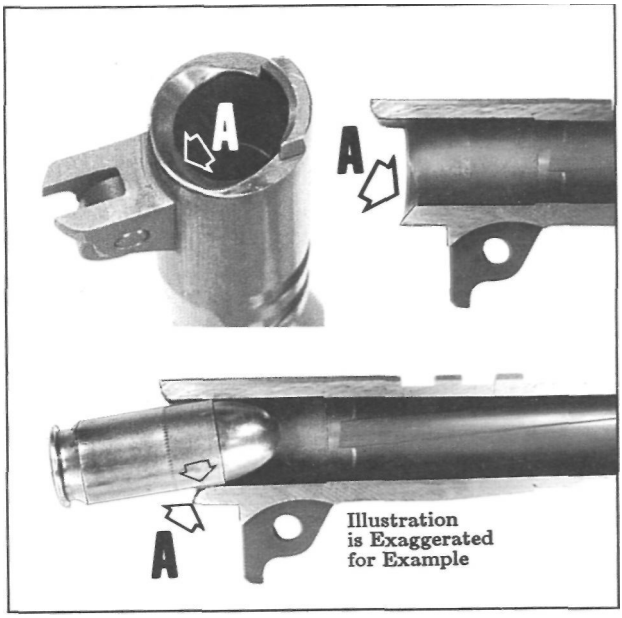


Figure 100- Shows the chamber mouth with its' sharp inside corner removed at **"A"** to provide "break-over" clearance for easier cartridge chambering. Break-over is the precise point at which the cartridge straightens in the chamber. Also, the inside barrel hood is shown chamfered at 45 degrees for cartridge pick-up clearance.

Ramping Safety

Carrying the example from the previous page just a step further, consider that the amount of headspace past "go" gauge measures .020". This is still not quite at the "no-go" point. Let's say that someone has recut the barrel ramp forward about 1/32", also moving point "A" the same 1/32" forward, or about .030" for round figures' sake. As you can see, .075 + .020 + .030 =.125". What this now amounts to is 1/8" of brass fully exposed ahead of the extractor bevel. As can be seen in cross section, this is asking thinner, unsupported brass to do a lot.

Safety Formula

Although this formula has been called conservative, I suggest making it a rule not to locate point "A" any further forward than .090" as determined by the formula of "go" gauge plus a maximum additional headspace of .015". [Measured by feeler gauge.] Standard ramp depth of .075" added to .015" equals .090".

Polish Chamber Mouth

Now that all other ramp adjusting and polishing has been done, final polish the top corner of the chamber mouth [point "A"] using a fine Craytex abrasive rod. In cases where point "A" is at the .090" limit, remove no more than about .001" of the corner. If well under the limit, reduce the corner about .002" and polish until the surface is very smooth.

Check Ejector

Frequently, you will find that replacement ejectors are improperly fit in military and civilian .45's. These are very easily discovered since they usually stand a bit taller on the frame, show space at the bottom of the ejector, or will be loose and wobbly, and usually have a poorly fit pin. Incorrectly slotted mounting studs and undersized pins are also commonly found.

1. Visually inspect ejector to frame fit.
2. Test by trying to move the ejector by hand. It should not move.
3. Check for straightness and hammer clearance.
4. Check the retaining pin. It should be snug and slightly below flush in the frame.

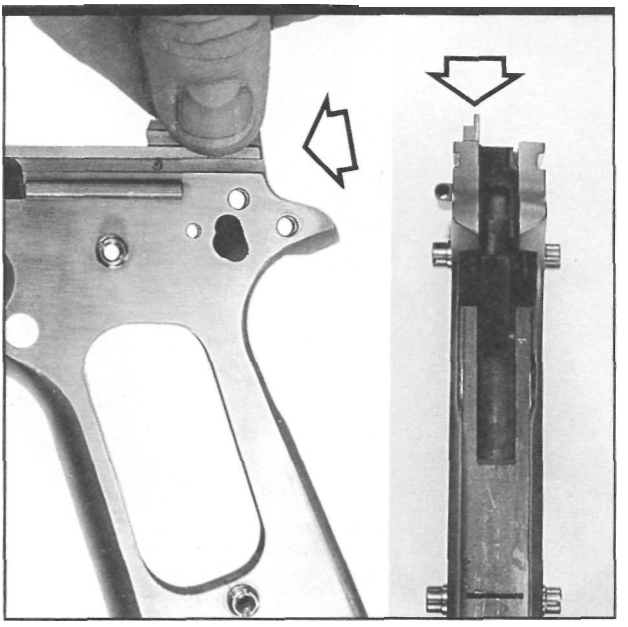


Figure 101- Shows inspecting the ejector for straightness and proper fit on the frame. The ejector body should rest squarely on top of the frame without space between it and the frame, and without side play or any detectable up or down movement. The retaining pin should be just slightly below flush on either side.

Remove Ejector

An ejector that is damaged, crooked, stands tall, or is loose, must be removed and either refit or replaced.

1. Position the frame on a bench block as shown.
2. Drive the pin out from the left with a 1/16" punch.
3. Secure the ejector body between soft vise jaws as shown in figure 102.
4. Draw the frame off the two ejector mounting studs.

Warning: Use caution when removing an ejector. In the event that the ejector stud was improperly prepared and/or the pin oversized, the stud can break off inside the frame below the retaining pin hole. If resistant, apply a few drops of oil and work the studs carefully out.

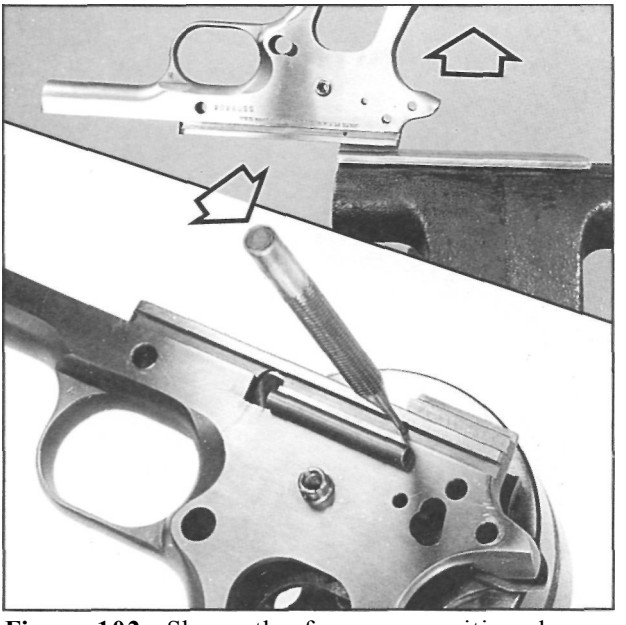


Figure 102- Shows the frame prepositioned on a bench block, set up for removal of the ejector retaining pin. The pin is punched out from left to right. Just above, the ejector is shown secured between soft brass vise jaws. Now the frame is ready to be carefully lifted straight up and off the ejector's mounting studs.

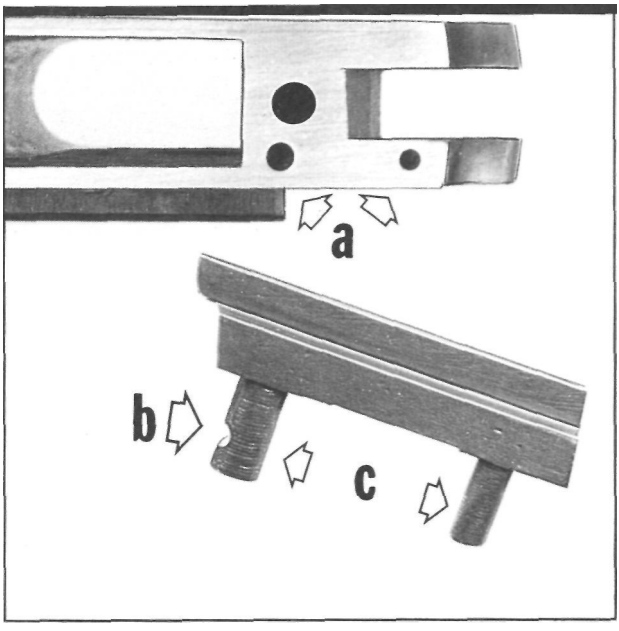


Figure 103- Shows the three frame and ejector areas which must be pre-fit before installing a new or repaired ejector: **"A"** shows the frame's ejector stud tunnels which require cleaning and deburring; **"B"** shows the ejector retaining pin notch; and at **"C"**, the mounting studs are shown. Both studs require trimming to length.

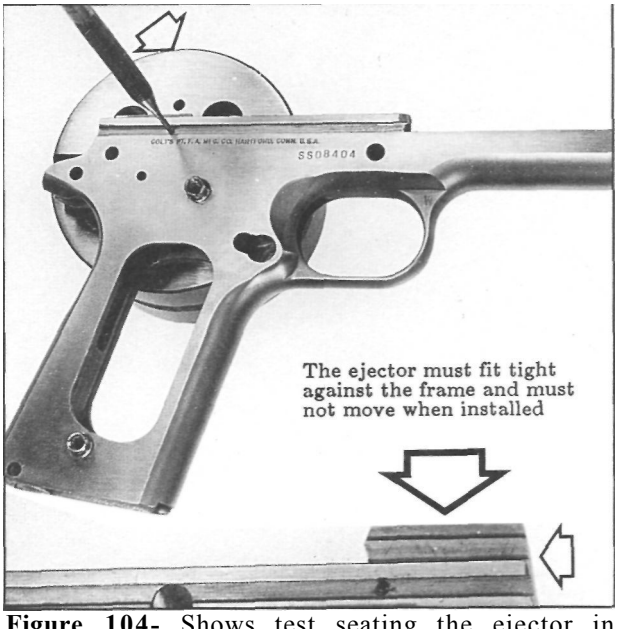


Figure 104- Shows test seating the ejector in the frame to make sure the mounting studs fit and that the body rests completely against the frame. The retaining pin notch must align with its' hole in the frame. Above, the left side of the frame is on the bench block as the ejector retaining pin is driven in from right to left.

Fit New Ejector

When a standard ejector retaining pin is too loose and no longer fits the frame, pick out a length of pin stock that fits the pin hole just to a snug finger tight fit. Then, trim the pin to about .020" shorter than frame width.

1. Measure ejector mounting stud length against frame depth. See figure 103.
2. Then, trim the mounting studs until they just clear when bottomed in the frame.
3. Using an undersized pin as a scribe, mark the crosspin location on the forward stud.
4. Cut the crosspin slot in the front mounting stud in agreement with the frame, but with the bottom of the slot just a tad high, to apply tension to the retaining pin as it is driven into place.

Note: Sometimes, replacement ejectors are not pre-marked or slotted for the retaining crosspin.

Install Ejector

1. With a fine stone, deburr the sides and bottom edges of the ejector mounting studs.
2. Then clean and deburr the frame tunnels, but do not oversize the diameter.
3. Trial fit the ejector, making sure that it fully bottoms against the frame.
4. Insert the retaining pin and then drive it in from the right side. See figure 104.
5. If the bottom of the crosspin slot runs slightly high and is too resistive, lightly tap the top of the ejector with a brass hammer.

Check Ejector Clearance

If ejector clearance was not checked during frame and slide inspection earlier, or if the slide or ejector has been replaced, clearance must be checked now. See fig. 105.

1. Check for drag or contact by installing the slide and moving it back and forth over the ejector. Then, push down firmly and repeat.
2. Stone contact areas until daylight is visible between the top of the ejector body and the inside of the slide.
3. Temporarily install the hammer and hammer pin and check side clearance.
4. Stone the inside of the ejector at a slight taper, until any hammer contact or drag has been eliminated.

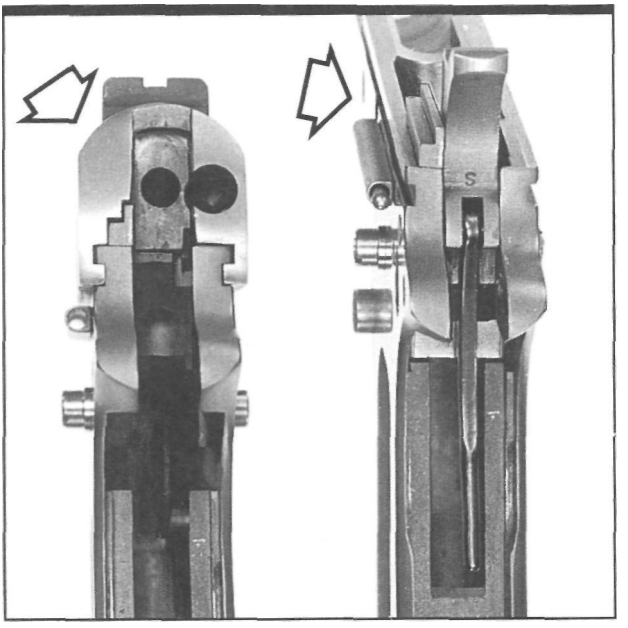


Figure 105- Shows checking ejector/slide and ejector/hammer clearances, after replacement of the ejector. Frame tunnel position and ejector dimensions can vary somewhat, making final clearance adjustments necessary. Installation is not complete until all slide and hammer contact has been eliminated.

Check Plunger Tube

Unless well staked, plunger tubes will loosen. Proper thumb safety and slide stop operation requires that the plunger tube and plungers be held tightly to the frame.

1. Inspect plunger tube position on the frame. The small I.D. end should be toward the front. The tube must be firmly staked and immoveable on the frame.
2. Gauge the inside of the tube at both ends. See figure 106 for gauge information.
3. Sometimes, small dents can be straightened just by insertion of the gauge.
4. If. the tube has been dented or nicked at the opening and cannot be easily straightened, it must be replaced. See figures 107 and 108.

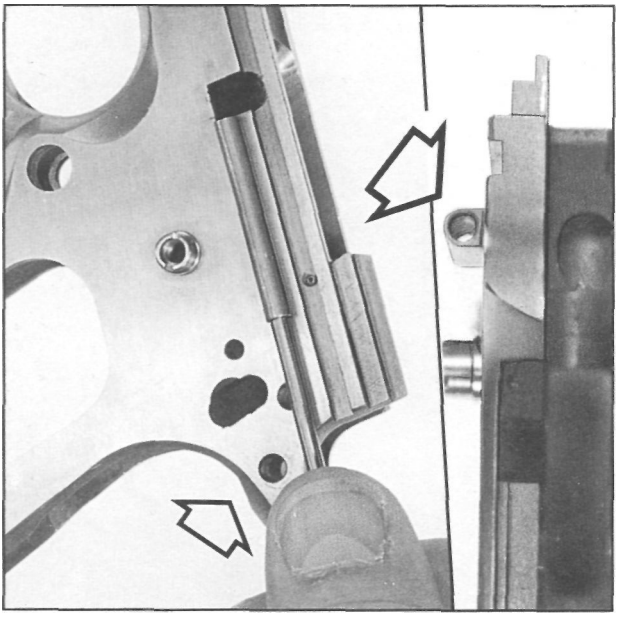


Figure 106- Shows checking the plunger tube for proper position and tightness against the frame. Also, an insert gauge made from an old 7/64", or comparable wire gauge size, drill shank is shown being used to check the larger I.D. bore portion of the plunger tube. Check the smaller front diameter with an .089" drill shank.

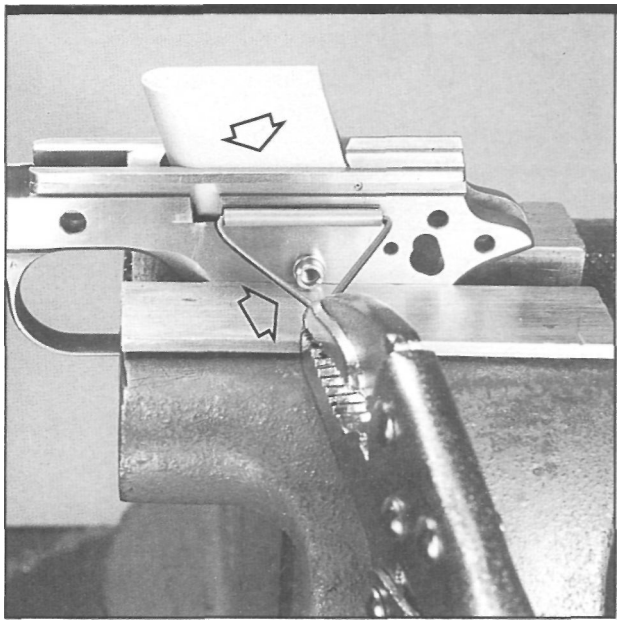


Figure 107- Shows the frame set up in the vise between soft jaw pads, and ready for removal of the plunger tube housing. A magazine well insert prevents bending or distortion of the frame as pressure is applied. Vise grip style pliers and .075-.080" hanger wire are shown being used to draw the housing off the frame.

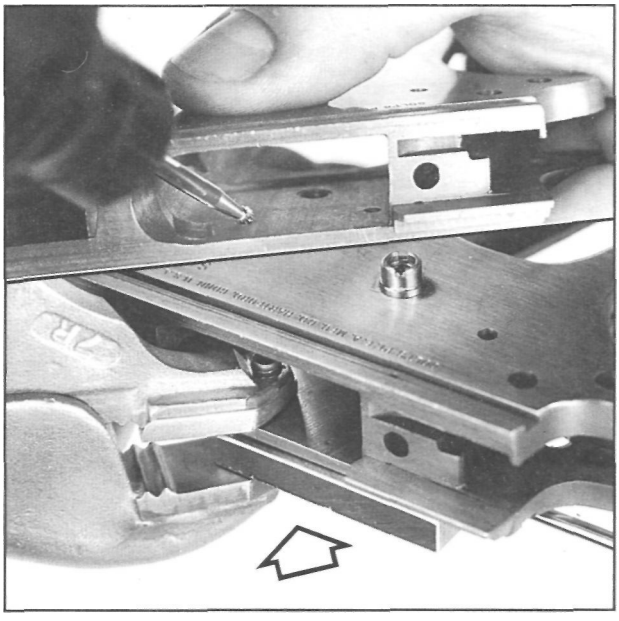


Figure 108- Shows the frame being prepared for plunger tube replacement. The staking holes in the frame are slightly countersunk on the inside with an 1/8" ball cutter. This extra recess helps prevent loosening of the mounting studs, once they are staked. Below, the plunger tube is shown as it is being staked in position.

Remove Plunger Tube

When a plunger tube is wall damaged, end dented and/or cannot be held by re-staking, it must be replaced. Some gunsmiths pry these off the frame; a bad mistake- since finish damage usually results.

1. Prevent damage by securing the frame as shown in figure 107. **Do not** clamp or apply pressure to the frame without first installing a magazine well insert.
2. Loop a section of .075" or .080" wire through the tube, twist tight, and remove the tube housing by pulling it off the frame.

Replace Plunger Tube

If the frame's plunger tube receiving holes are oversized, staking can be a problem. And, if the tube mounting studs are off center or short from a previous staking, a solid expansion of the stud ends is not possible, and re-staking will not usually hold. But, this can be remedied by careful countersinking inside the mounting stud holes.

1. Using an 1/8" ball cutter and Dremel tool, cut an 1/8" recess about .025" deep at the mouth of each hole.
2. Install the plunger tube with the smaller diameter plunger hole to the front.
3. Place a drop of red Loctite on each stud, and allow a minute soak-in time.
4. To prevent compression damage, since staking tool tube well dimensions vary, insert a 7/64" liner in the tube tunnel before applying pressure. As with the earlier gauge, this liner can be made from the shank of a drill bit.

Replacement of Stripped Grip Screw Bushings

Grip screw bushings never strip on the way out, as the non-mechanical amongst us keep insisting that they do. Screws strip because their owners try to reinstall the bushings blind- that is, while they are still connected to the screw at the back side of the grip. And, probably, this method is successful about half the time. Naturally, as gunsmiths, we see the others. What it comes to is this: most of the time, bushings can't strip while being screwed back in had they not come out in the first place. Frame threads run only about five fine threads deep- **stake or "Loctite" all bushings so they cannot come out.**

1. Make sure both grips are off and a shop cloth has been inserted inside the magazine well to catch metal cuttings.
2. If only the top thread has been damaged, re-clean the threads with a standard .236 X 60 tap.
3. If more than one thread has been damaged, re-tap with an oversized .255 X 60 tap. See figure 110. Use plenty of threading lubricant.
4. Degrease the new threads, and hand start the oversized bushing threads in the frame.
5. Apply two drops of red Loctite, and then snug the bushing in the frame.
6. Or, just stake the bushing instead. However, ' I still suggest using Loctite.
7. Level the bushing inside the frame, and check inside clearance against a magazine inserted in the well.

Figure 109- Shows both a standard size and an oversized grip screw bushing. [.235" O.D. threads and .254" O.D. threads.] An oversized, replacement bushing tap [.255 X 60] and a standard stock screw tap [.150 X 50] are also shown. In most cases, the .255 X 60 will re-tap stripped standard bushings without drilling.

Figure 110- Shows re-tapping the frame to the larger .255 X 60 size to receive an oversized grip screw bushing. Generally, this is done by hand. Frames with heavy thread damage would be the exception. In these cases, a tapping guide or drill press mounted tapper should be used to prevent damage to the remaining material.

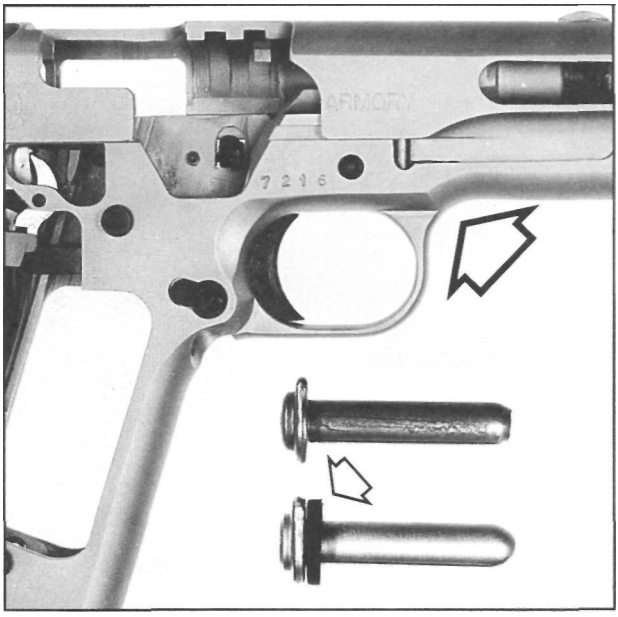


Figure 111- Shows a cutaway view of the front part of the frame. The slide is to the rear in the full recoil position. The back surface of the slide's spring plug housing has stopped the slide and is in full contact against the recoil spring guide's base plate. A spring guide is shown below with a shock absorbing buffer installed.

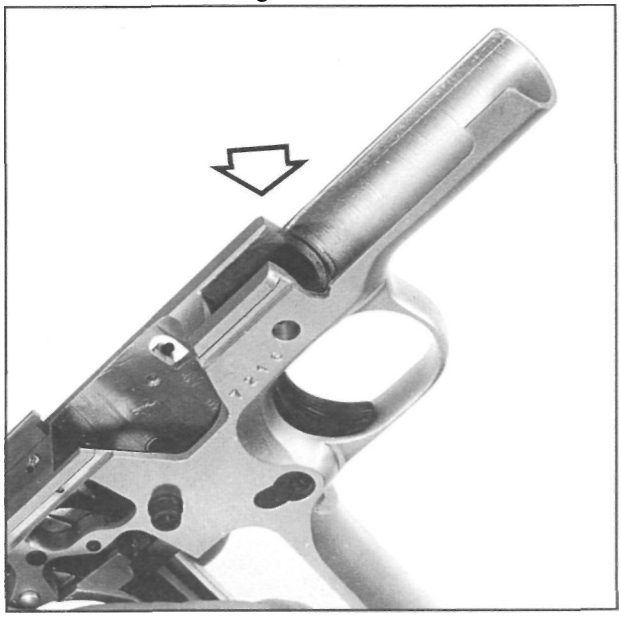


Figure 112- Shows the frame rail ends where set-back and dressing is required when the slide contacts the front of the frame rails at the same time it contacts the spring guide's base plate. These abnormal, early stops against the front edges of the frame rails batter the rails, and are an indication of mis-fitting of slide and frame.

Slide/Frame Battering

Some amount of battering can occur normally as the slide contacts the recoil spring guide and hammers it against the frame. When severe, battering may crack the frame tunnel where it joins the frame. Correct recoil springs and a recoil buffer help soften recoil impact. See fig. 111. When frames are over recessed for the spring guide centering button, or if the button is undersized, the back of the guide slaps and peens dents into the frame just under the rails. Occasionally, a frame is found with rails too far forward, causing early guide plate contact and indenting of the frame.

Slide Hits Rails

In some frame combinations, slides will stop against the frame rails slightly before contacting the spring guide plate, even when the spring guide is not defective. Rails batter when this happens. This is another dimensional shift problem, originating at manufacture, but in most cases can be easily remedied by careful fitting.

1. Set back the front of the rails, until the slide no longer contacts the fronts with the recoil spring guide in place. See figure 112.
2. Then, radius the corners of the rails to eliminate the possibility of early corner contact with the slide.
3. Reinstall the spring guide, then recheck that the slide doesn't stop against the rails.

Check Trigger

The trigger bow and body must move freely inside the frame without bind, excess friction, or drag. Otherwise, the trigger can stick and/or creep. A correctly fit trigger will slide easily out when the frame is tipped. Resistance and drag result from burrs in the frame and deformed or bent trigger bows and bodies.

1. The three types of trigger bow connections are: pinned, staked, and brazed. Check tightness; repair or replace.
2. Install the trigger on a bow forming die and check for corner drag. Stone inside the bow to eliminate drag.
3. Reinstall on the die and check the sides of the bow; straighten as necessary. Use a soft hammer for this work.
4. Install the trigger in the frame, and check remaining frame or trigger bow drag.
5. Stone high spots in the frame and on the trigger.
6. Locate hard to find drag spots by coating the trigger with Dykem Blue.
7. Check position of the rear engagement surface. It must be at flush, or slightly lower, when the trigger is fully forward in the frame.
8. To prevent disconnector drag, some adjustable triggers require lowering the bottom rear corner of the bow to just below flush.

Standard production triggers usually have greater vertical tolerances than desireable for competition. For this use, I suggest replacing standard triggers with tighter fitting, custom, adjustable triggers.

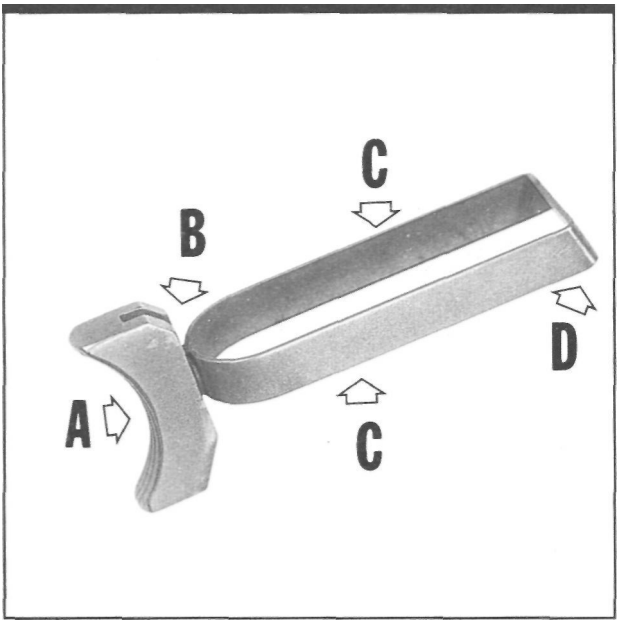


Figure 113- Shows four trigger check points: **"A"**- the trigger body should be inspected for straightness and minimum play in the frame, **"B"**- check for tight connection of trigger bow and body, **"C"**- check the bow for straightness and frame fit, **"D"**- inspect for correct frame position of the rear engagement surface.

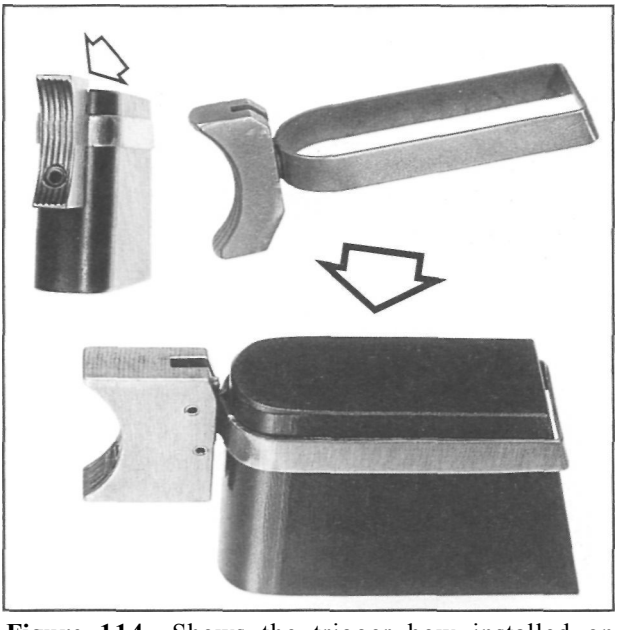


Figure 114- Shows the trigger bow installed on a trigger bow forming die, used with a plastic hammer in reforming damaged corners and also to straighten the sides of the trigger bow. A crooked trigger body can be hand straightened by using the die as an aligning reference. This work eliminates trigger drag in the frame.

Figure 115- Shows a cutaway view of the frame exposing the trigger bow. The magazine and bow are shown being clearance checked in their normal positions inside the frame. The trigger bow is checked for magazine contact. The trigger body should be reinspected for drag as it is moved back and forth in the frame.

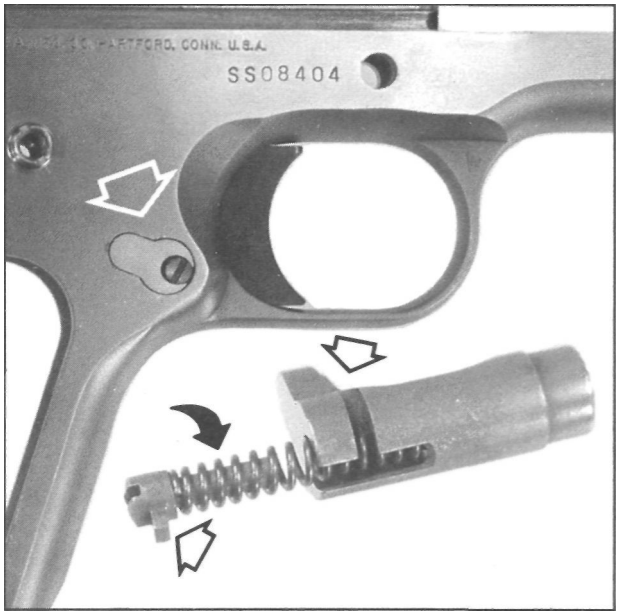


Figure 116- Shows the magazine catch assembly and inspection points. The catch lock [looks like a screw head] is turned clockwise as shown to re-engage its' locking stud in the frame. With the stud positioned inside the engagement recess in the frame, the catch assembly body is then free to retain or disengage the magazine.

Check Magazine Fit Inside the Trigger Bow

Once the trigger assembly has been fit to the frame, it then must be rechecked for inside magazine clearance. This is done by installing a standard magazine and then stoning away any high or contact areas found at the inside of the bow. Sometimes, custom triggers are found to bind or drag only after the magazine has been installed. This is solved by dressing the inside of the bow then adjusting the angle of the trigger body.

Check and Install the Magazine Catch Assembly

With trigger work completed, the magazine catch is now installed in the frame.

1. Disassemble the catch assembly and inspect the condition of the lock stud, spring, and screwdriver slot.
2. Replace the catch lock if the stud or slot show damage.
3. If there is any doubt about the condition of the catch spring, replace it also.
4. If the catch body is in good condition, reassemble it, turning the lock stud back to the disassembly position, thus locking it in place.
5. Drop the assembly into the frame, depress the slide release button to about flush with the frame, then turn the catch lock clockwise until it is fully engaged in the frame slot. Once installed, catch bodies will be a bit loose in the frame. This is not a problem in itself, but it can make setting an adjustable trigger a bit difficult.

Inspect Disconnector Port

In Colt .45 autos, **primary timing** of the disconnector is determined by the position of the frame's disconnector port and the slide's timing slot. Both must align. To allow for manufacturing variations, the slide's timing slot is cut slightly longer than necessary and is somewhat forgiving.

1. In the event it was missed earlier, make sure the frame disconnector port has not been oversized or altered in any way. See figure 117.
2. Remove any nicks, burrs, or raised material in and around the frame port.
3. Clean and remove dried, impacted dirt underneath.

Check Disconnector

The last half of disconnector timing is controlled by the length of the disconnector. When long, a disconnector may drag, but is safe. When short, they are unsafe, cause doubling, and, in some cases, uncontrollable full auto fire.

1. Fit all disconnectors as long as possible, but without any slide rail drag.
2. To operate, it must cam downward enough to safely disconnect, and then move upward enough to reconnect.
3. Final operation is **visually checked**, slide installed, and with a modified sear spring having only the center finger.
4. **Always test fire after** any **disconnector work.**

Warning: Have a senior Colt qualified pistolsmith recheck your work before loading or test firing the pistol. To prevent accident, load only two rounds at a time.

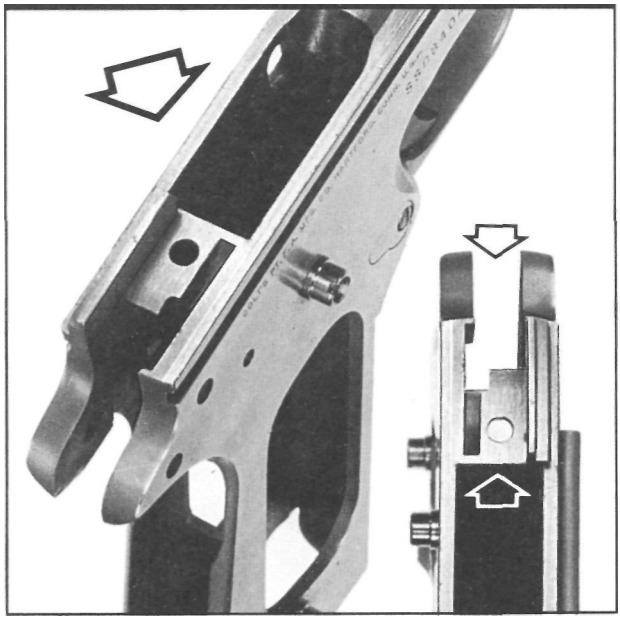


Figure 117- Shows inspecting the disconnector port at the top and inside of the frame. The port should be round, not oval, with an inside diameter of approximately .160". Distance from port centerline to the back of the magazine well varies with well sizing, and may not indicate a port problem unless it is less than about .195".

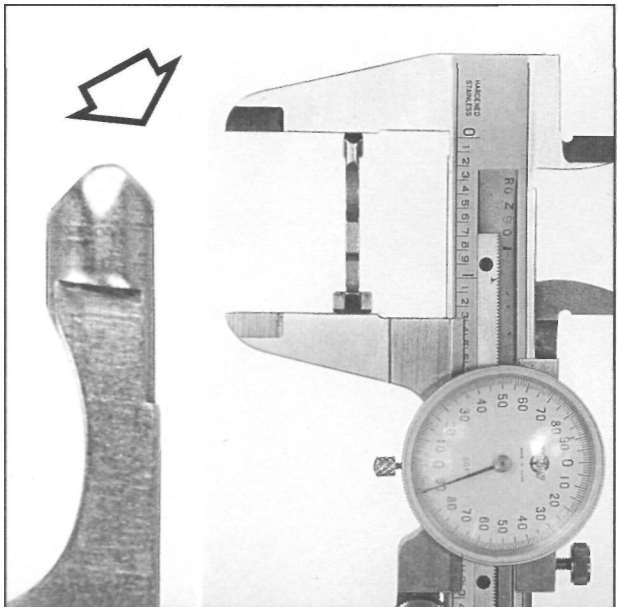


Figure 118- Shows inspecting and measuring a factory finished disconnector from a new Colt civilian model pistol. Most Colt factory fit disconnectors I have measured run 1.28?" to 1.290" overall length. Unfinished replacement disconnectors, as built by the various parts manufacturers, can exceed 1.310" in length.

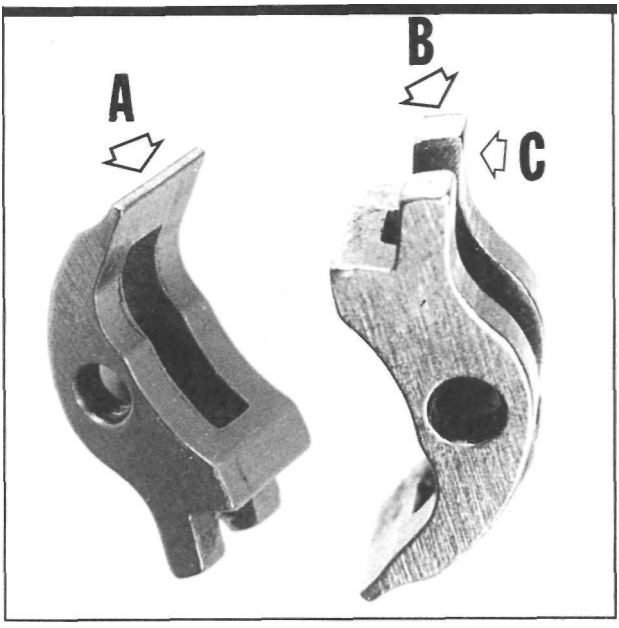


Figure 119- Shows a close view of both sides of the sear and the three inspection areas: at **"A"**, the sear engagement face is checked for damage from battering or alteration, at **"B"**, check for sear/disconnector cycling drag marks or earlier modification, and at **"C"** check for disconnector drag marking. **Replace any questionable sear**.

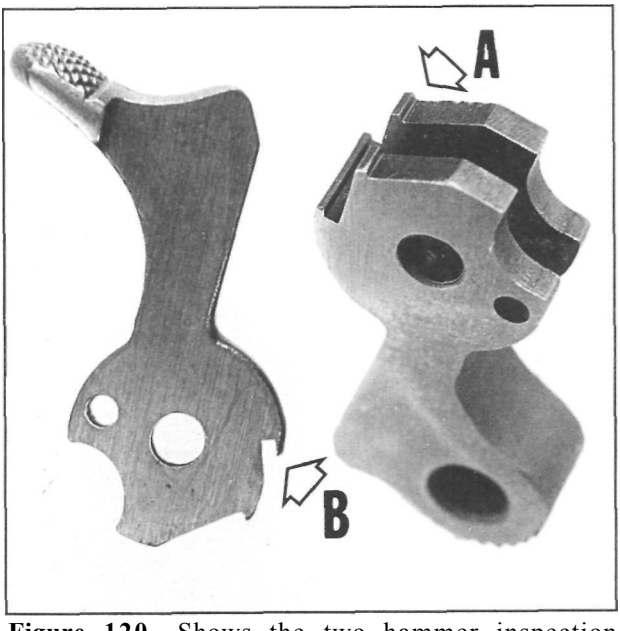


Figure 120- Shows the two hammer inspection areas important at this time since the hammer and sear are mated parts. **"A"** shows a close view of the sear engagement notch, measuring about .025" to .035" deep on the average hammer. **"B"** shows the half-cock notch, made captive in all models until Series 80 production.

Inspect Standard Sear

Not to replace a sear when it's too short, or in anything less than perfect fitting condition is a false economy, and causes more work later.

1. Check the engagement edge for signs of battering, corner damage, modification, undersizing, or chipping.
2. Check the bottom hooks, or sear fingers, for indication of sear-disconnector cycling drag. Check the rear of the fingers for disconnector drag marking, possibly caused by a slightly long trigger bow.
3. Also check for evidence of improper modification. If the hooks are shortened, too little contact surface will be left for disconnector engagement and proper sear release.

Inspect Standard Hammer

Before fitting the sear, be sure that both of the hammer engagement surfaces are in excellent condition.

1. Closely inspect the half-cock notch. It must be unmodified and approx. .050" deep. The over-engagement wall must not be damaged.
2. Examine the full-cock notch, making sure that both of the engagement surfaces are intact and have not been altered or incorrectly fit.
3. Measure the engagement height of the full-cock notch. Minimum height for general or service use should not be less than .025" on both sides. Some competition hammers will have full engagement walls tuned to as low as .018" and, possibly, .016". This **shallow engagement can be dangerous** in general and service duty use. Inspect with a 6X magnifying glass.

Inspect Series 80 Hammers

Being more positive, the newer firing pin locking system is superior to the older captive type half-cock hammer safety system. Now, the old half-cock surface serves only as a hammer stop. The stop ledge provides a back-up in cases of hammer release or follow through caused by sear bounce. In the Series 80, what appears to be a half-cock notch still remains, but, obviously, is not a safety of any kind because it can be easily squeezed off. With these changes, the factory has built a modern firearm that cannot be fired unintentionally- a very good idea in this time of insane product liability.

When checking Series 80 hammers, make sure that the stop ledge hasn't been altered or lowered. Lightly polish only the outer surface for sear clearance. See fig. 121.

Gold Cup Sear/Hammer

Both Series 70 and 80 Gold Cups use the same special sear with the supplemental sear spring and depressor. This thinner sear is notched at the top for half-cock/stop ledge contact protection, and also at the back of the sear fingers for adjustable trigger clearance. See figure 122.

The same half-cock notch change has been made in the Series 80 Gold Cups, but the narrow stop configuration has been retained. Series 80 Gold Cup stop ledges average about .070" deep. Sear engagement on both hammers averages .018" to .020" in depth - **inspect carefully.**

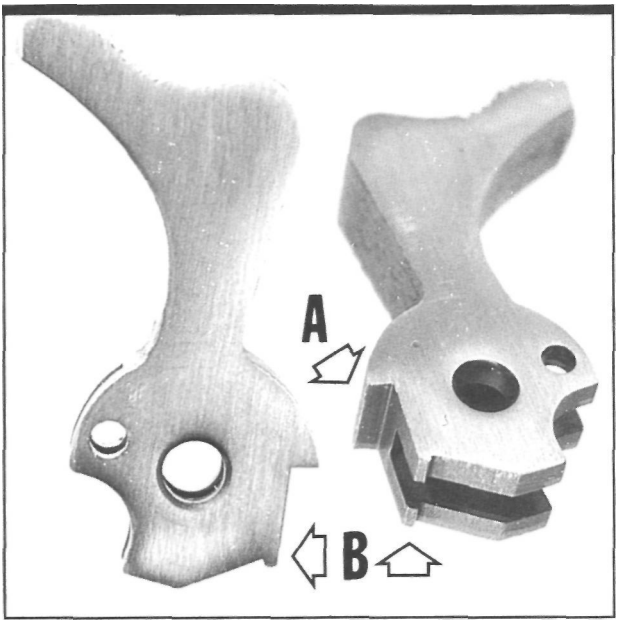


Figure 121- Shows the two inspection points on Series 80 Govt. Model hammers. **"A"** shows the follow-through stop ledge- no longer captive as with Series 70's and earlier production. Ledge height runs about .075". Keep the ledge in its' original condition. Do not undersize. Full-cock engagement at **"B"** averages about .030" deep.

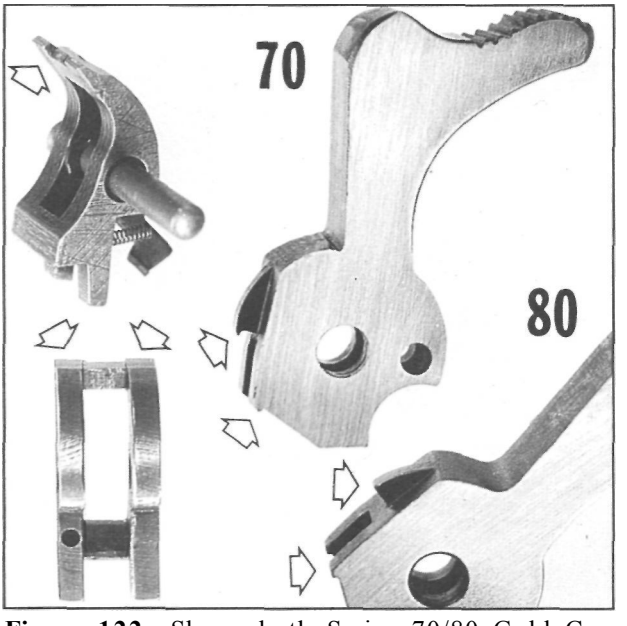


Figure 122- Shows both Series 70/80 Gold Cup hammer inspection points. Sear engagement on both runs .018-.020", but the difference is that the Series 80 no longer has a captive half-cock notch. Series 80 stop ledges average about .070" tall. The same sear is used for both models and must be inspected for engagement condition.

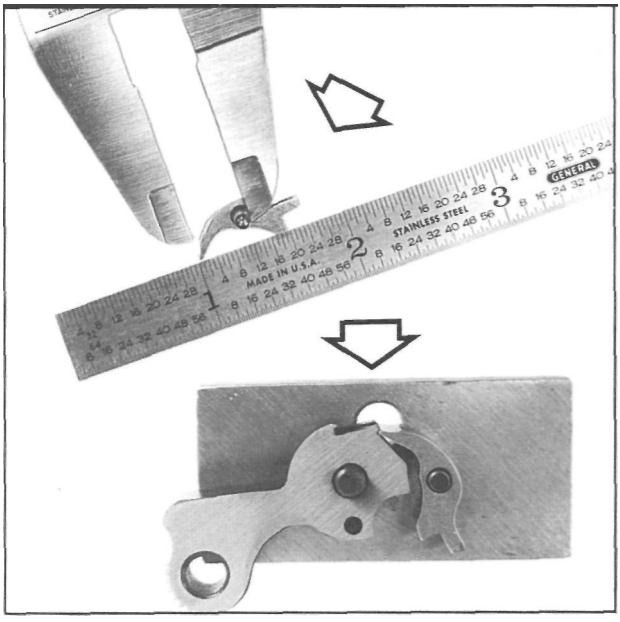


Figure 123- Shows, at top, the quick reference system for pre-checking minimum sear size. A fitter's test block is also shown being used to inspect correctness of sear angle and amount of engagement. With correct engagement and sear angle, and surfaces in well polished condition, further fitting work is not usually needed.

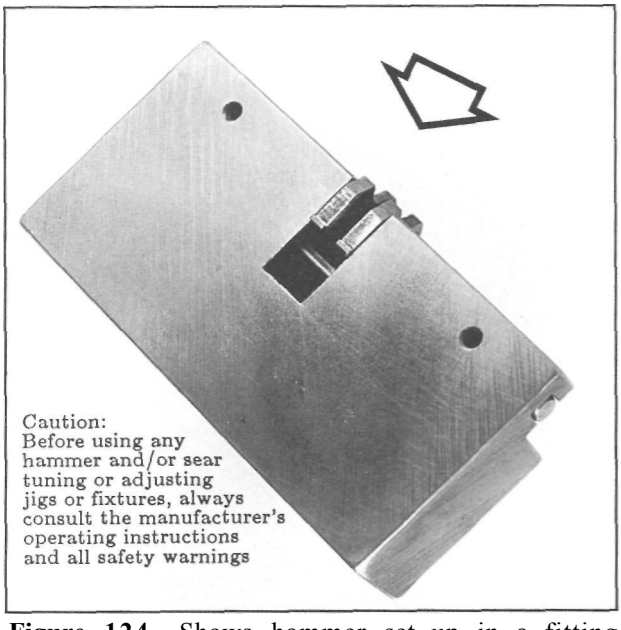


Figure 124- Shows hammer set up in a fitting jig for surface adjustment. Keep the hammers hooks at 90 degrees to the jig top. Position the hammer so the bottom will finish just at the required hook engagement height. If .030" is needed, set the pre-dressed hooks at .030", then work the surface down until just flush with jig.

Check Sear Engagement

Make sure the sear isn't undersized before checking the sear and hammer on the bench test block. While tolerances vary, below .395" pin bottom to sear tip is a bit short. See fig. 123. If length is O.K., check for correct engagement and sear angle.

1. Install hammer and sear on the test block and check in the full-cocked position.
2. Hammer hook engagement height should be about .030" deep, but not less than .025" for general service duty use.
3. Hold the block to the light, checking engaged sear angle. The sear must agree with the hammer notch angle [just under 90 degrees]. At least .020" of the sear face should contact the hammer engagement hooks.
4. The sear face must engage both hammer hooks equally.

Hammer Adjustment

When engagement or surface correction is needed, begin refitting with the hammer.

1. Install the hammer in the fitting jig. Align the hooks to exactly 90 degrees with the jig surface. **Don't alter engagement angle.** See f. 124.
2. First, set the hammer low enough to just dress the outside tips of the hooks.
3. Reposition the hammer to the desired hook engagement height above the jig. Then, lower the bottom engagement surface until the desired hook depth is reached. Use a hard, white, sharp cornered Arkansas stone for this work. **Warning:** Remove very little material, do not alter original angles, **recheck as you go.**

Sear Adjustments

When the sear face condition or insufficient engagement makes adjustment necessary, use a fixture or jig for the job, since perfect surfaces cannot be cut or gauged by eye. See figure 125.

1. Before removing material from the sear face, check its' length [see fig. 123], then adjust fixture angle to the correct hammer hook angle.
2. For general, or service duty use, remove just enough material to clean the existing surface and slightly increase the face to .020" plus a small amount for the relief angle.

For example: Cut the face to .030" width, then with .010" removed for the 45 degree inside relief angle, a net sear face of .020" is left. Further reduction of the sear face and hammer engagement is not recommended for general use. See Shop Work Section for competition work.

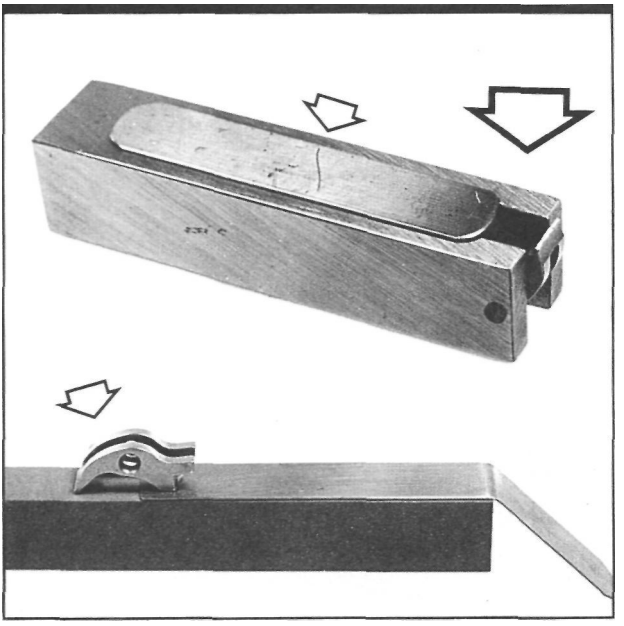


Figure 125- Shows the sear in a fitting jig. Angle is adjusted by set screw in the fixture. Hardened spacers placed on top of the jig provide different stoning heights. With this jig, a .040" spacer is used for standard sear length, and a .030 or .020" for tuned. Below, a 45 degree bevel is stoned on the inside sear edge.

Recheck Mating on External Frame Pins

Although seldom found with Colt civilian frames, slight oddities in center to center pin hole spacing and parallel alignment can exist in certain other manufacturers' frames. Externally mounted hammer and sear fitting pins will align with any given frame's pin holes, allow detection of small variations, and make final sear fitting and mating a lot easier and faster. Since fitting jigs are based on exact pin alignment and can also vary, make it a practice to always recheck and final fit on these external pins.

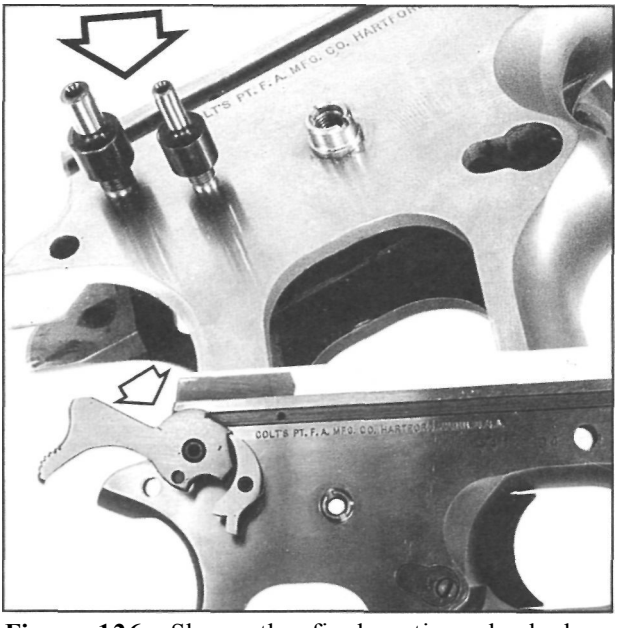


Figure 126- Shows the final mating check done on test pins installed on the exterior of the frame. Coat the surfaces with Dykem blue and hand work together. This test will show slight variations in frame pin location and alignment. If needed, minor adjustments can be made to better mate the hammer and sear surfaces.

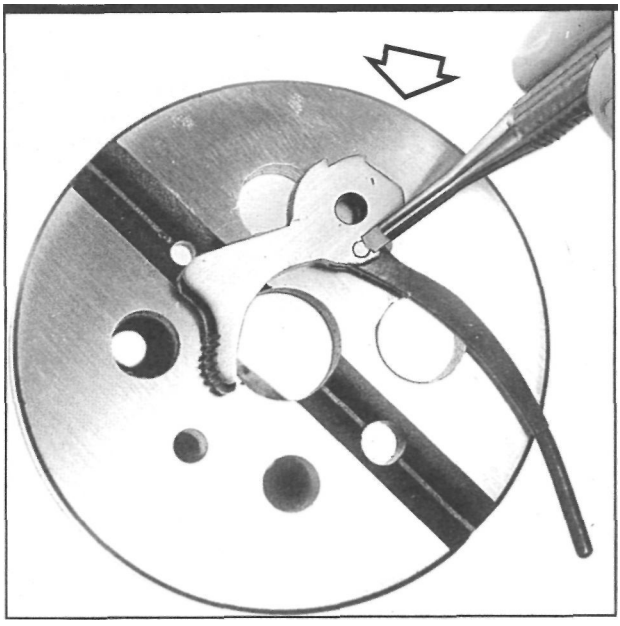


Figure 127- Shows the hammer/strut assembly positioned on a bench block, ready for staking the hammer strut pin. When the strut pin has been properly staked on both sides, and the sides of the hammer dressed, all possibility of the pin backing out and dragging inside the frame has been completely eliminated.

Figure 128- Shows checking hammer and sear pins before further assembly. If pin condition or fit is poor, irregular movement can cause hammer and sear positions to shift, producing variable sear releases, and, in some cases, creep. Sometimes, leaving the head of the hammer pin slightly high helps support the thumb safety.

Stake Hammer Strut Pin

In preparing the hammer for installation, the strut pin should be securely staked to prevent movement while inside the frame. Loose strut pins pose little problem other than that of falling out and getting lost as the hammer is removed. The majority fit moderately tight, and can thrust to one side and drag against the inside of the hammer well. Both problems are handled by staking.

1. Stake the pin junction on both sides, and then stone the raised material to flush.
2. Polish the sides of the hammer, eliminating contact marks, high spots, and stains.

Check Hammer and Sear Pins Before Assembly

Replace hammer and sear pins when worn or if fit is loose in the frame. See figure 128. The rule is: the better the frame fit, the more consistent the sear release.

1. The sear pin head should fit just at flush, and not drag against the thumb safety.
2. Since frame and thumb safety fit varies, the head of the hammer pin may be left .002" to .003" high to provide extra center support for the safety lever when needed.
3. If the hammer pin head is too high, it will drag and will also cause the safety shoulder to drag inside the frame. In these cases, lower the pin head countersink- **don't bend the safety lever.**
4. Replace all worn pins.
5. Pins can be built up by electroless nickel plating to better fit looser frames.

Install Sear and Disconnector

With sear and hammer mated, and disconnector inspection and dressing completed, etc., the sear and disconnector can be installed in the frame. Do this left side up, especially with Series 80's, to make the job easier. See figure 129.

1. Place the frame on a bench block, left side up.
2. Then, insert the sear and disconnector into the frame.
3. Move both disconnector and sear slightly, until the sear pin can be started in from the left side.
4. With pre-Series 80 pistols, slip the sear pin all the way through, and you're done.
5. On Series 80's, slip the trigger bar lever into the frame slot, just under the sear. Then, slip the sear pin through the lever into the right side of the frame.
6. These pins fall out easily: a bit of masking tape helps.

Series 80 Sear/Hammer Safety Parts

Since hammer installation is next- **and if the pistol is a Series 80-** don't forget the plunger lever. This lever, originating with Series 80's, is mounted on the right side of the hammer pin, and is operated by the trigger bar lever. The plunger lever, in turn, then operates the firing pin lock. See figure 130. There are three part numbers for this lever: #567671, 72, and 73, [stamped 1,2,3]. This is a critical part. Don't mix these up. Use only the part number that was originally fit at the factory. When ordering replacement parts, identify by ending number.

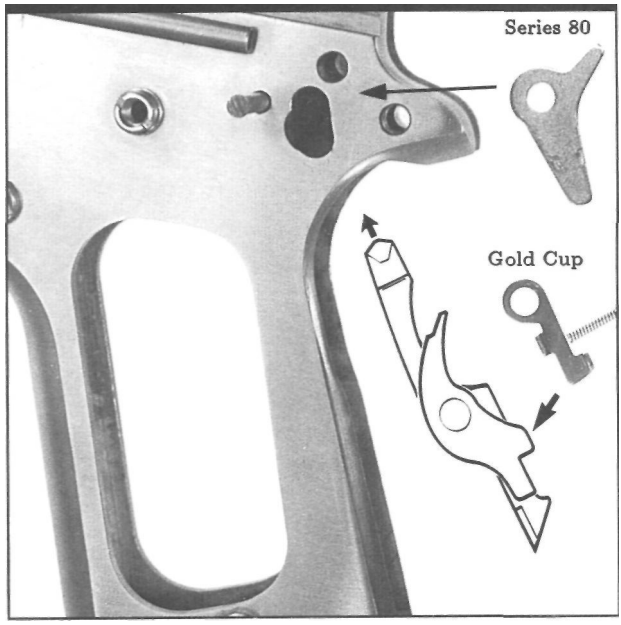


Figure 129- Illustration shows a preassembled sear and disconnector as they would position in the frame. Installation is done with the frame left side up so that small parts such as the Series 80 trigger bar lever can be installed beneath the sear. Preposition the Gold Cup sear depressor and spring; retain with a short pin.

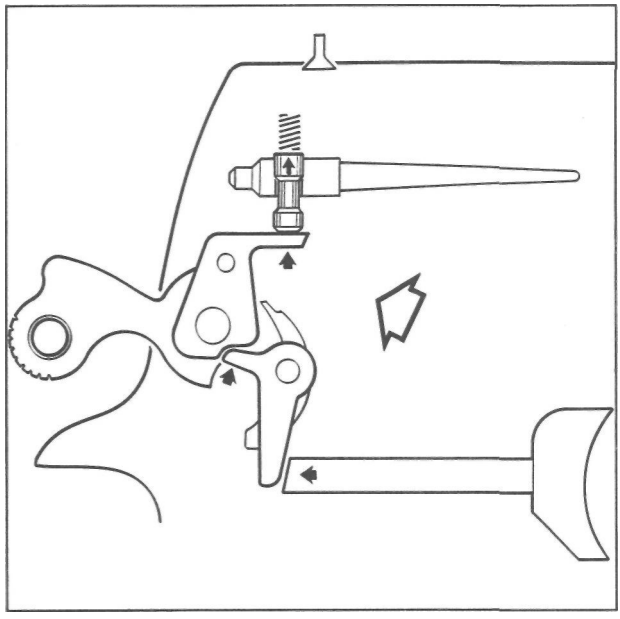


Figure 130- Shows the interaction of Series 80 safety features, as a safety reminder, and also to caution about the **factory fit** plunger lever. This part has three fitting variations marked 1. 2, and 3. They vary in angle and elevation, and provide critical final lift for the firing pin lock. **Only the original fitting** number can be used!

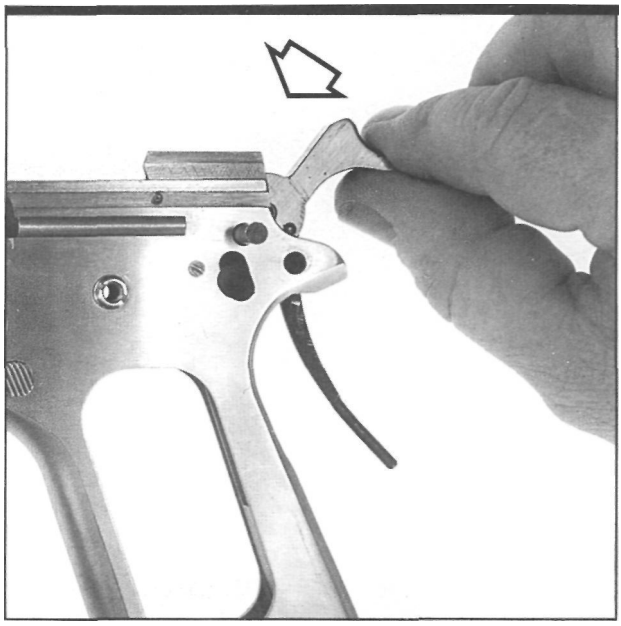


Figure 131- Shows installing an M1911 through Series 70 hammer and strut assembly in the frame. Be certain the strut pin has been staked and that drag marks have been removed from the body of the hammer. Slide/hammer side drag can be eliminated by reducing thickness of the portion of the hammer above frame level.

Figure 132- Shows installation of a Series 80 hammer/strut assembly in a Series 80 frame. This is best done with the right side of the frame up, as shown. With hammer positioned, the plunger lever is slipped sideways into place. The lever fits into the small recess milled in the right inside of the frame. See figure 130.

Install M1911 through Series 70 Hammer

With the hammer strut pin securely staked, and the sides of the hammer body dressed, the hammer is now ready to install in the frame.

1. Pre-position the hammer in alignment with the pin hole in the frame.
2. Install the hammer pin from the left side as shown in figure 131.
3. Temporarily install the slide and check for hammer contact or drag at either side.
4. Dress the sides of the hammer above the frame line as necessary until evidence of drag is gone.

Install Series 80 Hammers

The same procedure as above applies with Colt Series 80 hammers. The one difference is that the frame must be placed on the bench right side up. In this way, the plunger lever can be slipped into the inside shelf, or recess, milled into the hammer well. See figure 132. This part can be easily installed by sliding it in on top of the pre-positioned hammer.

Just a reminder about small parts including hammer and sear pins: as inexpensive as they are, it is unwise to re-use a worn or undersized pin or other small part. It is a good idea to maintain a bulk stock of such items so that they can be replaced on an "as-needed" basis during final fitting. This adds a quality and professional touch.

Figure 133- Shows a cutaway view exposing both the hammer and sear in an M1911A1 type pistol. With the hammer in the rest position, the sear is against the outer wall of the hammer's half-cock notch. As the slide closes, the disconnector moves up, ready to pick up the sear when the hammer is cocked.

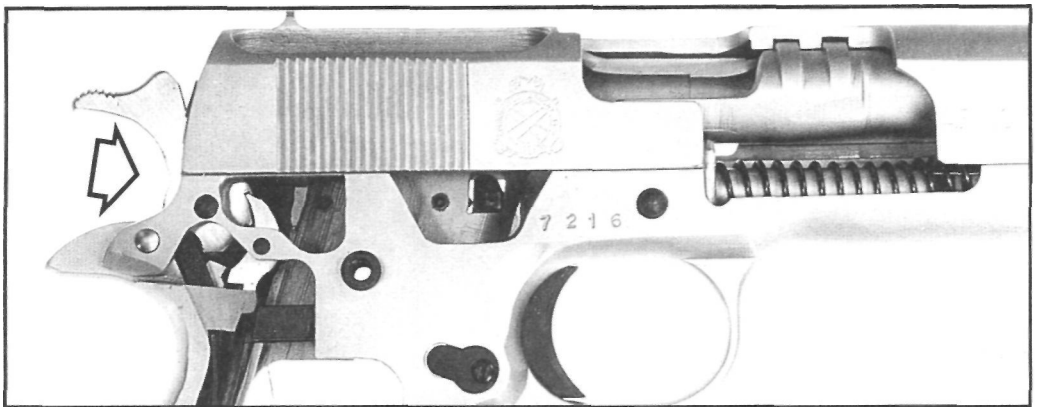


Figure 134- Shows an M1911A1 cutaway as above. The sear is now in the captive half-cock detent. With the slide still closed, the disconnector stays up and in contact with the sear. If the slide is moved slightly to the rear, the disconnector rail cycles the disconnector downward and clear of the sear's hooks.

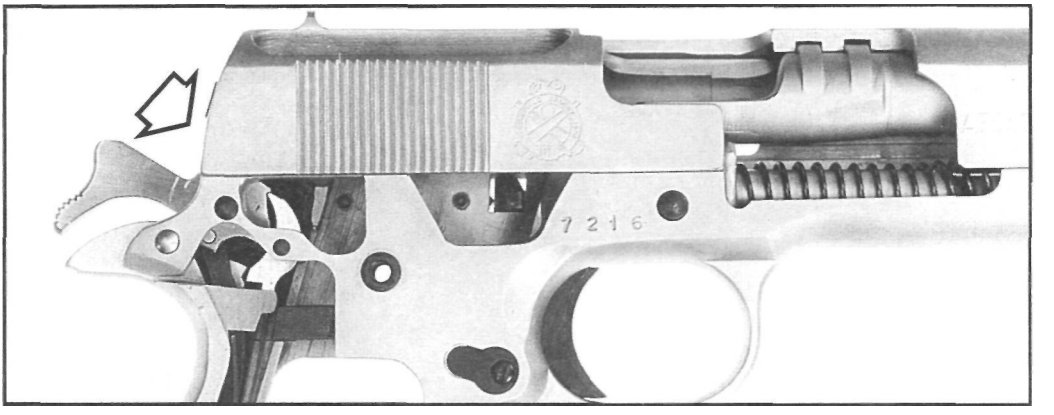


Figure 135- Shows an M1911A1 cutaway as above, with the sear now engaged in the full-cock position. In operation, as the slide closes, the disconnector is automatically cycled upward to pick up the sear hooks. Firing is possible. The thumb safety can be engaged only when the hammer is in full-cock position. The safety stop stud contacts the sear's safety ledge and prevents sear movement.

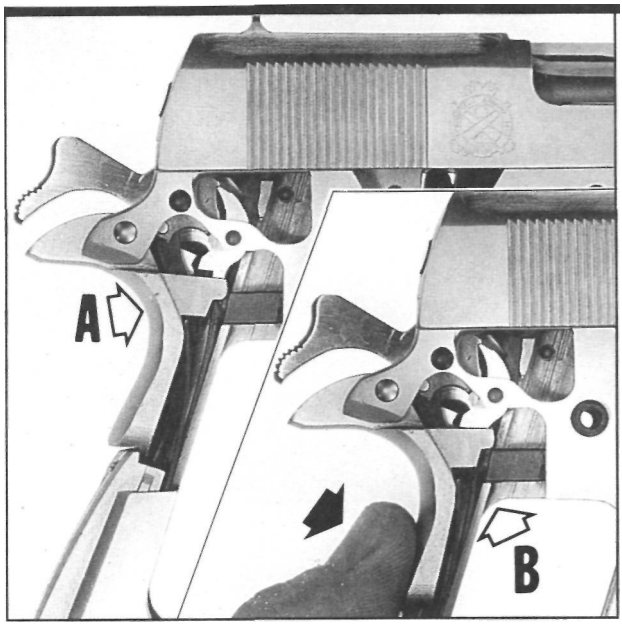


Figure 136- Shows the grip safety in cutaway view temporarily installed for testing. In position **"A"**, the safety is undepressed and the stop surface is long enough to prevent trigger bow movement and sear release. **"B"** shows the grip safety squeezed and in the bypass position, allowing full movement of the trigger bow.

Figure 137- Shows the grip safety extension on a bench block, ready for stretching a slightly short tip. Use a six ounce ball peen hammer for this job. Strike the tip with a series of moderate taps until it reaches the desired length. If the stop tip requires more than .030" stretching, I suggest replacing the grip safety.

Grip Safety Operation Check

Temporarily install the sear spring and grip safety in the frame. Insert the mainspring housing half way into the frame, to hold sear spring position.

1. Check the grip safety spring for correct tension.
2. Then, depress the trigger without squeezing the grip safety, and try to release the hammer. The hammer must not release.
3. Release the trigger. Now, squeeze the grip safety, and then squeeze the trigger again. This time, with the safety in the bypass position, the hammer should release. See figure 136.

Repair Short Grip Safety

As a rule, grip safeties are seldom manufactured short. In some instances frame and trigger bow dimensions will vary, and, on occasion, an amateur pistolsmith will file one under size. If the grip safety extension is just a bit short of stopping the trigger bow, the stop tip can be stretched by careful peening.

1. Place the extension on a bench block. See figure 137.
2. Peen the stop tip by tapping moderately with a six ounce hammer until the tip has reached the required length. Do not stretch past about .030" additional length.
3. Do not bend the grip safety extension.
4. Dress the stop tip for correct stop engagement.
5. Dress the bypass area so that the trigger bow does not drag. In some cases, this can produce noticeable creep.

Check Thumb Safety

Inspect the thumb safety for any visible defect.

1. Install the thumb safety in the frame and check for bend. A bent safety is easily detected because it no longer rests parallel to the frame.
2. If the thumb safety is bent, worn, misfit, or is at all questionable, don't repair it, replace it. The thumb safety will be fully function tested after final assembly.

Check and Install Double Plunger Assembly

1. Inspect both plungers for wear. Replace if necessary.
2. Make sure the plunger spring is slightly dog-legged at center. See figure 138.
3. Check plunger/spring captive connections. Crimp slightly if necessary.
4. Clean the tunnel, then install the dual plunger assembly, small end forward.

Inspect and Prepare Mainspring Housing

The mainspring and housing assembly must be checked and cleaned before installing.

1. Disassemble and clean the mainspring assembly, remove all dried oil, dirt, and etc.
2. Dress inside the tunnel with a small round stone or Craytex rod to remove burrs and machining ridges.
3. Inspect the mainspring. If cut more than two turns, replace it. Remember that trigger pull will probably be much lighter with a well fit sear. If a lower power spring is desired, it can be installed.

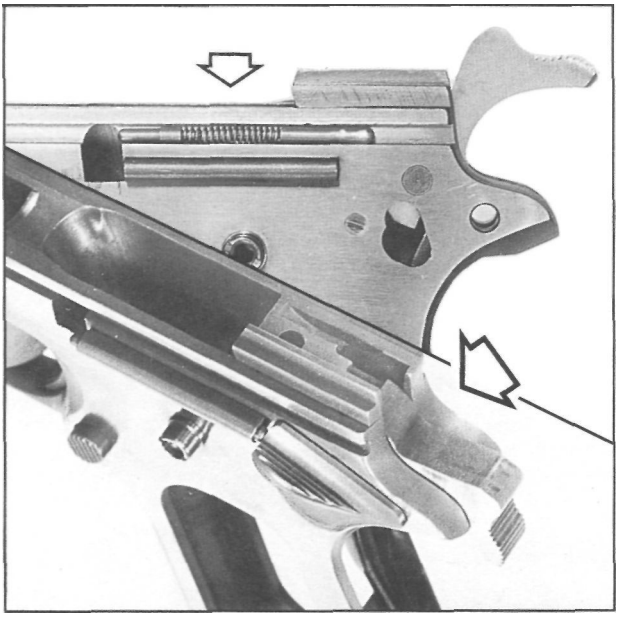


Figure 138- Shows the thumb safety installed temporarily, to check frame fit. This is done before the plungers are installed so that bind or drag can be easily detected. The dual plunger and spring assembly is also shown. Note the correct dog-leg at spring center. A doubled pipe cleaner is the best plunger tube cleaning tool.

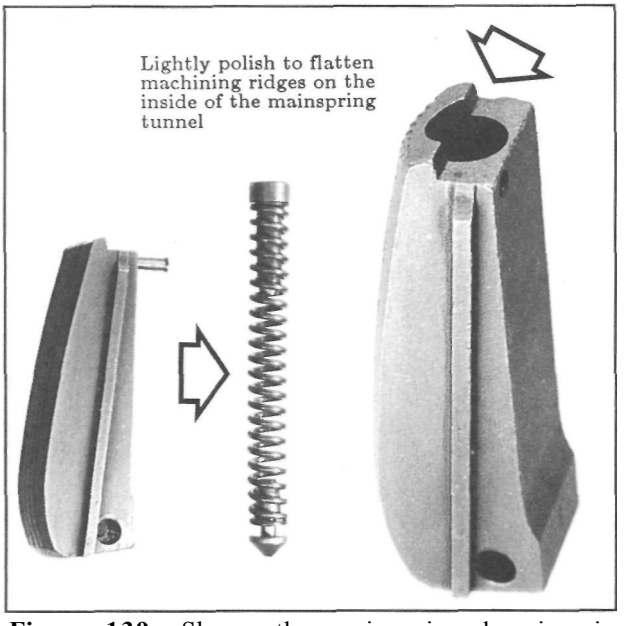


Figure 139- Shows the mainspring housing in various stages of assembly. Burrs and ridges in the mainspring tunnel can cause spring drag. Cutting the mainspring beyond two turns is not productive in reducing spring energy. A much better method is to replace the spring with a full length, but lower energy, spring.

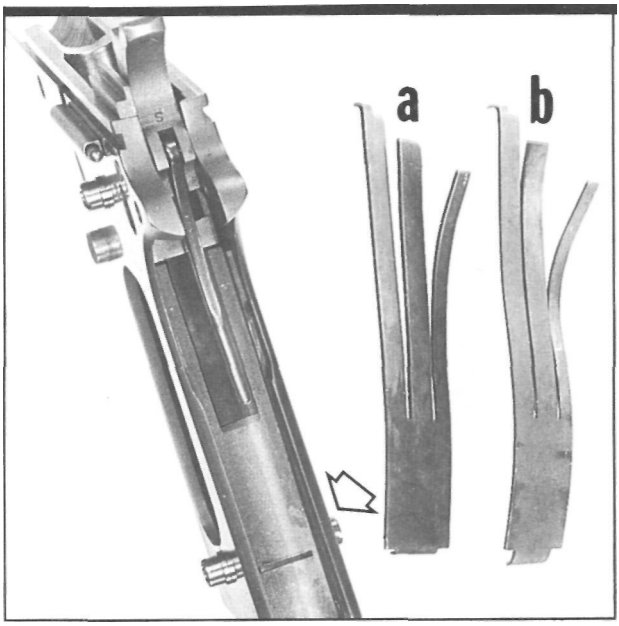


Figure 140- Shows the sear spring retaining slot machined in the frame to hold the sear spring in correct vertical position. Curvature of the standard factory sear spring is shown at **"A"** and a reduced power spring at **"B"**. Standard springs measure .036" to .0375" thick. Reduced power springs are thinner, measuring .034" to .035".

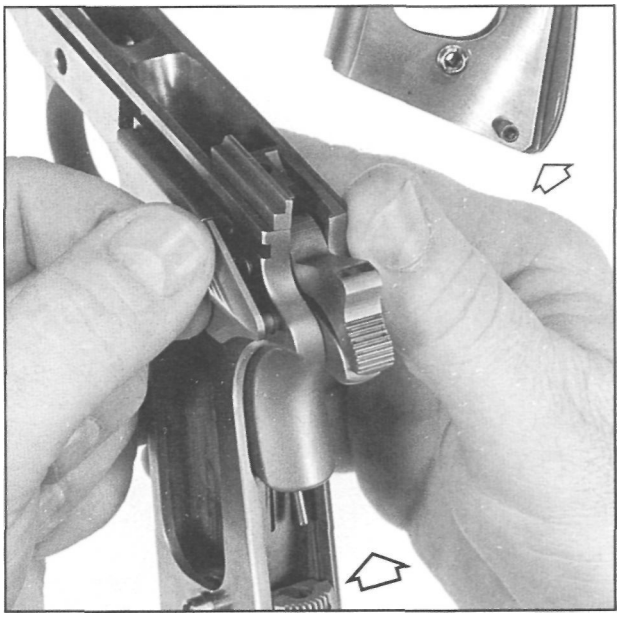


Figure 141- Shows the sear spring being held in proper position by the mainspring housing as the grip safety is slipped into place under the cocked hammer. Next, the thumb safety is put in, retaining the grip safety. Then, the hammer is de-cocked, the mainspring housing is pushed up, [capturing the safety tab] and pinned.

Inspect and Install Sear Spring

An incorrectly shaped, weak, or re-bent sear spring can cause both action and safety problems. Sear springs must be replaced if defective or questionable. Correct factory curvature is shown in figure 140. In the event there is any doubt about spring bend or curvature, check it against a new factory made spring. Standard factory springs are suggested for general service use, but lighter springs are available. With a well fit sear, installation of a reduced power mainspring and sear spring can reduce trigger pull by as much as half.

Install Thumb Safety

By design, the thumb safety can be installed only when the hammer is in the cocked position. The thumb safety crosspin also retains and hinges the grip safety in the frame. See figure 141.

Install Mainspring Housing Retaining Pin

With the thumb and grip safeties now installed, the next steps are as follows:

1. Before moving the mainspring housing, the hammer must be de-cocked.
2. Then, slowly move the mainspring housing upward, engaging the hammer strut and mainspring cap- and the grip safety retaining tab as you reach the top.
3. Once the housing is in position, install the retaining pin from the left side.

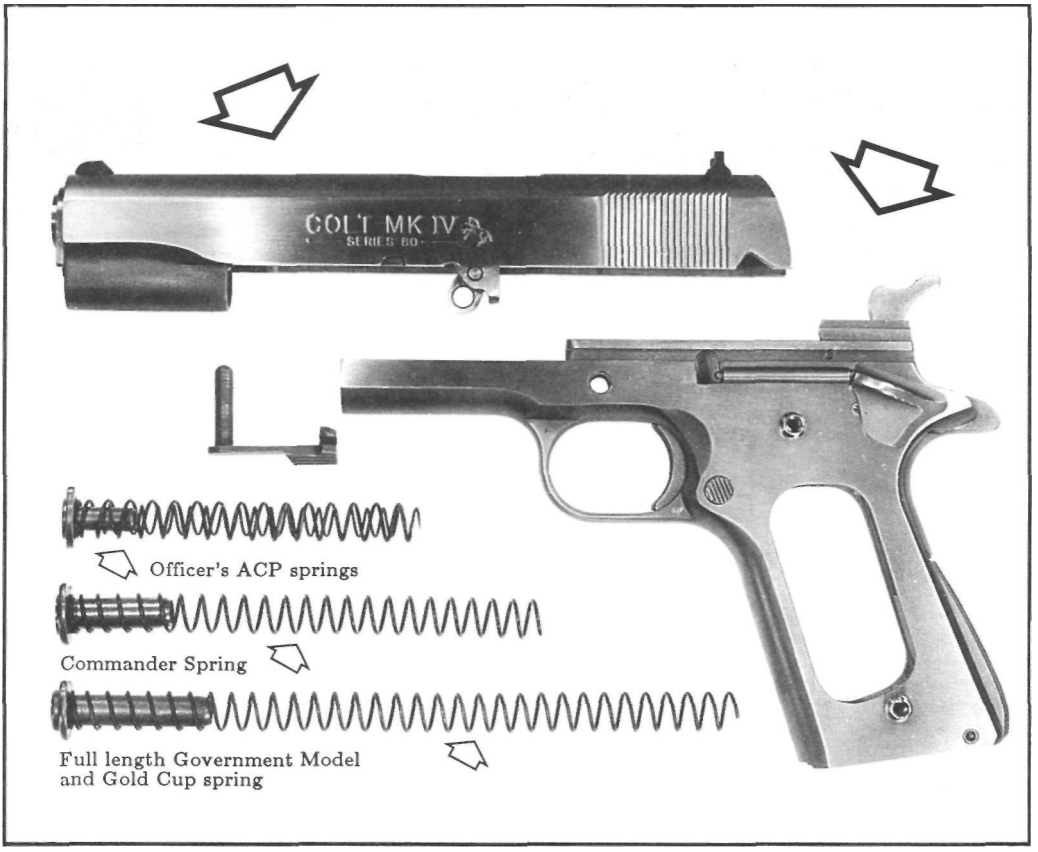


Figure 142- Shows the pre-fit and already finished slide assembly and slide stop, at the top. Below, the completed frame assembly is shown, except for installation of the grips which we always leave until last. At bottom, the three basic types of recoil springs are shown: standard Government Model, Commander type, and the short, double spring system used in the Officer's Model.

Recoil spring weight in the standard factory Government Model will vary somewhat, but averages approximately 16 pounds. This spring weight began with the original M1911 production, and is correct for 230 grain ball ammunition at velocities of about 800 fps. Going up one spring size [17 1/2 to 18 lbs.] improves cycling and lessens battering potential with current factory loads. Faster hard ball loads may require weights of 20 or 22 lbs.

Gold Cup recoil spring weights vary a bit also, but will average about 2 lbs. less than springs used in Government Models, spring rate should be matched or calibrated for best cycling of the particular ammunition used. For optimum tuning, calibration springs are made in weights of 10 through 24 lbs.

The Commander, being 3/4" shorter, requires a recoil spring that is just a little stiffer, usually measuring about 20 lbs. For hard ball use, and velocities over 860 fps, a 22 lb. recoil spring is usually better.

The Officer's Model is even shorter than the Commander. With a barrel length of only 3 5/8", it has even less slide mass and recoil distance to absorb the same recoil energy. For this reason, the pistol uses two concentric recoil springs which total about 22 lbs., on average. A 24 lb. recoil spring rate works nicely for hard ball velocities over 860 fps.

Recoil shock absorbers, or buffers, are a worthwhile and suggested option. Always install the recoil spring weight that is best suited for the pistol's intended use. Discard weak or questionable recoil springs.

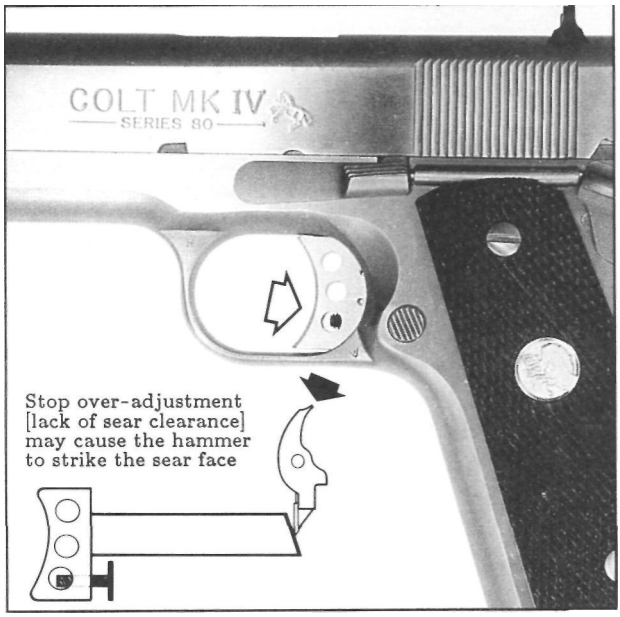


Figure 143- Shows the slide assembly and grips now installed on the frame. Below, the possible sear damaging effect of improper trigger stop screw adjustment [adjustable triggers only] is illustrated. Shorter sears finish with wider faces. Without a sear escape angle clearance cut, the risk of sear edge damage is increased.

Figure 144- Shows function testing grip and thumb safeties; both must prevent hammer fall. After sear work, the sear's safety shoulder may be slightly forward at full cock. If shoulder clearance exists, the thumb safety stop stud may not be able to prevent sear release. In this case, sear or safety replacement may be required.

After Assembly Checks

Once frame and slide have been reassembled and grips installed, several important functions must be checked.

1. Install an empty magazine and check magazine release.
2. Check the slide for lock-back on an empty magazine.
3. If installed, check the adjustable trigger stop and set to zero sear-hammer drag. Drag is detectable as internal friction when the trigger is depressed and hammer slowly cycled by hand. Loosen the adjustment to eliminate. See figure 143.

Recheck Safety Features

1. Function check Series 80 firing pins for lock/unlock.
2. Depress trigger and cycle the slide to test disconnector. Hammer must not drop until the trigger is released and squeezed the second time.
3. When depressed, the grip safety must allow trigger bow bypass and movement. When out, it must block the trigger.
4. Gravity test grip safety by pointing the muzzle down and then pulling the trigger without touching the safety. The hammer must not drop.
5. Check the thumb safety by cocking the hammer and engaging the thumb safety lever. Squeeze trigger and grip safety while supporting the hammer. The sear must not release. See figure 144.
6. A short safety stop stud, a too short sear, oddities in frame pin location, and/or a combination, may allow sear release from "safe" position. Test for a short safety by replacing it. If this does not work, replace the sear.

Check Trigger Pull

Earlier, during frame fitting, both the sear face and the hammer engagement surfaces were dressed. Keep in mind that refitting, rather than precise sear tuning, was the purpose. With standard sear engagements and standard weight springs, trigger pulls of about 5 lbs. usually result. A 45 degree sear escape angle usually lessens the pull to about 4 lbs. In Series 80's, pull will generally run about 1/4 lb. heavier. Competition triggers of 3 1/2 lbs., or less, are not suggested for general or duty use. Also, with pulls below 4 pounds, lightweight triggers are suggested to minimize the possibility of sear bounce releases.

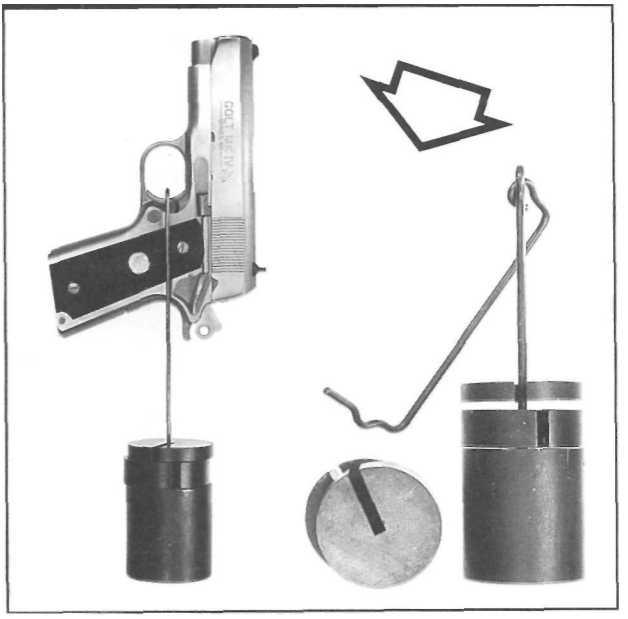


Figure 145- Shows testing trigger pull using the military/NRA type weight system. This method is simpler and more consistent than the average spring scale. Unlike sprung devices, weights can be helpful: for example, a light tap usually releases the sear when you are about a 1/4 lb. from the mark, making tuning much easier.

Feeding Function Test

Before test firing the pistol, always check ramping and feeding with dummy rounds. With correct ramp work and extractor fitting, ball type rounds should easily slow feed from a good magazine.

Test Firing

1. Before loading, inspect the bore, and patch clean.
2. Load only two rounds in the magazine as a protection against malfunctions and/or disconnector problems such as doubling or full auto fire.
3. If the first two rounds fire properly, fire a second two rounds, then three, etc.
4. During test fire, check correct ejection and slide lock-back on an empty clip.
5. Inspect the brass for unusual marking and also for shell case bulges caused by incorrect throating/ramping.

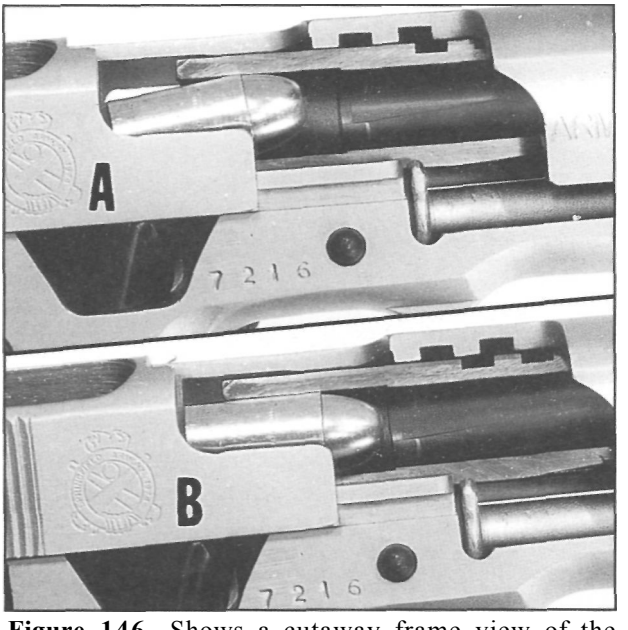


Figure 146- Shows a cutaway frame view of the dummy cartridge ramping and feeding test. **"A"** shows a ball round just at release from the magazine lips. At **"B"**, the cartridge is now free of the magazine and has passed the pivot point. The rim has cammed up, into position inside the extractor's hook, as the slide closes.

Summing It Up . . .

In the first section, or **Book I**, we have covered the majority of the shop inspection and refitting work that could come across a gunsmith's bench. The non-gunsmith may find the information somewhat tedious, even excessive, but the fact is that, as a pistolsmith, you will see pistols in all levels of condition: from those needing a simple cleaning to those requiring complete rebuilding. From time to time, you will see pistols that are even beyond repair or rebuilding.

For safety and liability reasons, always operate from a "worst condition" scenario so that nothing is overlooked. Even though you may not have included the cost of an overall inspection, including safety system operation- spend the time and do it just the same. It may be that your **work order notes** and **cautionary advice** to your customer might protect you both from harm.

No matter what work a pistol may require, do it thoroughly and then recheck it. While working, carefully protect the finish on your customer's gun. Finish damage is evidence of poor craftsmanship. Common sense, a clean work bench, and careful handling will reduce finish damage to near zero.

Now and then, the beginning pistolsmith may find himself in doubt as to some aspect of a job at hand. When this happens, have the problem, or your work, checked by a senior Colt qualified gunsmith. Don't fog the problem over and send it on its* way, as if magically corrected. It is the smart man who knows when he has a problem- **but it's the wise pistolsmith who gets a second opinion when needed.** The even wiser shop supervisor watches for those who can be depended upon to do things safely and well.

In this time of impossible product liability and, for many, nearly unobtainable insurance, the pistolsmith has to be careful to the point of the ridiculous. There is no such thing as too much caution. We all owe it to each other to preserve our industry, and careful workmanship is a good place to start. Good training, thoughtful customer advice, and competent safety instruction will also help a lot.

T r o u b l e s h o o t i n g

Guide

Figure C- Shows a three-quarter view of a cutaway M1911A1 type pistol, as used for gunsmith training purposes. In automatic pistols, major working components, small parts, plungers, springs, etc., are mostly contained inside the slide and frame. Without assistance, this leaves all possibility of viewing the precise internal interaction of these parts largely in the realm of imagination, making problem solving more difficult than it should be. When it comes to trouble shooting, the cutaway can be even more valuable than it is in learning the basic mechanics of operation. For this reason several additional cutaway views are included with the trouble shooting guide

Figure D- Shows top and right side views of a cutaway training pistol. A cutaway magazine is also shown. The more the windows expose, the better.

Figure E- Shows both left side and 3/4 front views of the M1911A1 type pistol.

WHERE?	WHAT IS IT?	CHECK FOR:	REMARK:
Barrel	Heavy leading	Velocity too high?	Check loading
Barrel	Heavy leading	Velocity O.K.?	Check bullet lube
Barrel	Heavy leading	Lube O.K.?	Check bullet diameter
Barrel	Leading	Soft alloy?	Adjust alloy
Barrel	Leading	Soft alloy?	Adjust lubricant
Barrel	Leading	Soft alloy?	Use Lewis Lead Remover
Barrel	Rusty	Rust inside?	Replace barrel
Barrel	Bulged	Stuck slugs?	Replace barrel
Barrel	Slug stuck	Barrel O.K.?	Replace if swelled
Barrel	Inaccurate	Loose bushing?	Replace bushing
Barrel	Inaccurate	Vertical play?	Check short link
Barrel	Inaccurate	Side play at hood?	Replace barrel
Barrel	Inaccurate	Inside condition, wear?	Replace barrel
Barrel	Bottom lug damage	Broken link pin?	Replace barrel if needed
Barrel	Bottom lug cracked	Check link pin?	Replace barrel
Barrel	Bottom lug bind	Broken link pin?	Replace pin
Barrel	Bottom lug bind	Check lug fitting?	Refit lugs
Barrel	Crown nicked	Minor damage?	Recrown barrel
Barrel	Crown dented	Major damage?	Replace barrel
Barrel	Ramp catches rounds	Too long?	Check headspace, adjust ramp
Barrel	Ramp catches rounds	Lug set back?	Check headspace, re-ramp
Barrel	Face battered	Minor?	Dress barrel face
Barrel	Face battered	Minor?	Check slide ledges
Barrel	Face battered	Major?	Check slide, replace barrel
Barrel	Won't chamber rounds	Ammunition?	Use correct ammunition
Barrel	Won't chamber rounds	Case mouth expanded?	Taper crimp
Barrel	Won't chamber rounds	Case mouth O.D. tight?	Taper crimp
Barrel	Won't chamber rounds	Chamber dirty?	Clean chamber
Barrel	Won't chamber rounds	Chamber rusted?	Replace barrel
Barrel	Won't chamber rounds	Throating needed?	Throat barrel
Barrel	Won't chamber rounds	Bullet diameter?	Replace bullets
Barrel	Won't chamber rounds	Chamber undersized?	Finish ream chamber
Barrel	Won't chamber rounds	Magazine?	Adjust or replace
Barrel	Springs on lock-up	Bind at bushing?	Relieve bushing
Barrel	Won't unlock	Shell stuck in chamber?	Remove, inspect chamber
Barrel	Won't unlock	Broken link pin?	Check and replace pin
Barrel	Won't unlock	Broken link?	Check and replace link
Barrel	Won't unlock	Broken bottom lug?	Replace barrel link and pin
Barrel	Won't unlock	Barrel swelled?	Remove bushing, replace barrel
Barrel	Won't lock	Impacted lug slots?	Detail clean
Barrel	Won't lock	Bushing clearance O.K.?	Relieve bushing
Barrel	Won't lock	Battered lugs?	Replace barrel and/or slide
Barrel	Won't lock	Misfit bottom lug?	Refit lug
Barrel	Won't lock	Broken bottom lug?	Replace barrel, link, and pin
Bushing	Loose in slide	Slide O.K.?	Expand bushing
Bushing	Loose in slide	Slide O.K.?	Replace bushing
Bushing	Loose on barrel	Barrel O.K.?	Replace bushing
Bushing	Drags on cycling	Skirt mouth drags?	Chamfer mouth
Bushing	Drags on cycling	Barrel diameter?	Reduce behind bushing
Bushing	Restricts lock-up	Vertical clearance?	Adjust bushing
Collet	Restricts lock-up	Finger clearance?	Adjust finger O.D.
Collet	Fingers break	Fingers too thick?	Adjust finger O.D.
Rec.spr.guide	Batters frame	Guide fits frame poorly?	Replace guide
Rec.spr.guide	Batters upper frame	Rails forward?	Clearance rails
Rec.spr.guide	Batters frame evenly	Recoil buffer?	Install recoil buffer

WHERE?	WHAT IS IT?	CHECK FOR:	REMARK:
Firing pin	Binds, drags	Straight?	Replace as needed
Firing pin	Binds, drags	Spring O.K.?	Replace as needed
Firing pin	Excessively off center	Wrong part?	Replace firing pin
Firing pin	Excessively off center	Bent pin?	Replace firing pin
Firing pin	Excessively off center	Barrel link-up?	Bush firing pin
Firing pin	Excessively off center	Slide tunnel problem?	Bush firing pin
Firing pin	Won't retain stop	Weak spring?	Replace spring
Firing pin	Won't retain stop	Head bevel?	Dress or replace pin
80 Firing pin	Won't fire	Lock plunger/spr. O.K.?	Replace as needed
80 Firing pin	Won't fire	Plunger lever O.K.?	Replace as needed
80 Firing pin	Won't fire	Plunger lev. matched?	Use correct lever [1,2,3]
80 Firing pin	Won't fire	Trigger bar lever O.K.?	Replace as needed
80 Firing pin	Won't fire	Lever misinstalled?	Reinstall correctly
Extractor	Vectors shell overhead	Bottom extr. angle?	Dress as needed
Extractor	Won't pick up rims	Battered shell rims?	Replace ammunition
Extractor	Won't pick up rims	Extractor bevel?	Refit extractor
Extractor	Won't extract shell	Chamber impacted?	Brush and clean chamber
Extractor	Won't extract shell	Extractor tension?	Tune as needed
Extractor	Won't extract shell	Worn extractor?	Replace extractor
Extractor	Won't extract shell	Broken extractor?	Replace extractor
Extractor	Won't extract shell	Chamber pitted?	Replace barrel
Ejector	Erratic ejection	Recoil spring bind?	Install long guide
Ejector	Poor ejection	Short ejector?	Replace ejector
Ejector	Poor ejection	Loose or misfit?	Replace ejector and pin
Ejector	Won't eject	Broken ejector?	Replace ejector
Ejector	Won't eject	Extractor problem?	Check extractor
Recoil spring	Too strong	Limits slide travel?	Check and replace spring
Recoil spring	Too weak	Slide hammers?	Check and replace spring
Recoil spring	Too weak	Won't lock slide?	Replace spring
Recoil spring	Slide batters	Spring O.K.?	Install recoil buffer
Recoil spring	Binds	Ejection erratic?	Install long guide
Recoil spring	Binds	Feeding erratic?	Install long guide
Slide	Drags	Rail slots dirty?	Detail clean slide
Slide	Drags	Warped?	Replace slide
Slide	Drags	Frame rails O.K.?	Dress as necessary
Slide	Binds	Slide cracked?	Replace slide
Slide	Binds	Frame cracked?	Weld or replace frame
Slide	Binds	Plug housing contact?	Clearance housing
Slide	Binds	Bottom link contact?	Clearance frame
Slide	Binds	Frame tunnel contact?	Clearance frame
Slide	Binds	Tunnel top contact?	Lower tops of tunnel walls
Slide	Sticky	At end of travel?	Dress front rail ends
Slide	Sticky	In rail slots?	Lap with J.B. Compound
Slide	Cracked	Determine cause?	Replace slide
Slide	Stuck	Case won't extract?	Drive out with dowel
Slide	Stuck	Hammer strut O.K.?	Replace as needed
Slide	Stuck	Collet finger broken?	Replace collet
Slide	Stuck	Link or lug broken?	Tap barrel hood down
Slide	Sight	Loose front blade?	Replace front sight
Slide	R. sight	Loose in dovetail?	Tighten or replace rear sight
Slide	Dents brass	Port problem?	Mill ejection port
Slide	Jams on empties	Case rollover problem?	Mill rollover notch
Slide	Jams on empties	Ejector problem?	Replace ejector
Slide	Jams on empties	Recoil spring problem?	Check and replace spring

WHERE	WHAT IS IT?	CHECK FOR:	REMARK:
Hammer	Won't cock	Hammer strut O.K.?	Replace as necessary
Hammer	Won't cock	Sear spring O.K.?	Replace as necessary
Hammer	Won't cock	Cocking notch O.K.?	Replace hammer as necessary
Hammer	Won't cock	Damaged sear?	Replace sear
Hammer	Won't cock	Disconnector problem?	Check and/or replace disconnector
Hammer	Won't cock	Altered hammer?	Replace hammer
Hammer	Won't cock	Altered sear?	Replace sear
Hammer	Cocking stiff	Strut bent?	Replace strut
Hammer	Cocking stiff	Mainspring impacted?	Clean spring and housing
Hammer	Cocking stiff	Mainspring drags?	Dress inside housing
Hammer	Cocking notch broken	Sear O.K.?	Replace as necessary
Hammer	Won't fall	Hammer strut O.K.?	Replace strut as necessary
Hammer	Won't fall	Strut pin problem?	Seat and stake pin
Hammer	Drops from 1/2 cock	Notch broken?	Replace hammer
Hammer	Drops from 1/2 cock	Notch altered?	Replace hammer
Hammer	Drops from 1/2 cock	Series 80 hammer?	Normal- has no 1/2 cock
Hammer	Drags ejector	Ejector fit O.K.?	Refit ejector
Hammer	Drags ejector	Ejector fit O.K.?	Clearance ejector
Hammer	Drags ejector	Hammer straight?	Level sides of hammer
Hammer	Drags frame	Hammer straight?	Level sides of hammer
Sear	Won't hold cock	Sear spring O.K.?	Replace spring
Sear	Won't hold cock	Sear broken?	Replace sear
Sear	Won't hold cock	Altered face?	Reface if long enough
Sear	Won't hold cock	Altered face?	Replace if sear is short
Sear	Won't hold cock	Hammer notch O.K.?	Replace hammer
Sear	Won't hold cock	Hammer notch altered?	Replace hammer
Sear	Won't hold cock	Mainspring tension O.K.?	Replace mainspring
Sear	Binds	Hammer notch uneven	Refit or replace hammer
Sear	Binds	Sear too short?	Replace sear
Sear	Binds	Binds on disconnector?	Check sear length
Sear	Creeps	Notch engagement rough'?	Refit or replace hammer
Sear	Creeps	Sear face damaged?	Refit if sear is long enough
Sear	Creeps	Escape angle O.K.?	Dress angle
Sear	Creeps	Sear/hammer pins O.K.?	Replace pins as needed
Sear	Creeps	Trigger binds?	Refit trigger
Sear	Creeps	Disconnector problem?	Check or replace disconnector
Sear	Creeps	Disconn. bevel rough?	Polish bevel
Sear	Drags	Sear too short?	Replace sear
Sear	Rough	Sear/hammer broken?	Replace as needed
Sear	Bounces out	Low sear spring tension?	Replace spring
Sear	Bounces out	Low mainspring tension?	Replace spring
Sear	Bounces out	Hammer notch angle?	Refit or replace hammer
Sear	Bounces out	Not enough engagement?	Replace hammer
Sear	Bounces out	Misfit sear?	Refit or replace sear
Sear	Bounces out [GoldCup]	Depressor/spring O.K.?	Replace as necessary
Disconnector	Hammer falls off-cycle	Too short?	Replace disconnector
Disconnector	Hammer falls off-cycle	Altered?	Replace disconnector
Disconnector	Doubles	Too short?	Replace disconnector
Disconnector	Doubles	Sear spring weak?	Replace sear spring
Disconnector	Doubles	Altered sear spring?	Replace sear spring
Disconnector	Binds sear	Sear too short?	Replace sear
Disconnector	Drags sear	Drags on return cycle?	Polish sear hooks

WHERE?	WHAT IS IT?	CHECK FOR:	REMARK:
Thumb safety	Binds	Safety lever bent?	Replace safety
Thumb safety	Binds	Hammer pin high?	Dress pin head
Thumb safety	Binds	Hammer pin high?	Seat pin lower in frame
Thumb safety	Binds	Notch drags frame?	Clearance notch
Thumb safety	Binds	Plunger damaged?	Replace plunger
Thumb safety	Binds	Plunger/tube aligned?	Restake or replace tube
Thumb safety	Won't hold position	Plunger/spring O.K.?	Replace plunger or spring
Thumb safety	Won't hold position	Plunger tube O.K.?	Restake or replace tube
Thumb safety	Won't hold position	Plunger indent O.K.?	Replace safety
Thumb safety	Doesn't work	Sear slightly short?	Replace sear or safety
Thumb safety	Doesn't work	Sear too short?	Replace sear
Thumb safety	Doesn't work	Safety defective?	Replace safety
Thumb safety	Doesn't work	Frame dimensions off?	Build up and refit safety
Grip safety	Allows hammer fall	Weak sear spring?	Replace spring
Grip safety	Allows hammer fall	Stop length?	Stretch and refit stop
Grip safety	Allows hammer fall	Stop too short?	Replace safety
Grip safety	Drags trigger bow	Trigger problem?	Dress trigger bow
Grip safety	Drags trigger bow	Misfit safety?	Dress safety bypass
Plunger tube	Plungers stick	Tube impacted?	Clean inside tube
Plunger tube	Plungers stick	Tube damaged?	Replace plunger tube
Plunger tube	Plungers stick	Weak, wrong spring?	Replace spring
Plunger tube	Away from frame	Staking loose?	Restake plunger tube
Plunger tube	Loose on frame	Won't restake?	Replace plunger tube
Trigger	Loose in frame	Bow undersized?	Expand or replace
Trigger	Loose in frame	Body undersized?	Expand or replace
Trigger	Bow contacts spring	Bow too long?	Dress corner of bow
Trigger	Bow binds	Against disc./sear?	Dress corner or replace trigger
Trigger	Bow binds	In frame slots?	Reshape and refit trigger bow
Trigger	Bow binds	On magazine?	Fit bow/replace magazine
Trigger	Body binds	Body aligned?	Straighten body
Trigger	Body binds	Body oversized?	Fit body
Trigger	Stiff	Excess spring pressure?	Replace or tune spring
Trigger	Stiff	Bow drags magazine?	Fit bow/replace magazine
Trigger	Stiff	Hammer hooks uneven?	Refit hammer
Trigger	Stiff	Sear face angle O.K.?	Refit sear
Trigger	Stiff	Break-away angle O.K.?	Refit sear
Trigger	Creeps	Rough sear?	Refit sear
Trigger	Creeps	Rough sear notch?	Refit hammer
Trigger	Creeps	Sear/hammer pins O.K.?	Replace pins as necessary
Trigger	Creeps	Bow drags grip safety?	Clearance safety
Trigger	Creeps	Sear drags disconnector?	Replace short sear
Sear spring	Weak/wrong bend	Disconnector problems?	Tune/replace spring
Sear spring	Weak/wrong bend	Sear bounce problems?	Tune/replace spring
Sear spring	Too strong/overbend	Excess trigger pull?	Tune/replace spring
Sear spring	Weak safety leg	Grip safety problems?	Replace sear spring
Sear spring	Disconnector drags	Rough disc, bevel?	Polish disc, bevel
Mainspring	Drags	Inside housing rough?	Polish spring recess
Mainspring	Drags	Incorrect spring?	Replace spring
Mainspring	Drags	Spring housing impacted '	Clean spring recess
Mainspring	Irregular tension	Cut too short?	Replace spring

WHERE?	WHAT IS IT?	CHECK FOR:	REMARK:
Mainspring	Too stiff	Incorrect spring?	Replace spring
Mainspring	Too stiff	Stock spring?	Shorten or replace
Mainspring	Too stiff	Rough inside housing?	Polish spring recess
Mainspring	Too stiff	Mainspring cap O.K.?	Replace spring cap
Mainspring	Too stiff	Hammer strut damaged?	Replace strut
Mainspring	Too stiff	Strut pin drags?	Fit and stake pin
Mag. catch	Won't hold	Wrong spring?	Replace spring
Mag. catch	Won't hold	Weak spring?	Replace spring
Mag. catch	Won't hold	Defective magazine?	Replace magazine
Mag. catch	Won't hold	Altered catch?	Replace catch body
Mag. catch	Too stiff	Wrong spring?	Replace spring
Mag. catch	Too stiff	Stock spring?	Tune spring
Mag. catch	Won't release	Damaged catch?	Dress or replace catch body
Mag. catch	Won't release	Catch impacted?	Disassemble and clean
Magazine	Drags/binds	Stock bushings long?	Dress bushings
Magazine	Drags/binds	Mag. body bent?	Replace magazine
Magazine	Drags/binds	Mag. body oversized?	Replace magazine
Magazine	Drags/binds	Catch damaged?	Dress or replace catch body
Magazine	Drags/binds	Wrong catch spring?	Replace spring
Magazine	Drags/binds	Mag. catch impacted?	Disassemble and clean
Magazine	Drags/binds	Frame bowed, sprung?	Select smaller magazine
Magazine	Drags/binds	Frame bowed, sprung?	Replace frame
Magazine	Feeding problems	Lips rough?	Dress lips
Magazine	Feeding problems	Lips bent?	Straighten or replace mag.
Magazine	Feeding problems	Late release?	Adjust magazine lips
Magazine	Feeding problems	Early release?	Close magazine lips
Magazine	Feeding problems	Erratic?	Tune or replace follower
Magazine	Feeding problems	Erratic, sticky?	Clean mag. interior
Magazine	Feeding problems	Spring weak?	Replace mag. spring
Magazine	Feeding problems	Spring backwards?	Install spring correctly
Magazine	Feeding problems	Follower bent?	Reshape or replace
Magazine	Early lock-back	Follower problem?	Tune stop engagement
Magazine	Early lock-back	Follower problem?	Use round top follower
Magazine	Early lock-back	Slide stop clear. O.K.?	Clearance correctly
Magazine	Early lock-back	Stop corner too sharp?	Bevel corner
Magazine	Early lock-back	Plunger/spring O.K.?	Replace as needed
Magazine	Early lock-back	Stop needs detent?	Cut detent
Slide stop	Crosspin loose	Worn, undersized?	Replace slide stop
Slide stop	Not flush w/frame	Stop bent?	Replace slide stop
Slide stop	Not flush w/frame	Frame chamfered?	Fit frame and stop
Slide stop	Catches disassy. slot	Stop clearance O.K.?	Clearance stop
Slide stop	Catches dissassy. slot	Stop corner sharp?	Bevel corner
Slide stop	Locks early	Mag. follower problem?	Tune or replace follower
Slide stop	Locks early	Mag. follower problem?	Use round top follower
Slide stop	Locks early	Plunger and spring O.K.?	Replace as needed
Slide stop	Locks early	Correct plunger and spring?	Mill plunger detent
Frame	Slide drags	Rails & slots impacted?	Detail clean
Frame	Slide drags	Rails nicked, dented?	Dress rails
Frame	Slide drags	Frame tunnel contact?	Clearance frame and slide
Frame	Slide drags	Clean and dressed?	Lap with J.B. Compound
Frame	Plunger tube loose	Stakeable?	Restake plunger tube
Frame	Plunger tube loose	Poor condition?	Replace and stake tube
Frame	Mainspring hsng. binds	Housing problem?	Fit housing
Frame	Mainspring hsng. binds	Frame bent?	Straighten and refit

WHERE?	WHAT IS IT?	CHECK FOR:	REMARK:
Frame	Grip loose	Screw bushing O.K.?	Tighten with Loctite
Frame	Grip loose	Screw bushing stripped?	Retap oversized and replace
Frame	Cracked	At tunnel?	Heliarc weld and resurface
Frame	Cracked	Elsewhere?	Replace frame
Frame	Rails	Altered, damaged?	Replace frame
Frame	Slightly bowed in	Magazine still fits?	Use is optional
Frame	Bowed, warped	Magazine doesn't fit?	Replace frame
Ammunition	Won't feed/chamber	Overall length?	Seat correctly
Ammunition	Won't feed/chamber	Bullet seating damage?	Replace ammunition
Ammunition	Won't feed/chamber	Bullets deformed?	Replace ammunition
Ammunition	Won't feed/chamber	Over-exp. case mouth?	Set minimum expansion
Ammunition	Won't feed/chamber	Case mouth O.D. problem	Taper crimp rounds
Ammunition	Won't feed/chamber	Primer fully seated?	Seat just below flush
Ammunition	Won't feed/chamber	Rim damage?	Replace brass
Ammunition	Won't feed/chamber	Extractor bevel/fit O.K.?	Fit extractor
Ammunition	Won't feed/chamber	Frame ramp altered?	Replace frame
Ammunition	Won't feed/chamber	Frame ramp rough?	Polish ramp only
Ammunition	Won't feed/chamber	Barrel ramp overhangs?	Fit and polish
Ammunition	Won't feed/chamber	Barrel over-ramped?	Replace barrel
Ammunition	Won't feed/chamber	Chamber O.K.?	Polish or throat as needed
Ammunition	Won't feed/chamber	Magazines O.K.?	Check and tune
Ammunition	Won't feed/chamber	Mag. release point O.K.?	Tune for rounds used
Ammunition	Won't feed/chamber	Mag. spring O.K.?	Replace if weak
Ammunition	Won't feed/chamber	Mag. spring O.K.?	Reverse if backwards
Fired shells	Rims nicked	Extractor fit?	Refit extractor
Fired shells	Cases dented	Striking port wall?	Lower port to 1/2" high
Fired shells	Throwing overhead	Bottom ext. angle?	Adjust angle
Fired shells	Weak ejection	Ejector problem?	Replace ejector
Fired shells	Weak ejection	Too heavy recoil spring?	Check, replace spring
Fired shells	Bulged at base	Soft brass?	Replace brass
Fired shells	Bulged at base	Overloads?	Check loading
Fired shells	Bulged at base	Over-ramped/throated?	Replace barrel
Fired shells	Bulged at base	Excess headspace?	Replace barrel
Fired shells	Bulged at base	Combination of above?	Correct problem
Fired shells	Base blown/cracked	Over-ramped/throated?	Replace barrel
Fired shells	Base blown/cracked	Excess pressure?	Replace ammunition
Fired shells	Base blown/cracked	Defective brass?	Replace brass
Fired shells	Case mouth cracked	Work hardened brass?	Discard brass
Fired shells	Case mouth cracked	Mouth overexpansion?	Discard brass
Fired shells	Case mouth cracked	Excess pressures?	Replace ammunition
Fired shells	Case mouth cracked	Oversize chamber?	Replace barrel
Fired shells	Primers backing out	Excess headspace?	Check headspace
Fired shells	Primers backing out	Oversize primer holes?	Replace brass
Fired shells	Primers backing our	Low pressures?	Seat to bottom
The pistol	Inaccurate	Ammo problem?	Replace ammo
The pistol	Inaccurate	Ammo problem?	Inspect reloads
The pistol	Inaccurate	Ammo problem?	Review reloading procedure
The pistol	Inaccurate	Reloads O.K.?	Inspect sights
The pistol	Inaccurate	Sights O.K.?	Test trigger
The pistol	Inaccurate	Trigger O.K.?	Inspect barrel to bushing fit
The pistol	Inaccurate	Fit O.K.?	Inspect rear barrel link-up
The pistol	Inaccurate	Link/fit O.K.?	Inspect for barrel springing
The pistol	Inaccurate	No barrel spring?	Inspect firing pin
The pistol	Inaccurate	Pin O.K.?	Inspect primer indent
The pistol	Inaccurate	Indent off center?	Offset sleeve firing pin
The pistol	Inaccurate	Indent O.K.?	Measure headspace
The pistol	Inaccurate	Headspace O.K.?	Inspect bore
The pistol	Inaccurate	Worn bore?	Replace barrel

Figure F- Shows a Colt Mark IV, Series 80 Commander. This, and other, Series 80 product photos were supplied courtesy of Colt Industries, Firearms Division.

Book II

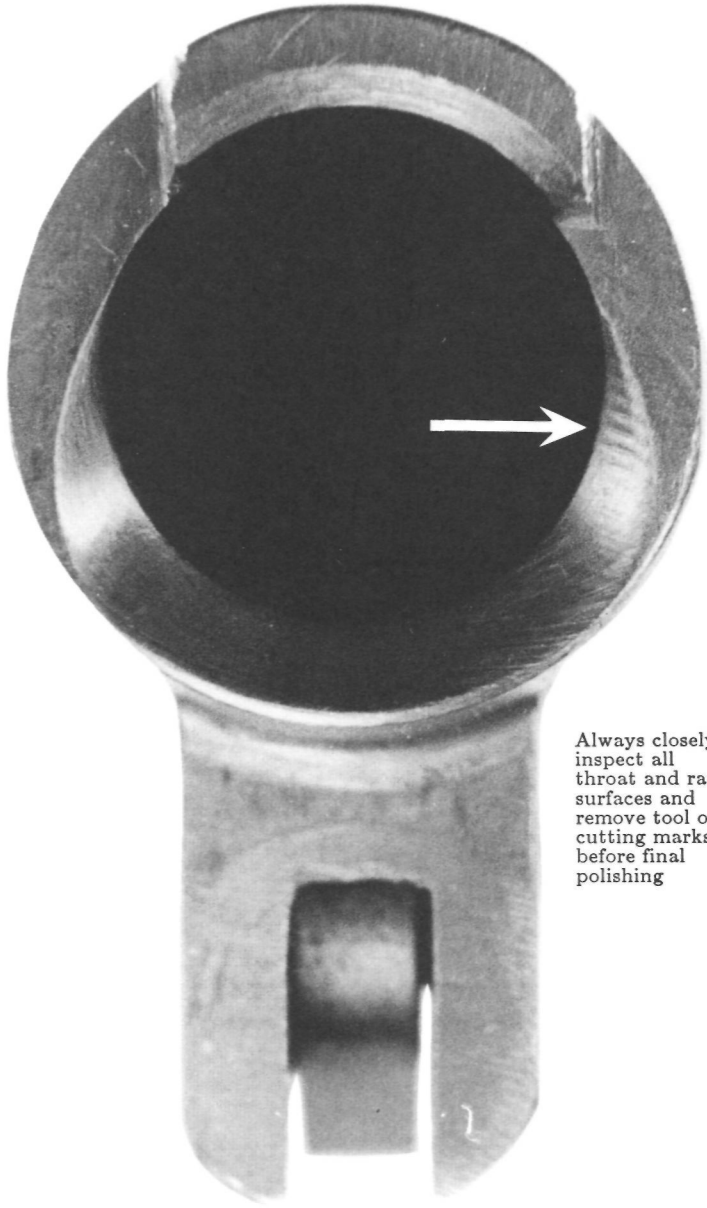


Figure AA- Shows an enlarged rear view of a Colt .45 auto barrel after rough throat and ramp contour shaping and stoning. When completed, the last step is to fine polish the newly contoured areas. This chamber entry modification assists feeding when wadcutter or other flat nosed cartridges are used.

BOOK II

Editor's Note:

Jerry Kuhnhausen has written two complete shop manuals on the Colt M1911 .45 automatic, which include all model variations to date. His first manual covers basic bench inspection, checkout, and small repairs, and goes on to refitting and complete rebuilding. This information is included as the first section of this book, and is called Book I. The original, detailed troubleshooting guide is retained as an easy bench reference, and is helpful regardless of ability level.

The original second shop manual contained almost every imaginable aspect of Colt M1911 shop gunsmithing, including custom work, machine set-ups, mechanical accuracy modifications, refinishing techniques, and information on the special tools and fixtures needed.

In editing Book II, the second section of this book, we have taken an assortment of specific pistolsmithing jobs from the author's second shop manual. We have included an array of the most popular, most frequently asked for custom gunsmithing work. In this section, there are examples of some of the most complex jobs custom pistolsmiths are asked for, as well as the more everyday custom work. By reader request, special tools required are also discussed in some detail.

With sections I and II of The Colt .45 Automatic- A Shop Manual, you have more detailed information at hand about the workings of the Colt .45 automatic than has ever been published in any single book before.

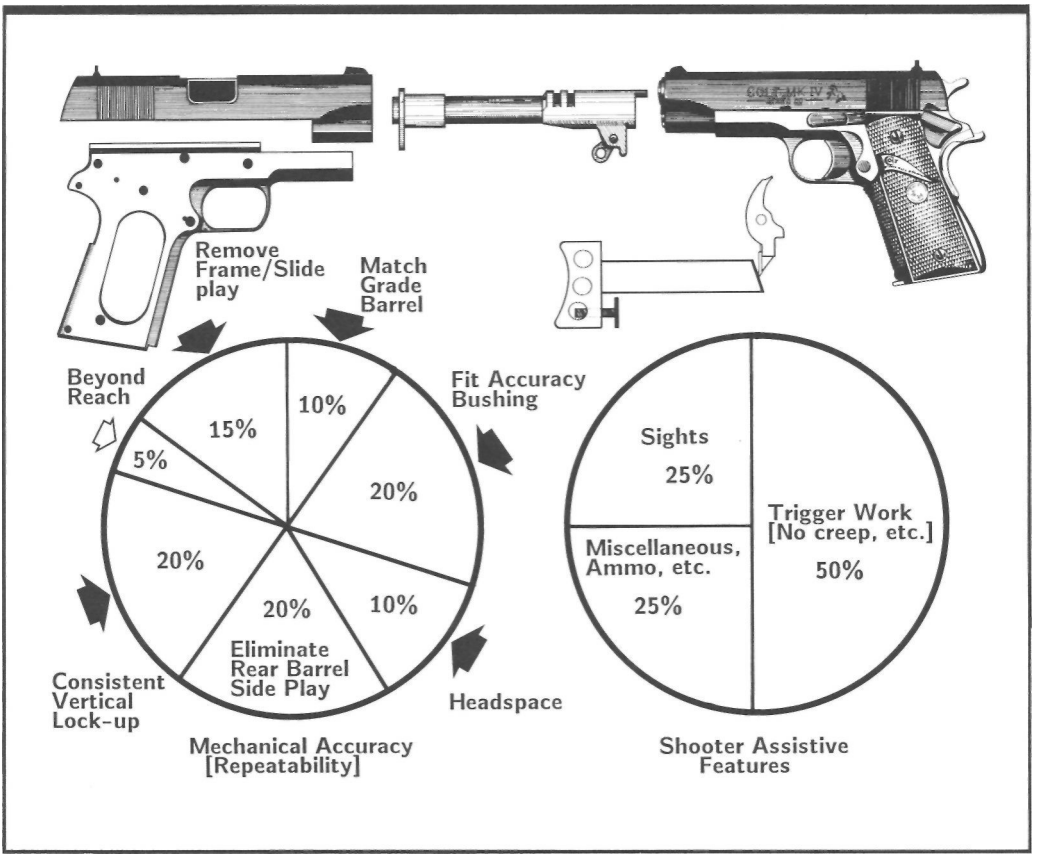


Figure 147- Shows the various elements that produce mechanical, and shooter assistive accuracy in the basic M1911 design. Although this is an over simplification, mechanical accuracy is nothing more than precision fitting and reduction of tolerances until consistent and repeatable function has been reached. Or, in other words, the pistol is tuned, mechanically, to do the same exact thing again and again.

Shooter assistive accuracy features can not, by themselves, increase mechanical repeatability in any firearm. These features, such as reduced trigger pull, better sights, correct ammunition, and etc., help the shooter use whatever level of mechanical accuracy, or repeatability, a given pistol has. To illustrate this point : trigger work can't make the barrel or slide fit any better, but, instead, enables the shooter to maintain his hold on target as he releases the hammer. In this way, the shooter uses the inherent accuracy of barrel/slide/bushing fit, etc. Look at it like this: machine rest accuracy isn't bothered by trigger creep, the machine doesn't notice it- **but a shooter does.**

More than 60% of mechanical accuracy **[repeatability]** is determined by the fit of the following:

1. Correct **[no play]** fit of the barrel and bushing.
2. Correct **[no play]** fit of the barrel hood in the slide.
3. Correct **[maximized]** vertical barrel lock-up.

Frame rail and slide tightening work are extremely important in competition shooting, but produce only about 15% of total mechanical accuracy. It is interesting to note that a match grade barrel and correct headspace may produce as much as 20% overall. Of course, 100% mechanical accuracy is unreachable.

In the assistive accuracy category, trigger work can improve target performance by as much as 50%, and sight improvement by as much as 25%. The remaining 25% is spread over items such as better ammunition, improved grips, and etc.

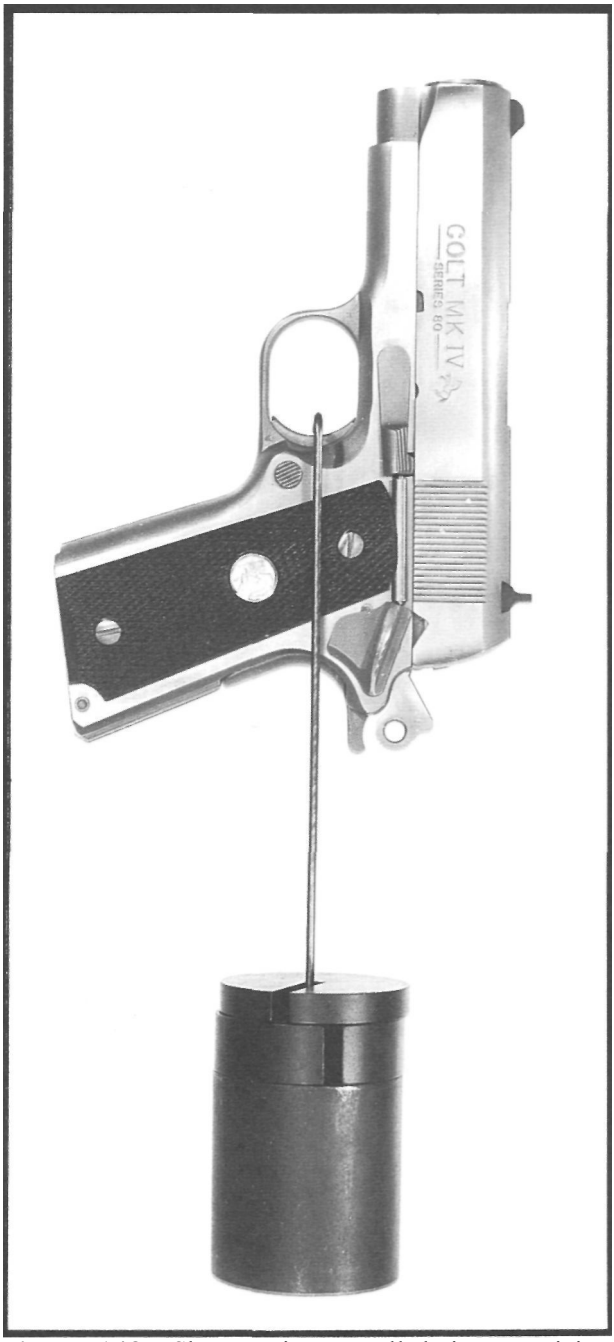


Figure 148- Shows trigger pull being precision tested using the military/NRA type trigger pull weight system. Standard weights are graduated in 1/4 pound steps. Some gunsmiths use extra fractional weights for fine tuning. With the pistol firmly supported, this method cannot produce a false reading. In tuning, a moderate tap on the frame will release a .45 auto sear at about 1/8 to 1/4 lb. before the actual pressure release point. I suggest using this simple, positive system for all trigger work.

First Things First

Sometimes, gun salesmen try to sell .45 owners on the idea that, to be worthwhile at all, a .45 auto must be fully modified, "built", "accurized", and "full-house". Keep in mind that the vast majority of pistol shooters really want improvements that will make a big performance difference without spending a bundle.

For this reason, trigger jobs, throating, ramping, and sight work are the most asked for custom jobs. Probably, the average pistolsmith will find that he does more trigger work than any other kind.

I suggest using both common sense and caution in doing trigger work. Naturally, the proper tools, fixtures, and etc. should be used. Common sense comes in on the sales end. When 4 to 4 1/2 lbs. is great for a general or duty use pistol, don't sell, or be talked into, less than 4 lbs. for this category. The risk of an accidental, or early discharge is much greater with shooters unaccustomed to light trigger pulls. Advise and caution customers about this. A good approach is to suggest a slightly heavier pull than is requested- you can always readjust it later. Match and other competition shooters may require pulls of less than 4 lbs. **Draw a line at this point:** know your customer and his capabilities when reducing below 4 lbs. I suggest that you refuse all trigger work you know is too light or that does not meet the proper minimums for the actual category of use.

ABOUT CUSTOM WORK

It's true to say that all custom work should be planned. And, it's especially true, when major custom work such as full mechanical accurizing is to be done. Then, planning is an absolute necessity. For example; deciding to lower the frame rails, after having first fit the bottom barrel lugs on a match grade barrel, will require that the bottom lugs be fit a second time. And, linking adjustment to increase upper locking lug engagement will have to be re-done, etc. By using a correct work sequence, these types of costly, labor intensive mistakes can be avoided.

Basic decisions must be made before the work begins. Will you lower the rails? Will you replace the frame with an oversized National Match type frame? Or, will you use the standard factory production frame without rail modifications, and etc.? Is this to be a match pistol, combat pistol, or what? These questions have to be settled before any work can be done.

Why lower and tighten the frame rails? Why tighten the slide?

1. With correct rail lowering, and a tightened slide, mechanical accuracy potential is increased when barrel and bushing accuracy work is also done.

2. In match shooting, virtually all other competing pistols will have frame rail and slide modifications, giving them an approximate 15% edge against competitors without these improvements.

3. With slide and frame rails tightened, bearing surface area is vastly increased, minimizing point contact wear, and adding to long term durability.

4. General feeding reliability is increased. The slide is always in the same relative position as it rides on the frame rails. As a result, cartridges are ramped and then cammed into the extractor's cartridge rim retaining slot in the same way on each and every cycle.

And, why not?

1. Cost; when correctly done, frame rail work and slide tightening is labor intensive, and therefore expensive.

2. Cost; the frame should be refinished after rail work has been completed.

3. Unless combined with full mechanical accuracy modifications, this particular modification is not, by itself, productive of measurably increased accuracy.

4. Tightened rails have a somewhat lower dirt and grit tolerance factor, requiring additional attention.

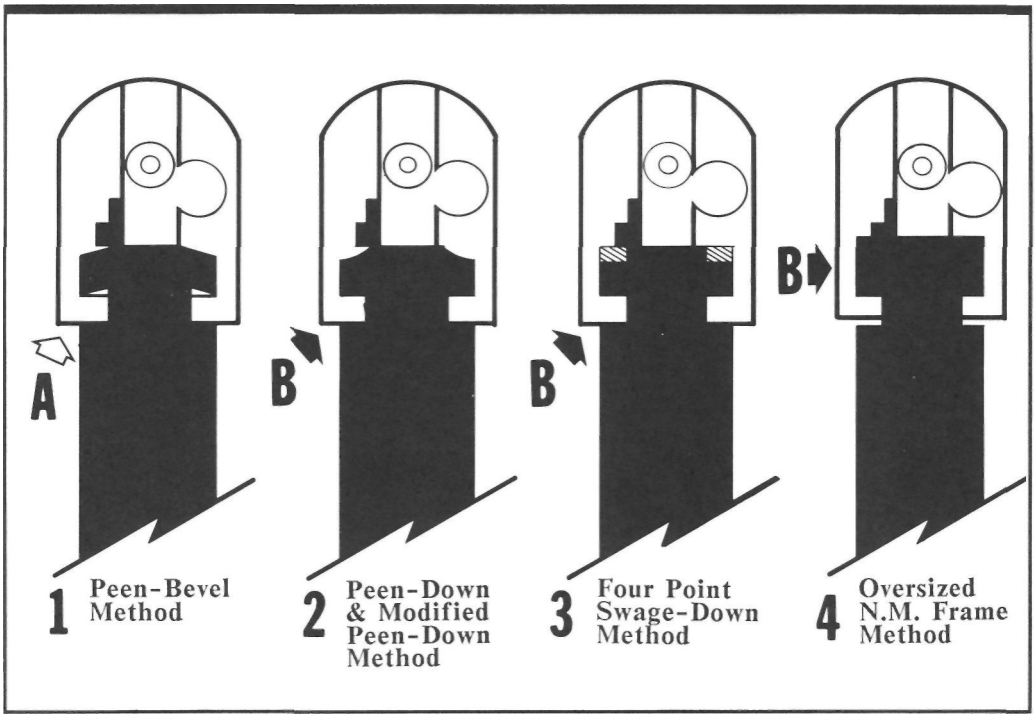


Figure 149- Shows four basic examples of vertical frame rail tightening and fitting. This work controls vertical slide movement, or play, on the frame. The first three methods invert the frame's bearing surfaces, converting the insides of the frame rails [rail slotsl into new slide bearing and control surfaces. Bearing surfaces are indicated with **"B"**, above. In this process, slide position is lowered on the frame to the extent that the rails have been lowered. The last example shows a National Match frame. These frames are oversized and require a slight reduction in rail size to fit into a standard slide's rail slots. This system maintains the original upper bearing surfaces, since the frame rails and slide are not lowered.

1. The Peen-Bevel Method- This short cut method is much faster and has less potential for frame marking. However, the problem with this system is that very little of the frame rail area is actually lowered and in final bearing contact with the slide. Only the rail corner edges become bearing surfaces, and they very quickly wear out. See **"A"**, above. I suggest using a better approach.

2. The Peen-Down Method- This traditional method is best known and produces excellent results when used by skilled and experienced pistolsmiths. The shortcoming is that the very thin frame areas on either side of the magazine well can be easily buckled or distorted while learning this process.
2.A. Modified Peen-Down- Basically, this system is the same as above, except that the thin, collapsible areas at either side of the magazine well are left, and not peened. This amounts to a peened, four point lowering/tightening system.

3. Four Point Swage-Down **Method-** This very workable rail lowering method is similar to the modified peen-down system, except that slightly less than 1" of each rail end is lowered with a rail swaging punch.

4. Oversized Frame Method- Here, the rail/slide bearing surfaces are not reversed, or inverted, as was the case with the other examples. With oversized National Match type frames, rail work is limited to precision fitting of the oversized, frame rails to the rail slots of the slide being used. Squeezing, or compressing the slide to improve fit is seldom needed with these high quality frames. While availability of oversized frames has been limited, it now appears that new manufacturers are beginning to produce this item again.

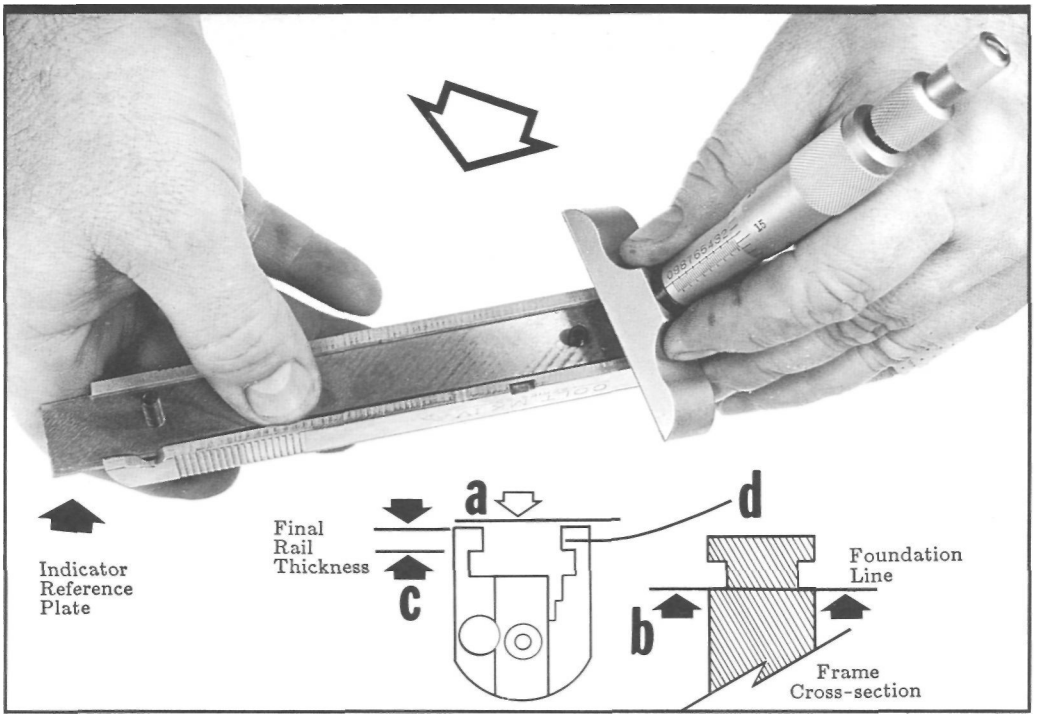


Figure 150- Shows slide measurements and checks necessary before frame rail lowering can begin. It is sometimes forgotten that the finished slide is the actual measuring reference that determines just how far the frame rails must be moved downward, or lowered.

A. Bottom slide edges- must be checked for parallel and uniformity. Once the frame rails have been lowered, the new bottom slide edges become the main bearing surfaces. For this reason, slide edges must be measured for uniformity, and then trued to the point that they are perfectly smooth and parallel with the rail slots machined into the slide. A depth gauge micrometer is used to determine both irregularities and the new bottom edge measurement. A precision ground indicator reference plate is inserted into the rail slots and then, with set screws, elevated to full inside rail contact, as shown above.

B. Foundation line- once the bottom edges of the slide have been trued and polished to the point that they are perfectly parallel with the slide's rail slots, potential vertical rail-fitting bind, caused by the slide itself, will have been eliminated in advance. An improperly prepared slide will make precision frame rail work difficult, and sometimes nearly impossible. The newly finished bottom edges of the slide become the basis for frame rail measurement, and determine the slide's new position on the frame. All frame rail downward adjustment is measured from this important foundation line.

C. Slide rail thickness- once the slide foundation line is set, vertical slide rail thickness can be measured. This measurement is used to determine just how high the level of the frame rails must be [or, in reverse, how much they must be lowered]. For example: if the final slide rail thickness at "C", above, measures .113", then we know that the frame rails must be lowered to about .113" + an allowance of .0005" to .001" for clearance. You can see that, once the foundation line has been set, any further polishing or alteration of the slide's bottom edges will shorten slide rail height and then require additional frame rail lowering.

D. Inside rail shoulders- at this point, it's a good idea to dress the rail shoulders inside the slide to eliminate high spots and burrs where they contact the frame's rail slots.

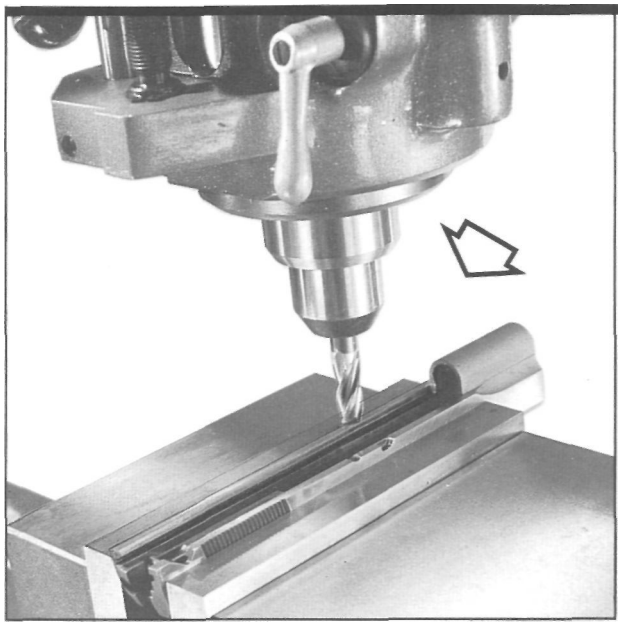


Figure 151- Shows using a carbide end mill to adjust and true the edge level of a hard, or more than slightly irregular, slide bottom after first indicating position. This method is very useful when surface irregularity is found where the recoil spring plug housing extends from the slide. Make multiple light cutting passes.

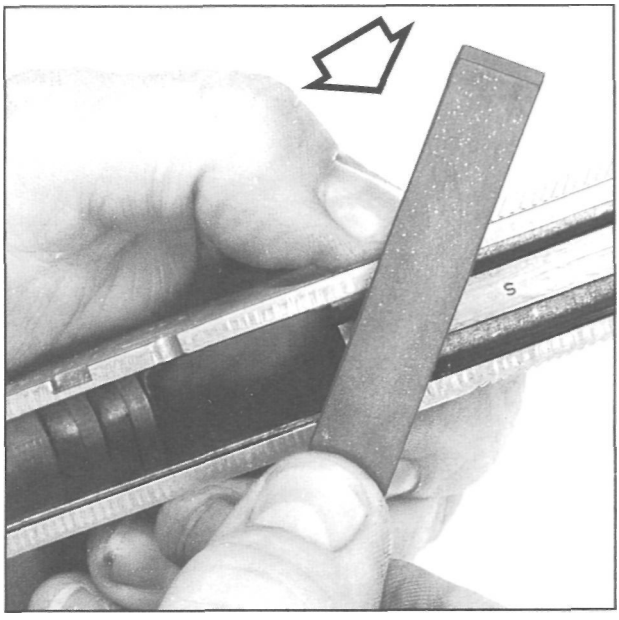


Figure 152- Shows finishing a slide bottom by hand, using a 1/2"x1/2"x6" fine cut stone. Many slides will require no more than moderate leveling and dressing with this type of stone. But some will be found with irregularities that require truing by file. Harder civilian slides should be milled as shown in figure 151.

Slide Bottom Preparation

When the frame rails are to be lowered and tightened, the slide must be predimensioned for proper frame fit. The rails also must be prepared and dressed to prevent bind or sticking on the frame.

1. Check slide bottom height using a depth micrometer and a measuring reference plate inserted between the inside slide rail slots. For accurate measurement, the reference plate must fit snugly.
2. With most slides, slight bottom variations, burrs, and high spots can be easily leveled with a fine stone.
3. When irregularities and high spots are found that won't reduce with moderate stoning, file the slide bottom area until true. See figures 151 and 152. Harder slides may require milling.
4. After truing, stone and dress the slide bottom until it is smooth, level, and parallel with the slides' rail slots.
5. Measure the remaining slide rail slot to slide bottom thickness. When in operating position, the bottom surface becomes the new foundation line which determines just how low the frame rails must be. See figure 150.

Caution: Don't polish or alter the final slide bottom surface once the frame rails have been lowered.

6. After frame rail work has been completed, the slide will be tightened to remove side play- dress and deburr the inside rail shoulders now. Use a 1/2"x1/2" fine stone for this work, and remove burrs and high spots only.

Frame Rail Forming and Gauging Bars

After slide truing work has been finished, and the slide bottom has been polished, the resulting slide rail thickness dimension is measurable. This measurement, taken from the new bottom foundation line to the top of the slide's rails, determines just how far the frame rails must be lowered. Now, the correct size rail forming-gauging bar can be selected. Standard gauge bars are machined, hardened, and precision ground in several even sizes; .115", .114", .113". .112", .111", .110", and .109". The first four are most often used. The last three are mostly needed when a slide's bottom condition is uneven, and requires extensive truing. Half-size bars such as .1145", .1135", .1125", and etc., are used by some pistolsmiths to minimize metal work; a very good idea.

Using Frame Rail Forming and Gauging Bars

Peening or swaging frame rails down to a gauge bar is a skill requiring patience and careful attention to detail. Expertly done, the underside of new rail bottoms will be nearly as straight and even as if machined. In theory, a series of small, even taps on the rail tops can gradually form an almost mirror like impression of the gauge bar held in the frame rail slot. While developing this skill, it's a good idea to practice on older frames, reducing rail height in steps, while using successively lower gauges.

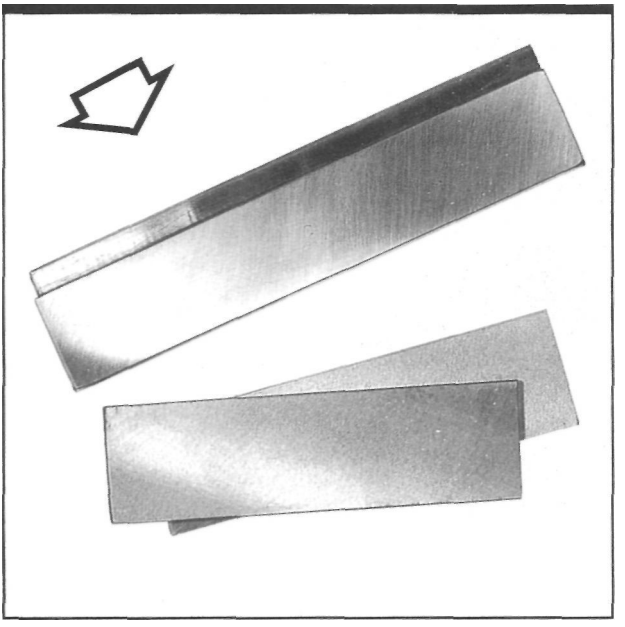


Figure 153- Shows both single and double-side rail forming and gauging bars. These hardened, surface ground bars are used as an inside frame rail forming die by holding them inside the rail slots as the rails are peened, or swaged lower. The bars are also useful as a measuring device for checking rail slot height and condition.

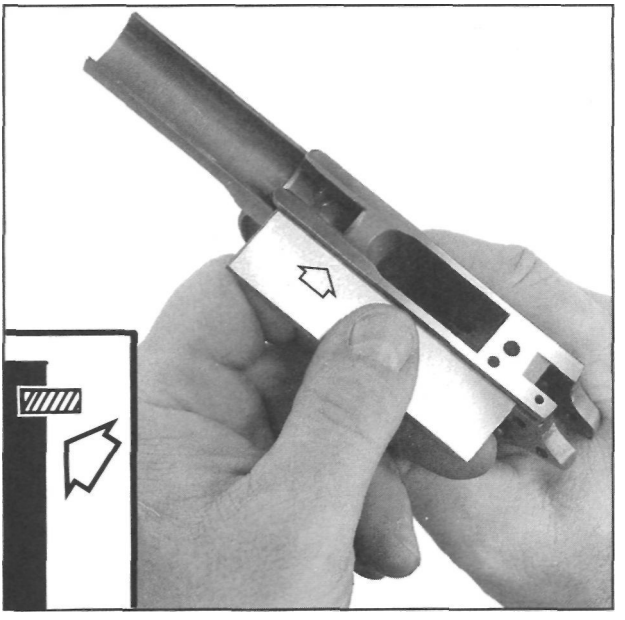


Figure 154- Shows a single-side rail forming and gauging bar inserted into the frame's ran slot, placed just as it would be when the rails are lowered. Gauge bars should be pre-selected at a size approx. .001" over actual needed slide rail height. While developing a "feel" for this work, use bars .002" over as a first step.

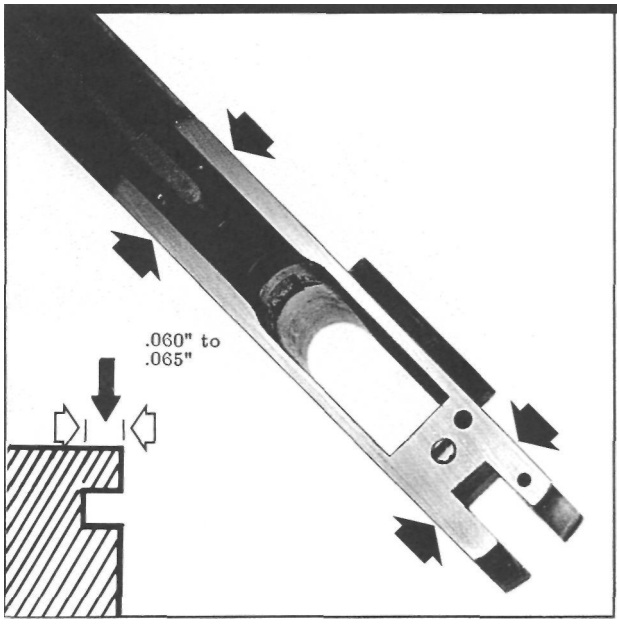


Figure 155- Shows the four rail end areas that are lowered when the modified rail peen-down method is used. Only a top rail area equal to the frame's slot depth should be lowered. Most rail slots run between .060" and .065" deep. Trying to peen down a wider area of the frame may damage the frame or work harden the rails.

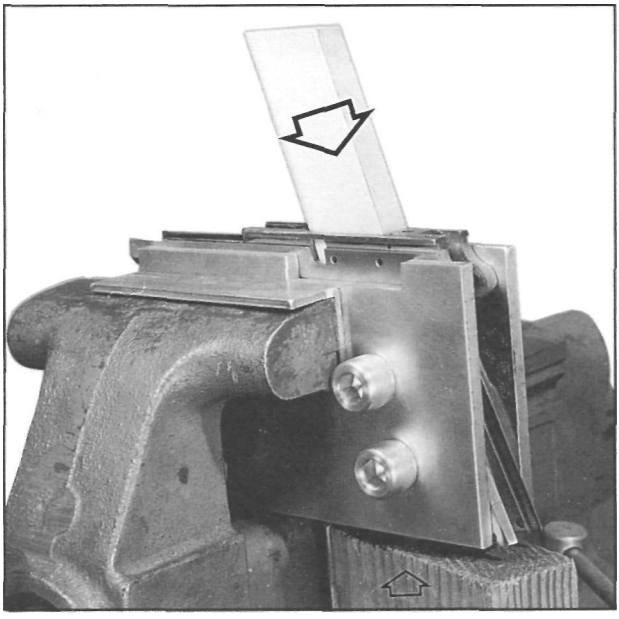


Figure 156- Shows the frame in the vise, set-up between aluminum frame plates, ready for rail peening or swaging. A reinforcing insert, or filler, is. used in the magazine well to prevent frame distortion when the vise is tightened. I suggest using a small lead or wood block under the frame to hold it in vertical position.

The Modified Peen-Down Rail Lowering Method

This method replaces the old full length rail lowering system and prevents damage to the thin middle rail areas on both sides of the magazine well. Full length rail lowering is hard to learn and always carries a potential for frame damage. Also, it has been discovered that lowering the middle area doesn't improve performance. The important requirement, as it turns out, is to provide tight, consistent, repeatable lock-up, and with a minimum of vertical and horizontal slide clearance.

Approximately 7/8" of each rail end should be lowered. See figure 155. Peen only that portion of the rail just above the slot. Trying to lower a wider area requires too much force and, again, increases the potential for frame damage.

Frame Set Up

While there are quite a number of ways to secure the frame while the rails are being modified, the use of aluminum frame plates allows maximum holding power at a minimum of vise pressure. Leather protective pads can be used to preserve finishes. See figure 156.

Much less vise pressure is necessary when the frame is supported underneath. Use a soft lead or wooden block for this purpose. This simple step, when combined with the insertion of a magazine well filler, helps prevent frame compression damage.

Peen-Down Frame Rails

Begin with the frame secured as shown in figure 156. Tighten the vise just enough to hold the work in place.

1. Carefully prepare the ball peen hammer face. Any mark on the face will transfer directly to the peened rail surface. See figure 157.
2. Double check that the size of the forming-gauging bar is correct. As a protection against over lowering, first select a bar .001" thicker than the actual final size needed.
3. Then, peen both the front and rear rails in two separate stages. Once the rails have been successfully lowered to the thicker gauge bar, they can be further lowered to the final, tighter fitting bar.
4. Check slide fit as you go. If bind is present when the rails are peened to a light contact with the gauge bar, make sure it is not caused by the front of the frame. See fig. 158. At a certain point, the unlowered rail tops at the sides of the magazine well may corner bind, requiring clearancing. Use Dykem Blue to locate any tight problem areas. Any rail bind still present can be either stoned on the outside rail surfaces, or lapped if inside.
5. Dress the outside edges of the rails, removing burrs and bringing the rails to parallel.
6. If slide fit is O.K., now lower front and rear rails to their final gauge level.
7. Recheck fit. Work out slight drag with a fine polish like JB bore compound, then clean, oil, and hand seat until the slide moves freely.

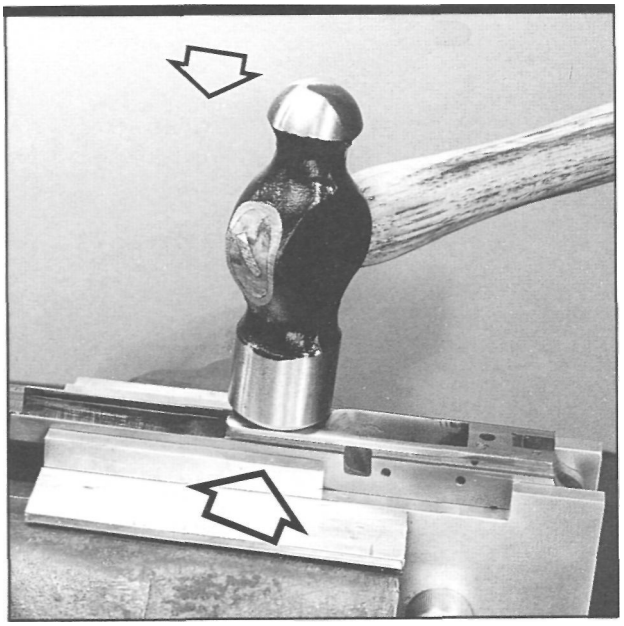


Figure 157- Shows a 6 or 8 ounce ball peen hammer positioned over the front frame rails. The hammer's face must be trued and polished to prevent excess impact marking. Only the top rail ledge 1.060" to .065"] of the frame is to be lowered. Insert the correct forming bar into the rail slots, where shown. See arrow above.

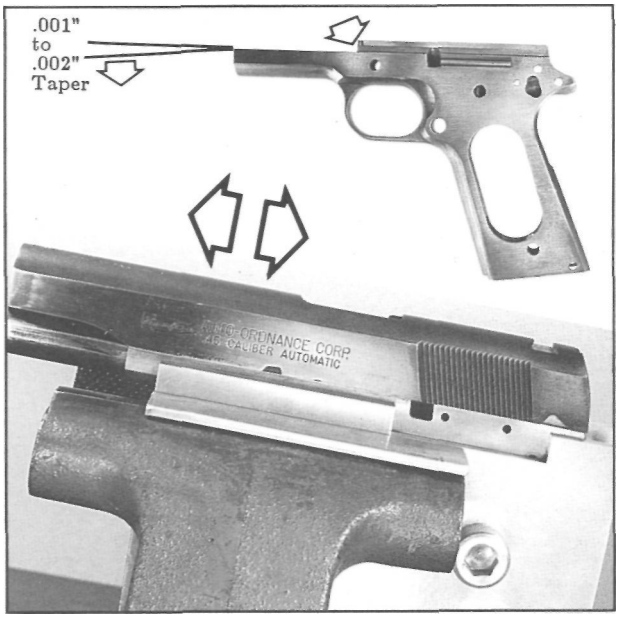


Figure 158- Shows trial fitting the slide on the newly tightened frame rails. It's a very good idea to make this check frequently during the lowering process. The forward portion of the frame, or recoil spring tunnel, may contact or bind, requiring extra clearance as shown above. Sometimes, gunsmiths mistake this for rail bind.

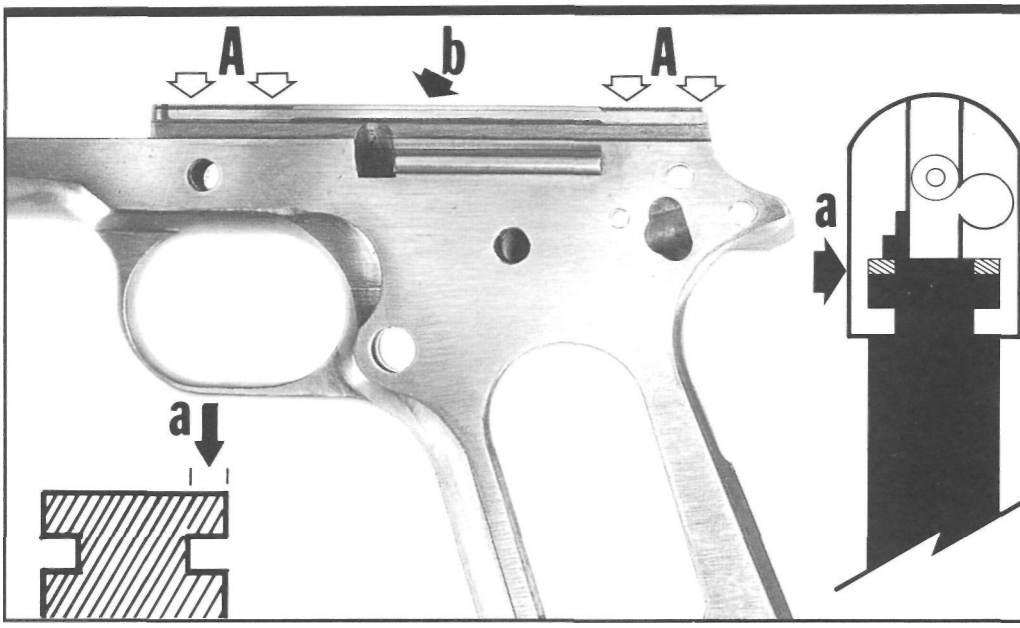


Figure 159- Shows both a side and end view of the frame rails after they have been lowered using the four point swage-down system. **"A"** indicates the approx. 7/8" front and rear rail bearing areas which are lowered with the swaging punch. **"B"** indicates the unlowered "between" areas at the sides of the magazine well. These outside rail corners now require clearancing to prevent bind when the slide is in the new lower position. As with the modified peen-down system, only a width of .060 to about .065" of the rail ends are lowered. Remember that rail slot depth varies somewhat from frame to frame.

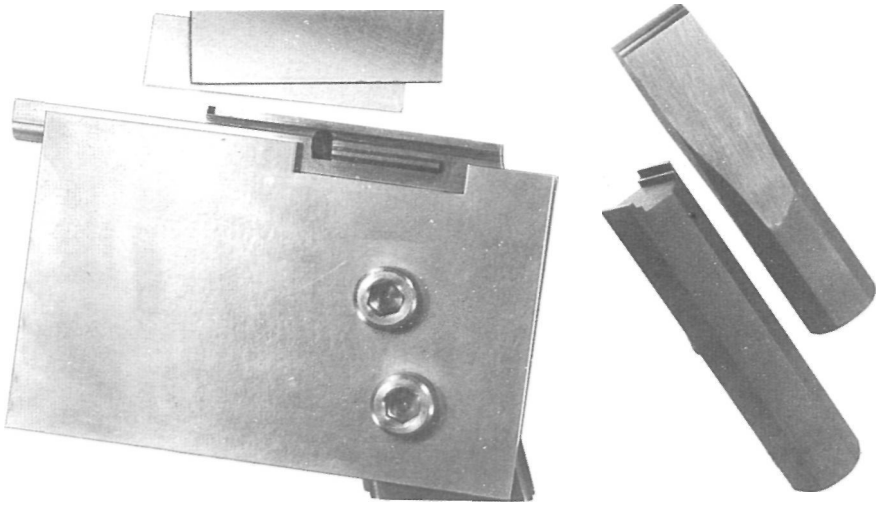


Figure 160- Shows the tools and fixtures necessary for rail swaging. The aluminum frame plates hold the frame over its' stiffer cross members, allowing a stronger, better grip at less pressure. I suggest using frame plates with all methods of rail lowering. The magazine well reinforcing filler is not quite as important when frame plates are used, but is suggested as insurance against possible frame distortion. The swaging punch is notched .065" deep so that only the part of the frame rail directly above the slot can be swaged downward. The same forming-gauging bars are used as with other systems.

Four Point Frame Rail Swage-Down Method

Four point swaging lowers the same part of the frame rails as the modified peen-down system, but with less overall movement of metal. See figures 155 through 160. Carefully done, and with the frame protected with leather pads between the aluminum frame plates, little sign of alteration is evident except on the rails themselves. Use the same gauge bars as with peening. Lower the rails in the same two separate steps, remembering to check slide fit frequently. With swaging, it is a matter of holding the punch perfectly straight and learning just how hard to hit. Start with very light taps, increasing force until the rail tops begin to move. It doesn't take long to develop a "feel" for the amount of movement that a given impact produces. In swaging, impact energy is both focussed and heavier. For support, use a hardwood or lead back-up block under the frame tail.

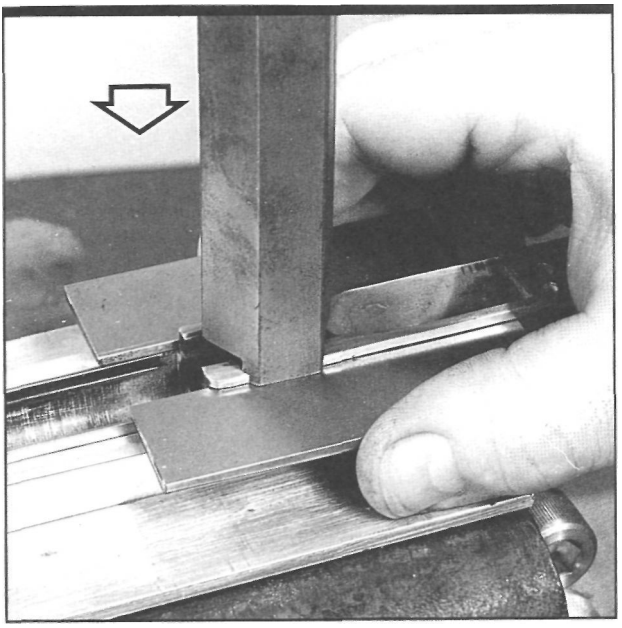


Figure 161- Shows using the rail swaging punch to lower the frame rail ends. Just as with the peening method, swaging is done in a series of controlled taps, except with a much heavier, 12 oz. hammer. It is important that the punch be held against the rail and straight up while the rail is being moved progressively downward.

Check Rail Parallel

Production frame rails aren't exactly parallel, and they will be less so after lowering by either peening or swaging. A tendency among gunsmiths is to lessen the importance of this, believing it acceptable to lap out any and all bind after tightening the slide. The error in this practice is that heavy lapping produces rounded off contact spots, instead of full length bearing surfaces. See figure 162.

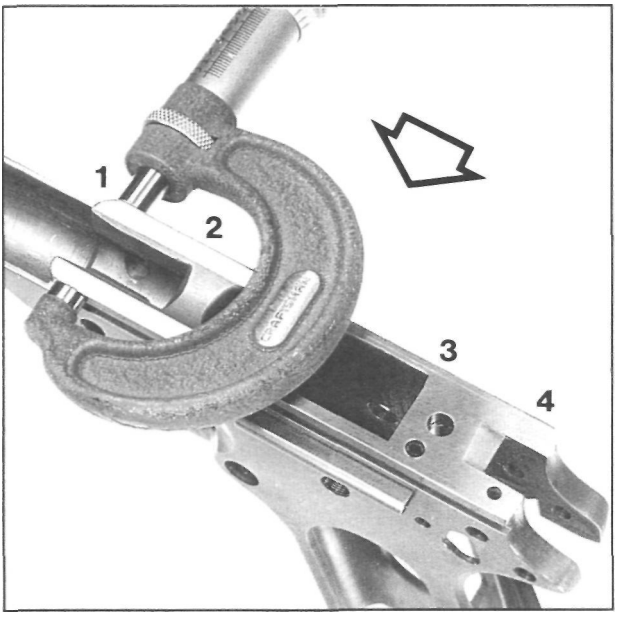


Figure 162- Shows parallel checking the outside surfaces of the newly lowered and shaped rails in preparation for slide tightening. To prevent frame caused contact sticking, the rails must be checked at each of the four points shown, and surface polished to within .001" of parallel before the slide is horizontally tightened.

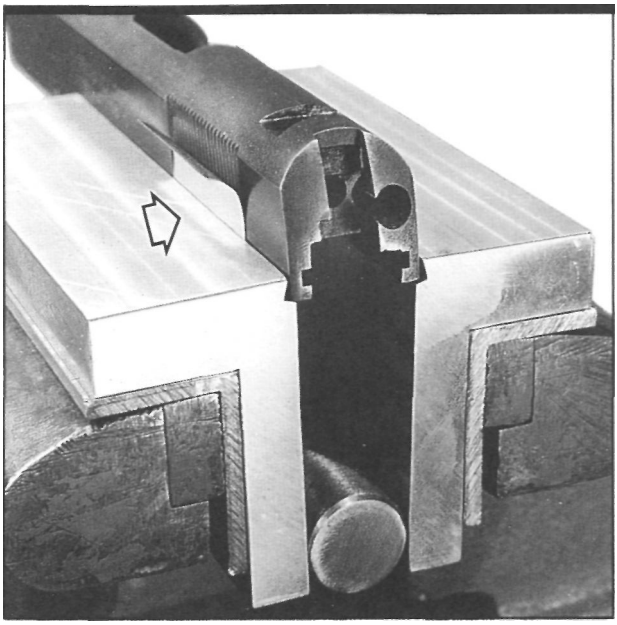


Figure 163- Shows the slide between reinforced aluminum tightening jaws. Only about 3 1/4" of the jaws bear on the slide. Shims in the finger grooves make compression more uniform. For less flex, use a large, heavy duty vise. With other variables controlled, the heavier the vise, the more predictable the final product.

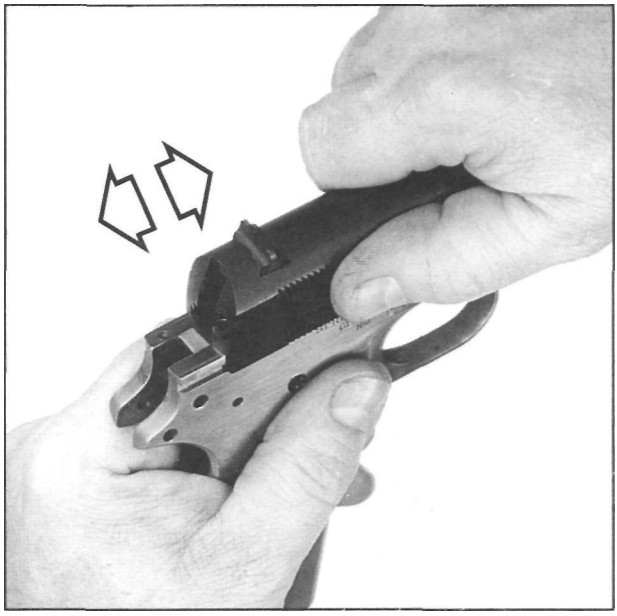


Figure 164- Shows final seating a tightened slide on **a** modified rail frame. When correctly compressed, the slide will finish just to a light drag fit. Drag is removed by lapping with JB bore, compound. Lap with oil and 3F silicon carbide powder to remove heavier resistance. After cleaning, hand seat the slide with oil.

Tighten Slide to Frame

After 50 years, experts still argue as to whether the slide should be tightened before, or after, frame rail work.

As I see it, results are much more precise when the slide is carefully adjusted inward to fit on a true and parallel frame rail surface, after all rail modifications are done. This system requires a bit more fitting time, but it's better than trying to make the frame fit inside the slide. Properly, a slide is tightened through the cross section of its' rail slots. To prevent slide damage, correct tooling is a must. See figure 163.

Correctly tightened slides will have reasonably straight sides, and poorly tightened, slides are often found bent in or curved at the rail bottoms.

1. Be sure that the inside rail edges are dressed.
2. Measure the inside of the slide for reference before applying tightening pressure.
3. Shim the lower finger groove areas, as needed, to provide even compression.
4. Begin by flexing the slide inward .020"-.025" from the slide reference measurement. Hold about 20 seconds, then stress relieve by striking the flat anvil part of the vise sharply with a lead hammer.
5. Now check slide fit.
6. Remeasure the inside of the rails, adjusting both shims and position as needed.
7. Repeat steps 4 and 5 and, if required, increase slide flex until at .030" under the first reference measurement. Correct resistive areas with thicker shims.

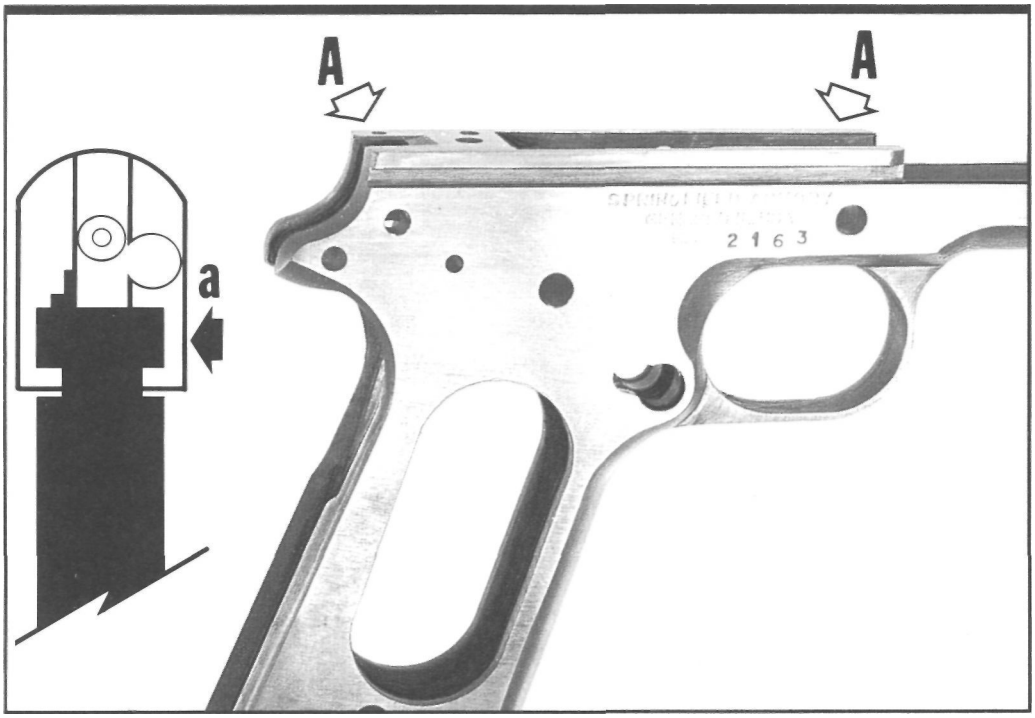


Figure 165- Shows an oversized National Match type frame. This frame is larger in both rail height and width, and does not require rail peening or swage-down. The two earlier systems reversed, or inverted, the bearing rails, to make the slide's bottom rails fit tightly in the frame. With this larger frame, the upper rails remain as bearing surfaces and are hand fit to minimum clearance inside the slide's original rail slots. See bearing surface indicated at **"A"** above.

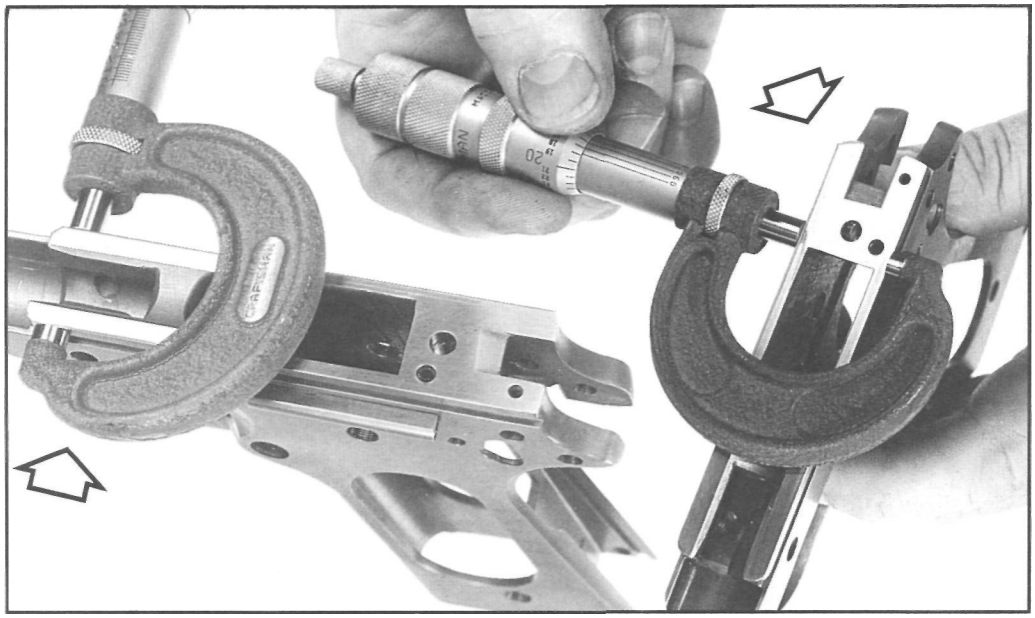


Figure 166- Shows measuring dimensions of the oversized N.M. frame rails for final adjustment. Both height and width must be reduced by stoning- or, preferably, by use of **a** surface plate. Fit rail height and width, and then dress until the slide will just fit onto the frame. At this point, the slide should drag evenly on the rails. Carefully remove sharp corners, burrs, and etc. from both slide and frame. **Use oil when checking fit. Do not force or gall.**

Figure 166A- Shows two views of an M1911 National Match type frame, as manufactured by Springfield Armory Inc., Geneseo, lll. This very well machined frame was specially ordered in the white, as shown, and is excellent in every detail. And, being machined from a solid forging, very little fitting and finishing is required. If this specimen is typical of production, Springfield will sell a lot of these frames. I prefer forged frames for match use. With the mold variations found in investment cast frames, one side can be slightly off-set, causing dimensions to vary or shift from one side to the other.

Final Slide Lapping On National Match Frame

When building competition pistols on National Match type frames, it is important initially to fit the slide just a little bit tighter than a light drag fit, but without galling. The reason for this is that final fitting is done by carefully lapping the slide to the frame. For tight bottom rail slots, I suggest using the thinned #3F compound as shown in figure 167. Then, use an extremely fine lapping polish, such as JB compound or white toothpaste.

1. Brush a very small amount of compound onto the rails and into the slots.
2. Work the slide back and forth lightly and with full length strokes. **Do not use force or pressure against the lapping compound.**
3. Remove the slide after several passes, and solvent wash all lapping compound from both slide and frame.
4. Oil the rails and test fit.
5. Repeat steps 1 through 4 if drag is still present.
6. When resistance is no longer present, detail solvent wash the frame and slide. Scrub the rail areas with a brass brush, making certain that all polishing residue has been removed.
7. Heavily oil the rails and hand work the slide in with two hundred full strokes.
8. When these steps are correctly done, the slide should pass the "gravity test", as shown in figure 168.

Final vertical and horizontal clearances of less than .001" are possible with this method.

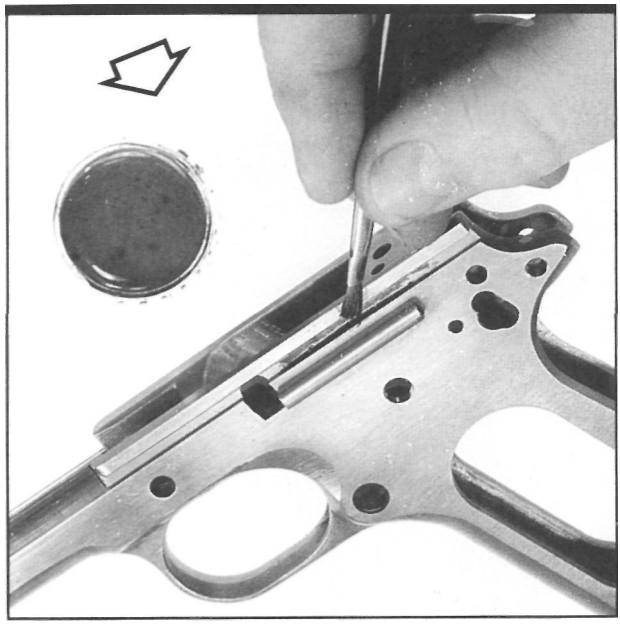


Figure 167- Shows carefully brushing a very small amount of fine lapping compound into a tight N.M. frame's rail slots. The compound is a thin mixture of 3F silicon carbide flour and oil, and is used when the slide still drags inside the rail slots even after the inside shoulders of the slide have been stoned and dressed.

Figure 168- Shows "gravity testing" the slide's fit after lapping and final oil seating the rail surfaces. Now, the slide no longer drags in the frame rails, and yet has less than .001 vertical and horizontal clearance. The slide feels very solid when fit this closely, but moves quite easily when it is tipped in either direction.

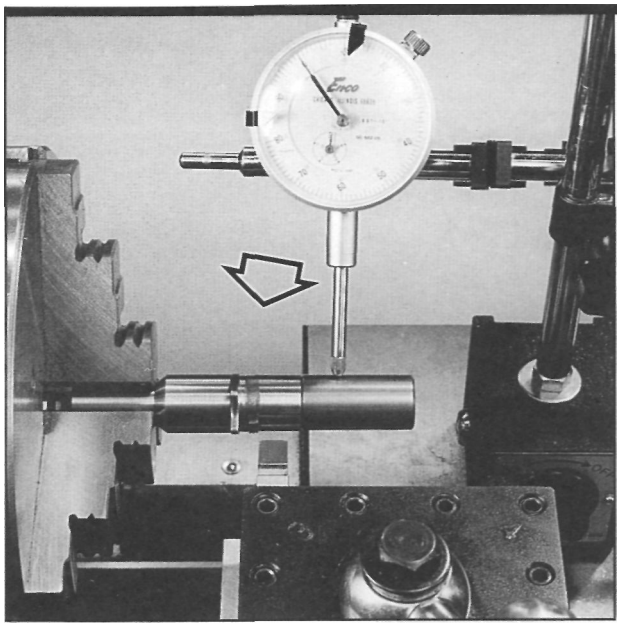


Figure 169- Shows a larger, or accuracy type barrel bushing set up on a lathe mandrel. Some oversized busnings are ribbed and/or otherwise irregular on the outside, making direct dial indication difficult. To prevent lathe tool tip breakage, use H.S. steel tooling for this work insteadof carbide. Set the lathe at low rpm.

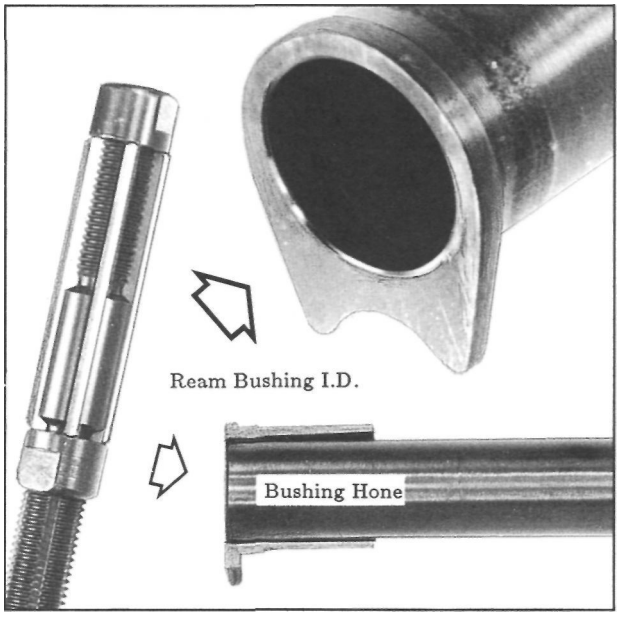


Figure 170- Shows an accuracy bushing that has been turned and sized to the slide, ready for inside barrel fitting. Adjustable reamers are helpful in pre-sizing bushing I.D. For use in competition it's important that the bushing is reamed and then honed to a light drag fit before lock-unlock clearancing and work-in.

Fit Competition Bushing

Competition requires both a tight and durable bushing to slide fit. This means that the bushing skirt should make mazimum and even contact with the inside of the slide. To guarantee a uniform fit, deburr and dress the bushing area inside the slide before refitting. With oversized accuracy bushings now being in plentiful supply, I do not suggest bushing expansion for this category of use.

Lathe turning the outside of an oversized bushing will produce a more even skirt and result in a larger slide contact area. Hand work should be limited to final stoning and polishing after lathe work is done. For more fitting information, see figures 50, 51, and 52.

Fit Competition Bushing to Barrel

Inside bushing fitting for competition is largely the same as covered earlier under accuracy use. The emphasis here is on a slightly tighter barrel fit requiring work-in.

Ream and then hone the I.D. of the bushing to a size that will just start on the barrel. Then, lightly polish and work the fit in from there.

With this done, the bushing bore requires top and bottom inside relief for vertical barrel swing during lock up. Remove only an absolute minimum of material; just enough to prevent barrel springing when in the locked position. For extra data, see figures 56, 57, 60 and 61.

Slide Preparation for Match Barrel Installation

Match barrels are fit and linked higher for maximum lug engagement. The inside slide area just below the lug slots must be prepared before rear barrel fitting can begin.

1. Level all machining marks or flanging ridges at the lower edges of the slide lugs. See figure 66.
2. While leveling, angle the inside surface of the slide slightly toward the ejection port. This helps when linking the barrel higher into full lug engagement. **Warning:** .055" min. final lug depth must remain at the lowest point.
3. Next, hone the lug tops. See fig. 171. Then, slightly break the sharp lug edges with a 1/4" round stone.
4. If less than 10% lug corner battering was present, a very light chamfering will now remove it. **Caution:** Do not chamfer the lug edges by more than .005". See fig. 65.

Fit Match Barrel Hood

Fitting the barrel hood so that it cannot move once the barrel is fully locked, is the key to mechanical accuracy - or repeatability of position.

1. Coat the rear of the barrel with Dykem Blue and install with a loose bushing.
2. Estimate how much metal is to be removed from the hood by contact marks in the Dykem Blue. Also, check high spots while holding the assembly as closed as possible against a bright light.
3. Reduce oversized areas with a hard 1/2"x1/2" stone, rechecking with Dykem Blue, until the barrel hood lets the barrel move up into full lock.

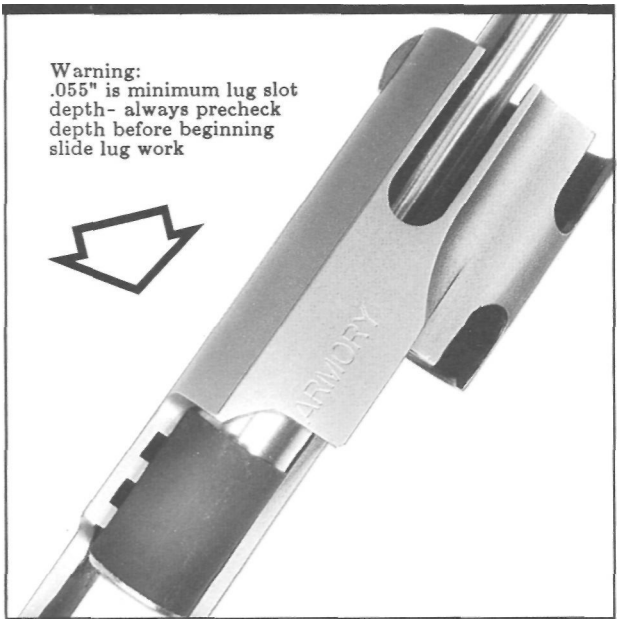


Figure 171- Shows a cutaway view of the slide with a hone being used to dress the top lug area inside. After leveling honing prepares the slide for match barrel installation and for later barrel link-up into full lug engagement. A shallow honing angle permits an increase in rear barrel elevation. Do not lower lugs below .055" depth.

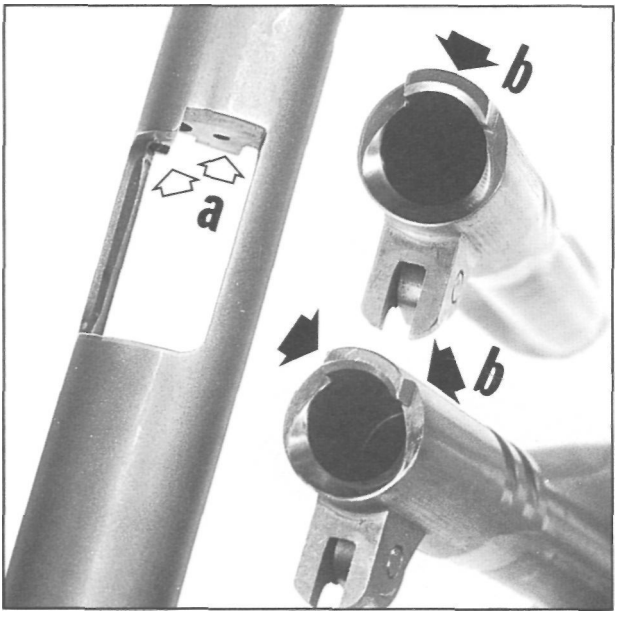


Figure 172- Shows the fitting points on a match or competition grade barrel. Match barrel hoods are oversized for precise rear barrel to slide adjustment. The arrows at **"B"** show where the barrel fits into the corresponding slide areas at **"A"**. All hood edges are fit to a light drag contact, then the corners are relieved.

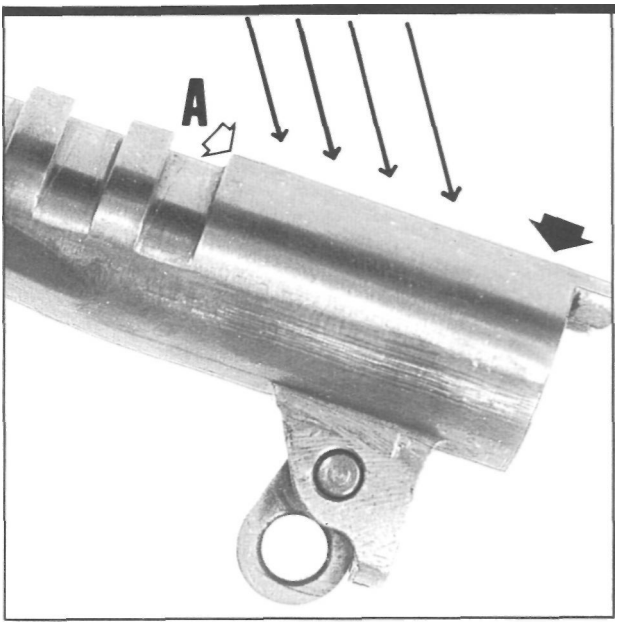


Figure 173- Shows rear barrel areas requiring pre-polishing before further fitting. The object is to provide clearance and to eliminate barrel top irregularities by cross-hatch sanding at 45 degrees. The lug tops are kept level, but the barrel top and hood are clearanced on a slight angle. The lug wall at "A" is not lowered.

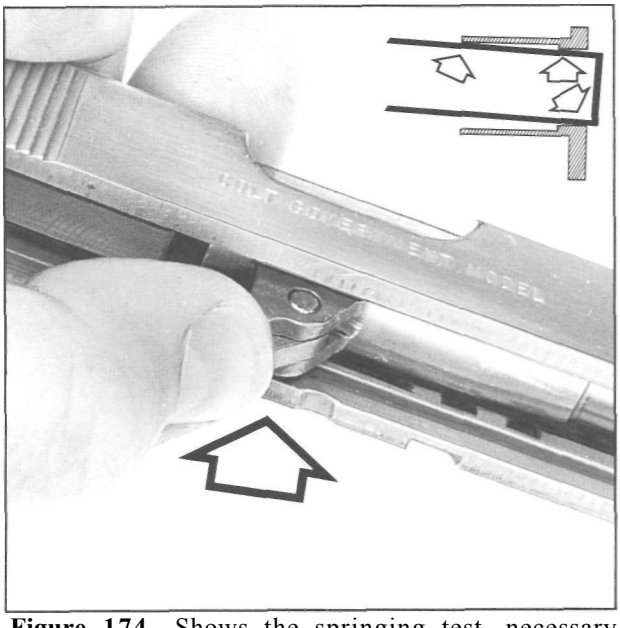


Figure 174- Shows the springing test, necessary after precision barrel and bushing fitting. This is a simple, yet important, check for possible inside bushing throat and skirt bind. The barrel must go into the full-lock position without the slightest bend or stress. Inside bushing bind and contact areas are also illustrated above.

Final Fit Match Barrel, Bushing and Slide

The following final steps are necessary before slide, match barrel, and bushing fitting can be considered finished.

1. Round and pre-dress the barrel top and lug area with #320 sand cloth. See fig. 173. Cross hatching helps retain roundness and provides a dull surface that will show contact marks during later seating.
2. Then, clean and oil the barrel, and install it in the slide- **with the previously fit oversized barrel bushing.**
3. Now, thumb depress the barrel into the fully locked position to check for lock-up springing. The barrel and lugs should come to rest with a solid feel and slight hood drag, but without the feel of springing. The barrel hood is still slightly oversized and will likely drag even more at lock-up since the tightened bushing is used. Don't polish the hood edges further at this time unless contact bind **is** excessive. All drag areas are handled during final seating.
4. Barrel springing caused by bushing throat bind is easily corrected by further barrel swing clearancing at the upper and lower bushing throat surfaces.
5. Springing caused by barrel/bushing skirt contact is eliminated by chamfering the inside of the skirt and/or by clearance turning the O.D. of the barrel. Also see figures 175, 59, 60, and 61. Almost all match grade barrels are larger diameter and require O.D. reduction behind the bushing engagement point.

Match Barrel Cycling Relief

Most manufacturers of match grade barrels lathe turn the main section of the barrel tube back down to standard diameter, as a fitting aid. But, depending on the wall thickness of the particular bushing used, and how high the barrel is linked into lug engagement, the barrel may require further reduction in O.D. for cycling clearance. See figures 61 and 175.
Only enough metal should be removed from the barrel tube to provide clearance during cycling. Colt Series 70 and 80 barrels measure about .580" at front and then step down to about .567" for clearance.
Some gunsmiths may not be familiar with this better method and choose, instead, to enlarge the inside of the bushing skirt, not realizing that a thicker bushing stays tight much longer.

Checking Full Match Barrel Lock-Up

Now that barrel springing is eliminated, and clearance work completed, the next step is to check for 100% lug engagement at the first barrel lug slot. See figure 176. The downward position of the **first slide lug** determines how far the barrel lugs can engage the slide. **When the barrel links up, all upward movement stops here.** As can be seen in figure 176, the barrel locks on a slight upward angle, allowing about 85% or 90% lug engagement at the **second barrel slot.** See figure 177 for measurement.

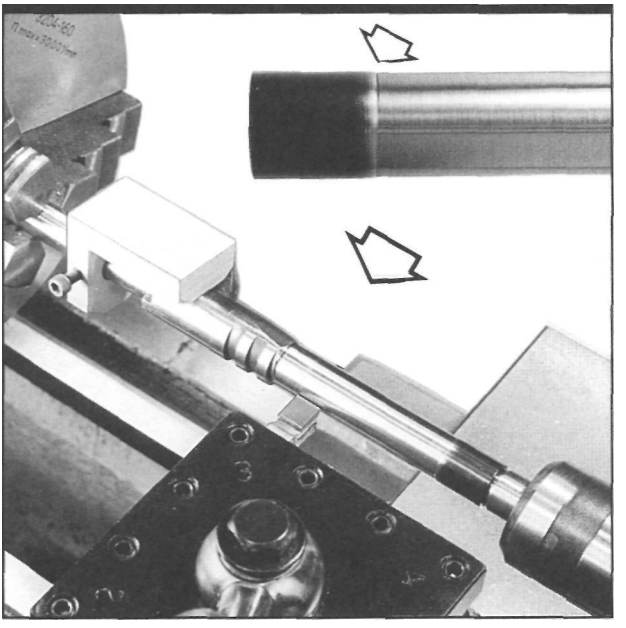


Figure 175- Shows a close view of the front of an oversized match barrel that has been turned to about .575" O.D. for bushing clearance. Note the necessary gradual taper where the barrel steps-up to the bushing engagement surface. Just below, a barrel is shown set up between the self aligning fixture and a live center.

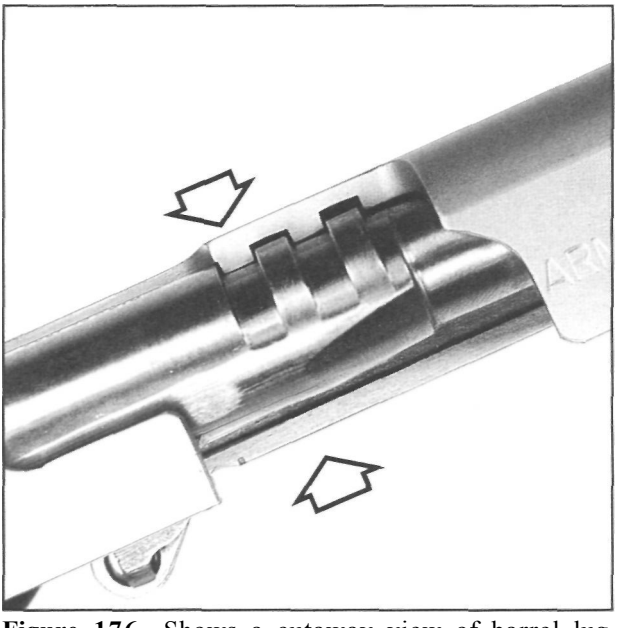


Figure 176- Shows a cutaway view of barrel lug and slide engagement. As a rule, the lug slots in the slide run slightly deeper than the height of the barrel lugs. So, the slide is dressed to allow greater vertical barrel lug engagement. Now, when locked, the rear of the barrel is tipped up a few thousandths more than before.

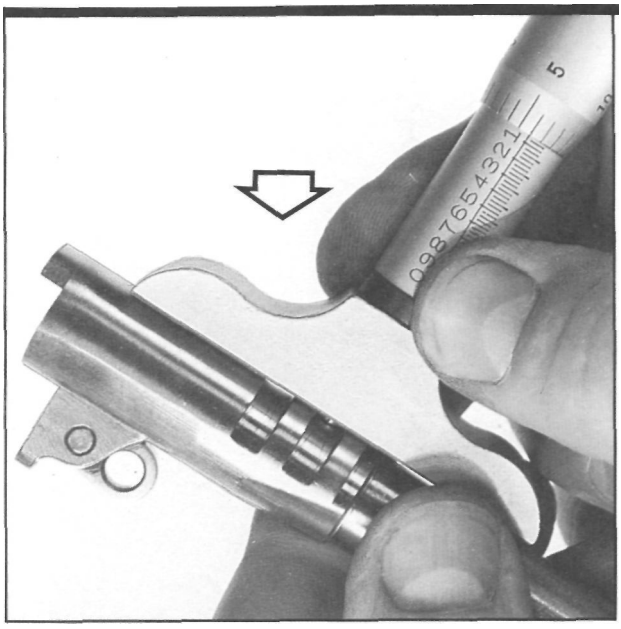


Figure 177- Shows approximating vertical lug engagement using a depth micrometer. Strips of modeling clay pressed into the lugs show slide lug impressions. The micrometer bridge is held at the center line of the lugs, and also toward the light, as the gauge rod is lowered to contact with the upper surface of the clay.

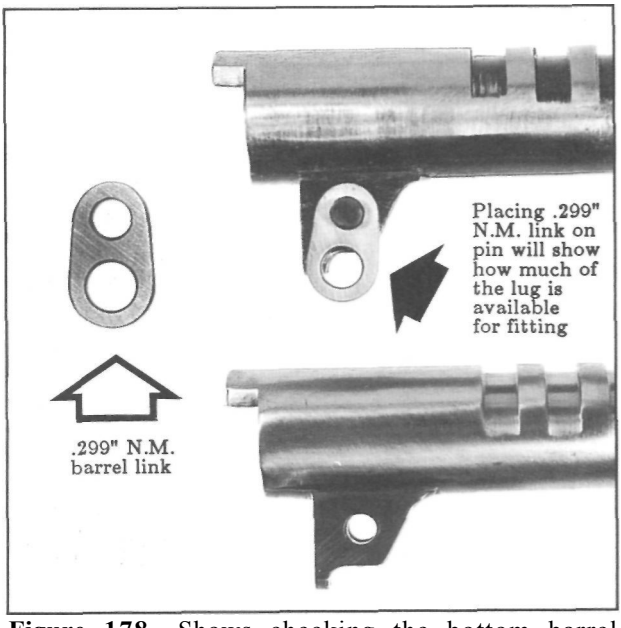


Figure 178- Shows checking the bottom barrel lugs against the longest N.M. link before lug cutting. The lugs must have more than enough bottom material for this link when lugs are cut on a National Match frame. After lug cutting, the new surfaces will be properly contoured, but .002"-.006" over, depending on the cutter.

Measure Vertical Barrel Lug Engagement

This reference measurement will show how well the barrel locking lugs fit up into the slide's lug slots. This is not quite the same as final link-up engagement testing, which is done with an assembled pistol. The barrel must fit to 100% contact with the first slide lug before cutting the bottom lugs on any match grade, or welded-lug, barrel. Normally, there is a bit less engagement at the #2 barrel lug slot. See fig. 176 and 177.

1. Degrease the barrel and place small strips of modeling clay in each lug slot.
2. Clean and dry the slide, and apply talc to prevent clay sticking. Then install the barrel and correct bushing.
3. Press the barrel lugs in all the way, until they stop.
4. Then, measure the level of the clay as shown in figure 177. The first barrel lug slot should show metal contact. The second lug slot should show a very thin layer of clay, but still measure at least 85% lug engagement.

Bottom Barrel Lug Cutting

Before bottom lug cutting, pre-check the actual amount of available lug material by temporarily installing a max. length [.299"] N.M. barrel link. This simple test, a necessity with the higher rail National Match frames, also provides a very useful safety margin with rail-lowered standard frames. Testing for correct link length is better done with an undersized link pin, a handy tool that will prevent pin hole enlargement.

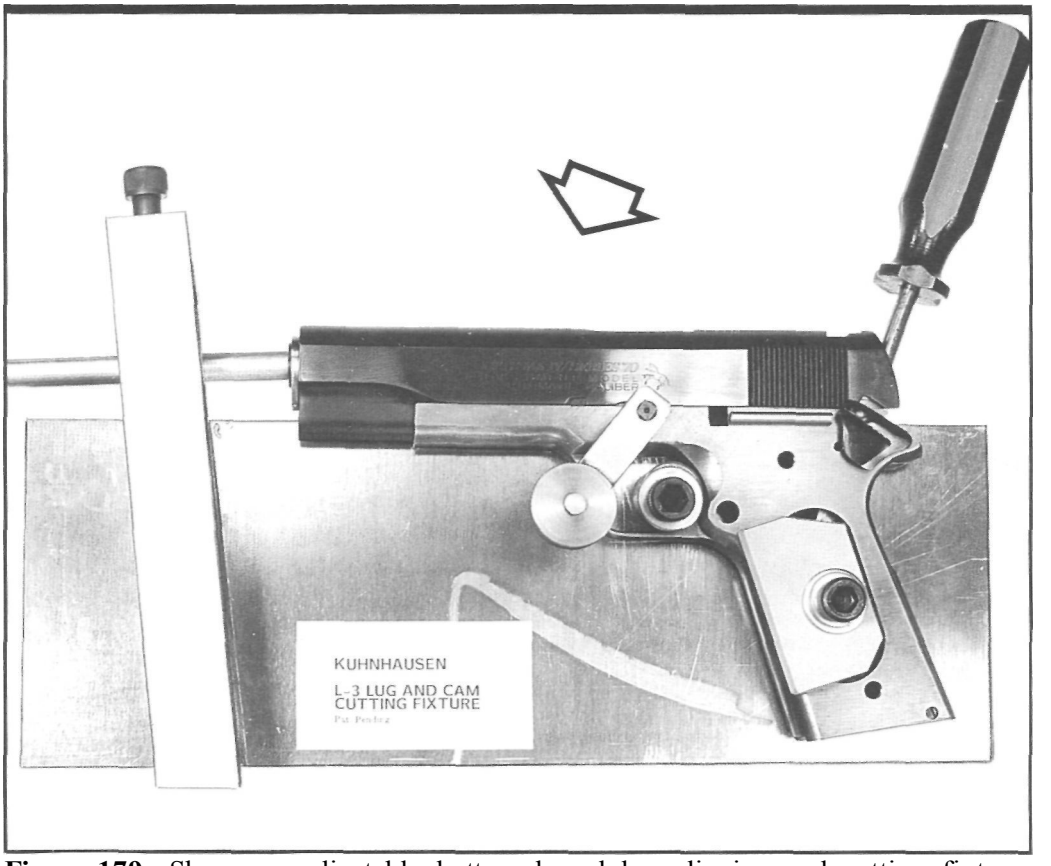


Figure 179- Shows an adjustable bottom barrel lug aligning and cutting fixture, built to be used either straight up in a vise or bolted to a bracket on the bench. Hand cutting bottom barrel lugs continues to be the best way, since the "feel" of the work against the lug cutting head "tells" the pistolsmith how the work is going and when oil is needed. The primary reason that holding jigs, or fixtures, are helpful in bottom lug cutting, is that several things are happening at the same time- and most people have only two hands.

How It Works:

1. The bushing and barrel [without link and pin] are installed in the slide, and the slide is placed on the frame. Then, the assembly is placed in position in the holding brackets. The cutter pilot is prepositioned in the fixture.

2. The hand cutter is installed and slipped into the pilot, positioned in the fixture below.

3. The frame is aligned and secured so that it cannot move.

4. The rod inside the barrel is adjusted to tension the barrel upward and then to hold it in the fully locked position. The lug must be cut with the barrel securely held in this position. The barrel must not move.

5. Forward hand pressure on the tensioning lever moves the slide forward and feeds the bottom barrel lug to the cutter as the cutter is hand turned.

Regular oiling provides cutter lubrication and chip flushing during operation. When the back of the slide is exactly even with the back of the frame, the lug is fully cut. Test to make sure that the thumb safety lever will enter the slide's safety notch before removing the pistol from the fixture. Some amount of final hand fitting is necessary after this work. See figures 180 and 181. The sides of the bottom lug may require dressing before the lug will fit the frame.

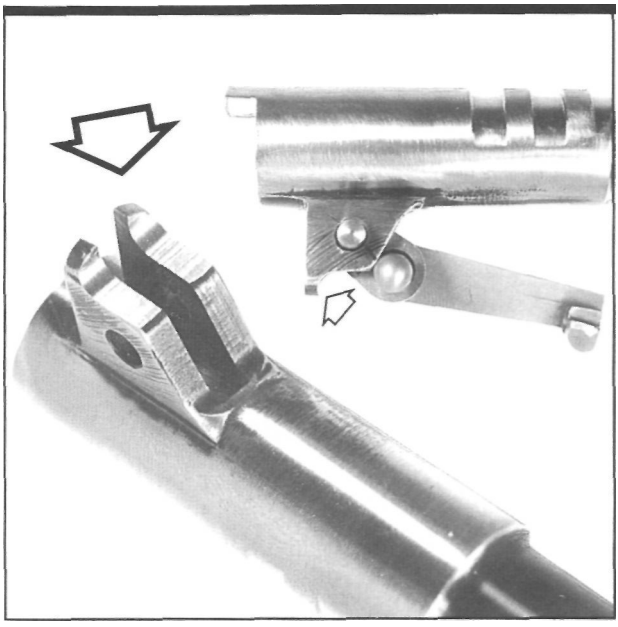


Figure 180- Shows the bottom lug surfaces after having been cut with a lug cutter. When hand fitting is done, the longer link and new, higher lug surfaces, maintain positive vertical locking position. Final lug surface level determines link length. With the barrel fully locked, the lugs should rest on the top and back of the crosspin.

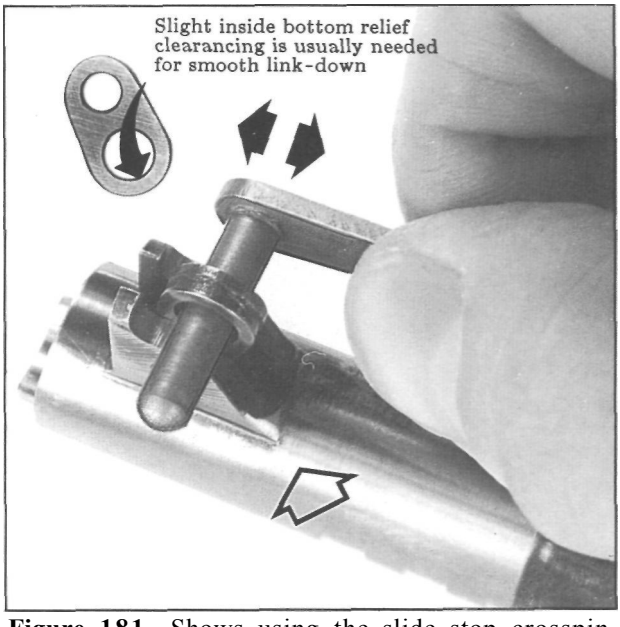


Figure 181- Shows using the slide stop crosspin, with correct link, to locate high spots or bind areas on the new lug surfaces. Remember that most lug cutters leave the lugs slightly high for final hand fitting. A 1/4" round stone is best for this work. Dykem blue will help pinpoint any remaining high spots and drag areas.

Final Fitting the Bottom Barrel Lugs

At this point, the bottom barrel lugs have been cut to pattern while inside the frame. They are at correct height and forward position. Now, the correct barrel link can be selected and the new lug surfaces finally fit.

1. Start with a slightly undersized link pin, and a link that is just at, [but a few thousandths shorter than] the height of the unfinished lug. Remember that the lugs were cut slightly long. See fig. 180.
2. Pre-dress the lug surfaces with a 1/4" round stone, and then coat with Dykem Blue.
3. Slip in the slide stop crosspin. Move the link and crosspin to detect any areas that are still too high.
4. Carefully stone the lugs until the crosspin will pass over the lug ramp corner without contact or drag, and then just come to rest against the lug walls. See figure 181.
5. Assemble slide, barrel, bushing, frame, and crosspin, and check barrel link-up. The barrel must go into full and positive vertical lock-up. Don't worry about slight lug tightness or top barrel drag at this time. All fitting drag is eliminated when the parts are polished after hand seating.
6. Disassemble again, and replace the undersized link pin with a full size pin.
7. Now, stake both sides of the link pin, then dress the sides of the lugs for frame clearance. Some bottom barrel lugs may require side clearancing before assembling for the link-up test.

Barrel Ramping and Chamber Entry Throating

Amongst the inexperienced, there is the tendency to **over-ramp** and under-throat .45 barrels. Over-ramping is the most dangerous of the two. See figures 99, 100, and "Ramping Safety". The basic fact is that very little metal need be removed in ramping, and just a moderate amount when throating. When a .45 barrel has been over-ramped, it is either dangerous, or is potentially dangerous, and must be replaced. It's always better to begin with a barrel in original condition. See figure 182.

Before throating or ramping: Always safety check the location of ramp point **"A"**, and the amount of brass exposed at the ramp. See figure 99 and figure 183.

About Entry Throating

Throating opens or widens the chamber mouth. This allows cartridges that do not have a rounded front section, and those that. are not quite aligned, to self-align and then funnel into the chamber.

1. 90% of the widening of the chamber mouth is done below the centerline of the barrel. See figure 183.
2. The top and unthroated half of the rear barrel face must be left intact to meet the barrel ledge surfaces inside the slide.
3. Over-throating destroys the barrel face and, if deep enough, exposes too much brass - and could be just as dangerous as over-ramping.

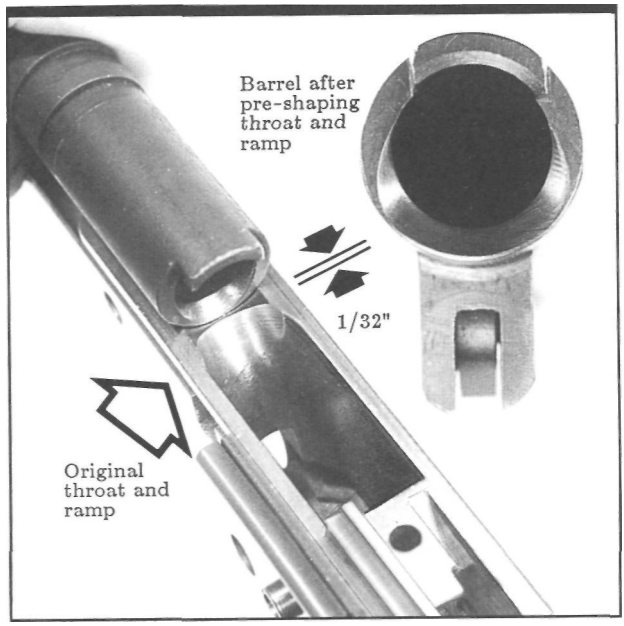


Figure 182- Shows a factory fit, M1911 type barrel positioned on its' frame. Note that the necessary 1/32" gap exists between the bottom of the barrel and the beginning of the frame ramp. The frame ramp angle is original and unaltered. This untouched state is the ideal beginning point for ramping and throating.

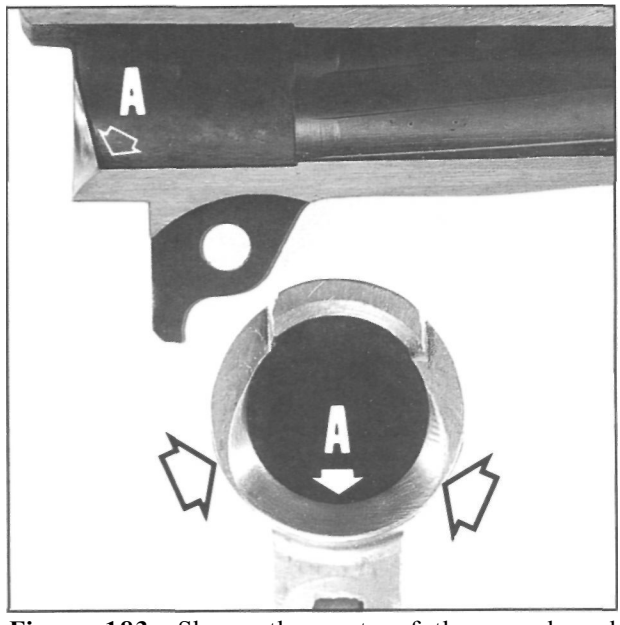


Figure 183- Shows the parts of the rear barrel face that are widened in throating. This barrel ramp widening was developed to solve feeding problems with unjacketed and wadcutter type ammunition, and also works very well with ball rounds. The location of point **"A"** , shown above, is critical, and should not be altered.

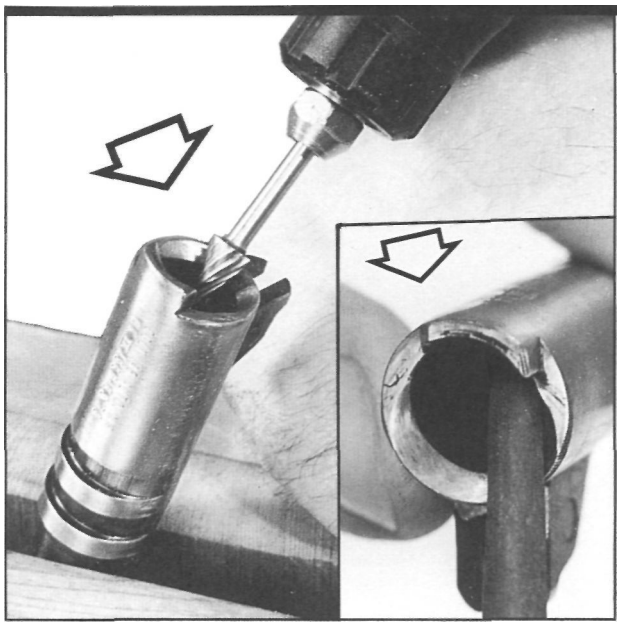


Figure **184-** Shows a barrel set-up in the vise between wooden blocks to prevent tool chatter. Entry throats can be cut with a Dremel tool [at moderate speed], but a Foredom variable speed tool controls and works better, in my opinion. Some consider hand broach cutting easier. Final shaping is done with a medium India stone.

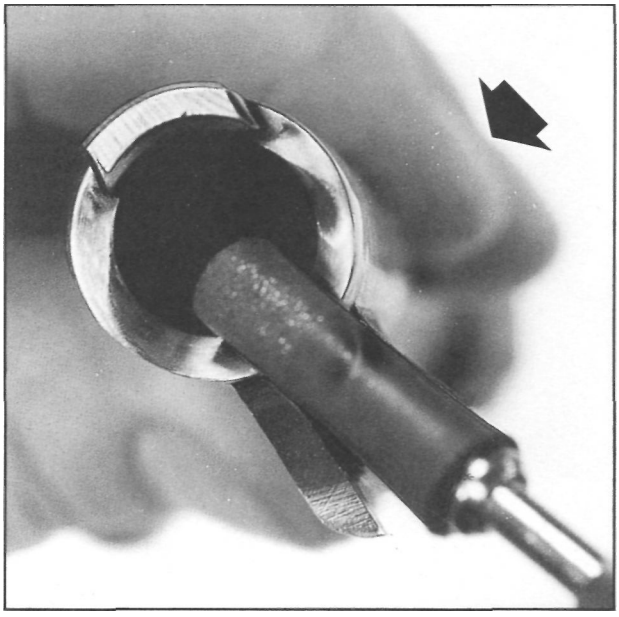


Figure 185- Shows the chamber throat as it is being blended-in with the barrel ramp. Then, the combined throat and ramp surfaces are fully polished. The Foredom tool is used again, this time with Craytex rubber-abrasive polishing tips. A medium tip is excellent for blending, and fine, or extra fine, for final polishing.

Cut Chamber Entry Throat

Always use extra care when cutting a chamber throat. Foredom's variable speed power tools are great for this work- but, remember that all power tools are unforgiving of even the smallest slip.

1. Clamp the barrel in wood blocks to absorb vibration and help prevent tool chatter. Use a hand rest [even your other hand] for extra control.
2. Cut in light, controlled passes, in agreement with the tool's cutting edges [don't cut backwards]. With careful control, grinding heads may be used in either direction.
3. Remember, most of the throat is below center line of the barrel. See figure 183.
4. **Caution:** Do not alter the existing barrel ramp. And, do not move the location of point **"A"** when throating.
5. When rough cutting is done, complete final shaping with a medium India stone, while also removing any remaining cutting tool marks.

Polish Chamber Throat

1. Pre-polish the newly shaped throat areas with a medium Craytex rubber-abrasive cylinder style tip.
2. Blend in the junction of ramp and new throat surfaces with the same medium tip.
3. Then use fine, followed by extra fine, Craytex tips to final polish the entire, now continuous ramp and throat surface. See fig. 185 and 186.

Check Inside Hood Chamfer

Check the inside edge of the barrel hood for an approx. 45 degree bevel. This clearance helps feeding, especially with wadcutters. See fig.185. Dress as necessary for wadcutters.

Radius Polish The Barrel Ramp at Point "A"

As a rule, most .45 auto ramps require very little polishing beyond removal of the machine marks left from manufacturing. See figures 98, 99, and 100. The two reasons for polishing are: to reduce feeding drag, and to eliminate chamber jams by adjustment of the cartridge "break-over" point. Break-over is the precise feeding point where the cartridge tips over and then moves straight into the chamber. Polishing a very slight radius on the ramp corner at **"A"** will greatly increase break-over clearance without damage to the important ramp surface. Over-ramping a barrel does not improve feeding, but simply exposes too much of the soft brass shell casing.

1. Radius polish the ramp at "A" with a Foredom tool and a rounded, extra fine Craytex tip. See figure 186.
2. Round off the corner by about .001" to .002" at maximum- **do not take off any more material.**
3. Blend in the radius from almost none, at the sides, to the full break-over clearance at top center of the ramp.
4. Once the radius has been polished, continue polishing down the face of the ramp.

About The Frame Ramp

The frame's ramp angle must not be altered. Limit ramp polishing to removal of most of the machine marks. More work is seldom required. With frame ramps, angle is more important than surface.

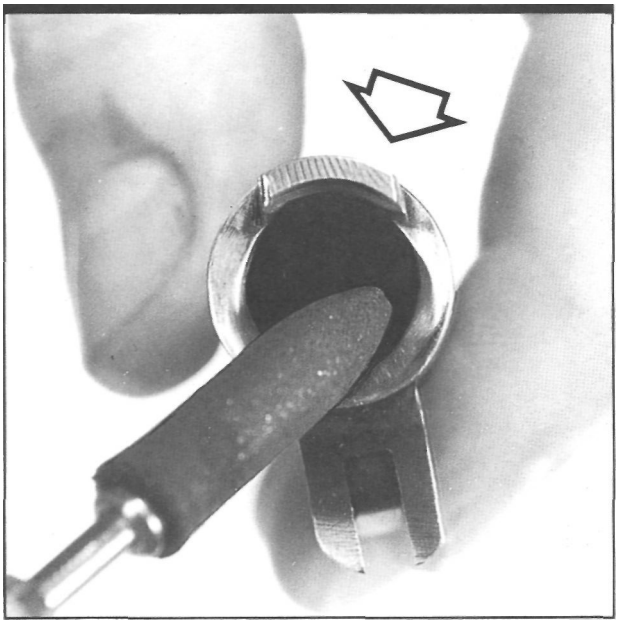


Figure 186- Shows the barrel ramp being radius polished with an extra fine, round end, Craytex tip at point **"A"**. Only an area of about 1/4" to 5/16" of the barrel ramp is radiused, as shown. Correct tool angle is approx. 15 degrees toward the bore. At this angle, the round-off is a very slight .001" to .002". See caution at figure 187.

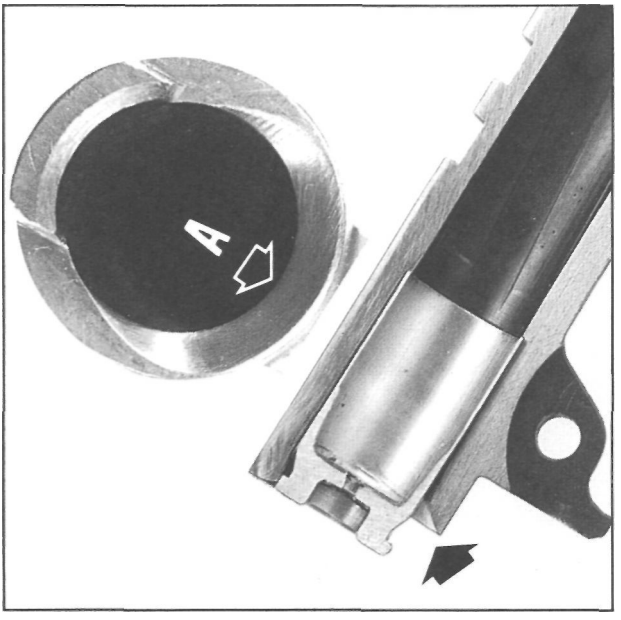


Figure **187-** Shows the ramp after polishing. The cutaway correctly shows less than .090" of the brass case exposed ahead of the extractor bevel with the shell head against the recoil face, as during firing. **Caution:** More than .090" brass exposure may be unsafe- when "A" is any further forward, clearance is already excessive.

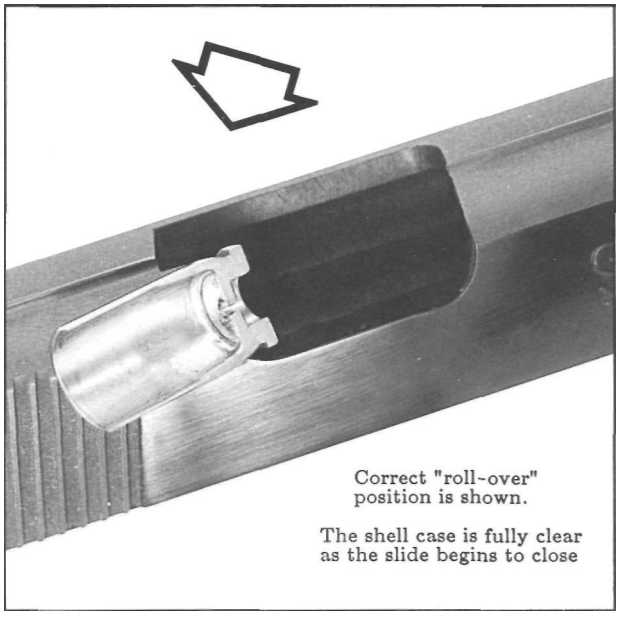


Figure 188- Shows an empty shell in the just ejected, "roll-over" position. The empty case contacts the ejector and literally rotates out of the ejection port. When a roll-over clearance notch is milled into the slide, the shell clears the port much earlier, leaving the inside port area free to cycle the next cartridge.

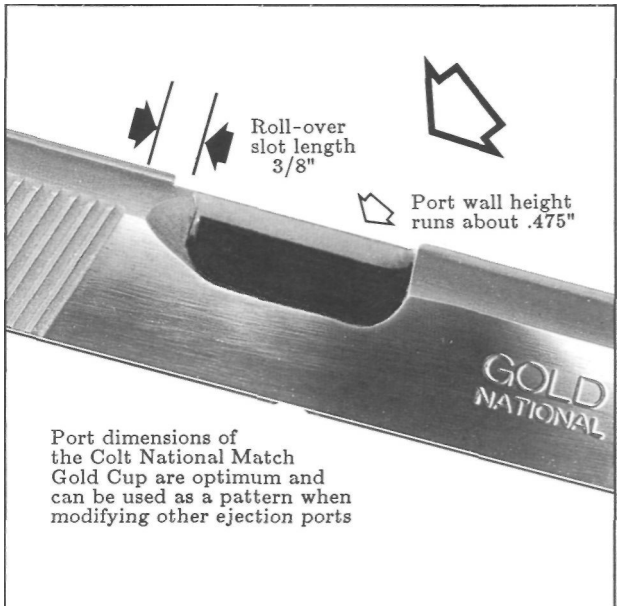


Figure 189- Shows a standard Colt factory Gold Cup ejection port. This slide is made with a lower and longer port, and a roll-over clearance notch. Port wall height runs just at .475", and handles almost any ejected shell swing angle. The clearance notch, begins at the forward edge of the barrel hood slot and extends back 3/8".

Modify Ejection Port

Adjusting the bottom angle of the extractor hook can be helpful when fine tuning for best shell ejection angle.

Additionally, replacing the standard ejector stud with a custom and extended version, begins ejection timing a bit earlier and increases throw.

Enlarging the ejector port size, and thereby increasing shell clearance, is even more helpful, since the empty shell is guaranteed a completely unobstructed way out.

The combination of porting work, a well fit extractor and a positive ejector, virtually eliminates port related jams.

1. Porting dimension lines can be scribed on the slide, and carefully hand-cut with a Foredom power tool, then stone finished. I have seen excellent porting work done in this way.

2. But I strongly suggest that this work be done on a mill, and particularly so with the harder civilian model slides.

3. To prevent vibration related cracking problems, the bottom corners of the new, enlarged port must not be square. I recommend the corners be cut on about a 1/2" radius.

4. A 1/2" carbide end mill works well for this purpose. Carbide tooling is especially recommended for use with harder, heat treated slides.

Caution: When cutting the roll-over clearance notch in the slide, first scribe a curved pattern line where the rear barrel face meets the barrel ledge inside the slide. Don't cut below this line.

Figure 190- Shows a close-up view of a Bo-Mar Deluxe BMCS sight, installed on a Colt Series 70 Government Model pistol. With minor fitting, this sight fits the standard factory dovetail. Sometimes, depending on factory dovetail depth, a small clearance flat", usually .005" to .010" deep, must be milled at the top of the slide to accommodate the BMCS sight body. Once sight body position has been established, the slide is then drilled and tapped for the elevation screw.

The BMCS also can be milled into a lower profile in the slide. The drawing at lower right is for reference only, but provides an example of one possible sight position. When installing custom sights, and the venerable BMCS is no exception, always layout the job after reference measuring both the slide and the sight. Always consult the manufacturer's instructions.

Caution must be used when milling low profile sights into any Series 80 model slide, since the firing pin plunger hole extends up about .865". [measured from the bottom of the slide rails], on the average. This places the inside top of the plunger hole at just about .050" beneath the standard factory dovetail slot. This means that a new and lower positioned dovetail slot may intersect the plunger hole. If this is the case, make certain before milling that the sight you plan to use has sufficient material in it to allow redrilling the plunger hole back to its' standard factory depth. If not, it can't be used. Checking this first may save a slide.

Figure G- Shows a close view of the Bo-Mar .45 auto Accuracy Tuner rib. Sight radius with this rib is 7 1/8". The added weight of approximately 5 oz. increases stability. This patented design uses an adjustable barrel positioner and precisely adjusts, or "tunes", the final position of the barrel extension hood. Once adjusted, the "tuner" block provides constant, repeatable vertical barrel lock-up, and also centers barrel and cartridge, making firing pin contact and ignition more uniform. Not for hard ball use. Must be gunsmith installed, requires drilling and tapping.

Courtesy Bo-Mar Tool and Manufacturing, Co., Inc., Longview, Texas

Figure H- Shows a close view of an installed Bo-Mar low profile rib. This rib is similar to the accuracy tuner model but does not have the "tuning" block. The sighting plane is deeply serrated and then heavily sandblast finished. Sight adjustment for 7" radius- **elevation:** one click equals .4" at 50 yards- windage: one click equals .5" at 50 yards. Weight is also approximately 5 ounces. The low profile rib uses one less mounting screw than the "tuner" rib, and also must be gunsmith installed, since alignment, drilling, and tapping are required.

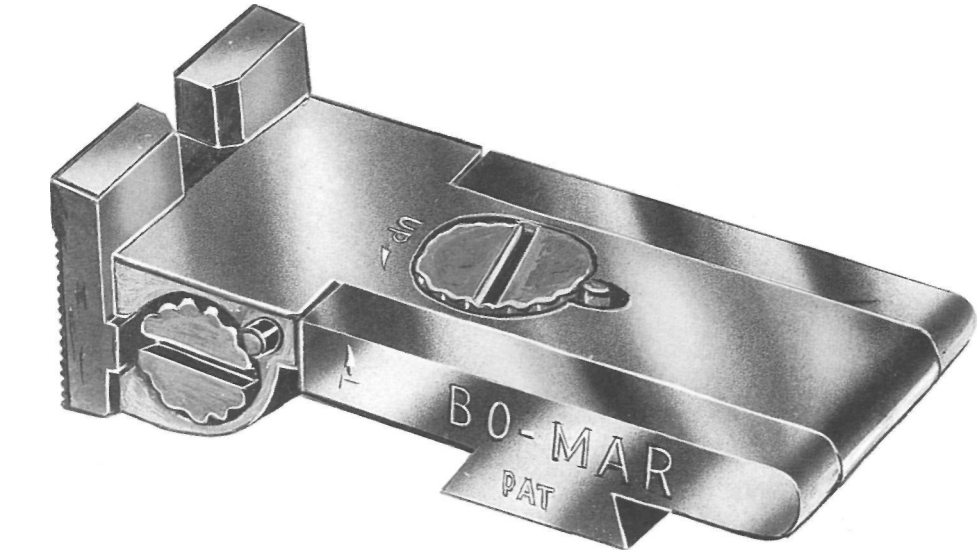


Figure I- Shows a close view of the **Bo-Mar Deluxe BMCS Adjustable Sight.** When the BMCS is installed in a Government model .45 dovetail, with Bo-Mar's tapered, undercut 1/8" post front sight, a radius just under 7" results, making the installation legal for hardball matches. The BMCS must be hand fit to the standard factory dovetail and requires drilling and tapping the slide for the elevation screw. Click adjustments are positive and fine enough to center in the X ring. Windage and elevation adjust at approximately 3/8" per click at 50 yards. The sight blade is serrated. **-Courtesy Bo-Mar Tool and Mfg. Co.**

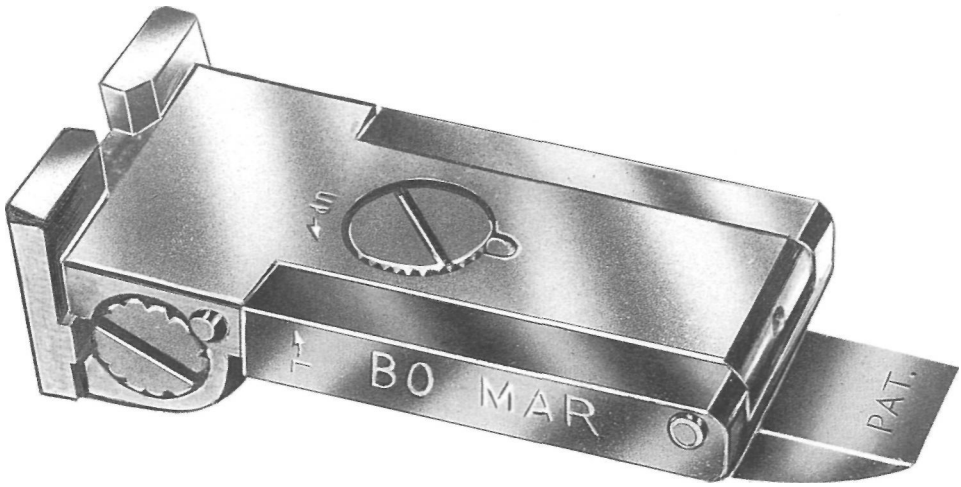


Figure J- Shows a large view of a **Bo-Mar** sight, similar to the **BMCS**, but on a modified base to fit Colt Gold Cups. Bo-Mar says this sight is now discontinued. What was good about this sight is that it provided a sight radius closer to 7". It's fairly easy to to make custom variations of this base on a mill and then install a BMCS in it- if your customer just has to have one for his Gold Cup.

About replacement sights, front blade height, and elevation adjustment -

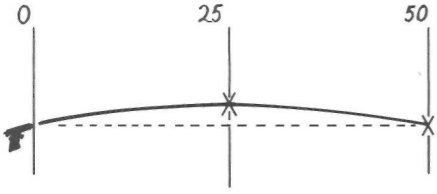
Sometimes, gunsmiths have difficulty estimating front sight blade height when installing adjustable custom rear sights on automatic pistols. And understandably so, because there is a lot more to this subject than meets the unseasoned eye. This becomes obvious only when you consider that the point of actual vertical bullet impact [elevation] varies with any one, or combination of, the following important factors:

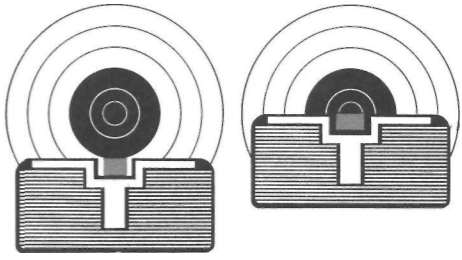
1. Height of the rear sight blades.
2. Height of the front sight blades.
3. Depth of the rear sight dovetail or mounting surface.
4. Depth of the front sight mounting or leveling pad.
5. Sight radius, or distance between the sights.
6. Length of the pistol barrel.
7. Bullet velocity and characteristics.
8. Actual height of the rear of the barrel in vertical lock-up position.
9. Barrel and bushing position in the slide.

Another complicating factor in estimating front sight height- is that the top surface of a .45 automatic slide is far from parallel with the centerline of the barrel, or even with the bottom of the slide, for that matter. To compensate for this, most manufacturers' sight tables are first based on the centerline of the bore, but are then adjusted, or "averaged", to allow for the usual difference between barrel centerline and the top of the slide in typical production pistols. But, in fact, all pistols are different, and made even more so when barrel lug engagement has been increased.

When blade estimates are based on the centerline of the barrel- they naturally take the sight radius available on Government Model pistols, and the average mid-range trajectory of most factory high velocity ammunition into consideration. To provide a useful sight picture on a .45 auto, front sight blades generally must run between .010" and .020" lower than rear sight blades with reference to barrel centerline.

Blade estimates based on the top surface of the slide- are not the most accurate way to estimate front sight blade height unless you are the pistol manufacturer and can control all of the variables. Measuring from the top of the slide, most standard fixed rear sights are about .035" to .045" higher than their corresponding front blades. Many replacement and higher profile fixed sights measure even higher in rear elevation to provide 25 and 50 yard flexibility. In general use, such sights zeroed to a six o'clock hold at 25 yards work reasonably well when held on target centerline at 50 yards, or the other way around.





Both competition and individual point-of-hold requirements vary. With enough beginning front sight blade height, setting the useful range of elevation simply becomes a matter of tuning or adjusting the front sight blade to meet your customer's hold requirements. After careful installation of a new adjustable rear sight, and particularly when the sight body has been milled lower into the slide, the best and fastest way to solve the problem of the above nine elevation variables is to set rear sight elevation at minimum, and then tune the height of the front sight blade to meet the customer's lowest hold specifications. Thereafter, all additional elevation is simply an adjustment of the rear sight. Make all front sight tuning adjustments while test firing the pistol from machine rest, and with the correct ammunition.

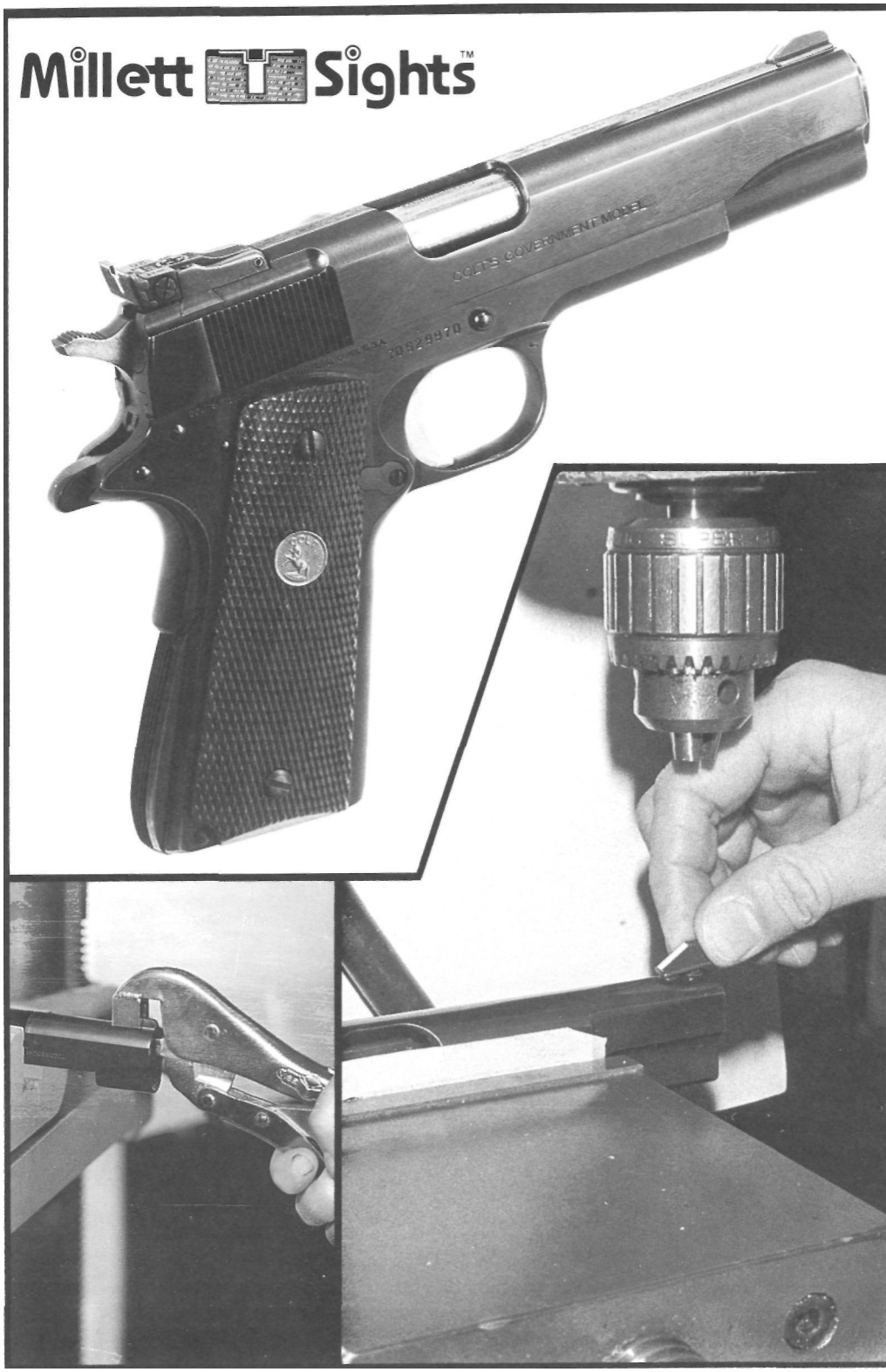
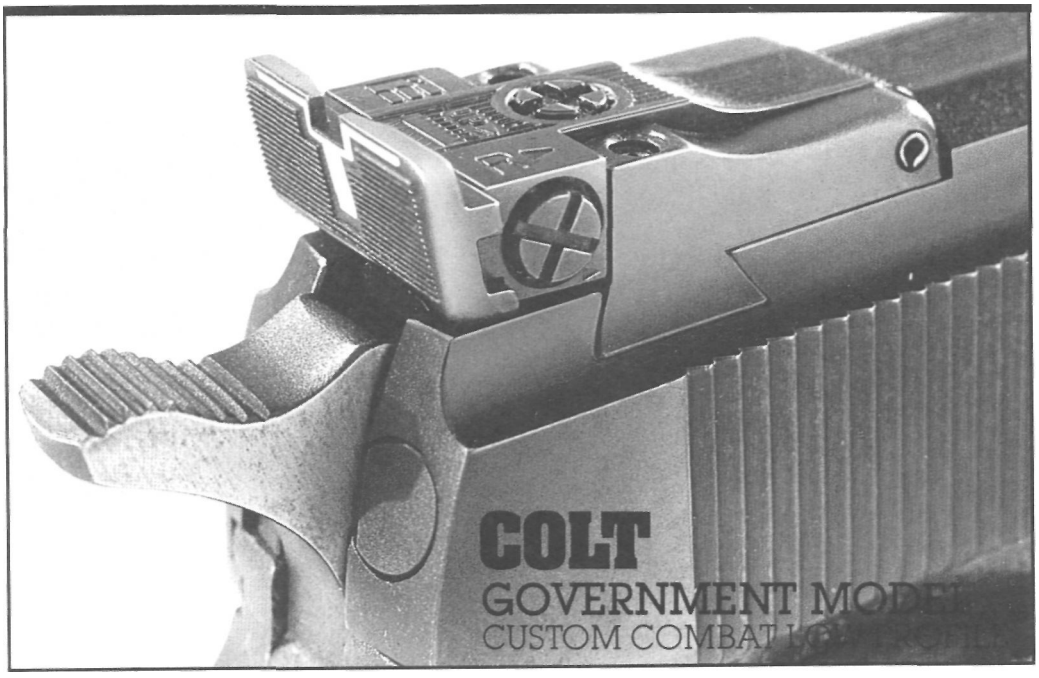
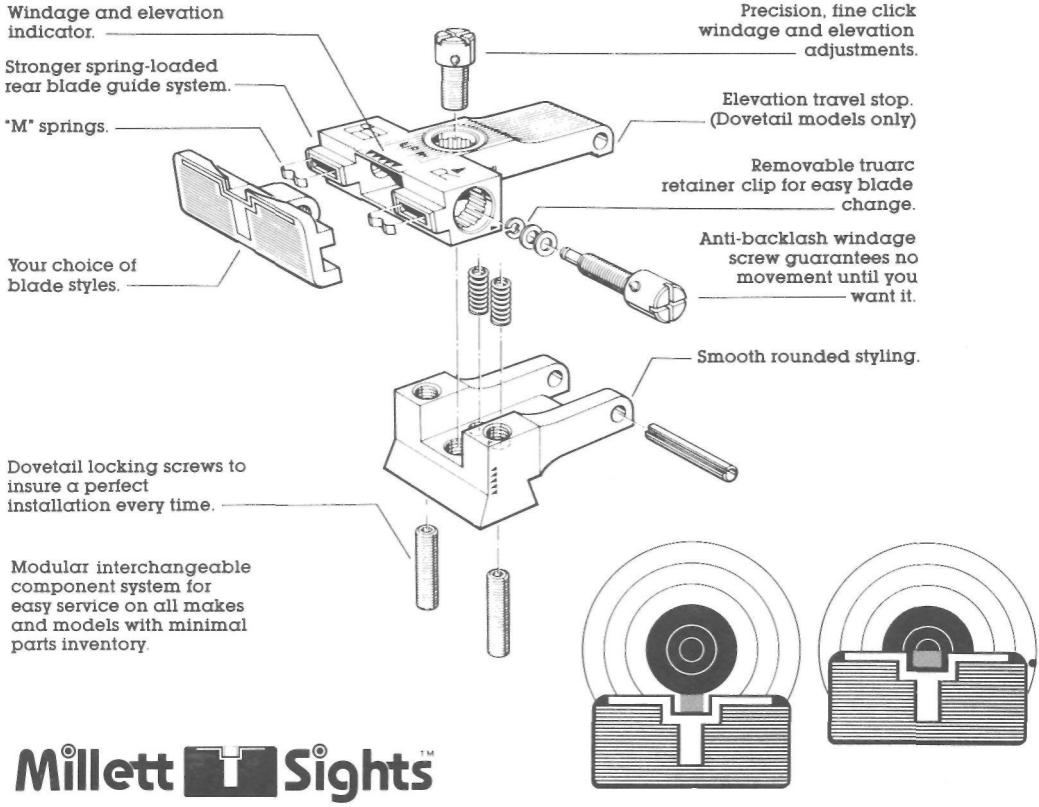


Figure K- Custom combat low profile sight and scenes, **courtesy Millett Sights.**



SERIES 100 ADJUSTABLE SIGHT SYSTEM

FEATURES:



Millett Sights™

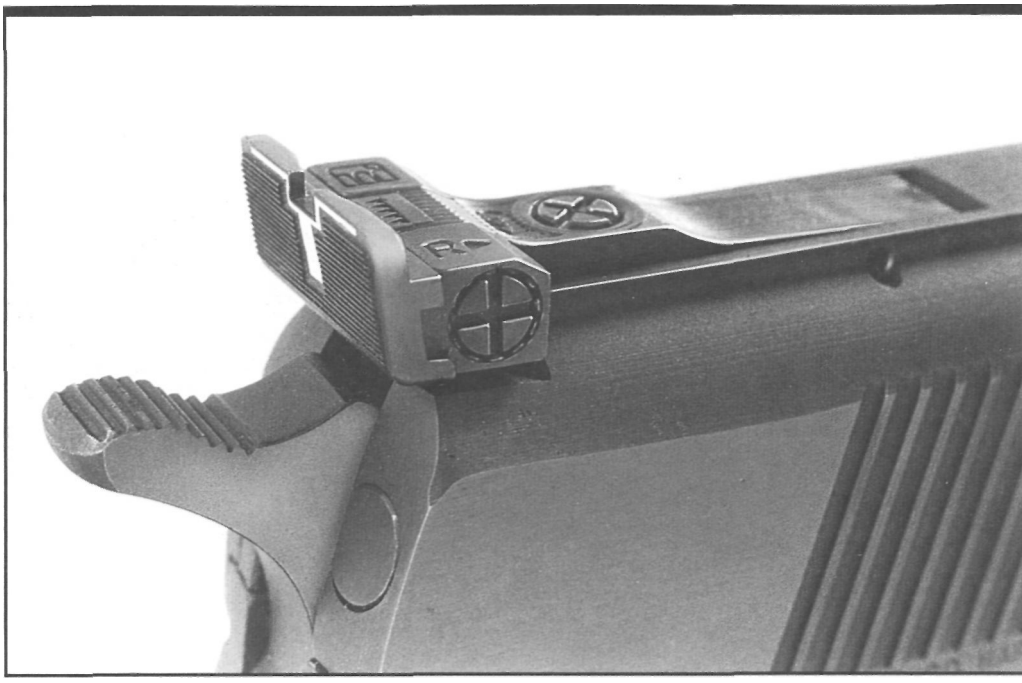


Figure L- Shows a Colt National Match Gold Cup with a **Millett Series 100 Gold Cup Sight** Installed. The sight fits perfectly into the factory milled slot- but I suggest that you replace the factory pin. Both windage and elevation adjust at 1/8 per click, at 25 yards. Requires a .200" front sight.

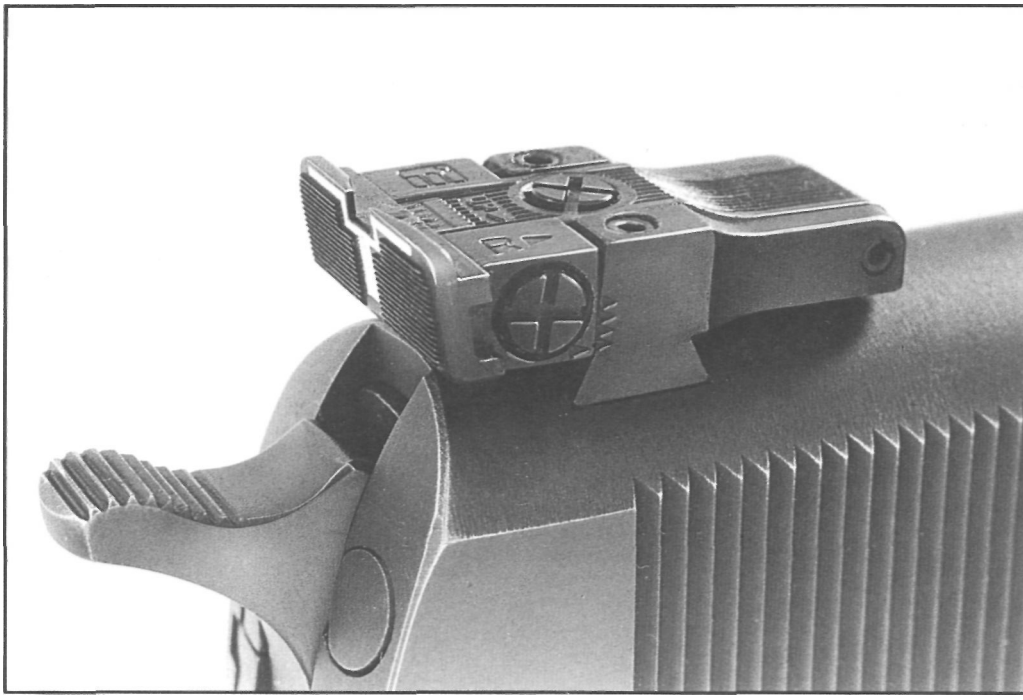


Figure M- Shows a Colt Government Model with a **Millett Series 100 High Profile, Adjustable Sight** installed. The high profile sight fits the standard factory dovetail, without machining, but fitting is required. A .312" front sight blade must be installed, for correct elevation.

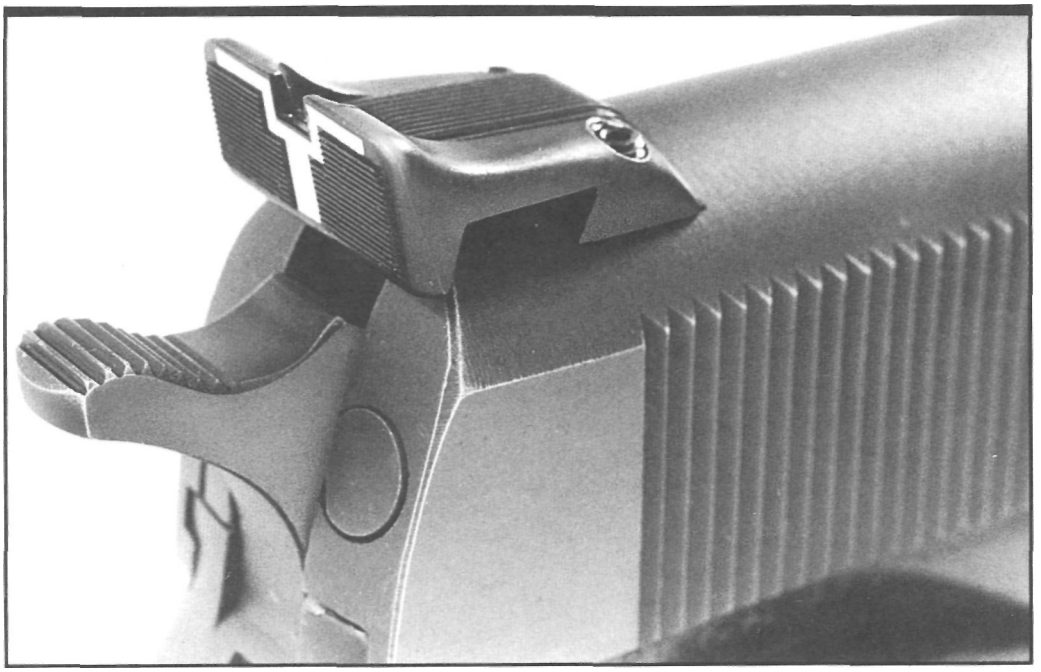


Figure N- Shows a Colt Government Model with a **Millett Mark II, Low Profile Sight** installed. Two set screws lock the sight in the factory dovetail. This very easily installed sight extends useful sighting radius by approximately 5/8".

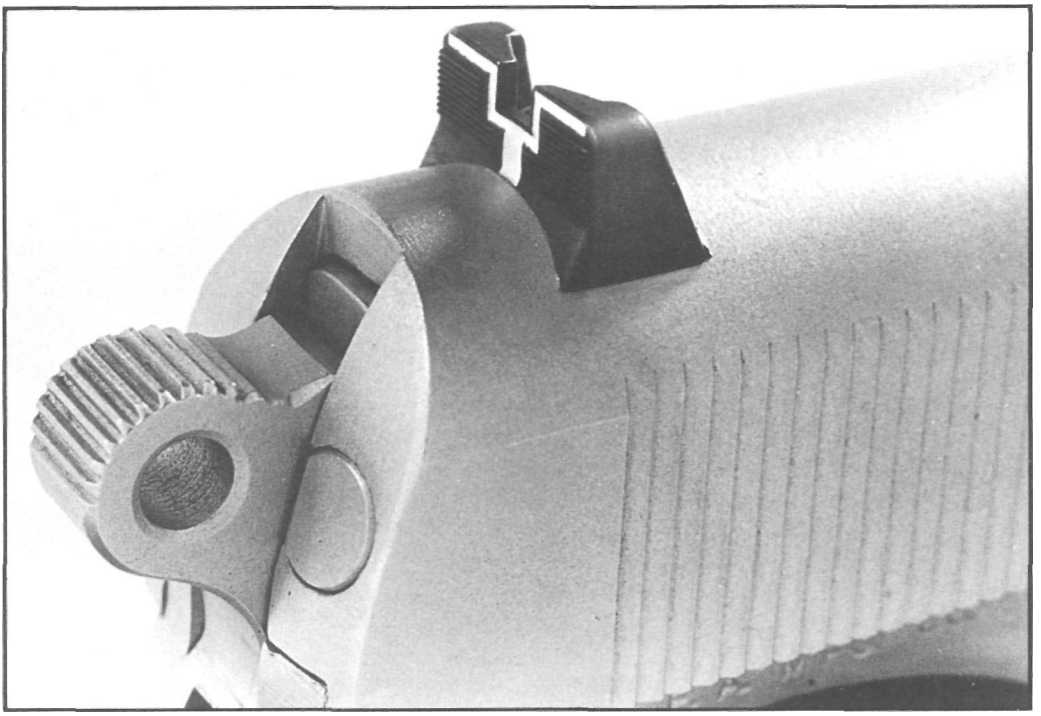


Figure O- Shows a Colt Combat Commander with a **Millett Mark I, High Profile Sight** installed. Fits the standard factory dovetail. Features: rounded corners for carry, white outline, and steel construction.
-Photos Courtesy, Millett Sights

Figure P- Shows, at top, a very useful handgun bore sighting fixture and gauge from **Millett Sights.** The complete set includes 9mm, .38/.357, and .45 caliber barrel inserts, and measures sight height based on the centerline of the bore, which is the only accurate way. Millett's standard sight staking tool kit [single staking] is shown at center and their Dual-Crimp sight installation tooling is shown at bottom. **-Courtesy Millett Sights**

Millett Sights

HANDGUN BORESIGHTER ADJUSTMENT CHART

FOR 25 YARDS USING HIGH VELOCITY FACTORY AMMO

SIGHT RADIUS (DIFFERENCE BETWEEN FRONT AND REAR SIGHTS)

SIGHT DIFFERENCE	5"	6"	7"	8"	9"	10"	11"	12"
	POINT OF IMPACT CHANGE							
.001	.180	.150	.128	.113	100	.090	082	.075
.002	.360	.300	.256	.226	.200	.180	164	.150
.003	.540	.450	.384	.339	.300	.270	.246	.225
.004	.720	.600	.512	.452	.400	.360	.328	.300
.005	900	750	.640	.565	500	.450	410	.375
.006	1.080	.900	768	.678	.600	.540	.492	.450
.007	1.260	1.050	.896	.791	.700	.630	.574	525
.008	1.440	1.200	1.024	.904	.800	.720	.656	600
.009	1.620	1.350	1.152	1.017	.900	.810	.738	.675
.010	1.800	1.500	1.280	1.130	1.000	.900	.820	.750
.011	1.980	1 650	1 408	1.243	1.100	.990	.902	825
.012	2.160	1.800	1.536	1.356	1.200	1.080	.984	.900
.013	2.340	1.950	1.664	1.469	1.300	1.170	1.066	.975
.014	2.520	2.100	1.792	1.582	1.400	1.260	1.148	1.050
.015	2.700	2.250	1.920	1.695	1.5OO	1.350	1.230	1.125
.016	2.880	2.400	2048	1.808	1.600	1.440	1.312	1.200
.017	3.060	2.550	2 176	1.921	1.700	1.530	1.394	1.275
.018	3.240	2.700	2.304	2.034	1.800	1.620	1.476	1.350
.019	3.420	2.850	2.432	2.147	1.900	1.710	1.558	1.425
.020	3.600	3.000	2.560	2.260	2.000	1.800	1.640	1.500
.021	3.780	3.150	2.688	2.373	2.100	1.890	1.722	1.575
.022	3.960	3.300	2.816	2486	2.200	1.980	1.804	1.650
.023	4 140	3450	2.944	2.599	2.300	2070	1.886	1.725
.024	4.320	3.600	3.072	2.712	2.400	2.160	1.968	1.800
.025	4.500	3.750	3.200	2.825	2.500	2.250	2.050	1.875
.026	4.680	3.900	3.328	2.938	2.600	2.340	2.132	1.950
.027	4.860	4.050	3.456	3.051	2.700	2.430	2.214	2.025
.028	5.040	4.200	3.584	3.164	2.800	2.520	2.296	2.100
.029	5220	4350	3.712	3.277	2.900	2610	2.378	2.175
.030	5 400	4 500	3.840	3.390	3.000	2.700	2460	2.250
.031	5.580	4.650	3.968	3.503	3.100	2.790	2.542	2.325
.032	5.760	4.800	4.096	3.616	3.200	2.880	2.624	2.400
.033	5.940	4.950	4.224	3.729	3.300	2.970	2.706	2.475
.034	6.120	5.100	4.352	3.842	3.400	3.060	2.788	2.550
.035	6.300	5.250	4.480	3.955	3.500	3 150	2.870	2.625
.036	6.480	5.400	4 608	4.068	3.600	3240	2.952	2.700
.037	6.660	5.550	4.736	4.181	3.700	3.330	3.034	2.775
.038	6.840	5.700	4.864	4.294	3.800	3.420	3.116	2.850
.039	7.020	5.850	4,992	4.407	3.900	3.510	3.198	2.925
.040	7.200	6000	5.120	4.520	4.000	3.600	3.280	3.000
.041	7.380	6.150	5.248	4.633	4.100	3.690	3362	3.075
.042	7.560	6.300	5.376	4.746	4.200	3.780	3.444	3.150
.043	7.740	6.450	5.504	4.859	4.300	3.870	3.526	3.225
.046	8.280	6.900	5.888	**5.198**	4.600	4.140	3.772	3.450
.047	8 460	7.050	6.016	5311	4.700	4.230	3.854	3.525
.048	8.640	7.200	6.144	**5.424**	4.800	4.320	3.936	3.600
.049	8.820	7.350	6.272	5 537	4.900	4.410	4.018	3675
.050	9.000	7.500	6.400	5.650	5.000	4.500	4.100	3.750

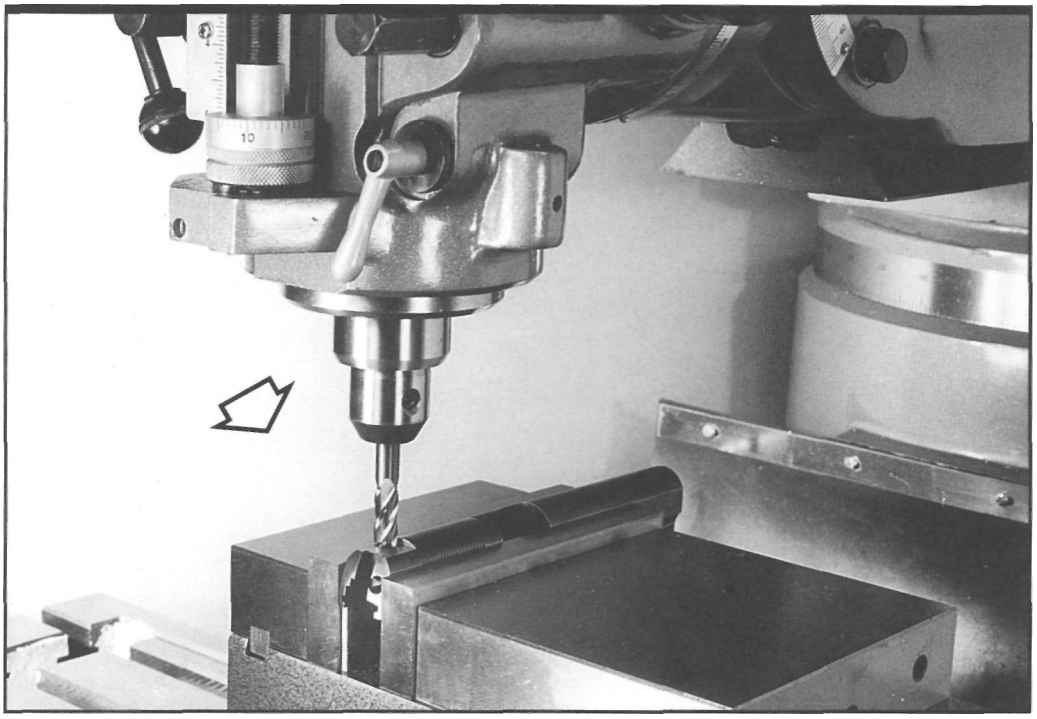


Figure 191- Shows the slide being milled to receive a custom low profile type sight. When this step is done, the new dovetail is located and then cut while the slide is in the same set-up position. Select the correct angle sight base cutter [either 60 or 65 degree] before milling the dovetail slot. **Caution:** Tips will break if cutters of this type are rotated at speeds beyond about 600 to 700 rpm.

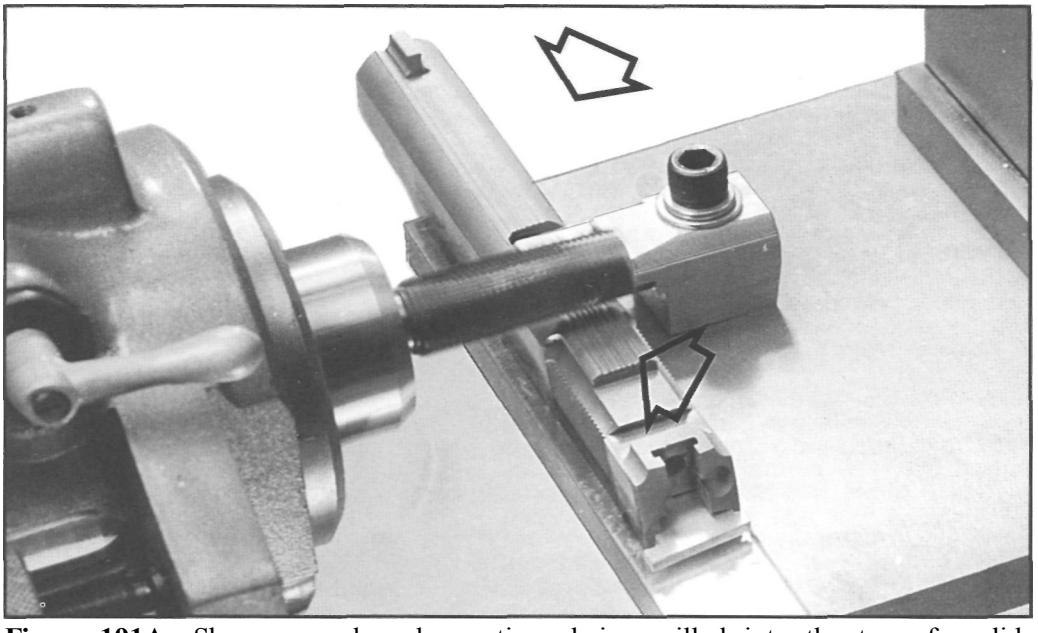


Figure 191A- Shows vee shaped serrations being milled into the top of a slide with mandrel mounted, stacked, miniature double-angle wheel cutters. For light, occasional work, this system is quite workable on a vertical mill when secure mounting fixtures are used. Carbide cutters are required for harder civilian slides; feed slowly, and use plenty of lubricant. For production work, use a horizontal mill.

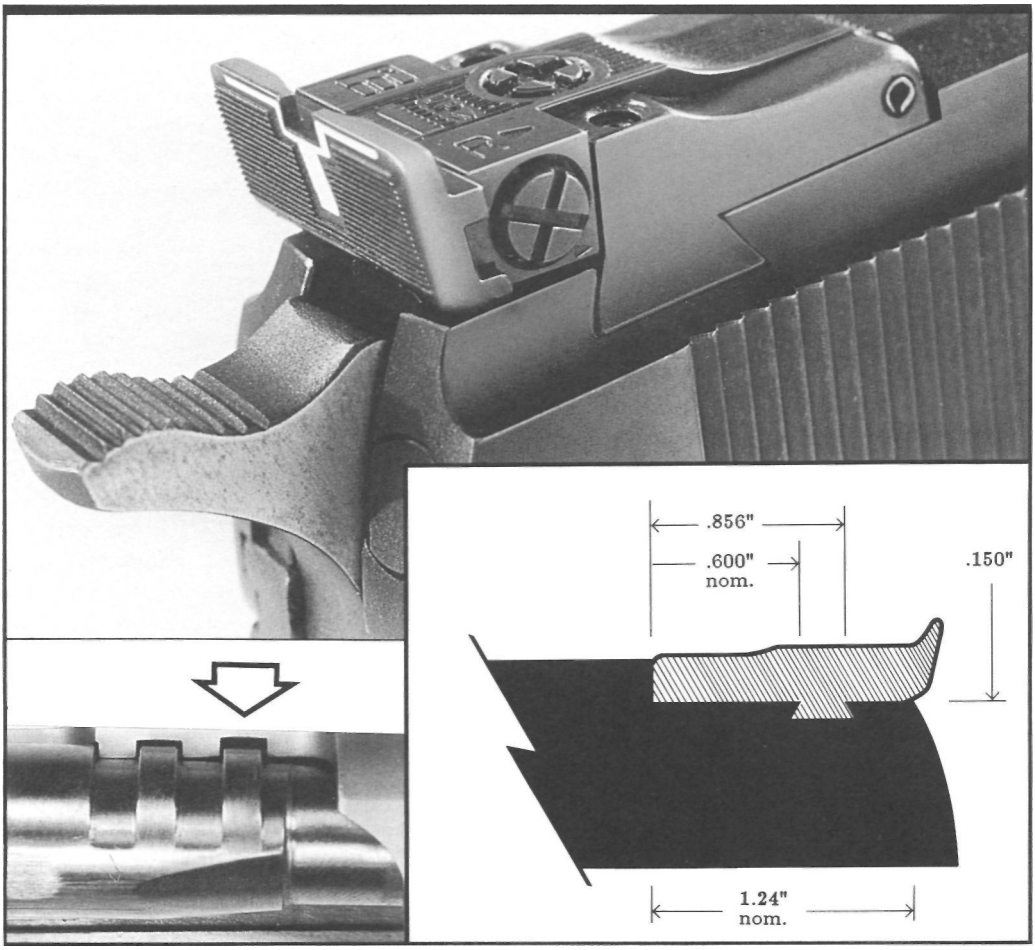


Figure 192- Shows at top, a correctly installed Millett Custom Combat Low Profile Sight. The inset, at lower left, shows a cross section of a slide that had been overmilled and ruined by a fellow who was not a gunsmith. For reasons beyond us, he had attempted to install the same style sight even .060" lower than was correct for low profile. And worse, he also lowered the top of the slide correspondingly, and then serrated it deeply. This left a metal thickness of only .035" above the slide's lug slots. The machine work was well done, but had seriously weakened the slide. He should have taken the job to a gunsmith in the first place. By the time he brought it into us, he was already aware that the only remedy was to replace the slide and start over. The old slide was all we needed to make another great cutaway pistol.

Before milling and serrating the top of any slide, first measure remaining thickness above the lug slot cuts. Most slides will average about .115" to .125" remaining thickness above the cuts. If you plan to machine the top of a slide, I suggest that you maintain at least .100" of metal above the lug slots. This limits milling to about .015" to .025" maximum with most slides.

While the drawing at lower right is for reference only, it does provide a realistic example of correct sight position and depth for a Millett Custom Combat Low Profile sight. Exact installation information is included with these sights.

A practical warning: when installing a custom sight, always layout the job after you have measured both the slide and the sight to be installed. Always consult the manufacturer's instructions. If the individual mentioned above had done these simple things, his slide, and his pride, would have been saved.

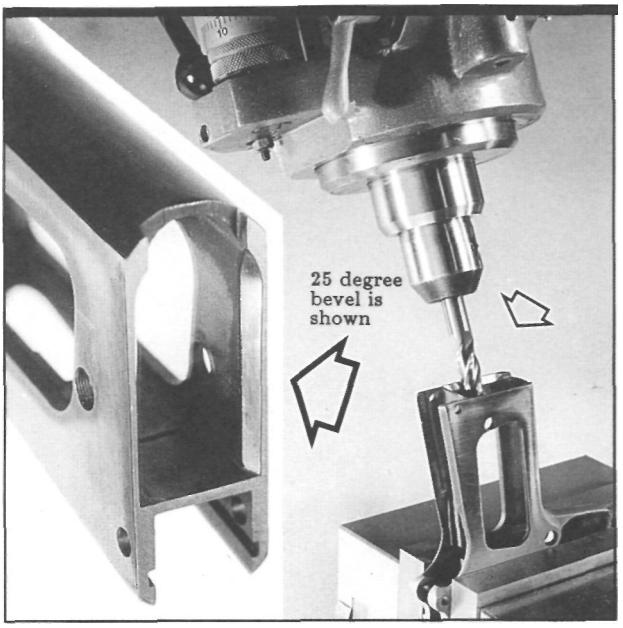


Figure 193- Shows the bottom of the frame and magazine well, after it has been bevelled. A milling angle of about 25 to 30 degrees will provide the best opening that can be machined into the thickness of the frame. If you use external add-on funneling devices, such as the Speed-E-Loader, do not mill the frame.

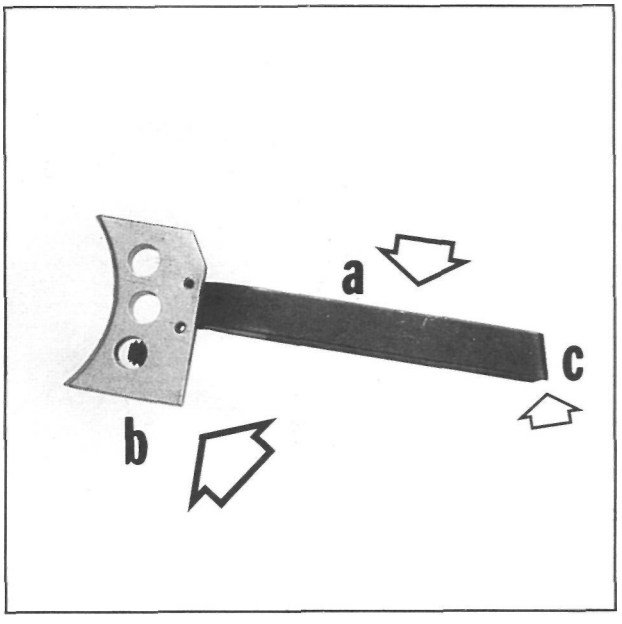


Figure 194- Shows points on adjustable, custom triggers that require inspection and/or fitting. The bow **"A"** and trigger body **"B"** both require fitting to the frame. See figures 113 through 115. The bottom rear edge **"C"** of the trigger bow is a sometimes overlooked area that can cause disconnector problems when left too long.

Bevel the Magazine Well

When it comes to customizing or bevelling magazine wells, there are two basic choices. Either the bottom of the frame will be milled for ease of magazine entry, or some type of funneling device will be installed. Decide what you want in advance, since a Speed-E-Loader, added after milling the frame, makes the final product look like an accident. The best milling angle is between 25 to 30 degrees. See figure 193.

Install Adjustable Trigger

Most of the mechanics of trigger fitting were covered earlier in sections 113, 114, and 115. It is important to reduce trigger play to a minimum, and yet the trigger assembly must move without resistance in the frame.

Adjustable Trigger Caution:

The rear surfaces of some adjustable trigger bows are finished on a shallower angle, for better adjustment of the trigger stop and elimination of possible sear bind. With this angle, the bottom rear corner of the trigger bow can be too long. A rear corner clearance cut may be needed to keep the trigger bow edge from picking up the center finger of the sear spring, and rendering the disconnector inoperative. **Sear spring pick-up** only happens when a non-adjusted long trigger is held all the way back during firing. Stop adjustment will usually conceal this problem. The disconnector will unspring only if the trigger can move back far enough.

Be certain that trigger bow clearance is correct.

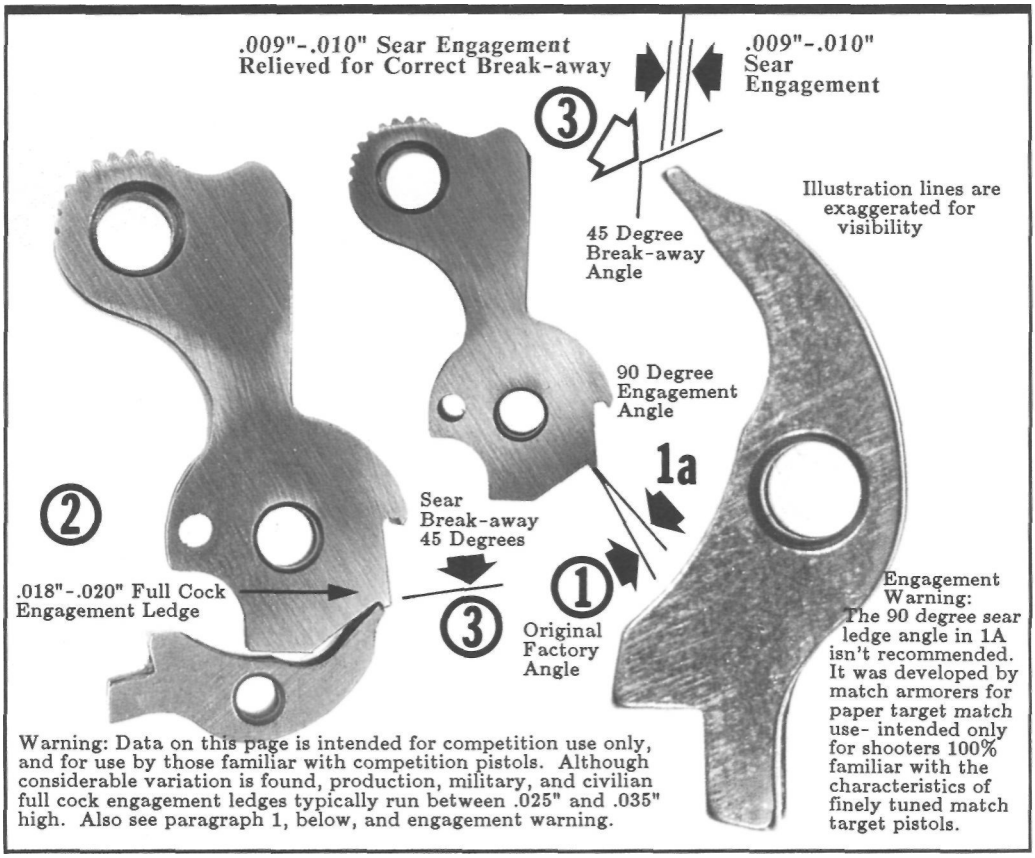


Figure 195- Shows ideal competition sear face and hammer engagement angles and dimensions. Sear escape angles and engagement measurements are also given. Competition modifications are not suggested for general or service duty use.

1. For combat and similar use- the original factory full-cock engagement angle has been left as-is (under 90 degrees) on the hammer shown above. Jig set-up would use the original factory hammer hook angle as reference. See figure 124.
1A. For match target use- the angle of the hammer's engagement ledges (or hooks) has been changed from slightly under 90 degrees to exactly 90 degrees for better sear escape clearance favoring paper target shooting. This jig set-up would use the original factory full-cock face (not the engagement hooks) as reference, and alters engagement angle to 90 degrees. With 90° engagements, the potential of hammer follow through is somewhat increased with standard loads. However, since lower velocity ammunition is used in paper target shooting, this presents virtually no problem when custom sear/hammer work is properly done.
2. Full-cock engagement ledge height- is adjusted to .020" for combat and .018" for target. Some wadcutter shooters have set height as low as .016", which is not recommended; .020" and .018" are fairly standard and generally preferable in most competition use. The ledge tops must be true and exactly the same on both sides. For this work, use a hammer jig as shown in figure 124.
3. Sear escape angle- (or sear break-away angle) is approx. 45 degrees. Escape clearance is provided by relieving the sear point at 45 degrees, as shown. Up to approx. 1/2 of the sear point is relieved, or about the first .009" to .010" of the sear face. Also see figures 125, 126, and 196.

Short sear warning: A sear is too short- when its face has been so severely cut that the safety stop shoulder can't be stopped or blocked by the thumb safety.
A sear is too short- when its face has been cut to the extent that the sear rotates forward and wedges the disconnector against the trigger bow. Be extra careful on this one, because disconnector drag or bind also can be caused by an incorrectly long top rear trigger bow corner as found on some replacement triggers.

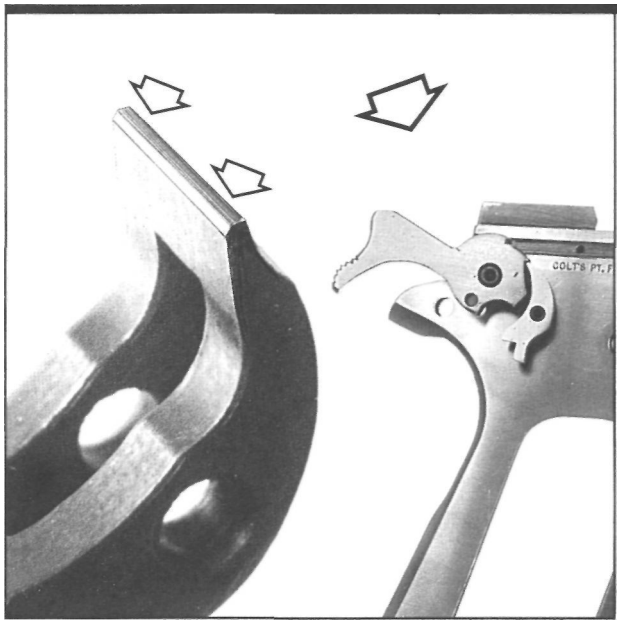


Figure 196- Shows final checking the sear and hammer engagement on external test pins before installation. After coating with Dykem Blue, mating is checked by hand operating the parts. When contact at both of the hammer's sear engagement ledges is identicad the parts are mated. The sear battering zone is also shown.

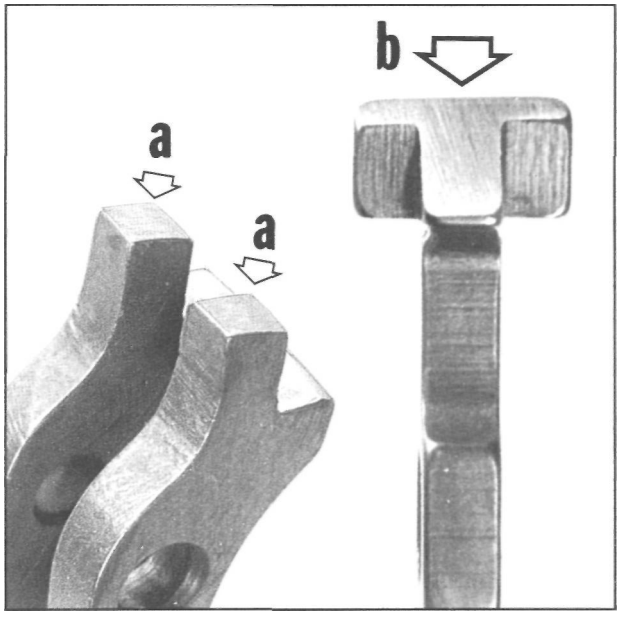


Figure 197- Shows two areas where light, final polishing is needed when precision competition trigger work is done. At **"A"** the sear hooks are shown, which require light, by-pass polishing. And, at **"B"**, the sear spring engagement bevel at the bottom of the disconnector is polished. Both make disconnector cycling much smoother.

Sear Mating Check

Since alignment of the pin holes for the hammer and the sear can vary somewhat from frame to frame, competition sears and hammers, being critically fit parts, **cannot be jig fit, only,** and then just dropped into the frame. See figure 196. Even minimal mis-alignment of the sear engagement surfaces can be easily detected and corrected by rechecking fit on external frame test pins.

Sear Safety Warnings:

1. Always test thumb safety operation after any sear work, no matter how slight.
2. Always check for possible disconnector drag or bind after sear work.
3. Before loading or firing the pistol, always have sear, hammer, and disconnector work re-checked by a senior, Colt qualified pistolsmith. If you are already fully Colt qualified, remember to safety check your own work.

Sear/Disconnector Cycling

Sometimes, pistolsmiths spend a lot of time with perfecting hammer and sear engagement and forget about possible sear hook and sear spring drag. Polish the surfaces shown in figure 197 very lightly, and just enough to eliminate interference or drag. More than this, and the parts can be damaged beyond use.

Sear Battering Damage

Protect tuned sear faces from potential battering damage by holding triggers to the rear **[sear clear of the hammer]** whenever the slide is cycled.

Additional Tuned Hammer and Sear Operating Safety Warning

With sear and hammer tuning work correctly done, and with trigger pull above 3 3/4 to 4 lbs., hammers seldom follow through. When they do, hammer travel is stopped at the captive 1/2 cock notch- up to and including Series 70 production. In Series 80 Models, follow through is stopped by the non-captive hammer stop ledge.

Times past, when .38 cal. wadcutter auto pistols were tuned to 2 1/2 lb. trigger pulls, occasional "surprise" first rounds were fired when the slide was closed on a full magazine. Now, as you know, this shouldn't happen. In follow through, the hammer should have stopped fully against the hammer's 1/2 cock notch. And, in these pistols, the hammers probably did stop the first time or so, until the thin National Match captive edge battered or sheared. [I have seen some of these earlier pistols modified to the extent that no ledge surface remained.]

Pulls this light are only attained with very shallow, 90 degree sear engagements, and extremely light sear and mainspring pressures.

In these pistols, the sear can bounce out of the fully cocked position. And, it can also bounce off and/or cam past the small, once captive, N.M. 1/2 cock notch. The old remedy of cutting the captive notch deeper isn't helpful because, past a certain point, the edge breaks off even easier. The fact is that the nearly nonexistent sear spring pressure necessary for trigger pulls that are this light can't always lever or hold the sear against the hammer fast or firmly enough to prevent bypass.

Some .45 cal. match target pistols set at 4 lbs. will follow through, but the vast majority will have enough sear spring pressure to keep the 1/2 cock notch or ledge fully functional. It will stop the hammer if, or when, it follows through.

The greatest danger in .45 auto trigger/sear/hammer work is that of "surprise" full auto fire. In these rare cases, with a full magazine, the pistol doubles, triples, or fires the full magazine instantly, and cannot be controlled. **This is a deadly circumstance**. The causes are: trigger pull too light, insufficient sear and mainspring pressures, disconnector too short, adjustable trigger stop mis-set too close, and sear spring pick-up. Although, under certain conditions, any one of these might cause this problem, evidence indicates it is usually a combination of the above.

For this reason, always test fire after trigger adjustment and any trigger, sear, hammer, disconnector and/or spring work. Load two rounds at a time, until the pistol proves. It is always better to test fire from a machine rest.

Trigger pulls below 3 3/4 lbs. are not very practical, and improperly done, can be potentially dangerous. I strongly suggest you stay above this level.

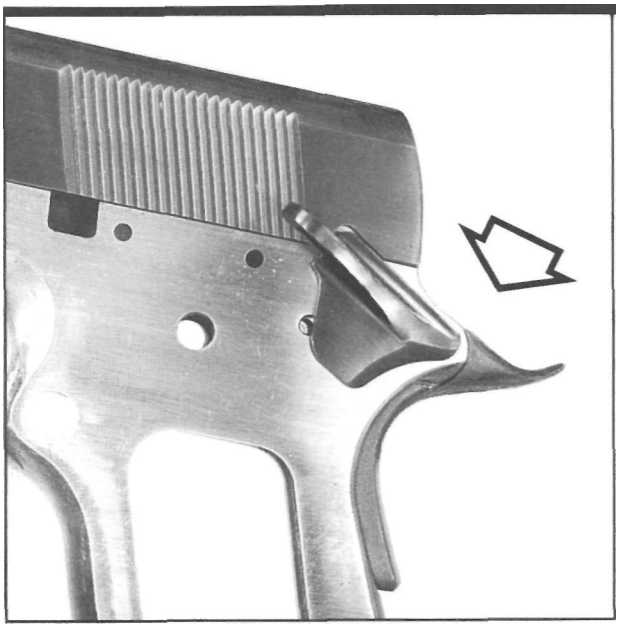


Figure 198- Shows the frame tail modified to receive a beavertail grip safety. This work is best done on a mill, using a cutting fixture, but, with care, can be done by hand. The first shaping cut should be made slightly oversized to allow for minor, individual differences in grip safeties. A hammer pin can be used for fitting.

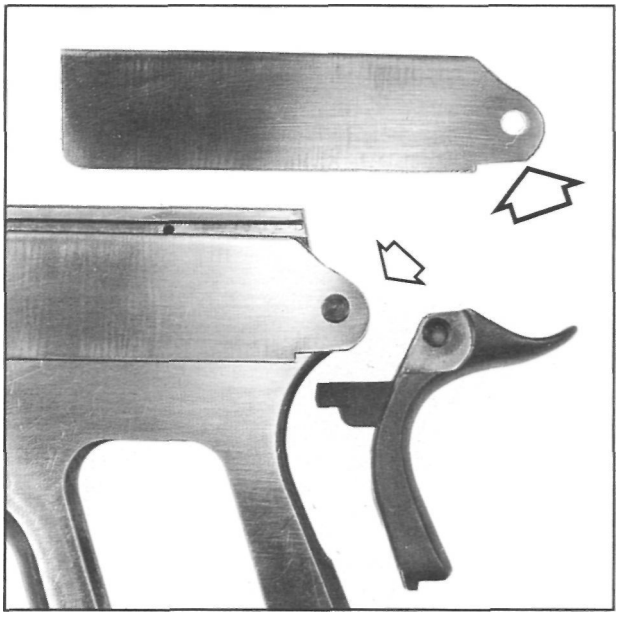


Figure 199- Shows an easily made sheetmetal template used for marking the outline of the revised frame tail. Below, a spare hammer pin is inserted through the hole in the template and then into the safety pivot hole in the frame. This locates the scribe line for the beavertail grip safety. Cut to the outside of the line.

Modify Frame Tail for Beavertail Grip Safety

Beavertail grip safety castings seem to be consistent in size. But, pivot hole position can vary. As a result, care must be taken when modifying the frame for installation of a beavertail safety. Make all first shaping cuts somewhat on the long side, so that the frame is not undercut. Although this job is easier if done on a mill, excellent work can be done by hand when an accurate layout template is used. See fig. 199.

If the frame tail is hand cut:

1. First, position the folded edge of the template inside the frame rail slot.
2. Then, locate the template with a hammer pin, as shown in figure 199, and scribe the outline of the frame cut.
3. Cut and file the frame to the new contour, but just to the outside of the line.
4. Check the fit of the new safety in the frame.
5. Contour file as necessary, then stone and true the surfaces until the pin slips through both the frame and the safety.
6. Finally, work in with #320 lapping compound.

The frame will appear to be machined when carefully shaped and finished.

Check Grip Safety

Check safety operation after the top of the safety has been fit, and moves freely. Make sure that the trigger stop surface prevents sear release and that the by-pass notch does not bind against the trigger bow.

Trigger Guard Modification

Two handed .45 shooting can be made easier by modifying the front of the trigger guard to accommodate the shooter's second hand. Some customers ask for convex shapes, but most order squared or semi-squared trigger guards with a slightly rounded corner.
This form lends itself to easy mill shaping after welding. To prevent frame warpage and hardened spots in the trigger guard strap, I suggest heliarc welding using copper heat sinks. Gas welding is not recommended for two reasons: in gas welding the flow additives used in some cast frames can create slag pockets, and too much heat is usually applied to the frame.

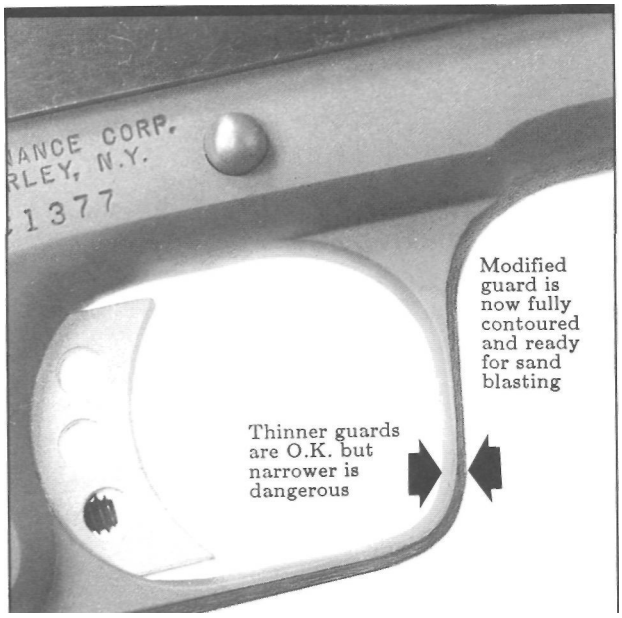


Figure 200- Shows a trigger guard after being cut, heliarc welded and reshaped. Semi-square, recontoured trigger guards are useful in two hand shooting. But a safety precaution: when reforming the sides of a trigger guard, do not reduce metal thickness to the point that the trigger can contact or catch against the holster.

Trigger Access Clearance

The big problem with large frame autos and average size hands is that, with short triggers, the second segment of the index finger pushes inward against the frame just as the trigger is squeezed, rolling the frame. Longer triggers help eliminate this condition for many shooters, but not for all. Milling a deeper trigger access in the frame, and then rounding the forward corner, is sometimes helpful to those with shorter index fingers who can't reach the long trigger and tend to roll the frame with short triggers. When cutting or milling the trigger recess bevel deeper in the frame, carefully estimate remaining frame wall thickness, and particularly in the area just above the trigger bow slot.

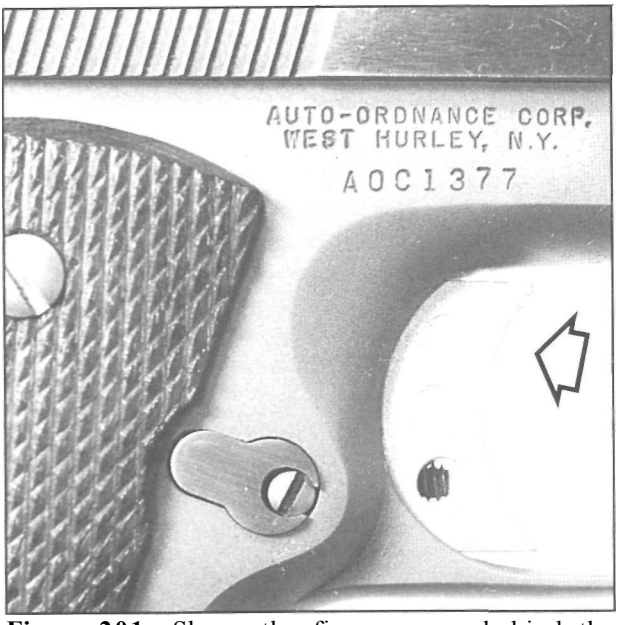


Figure 201- Shows the finger recess behind the trigger milled deeper and then curved inward [see arrow]. This modification provides extra frame clearance for shooters with short index fingers. The slot for the trigger is milled inside the frame, just below the center of the finger recess; measure carefully before cutting.

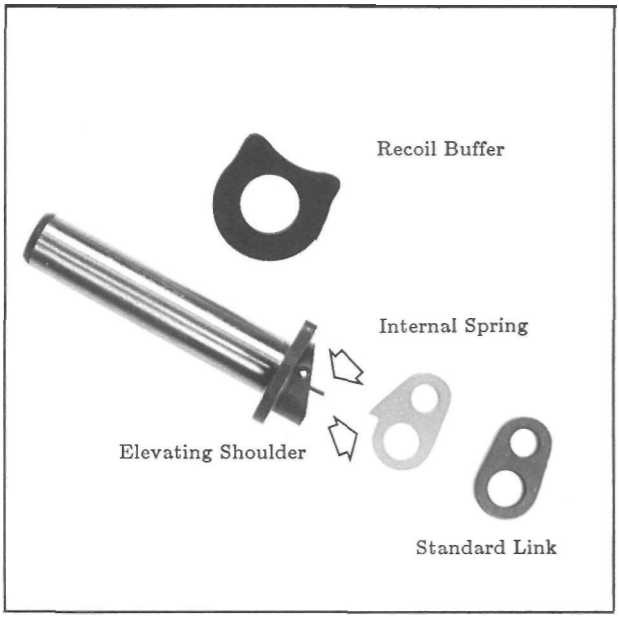


Figure 202- Shows a Dwyer Group Gripper and link. A standard link is shown for comparison. This simple, yet workable device contains a stiff spring which loads the shoulder of the Dwyer link. In turn, this holds the barrel at the upward limit of the link. These non-fit parts replace the standard link and spring guide.

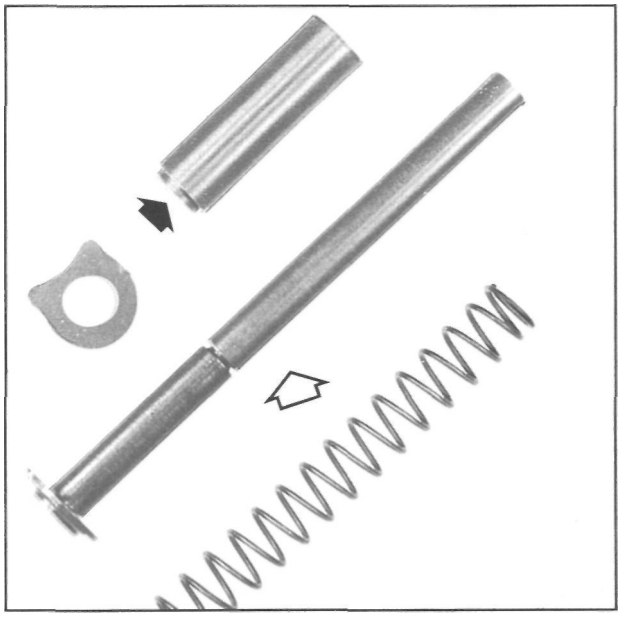


Figure 203- Shows a full-length replacement recoil spring guide. The spring plug has been drilled and clearanced for the longer spring guide stem. This system, when used with a recoil shock buffer and with the correct weight recoil spring, makes slide cycling much more consistent. Available in blue and stainless steel.

Recoil Systems

It quickly becomes obvious, with the many rounds fired in competition, that the original M1911 recoil system has two basic problems:

1. The slide stops against the recoil spring guide plate. **This impact then hammers or batters the frame.** Recoil buffers will eliminate this part of the problem.
2. The original short guide stem allows the recoil spring to compress differently on each cycling of the slide.

Dwyer Group Gripper

This system is made in two guide lengths, and drops in without fitting. The Group Gripper works by applying upward spring pressure on the special Dwyer link, thus holding the barrel up and improving vertical lock-up. With the Gripper, actual vertical lug engagement does not increase. But, instead, is made consistent by spring pressure. See figure 202. Dan Dwyer is the inventor, and you can order one from Wilson's Gun Shop in Berryville, Arkansas.

Full-Length Recoil Spring Guides

When the stem of the recoil spring guide is extended to full length, the recoil spring then has full middle support. This allows even compression of the spring coils as the slide moves to the rear. The stem holds the spring on centerline, preventing bind and making the absorbtion of recoil energy more uniform. This thrust centering makes slide cycling consistent and helps feeding and extraction.

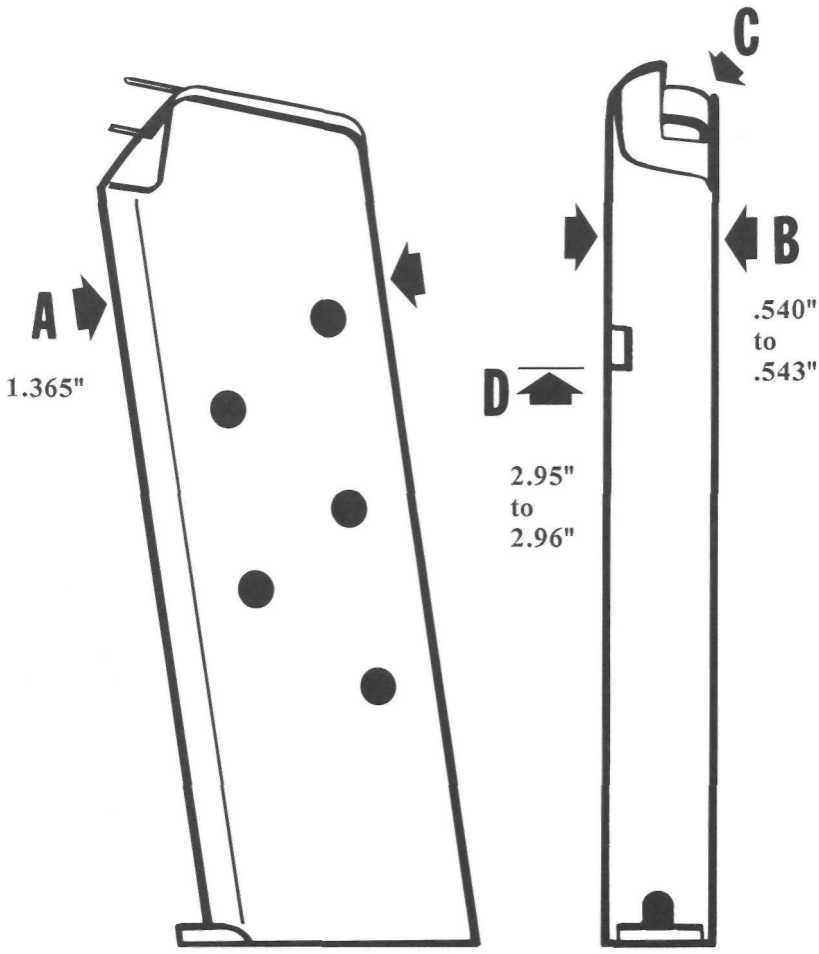


Figure Q- Shows two illustrated views with suggested dimensions for the M1911 type .45 caliber magazine. Front to back measurement at **"A"** can be found to vary from 1.360" to 1.370", but just at 1.365" is desireable. Body width at **"B"** will range from just under the military dimension of .535" up to a width of .547", and in rare cases, a bit more. In most civilian frames, with the grip bushings correctly fit, a width of .540" to .543" across the magazine body and the control lips [at **"C"**] provides excellent mechanical centering, without magazine drag. In cases where the frame well is narrower, or has been slightly bowed inward from previous work, narrower magazines must be selected. Height **"D"**, from the bottom of the magazine to the magazine catch slot, usually measures 2.95" to 2.96". Thinner bottom plates can vary this distance without problem. For best performance and easiest tuning, I suggest using Colt factory magazines, or other high quality accessory replacements. Avoiding the cheaper substitutes will save money in the long run.

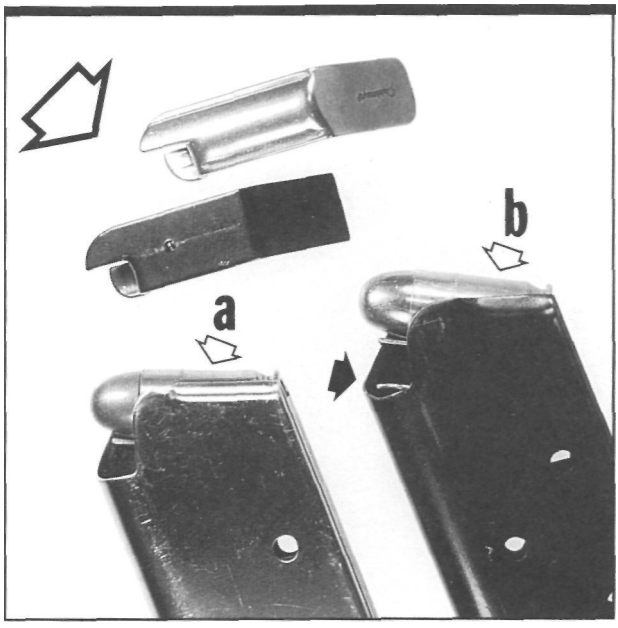


Figure 204- Shows round top and flat magazine followers, above. When control lips are not malformed or too wide at the front, round tops are generally better. The magazines below have round top followers. Both cartridge and stop tab positions are correct at **"A"**, but overly wide lips at **"B"** allow cartridge and follower tip-up.

Figure 205- Shows four typical release timing zones and cartridge control lip shapes. If lips are tapered, degree of taper determines release point. With parallel lips, distance apart, and release point position and shape, regulate final cartridge release. Release should coincide with cartridge break-over and extractor pick-up.

Magazine Tuning

The original magazine design has tapered cartridge control lips and permits a somewhat variable release point. This, in effect, serves to allow for variations in final production sizes of all the parts, and yet preserves function. This was a "jack of all trades, master of none" compromise. In fact, all magazines could use some amount of adjusting and/or tuning to match both pistol and ammunition being used.

Magazine Tuning Guidelines

1. The body of the magazine must be straight and parallel, and measure between .540" and .543" in outside width. [Military mags, run .535".]
2. Round top followers work better than flat when mag. lips are correctly formed.
3. Pistol dimensions vary. This, in turn, varies correct release point position. So, tune clips for a specific gun.
4. Release point is easier to adjust with parallel mag. lips, providing enough lip material remains for fitting.
5. Angle and level of the follower is easier controlled with parallel magazine lips.
6. For reliability, cartridge release point must be tuned to maximum repeatability for the type of round being used.
7. Always start long. Tune or adjust the release point carefully from front to back.
8. Once in range, you will find that the best release point is actually a zone about .030" in length.
9. Short wadcutter cartridges require an earlier release.
10. Unless damaged, most magazines can be tuned.

Adjust Cartridge Release Point

In most pistols, the shorter wadcutter round requires a slightly lowered magazine follower and also somewhat earlier magazine release timing. These adjustments let the cartridge break-over correctly and pick up the extractor, while aligning with the chamber in proper timing sequence with the slide.

Small polishing adjustments can be made to allow an earlier release. See figure 206. When an even earlier cartridge release is needed, the magazine lips will have to be re-formed.

A late release will chamber-jam a round [particularly shorter wadcutters] on an angle between the lower recoil face of the slide and the upper inside surface of the chamber. With too early releases, the round sometimes tries to stand up.

Adjust Magazine Lips for Later Cartridge Release

To achieve a later cartridge release with tapered lip type magazines, the taper must be carefully closed, and then trial and error dressed back to the correct release point. If necessary, this can be done with pliers, and then stone finished. But, the most reliable method is to place a forming mandrel inside the magazine, clamp it between padded vise jaws, and then form the lips forward, using the swaging punch shown in figure 207. Slotted release point type magazines cannot be adjusted forward.

Figure 206- Shows the inside lip and polishing areas at **"A"**, where tapered magazine lips are dressed and slightly opened for earlier cartridge release. **"B"** shows the release timing rim slots in one style of parallel-lip magazine. Polishing these slots and chamfering the bottom inside lip edges will quicken cartridge release timing.

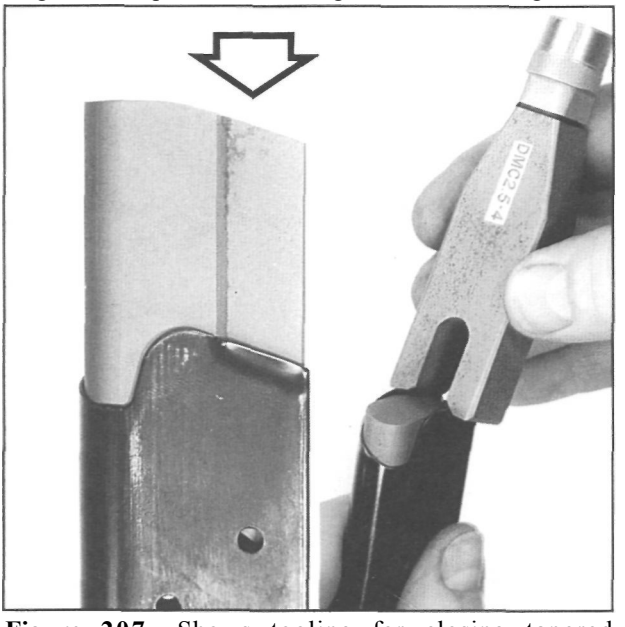


Figure 207- Shows tooling for closing tapered or parallel magazine lips to adjust their release points. It is also useful for complete reforming of the lips. The mandrel we received was .017" larger than the inside of any clip we have ever seen, and off in one other aspect, but such a great idea that we decided to remanufacture it.

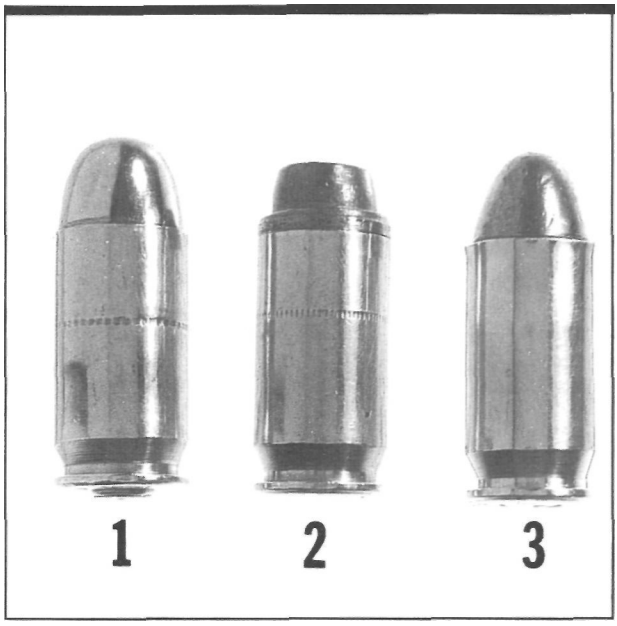


Figure 208- Shows examples of three classic ammunition problems: **1.** Improperly seated primers. **2.** Crushed and expanded soft lead semi-wadcutters. **3.** Overly expanded and/or poorly crimped case mouths. All will affect accuracy, cause mechanical feeding problems, and are made worse by incorrect seating length.

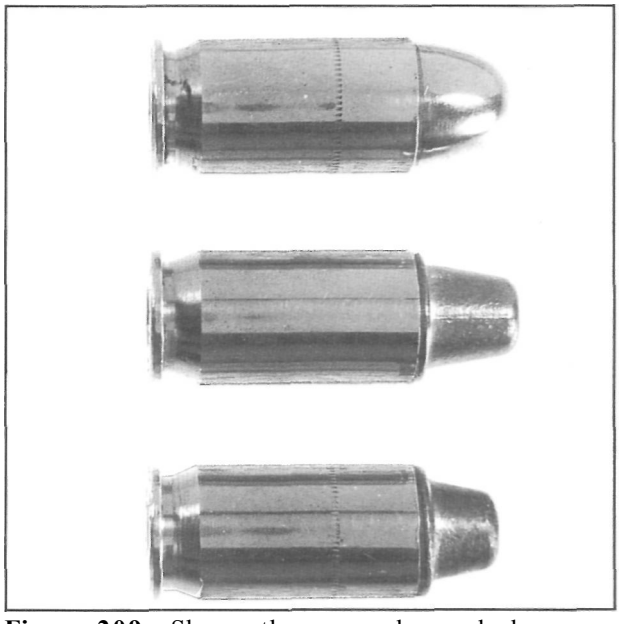


Figure 209- Shows three popular and, by now, very standard loading configurations. For best results, select the ammunition style and load you plan to use with a given pistol, and then stay with it. For maximum repeatability, all competition pistols and magazines should be tuned to, and used with, a specific load.

Ammunition For Competition Pistols

The intent here is to remind the pistolsmith that more than half of the feeding malfunctions in auto pistols are caused by basic, sometimes simple, reloading mistakes. Observation shows us that certain kinds of accuracy problems can naturally follow these basic reloading errors. Usually, cartridge problems that can lessen function [jam] will also reduce overall mechanical accuracy. When trouble-shooting this kind of problem, it's always wise to inspect the ammunition first.

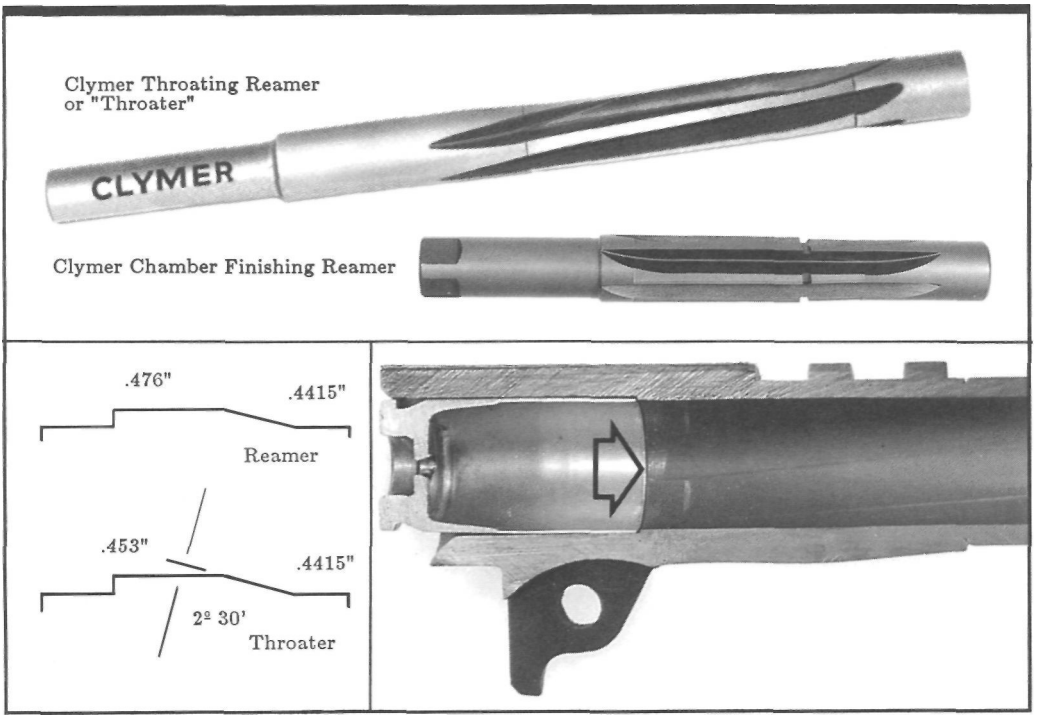
Feeding Problems Can Be Caused by:

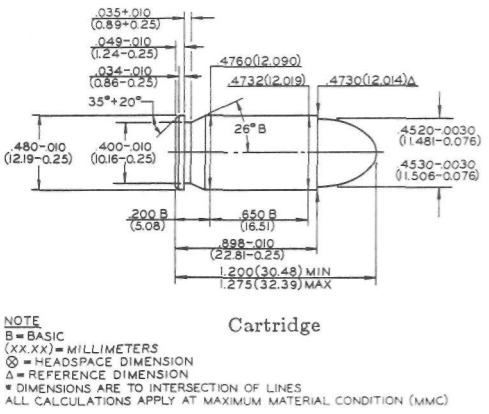
1. Poorly seated primers
2. Incorrect seating length
3. Lead deformation, front
4. Lead deformed, shoulder
5. Over expanded case mouth
6. No taper crimping
7. Damaged case rims

Related Accuracy Problems:

1. Irregular primer seating causes uneven ignition.
2. Irregular seating depths may cause bullet deformation and varying pressure curves.
3. Bullet seating deformation will always affect accuracy..
4. Nonstandard crimping can also vary the pressure curve, and resulting accuracy.

It follows that correctly loaded, uniform ammunition, made with good components and excellent brass, will feed with mechanical consistency. Then, it's up to the shooter to select the exact accuracy and performance load for his particular form of shooting or competition. It is this load that his pistol should be tuned to cycle flawlessly.





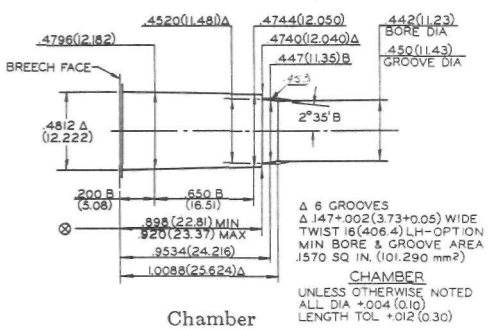


Figure R- Shows both chamber finishing and foreward chamber throating reamers from Clymer Manufacturing Co. Cutting dimensions are given at right. The half-sectioned barrel has been throated [see arrow] at the optimum angle of *2?* degrees. The new, longer throat virtually eliminates cycling problems caused by leading, and lead build-up, at the chamber leade. Additionally, lead semi-wadcutter bullets generally perform with greater accuracy, since they are eased [almost funneled] into gradual contact with bore and rifling, and with minimum deformation. The original .45 ACP chamber was designed with a very short throat for copper jacketed, ball type ammunition, and does not handle non-jacketed bullets as well as one that has been throat modified. Some still call this work "free-boring", in this way differentiating it from chamber entry throating and ramping done to improve feeding. SAAMI standard cartridge and chamber dimension drawings are shown below. Clymer's "GO" and NO-GO" gauges are shown in use in earlier sections. - **Courtesy, Clymer Mfg. Co., Inc.**

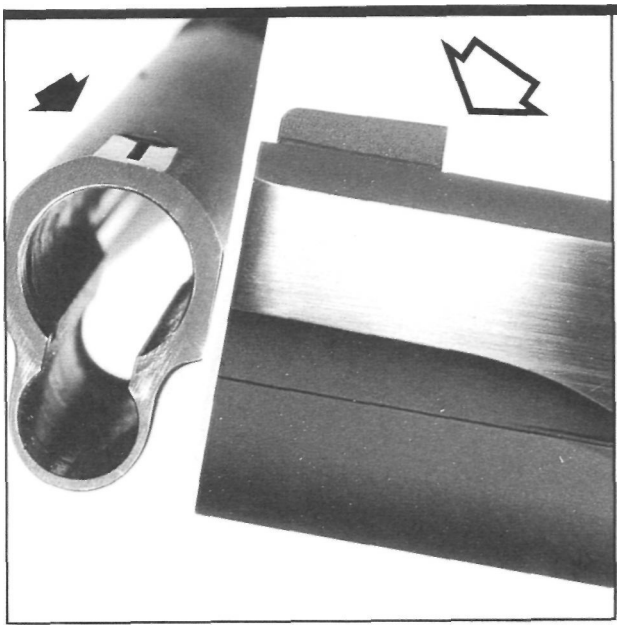


Figure 210- Shows a Millett skirted front sight in staking position on the slide. Note the small level area milled to receive the flat bottom of the skirt. When correctly installed, this sight is stronger than other single-staked types. Bonding is further increased by applying fiberglass resin to the skirt and stem just before final staking.

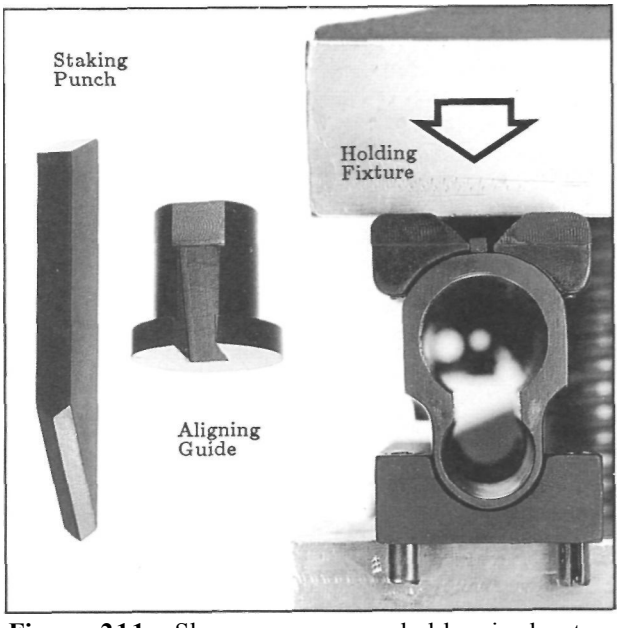


Figure 211- Shows a very workable single-stem front sight staking system, also available from Millett Sights. This tooling is designed for use in a bench vise and provides full, positive slide control, during sight installation. Correct alignment of the sight is maintained while the sight stem is being staked in position.

A Better Staking System For Competition Sights

Generally, when larger and adjustable competition rear sights are installed, most standard front sight blades must be replaced. Taller and wider front sights become necessary in order to match elevation and work correctly with the new rear sight.

With the force and repetition of recoil, the extra metal in the now larger front sight has just enough mass to help, or cause, self-loosening.

For this reason, a better and stronger means of securing a front sight is needed. As I see it, silver brazing is not a workable answer since risk of slide warpage and alteration of the heat-treat is high. This is particularly a problem with tightened slides.

The best answer is to stay with mechanical attachment of the front sight [no heat] and then help bonding along with fiberglass or an epoxy. See figures 210 and 211.

1. Begin by dressing the square hole and slot in the slide to receive the new sight.
2. Do not undersize the sight stem. Instead, enlarge the hole and/or slot in the slide as needed to fit the sight.
3. Mill [or carefully file] a flat on the slide to receive the bottom of the sight skirt.
4. Degrease both the slide and sight and apply fiberglass resin to the stem and skirt.
5. Stake, using correct tooling as shown in fig. 211.
6. Remove any fiberglass residue with acetone.
7. Grind away excess staking material until bushing fits.

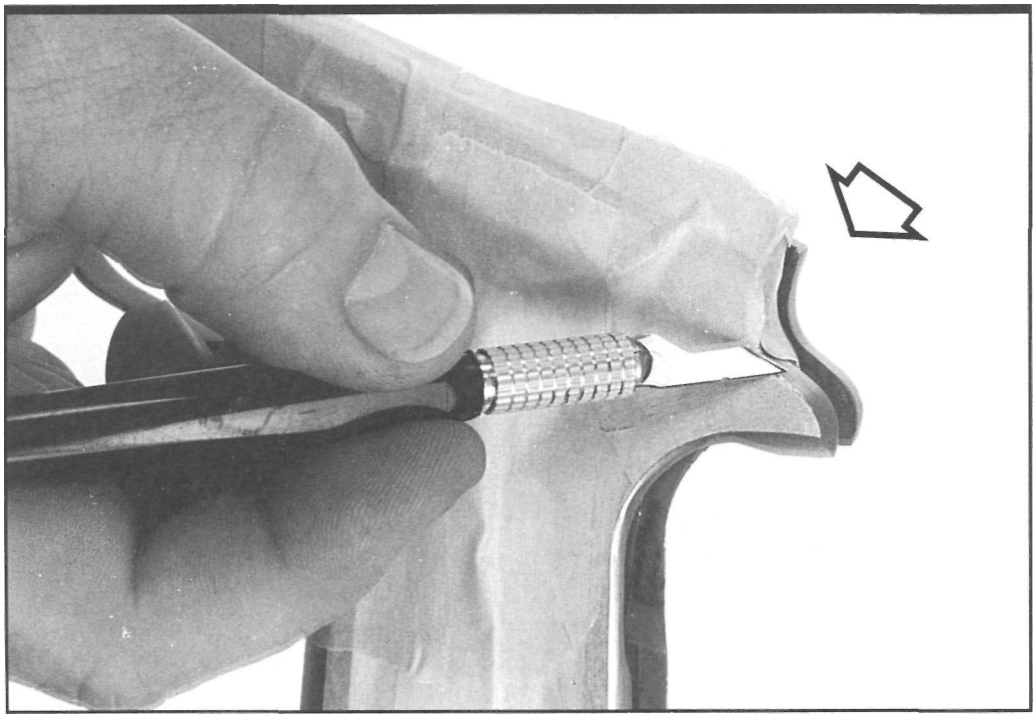


Figure 212- Shows the frame sides, top, and rail slot areas masked in preparation for partial sandblasting. Masking tape will not adhere unless all surfaces are clean and grease free. Remember to protect the rail slots. Trim excess masking tape away with a sharp Exacto knife. When the sides of the frame are to be sandblasted also, mask only the rail slots and top of the frame.

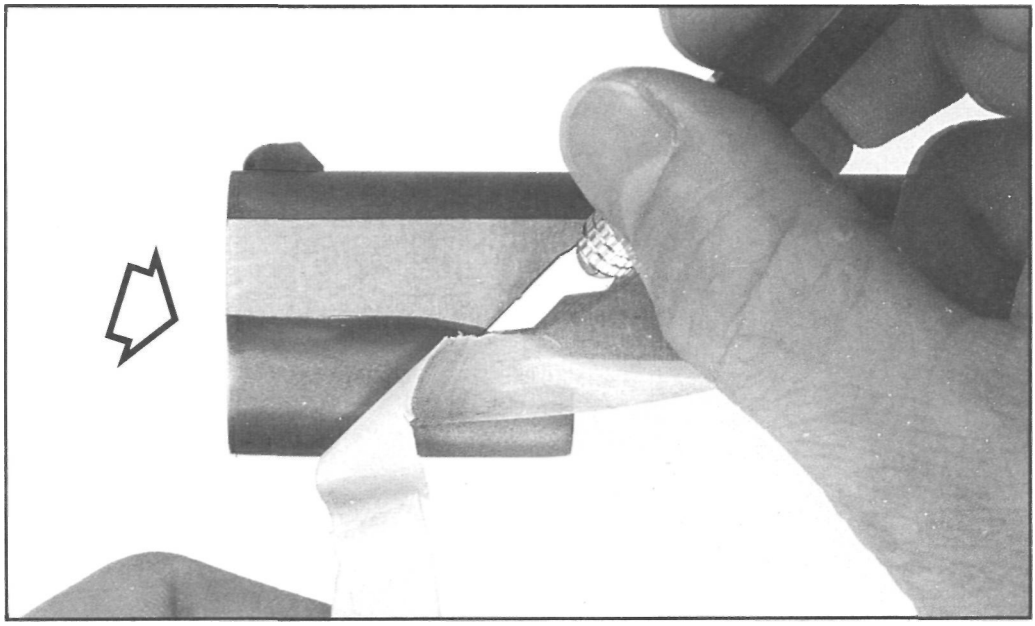


Figure 213- Shows detail trimming excess masking tape applied to the pre-polished sides of the slide. Use sharp blades and a cutting angle that prevents marking the slide. After sandblasting, the sides are final polished with sandcloth or a felt covered block and polishing compound. This produces the desired finish and also a sharp corner edge where the sandblast begins.

Final Seating Work

Naturally, all individual parts are correctly fit, clearanced, and polished as they are installed.

But, when major custom modifications have been made, such as rail lowering, slide tightening, re-linking work, installation of a match barrel and bushing, or when an entire pistol has been custom built, final seating-in and adjustment as a system is necessary. The new assembly has never operated as a working system before, and many angles and clearances have been changed.

Final seating requires plenty of oil and patience. After assembly, all parts, rails, slide, and etc., are heavily oiled and worked in by hand. Then the pistol is disassembled, drag areas are polished, the pistol is cleaned, re-oiled, reassembled and further seated, and checked again, etc., until it operates smoothly.

After this, fifty to a hundred rounds are fired and then the pistol is once again disassembled, inspected, and any remaining drag areas polished.

When another two hundred and fifty to three hundred and fifty rounds have been fired, the pistol can be said to be fully seated in.

Sear Protection

Remember that a finely tuned sear has an engagement surface that is only about .009" to .010" wide, and, being this thin, is very easily damaged. It's both practical and wise to hold the trigger back [holding the sear out of the way] whenever the slide is cycled for any reason. You automatically do this when firing the pistol.

A Few Last Words About Action Tuning and Custom Work . . .

Times have changed for the craftsman. These days, if you do action tuning and custom work, you brush shoulders with a bad dream come true called product liability, in much the same way as would a manufacturer. If you aren't already familiar with this subject, you might find it worthwhile to talk it over with your attorney. Product liability could be defined as "the modern road to riches." With the help of crafty lawyers, more and more of the undeserving are retiring early- and sadly, on your hard earned insurance dollars.

1. Remember that custom gunsmithing is creative, and therefore different than basic mechanical repair work. When you enter this field, you are the designer.

2. Don't do patch work, ever. When you know that a part, barrel, slide, frame, etc., actually requires replacement- replace it and be done with it.

3. When doing machine work, make all set-ups carefully and on a strictly individual basis. Remember that, with the plus and minus tolerances intrinsic in all mass produced products, no two parts are precisely the same. Always recheck set-ups before cutting.

4. Never alter a safety system; and especially do not pin grip safeties. Replace altered or mismatched safety parts. And, always recheck safety function, since you could be sued for any mishap.

5. Do only custom work that you know is safe and properly useful. Turn down odd requests for things such as extremely light trigger pulls, cutaway trigger guards, etc.

6. Turn down every "opportunity" to perform low quality work. Whatever work you accept, do it well. However small, every job you do becomes a part of your reputation.

7. Do only the highest quality custom work, and price it accordingly, as high quality work. In this way, you will develop a quality clientele.

8. Be selective, work only for those who can appreciate fine work. Remember that high quality custom gunsmithing goes beyond simple craftsmanship; somewhere along the line, it becomes an art form.

The very best things have always been made by hand: the finest automobiles, the best shotguns, and the best and most accurate target pistols. When properly cared for, well crafted firearms will last and can be enjoyed by generations.

O D D I T I E S . . .

In the past, some independent parts manufacturers and Colt copy producers nave had quality control standards that allowed non-blueprint parts to be shipped. Evidence of this is the fact that such parts do exist, and are found from time to time during gunsmithing work. While many oddities are found, these are the main ones:

About Frames and Slides-

Frames can be found with disconnector ports mis-machined or on an angle- replace these frames.

Some frames have been made with plunger tube holes and/or ejector stud holes mis-positioned or spaced incorrectly. This is a matter of degree; careful fitting can compensate for slight errors.

When you receive a new frame, check it against known correct parts [as gauges] ie: ejector, plunger tube, trigger, etc. Check the rails and the magazine well.

Investment cast frames can be found with one rail slot noticeably lower than the other. With these frames, normal slides are usually twice as loose on one side- replace these frames.

Always check replacement slides for warp from heat treating. A small amount of warp is not unusual, and is easily dressed. Past a few thousandths, reject the slide.

Investment cast slides with one side higher or lower than the other should be rejected. But, if you are a real optimist, you might keep the slide in the hope of finding a mis-cast frame that happens to match.

Miscellaneous-

If, after installation of a new slide stop [full diameter crosspin], a relinked match barrel begins to bind at the corner of the bottom lug as the barrel tries to link down, enlarge the bottom half of the link pin hole [the big hole] by about .002" to .004". This will allow extra disconnect clearance without affecting lock-up.

Sometimes, links will bind against the bottom of the frame tunnel, which requires that the area just below the link be lowered and/or the link be edge dressed for clearance.

On test firing, primers may show firing pin strikes off center enough to affect accuracy after dressing the slide lugs and linking the barrel higher. In these cases, the stock firing pin hole is drilled and an off center, realigning firing pin bushing insert is installed.

Sometimes, accessory [usually adjustable] triggers with unusual rear bow angles and/or extra bow length cannot be trimmed enough to work correctly. In an effort to make such a trigger work, it's possible that someone may have incorrectly trimmed the back of the sear for adjustable trigger clearance. Watch for these and replace as necessary. If you decide to clearance cut the back of a sear, either use a Gold Cup sear for a model, or skip it and install a Gold Cup sear instead.

A slightly over cut [too deep] hammer full-cock engagement bottom, combined with a slightly short sear, can also render thumb safety inoperative.

Watch for plunger tubes with off center or mis-positioned mounting studs. They are fairly common. Reject them.

Series 80 firing pin plates will retrofit, but earlier types do not fit 80's, since they do not have a plunger lever clearance notch.

Welding on some investment castings can produce surprises. Flow additives used by some manufacturers will produce slag pockets even with the best heliarc procedures. With such castings, don't even consider gas welding .

For replacement parts-

For best quality and a minimum of problems, I suggest you stay with factory Colt- or a high quality accessory parts manufacturer.

Quick factory parts recoil spring identification-
[May not apply to springs of other manufacture.]

Number of turns	Barrel length	Caliber
24 coils	4 1/4" Commander	9mm
24 coils	4 1/4" Commander	.38 Super
24 coils	4 1/4" Commander	.45 ACP
28 coils	5" Gold Cup	.45 WC*
28 coils	5" Government	.9mm
28 coils	5" Government	.38 Super
28 coils	5" Ace .22	.22 LR
28 coils	5" .22 conversion	.22 LR
32 coils	5" Government	.45 ACP
32 coils	5" Gold Cup	.45 ACP**

* Gold Cup- use 28 coil factory spring with wadcutters.
** Gold Cup- use 32 coil factory spring with hardball loads.
Models that are not listed use other recoil systems.

Factory slide stop parts identification-

Imprint	Caliber
#1	All .45 caliber models
#2	Ace .22 and .22 conversions*
#3	All 9mm & .38 Super models
#4	10mm Model

* The #50278 .22 conversion slide stop was also used on the Gold Cup National Match .38 Spl.

TOOLS and SPECIAL TOOLS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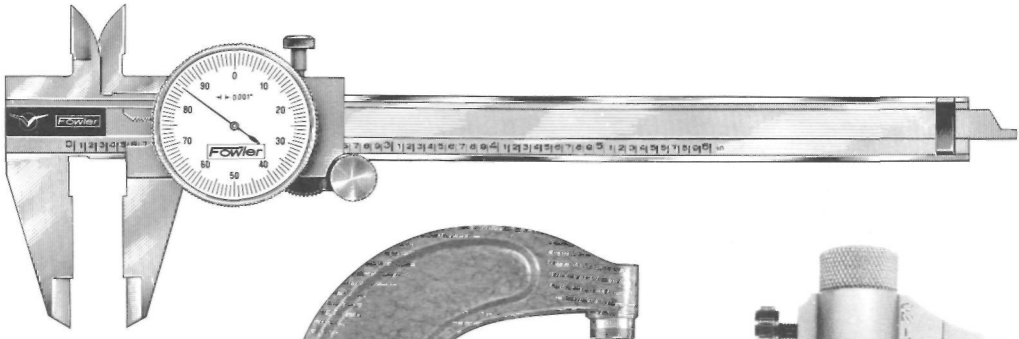
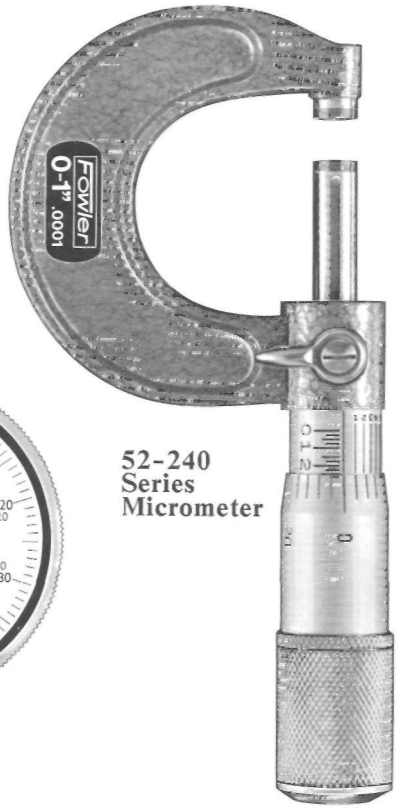
20
CRAFTSMAN

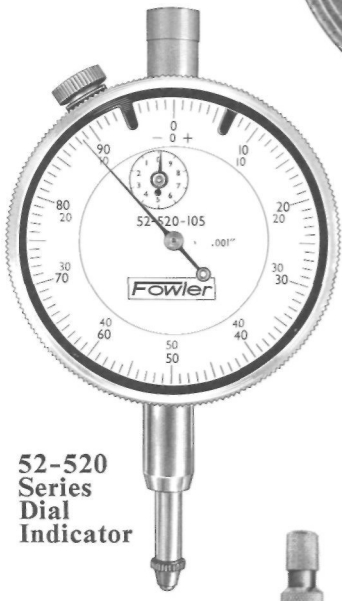


52-008 Series
Dial Caliper



52-240
Series
Micrometer

52-275 Series
Inside Micrometer



52-520
Series
Dial
Indicator

52-225 Series
Depth Gauge
Micrometer
With Rods

-Courtesy Fred V. Fowler Co., Inc.

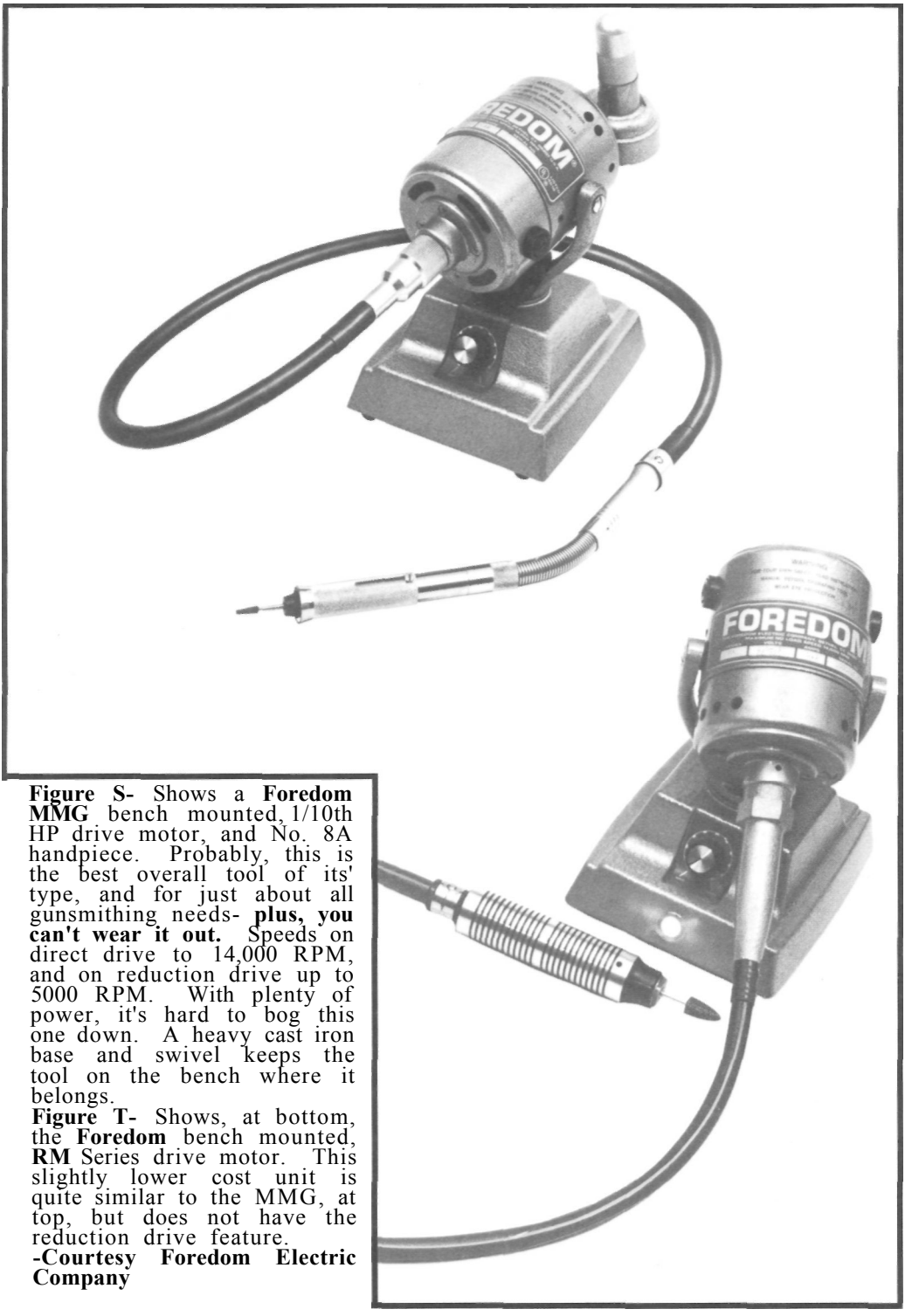


Figure S- Shows a **Foredom MMG** bench mounted, 1/10th HP drive motor, and No. 8A handpiece. Probably, this is the best overall tool of its' type, and for just about all gunsmithing needs- **plus, you can't wear it out.** Speeds on direct drive to 14,000 RPM, and on reduction drive up to 5000 RPM. With plenty of power, it's hard to bog this one down. A heavy cast iron base and swivel keeps the tool on the bench where it belongs.

Figure T- Shows, at bottom, the **Foredom** bench mounted, **RM** Series drive motor. This slightly lower cost unit is quite similar to the MMG, at top, but does not have the reduction drive feature.

-Courtesy Foredom Electric Company

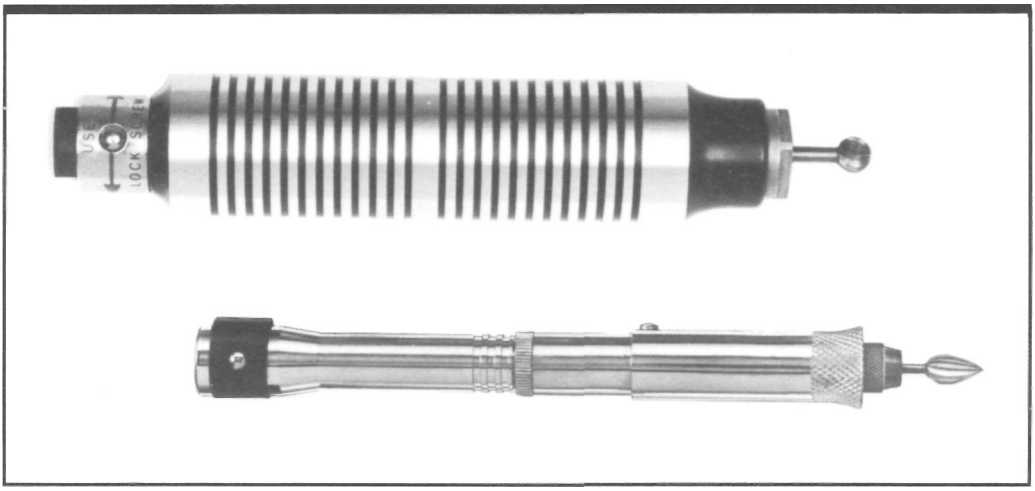
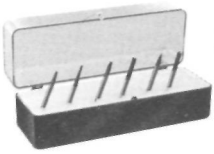
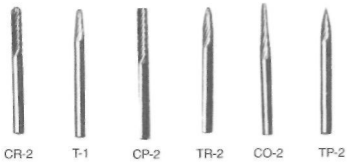


Figure U- Shows two **Foredom** handpieces excellent, in my opinion, for bench gunsmithing use. The number **25**, at top, has double sealed ball bearings, and takes tool collets from 1/16" up to 1/4". Weight is about 7 oz. This is a heavy duty production grade tool. And below, the smaller, and lighter, Foredom number **8A** handpiece handles tool collets from 1/32" through 3/32", with 1/8" as standard. Diameter is 3/4", weight is about 4 ounces, great for close detail work. **-Courtesy Foredom Electric Co.**

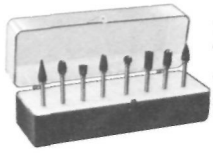
FOREDOM® KIT No. 410
CARBIDE BURS



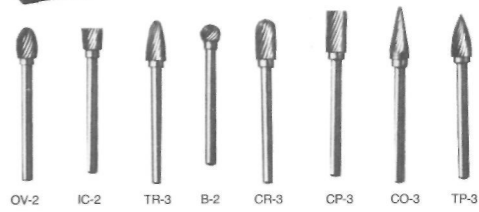
Six assorted durable carbide burs ideal for use with hard woods and most metals. 1/8" shank. 1/8" cutter dia., rated to 100,000 RPM.



FOREDOM® KIT No. 420
CARBIDE BURS

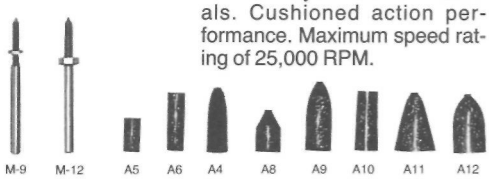


Eight assorted heavy duty carbide burs ideal for use with hard woods and most metals. 1/8" shanks. 1/4" cutter dia., rated to 35,000 RPM.

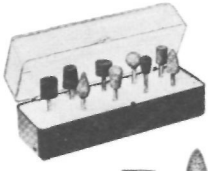


FOREDOM® KIT No. 220
UNMOUNTED RUBBER BONDED ABRASIVES

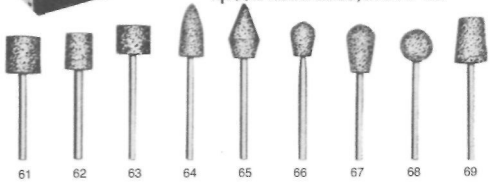
64 unmounted rubber bonded abrasive points and four 1/8" mandrels. Two each of 8 shapes in four grits — coarse, medium, fine and extra fine. Used for light deburring, cleaning, smoothing and polishing. Ideal for hard to reach areas on ferrous and non-ferrous alloys and other materials. Cushioned action performance. Maximum speed rating of 25,000 RPM.



FOREDOM® KIT No. 80
MOUNTED ABRASIVE POINTS



9 Aluminum Oxide (red) heavy duty mounted points for rough work on high tensile materials like steel, malleable iron, etc. 1/8" shanks. Kit shown contains one of each of these points. Maximum speed rated at 35,000 RPM.



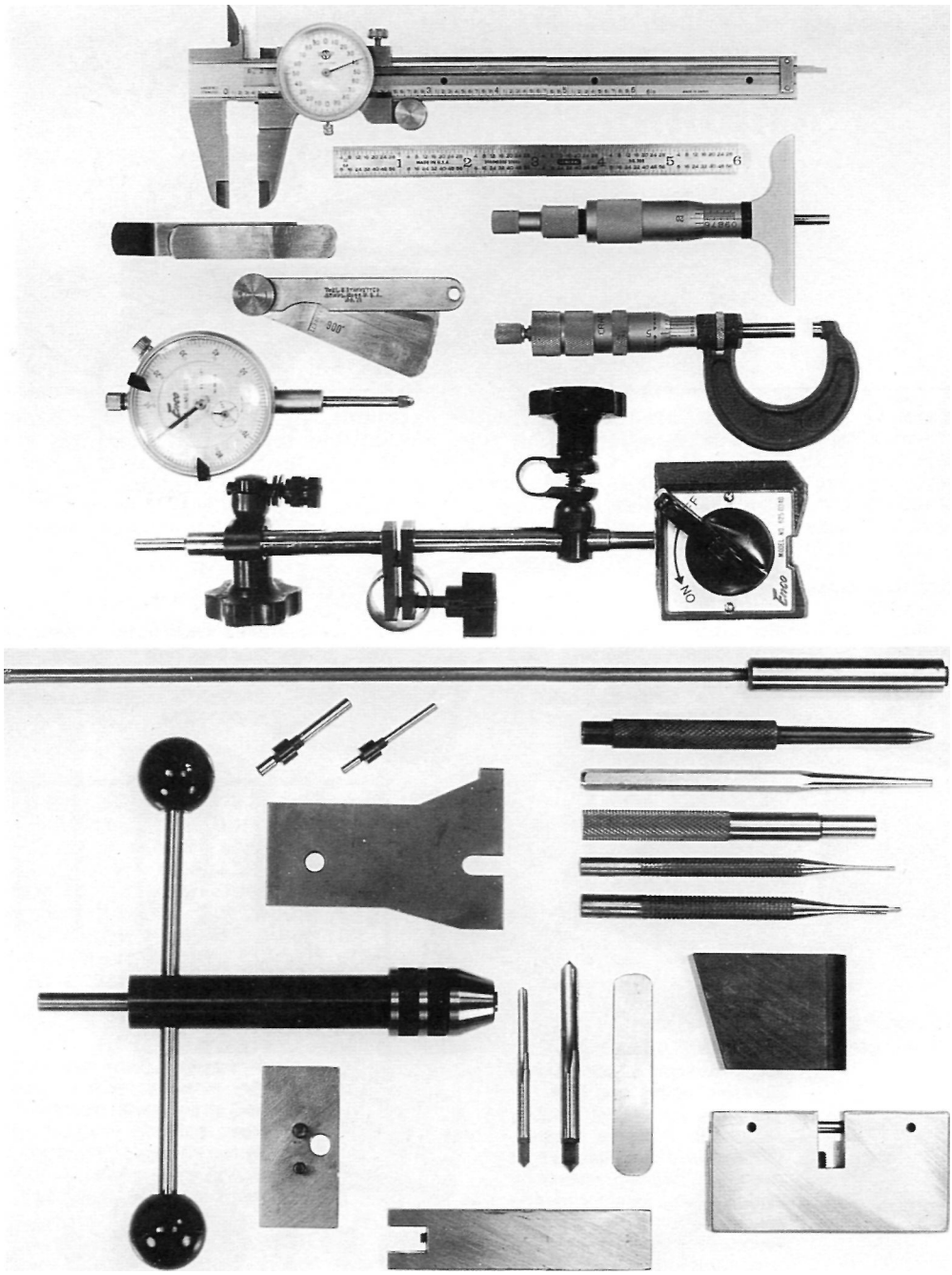


Figure V-. Shows basic measuring and gunsmithing tools particularly helpful in .45 auto pistolsmithing work, including dial calipers, both inside and depth gauge micrometers, gauge stock, dies, taps, staking tools, punches, drifts, basic hammer and sear jigs, a barrel plug gauge, a thread aligning tapper and a dial indicator.

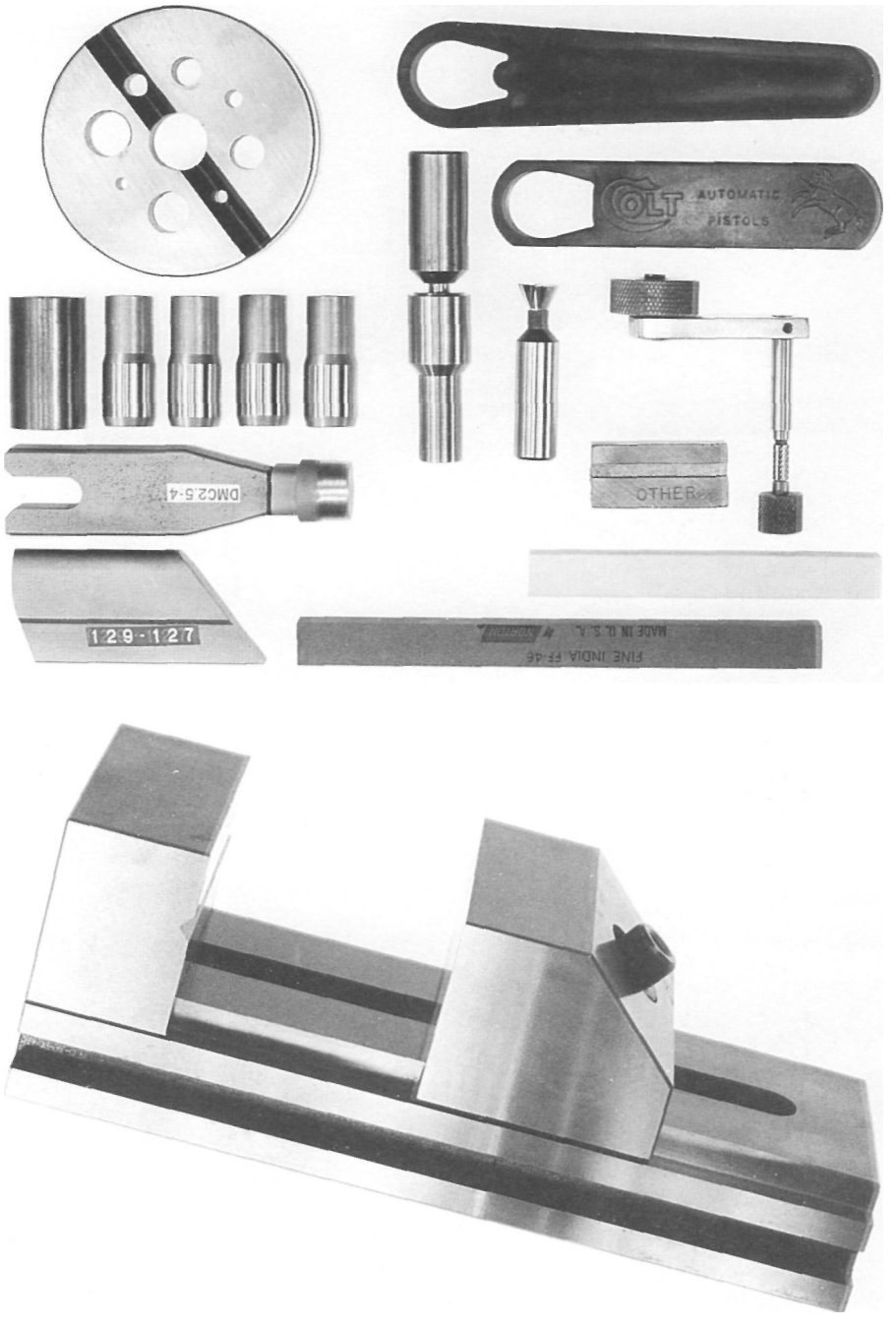


Figure W- Shows additional useful pistolsmithing items including a steel bench block, both steel and plastic bushing wrenches, bushing expanders, bushing turning mandrel, dovetail cutter, assorted stones, a lug cutter, sight block, and magazine tuning/adjusting tools. Shown below is a toolmaker's vise; very handy for holding and fitting small parts. I suggest buying better quality tools; they work better and last longer.

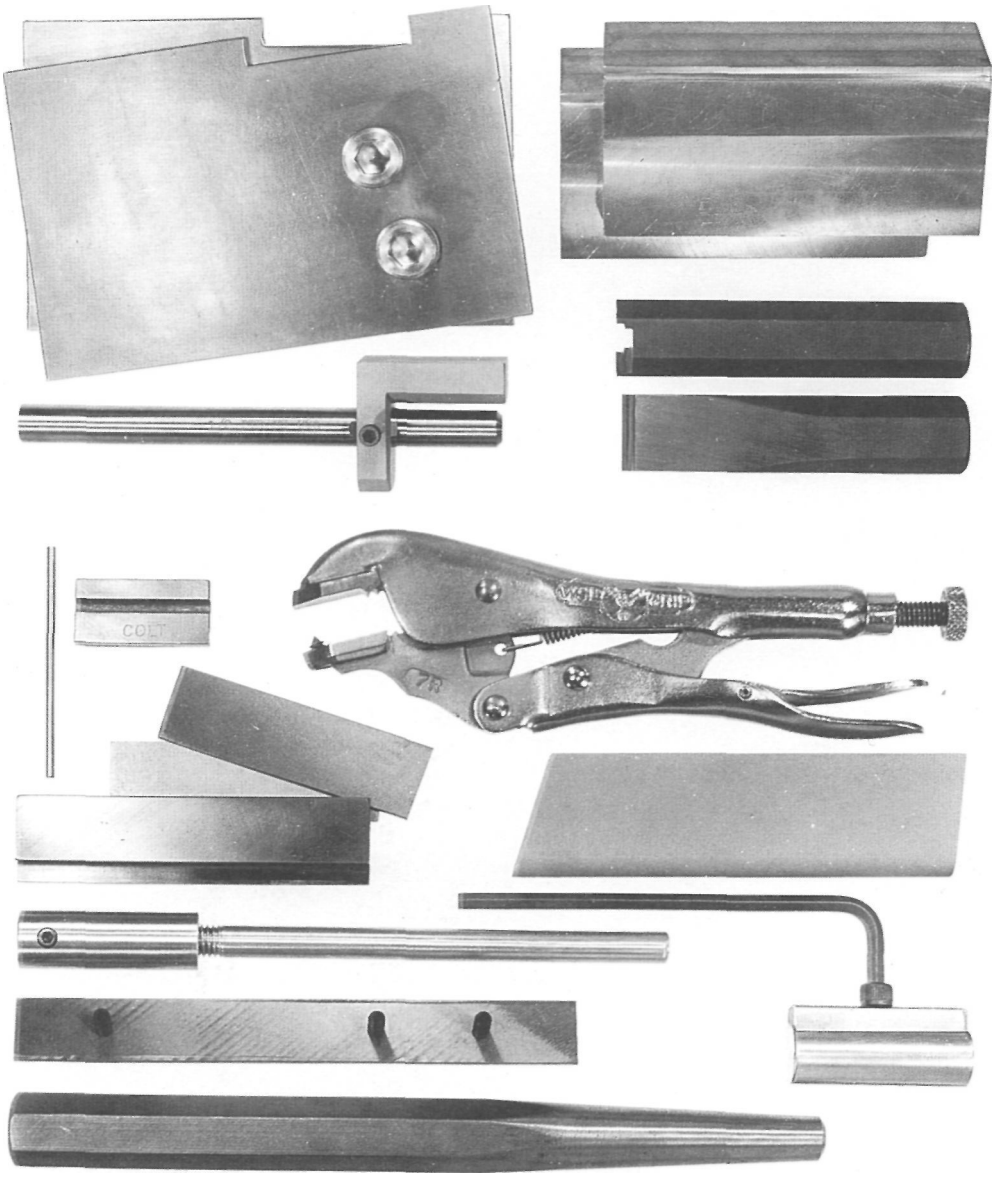


Figure X- Shows tool variations designed and used by gunsmith Jerry Kuhnhausen for in-shop application. From left to right, top to bottom: frame holding plates, heavy duty slide tightening blocks, barrel clearance turning fixtures, frame rail swaging and adjusting punches, plunger tube insert and gauge, adjustable plunger tube staking pliers with reinforcing block [based on Vise Grip Pliers], frame rail gauging/sizing bars, magazine well reinforcers [one type shown only], slide lug hone, slide lug iron, slide rail inside indicator plate, and bushing expander punches. When the exact tooling or tool variation he needed wasn't commercially available, the author either modified an existing tool or designed and manufactured one to do the job.

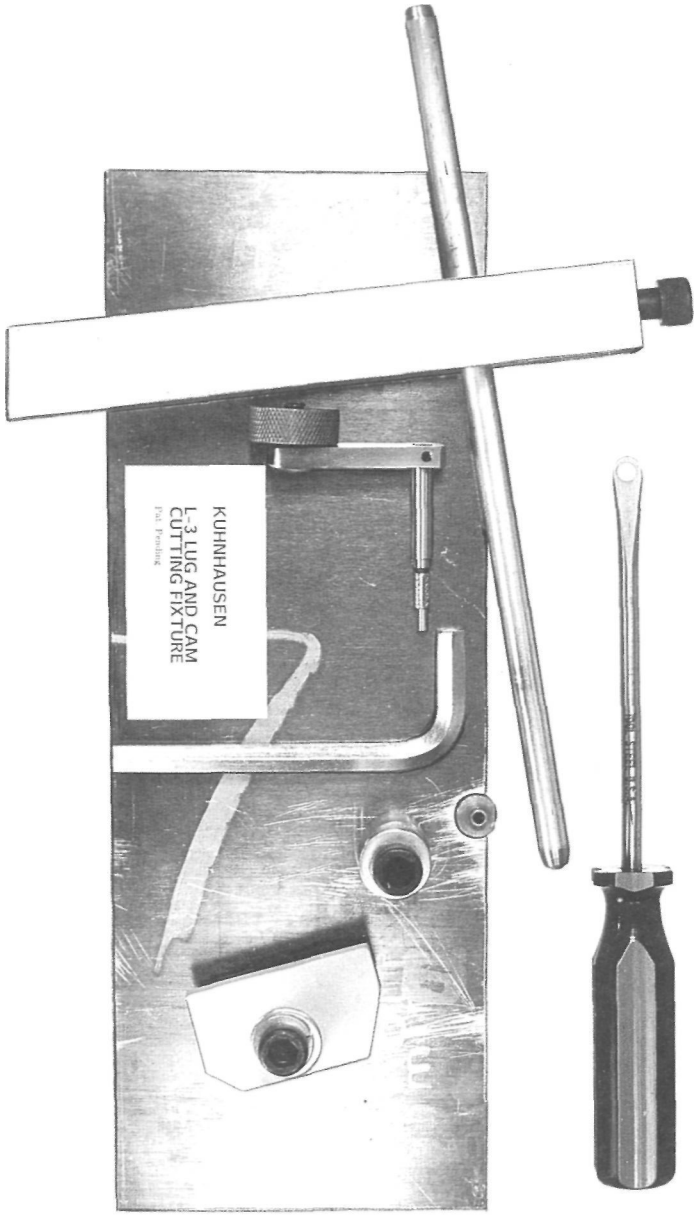


Figure Y- Shows a close view of an L-3 adjustable bottom barrel lug cutting fixture, invented by the author to solve what he calls a "basic evolutionary problem": which is that the average human being needs 1.7 more hands than he is born with in order to hold position and hand-cut bottom lugs perfectly. When correctly adjusted and mounted in a bench vise, this tool allows easy two hand use and permits the pistolsmith to fully concentrate on the work. One hand maintains light, continuous feeding pressure, while the other turns the cutter.

Caution: When function testing, never load more than two rounds at a time. Make this a habit, even when test firing on a machine rest. Load and test with only two rounds until the disconnector proves.

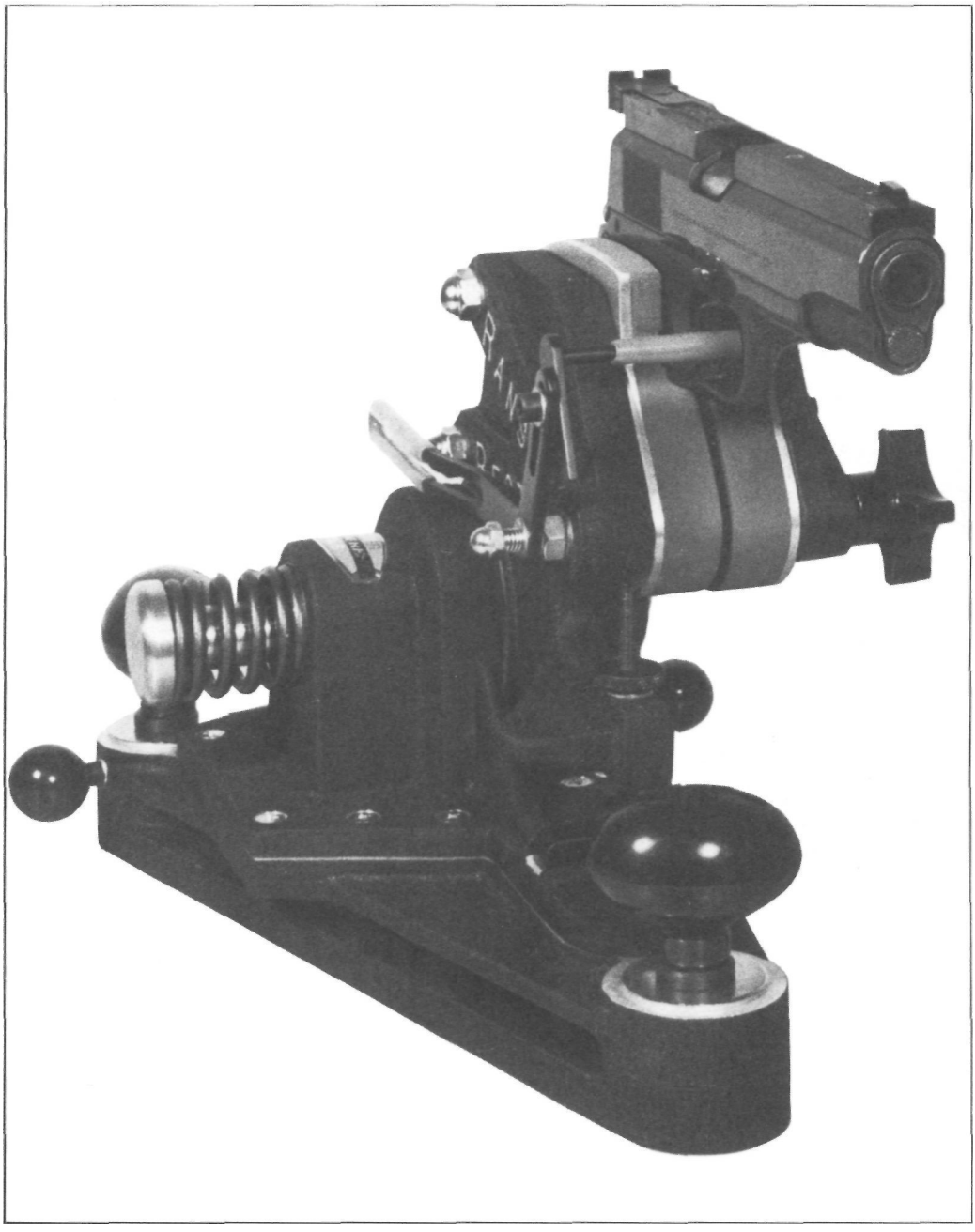


Figure Z- Shows a Colt Government Model set up for function testing in a **Ransom Master Series Machine Rest.** Matching Government Model grip inserts secure the pistol to the main frame of the machine rest. The Ransom Machine Rest is an indispensable aid to the pistolsmith, and is probably the safest way to test fire semiautomatic pistols of all types. **-Photo by Richard Aldis, courtesy Ransom International Corp.**

Test firing on a Ransom Machine Rest can help the pistolsmith easily solve even the most difficult sight related problems by ruling out hand held variables. This professional tool is a wise investment, and a "must" for all pistolsmiths and armorers.

Figure Z-1- Shows **a Ransom Master Series Machine Rest,** with adjustable windage base, being used to check the sights on a customized Government Model. The basic Master Series Rest is adjustable for elevation. The optional windage adjustment base, shown installed on the above rest, is a worthwhile addition, and is suggested for custom sight work. After firing, the pistol and upper rest are easily returned to the original firing position by depressing the return lever beside the elevation screw. **-Photo by Richard Aldis, courtesy Ransom International Corp.**

Notes

Notes

PARTS DIAGRAMS

The following parts diagrams, listed in model sequence, were used in the original manuals to provide a quick and easy one book bench reference.

In use, this proved so convenient, and such a timesaver, that we have included the diagrams here.

Being historically related, **Ace, Service Ace,** and **.22 Conversion Unit** parts details are also shown.

It seems only fitting that a parts diagram of the latest offering of the **M1911A1**, this time from Springfield Armory, Inc., be included as the last in the series. Seventy-eight years have passed since the original U.S. military adoption of the **M1911** .45 Automatic. It is amazing that a pistol designed so long ago retains undiminished public popularity to this very day.

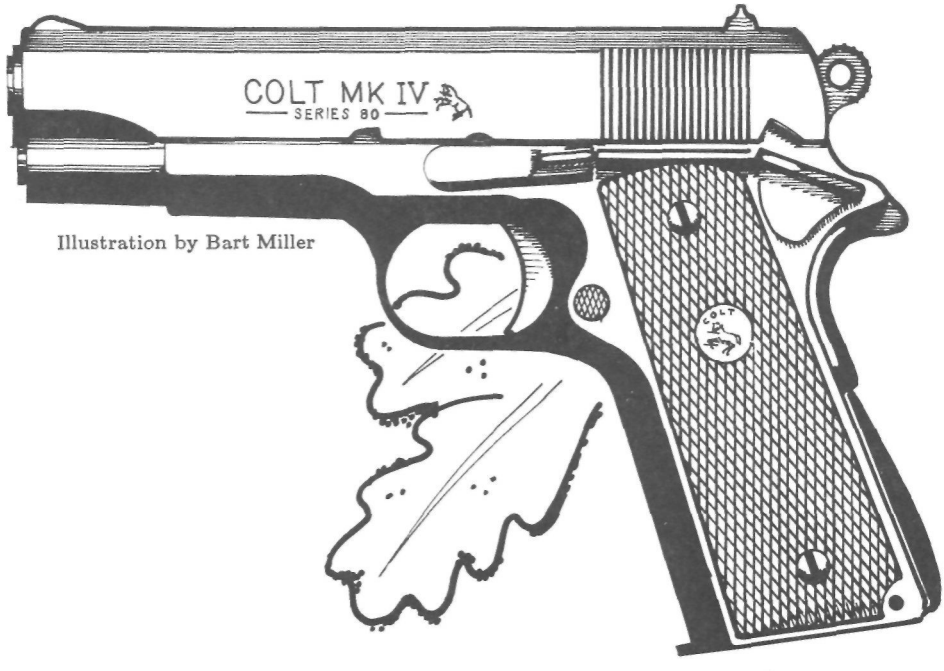


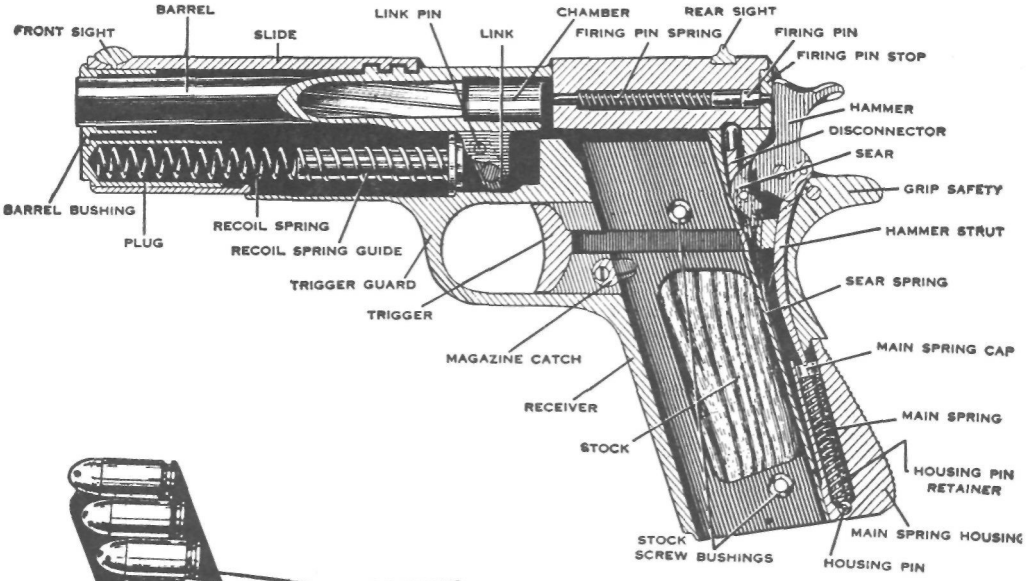
Illustration by Bart Miller

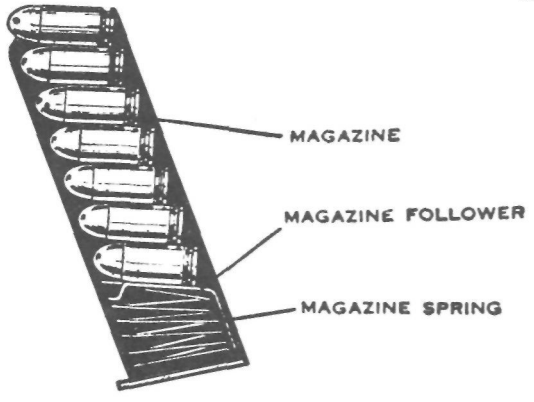
General Data and Specifications

Data Category	Government Model	Combat Commander	Commander L.W.	Officer Model	.22 Conv. Installed
Wt. Empty	39 oz.	36 oz.	27 oz.	34 oz.	42 oz.
Wt. Loaded	46 oz.	43 oz.	34 oz.	40 oz.	44 oz
Length O.A.	8 5/8"	7 3/4"	7 3/4"	7 1/8"	8 1/2"
Height O.A.	5 1/2"	5 1/2"	5 1/2"	5"	5 1/2"
Sight Radius	6 1/2"	5 1/2"	5 1/2"	4 7/8"	6 1/2-6 3/4"
Barrel length	5"	4 1/4"	4 1/4"	3 7/8"	5"
Rifling	Left 1:16"	Left 1:16"	Left 1:16"	Left 1:16"	----
Depth	.003-.0039"	.003"	.003"	.003"	----
Type Action	Short Recoil	Short Recoil	Short Recoil	Short Recoil	Blowback
Mag. Capacity	7	7	7	6	10
Trigger pull	5-6.5 lbs.	5-6.5 lbs.	5-6.5 lbs.	5-6.5 lbs.	5-6.5 lbs.
Effective Range	50 yards	50 yards	50 yards	50 yards	25 yards
Max. Range	1600 yds.	1500 yds.	1500 yds.	1500 yds.	

Colt Series 80 Government Model product photo courtesy; Colt Industries, Firearms Division

The Colt logo is a trademark of Colt Firearms

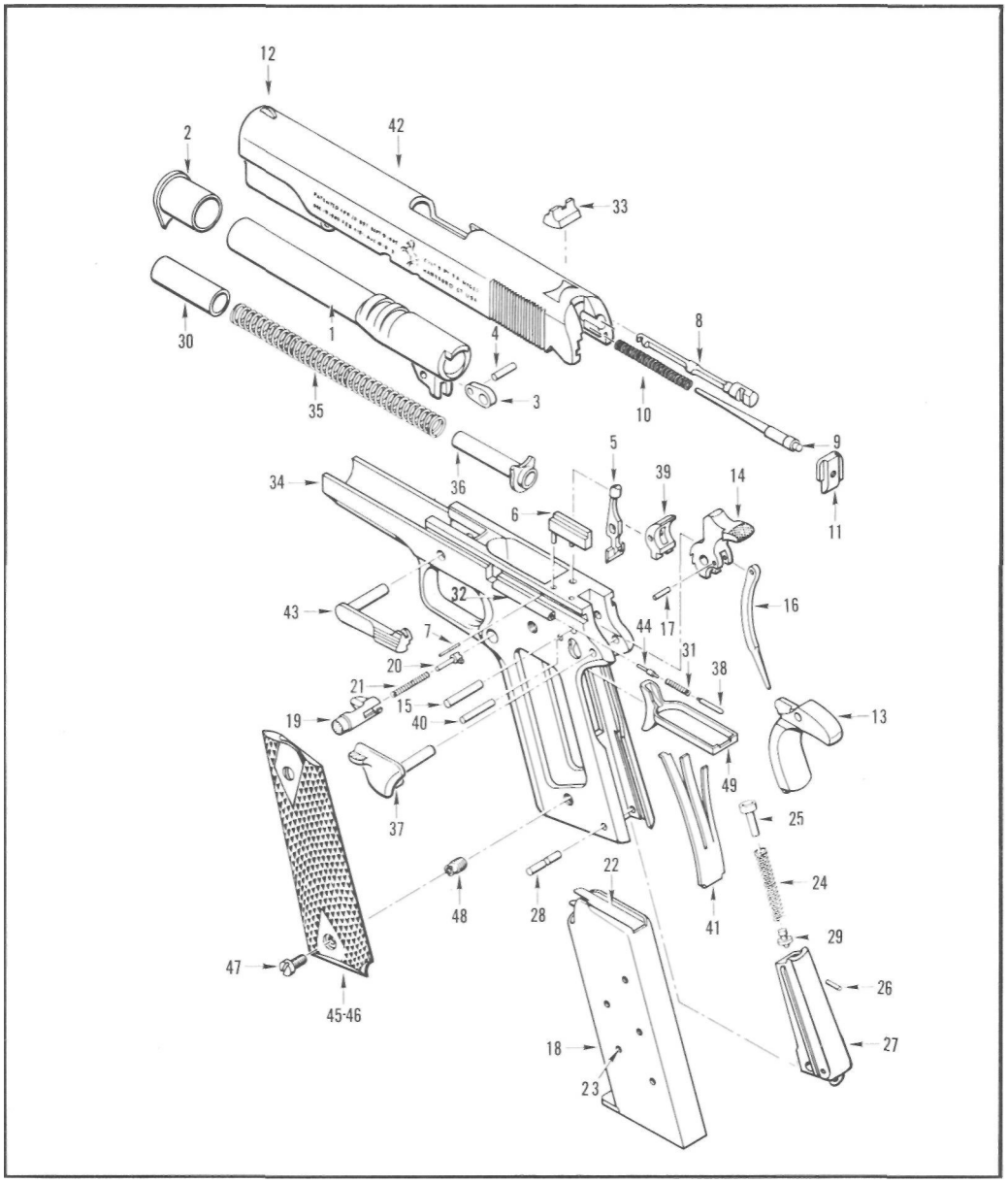

FRONT SIGHT
BARREL
SLIDE
LINK PIN
LINK
CHAMBER
FIRING PIN SPRING
REAR SIGHT
FIRING PIN
FIRING PIN STOP
HAMMER
DISCONNECTOR
SEAR
GRIP SAFETY
HAMMER STRUT
SEAR SPRING
MAIN SPRING CAP
MAIN SPRING
HOUSING PIN RETAINER
MAIN SPRING HOUSING
HOUSING PIN
STOCK SCREW BUSHINGS
STOCK
RECEIVER
MAGAZINE CATCH
TRIGGER
TRIGGER GUARD
RECOIL SPRING GUIDE
RECOIL SPRING
PLUG
BARREL BUSHING


MAGAZINE
MAGAZINE FOLLOWER
MAGAZINE SPRING

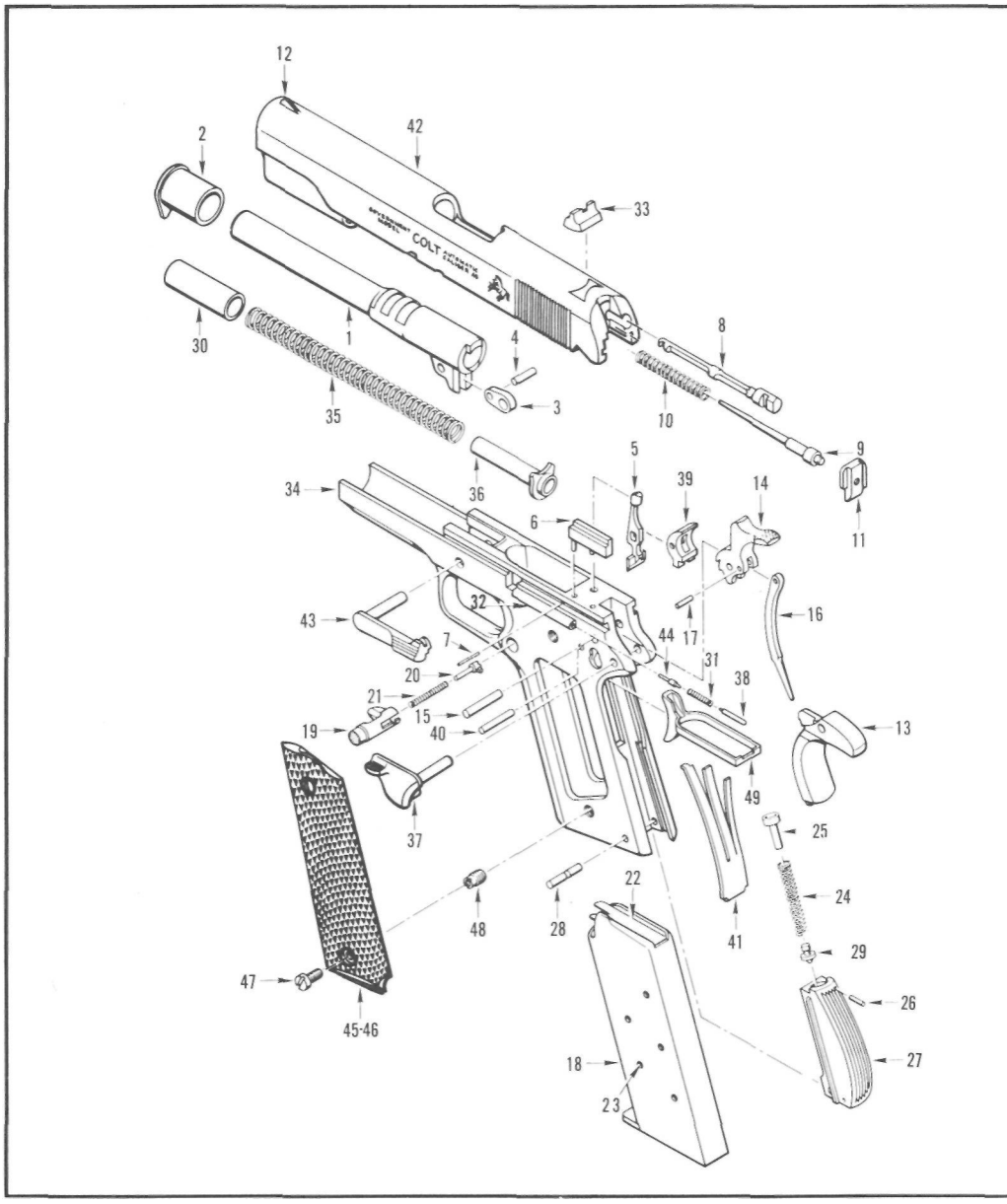
Parts Description

1. Barrel
2. Barrel Bushing
3. Barrel Link
4. Barrel Link Pin
5. Disconnector
6. Ejector
7. Ejector Pin
8. Extractor
9. Firing Pin
10. Firing Pin Spring
11. Firing Pin Stop
12. Front Sight
13. Grip Safety
14. Hammer
15. Hammer Pin
16. Hammer Strut
17. Hammer Strut Pin
18. Magazine Assembly
19. Magazine Catch Body
20. Magazine Catch Lock
21. Magazine Catch Spring
22. Magazine Follower
23. Magazine Spring [inside]
24. Main Spring
25. Main Spring Cap
26. Main Spring Cap Pin
27. Main Spring Housing
28. Main Spring Housing Pin
29. Main Spring Housing Pin Retainer
30. Recoil Spring Plug
31. Plunger Spring
32. Plunger Tube
33. Rear Sight, Fixed
34. Frame
35. Recoil Spring
36. Recoil Spring Guide
37. Thumb Safety Lock
38. Safety Lock Plunger
39. Sear
40. Sear Pin
41. Sear Spring
42. Slide
43. Slide Stop
44. Slide Stop Plunger
45. Grip Panel
46. Grip Panel
47. Grip Screw
48. Grip Screw Bushing
49. Trigger Body and Bow
50. Rear Sight Body Assy. [Adj.]
51. Elevation Screw
52. Elevation Springs
53. Rear Sight Pin
54. Sear Depressor
55. Sear Depressor Spring
56. Trigger Stop Screw
57. Return Spring
58. Rear Blade
59. Detent
60. Detent Spring
61. Windage Screw
62. Windage Spring
63. Elevation Retaining Pin
64. Trigger Bar Lever
65. Firing Pin Lock Plunger
66. Firing Pin Lock Plunger Spring
67. Firing Pin Lock Plunger Lever

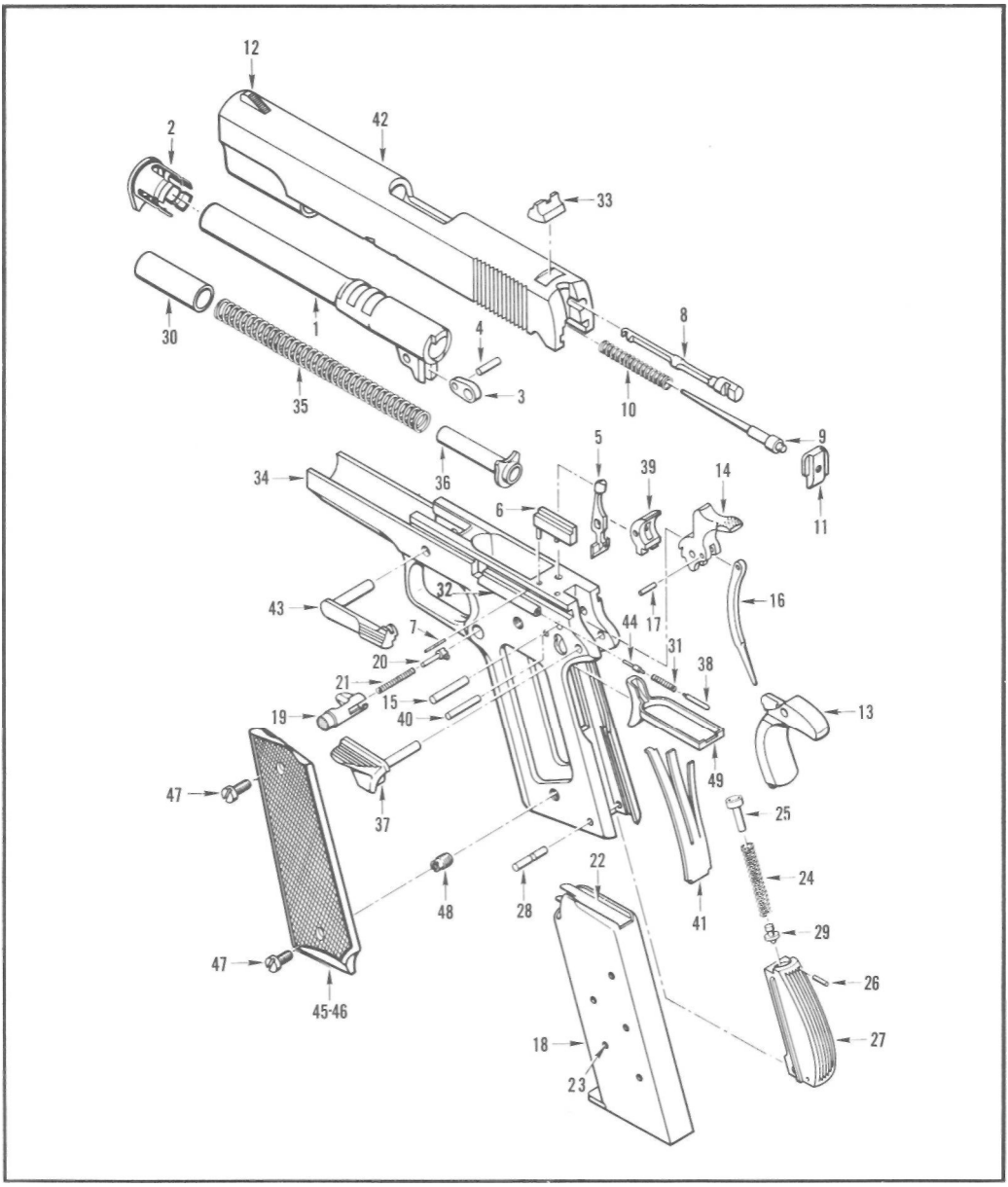
Parts Diagram
Colt Model 1911
Government Model .45



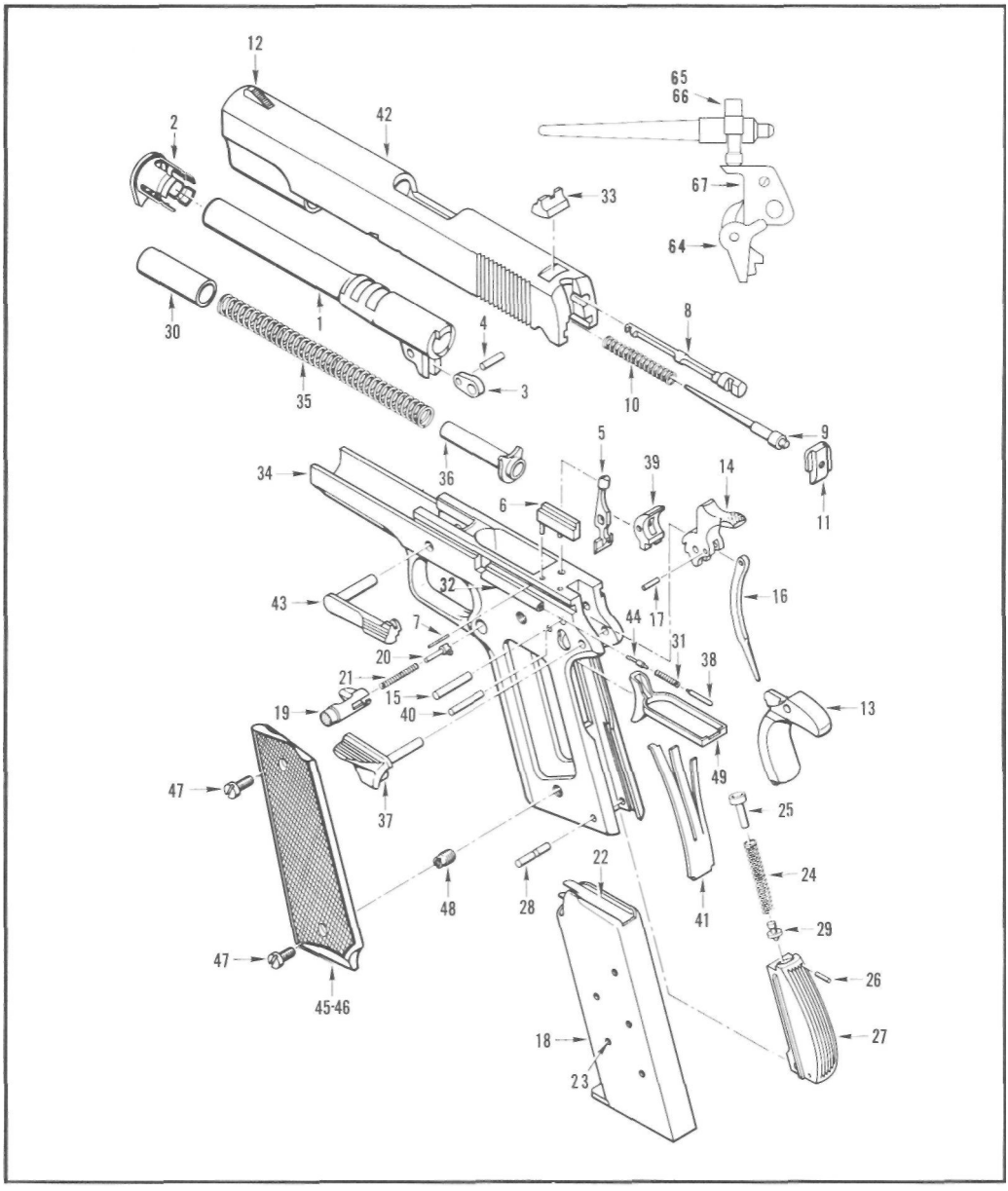
Parts Diagram
Colt Model 1911A1
Government Model .45



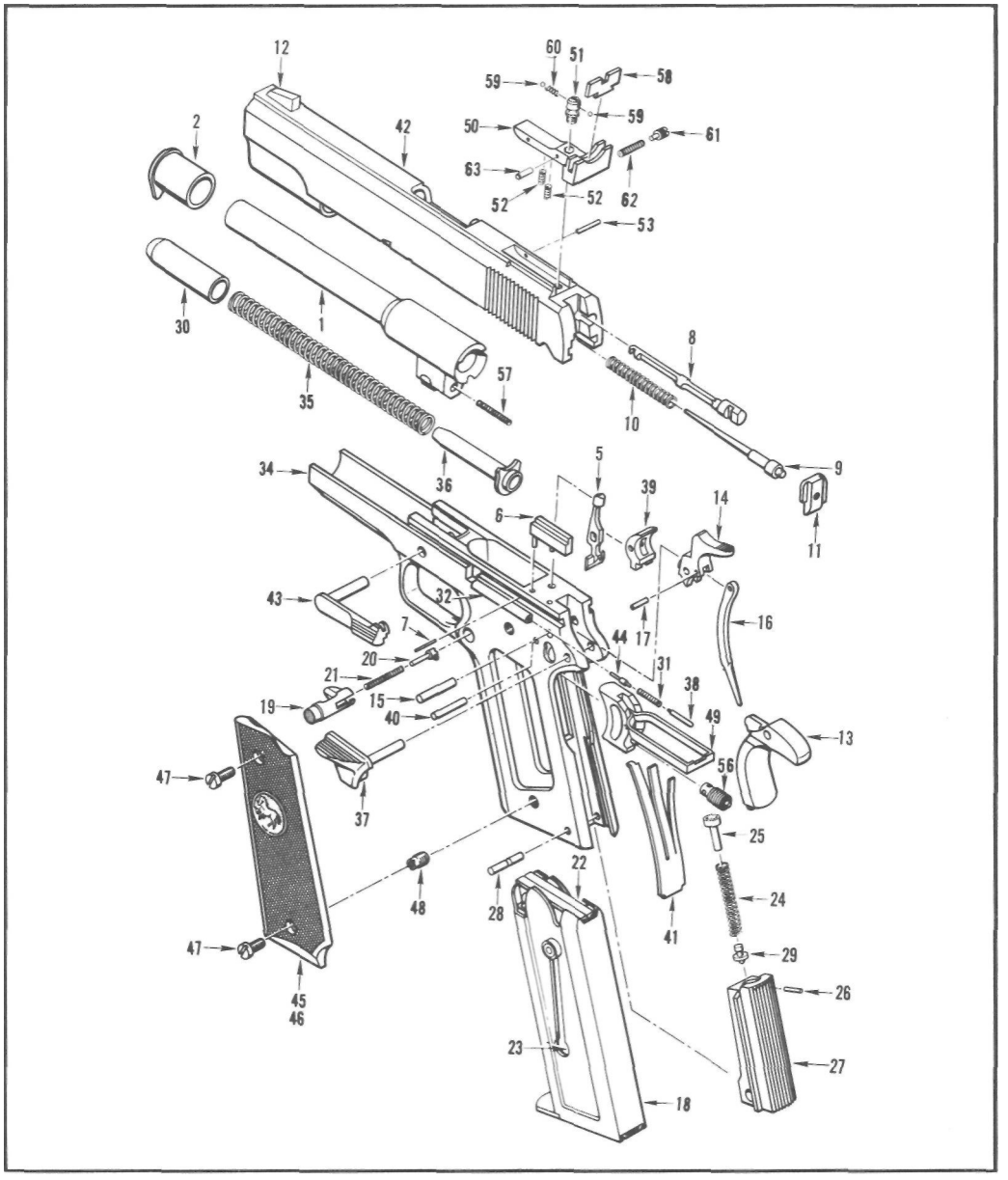
Parts Diagram
Colt Series 70
Government Model .45



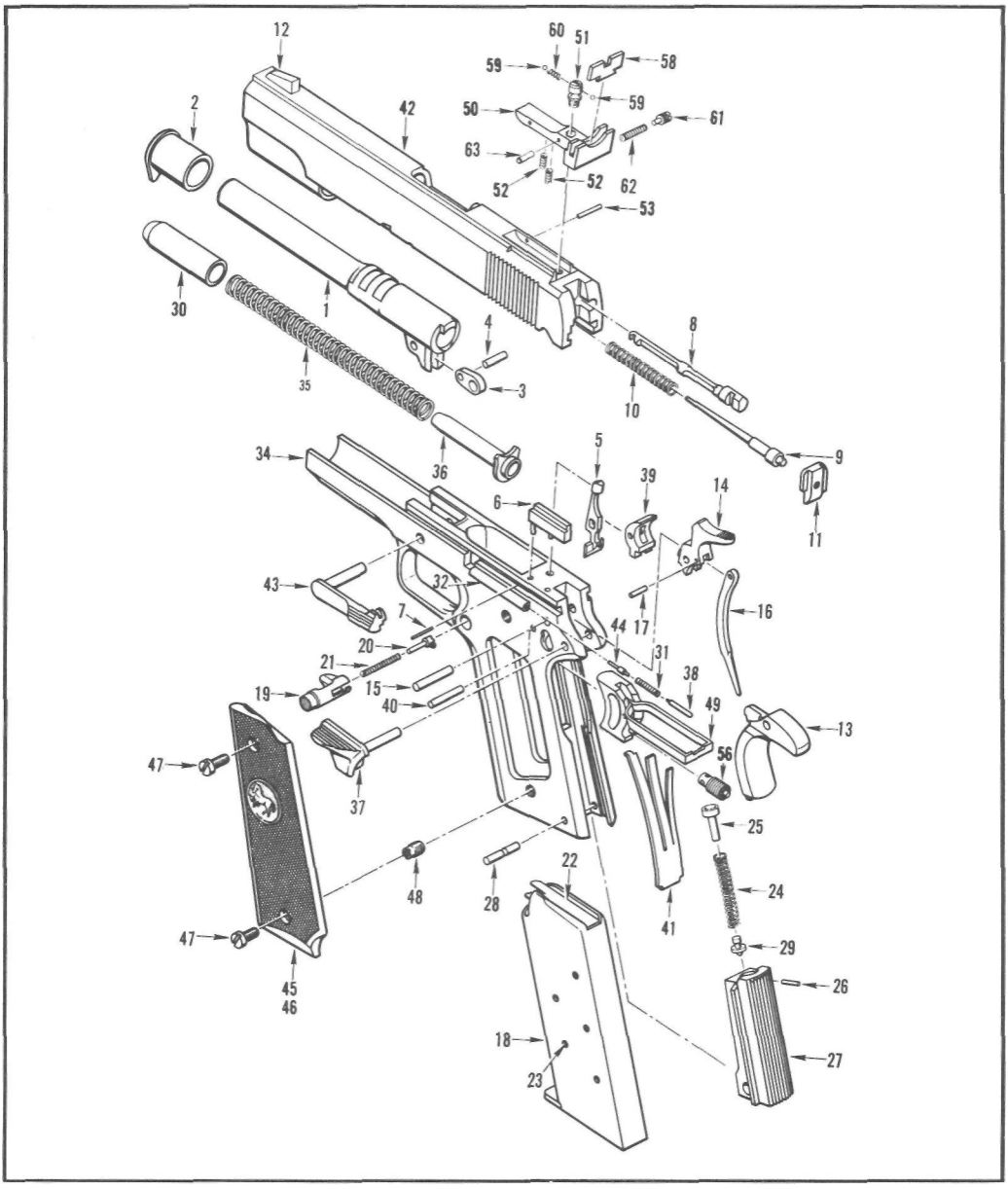
Parts Diagram
Colt Series 80
Government Model .45



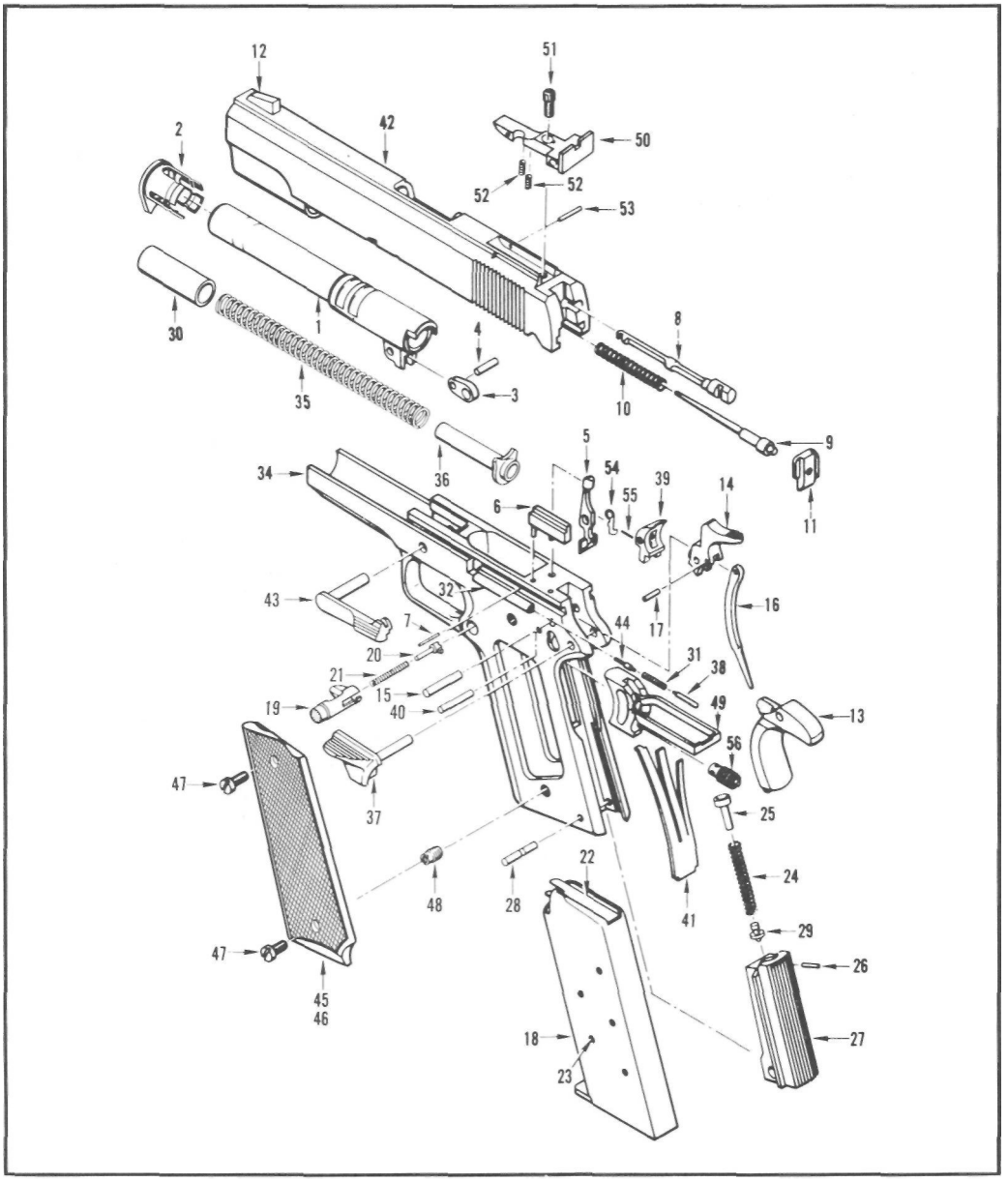
Parts Diagram
Colt Gold Cup
National Match .38



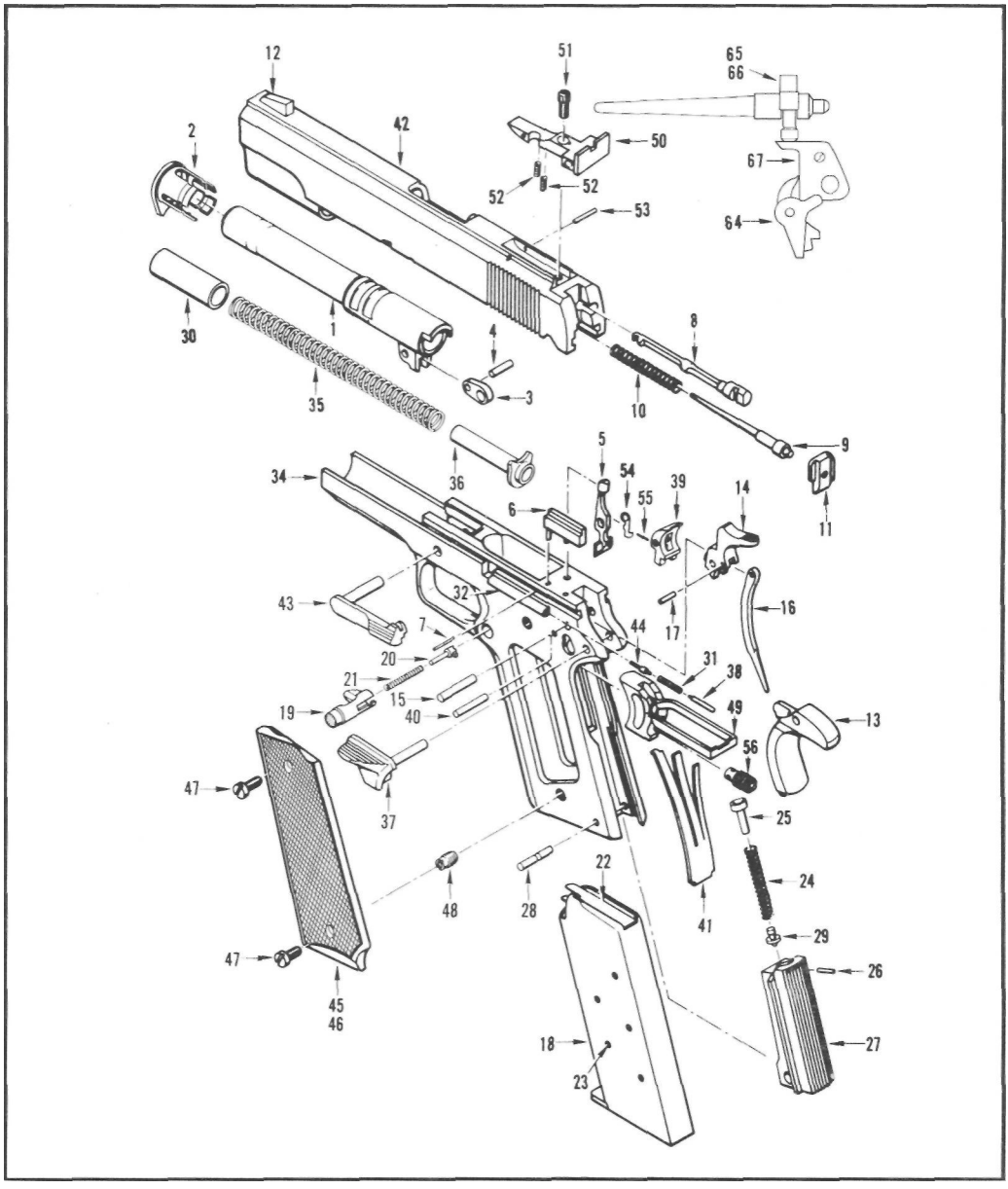
Parts Diagram
Colt Gold Cup
National Match .45



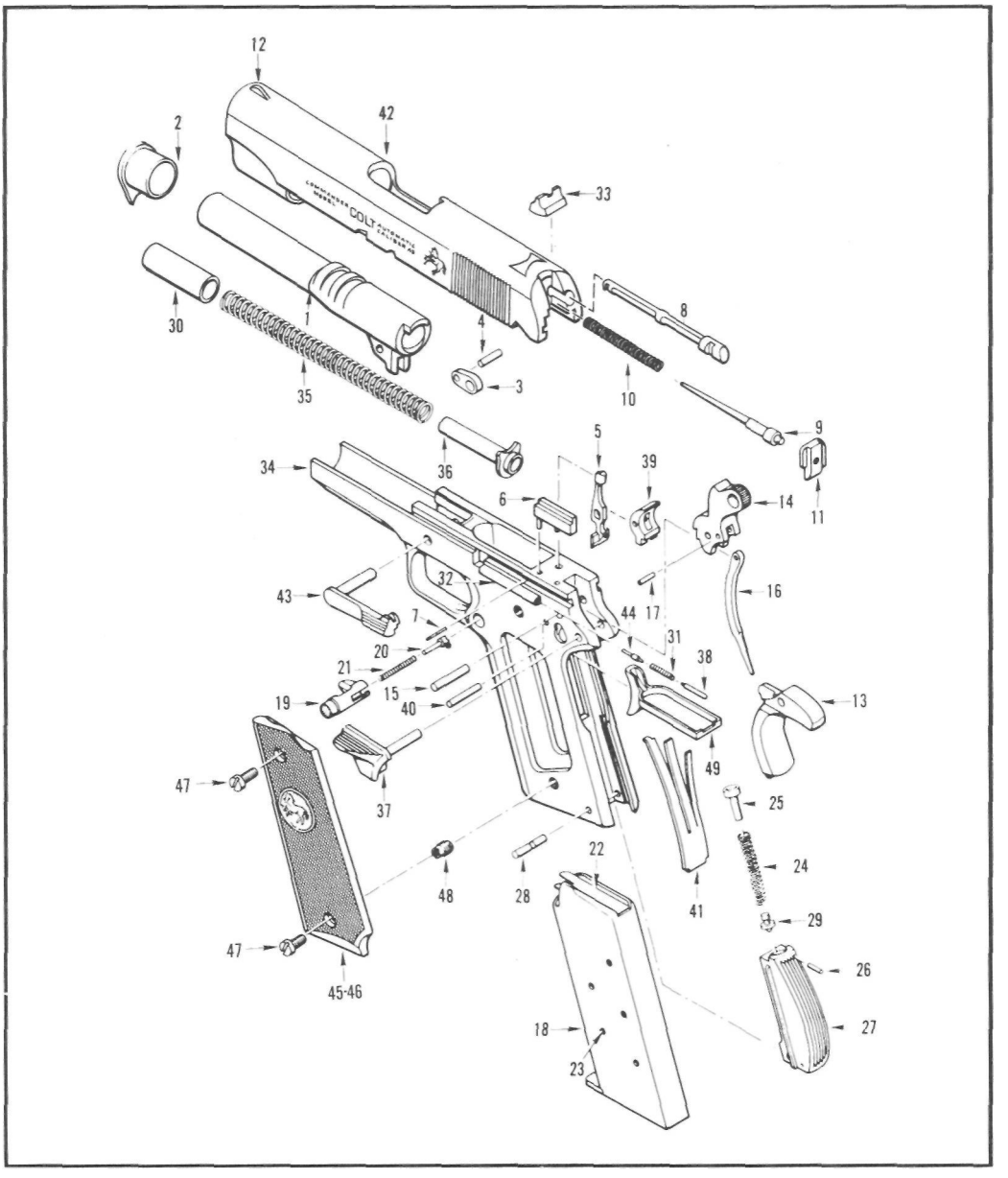
Parts Diagram
Colt Series 70 Gold Cup
National Match .45



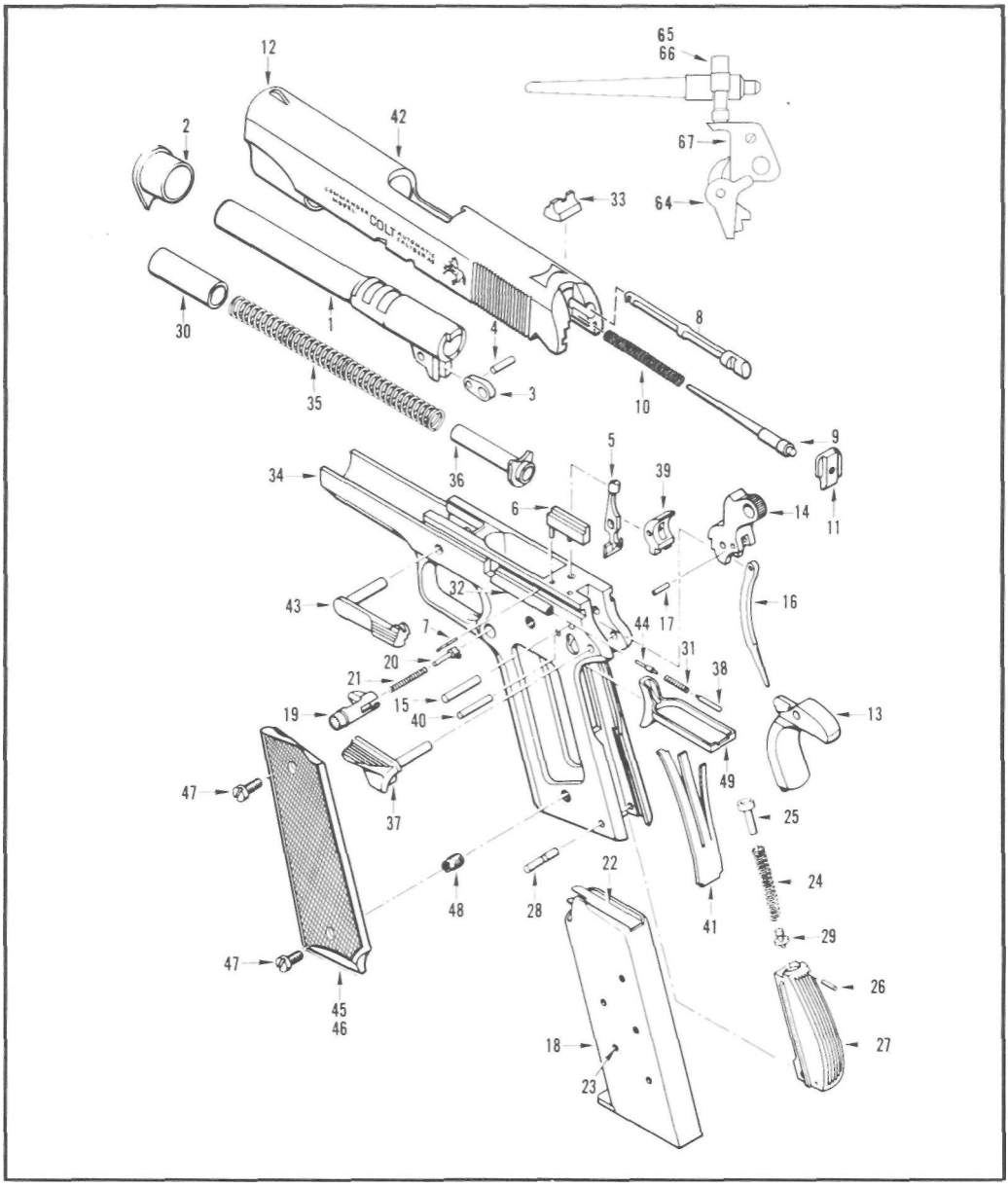
Parts Diagram
Colt Series 80 Gold Cup
National Match .45



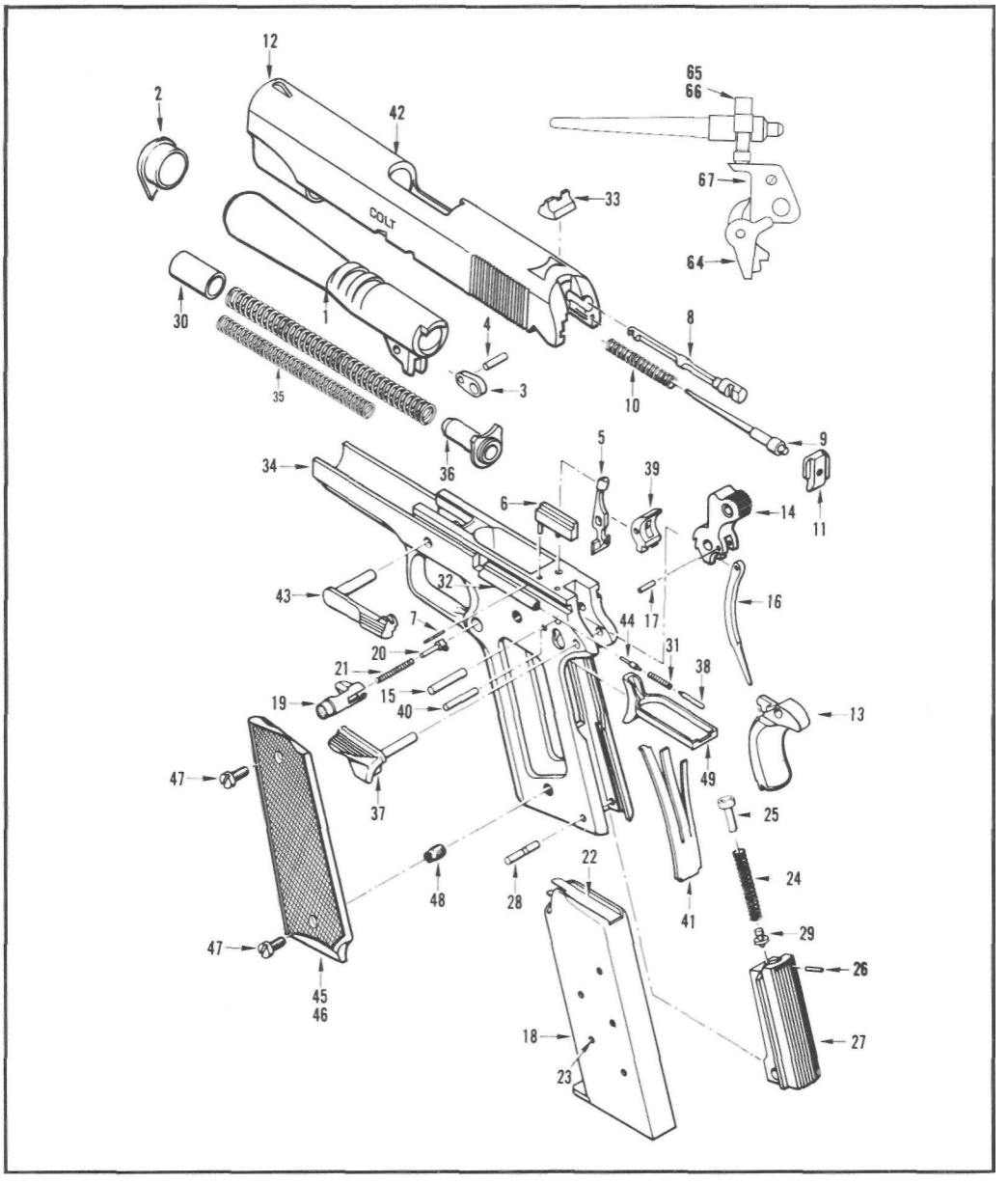
Parts Diagram
Colt Combat Commander
And Commander Lightweight .45



Parts Diagram
Colt Series 80
Combat Commander .45



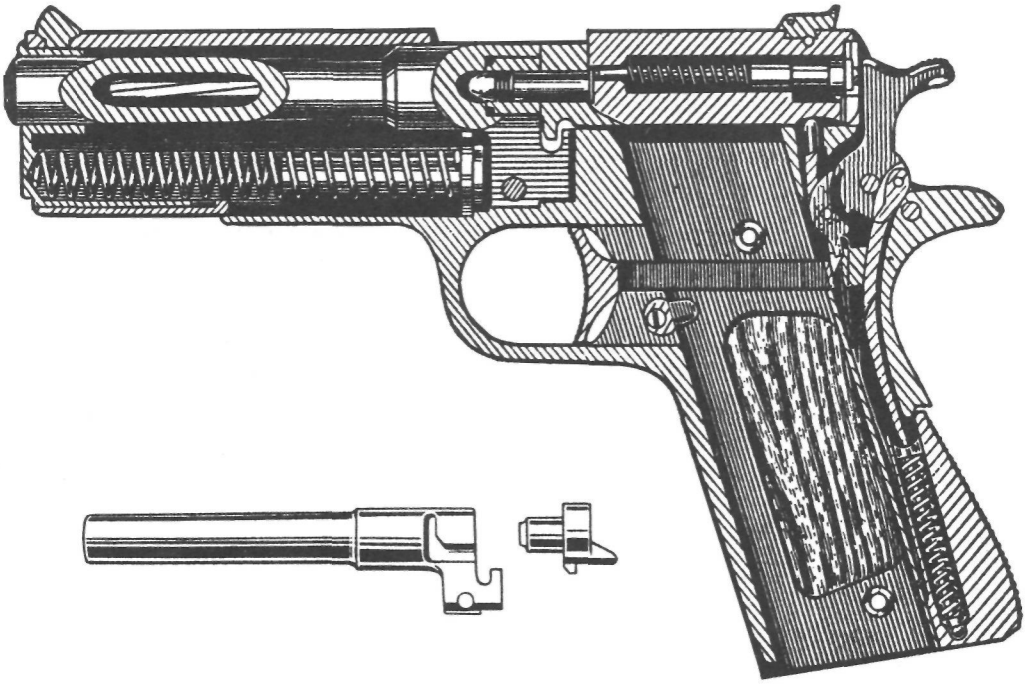
Parts Diagram
Colt Officer's Model .45



Colt Series 80 stainless steel Officer's ACP product photo courtesy; Colt Industries, Firearms Division

The Colt logo is a registered trademark of Colt Firearms

Cross Sectional Drawing .22 Conversion Unit Installed on .45 Frame

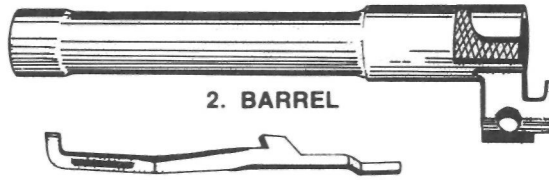


The half-sectional drawing above shows a .22 L.R. conversion unit installed on a .45 automatic frame. The barrel and floating chamber shown in the drawing and illustrated separately below distinguishes the .22 L.R. conversion unit and the Colt Ace Service Model from the original Colt Ace .22 pistol which has a solid, one piece barrel. The floating chamber feature permits standard weight slide function with standard velocity .22 L.R. cartridges. This, in turn, helps simulate the feel of more powerful centerfire ammunition.

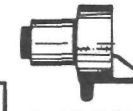
Parts Diagram
Colt .22 L.R. Caliber
Conversion Unit

1. SLIDE ASSEMBLY

4. BUSHING



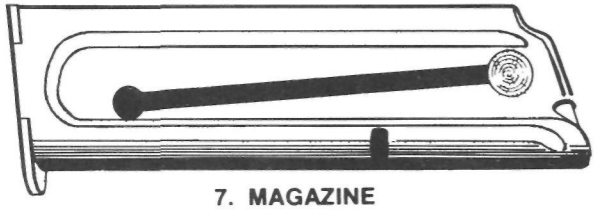
2. BARREL



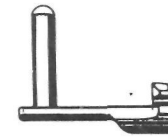
3. FLOATING CHAMBER

5. EJECTOR

6. RECOIL SPRING



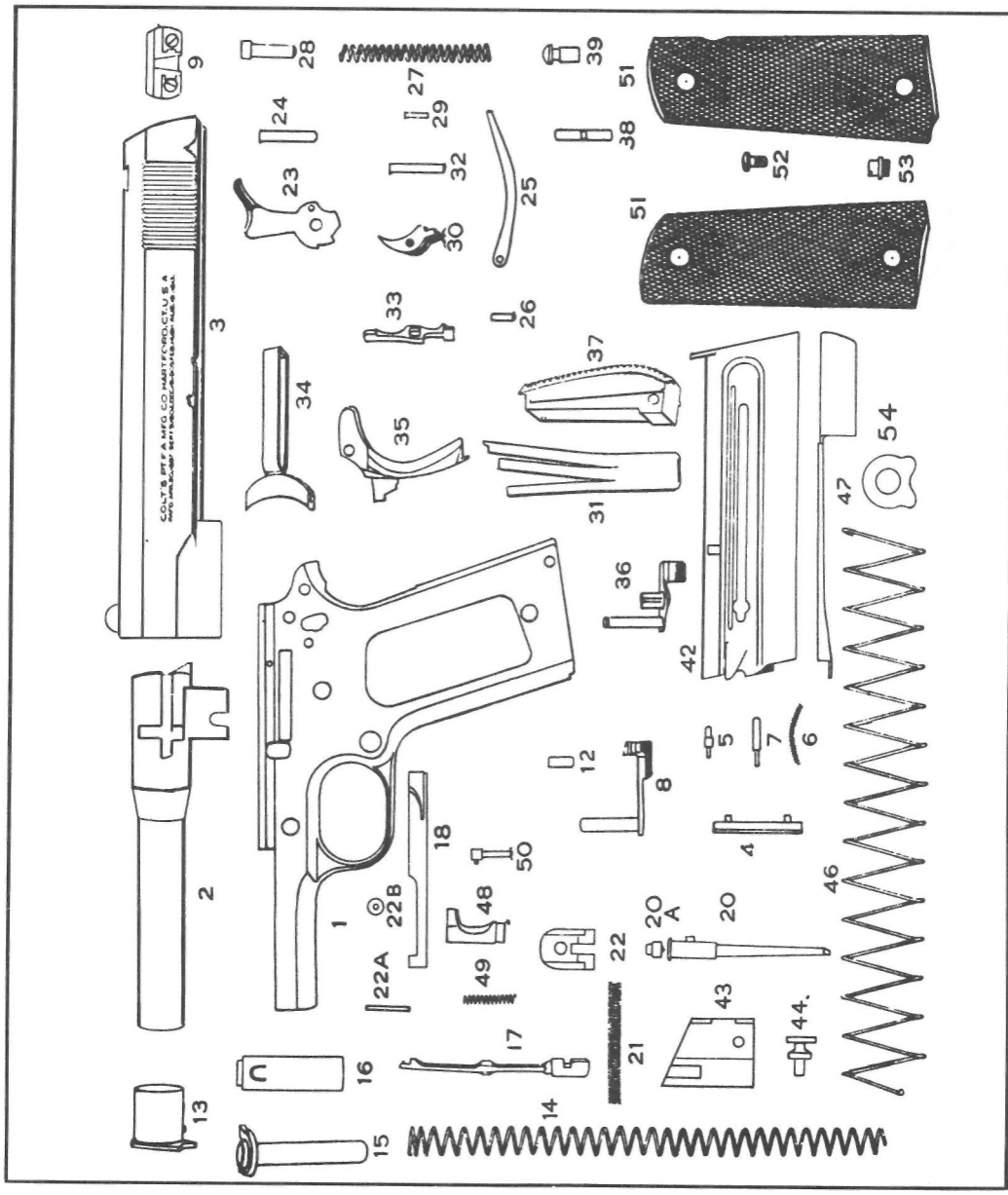
7. MAGAZINE



8. SLIDE STOP

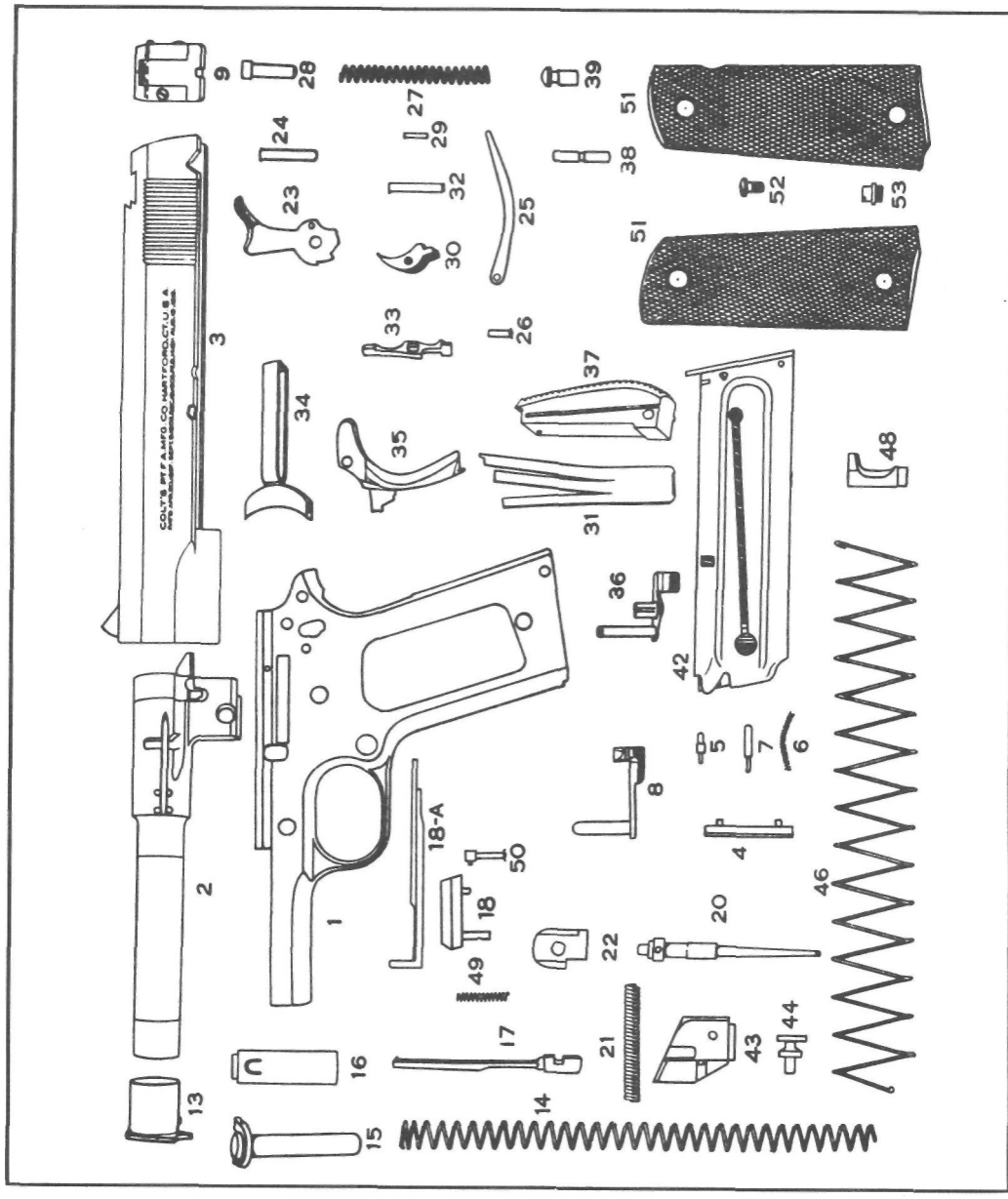
Cross Sectional Drawing
Colt Ace
.22 Automatic Pistol

Parts Diagram
Colt Ace .22 L.R. Caliber



Cross Sectional Drawing
Colt Ace Service Model
.22 Automatic Pistol

Parts Diagram
Colt Ace .22 L.R. Caliber
Service Model



SPRINGFIELD ARMORY

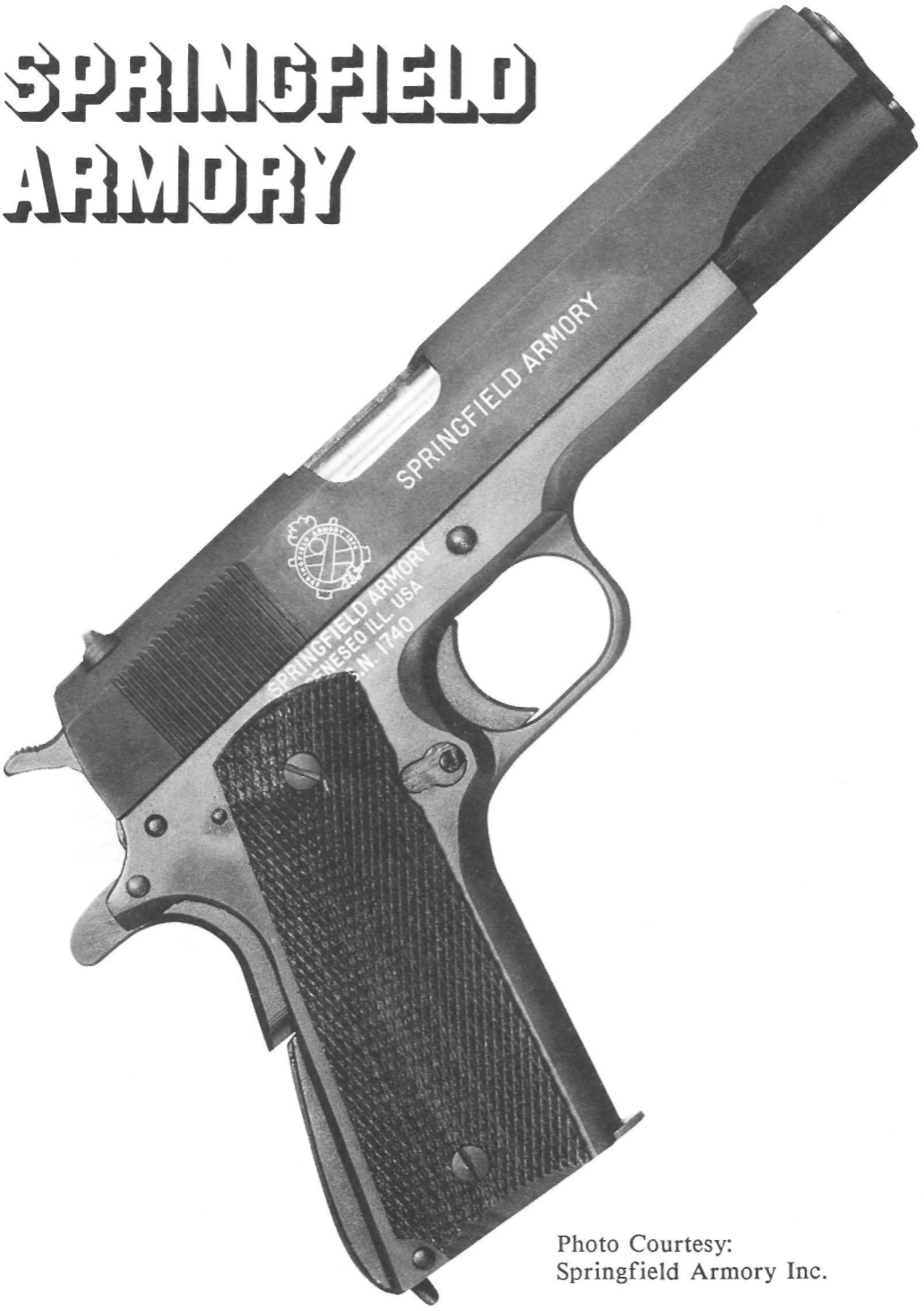
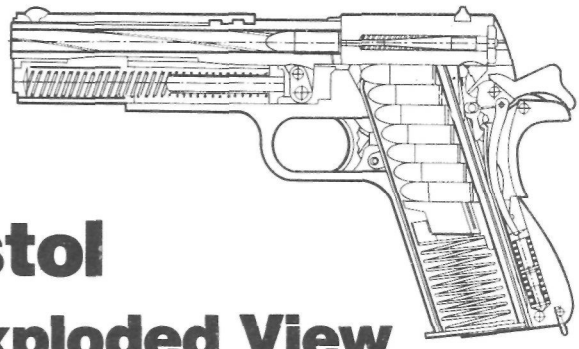


Photo Courtesy:
Springfield Armory Inc.

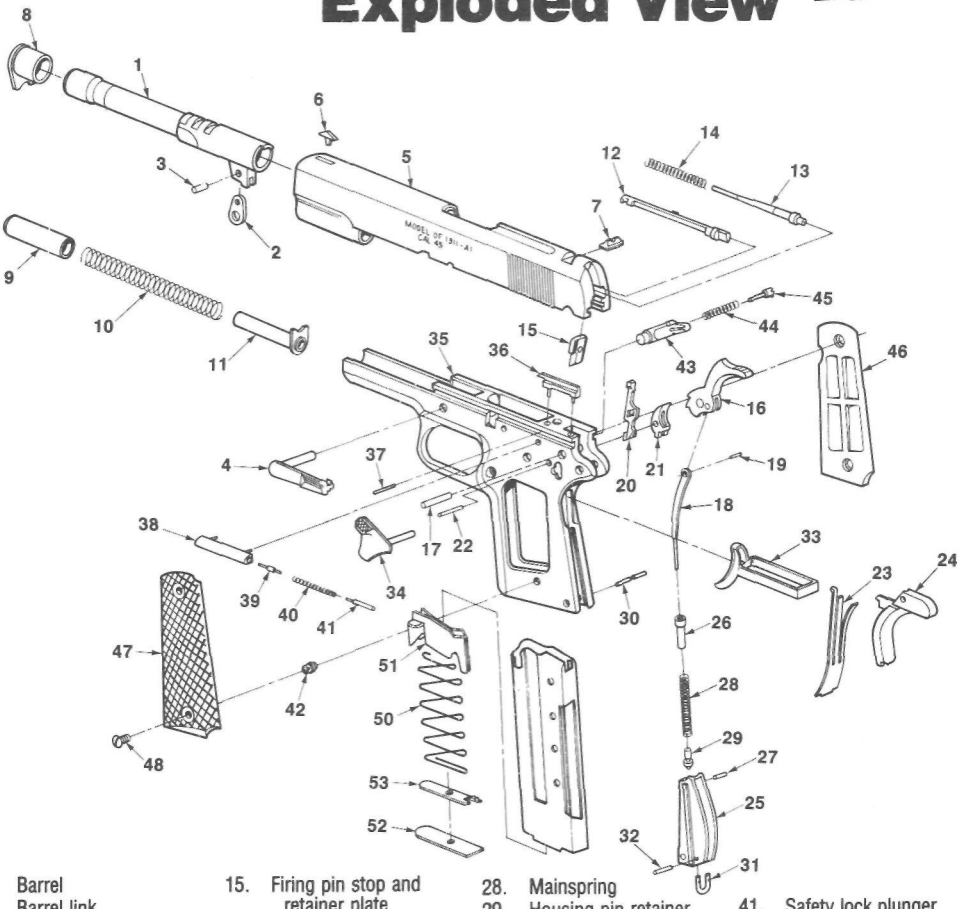
SPRINGFIELD ARMORY T.M.



1911-A1 Pistol

.45 ACP or 9MM

Exploded View



1. Barrel
2. Barrel link
3. Barrel link pin
4. Slide stop
5. Slide
6. Front sight
7. Rear sight
8. Barrel bushing
9. Recoil spring plug
10. Recoil spring
11. Recoil spring guide
12. Extractor
13. Firing pin
14. Firing pin spring
15. Firing pin stop and retainer plate
16. Hammer
17. Hammer pin
18. Hammer strut
19. Hammer strut pin
20. Disconnector
21. Pin
22. Sear pin
23. Sear springs
24. Grip safety
25. Mainspring housing
26. Mainspring cap
27. Mainspring cap pin
28. Mainspring
29. Housing pin retainer
30. Mainspring housing pin
31. Lanyard loop
32. Lanyard loop pin
33. Trigger
34. Safety lock
35. Frame (receiver)
36. Ejector
37. Ejector pin
38. Plunger tube
39. Slide stop plunger
40. Plunger spring
41. Safety lock plunger
42. Grip screw bushing (4)
43. Magazine catch
44. Magazine catch spring
45. Magazine catch lock
46. Right hand grip
47. Left hand grip
48. Grip screw (4)
50. Magazine spring
51. Magazine follower
52. Magazine base
53. Magazine base pin

Colt MK IV Series 80
Stainless Steel Government Model

Colt Series 80 stainless steel Government Model product photo courtesy; Colt Industries, Firearms Division

The Colt .45 Automatic

A Shop Manual