

Professional Stonesetting

A Contemporary Guide to
Traditional Setting Techniques



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WARNING: Some of the traditional procedures described in this book can be harmful if not executed properly. Learn about the hazards of all techniques and materials before using them. Wear protective goggles and use proper safety measures. When in doubt, consult an expert.

This book as well as a complete listing of instructional opportunities for jewelers is available from:



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Introduction

The art of setting precious and semiprecious gems into jewelry has evolved over thousands of years. This book is intended for craftsmen at all levels, from absolute beginners working on their first bezel to those intent on perfecting their prong and bead-setting skills. The projects in this book are demanding, so it is important to remember that patient practice leads to success, confidence and eventually, mastery. Strive for perfection at every point. As in making jewelry, the first step is always the most important, that is, until the second step comes along. Just as the placement of the four corners of a building determines the course of construction that follows, when setting stones, preparation and planning are critical steps. The finished product will never be more accurate than the first step, so get off to a good start. Take measurements, evaluate and think through each step in the process.

Although the ultimate goal is to work both flawlessly and rapidly, novices should concentrate exclusively on the former. The first time an artisan attempts something new, the going is slow. Speed comes with experience over time. Flexibility and adaptability to new situations develop along with skill and confidence. At every point, look for areas that need a little more attention. There is always some way to improve your work. Do not stop until you are convinced that you have done the best job possible, even if it takes longer than you expected. In the end, the results will be worth the effort.

This volume is a companion to my book *Professional Jewelry Making* and focuses strictly on stonsetting. The setting projects in this book represent traditional, classic stone settings, which for the most part are available commercially. The techniques used can be applied to more contemporary artistic jewelry as well. Each project begins where the bench jeweler/goldsmith's job leaves off, with a polished ring or pendant ready to receive a stone. In most of the projects shown here I have chosen to start with a commercially available mounting. This makes it possible for readers to start from exactly the same place and move through the projects in tandem with me. The source and specific item numbers for ordering these settings are presented at the end of the book.

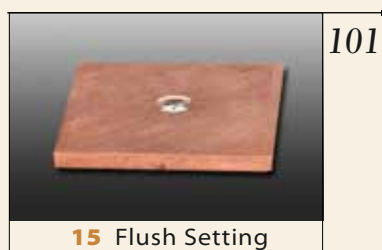
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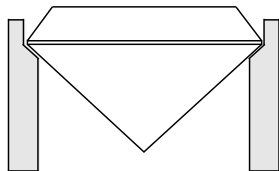
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5 • Square Bezel

Square bezels require exact fitting and burring, firm control of the punch and precision filing and finishing. In this example we are setting a 5 millimeter square synthetic ruby into a sterling ring.

- 1 This cast sterling ring is made with a seat to accommodate a 5 mm stone. One way to fabricate this setting in metal is to use two square tubes that fit snugly, one inside the other. The inner tube becomes the seat and is therefore filed to an angle that matches the pavillion of the stone. The outer tube is taller and vertical and will become the bezel. For small stones, it is practical to construct the setting with metal that is thick enough that the seat can be carved using burs and gravers.

However the mounting is created, the first step in setting is to refine the fit. Depending on where and how much cutting is needed, gravers and burs can be used to trim the metal. The stone should drop between vertical walls and sit on a seat that mimics the angle of the stone's pavilion. The stone should sit on all four seats evenly.



- 2 Place the stone into the bezel and use a pair of dividers set at 1 mm, to inscribe a light line around the setting. Establish this line first, before you make any adjustments. It will serve as an approximate height of the girdle and also as a constant reference after filing begins.



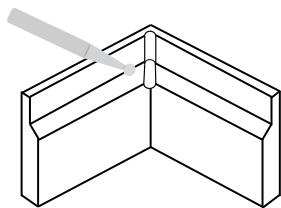
3 Use a large flat file to adjust the height of the bezel. Although the surface is small, needle files are not nearly as effective as a large flat hand file. File across the top from all sides as you lower the metal evenly. Use the scribe marks as a reference. Insert the stone periodically as you file to check the height. Continue until approximately 25% of the crown protrudes above the bezel.



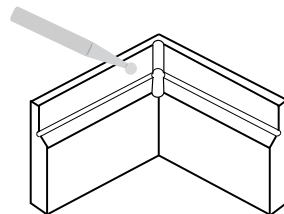
4 Because the metal is thick, several small steps are added to “encourage” it to move more easily. First, file a bevel on the top so there is less metal to move. Use the same large flat file to angle the top of the wall into a bevel that slopes downward about 10°, away from the stone. Use long even strokes and do not wobble. File a bevel on each of the four sides, leaving a miter in all corners, where the angled bevels meet.



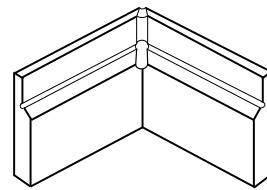
5 To prepare the seat, use a tiny 0.5 mm ball bur to remove a small amount of metal at the inner creases. Start in the vertical corners at the seat, moving the bur up and down to create a shallow groove at the corners. This metal is removed to prevent stress on the typically fragile corners of the stone. Make even gouges into the metal at all four corners.



1. Cut a groove in the corner with a 0.5 mm round bur.



2. With the same bur, cut a groove along the base of the bearing.



3. Use a sawblade to make a small notch on the top bevel.

With the same small bur, cut a groove horizontally along all four sides where the wall meets the seat. This is a form of scoring that will help to determine where the metal will bend when you start to push the sides over the stone. Scrape the spinning bur back and forth lightly along the corners, deepening the grooves to weaken the metal.

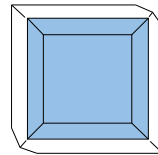
6 Here is the last little adjustment to make the thick bezel walls fold in and over the stone. Use sawblade or a square graver or even a small bur to nick the corners from above. This is definitely not slitting the corners to make tabs out of the four sides, which is amateurish and never looks good. Instead, make a nick less than a millimeter deep exactly at the corners to weaken the metal and get it moving in the right direction when force is applied. Do not saw further than the depth of the sawblade.

7 A ring clamp that has been cut in half makes a useful tool that can be securely gripped in a vise or gravers block without damaging the setting. Once the ring is secure, use a chasing hammer and setting punch to push the metal over the stone. Lay a wax “setting snake” over the stone to hold it in position during the initial hammering. Place the face of the setting punch near a corner, on the bevel. Hold the punch at an angle of 45–60° and tap downward, rather than just inward. Move the metal a tiny bit over the stone and stop. Now place the punch on the other side of the same corner and move it inward too. Go back and forth

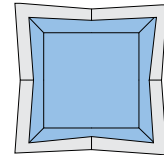


working alternately on the two sides of two opposite corners, pinching the metal a little bit just at the corners. Work only at the corners until the stone is tight.

Next use the punch to move the middle of the walls inward. This process is pretty easy to control because the metal at the corners does not move because it has been work hardened in the earlier step. Maintaining the same 45° angle throughout the process, use the punch to create a smooth bevel on the top of all four bezel walls.



Correct:
Start at the
corners.



Incorrect:
If you start on the sides the
corners will never close.

- 8** Raise the punch to about 75° and tap downward, pushing the metal further and smoothing the surface. Pay special attention to the inner edge, making sure you see contact between the metal and the gem. This angle of the bevel should approximate the angle of the stone's crown.



9 Use a large fine-cut file to remove excess metal and smooth the surface. There is no metal to waste so file away only what is needed to remove tool marks. These facets are difficult to file correctly with anything but a large file. This tool enables one to take long strokes that create a uniform plane on top. Setters often use a very long narrow fine-cut flat file for this purpose. Stop when the four facets are flat and there is a crisp mitered corner diagonally between them. Do not let the file touch the stone.



10 Take the top surfaces down to a finer finish in preparation for polishing. Use a 600-grit sanding stick, making sure that the paper is flat and tight. Maintain crisp corners with diagonal miters. Do not let the sandpaper touch the stone.



11 An alternative to sanding is to use the flat end of an abrasive rubber wheel, which will prepare the surface for polishing. Rubber abrasives come in all shapes and grits. This photo shows a fine flat Shofu® disc used in a flex shaft.



12 The final touch is to create a reflective bright cut where the metal lays directly against the stone. The traditional method is to use a flat graver to shave the metal to an even line. If the graver has a high polish, the result is a highly reflective rim angled inward, perpendicular to the crown of the stone. A less precise method is to use a polished pointed burnisher to rub the inner edge of the metal where it meets the stone (see page 48). The tool imparts a polish without any trimming. At all times and with both methods, great attention needs to be paid to the tip of the tool which should glide just above the stone so it will not damage it.

Place the corner of a highly polished flat graver carefully against the metal and shave off as little as possible in multiple passes. At the end of each cut, drag the graver backward along the area just cut to burnish the facet. Repeat: shave, burnish, shave, burnish until the bright cut is crisp and meets at sharp mitered corners.

13 During finishing, buffing and polishing take care to avoid rounding the crisp facets and corners of the setting. For this reason, it is best to take the surfaces up to the highest level of abrasive prior to polishing. Hard felt wheels are better for polishing flat surfaces. Use a light touch, keep the buff moving and avoid wearing down the recently prepared bezel.

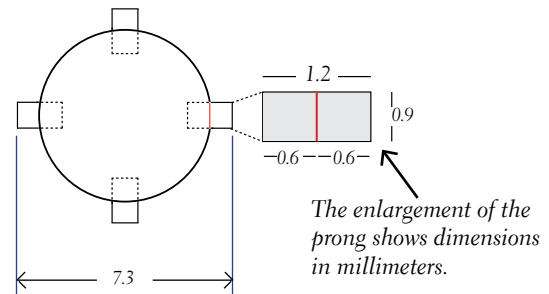


6 • Four-Prong Setting

Prong settings are among the most common ways to set diamonds and other gems in jewelry. The concept is simple but the execution is not. This lesson breaks down the procedures into the smallest increments to demonstrate the most elementary and important steps in prong setting. For this reason, instruction here includes added steps to ensure accuracy. And rather than jump ahead and using a bur, more will be gained by using a saw and file to prepare the seats in this setting.

- 1 The basic idea is to carve seats into prongs to hold a stone securely. This 14k gold cast mounting has one large 4-prong setting in which to set a diamond or other faceted gem. The prongs are hefty and there are no other settings or obstacles to contend with which makes this a good project in which to learn the basics of prong setting.
- 2 Measure the stone so that the mounting can be adjusted and the seat cut to the proper dimension. A digital slide caliper shows that the diamond measures 6.1 mm at the girdle, making it slightly under one carat in weight. These measurements will be important when adjusting the prongs and cutting the seat.
- 3 Use the caliper to measure the thickness of a prong from the interior to the exterior. In this setting the prongs are 1.2 mm from inside to outside and 0.9 mm wide. Placing the 6 mm stone in position reveals that the opening is too large and allows the stone to drop between the prongs. Most prong settings can be adjusted to accommodate a range of stone sizes, so this is not a problem. If opened further, this setting could accommodate a 7 mm stone, or even larger. And if closed down, the setting could comfortably hold a 5.5 mm stone.

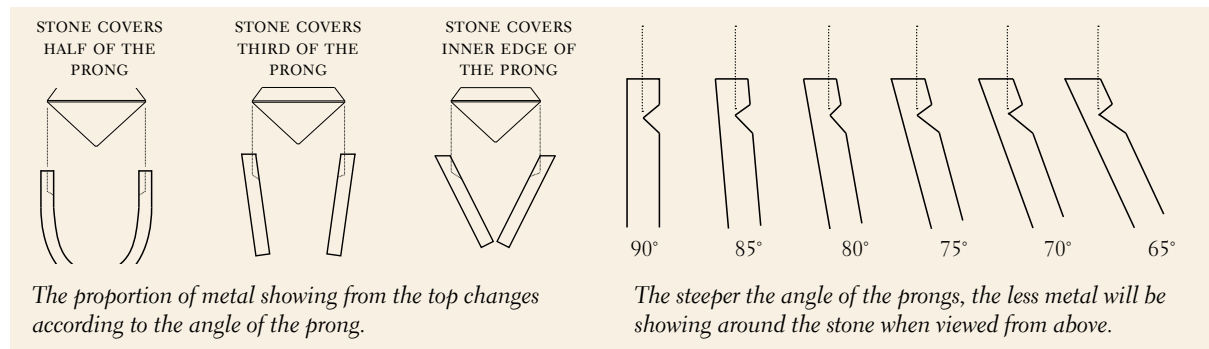
Standard procedure is to adjust the prongs



The opening in this setting is too large; the stone drops in.



After moving the prongs inward, the stone sits on top as it should, covering half of each prong when viewed from above.



so that the stone will sit at the correct point in each prong. Ultimately the stone will rest on an angled bearing (or seat) that matches the angle of the stone's pavilion. This seat is carved half way through the prong, from the interior. The remaining half of the prong becomes the vertical wall which will be bent over the stone.

The task now is to determine the correct position for the prongs. In this case half of each prong will become the vertical wall, outside of the stone's diameter. Adding the two 0.6 mm vertical walls to the stone's diameter of 6.1 mm yields 7.3 mm. That should be the exterior measurement for the outside of two opposing prongs when complete. Use a pair of chain-nose pliers to squeeze the prongs inward toward each other until they rest with the outside measurement 7.3 mm in both directions. Check and correct for symmetry as needed. Make sure that the prongs are also lined up correctly in relationship to each other.



- 4** Use a flat file to level off the tops of the prongs, bringing them all into one flat plane.
- 5** Check the fit by placing the stone onto the setting. At this point, because the top portion of the prongs is straight and vertical, the stone should sit covering half of each prong when viewed from directly above. If the prongs were angled outward, which is very common, the stone would cover less of each prong, and per-



haps even just barely rest corner-to-corner on top of the prongs. This is to allow for the stone to drop into the right position in the angled prong at the point where it will be held. In all cases, an imaginary line dropped straight down from the edge of the stone should cover half of the prong at the seat.

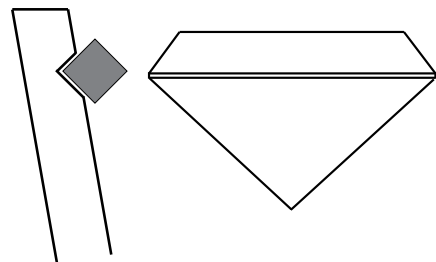
- 6** Because this exercise is a demonstration of the basics, some steps are included here that are not followed by experienced setters. At this point, most working setters would grab a bur and use their flex shaft to cut seats into the prongs. But for the purpose of instruction, we are going to slow down the process.

It is helpful when learning to mark the height of the seats by inscribing lines at the same height on all the prongs. Set a pair of dividers at about 0.9 mm. Place one leg on the top and drag the other leg very lightly across both sides of the prongs. Note that 0.9 mm is approximately the height of the crown of the stone. This dimension will be larger or smaller depending on the size of the stone.

- 7** Instead of a bur, use a jewelers saw to begin each seat (also called a bearing) from the inside of each prong. Cut at the mark and saw about $\frac{1}{4}$ of the way into each prong (about 0.3 mm). It is very important that these cuts be level with each other.

- 8** Continuing by hand rather than by burring, carve seats at the sawcuts. Use a #2 or #4 cut square needle file to create the seats. Carving by hand will afford greater precision than burring with a flexible shaft. Because the angle at the girdle of a brilliant cut stone is near 90° , a square needle file is perfect.

Place the tip of the file in the saw cut, positioned so the four corners are pointed

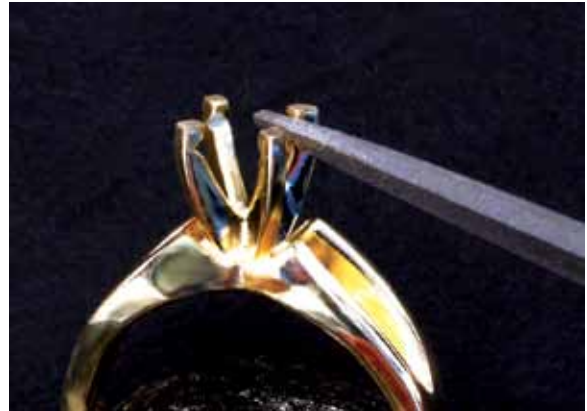


The square needle file is positioned to match the stone's shape at the girdle.

exactly up, down, left and right. Any variation in this orientation will leave seats that do not match the shape of the stone. With gentle pressure sideways against the prong, begin to file a notch in the saw cuts. Do not let the file slip or change orientation or touch the other prongs. File until the cut is halfway into the prong. The seat should always cover less than half the thickness of each prong. Use a caliper to verify that the distance between the interior corners of the opposing seats is 6.1 mm or slightly less. The seats should all line up in one plane when the ring is viewed from the side and rotated. If the stone could be slipped into place now, each of the newly carved seats would be in just the right position and depth to hold the stone perfectly. But that would be very difficult to do with a setting this large, so the next step is to carve away the top portion inside each prong, leaving vertical walls above the seats.

- 9 Use a #4 barrette needle file to carve sideways into each prong. Hold the file in a near vertical position leaving opposing walls parallel to each other so that the stone can drop into place. While carefully avoiding the bottom of the seat, hold the file almost vertical so that you can carve the top part back. In order to limit abrasion to just the vertical wall, use a “safe” file that has polished edges. In fact, it is not necessary to make the wall truly vertical because the stone can be slipped into place with the walls angled inward slightly. This is preferred, because the stone cannot move as much during setting and the metal does not need to be pushed as far.

At this point the stone should slip tightly into place with a little pressure. Before inserting the stone for the final time, use a scraper to remove the burs that remain from filing.



Polish the interior and sides of the prongs, along with all other areas that might be difficult to reach after the stone is set. Insert the stone and press it downward to sit squarely on all four prongs. For a large stone like this, rotate it while viewing from above to align the prongs with the facets. Adjust as needed.

- 10** There are numerous ways to close the prongs. In this project, use a pair of chain-nose pliers in a two-step process. To help prevent slipping, sand the interior of each jaw with 220-grit paper, leaving a fine texture to grip the metal. Coming from directly above, place the pliers over the setting and outside two opposing prongs. Squeeze and the angle of the jaws will force the tips of the prongs inward over the stone.



- 11** Tilt the pliers back so that one leg lies along the outside of a prong below the girdle and the other leg meets the opposing prong above the girdle. Being very careful to keep the pliers from slipping, squeeze and watch the metal move in. Then tilt the pliers the other way and repeat for the opposing prong. This should bring the material in close, but probably not tight at the tips.



- 12** The tips of the prongs have to be pressed in, but the pliers do not have the leverage to force the metal in the correct direction. One method is to use a setting pusher with a coarse face (to prevent slipping) to finish the job. Place the working face on the tip and very carefully force the metal downward onto the stone.



- 13** Check and adjust for contact, symmetry and alignment of the prongs. Use a #4 barrette needle file to trim the excess metal so that all four prongs are at the same level. Each should come up about 80% of the height of the crown, the vertical distance between the girdle and the table.



- 14** Use a #4 or #6 needle barrette needle file with a safe edge to trim the fronts of the prongs flat, where the tips cover the gem. File each tip back so the prong covers less than half of the slope above the girdle.

Continue to carve the top of each prong so that, when viewed from the side, each has a curved contour that blends into the straight outside of each prong below the girdle. In this case leave the sides of the prongs flat. The tip of each prong looks like the side of a small flat cylinder (not a ball though many prongs are finished this way).



- 15** Use rubber abrasive wheels to correct and clean up this setting. Follow by buffing with tripoli and then polishing with rouge. The finished prongs should hug the stone for security, with no spaces or gaps between the metal and the gem. It should not be possible to slip a piece of paper under the prong tips. The prongs hold the stone securely while showing it off to maximum advantage.

