

Professional Jewelry Repair Series

RING REPAIR

Alan Revere

Revere Academy of Jewelry Arts
San Francisco

Photography by Barry Blau

Illustrations by George McLean and Alan Revere



Ring Repair by Alan Revere
Professional Jewelry Repair Series
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Book designed by Alan Revere and Barry Blau

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Warning: The 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.

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9 8 7 6 5 4 3 2 1

Library of Congress Cataloging in Publication Data

Printed in China

ISBN 0-9651049-1-5

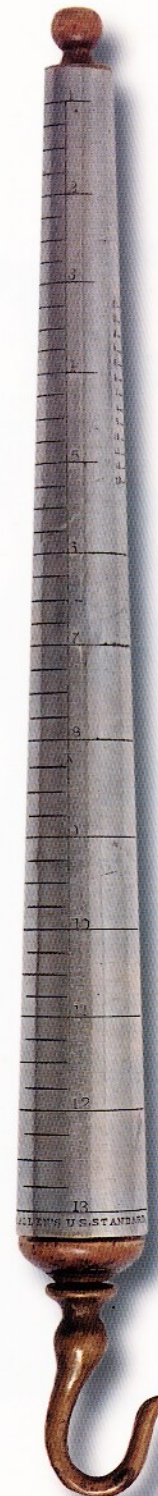
Published by:
RAJA Press
PO Box 470782
San Francisco, CA 94147

Available from:
Revere Academy Books
760 Market Street
Suite 900
San Francisco, CA 94102

Tel: 415-391-4179
Fax: 415-391-7570
Website: www.revereacademy.com

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Foreword

It is a great personal and professional pleasure to introduce this first book in the *Professional Jewelry Repair Series*. Alan Revere's manual is a landmark in the literature for the bench jeweler generalist, and I believe its impact will be wide and long lasting.

As one who has spent his life working in jewelry: at the bench, in education, in manufacturing, and now as Director of Professional Certification for Jewelers of America, I can say that Alan has done a great service to our trade. The 13,000 JA member stores have requested education and training material that is useful, professional, and practical. Surveys indicate that approximately 75 percent of retail jewelry stores have shops on site that perform jewelry repair and reconstruction services, confirming repair's key place in our industry. Yet, until now bench jewelers have lacked a comprehensive source for the technical information they need for their daily work.

Alan Revere has assembled in one place a summary of repair experiences that would ordinarily take years to encounter. I remember how daunting it was for me, as a novice bench jeweler in my family's store, to face first-time repair challenges without any guidance. This book will help repair jewelers at all levels because it shows examples that demonstrate the entire spectrum of problems and situations encountered when repairing rings. *Professional Ring Repair* is an excellent teaching tool for the beginner and a comprehensive reference for the experienced bench jeweler. It answers the industry's need for professional training material and it conforms to the standards required for JA Bench Certification.

This volume is exceptional in scope, accuracy, and readability. The book's layout, photography, and logical step-by-step format set new standards for jewelry education. They reflect the care and expertise which Alan, one of the most capable jewelry educators in the country, has invested in the presentation. This series offers complete and accurate information for bench jewelers doing repairs. In



addition, the other members of the retail team will gain by reading and understanding this material. Both store managers and sales associates can rely on it as an important source of information in serving their customers. It will enable all to speak intelligently and with an understanding of what is involved when accepting a customer's jewelry for repair.

I appreciate Alan's effort and know that all members of our profession will share my enthusiasm for this important work.

Mark B. Mann
Director of Professional Certification
Jewelers of America
New York City
December 1998

contributed substantially to this project: Joanna Seetoo, Tim McCreight, Shakti Ellenwood, Holly Beye, Holly Stempien, Francesca Flynn, Christine Dhein, Courtney Balzan, Marina Wolf, to Jürgen Maerz and Laurie Hudson of Platinum Guild International, and the people at Jewelers of America.

My thanks go out to those trusting souls who allowed me to work on their family heirlooms and sentimental treasures, as well as to those others who encouraged and supported this effort: Abraham Schmulewicz, Alexis Revere, Andrea Caccuro, Arthur Corbell, Bambi Knight, Beth Rosengard, Bill Hoefler, Blanche Moss, Bob Lynn, Candice Kollar, Carrie Randolph, Charles Levine, Charles Lewton-Brain, Crescent Jewelers, Dan Gill, Diane Alexander, Doug Zaruba, Dustin Revere, E. P. Van Leuven, Elise Misorowski, Fay Chu, Frank Trozzo, Gail Binchus, Gary's Jewelers, Gloria Dorson, Greg Todd of Stuller, GRS Corporation, Henry Kraft, Irene Hogan, Jake at Mining & Lapidary, Jan Williams, Jay Warshauer, Jim Terzian, Joanne Maggiora, John Donovan, Kathye Murphy, Kevin Castro, Kitty Rosenberg, Lang Antiques, Larry Katz, Leigh Roth, Lenny and Sunny Friedman, Linda Bullock, Lisa Futterman, Marcy Hamilton, Margery Brooks, Marilyn Jordan, Mary Weiler, Nathan Garcia, Otto Frei and Jules Borel, Paul Marfice, Elaine Corwin of Gesswein Co., Ralph Kazangian, Ruth Morris, Select Timepieces, Sir George Beilby, Stacey Roland, Steve Frei, Sue Dorman, The Goldsmith Shop, Trish McDermott, Walter Matlock, and ZJC Corporation.

And finally, I want to acknowledge my wife Jean who patiently put up with my late-night writing habit and provided me with a constant flow of jewelry to repair.

Thank you all. Without your help, this project would have taken an additional ten years to complete.

Alan Revere
San Francisco
January 1999

Introduction

We live in a throwaway society where almost everything is eventually discarded. In a class by itself, however, precious metal jewelry is never knowingly tossed in the trash. In fact, it is so highly valued that when jewelry is damaged or worn out, it is taken to a specialist for repair. And of all items brought to jewelers for repair, rings are by far the most common. Rings are worn more often, and by more people, than any other item of personal adornment. Rings can signify such things as marital status, family history, organizational membership, transportable wealth, and academic and sports athletic achievement. In our society, a ring is the most common jewelry gift between two people. Rings may have great intrinsic, emotional, and cultural importance; many are passed down from one generation to the next, frequently carrying great sentimental value as well.

Rings must fit their wearers to a finer tolerance than any other items of jewelry. Yet, rings also take more physical abuse through normal wear than do other types of jewelry. They may be worn for days, months or even years without being removed. Not surprisingly, ring repairs are the most often executed tasks which jewelry repair technicians are asked to perform.

When new, a ring must be custom fit to the wearer. Through the life of the ring, a thin or broken shank may be replaced, a finishing texture may be restored, accidental damage may be repaired, or the ring may be soldered to another ring. If the owner's finger changes, the ring may be sized or have a mechanism added to accommodate arthritic fingers. If a used ring is repaired, or if it is given or sold to another person, it may need sizing again. All of these tasks entail modifying a small circlet of precious metal with care, skill, accuracy, and respect. When a ring is truly worn out beyond simple restoration, it can be melted and the metal recycled to make new jewelry. However, it is rare indeed for rings, or any other item of jewelry made of precious metal, to be merely thrown away.



If you are interested in repairing jewelry, ring sizing is the place to start. The basics are easy to learn, and with time, more difficult operations can be attempted. Sizing a ring is a skill worth mastering, as it is the task most frequently performed by most repair jewelers.

In the following pages you will find the most frequent repairs that rings may require. Begin with the procedures and tools sections and then follow each of the 15 documented repair operations. Use the appendix for future reference when making or sizing a ring. No book can completely cover any subject. However, every effort has been made to include the most important, up-to-date, and safest techniques on ring repair in this volume. Read and understand all procedures first and then do your best to replicate or modify them as appropriate.

For those serious about jewelry as a career, this book covers many of the repair skills required for certification by Jewelers of America. As you follow the steps in ring repair within these pages, remember that each is a unique task with its own unique set of factors to consider. However, always keep this in mind: *Every time you accept a repair job you are entrusted with a precious heirloom. Treat each piece with the respect and care you would give to an item if it belonged to a member of your own family. Examine and evaluate your work as objectively as possible, and constantly strive to improve.*

Warning:

Some of the procedures described in this book can be harmful, or even fatal, if not executed properly.

These days, even lying in bed can be hazardous to your health, although you won't find any safety warnings under your pillow, at least not yet. Everything we do has some inherent risk, from crossing the street to slicing cheese to repairing jewelry. Some things are best learned by trial and error, but not safety precautions.

Here are a few very important things to keep in mind as you read through this book and work at your own bench:

- Most important: Your health and safety are your primary responsibility and yours alone.
- If you are unfamiliar with a process, chemical, or tool, learn about it before using it.
- Understand the risks and safety measures for all procedures before undertaking them.
- Think before you act. Imagine what could happen if things go wrong and what hazards may arise. Do your best to plan for the worst.

In the workshop

- Maintain a completely stocked first aid kit within sight and reach.
- Check your fire extinguisher. It should be in plain sight, easy to reach, and properly charged.
- Be sure that your facility complies with local, state, and federal regulations for fire, safety, and health.



Bodily protection

- Wear protective goggles when using spinning tools such as polishing motors, flexible shaft machines, and drill presses, as well as when using chemicals and solutions.
- When heating platinum, wear protective lenses specifically rated for the light emitted by the temperatures that are required. These should be at least #5 or darker.
- Wear the appropriate dust mask or respirator when using procedures that produce dust, such as polishing and sanding and also when working with toxic solutions.
- Tie back long hair, loose sleeves, and anything else that could get caught in machinery such as polishing motors and rolling mills.
- Keep your fingers out of harm's way when using polishing equipment, hammers, burs, drill bits, torches, gravers, etc.

Chemicals

- Consult the Manufacturers' Safety Data Sheets (available from the supplier) for all chemicals and solutions.
- Do not throw hot metal into pickle solution. It can splatter, dispersing toxic and corrosive particles into the air. These are very dangerous and can harm your skin, lungs, eyes, and clothing.
- Keep powdered baking soda on hand for accidental acid spills. Rinse recently pickled metal in a solution of baking soda and water.

Remember that a lifetime can be ruined by a single second of carelessness.

Procedures

When repairing a ring, there are a few important guidelines to follow.

- Take time to examine the ring closely.
- Compare the ring to the job envelope.
- Plan your work before you begin.
- Protect the gemstones.
- Conserve the shank's dimensions.
- Work accurately and efficiently.
- Maintain quality marks and engraving.
- Disturb as little as possible.
- Deliver the ring repaired and rouge-free.

Put simply, except for your repair, the ring should be unchanged.

ACCEPTING A RING FOR REPAIR

When taking in a ring for repair, examine it closely and look for signs of past repairs (Figure P.1). Try to locate prior solder seams on the shank. Inspect the gemstones. Look for a quality mark. Look for potential problems. Also inspect for damage that the customer may not have noticed. Point out such things as thin shanks and worn prongs that may need attention. This might be the time to install a new half-shank. Do your best to understand what the customer is giving you and what the customer wants before he or she walks out the door.

COMMUNICATING CLEARLY

Good communication is essential when accepting jewelry for repair. The customer should be told:

- the estimated cost
- when the job will be ready
- what, if any, problems may be encountered and their impact
- how the ring may change in shape or dimension, depending on the nature of the repair
- whether special finishes or textures can be replicated after repair

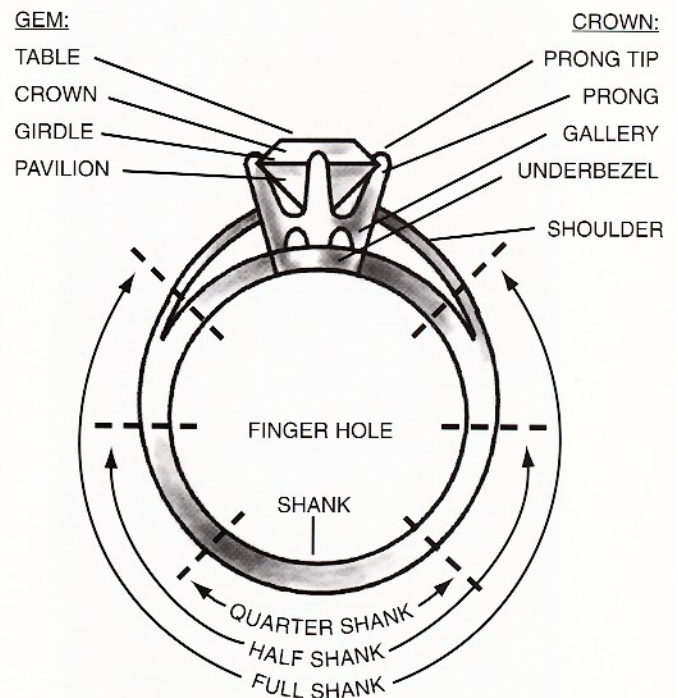


Figure P.1. Parts of a ring

NO GOODS DELIVERED WITHOUT THIS CHECK

No. 0618

WE WILL NOT BE RESPONSIBLE FOR GOODS LEFT OVER 60 DAYS

DATE RECEIVED _____

DATE PROMISED _____

No. 0618

ARTICLE _____

NAME _____

ADDRESS _____

CITY _____

REMARKS: _____

REPAIRED BY _____

TOTAL CHARGES _____

No. 0618

NAME _____

ADDRESS _____

CITY _____

PHONE _____

ARTICLE _____

DATE REC'D _____ PROMISED _____

INSTRUCTIONS: _____

REC'D BY _____

CASH WEEKLY SEMI-MO.
 MONTH WILL CALL MAIL

CHARGES		
FEDERAL TAX		
STATE TAX		
TOTAL CHARGES		
DEPOSIT		
BALANCE ON DELIVERY		

Figure P.2. A traditional job envelope

Your attention to the details in communicating with a customer before the repair assures him or her that quality workmanship will be carried out with great care. After all, a customer is trusting a stranger, you, with a valuable, sentimental, personal treasure, and you have an obligation to honor that trust. If you mislead or omit to tell the customer some important fact, he or she is likely to be disappointed.

Communicating and recording your findings on the envelope provides you with a record in the event that the customer questions your work after it has been completed.

THE JOB ENVELOPE

Most shops use one form of job envelope or another for repairs and custom work (Figure P.2). Some use pre-printed or custom printed envelopes with a one- or two-part tracking form. Other envelope systems have carbonless cover sheets, computerized tags, clear resealable plastic bags, etc. Regardless of the type of job envelope in use, all of the required information should be entered including the customer's name, address, and telephone numbers, as well as the date received, a description of the article, and instructions. An estimate of the cost should be communicated and noted, and also the date when the job will be ready.

The words and sketches on the job envelope are important for several reasons. They confirm receipt and serve as an agreement between the shop and the customer. In the unlikely event of a complaint, the information on the envelope may establish the facts. The information will also guide the bench worker and enable him or her to locate the ring among a pile of similar items. So, take the time to do it right.

DESCRIPTION

Your description of the article should clearly state what you see upon examination of the item. Unless you are a trained gemologist, metallurgist, or appraiser, write only what you observe. Make no assumptions that you cannot back up. Without testing the gems and metals you cannot be sure what the jewelry

is composed of, and so, it would be unwise to assume that materials are precious, even if the ring is stamped and the customer tells you what the gems are. Entering incorrect information can be extremely costly. Stories abound of the well-meaning counter person who upon accepting a ring writes, "1 carat diamond: D flawless." The problem occurs when the owner returns for the merchandise and claims that the diamond in the ring now is not the one he or she gave you. Be safe. If you observe a yellow metal ring with round white brilliant-cut stones, then that is what you should write down. Here are some safe terms to use:

- Silver-colored metal ring
- Yellow metal ring
- White stones

If the item is stamped with a quality mark, note it on the envelope because that is a direct observation. It is not a fact that you are certain the ring is gold, but it is so marked. If the customer states the gem is a diamond, write down, "Customer identified stone as a diamond." The stone may or may not be a diamond, but it is a fact that the customer said so. Use your head and enter only your direct observations.

ADDING A SKETCH

A sketch should be included on the envelope, along with your notes. Make a simple but accurate sketch of the ring and its features, often on the back of the envelope (Figure P.3). This can be critical for clarification of the work to be done. In addition using a sketch can minimize the written description, especially if words with arrows are included. Indicate where the quality stamp is located in order to establish which view has been made. The sketch should support what is written down, and vice versa. Sketches take just a moment to make, but they are invaluable. Bench jewelers, like most artisans, often communicate best visually. "A picture is worth a thousand words," whereas words can be interpreted in different ways. If there is a language difference among the staff or if different terminology is used, a sketch should make things clear to all.

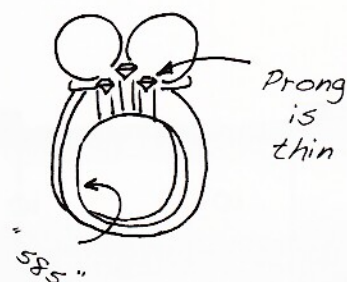


Figure P.3. A job envelope sketch



Figure P.4. Ring sizers used to measure fingers

MEASURING THE CUSTOMER'S FINGER SIZE

Use a standard set of ring sizers to find the size by trial and error (Figure P.4). Most provide rings in half-size increments, although quarter sizes and even eighth sizes can be estimated. For rings that are 5 mm or wider, use a set of wide ring sizers for greater accuracy. A proper fit means that the ring slides over the knuckle with a little friction and sits comfortably on the finger. It is not so loose that it spins around freely and not so tight that it pinches the skin around it. In reality, due to the great variation in human anatomy there are times when this goal cannot always be achieved.

Finger size can vary depending on the temperature, the humidity, the dryness of one's skin, and the time of day or month. You might ask the customer if the ring always fits the same way. If not, how does it feel now? This will help establish whether your measurement is reliable or if some adjustment needs to be made. If the customer has another ring that fits properly, you can use it as an example and measure its size. Knowing from experience that all sizers and mandrels within the establishment match, record your findings on the envelope.

MEASURING A RING'S SIZE

The size of every ring brought in for repair should be measured, whether or not the size is to be changed (Figure P.5). This can help avoid misunderstandings and provide the store with long term data, in case a loved one wants to purchase a surprise gift for your customer in the future. You will need an accurate ring mandrel or ring stick with the sizes marked in order to measure the ring. If the ring's shape is distorted, and easily correctable, try to round it before measuring the size. Slip the ring onto the mandrel and look at where the leading edge sits (the edge that is on the mandrel's larger size). Record your findings on the envelope. Remove the ring, reverse its direction and repeat. If there is a difference, note this. When determining the size of rings that are 5 mm or wider, read the size at the mid-point of the shank,

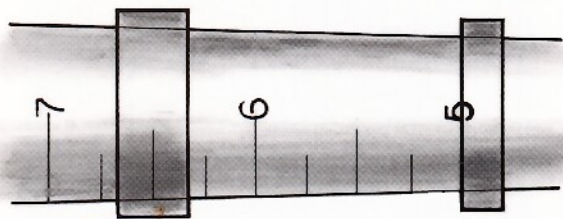


Figure P.5. When measuring a ring under 5 mm in width (right) read the mandrel at the leading edge: Size 5. For rings over 5 mm wide (left) read the mandrel at the center of the shank: Size 6 1/2.

not the leading edge. Note that specialized mandrels with a groove are available for measuring rings with large gems that protrude into the finger hole.

NON-ROUND RINGS

Not all rings are perfectly round; some are designed in another shape such as square or even triangular. If you are working with such a ring, slip it on the mandrel and then estimate the size, allowing for the gap, or use a soft flexible ring mandrel which fills in the gaps to give a more accurate measurement.

SHANK DIMENSIONS

Measure and record the thickness and width at the bottom of the shank opposite the top of the ring (Figure P.6). Show your measurement to the customer and explain that during sizing, a small reduction is expected. Depending on the specific job and the quality of craftsmanship, a loss of 5 to 10 percent is normal, although ideally the loss should be around 3 percent. Therefore a ring that measures 3 mm wide and 1.5 mm thick could come down as far as 2.7 mm x 1.35 mm, a reduction of 10 percent. If your shop delivers rings with a greater loss, check into it.

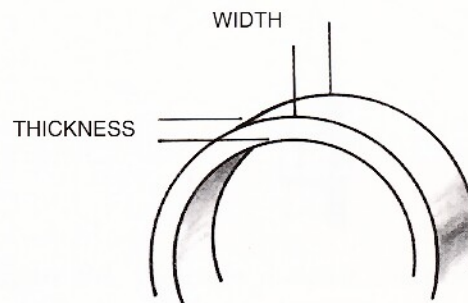


Figure P.6. Note the shank's thickness and width when accepting a job.

LOCATING PRIOR SEAMS

Ideally seams should be invisible, but that is rarely the case. Because each alloy and each solder has a different color, seams should be apparent upon inspection. Use a loupe if necessary. You may see a faint stripe of a slightly different color, which indicates a solder seam. You may see a line of small pits, a common but unacceptable result of overheating the solder. If no seam is visible and you suspect that there may be one, warm the unprotected shank for a second or two with a small hot oxidizing flame. If present, a seam will become visible after heating because different alloys (including solders) oxidize differently. Another method used to locate a seam on a gold ring is to put a drop of iodine on the shank. Use a 10 percent solution of nitric acid on platinum rings. Locating prior seams is necessary if you don't want

hot pieces of metal flying around during sizing. This can happen if you are unaware that the ring was worked on before.

A single seam means that the ring was sized down. Two seams mean the ring was sized up and the piece between the seams was added. The existence and location of previous seams will affect how you plan and execute the repair.

CHECKING THE ENVELOPE

Once you have studied the job envelope, compare it to the ring and the sketch. Examine the ring closely to determine independently if there are potential problems or inaccuracies in the envelope. Check the shank dimensions against what was noted, etc.

PRECIOUS METALS

Fine jewelry is composed of precious metals and gems. There are eight pure metals within this group.

- Gold
- Silver
- Platinum and related metals
 - Palladium
 - Iridium
 - Ruthenium
 - Rhodium
 - Osmium

None of these metals is commonly used in its pure elemental form, but instead each is alloyed with other metals for such reasons as cost, hardness, and color. Each of the precious metals and their alloys has its own unique characteristics. Heat conductivity is a physical characteristic that varies among the precious metals. However, in most ways they are all used similarly in jewelry applications.

HEAT CONDUCTION OF SILVER ALLOYS

Silver is the best conductor of heat. Anyone who has worked on a large piece of silver jewelry knows how

long it takes to heat in order to raise the temperature enough for the solder to flow (Figure P.7). As soon as you apply heat to one area, it is conducted away, raising the temperature elsewhere while the local temperature remains the same. When soldering silver, you must use a larger and more intense flame than you would on other metals.

HEAT CONDUCTION OF PLATINUM ALLOYS

On the other end of the spectrum, platinum is a poor conductor of heat (Figure P.8). Even though platinum requires extremely high temperatures for soldering and welding, it is possible to execute very localized repairs without heat loss. In fact, (this is not recommended) it is possible to hold the top of a platinum ring in one's fingers while welding the back of the shank, due to the fact that platinum has such a low thermal conductivity.

HEAT CONDUCTION OF GOLD ALLOYS

Gold alloys fall somewhere in between these two extremes so that less heat is transferred than when working with silver, and the heat stays more localized than platinum (Figure P.9).

SIZING PLATINUM RINGS

Unlike the other jewelry metals, it is often best to weld rather than solder ring shanks made with platinum. The exceptions to this are platinum/cobalt alloys which should be joined with 1700 solder and the Platinum S+ alloy which should be joined with 1500 solder. Neither of these alloys should be welded. However for most platinum alloys, welding is possible because of platinum's low heat transference and is preferable to soldering since it results in one solid piece of precisely the same metal without solder and without a visible seam. When welding platinum shanks, file a slight bevel or chamfer on both sides all around the seam. Using a piece of metal taken from the shank, roll it as thin as possible, (0.1 mm or less) and slide it into the seam, leaving about 1 mm excess all around. As in all platinum work, heat this welding

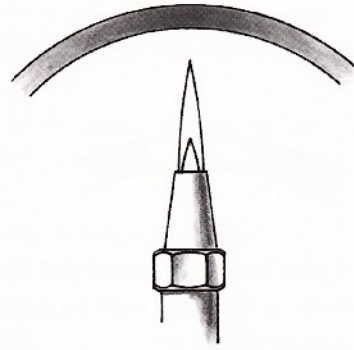


Figure P.7. Silver is the best conductor of heat with a thermal conductivity of 425 W/m K at 0° to 100°C. (Watts per meter degree Kelvin).

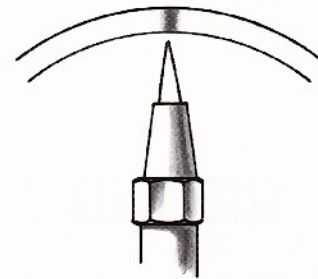


Figure P.8. Platinum is a poor conductor of heat with a thermal conductivity of 73 W/m K at 0° to 100°C.

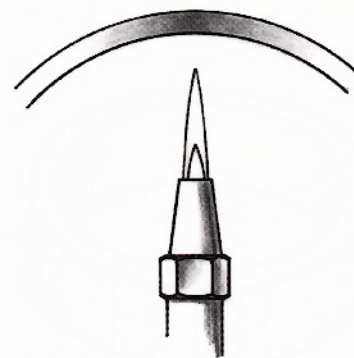


Figure P.9. Gold is a moderate conductor of heat with a thermal conductivity of 315.5 W/m K at 0° to 100°C.



Figure P.10. A platinum ring, ready for welding with a small sliver of the same metal held by tension between the beveled corners at the seam

stock directly until it flows. During welding, the added metal rejoins the shank and fills in the bevels for added strength (Figure P.10).

When welding is not possible, platinum may also be soldered. Roll the platinum solder as thin as possible and trim a piece to match the cross section of the seam. Do not bevel the shank when soldering (as in welding) and use neither flux nor firecoat, as both can contaminate the platinum. Solder can be held in place by tension, gravity or with a little saliva. After soldering, hide the seam by rubbing across it with a polished tungsten burnisher.

FIRECOATING

To preserve a polished finish on silver or gold during heating, firecoat the ring with boric acid. Do not firecoat platinum alloys. Dip the ring in a thick slurry of powdered boric acid in alcohol or coat the ring with Prip's flux (commercially available or prepared in the workshop). Place the ring on a charcoal block or in a pair of tweezers and ignite the alcohol leaving a coating of boric acid on the surface. Flux the seam and solder. When heated, boric acid glazes the surface before the solder flows. This glass-like coating seals the metal so that when the solder flows it is under a protective cover of glass, which eliminates most oxidation. The pickle will remove firecoating along with trapped oxidation, to reveal the original polished finish again.

SOLDER

If a previous seam exists and you are not removing it during sizing, you should use a grade of solder with a lower temperature to prevent the prior seam from flowing. Unless you did the work and kept notes, you usually do not know which solder was used. Therefore, you should use a medium or easy solder.

HOW MUCH TO ADD OR REMOVE

One ring size is equal to 2.54 mm, or one tenth of an inch. For the sake of simplicity, 2.5 mm is used.

In actuality, the precise measurement depends on the thickness of the material, but this small difference is rarely important. If the ring is going up or down one size, 2.5 mm is either removed or added.

Partial sizes mean that a portion of the 2.5 mm is measured (Figure P.11). If the instructions say, "Reduce the size from 6½ to 5¼" then 3.1 mm is removed. The same amount would be added if the instructions say to "Increase size from 5¼ to 6½."

TRANSFERRING MEASUREMENTS

Set a pair of dividers on the amount to be added or removed. This can be done by adjusting the points against the small sizing gauge on the side of your ring mandrel (if you have one), or on a gauge mounted on your bench (Figure P.12). Estimate partial sizes. Or, you can set the points at an opening of 2.5 mm per size against a metric ruler, again estimating partial sizes if necessary. With the dividers set at the desired amount, place both points on the shank (or sizing stock) and draw them across, making two parallel lines. The metal between the marks is the amount to be removed or added.

TRANSFERRING MULTIPLE MEASUREMENTS

Transferring measurements of less than two sizes is a simple matter (Figure P.13). But beyond that there is a problem because your measurement on a flat ruler is inaccurate when transferred to the curved surface of a ring shank. The distortion increases rapidly as the measurement increases. Therefore, when measuring more than two sizes, it is a good idea to do it incrementally. To do this, set the dividers on one size (2.5 mm) and mark the shank in one-size increments, side by side, plus any partial sizes.

MINIMIZING SEAMS AND SECTIONS

The goal is to minimize the number of seams and pieces in the shank. Ideally, the ring should have one seam if sized down and two with a section in between, if sized up. If there are more seams, or more

Example: Reduce the size from 6½ to 5¼

Convert to decimals and subtract:
size 6.5 – size 5.25 = 1.25 sizes

Multiply by 2.5 mm per size:
1.25 X 2.5 mm = 3.125 mm

Round off:
3.125 mm becomes 3.1 mm

Therefore remove 3.1 mm from the shank.

Figure P.11. Calculation for sizing a ring down 1¼ sizes

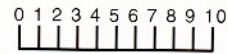


Figure P.12. Ring size gauge at 100 percent. One size is equal to 1/10 of an inch or exactly 2.54 mm.

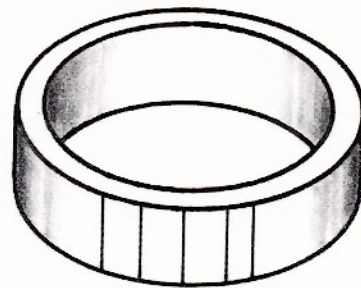


Figure P.13. A ring marked 3 times with a full-size and then one half-size more

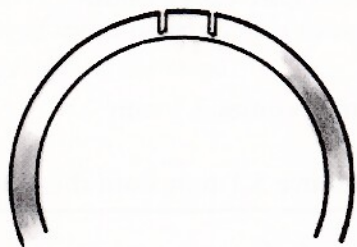


Figure P.14. Sawing most of the way while leaving a bridge for support

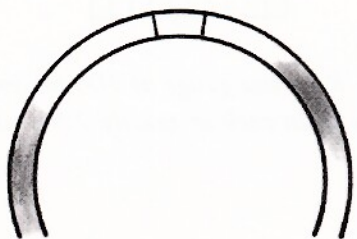


Figure P.15. Cuts angled inward when sizing down

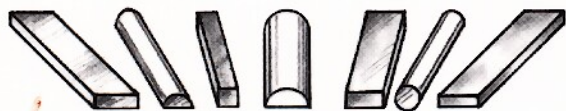


Figure P.16. Sizing stock comes in a range of shapes, sizes, qualities and colors.

than one insert of metal, problems can arise. If the ring was sized down previously, leaving one seam, remove it either by sawing on or around it. When sizing down, cut out prior seams and inserts if possible. By doing this you avoid the bench jeweler's dreaded initiation: having a hot shank fly to pieces when soldering.

LEAVING A BRIDGE WHEN SAWING

When making two cuts to size a ring down, it is often easier and provides more stability to cut partially through each mark, alternating between the two (Figure P.14). This leaves a little bridge for support until both cuts are nearly complete. Continue alternately sawing the two cuts until the piece is removed.

THE CUTTING ANGLE

When sizing a ring down, make the cuts slightly smaller on the inside, so that they converge at the center of the finger hole (Figure P.15). This will eliminate all or most of the filing to align the two ends before soldering.

UNDERSIZING

Whether sizing down or up it is often better to make your calculations to leave the ring just a bit too small. This allows you to apply more force when rounding the ring to reach the proper size.

SIZING STOCK

Stock for sizing rings is available from suppliers in a wide range of karats, colors, shapes and dimensions (Figure P.16). Choose a piece of sizing stock which best matches the characteristics of the ring. The stock should be slightly wider and thicker than the shank. Be sure that the metal you add is clean; new material is preferable, either from a supplier or from metal that you have alloyed yourself. Reusing a piece of scrap that came out of another ring can be a gamble because you cannot be sure of the composition.