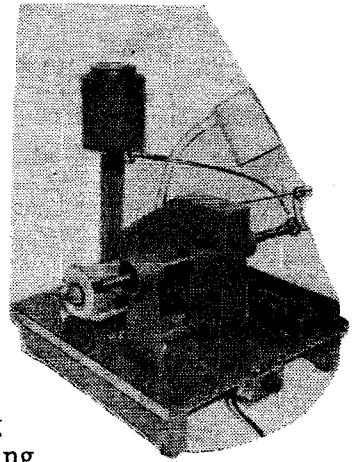


INSTRUCTIONS FOR THE COVINGTON GLASS ENGRAVER

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INSTRUCTIONS FOR THE COVINGTON GLASS ENGRAVER

INTRODUCTION

The information in this instruction is brief and basic. If at all possible, the beginner should work under the supervision of a skilled artisan or take a class under a trained instructor.

Engraving is the actual cutting of a design into the glass surface, similar to painting a picture on canvas. It is not usually intended to enhance the play of light.

Brilliant work changes the surface of glass to enhance the play of light and give additional sparkle or texture.

DESCRIPTION

The GLASS ENGRAVER is a two-station arbor designed for engraving and brilliant work with component parts mounted on a Lam-I-Cushion base. Heavy duty ball bearings are neoprene sealed and greased for life. Speed control allows shaft rotation to vary between 0 and 1600 RPM.

A half gallon drip can with adjustable water spout provides water to both work stations (wheels). Two water pans catch drip waste. Detachable leather tongue trails engraving wheel. Mounted hand control has ten speed settings.

The glass engraver comes complete with $\frac{1}{2}$ h.p. motor, belt guard, speed control, instructions and guarantee. Size: 36"L X 24"W X 24"H. Shipping weight, 50 lbs.

INSTALLATION

SAFETY: Before plugging the unit into your electrical supply, read the COVINGTON Safety Demand Sheet.

LEVEL: The vertical unit should be located on a sturdy, level table to avoid vibration.

VIBRATION: COVINGTON units delivered are checked for vibration before the machine leaves the factory. Do NOT use the machine if the wheels do not run properly. Contact COVINGTON Engineering for instructions.

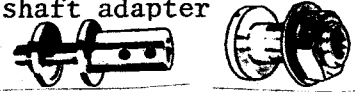
AFTER ACCEPTING THE MACHINE, IT IS THE CUSTOMER'S RESPONSIBILITY FOR MAINTAINING THE WHEEL BALANCE.

ROTATION: The rotation of the shaft turns in the opposite direction to the threaded ends or the adapter threads. This is necessary to prevent the chuck or nuts from unwinding and flying off. Jacobs chuck with 3/8"-24 R.H. thread is secured to the right end of the shaft.

INSTALLATION CON'T.

Mandrels: It is important to install wheels properly. If small wheels are used with a mandrel, the securing head must have a right hand thread and the wheel with mandrel firmly secured in the chuck. If the wheel is "out of round", it must be dressed. An "out of round" wheel can NOT be balanced.

Shaft Adapters: Four and six inch wheels are secured to the shaft by using large shaft adapter SA1035R X 5/8" (right side) and small shaft adapter SA1037L X 1/2" (left side).



Diamond wheels: Sharpen wheel by reversing its direction of rotation periodically (turn it around on the shaft). Use more water and flush wheel clean. Some suppliers recommend dressing wheel with coarse silicon carbide stick and flushing away all grit.

Silicon Carbide and Aluminum Oxide Wheels: The wheel will wear with use, although not rapidly. If the surface becomes grooved or wavy, it may be dressed by using a coarse silicon carbide dressing stick. Use continuous water spray while dressing. Smooth surface with 100 grit silicon carbide sandpaper over a wood block. A very practical method is to use two silicon carbide dressing sticks, 60 grit for shaping and 220 grit for finishing.

PROFILES OF ALUMINUM OXIDE WHEELS

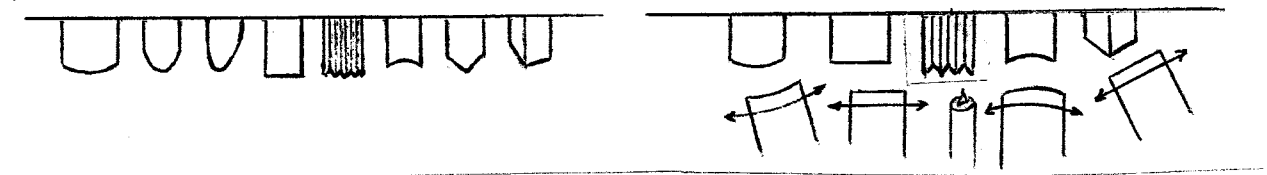
Trueing, dressing and shaping of wheels is necessary to make or maintain the proper profile of the wheel rim. A 60-80 grit silicon carbide dressing stick will quickly shape the wheel and a finer 220 grit will smooth the dressed area. A variety of other dresser types are available such as single point and "T" bar diamond, spur wheels, and files.

Rules to Remember When Dressing Wheels:

1. Caution: Wear safety glasses.
2. Don't even try to dress a wheel on a vibrating arbor.
3. Improvise a frame or bridge-rest of wood from which to control the tool.
4. Set the machine at medium speed.
5. Start the water feed.
6. Hold the dressing tool firmly on the rest and apply it to the running wheel at or just below center (wheel is turning toward the operator and down). Apply pressure very slowly. Continue until the worst of the obvious unevenness is gone.
7. Increase the speed and continue until the wheel runs smoothly concentric.
8. Shape the wheel to the appropriate profile.

Profiles of Glass Cutting Wheels

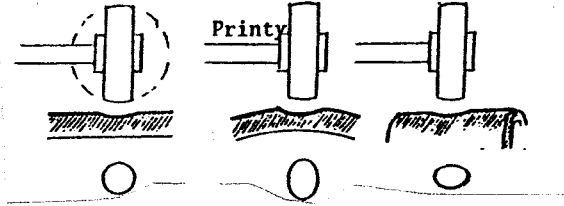
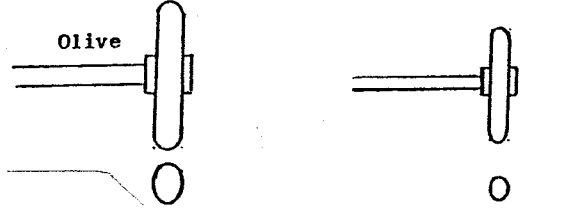
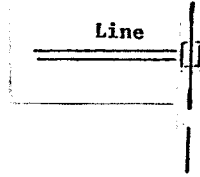
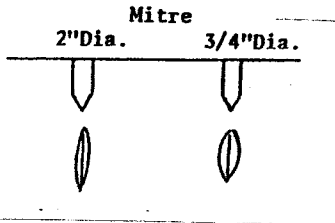
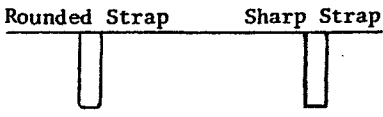
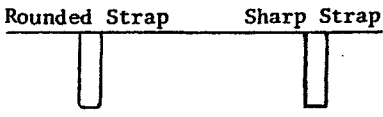
Arrows indicate direction and action of dressing tool.



PROFILES OF CORK AND FELT WHEELS

Cork and felt wheels are usually dressed in the same manner as a ALO wheel except that the wheel is dressed dry. When dressing, wear safety glasses to protect your eyes and a mask to protect your lungs from debris in the air.

USE OF WHEELS

Profile	Type	Size			Mandrel	Type of Cut
		Dia	Wid	Bore		
Printy	ALO	5/8	3/16	1/8	Yes	
<p>The formation of a printy (from left to right): cut on a flat surface; along the axis of a cylindrical glass; transverse to the axis.</p>						
Olive	ALO	1	3/16	1/8	Yes	
	DIA	3/4	1/8		Yes	
	DIA	1/2	1/8		Yes	
	DIA	3/8	1/8		Yes	
Line	DIA	3/4	3mm		Yes	
Mitre	ALO	2	1/8	1/4	Yes	
	ALO	3/4	1/8	1/8	Yes	
Rounded Strap	ALO	2	1/8	1/4	Yes	
	ALO	1 1/2	1/8	1/4	Yes	
Sharp Strap	ALO	2	1/8	1/4	Yes	
	ALO	1 1/2	1/8	1/4	Yes	

OPERATION

Wheels turn toward the operator and down. The work piece is held UNDER the wheel for cutting. Right end of the shaft has 3/8"-24 R.H. threads for a Jacob's chuck attachment. To avoid nut spin-off, adapters for the right end must have right hand threads; left end, left hand threads. Most engraving is done with the work piece under the wheel.

If cutting requires the work piece to be held ABOVE the wheel, the operator must work standing behind the machine. From this location the cutting wheels will be turning toward the operator and up.

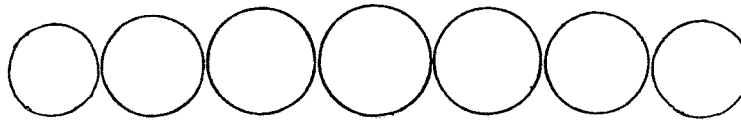
Before you work glass, see if there are any sharp edges. These should be removed before proceeding. Watch the wheel for a minute or two before using it to see that the spin is steady. Make sure you have a smooth-running wheel.

To start engraving, press the glass slowly but firmly onto the turning wheel and allow the wheel to get a good bite into the glass before you move it around. This is true for both the sharp and rounded grinding stones. If you try to move the glass before the wheel has effectively taken hold, it will skid. Once the stone has a good bite into the glass, you can slowly guide the glass along the path you want it to take.

BASIC CUTS, MATTING & POLISHING

Chains: Chains of printies can be produced vertically or horizontally, in straight lines or curved. Engrave each subsequent printy in the chain as evenly as possible so that each one just touches the next, neither more or less.

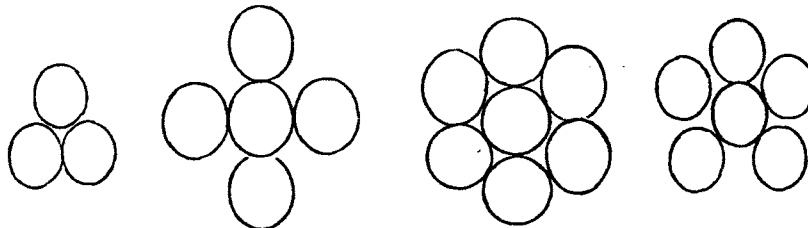
A Chain of Printies



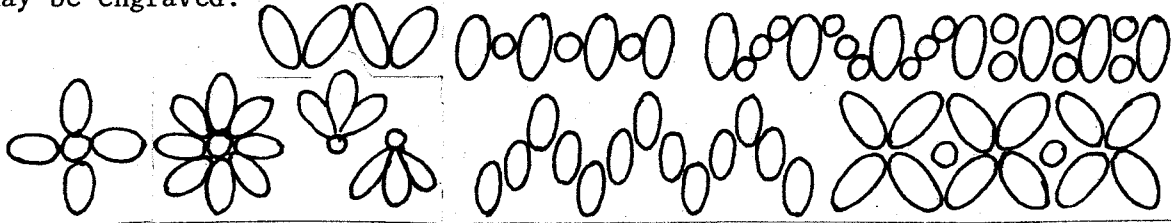
Rosettes: A six-petalled rosette is a regular geometric figure, so all the cuts should fit snugly together. Proceed in the order: center, top, bottom. Then fill in the gaps.

The way to achieve a fine-petalled rosette shape is either to bite into the center printy or to start with a smaller center. Proceed in the order: center, twelve o'clock, twenty minutes to, and twelve minutes past the hour. Then cautiously fill in the remainder. All such work should be engraved free hand.

Rosettes



Olives & Printies in Combination: Cut the center printy first. Follow with four even olives at right angles to each other. Fill in the remaining olives as evenly as possible to complete a neat rosette, with each component smoothly engraved. The combinations illustrated by no means exhaust the patterns which may be engraved.



Straight Lines: To get the feel of the tool, cut a series of single thin lines, long and short, in one movement of the glass. Continue the exercise by engraving several lines in parallel and equidistant.



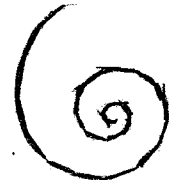
Keeping the glass against the wheel, engrave a regular four and eight-pointed star made up of very short intersecting lines. Some difficulty must be expected in accurately fixing the center of the intersecting lines. Continue producing the stars until several of approximately equal size and quality have been produced.



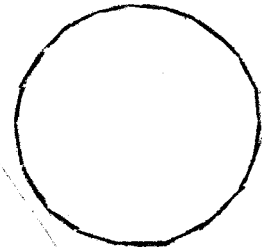
Mark out a series of evenly spaced intersecting zig-zags. Cut as accurately as possible to this pattern. Make sure the thin lines just meet and do not extend too far. Fill in the spaces with parallel lines.



Curved Lines: The principal upon which a curved line is based - the wheel should be approximately the same size as the circle it cuts. The closed small spiral is made up from a series of segments which are subsequently smoothed out.

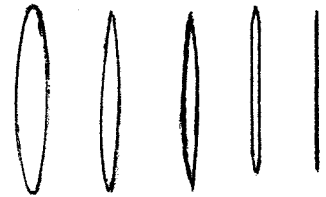


In principle, a wheel cannot correctly cut the arc of a circle smaller than its diameter. In practice, the best results are obtained when the cutting wheel is a little smaller than the circle it is attempting to cut.

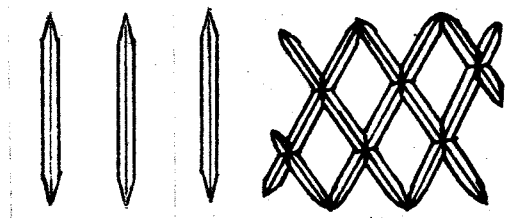
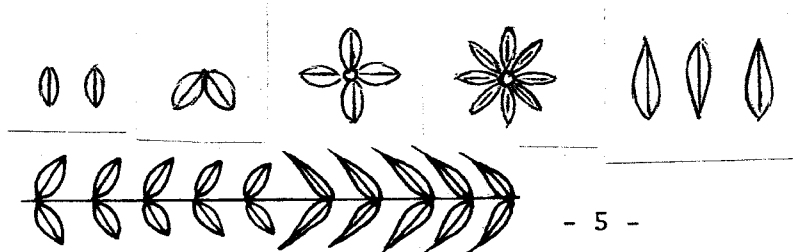


When the engraver feels that he has mastered tight curves, the next task in order of difficulty would be to complete circles.

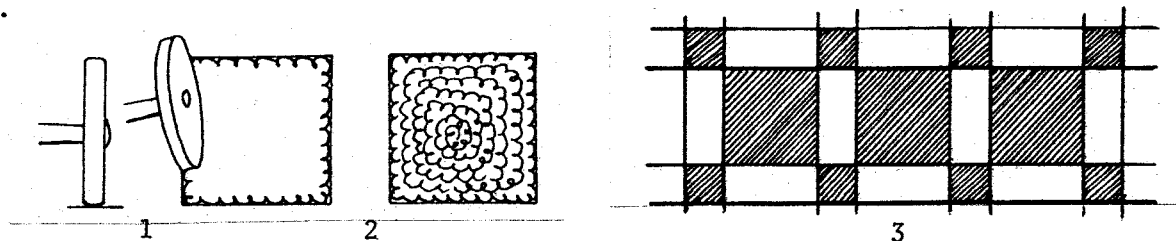
Mitre Lines: Cuts from different widths of mitre wheels showing the point at which the cut made by the thinnest mitre becomes indistinguishable from a line cut.



Some Simple Combinations of the Mitre Cut:



Matting: Many fine effects may be obtained by grinding selected areas of glass to a white satin surface known as matting. An even, white matt is very attractive. Illustrated below is (1) the rounded strap profile, (2) the method of filling in an area and (3) the exercise linework pattern to be matted.

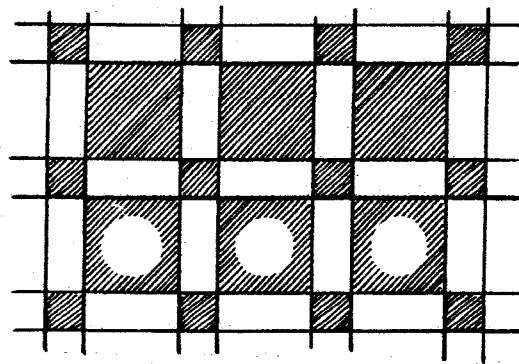


In general, the finer the abrasive, the finer the matt. The speed should be extremely slow. Matting requires a slow, soft, abrasive and brushing movement over the glass surface. Keep the wheel profile as square to the glass surface as possible and, using the slightest pressure, just abrade the surface. The wheel should never remain stationary, but must move continuously over the surface with a slight rotatory motion, matting the area as methodically as possible.

Polishing: Polishing wheels may be made up of various materials such as lead, wood, rubber, cork or felt. Usually the polishing wheel will match the size and profile of the abrasive wheel that made the cut.

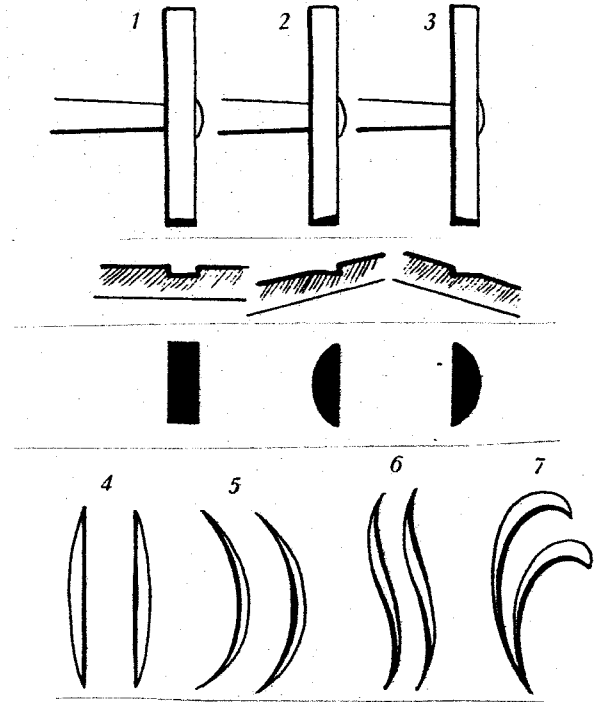
The Polishing Process: Mix 2F or 4F pumice with water. The speed of the wheel should be in the middle range of about 800 - 1000 rpm. (1) Charge the wheel and enter the printy or olive in the same direction as it was originally cut. (2) Using gentle pressure, roll the wheel slightly in the cut. This will ensure even polishing and maintain the profile of the wheel. (3) Recharge the wheel as the polishing power diminishes. This may have to be repeated two or three times. Take care to make a clean re-entry of the wheel. (4) Complete the polishing by allowing the pumice mix to dry out gradually on the running wheel, gently rolling all the time. By the time the powder is dry, the printy should be sharp and brilliant. (5) If a more polished surface is desired, repeat the process using cerium oxide as a final polish.

Polishing within a Matt Area: Take a piece of glass already matted in a pattern of neat squares and cut a printy in the center of each square. Polish these printies to a sharp brilliant contrast with the surrounding matt. The slightest slip will polish the surrounding matt and impair the effect. The result of a clear polished lens against the white matt is really regarding.



Edge Cuts: A sharp strap wheel, which has a square, flat, sharp profile can be used successfully to cut half moons, segments and crescents. By directing the cut from the sharp edge gradually over to the full flat of the profile, a combination of shapes can be developed. It is a detail making tool.

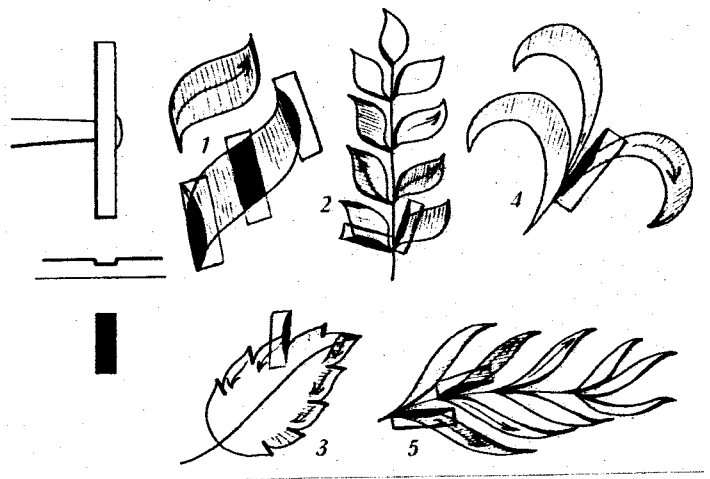
1. The shape and profile of the sharp strap and its vertical cut.
2. The shape of cut from the right hand edge of the wheel.
3. The shape from the left hand edge of the wheel (half moon).
4. The segment cut (elongated half moon).
5. The crescent cut.
6. Reversed crescent cut.
7. A widely used decorative variation of the crescent edge cut.



Slipping: When a strap wheel is used so that the cut is started on one profile edge and then allowed to slip out and move forward to the other edge, a shallow, flowing, leaf shape is produced.

The strap wheel of one size or another, is an important tool. It is used for lettering, refinement of sculptured forms, and all kinds of detail. Below are shapes produced by controlled slipping with a sharp strap wheel.

1. An enlarged diagram giving the position of the wheel and the direction of the cut for a shallow slip-leaf shape.
2. The different starting position and direction for a similar shape.
3. Slipping in serrations.
- 4 & 5. Alternate formations.



WHEEL ENGRAVED LETTERING

Use of line & strap wheels: Though very simple in structure, it is important that the individual cuts be accurately positioned, of equal weight, regular and precise. Thus the wheels must be very sharp and as large as possible; that is, large enough for the arc of the cut to allow a little manoeuvring at the end of the stroke, but not so small as to wander up and down the length.

A much better method is obtained by first engraving the running outline of the lettering in one single cut line, subsequently adding the stronger strokes to the letters as they should apply. The smaller line wheels necessary for the continuous line must be fitted to this exacting task. Each wheel must be absolutely sharp and not larger in diameter than the section of curve it is attempting to engrave naturally; and where the line is straight or the curve slight, a larger wheel should be used. Each curve or part of a curve must be patiently built up; entering and reentering the line wheel as it follows each individual letter. There is not much room for error.

CUT GLASS & BRILLIANT CUTTING

Position and Direction of Cut: Glass cutting is different from other engraving in that the glass piece is worked towards the top of the wheel instead of the bottom. The cutting is almost always made against the push of the wheel as it turns towards the operator and up.

Brilliant work that enhances the surface texture of the glass will give added sparkle to the finished piece. Some workers do not polish because mini-bevels are so fine, the effect may not be worth the added effort of polishing.

HELPFUL HINTS

Notching: Notching can be done with the pointed or the rounded wheel by pressing the glass briefly against the wheel. The shape of the notch depends on which surface you use and how long and how much pressure you apply to the glass. Notching is usually done on a polished bevel and appears as a sort of slice when the pointed wheel is used. When the rounded wheel is used, the shape of each notch is oval and is called beading.

Beading: A bead is the oval notch produced by the rounded wheel. It is not readily apparent as a single notch. Usually these shapes are done in multiples. Notching and beading can be intermixed in a glass piece.

Notching and beading intermixed



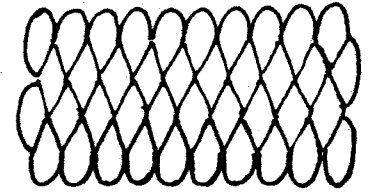
HELPFUL HINTS CON'T.

Zipper Cutting: Zipper cutting is a string of notches done with the pointed wheel in a series of quick dashes. A string of them will look like one side of a zipper. Notching and zipper cutting work are usually polished with rock hard felt. Ordinary felt will not maintain a pointed shape.

ZIPPER CUTTING



Honeycombing: In honeycombing, usually the entire surface of the glass is used. Use the rounded wheel and, starting in the center of the glass, make an entire row of little ovals. Then go below or above it to make another row. Make this row touch those on either side of the first row. This squares off the entire row. Stagger each row to the neighboring one like brickwork. This will give you a six-sided shape of a honeycomb. Each mark is then polished with the rounded felt wheel to keep the shape. You must polish each and every oval on the wheel. Honeycombing is usually done on the glass before it has been beveled.



ERASING AN ERROR

Wheel Grinding: With a 320 grit ALO wheel 3" or larger in diameter, using medium slow speed, gradually remove the glass from the unwanted spot with a travelling, circular movement. Avoid doing too much to start with until the depth of the engraving has been assessed. Move the tool further and further out so that no early undue hollow is allowed to form. Continue, regardless of the surrounding engraving, until the last part of the error has been removed and the surface brought as nearly as possible to the original curvature of the glass. Even the removal of a small error makes abrading over the surrounding area necessary.

Hand Grinding: Make a suitable size hand tool by folding 600 grit wet/dry silicon carbide sandpaper around a small wood block. Wash the glass surface and remove any trace of grit left by the grinding wheel. Manually grind the reworked area using lighter pressure near the outer edges. Check the grinding progress frequently.

Pumice Polishing: With 3F pumice/water paste on a 6" cork wheel using slow speed, firmly move the wheel at every angle to avoid directional polishing streaks. Apply the wheel in short, sharp bursts in order to keep the friction heat down, for the replenishment of cold abrasive on a localized hot spot could easily cause a fracture.

Felt Polishing: Clean the work bench and wheel guard of the wheel. Wash your hands and the glass workpiece. Change any previously used wipers for clean ones. All polishing wheels and cerium oxide paste should be kept well away from the other equipment or abrasives. The smallest particle of unwanted grit is a menace, and if any should become embedded on the felt wheel, the edge will need to be trimmed back.

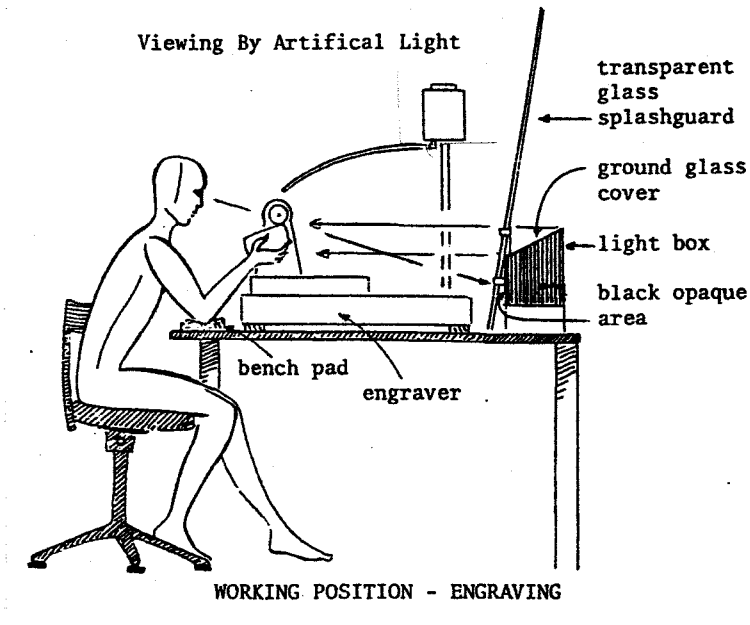
Using cerium oxide/water paste on a 4-6" felt wheel at slow speed, repeat the polishing process described on page 6.

LIGHTING

Good daylight is essential. Usually this can be accomplished by positioning the engraver near a window. The light can be controlled by placing a semi-transparent blind over the window.

Caution: All glass should be kept out of direct sunlight.

The mounted flexible Moffet lamp can be adjusted to provide close, direct light. Supplementary artificial light is usually necessary. Fluorescent lighting at ceiling height may provide shadowless general illumination; but for low level concentrated engraving, direct or shaded light is better.



WORKING POSITIONS

Engraving: The main action of wheel engraving depends on the manipulation of the hands and forearms with the elbows resting on a firm support (bench pads). Work is performed from the sitting position with the work piece under the wheel. The rotation of the wheel is toward the operator and down.

Cut Glass & Brilliant Cutting: The glass piece is worked toward the top of the wheel. The cutting is almost always made against the push of the wheel as it turns toward the operator and up. This type of cutting requires the worker to stand behind the wheel (facing from back to front).

WATER CONTROL

The flow of water is controlled by a valve under the water can. For engraving, a leather tongue trailing end can be positioned just forward of the top of the revolving wheel. For other types of cutting, an adjustable leather shield can be positioned behind the wheel. The drip pan below will catch much of the waste. The leather will last longer if impregnated with oil.

