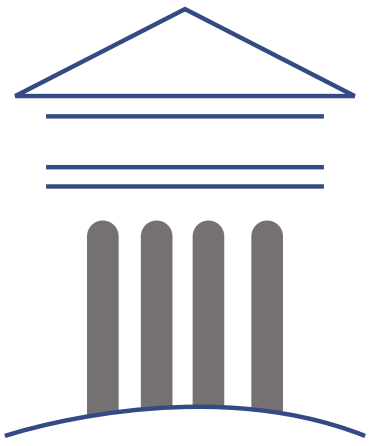
The Moto-Tool Lab (#)
Lab: 2509

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Beautiful scroll work by Jose Valencia. Some checkering can be done using a Moto-Tool, while other jobs still require hand work.

Introduction

Gunsmiths, like other craftsmen, learn their trade by using hand tools. Using hand tools allows a gunsmith to carefully hone or polish with little fear of taking off too much metal and destroying a fine gun. The progress can be checked every stroke to prevent mistakes. This method builds confidence for the beginner gunsmith so he or she can move on to more complicated and delicate work. Once you are proficient with hand tools, you will want to find faster ways to complete the same job. The Moto-Tool included in this kit will reduce the time required to finish many common gunsmithing jobs.

The Moto-Tool is a small, powerful, hand-held electric motor. Different bits and accessories can be attached so that a wide variety of jobs can be accomplished with this one tool. A selector switch is provided to allow you to operate the tool at either 15,000 or 28,000 rotations per minute (rpm). The tool can be used for drilling, shaping, carving, filing, sanding, cutting, and a variety of other projects. This manual will show you how to perform some of these operations.

The Moto-Tool is designed to make the job faster. However, you should remember that hand tools will still be used. Any time a close fit or minor metal removal is required, a honing stone and emery cloth should be used. The honing and polishing of a hammer and sear, for example, should still be performed by hand.

Kit Contents

This kit contains a Moto-Tool*. The picture in Figure 1 is illustrative of the tool provided with this lab. Depending upon availability, it may vary and be a comparable tool similar to the photo. It comes with a storage box and accessories to perform a variety of jobs.

If the tool is damaged, return the entire kit [including the packaging it came in] to the Sonoran Desert Institute for replacement. We cannot take any damaged or non-functional tools in return unless the complete product is returned, which includes all packaging materials from the original kit. *[Please make note of this].*

The Sonoran Desert Institute does not stock the individual bits and accessories for the Moto-Tool. All of the attachments for a Moto-Tool are available directly from several manufacturers, including Brownells, or at many local tool supply stores. Additionally, many local hardware stores carry accessories and bits for a Moto-Tool.



Image above is a representation of a Moto-Tool kit and may not match what you receive exactly.

Figure 1: *The Moto-Tool comes in a storage box and has 30 accessories*

** Please note that from time-to-time tools for the lab lessons may be unavailable. Should this occur, we will substitute an appropriate kit that will meet the objective of this lesson. Based on market availability, the exact manufacturers of these pieces vary from time to time. We strive to provide quality tools to our students to use as they gain the knowledge of the Gunsmithing industry. Our students realize that they will be responsible for purchasing additional tools for their businesses.*

Preparing to Use the Moto-Tool

The Moto-Tool is an extremely powerful and fast tool. It must be held securely to prevent accidental damage to you or the area surrounding the working area. There are several ways to hold the Moto-Tool. Figure 2 shows the two basic grips: the pencil grip and the golf grip.

Pencil Grip. This grip can be used for most applications. It allows close control of the tool and lessens the amount of pressure that can be applied to the tip. Refer to Figure 2A.

One-Handed Golf Grip. This grip can be used when sanding, grinding, or removing material with one of the cutters. It is helpful when you want to keep the tip of the tool parallel to the working surface (Figure 2B). When using this grip, always extend your thumb toward the tip of the tool for added control. Also, be sure that your other hand is a safe distance away from the spinning bit.

Two-Handed Golf Grip. This grip provides maximum control of the tool. It should be used whenever the cut-off wheel is used. The cut-off wheel can easily become wedged in the working material. This causes the wheel to "kick back," which could cause serious injury. When using this grip, be sure that the work piece is firmly clamped in place.

SAFETY

Always wear proper eye protection when using the Moto-Tool. Be sure to keep your free hand a safe distance away from the rotating bit. Do not wear loose clothing or jewelry that can become entangled with the Moto-Tool.

A dust mask is also recommended. At 28,000 rpm, the Moto-Tool will create a lot of dust. To follow the tool bit, you need to see through this stream of dust.

You may find tools and accessory bits for the Moto-Tool that are manufactured by another company. It is recommended that if you choose parts not made by the manufacturer of your Moto-Tool that these not be used. We suggest that you look for bits and accessories that have been tested at or above 30,000 rpm. At that speed, lesser quality tools may break apart, scattering pieces of metal throughout the work area. If a tool breaks at high speed, the chance of injury is quite high. So, always use accessories that are tested for 30,000 rpm or higher. ***Remember, when working with tools of any kind, wear appropriate eye protection to protect your eyesight and eyes.***

Never use a bit or accessory with a diameter greater than 1 inch. Using large-diameter accessories will place undo wear on the Moto-Tool and the accessories could be unsafe at the Moto-Tool's high speeds.

Always unplug the tool before changing accessories, changing collets, or servicing your Moto-Tool.

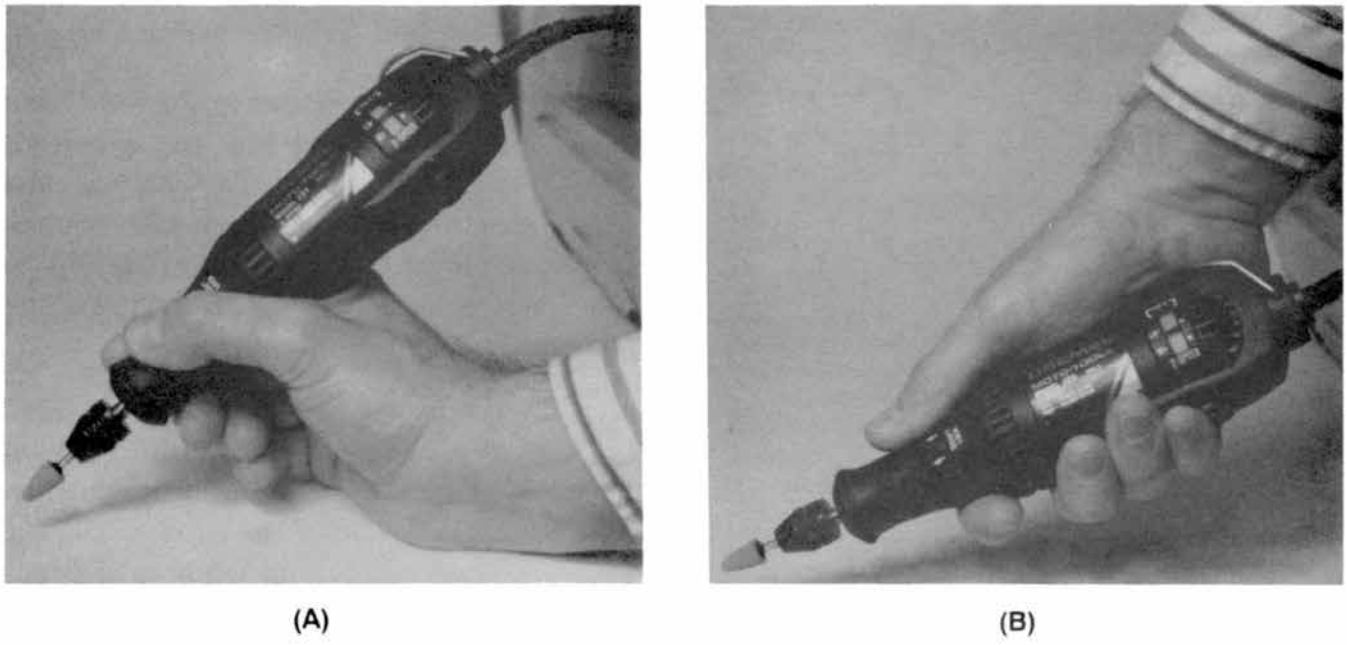


***Figure 2**: (A) A pencil grip. (B) A one-handed golf grip.*

Please note photos in this lesson may not match exactly the product you received.

SPEED

The appropriate speed setting depends on the type of job, the bit, the bit's condition, and the material you are working on. You will learn that certain speeds work better for you after you have practiced on a piece of scrap. You will be using the HI speed setting for everything except polishing, buffing, and delicate work, like woodcarving. The LO speed setting should also be used whenever a wire brush is attached.

Practice using the Moto-Tool on scrap material before using it on a customer's firearm. Although it is not difficult to handle, the Moto-Tool can, because of its speed, quickly ruin a firearm. If you want to practice on a firearm, junk guns or "wallhangers" are usually available at gun shows. Since these guns are unsafe to fire anyway, they can be used to practice without fear of damaging a fine firearm. Wallhangers are also perfect for practicing all your gunsmithing skills, like rebluing.

As you practice on scrap material, let the tool do the work. You should gently guide the tool. Do not force the tool by applying pressure. If the tool is not cutting the way you think it should, try a different speed. If the tool slows, or the bit heats up, you are probably applying too much pressure. The correct amount of hand pressure will be determined by practice.

ACCESSORIES

The Moto-Tool kit, shown in Figure 1, comes with several different bits and accessories. Each accessory that you use with your Moto-Tool performs a different job and requires a different technique. The following will help you become more effective in the use of these accessories.

Cutters. Cutters, shown in Figure 3, can be used on metal, wood, and plastic. They are used to remove material quickly. Cutting is done with the sides of the cutters. The tip of the tool cuts poorly and tends to chatter, or vibrate rapidly. The cutter will remove the most material when moved from right to left across the work. When used on wood, the cutter will tend to follow the grain of the wood. As with flywheels, the courser the teeth of the cutter, the greater the cut of the tool. Of course, the shape of the cutter will determine the shape of the cut.

Grinding Stones. Grinding stones, shown in Figure 4, are made in a variety of shapes, sizes, and grits. A dressing stone is included so that the original contour of the stone can be restored after the stone has been ground down. The dressing stone will also allow you to create a unique-shaped grinding stone for special jobs. To dress the grinding stone, secure the



***Figure 3**: Three high-speed cutters.*



***Figure 4**: Different styles of grinding stones. The courser the stone, the more material it will remove. Not all these stones will be in your kit.*

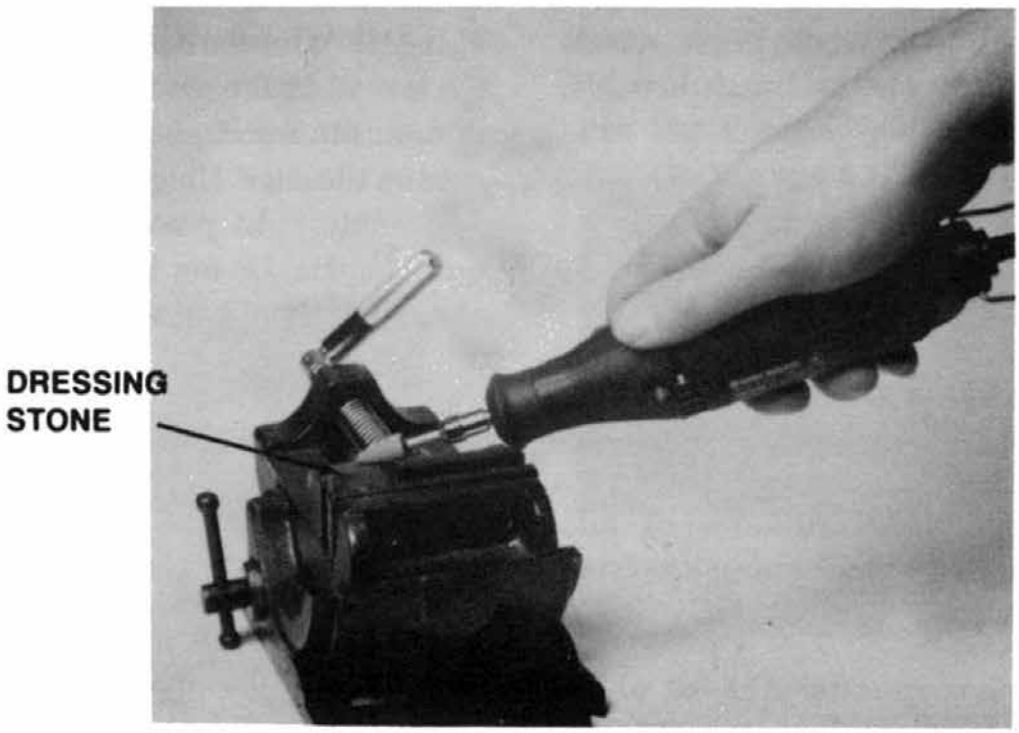


Figure 5: *Using the dressing stone to dress or reshape a grinding stone.*

dressing stone in a vise and gently apply the worn stone to the dressing stone as shown in Figure 5. Grinding stones are the accessories most used by gunsmiths because they accomplish the same task as a file.

Polishing Accessories. Like stones, there are different types of polishing accessories, as shown in Figure 6. The felt polishing wheels shown in Figure 6A are used with the screw mandrel shown in Figure 7A. The polishing wheel shown in Figure 6B is made up of fine emery. They are ideal for polishing metals.

To use the polishing wheel, connect the wheel to the mandrel shown in Figure 7B. Cloth polishing wheels (not shown) are also used with the mandrel in Figure 7B. The polishing compound shown in Figure 6, can be applied to either the cloth or felt polishing wheels to create a high luster on metals and plastics.

The polishing wheels can be reshaped using the dressing stone. Like grinding stones, you can make a special wheel to perform special jobs.

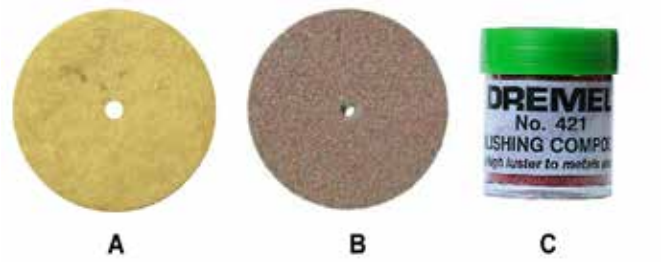


Figure 6*: Polishing accessories: (A) a felt wheel, (B) an emery-filled wheel, and (C) a polishing compound.*

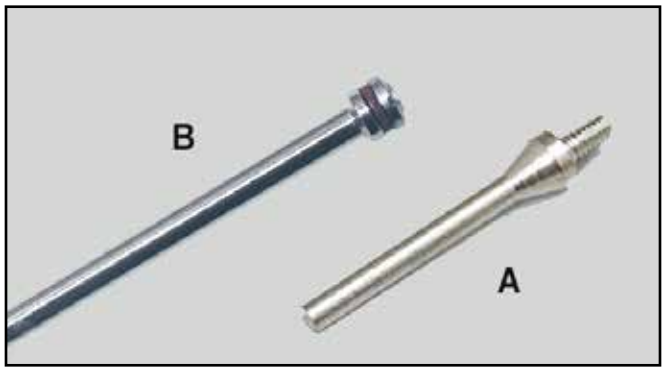


Figure 7*: (A) Screw mandrel. (B) Mandrel to be used with all cutting wheels, sanding disks, and emery-filled polishing wheels.*

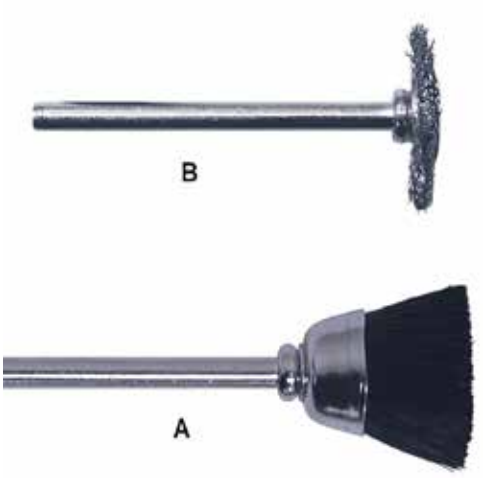


Figure 8: *Brushes: (A) bristly and (B) wire.*

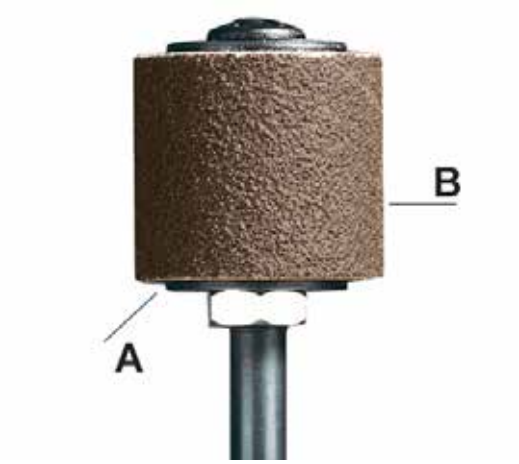


Figure 9: *A drum sander consists of (A) a drum and (B) a sanding belt.*

Brushes. There are two types of brushes for the Moto-Tool shown in Figure 8A, the bristle brush, and Figure 8B, the wire brush. They are used to clean and remove rust and corrosion. The harder wire brush cleans faster. The bristle brush should be used for soft metals and valuable pieces. Polishing compound can be applied to the bristle brush. Both brushes should be used at LO speeds. High speeds place too much wear on the brush bristles.

This will cause the bristles to break and fly away from the shaft.



Figure 10: *Cut-off wheels are abrasive on both sides but should not be used for sanding.*

Sanding. Sanding is accomplished using drums and disks. Start the sanding with a course drum or disk and finish with finer grits. The sanding drum uses a drum and a band, shown in Figure 9. The sanding band is placed over the drum and the screw at the top of the drum is tightened to hold the band. Sanding disks are used with the screw mandrel shown in Figure 7A.

Cut-Off Wheels. Cut-off wheels, shown in Figure 10, are used to cut bolts, nuts, sheet metal, thin wood, and plastic. The wheel only cuts on the edge. Hold the tool with both hands and apply light pressure. These wheels are quite brittle. Do not try to sand or cut curved slots with them because they will break.

The accessories are attached to the Moto-Tool by means of a collet and collet nut. To attach a tool, loosen the collet nut and insert the shaft of the tool into the collet. Tighten the collet nut using the wrench provided. To tighten the nut, press up on the switch at the tip of the tool as shown in Figure 11. This will lock the shaft of the tool so it will not turn as the nut is tightened.

Some accessories have a different diameter shaft. In this case, you will need to change the collet. Loosen and remove the collet nut and remove the collet. Choose a collet that fits the shaft of the tool and insert it into the output shaft of the Moto-Tool. Reinstall the collet nut, insert the shaft of the tool, and tighten the collet nut.

With the accessory bit in place and the collet nut tightened, turn on the Moto-Tool to check its balance and alignment. If the bit is not properly installed, the Moto-Tool will vibrate and the sound from the motor will be different. To correct this condition, loosen the collet nut and rotate the bit 1/4 turn. Tighten the collet nut and run the Moto-Tool. Continue adjusting the balance in this fashion until it is correct.

To maintain the balance on grinding stones, use the dressing stone. This removes high spots on the stone and trues the stone for good balance.

The keyless chuck that is included in this kit is one of the more useful accessories. It allows you to change bits quickly without the use of a wrench. It also allows you to use bits with different size shafts without changing the collet. To install the chuck, remove the collet nut and collet and install the chuck on the shaft as shown in Figure 12. To use the chuck, loosen the chuck and insert the shaft of the bit into the chuck.

Tighten the chuck while holding the "shaft lock" switch. Then, the collet and collet nut should be used because they hold the bit more securely. The keyless chuck can be used for everything except heavy cutting.

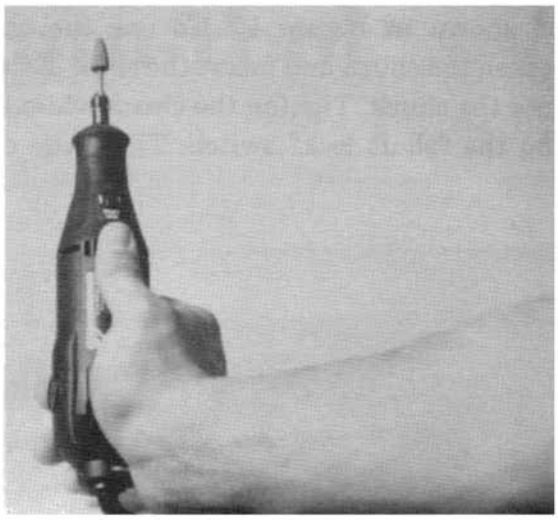


***Figure 11**: Push the lock button toward the tip to lock the shaft.*

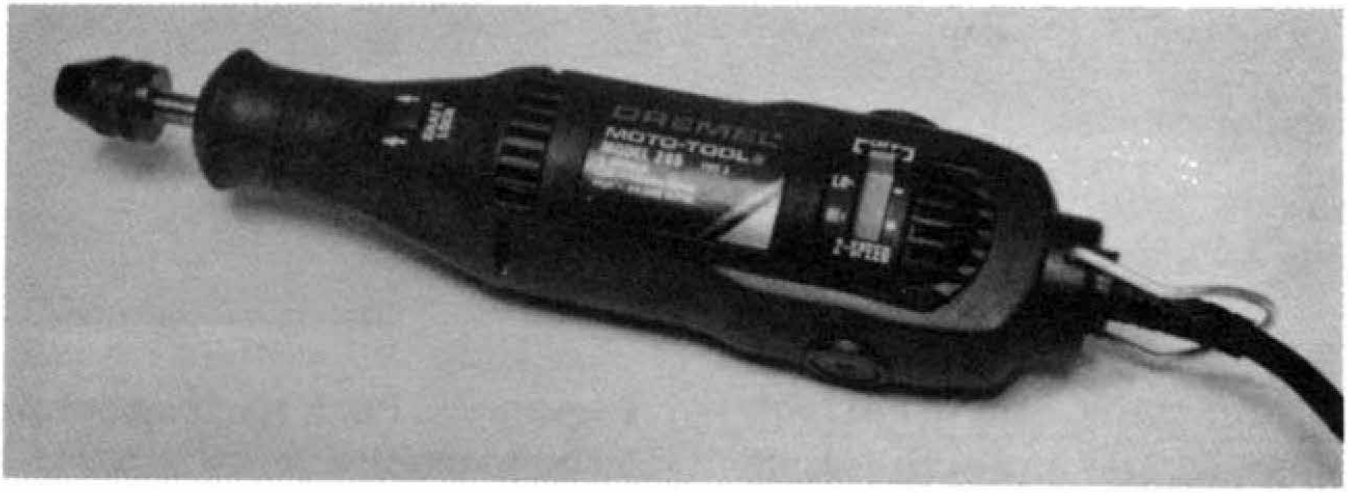


***Figure 12**: The keyless chuck installed on the shaft of the Moto-Tool.*

Using the Moto-Tool

The Moto-Tool can be used for many gunsmithing projects. The following sections will give you some insight into the uses of the tool and its accessories.

BARREL THROATING

Barrel throating is a very common gunsmithing operation, especially on the Government Colt .45 since it is very popular with competition shooters. Many shooters find that their gun will not feed semiwadcutter ammunition due to the narrow throat and feed ramp of the stock barrel. The throat and feed ramp of a Colt .45 are built into the chamber of the barrel, as shown in Figure 13. As you can see, the area is fairly narrow. To expand this area, you will need a high-speed cutter and your Moto-Tool.

Secure the barrel in a padded vise. Position the barrel so the chamber end is at an upward angle, as shown in Figure 14, and the lugs face down. During the throating operation, the angle of the original ramp must not be changed. Also, the ramp cannot be extended into the chamber.

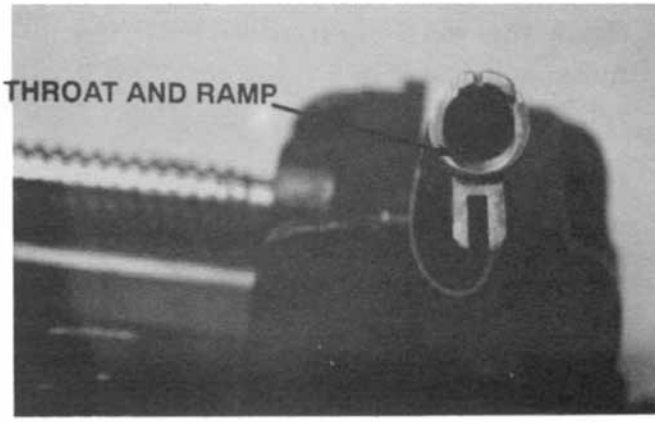


***Figure 13**: An unaltered Government Colt .45 barrel.*



***Figure 14:** To change the throat and feed ramp, secure the barrel in a vice with the lugs of the barrel facing down.*

Using the cutter at HI speed, recontour the opening of the barrel, following the angle of the original feed ramp. Only cut the lower 2/3 of the barrel and blend this contour into the unaltered portion of the barrel. When the cut is finished, it should appear close to that shown in Figure 15. Make only light cuts and check the work often. Taking off too much metal will result in a ruined and useless barrel.

Once the cutting is finished, smooth the cut with a grinding stone. While you have the grinding stone in the tool, slightly contour the inside edge if the barrel hood, shown in Figure 15, to a 45° angle. This contour will help the feeding of nonjacketed ammunition. Finish off the job using a felt polishing tip and polishing compound at LO speed.

Before the barrel is reinstalled in the gun, be sure to clean the bore so that all metal shavings, dust, and polishing compound are removed.

PREPARING METAL PARTS FOR BLUING

As explained in your lessons, all of the old bluing must be removed before a part can be reblued. After the old finish has been removed, the part is then polished and reblued.

If the part is not pitted, the old bluing can be removed using a polishing wheel, as shown in Figure 16. This will not only remove the old bluing, but will also give the part a light polish. The operation is completed using a cloth or felt wheel and polishing compound. Be sure to clean off any compound from the part before applying the bluing solution.

If the part has some minor pits, a fine grinding stone can be used as the first step. This will remove the old finish and any pits. Be careful not to remove too much metal or change the contour of the part. The polishing wheel can be used next, followed by a felt or cloth wheel with polishing compound.

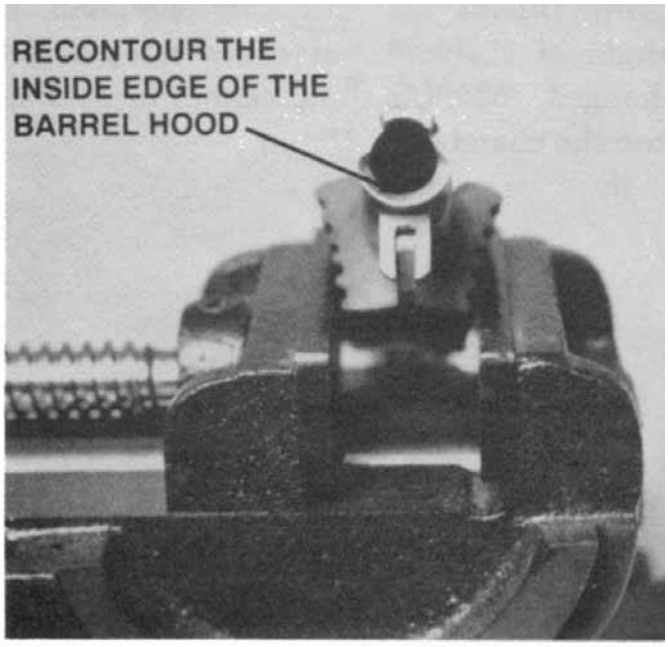


Figure 15: *An altered barrel for the Government Colt .45. Notice the width of the throat and ramp area.*

STOCK WORK

Carving. Once the pattern has been applied to the stock, most of the carving can be done using the Moto-Tool and a small engraving cutter, as shown in Figure 17. These small cutters are ideal for carving wood, fiberglass, and plastic. Once the pattern is carved, roughly sand it using a drum and/or a disk sander. Final sanding should be done by hand.

Inletting. Barrel inletting can be accomplished using the Moto-Tool and a high-speed cutter. Remember, the cutter will tend to follow the grain in the wood. This procedure is best performed using a curved or ball cutter. Once the stock is laid-out, the cutter can be used to bring the barrel channel to within $^1/_8$" of the layout marks. The final fit should be performed by hand. The channel can be sanded after cutting by using a drum sander.

Once the area is rough drilled, the action area of the stock can be finished with the Moto-Tool. Using high-speed cutters, the magazine well and action bedding can be cut. A drum sander can be used to finish the job.

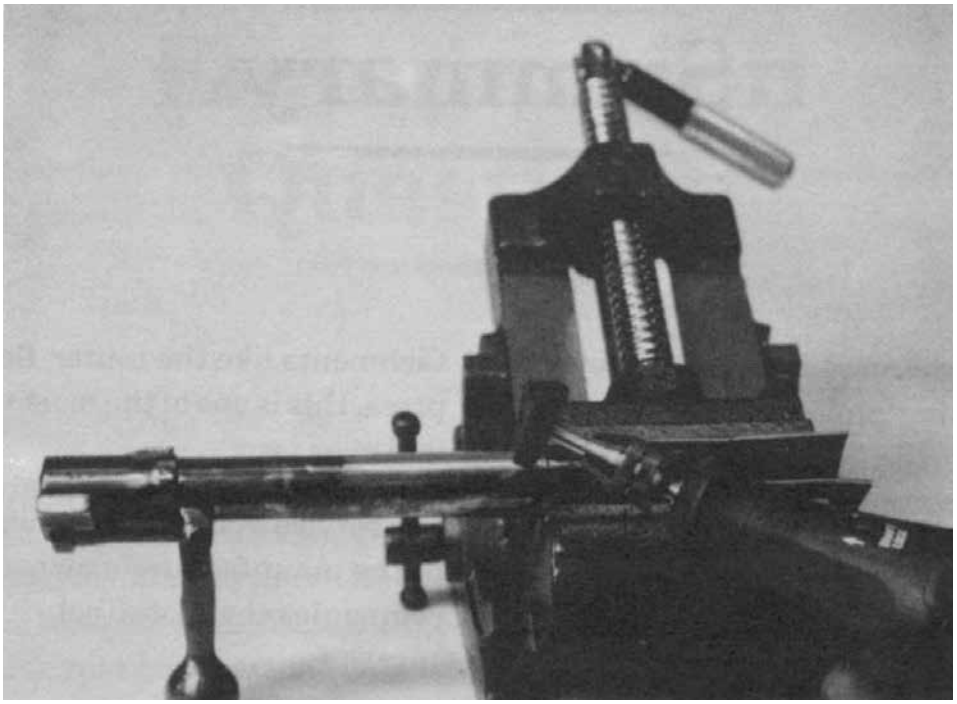


Figure 16: *Using a polishing wheel to remove the old bluing and to polish a bolt before rebluing.*

DRILLING

The Moto-Tool can be used as a drill motor. Any drill bit under 1/8" can be inserted into the chuck. Drilling should be done at high speed. Dremel makes a drill press that will hold the tool in a perfect, vertical position.

Summary

The examples discussed are only a few of the gunsmithing projects that can be accomplished using the Moto-Tool. There are hundreds of applications for this tool around the shop and home. With the accessory bits (available separately or in sets) and the attachments like the router, flex shaft, and drill press, this is one of the most versatile tools you will ever own.

For service and maintenance of the tool, refer to the manufacturer's owner manual that accompanies the Moto-Tool.

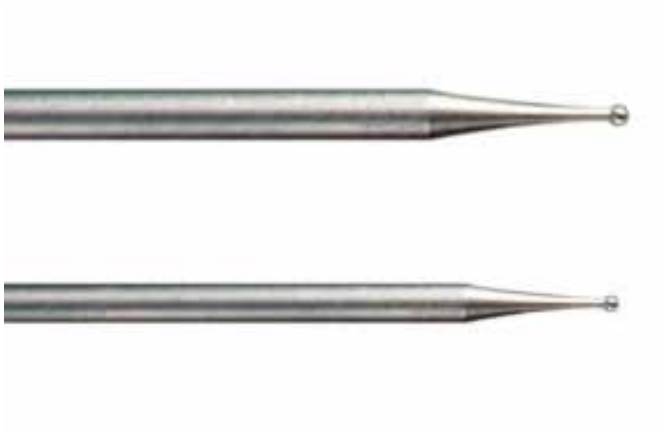


***Figure 17**: Engravers are very small cutters and therefore should be operated at high speed.*

Examination Questions

THIS IS EXAMINATION NUMBER 2509.

Make sure you print your name, student number, and examination number (Lesson No.) in the space provided on the Answer Form. Be sure to fill in the circles beneath your student number and examination number (Lesson No.).



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

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

1. **The high-speed cutters are designed to cut**
   a. On the point of the bit.
   b. On the sides of the bit.
   c. On either the point or the side of the bit.
   d. At low speed.

2. **Which of the following operations should be performed at LO speed?**
   a. Grinding
   b. Cutting.
   c. Sanding.
   d. Polishing.

3. **When using a high-speed cutter to cut the barrel channel in a wood stock, the cutter will tend to**
   a. Follow the grain of the wood.
   b. Cut better when moved from left to right.
   c. Cutter better at LO speed.
   d. Cut too deeply to be used.

4. **The cut-off wheel, being an abrasive wheel, can be used for all of the following except**
   a. Cutting plastic.
   b. Cutting metal.
   c. Cutting curved slots.
   d. Cutting straight slots.

5. **What accessory bit can usually be used instead of a hand file?**
   a. High-speed cutter.
   b. Grinding stones.
   c. Sanding drums.
   d. Felt polishing wheels.

6. **At what angle is the barrel hood of a Government Colt .45 cut to help the feeding of non-jacketed ammunition?**
   a. 35 degrees.
   b. 45 degrees.
   c. 55 degrees.
   d. 65 degrees.

7. **When using a cut-off wheel, the Moto-Tool should be held**
   a. Using the pencil grip.
   b. Using the one-handed golf grip.
   c. With two hands.
   d. Securely in a vice while the work is moved across the wheel.

8. **To aid in the polishing operation, polishing compound can be applied to all of the following accessory bits except**
   a. Wire brushes.
   b. Bristle brushes.
   c. Cloth wheels.
   d. Felt wheels.

9. What is the maximum size drill bit the Moto-Tool will hold?

a. 1/8 inch.

b. 1/4 inch.

c. 3/8 inch.

d. 1/2 inch.

10. Which tool should be used to do precision work like honing and polishing a trigger and sear?

a. Felt polishing wheels.

b. Emery-filled polishing wheels.

c. Fine grinding stones.

d. Hand files and honing stones.