

10 JEWELRY, BEAD & GEM HOW-TO'S P.83

SPECIAL TOOLS & SUPPLIES ISSUE!

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Important tools for the jewelry maker.

# Don't Leave Without Home Them

BY ALAN REVERE



# A



At the first meeting of my first goldsmithing class in Pforzheim, Germany, the instructor gave each of us a list of 10 tools saying, "Don't come back tomorrow without them." This list contained a few items I knew: three pairs of pliers (flat, chain, half-round), a ring file, a saw frame, scribe, and ruler. It also included some tools that I had not thought essential: a slide caliper, a machinist's square, and a pair of dividers. Clearly, this German approach was going to be more precision-oriented than what I had known before.

Somehow I suspected that this was not going to be the end of my tool expenditures. I was sure that there must be at least another 10 or 12 items I would need to make everything in my mind. Over the ensuing years, as I kept acquiring tools, I realized that there is no end in sight. Tools are essential to making fine jewelry, and as one's work and skills progress, new tools are always needed. Unlike any other craft, jewelry making is reliant on a very large assortment of very small tools.

There is an old saying, "The right tool is half the job." While for many tasks a variety of tools can be used, for some operations only one tool will do. Often there is no substitute for the correct tool.

You might as well get used to the idea that you will never have enough tools. Be prepared to add tools as needed until there is no more space in your drawers or on the top of your bench. When selecting tools, remember that often spending a few dollars more means that you get an item of better quality that lasts longer and does the job to a higher standard.

Also be prepared to customize your new tools, as many need modification or "dressing" before they are suitable for use. For example, the jaws of most new pliers should be sanded to remove imperfections and sharp corners. Gravers require grinding and sharpening, and hammers need to be shaped and polished before touching metal.

In this survey of jewelry hand tools, based on a chapter in my book *Professional Goldsmithing*, I list the most essential items to have on your bench, along with a few comments and personal tips for modification to improve tools' utility.

The jeweler's bench creates a comfortable work area where the jeweler's tools are within easy reach. Photo: Barry Blaw



## Work Area

**Jewelry bench:** Unchanged for hundreds of years, jewelry benches provide the station where nearly all hand work is executed. Made of sturdy wood, most benches have a working surface 36 or 37 inches above the floor. European-style benches have a semicircular area cut out so the goldsmith can be surrounded by the work surface and tools. Side drawers for storing tools and a pull-out catch pan for filings are common additions.

The key is to adjust your chair so that your upper arm is parallel to the floor when resting on the bench top. This puts the bench pin close and at the proper height so you don't have to work while hunched over.

**Bench pin:** A wooden bench pin is centrally located on the front of a jeweler's bench. It is the focus of nearly all fine work. While some people put the pin in with the top surface at an angle, I prefer to keep the top surface parallel with the floor for ease of piercing sheet. Meanwhile, the front edge of the pin is trimmed at an angle to support metal while filing.

I like to customize my bench pin by carving different shapes to suit particular tasks and work patterns. Most people carve an open "V" into the pin to support metal when sawing. I also file a diagonal groove to hold metal rods when filing, and I carve a recessed area on the top of the pin to hold gems and small parts so that they cannot roll or be pushed off. Carving a groove on the top surface precisely perpendicular to the side of the pin makes it easy to hold rods perpendicular to a file or saw held against the pin.

Drilling a few holes in the top of the pin can temporarily hold wooden or metal posts, which are helpful for holding objects securely. Serious jewelry makers should consider the Benchmate® system of interchangeable holding devices that slide into place when the bench pin is removed.

**FAR LEFT (OPPOSITE PAGE):** Michael Sugarman's 18K gold bracelet, including clasp, consists of roughly 200 individual pieces, all constructed from sheet, wire, and tube stock. Each segment is a little box. In addition to pliers, shears, punches, scribers, and other small hand tools, he used a hydraulic punch and a series of dies he made himself to create the bracelet. Photo © Ralph Gabriner

**LEFT (OPPOSITE PAGE):** This 18K gold ring with yellow-green beryl and green and yellow diamond accents by Bob Fremson, Dr. Livingston's Finds, is all handmade using such basic tools as a mandrel, needlenose and round pliers, calipers, discs, and rubber wheels. Photo © Ralph Gabriner

## Eye wear

There are two categories of eye wear: magnifying and protective. You should have both.

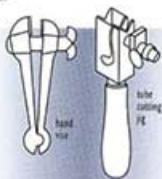
**Optivisors and loupes** for magnification.

**Protective goggles and a full face shield** for protection from flying objects, dust, and hazardous chemicals.

**Platinum goggles** rated for the work you are doing are an absolute necessity.

**Dust masks and respirators**, while not eye wear, are an absolute necessity for operations that create dust or fumes.

tool used to measure the thickness of wire and sheet. Of course, get a metric model.



## Holding

Jewelry is composed of small, odd-sized pieces that must be held securely and safely for filing, sawing, drilling, setting, etc. Here are some important holding devices:

**Ring clamp:** Probably among your first tools, the traditionally wooden model has met competition from several plastic, steel, and aluminum versions.

**Pin vise:** Like an adjustable collet hand vise, this tool is used to hold wire during filing, drill bits during sharpening, tubing during setting, and much more. Long pieces of wire or rod can be held by allowing the material to pass through the central hollow core of the pin vise.

**Hand vise:** Important for holding larger and less delicate items for filing, bending, sanding, etc.

**Tube cutting jig:** This specialized precision vise can be adjusted to hold a piece of tubing, wire, or rod at a fixed length during sawing or filing. A saw blade slips through a guide so that the work is cut off flat and square. Get either the German or Swiss model with hardened steel jaws.

your work is that when held tightly, pliers do not scar the work. It is primarily when the work slips in the jaws of loosely held pliers that marring occurs. Here are the essentials:

**Flat pliers:** Your first pliers should have smooth flat jaws without teeth.

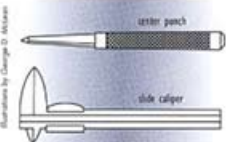
**Chain nose pliers:** Like flat pliers, but with jaws that taper toward the tip, these are ideal for holding smaller objects such as jump rings.

**Half round pliers:** These are really important for bending sheet or wire into smooth curves when making ring shanks, bezels, etc. If the desired curve is larger than the arc of the pliers, hold the metal diagonally to utilize the curved jaw with an increased radius.

**Round nose pliers:** have two long conical jaws, enabling you to bend tight curves in wire and sheet.

**Side and end cutting pliers:** These useful nippers should be reserved for jewelry metals. If used on steel or another metal that is harder than the jaws, permanent damage will result.

**Ring bending (bow closing) pliers:** These heavy-duty pliers have two dissimilar interlocking jaws, offering high leverage for bending heavy sheet and wire. Fit a hood of thin copper over the two-pronged jaw to protect your work against marring.



## Measuring and Marking

The most critical step in building anything (whether a ring or a skyscraper) is the first step: layout. Everything that follows depends on the accuracy of the first step.

First, the essentials:

**Metric ruler:** The metric system is far superior for jewelry work than either the English or gauge system. If you are not familiar with metrics, now is the time to learn.

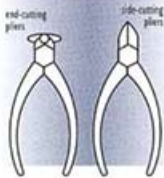
**Slide caliper:** This essential tool lets you measure and analyze your work with precision. Yours must be metric. Make sure you can read it to the nearest tenth of a millimeter.

**Dividers:** These have more uses than many novices realize. Select a pair of dividers with sturdy legs that meet at a precise point. The tips can be precisely maintained by sanding. Dividers are ideal for laying out straight lines, transferring precise measurements, and of course, for laying out arcs and circles.

You also need a **scribe** to scratch light layout lines onto metal; and a **center punch** to locate holes for drilling.

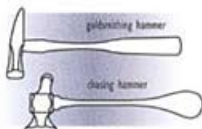
**Small machinist's square:** Many bench jewelers have yet to discover the utility of this tool. By butting one leg against a straight edge, a right angle is established for sighting and/or scribing perpendicular lines. The square is used to check the accuracy of flat surfaces, straight lines, and right angles in your work.

**Micrometer:** This is an important



## Pliers

There is a nearly endless array of pliers for holding every conceivable shape of object. As with many tools, pliers need to be dressed and often customized after purchase. One thing to keep in mind when concerned about the possibility of steel pliers marking



## Hammers

The term "goldsmith" literally means one who hammers gold. A number of hammers are important to jewelry making, whether in gold, silver, or any other metal.

**Goldsmithing hammer:** These always need dressing to put a slight dome on the round, planishing face. The cross peen end is used for riveting and forging.

**Chasing hammer:** Select one with a flat surface on the larger end, used for striking punches and other steel tools. The ball end can be used for embossing.

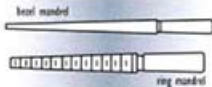
**Dead blow mallet:** Forget about rawhide mallets. They are too light and bounce back after each blow, making accuracy difficult. Instead, look for a 14-ounce, weighted, bounceless mallet. These effective mallets are made from a hard, rubber-like material filled with loose steel shot to eliminate the recoil after each blow.



it into a 75 millimeter piece of 12 millimeter wooden dowel, burning it into place. Quench and tap in further. Finally bend the tip about 45° approximately 25 millimeters from the end.

Hi-tech titanium solder picks, which do not stick to solder, are also available from suppliers. Some goldsmiths swear by pencils used as solder picks. The graphite core is refractory and works well as a pick, while the wooden handle provides insulation, although it burns away slowly.

**Refractory turntable:** For soldering all around an object, there is nothing better than a turntable with a refractory surface, commercially available from some suppliers.



## Mandrels

Mandrels are tapered shafts used for forming bezels, rings and bracelets. They come in a variety of sizes, shapes, and materials depending on the application.

**Ring mandrel:** The standard ring mandrel is made of steel. Some come with sizes marked, and some are grooved to protect the culet of stones which protrude into the finger hole. The most useful model is marked but not grooved. A section of tubular foam, used as bicycle hand grips, provides a luxurious grip.

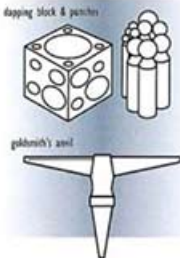
**Bezel mandrel:** After you solder a bezel closed, slide it onto the appropriately shaped mandrel for final forming (and enlarging if necessary). The basic and most useful round bezel mandrels graduate from about 4 millimeters to 16 millimeters, although square, oval, triangular, and rectangular mandrels are also available.

**Bracelet mandrel:** Just as bezels are formed on a bezel mandrel, bracelets can be formed on a bracelet mandrel. There are two basic styles, round and oval.

## Forming

**Steel block:** For flattening metal or for any of a number of other hammering procedures.

**Dapping block and punches:** A steel cube with a variety of graduated hemispherical depressions, this item is used with a set of complementary punches, to form domes, hemispheres,



and other similar shapes in metal.

**Swage block:** Also called a design or groove block, this steel block has a variety of graduated shapes and sizes around the various surfaces. Swage blocks are used to form metal as in furrowing a tube blank, or as a die for forging to alter the cross sections of rods.

**Draw plates:** These hardened steel plates contain a set of precision, graduated tapered holes. Draw plates are mounted in a bench vise or draw bench for pulling wire and tubing to reduce the size. Draw plates eliminate reliance on commercially available stock for wire and tubing. A nearly infinite array of shapes and sizes is available. Start with a round draw plate with holes ranging from 0.5 millimeter up to 4 millimeters.

**Draw tongs:** These heavy-duty pliers are used to grab wire and tubing when pulling through draw plates. They have heavily serrated jaws and one curved handle for secure gripping.

**Bench vise:** This is the common workshop vise that is mounted permanently on a work surface. It is used to hold some tools and various objects. Line the jaws with a sheet of copper to protect tools when mounted in the vise.

**Rolling mill:** Just as draw plates enable the goldsmith to manufacture finished wire and tubing, a rolling mill is essential to the manufacture of sheet and the preparation of stock wire for drawing. This item is one of the most expensive pieces of equipment needed for jewelry work. Again a great variety of models are available. Models with higher gear ratios and larger and wider rollers are preferred. Basic models have a combination of flat and wire surfaces on one set of rollers.

**Stump:** Traditional jewelry workshops include a wooden stump standing about 60 centimeters tall and from 45 to 60 centimeters around. It offers an

ideal work surface for hammering and forming metal. A vise and an anvil can be permanently mounted on top, and hammers can be slipped into loops of a leather "belt" nailed around the stump. Specialized grooves and depressions can be carved into the stump for specific applications as needed. Avoid using very hard woods such as oak and maple, as well as very soft woods such as pine.

**Anvil:** A small version of the common blacksmith's anvil is very useful for flattening, forming, and forging small pieces of metal. An ideal model for goldsmithing is about 15 centimeters long with a polished, flat top surface and a horn on both ends. One horn is conical and the other is pyramidal.



## Finishing

In addition to the shop's polishing lathe and the flexible shaft, here is an important and little-understood traditional hand tool used for finishing:

**Burnisher:** For hand-finishing or polishing metal components, a small polished burnisher is very effective. It can also be used to surface-harden and polish pin tongs, catch tongues, and other small items. Maintain a mirror finish.



Alan Revere is a well-known master goldsmith, jewelry designer, and educator. He directs the Revere Academy of Jewelry Arts in San Francisco, where he also teaches. His first book, *Professional Goldsmithing*, is considered by many to be a contemporary classic on jewelry making. Currently, he is working on a series of books about jewelry repair. Photo: Barry Blau