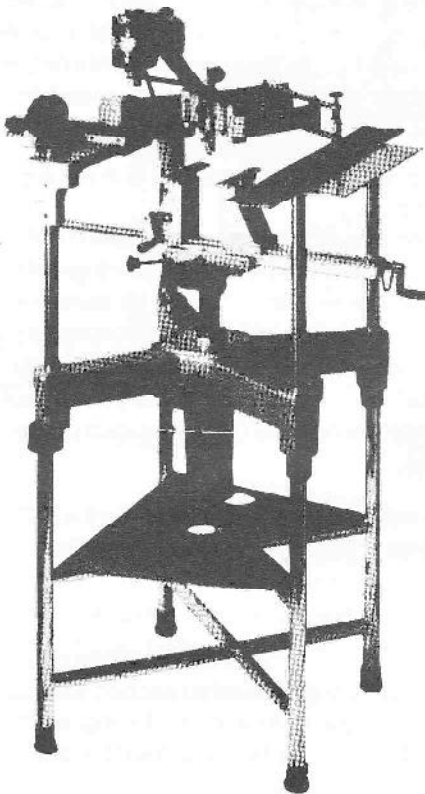
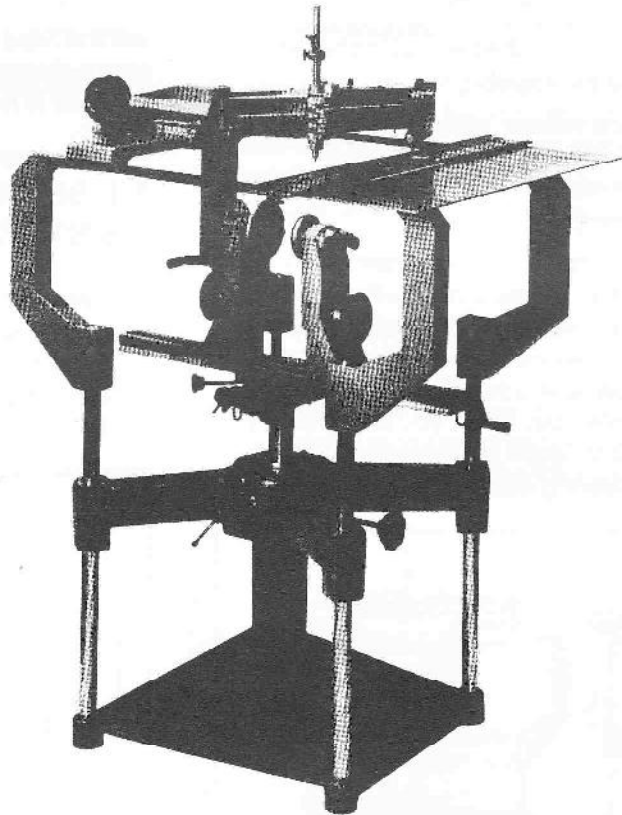


ITX-L/GTX-L



ITX-3/GTX-3



OPERATING INSTRUCTIONS

1. INTRODUCTION

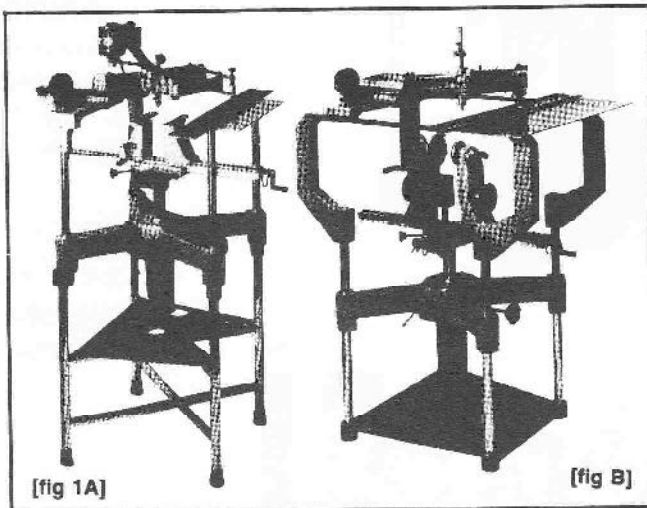
Congratulations on your new purchase! The newest additions to the family of Engravographs, Models ITX-L/ GTX-L (Fig. 1A) and ITX-3/GTX-3 (Fig. B), will give you vast opportunities to enter and succeed in many fields of engraving.

This instruction booklet applies only to the Hermes Models ITX-L or ITX-3 (equipped for rotary engraving, which is used on plastics, metals and other materials where a deep, routed-out cut is desired) and to Models GTX-L or GTX-3 (equipped for diamond-drag engraving, a process used on jewelry, trophy plates, precious metals and metal cups and bowls to give the engraving the appearance of hand-engraving). It is easy to equip your machine for both types of engraving — just consult the *New Hermes Machines & Accessories Catalog*.

This instruction manual will guide you through the detailed operations of these machines. Simply remember that whether you are using rotating or diamond equipment, the engraving process consists of the following basic steps:

1. Insert brass master copy type into copy-holding slides.
2. Position and lock item to be engraved into the work-holding vise.
3. Adjust the size of the finished engraving by setting the ratios on the pantograph.
4. Trace through the master letters, guiding with the stylus in one hand while depressing the engraving tool to the item with the other hand. Engraving is that simple.

If you have any question about operating your machine, contact your New Hermes Sales Representative or your New Hermes Branch Office. New Hermes, with over 45 years of experience in the engraving business can offer you valuable advice, and our customer Service Representatives can direct you to the proper accessory equipment for each engraving set-up. If necessary, our engineering department and machine



shop can also custom-design holding jigs, cutters, master templates or any other equipment to help you complete a special job.

2. GETTING STARTED:

Machines are shipped carefully packaged and partially assembled. When you receive your machine, check carefully for any damage that might have occurred during shipment. If you find any damage, particularly on the outside of the carton which contains your machine, immediately notify the carrier who delivered the equipment as well as the New Hermes Branch Office that shipped the machine.

Check all standard and accessory equipment ordered against the packing list. Inspect all packing material carefully before discarding. Many parts or components necessary for the operations of the machine are packed in separate envelopes within the main carton.

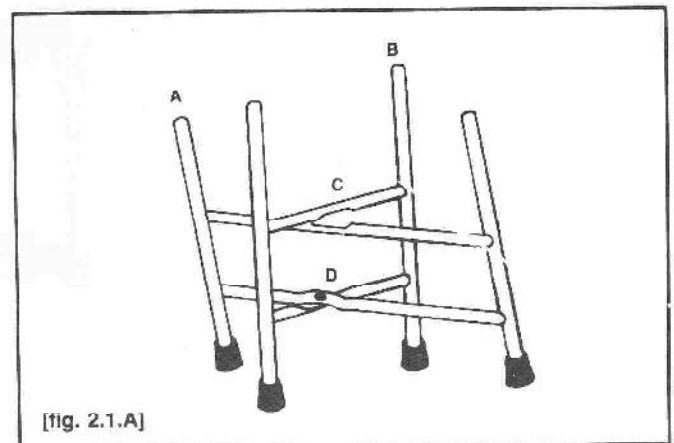
Note: Standard and Additional equipment subject to change without notice.

Set the machine on a level surface, with ample room to allow for back and forth movement of the pantograph. If you ordered the machine with a motor, be sure the machine is placed near a GROUNDED 115 receptacle.

To install the machine and prepare for engraving, you will first need to install the machine stand, the pantograph assembly and the motor assembly (the latter for models ITX-L or ITX-3 only).

2.1 SETTING UP THE MACHINE ON ITS STAND

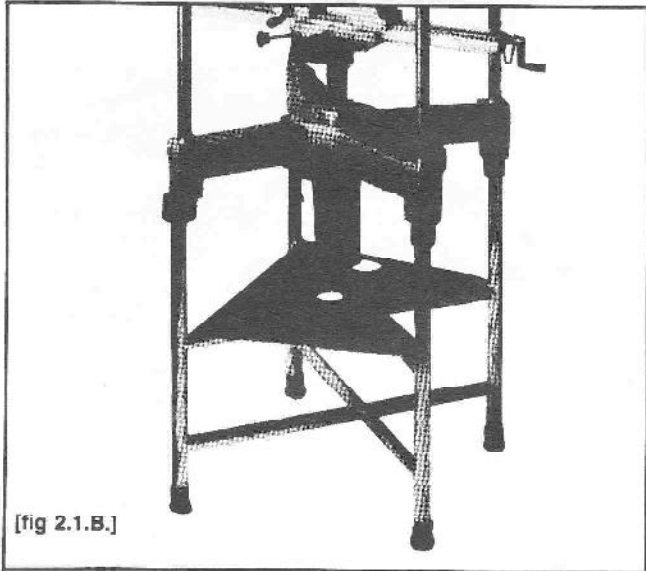
1. Refer to machine assembly instructions. Place one section of the stand through the other section with the recessed part of bars (A) and (B) facing each other (see figure 2.1.A). Give half a turn so that the holes line up.



2. Insert bolts (C) and (D) from top. **NOTE:** tighten nuts snugly but not tightly until the machine has been

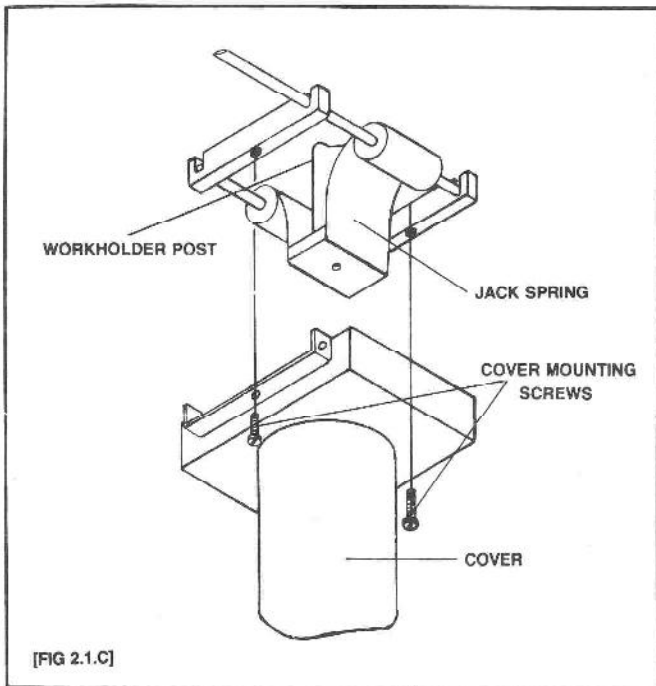
placed into the stand. When the stand is assembled, the front posts should be approximately 13.5" apart and the rear posts 18" apart.

- Place the machine into the stand so that the machine legs fit into the stand posts. Should you have difficulties installing the machine on the stand, contact your New Hermes Representative. Tighten bolts (C) and (D) securely.



[fig 2.1.B.]

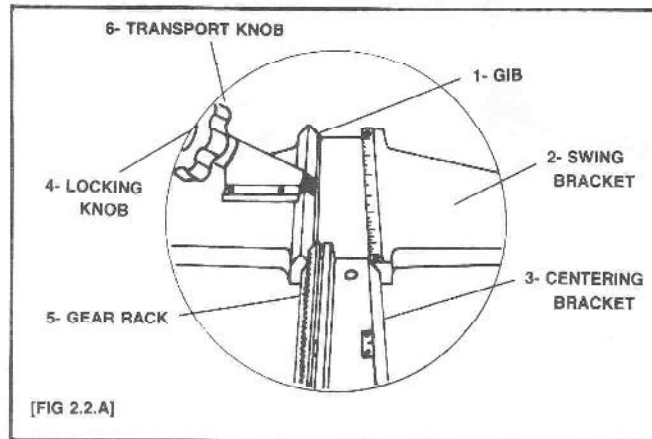
- Place storage shelves on stand as shown on Figure 2.1.B.
- Once the machine is on the stand, it is necessary to install the cover for the base of the workholding vise jack. Slide the cover from the bottom up around the jack spring and secure the cover in place with the two screws, as shown in Figure 2.1.C.



[FIG 2.1.C]

2.2 INSTALLING THE PANTOGRAPH ASSEMBLY

The pantograph assembly comes with the centering bracket attached and gib mounted to the swing bracket. (see figure 2.2.A).



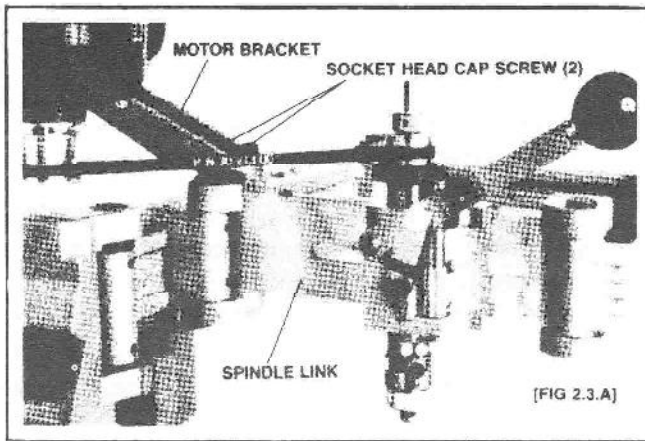
[FIG 2.2.A]

- Position the gib (1) onto the side of the swing bracket (2) so that the locating holes of the gib sit flush against the set screws of the swing bracket. Ensure that the small knob located inside the large knob that controls the drive gear is loose.
- Insert the centering bracket (3) into the swing bracket. The gib is then correctly positioned between the swing bracket and the centering bracket, placing even pressure on the centering bracket when locked in place.
- Slide the centering bracket until it reaches the drive gear. Turn the large knob while pushing the centering bracket until the drive gear catches the gear rack (5).
- Using the large transport knob (6), slide the centering bracket all the way into place. Tighten the small locking knob (4), securing the centering bracket into place.

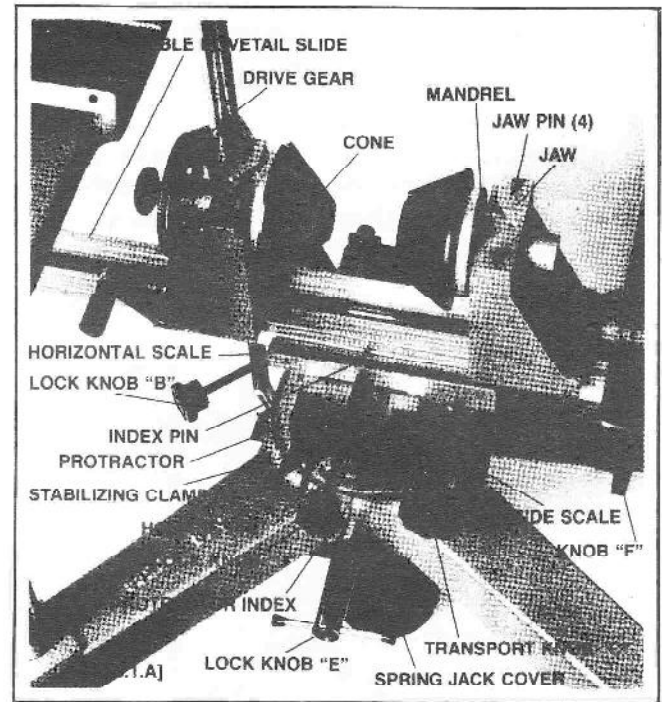
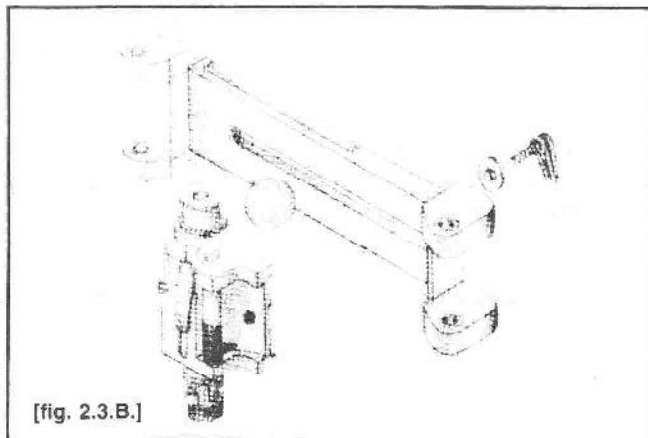
2.3 INSTALLING THE MOTOR AND BRACKET ASSEMBLY (ITX-L or ITX-3)

To mount the motor, insert the two socket head cap screws through the motor bracket holes and secure the motor bracket onto the pantograph, tightening the screws with the Allen key provided in the kit (see Figure 2.3.A.).

Mount the rotating spindle on the spindle link of the pantograph (see paragraph 3.2 for the terminology of the various pantograph parts), locking it into position with the lever screw and washer, as shown on figure 2.3.B. Position the drive belt connecting the motor pulley to the spindle pulley.



If you have a GTX-L or GTX-3 Model, simply install the diamond assembly instead of the rotating spindle as shown on Figure 2.3.B.



To move vertically (forward-backward) (See figure 3.1.A.): Loosen Lock-Knob "D" and turn Transport Knob "C". When position is reached, retighten Knob "D".

To move horizontally: Loosen Knob "B", and slide workholder to the right or left. Retighten Knob "B".

To move up and down: Loosen Lock-Knob "E". Turn Knob "F" to raise or lower the vise. Tighten Lock Knob "E".

To turn workholder around: Loosen Lock-Knob "E" until the workholder swivels freely. Loosen Lock Knob "D" and move workholder toward the back so that the Crank Handle "A" can clear the front column. Rotate the vise slightly then move it toward the front (the crank handle "A" is now outside the front column) until the double dovetail clears the rear column. Move the vise into position and tighten lock knobs "E" and "D".

Note: the shaft of the workholder is machined to give an automatic and precise positioning at 0 and 90 degrees. The protractor and index are therefore not necessary to record these positions.

To tilt the vise: loosen the four stabilizing clamps and remove the holding pin. Incline vise as desired and tighten the four stabilizing clamps. The holding pin is used only to refer back to the flat, horizontal position.

Quick release jaws (models ITX-3 and GTX-3 only): to open, remove the jaw holding pins (1 for each jaw), loosen the lever screws and pull the jaws in and out (see figure 3.1.1.A). In this position, the jaws operate independently from the workholder lead screw and crank handle, and the item is secured in place only by tightening the jaws with the lever screws. To operate the jaws with the lead screw and crank handle, slide each jaw until the red mark on the brass block (lead screw nut) appears through the hole at the base of the jaw. Position the jaw holding pin in place.

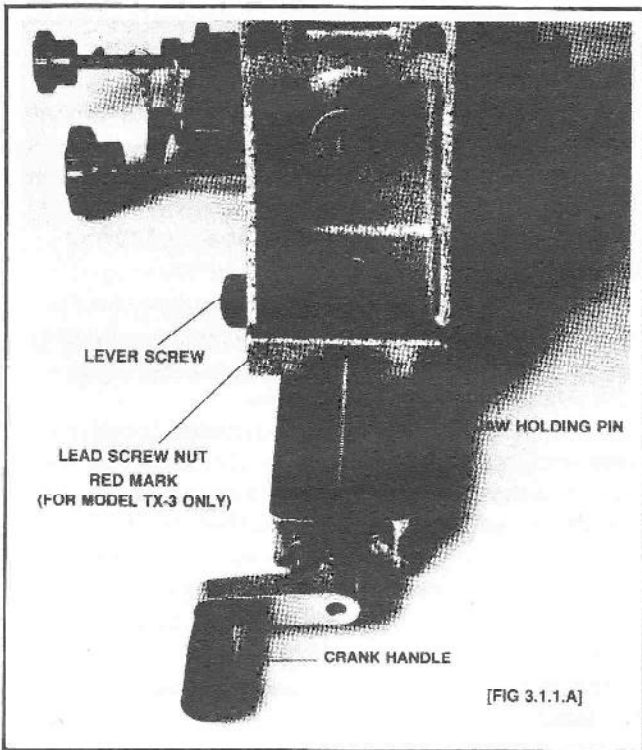
3. MACHINE COMPONENTS:

3-1. WORKHOLDING VISE:

The workholding vise clamps the item to be engraved. The workholding vise on the TX type models (for the purpose of simplification, when referring to TX type models, we will include models ITX-L, GTX-L, ITX-3 and GTX-3) can move the engraving area vertically, horizontally, and the item up and down. It can also be turned around, to any angle from its home position, as determined by the protractor located on the machine base (See figure 3.1.A.). In addition, the workholding vise can also be tilted, and the combination of all the different movements gives the TX type machine great flexibility for engraving a large variety of shapes and objects.

3-1-1. HOW TO USE THE WORKHOLDING VISE:

To open and close: Turn Crank Handle "A" (See figure 3.1.1A).



[FIG 3.1.1.A]

3-1-2. HOW TO CLAMP DIFFERENT ITEMS:

Virtually all items can be clamped in the workholding vise by using the holding jigs supplied as standard equipment with your machine, or additional holding jigs that can be obtained through any New Hermes branch. Consult our Machine Accessories Catalog to select the holding jigs best suited to your application.

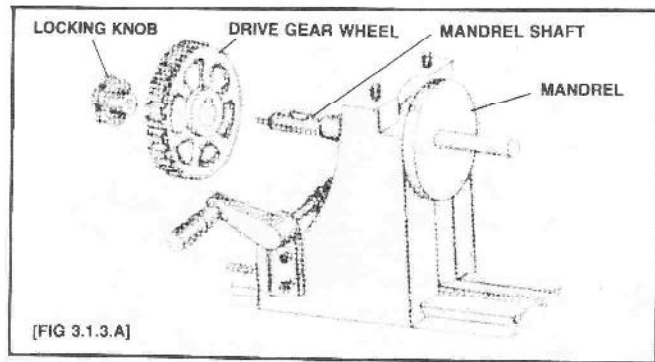
3-1-3. HOW TO CLAMP CUPS AND MUGS:

To engrave cylindrical items, the object is clamped between two cones and is turned by hand, using the gear assembly located in the back of the rear jaw of the vise.

On models ITX-L and GTX-L, the gear wheel and mandrels must be installed when switching from flat to cylindrical engraving. On models ITX-3 and GTX-3, the gear wheel and mandrels are mounted on a set of extension jaws. It is thus possible to engrave on flat objects with the extension jaws removed and to install them for cylindrical engraving. The removal of the gear wheel and mandrels is sometimes necessary, particularly when engraving on large bulky objects requiring the full capacity of the vise.

To switch from flat engraving to cylindrical engraving, proceed as follows:

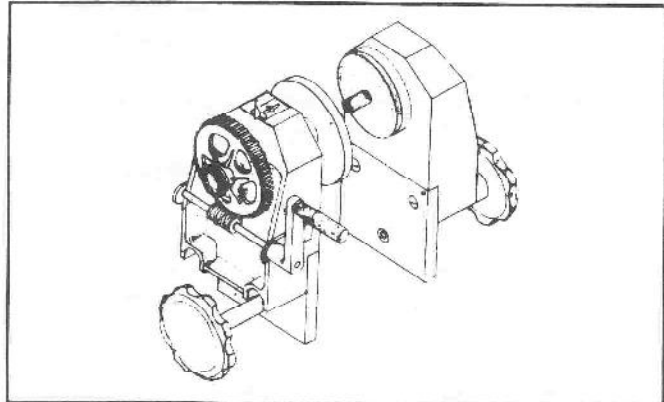
1. Lower the workholding vise to allow cutter clearance depending on diameter of object.
2. Insert the mandrels into the holes of the jaws of the workholding vise (see Figure 3.1.3.A). The tip of the rear mandrel shaft is shaped like the inside of the gear wheel which must be slipped onto the shaft. Use the knob screw to hold the rear mandrel assembly in place.
3. Slip cone onto the shaft of each mandrel. Various



[FIG 3.1.3.A]

cones are supplied with the machine. Use for each item the cone whose diameter is closest to the diameter of the object at each end.

4. Position the item between the cones, and tighten into place by closing the workholder. *NOTE:* When closing the workholder, the cup or mug will center itself on the drive cone. If the bottom of the cup or mug is flat, simply reverse the front cone and rest the bottom on the cup or mug on the flat portion of the cone.



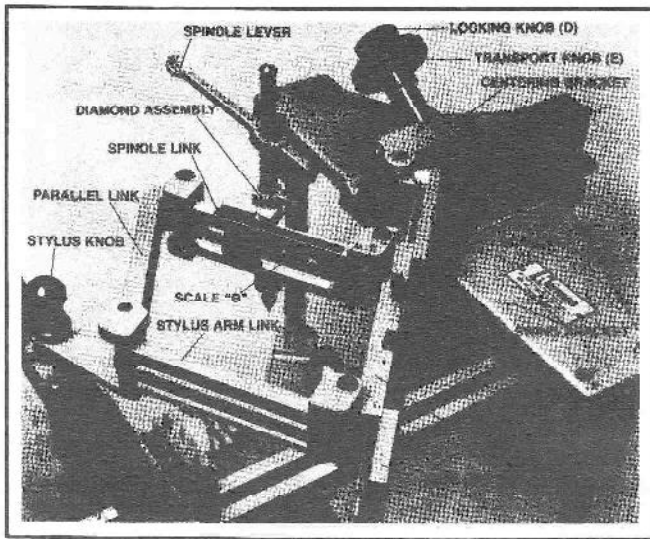
For Model ITX-3/GTX-3 Only

3-2. THE PANTOGRAPH:

This is the most important part of your engraving machine. It is the mechanism that transfers lettering or designs from the master copy type to the item being engraved. By adjusting the settings on the pantograph, you can produce up to 25 different sizes of finished engraving, from a single master template.

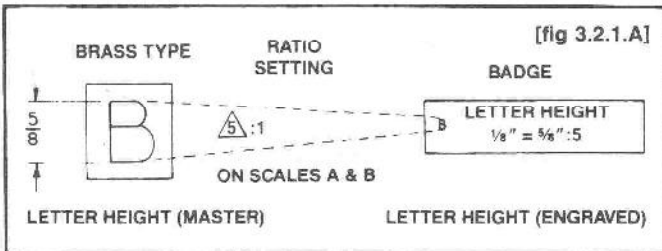
The numbers on your pantograph scales, also known as the ratio settings, range from 2 to 7. That means that the largest finished engraving pattern that you can produce from a given master will be one-half the size of the original brass master. Similarly, the smallest finished engraving size you can produce will be one-seventh the size of the original brass master character.

The size of the finished engraving will always be smaller than the size of the brass master. Scales "A" and "B" in figure 3.2.A control how much smaller the finished engraving will be. Scales "A" and "B" must always be set on precisely the same value or the engraving will be uneven. Scale "C" can be set on any value, but when set on the same value as "A" and "B", it can precisely center the engraving on an object.



3-2-1. HOW TO CHOOSE RATIO SETTINGS:

The best way to explain how to select a good ratio setting is to work with an example. Assume that you are using a style of master copy type in which the type size is $\frac{5}{8}$ of an inch. You are engraving a name badge, and have decided that you want a finished letter-height of $\frac{1}{8}$ of an inch. To find the setting that will give you this result, divide the type size of the master by the desired height of the finished letter. That is, $\frac{5}{8}$ divided by $\frac{1}{8}$ equals 5. Thus, you will need to set the ratio scales "A" and "B" on 5 (see figure 3.2.1.A).



The accompanying Ratio Chart can help you speed your choice of a ratio setting. The most common type sizes are shown in the left-hand column. Move horizontally from the size of the type you are using until you reached a desired finished engraved letter-height. The number directly above this value at the top of Chart A is the ratio setting you will need to use.

CHART A

Type Size	Pantograph Ratio Setting										
	1	2	2½	3	3½	4	4½	5	6	7	8
5/16"	5/16"	5/32"	1/8"	7/64"	3/32"	5/64"	.070"	1/16"	.052"	3/64"	.039"
1/2"	1/2"	1/4"	3/16"	11/64"	5/32"	1/8"	7/64"	3/32"	5/64"	.071"	1/16"
3/8"	5/8"	5/16"	1/4"	7/32"	3/16"	5/32"	9/64"	1/8"	7/64"	3/32"	5/64"
1"	1"	1/2"	13/32"	11/32"	9/32"	1/4"	7/32"	11/64"	13/64"	9/64"	1/8"
1½"	1½"	3/4"	19/32"	1/2"	7/16"	3/8"	21/64"	19/64"	1/4"	7/32"	3/16"
2"	2"	1"	13/16"	21/32"	9/16"	1/2"	7/16"	13/32"	21/64"	9/32"	1/4"
2½"	2½"	1¼"	1"	13/16"	23/32"	5/8"	9/16"	1/2"	21/64"	23/64"	3/16"
4"	4"	2"	1 19/32"	1 11/32"	1 5/32"	1"	57/64"	51/64"	43/64"	37/64"	1/2"
6"	6"	3"	2 13/32"	2"	1 23/32"	1½"	1 21/64"	1 13/64"	1"	55/64"	3/4"

The height of the finished lettering is not the only value you need to consider. The pantograph reduces the width of the engraving by the same amount it reduces the height. In the example given above, suppose that you have assembled the Brass Master Copy Type lettering for the message you wish to engrave and it measures 10" across. The item you are engraving is a name badge of 3" width. Will the engraving fit on the badge? To find out, divide the length of the line of type by the ratio: $10"/5 = 2"$. Thus, the width of the finished engraving will be 2 inches, small enough to fit on a name badge with room to spare on each side of the lettering as margins, to give the name badge an appealing look.

In actual practice, however, you probably will not bother with this simple calculation. Instead, you will simply insert and center the copy into the copyholding slide, as will be described further on. Then, by placing the tracing stylus in the extreme right and left portions of the copy, you will be able to visually determine how close the engraving tool comes to the edge of the engraving material.

If the width of the engraving does not fit, you have three basic options:

1. Use a larger name badge.
2. Switch to a lower ratio.
3. Change type style to a more condensed style, i.e. one that fits more letters into a given line-width.

NOTE: If you are engraving more than one line on one item, make sure in advance that the longest line of type will fit in the engraving area.

3-2-2. HOW TO SET PANTOGRAPH RATIOS:

For Scale "A" (see figure 3.2.A), loosen the lever screw on the cutter spindle (see figure 2.3.B) and align the center mark on the spindle with the desired ratio setting on the scale. Then, retighten the lever screw. This operation is the same for both diamond spindle and/or rotating spindle.

For Scale "B", loosen the lever screw "B" across from the scale and slide the pantograph bars until the hairline mark aligns with the desired ratio. Then, retighten the lever screw.

CAUTION: If Scales "A" and "B" are off their marks by even a fraction of an inch, the engraved line will slant. The setting of the ratios is a precise and important operation.

For Scale "C", loosen locking knob "D" and turn transport knob "E" to move the centering bracket either to the same ratio setting as Scales "A" and "B" or until the spindle is located over the desired engraving area.

3.3 THE ENGRAVING SPINDLE:

3-3-1. DESCRIPTION

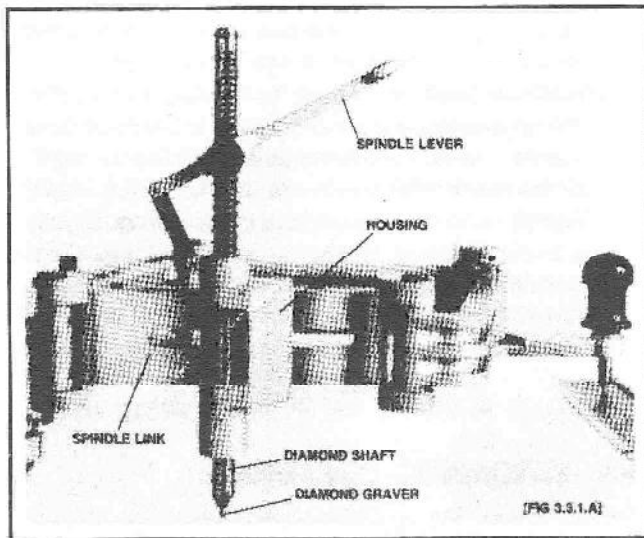
This is the part of the machine where the engraving actually takes place. There are two interchangeable

spindles that can be used with TX type machines. The diamond assembly (see figure 3.3.1.A.), standard on Model GTX-L or GTX-3, is used to engrave on metal items only. The rotating spindle (see figure 3.3.1.B), standard on Model ITX-L or ITX-3, can be used for motorized engraving on all types of material where a deep or wide cut is desired, utilizing carbide or high speed steel cutters. The depth of cut is changed by changing the micrometer setting; the width of cut is varied with the width of the tip-size of the cutter selected.

Both types of spindles are attached to the pantograph by means of a lever screw and washer (see figure 2.3.B). When changing from one type of spindle to the other, the same lever screw and washer can be used.

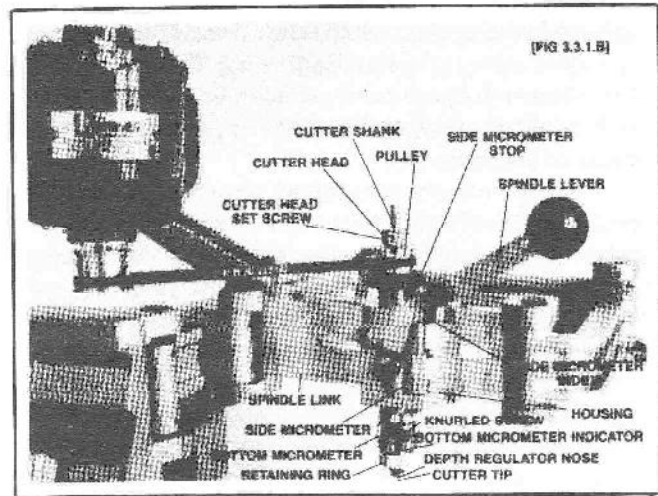
When attaching either spindle, make sure it sits flush against the pantograph casting. Even more important, do not tighten the lever screw until you are sure it is entering the spindle casting straight-on. Otherwise, you could strip the threads on the spindle housing.

Both types of spindles are operated by hand pressure applied onto the spindle lever, while the pantograph remains stationary. Although the pressure applied onto the material is not very important with the rotating spindle as we will see further on, it affects the engraving quality when using the diamond assembly. With a little practice, using the material supplied with the machine, you will quickly get the feel of how much pressure to apply for an even, attractive engraving. You can vary the depth of a line somewhat by increasing or decreasing the pressure, when using the diamond spindle; but be careful to use a light touch with thin, flexible or hollow-engraving items, such as gold charms or pewter mugs. The diamond insert, located at the bottom of the shaft of the diamond spindle, can be removed for replacement using an Allen wrench.



A diamond graver for rotating spindle is also available. (#42-036-02) To use the graver, remove the motor belt, nose and retaining nut from the spindle. Engrave without using the motor. **CAUTION:** Prolonged use of this diamond graver can damage the ball-bearings of your rotat-

ing spindle. For more than occasional use, purchase a diamond spindle.



The rotating spindle can be used with a wide range of cutters, available from New Hermes to perform a wide variety of engraving jobs:

- Cutting through the top layer of a Gravoply I or Gravoply II plastic material to let the contrasting color show through. This is by far the most common engraving job.
- Engraving in depth in single-color plastics, metals, or other materials, often to permit filling with paint or some other coloring agent.
- Reverse engraving on clear acrylic and 2-Plex. In this technique, letters are cut deeply in reverse on clear material. This gives the engraving an attractive, three-dimensional effect when viewed through the material.
- Burnishing on brass. This process is not deep cutting. It is often used on coated brass to produce engraving that can be darkened with oxidizing agents. (Gravoxide).
- Cutting your own brass master templates.
- Producing stencils.

Cutters are inserted into the spindle from the top. The cutter heads have left-handed threads, so they must be screwed into the spindle pulley counter-clockwise.

Make this point clear when training new operators on your machine. Many a spindle has been damaged by turning the cutter in the wrong direction.

3-3-2. HOW TO SET CUTTER DEPTH:

The rotating spindle has two separate mechanisms for controlling the depth the cutter penetrates the engraving material.

The side micrometer is used on flat, even surfaces. The bottom micrometer the preferred most commonly used method, is used on most surfaces and in conjunction with a depth regulator nose that rides on the surface of the material.

To use the side micrometer, press on the spindle lever until the side micrometer stops the down travel. Loosen the cutter head set screw using the cutter head wrench

(part number 31-210-00) and lower the cutter until it touches the surface of the material and tighten the cutter head set screw. Turn the side micrometer counter-clockwise to the desired depth level. This will lower the micrometer stop and when engraving, the down travel will increase by the amount selected in the side micrometer, in effect allowing the cutter to penetrate the surface of the material.

To use the bottom micrometer, you must adjust the vertical position of the cutter so that when the micrometer is set on zero, the tip of the cutter is flush with the bottom of the nose which is held in place by the retaining nut. Then, if you advance the micrometer setting to 8, for example, the cutter will penetrate .008" or 8/1000's of an inch into the material.

1. Select a depth-nose with a hole wide enough to accommodate the cutter you plan to use. Insert it into the retaining nut, and screw the retaining nut onto the micrometer. Make sure the depth-nose is seated flush in the retaining nut. Set micrometer on (0) zero.
2. Insert cutter as described above. *Caution:* be sure to check that the clearance hole of the depth regulator nose is large enough to accommodate the cutter tip size you have selected, and that the cutter can rotate freely. Use the chart below to select the proper depth regulator nose and check by turning the spindle manually that the cutter is not rubbing against the nose.

Chart B: Depth Regulator Nose Selection

Cutter Tip Size	Clearance Hole	Part Number
up to .020"	.040"	30-300-00
up to .040"	.060"	30-301-00
up to .060"	.092"	30-302-01
up to .171"	.185"	30-303-02

3. Press on the spindle lever until the depth regulator nose touches the surface of the material.
4. While holding the spindle in that position, loosen the cutter head set screw and lower the cutter until it also touches the material. Tighten the cutter head set screw. Raise the spindle lever.
5. Loosen the knurled screw on the micrometer indicator assembly and advance the micrometer clockwise to the desired depth-setting (see paragraph 4-2), and tighten the knurled screw.
6. Before turning on the motor, rotate the spindle pulley by hand to make sure the spindle turns freely. If it does not, the cutter may be rubbing against the inside of the depth-nose. If that is the case, you will have to switch to a wider depth-nose and begin again. The cutter must NEVER touch the depth-nose during engraving, as it will destroy the cutter and nose.

3-4. THE COPY TABLE AND COPY HOLDING SLIDES

This is the part of the machine that holds the master

copy type or design template in place. Type comes in four basic sizes and there are four corresponding copy slide varieties: 5/8"; 1 1/4"; 1 1/4" and 2 3/4" double-grooved slide; and 4 1/2". You can also purchase an adjustable copy slide for oversized masters.

3-4-1. CLAMPING COPY SLIDES TO COPY TABLE:

Simply loosen the two knurled screws located on the bottom of the slide, slip the slide onto the copy table and retighten the knurled screws. Make sure that the copy slide lines up with the scales along the sides of the copy table. Another easy way to line up a copy slide is to bring its top edge flush with the top edge of the copy table. Even so, always verify that the graduation on the right and left scales are the same.

NOTE: When using a double-grooved slide (1 1/4" and 2 3/4"), the engraving spindle will be located exactly in the center of the workholding vise when:

- A. Scales "A", "B" and "C" (See figure 3.2.A.) are set at the same ratio, and
- B. Slide is set flush with the copy table, and
- C. Workholding vise scales are all set to zero.

Most standard copy slides come with a scale for centering the type. When you first attach a copy slide to the copy table, you will need to center the scale with respect to the workholder. Do the following:

1. Adjust the workholder's left/right scale on "0" (zero).
2. Set the pantograph on any ratio (Scales "A" and "B"). We suggest ratio of 4.
3. Insert a pair of flat holding-jigs (e.g. Part No. 30-765-00) onto the workholder.
4. Use either the diamond assembly or the rotating spindle with a cutter inserted.
5. Place the tracing stylus on the "0" mark of the centering scale. With the diamond graver or cutter, locate the center hole of the holding jigs.
6. Slide the scale left or right, as needed, by loosening the screws holding the copy slide to the copy table. Tighten the screws of the slide when the "0" mark of the scale aligns with the tracing stylus. (HINT: Before centering the scale, tap the "0" mark lightly with a small nail. This indentation will help you to keep the tracing stylus on the "0" mark during the above operation.)

4. HOW TO ENGRAVE:

4-1. AUTOMATIC CENTERING:

If you need to engrave a single line of type on a symmetrical piece of engraving material (for example, a rectangular brass or plastic nameplate, a plain identification bracelet, or a brass disk), you can automatically center the engraving on the item. Here is how:

1. In addition to setting the two main pantograph scales on the same number, set the centering

bracket scale "C" (See figure 3.2.A.) at the back of the pantograph on the identical number.

2. Set the two workholder scales (front/back and side/side) on "0" (see figure 3.1.A).
3. Clamp the item in the center of a pair of holding jigs. For flat, rectangular objects, make sure that the right-hand and left-hand sides of the piece line up with the same numbers on the holding jig scales.
4. If you are using a double-grooved copy slide, align the top of the slide with the top of the copy table (see paragraph 3-4-1).
5. Compose your type, and insert it into the copy slide. (Be sure to include spaces between words, and punctuation where appropriate.) *Note:* If the punctuation falls at the end of a line, center the text first without the punctuation; then place the punctuation mark at the end of text and replace stop. By doing so you will have an aesthetically pleasing layout.
6. Position the two end stops so that they both align with the same number on the copy slide scale. Lock the type in place.
7. Check for automatic centering:
 - A. Centering bracket on same setting as pantograph scales.
 - B. Both workholder scales on "0" (zero).
 - C. Item clamped symmetrically in holding jigs.
 - D. Double-groove copy slide aligned with top edge of copy table.
 - E. Type centered on copy slide.

4-2. THE ENGRAVING SEQUENCE:

For diamond engraving, you are all set to engrave.

For rotary engraving, you will need to select the proper cutter for the material you are engraving. There are two items you will need to check: the part number and the tip size.

The part number corresponds to the material you are engraving. The tip size indicates the width of the line you are engraving. The larger the finished engraved letter, the wider the tip size, and vice versa. Table A below shows recommended tip sizes for different letter heights. It is meant as a general guide, and it only applies to single-line styles of type. For multiple-line type styles, a general guideline is to use a cutter width approximately half or a third of a cutter width you would have otherwise selected for a single-line type style.

TABLE A

Character Height	Cutter Tip Size
1/8"	.020"
1/4"	.030"
5/16"	.040"
1/2"	.060"
3/4"	.090"
1"	.125"
1 1/4"	.171"

Set the engraving depths with either the side or bottom micrometer. To avoid undue wear on your cutter, engrave

no deeper than necessary. Recommended cutting depths for standard engraving materials are:

TABLE B

Material	Recommended Depth
Gravoply	*.010" to .015"
Gravoply II	.003" to .005"
Gravoflex	.012"
Metallex	.003" to .005"
2-Plex	.015"
Aluminum	.003"
Brass	.008" (1 or 2 passes)
Phenolic	*.005" to .015"

* Depending on color

The Engraving Sequence:

1. Insert the tracing stylus in the groove of the master copy type.
2. If you are using the rotating spindle, turn the motor ON.
3. Lower the spindle to the surface of the engraving material and trace the letter with the stylus.
4. Always release the engraving spindle BEFORE moving on to another letter. Otherwise, you will engrave random marks on the item.
5. When you have finished engraving the line, check to make sure that the lettering is evenly and cleanly traced. If not, retrace where necessary. Do not remove the item from the workholder until you are sure that the engraving is satisfactory. Accurate retracing will be difficult once the item is moved.

NOTE: With rotating engraving, do not begin or end tracing at the corner of the letter. This can sometimes cause circles to appear at those points, and it is always better to go through the letter twice.

4-3. LAYING OUT FOR ENGRAVING:

4-3-1. ENGRAVING MORE THAN ONE LINE:

4-3-1-1. MULTIPLE COPY SLIDES:

1. Use either 1 1/4" or 5/8" copyholding slides. Clamp them onto the copy table, making sure that they are parallel both with the copy table and with each other. Also, make sure that the space between the slides is even.
2. Select a ratio as if all the lines were just one large line of type. That is, consider the distance between the top of the top line and bottom of the bottom line as your overall letter height. Select a pantograph ratio on the basis of that overall distance. If the individual letter heights are too small to be attractive at the selected ratio, move the slides closer together and start again.
3. As described in the pantograph section, make sure that the longest line of type will fit onto the engraved item at the selected ratio.

4. Finally, spot-check the centering of the engraving. Place the tracing stylus at the top of the top line and see where the cutter or diamond graver will contact the piece. To make this easier, place a piece of scotch tape on the item to be engraved, and make a light mark with the cutter or diamond graver. Then, do the same with the bottom of the bottom line.

Shift the forward/back position of the workholder until the distance between the top line and the top edge of the piece is the same as the distance between the bottom line and the bottom edge of the piece.

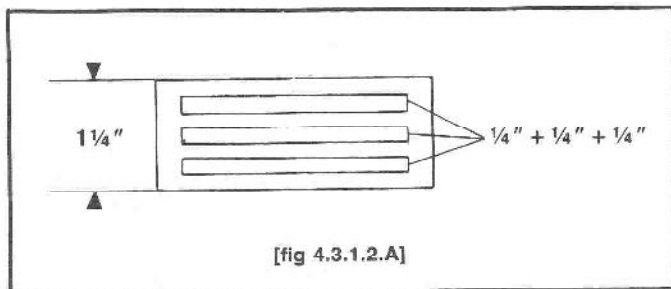
Although the engraving should be centered side-to-side automatically (assuming that you have centered the type with the copy scales, and that the side/side workholder scale is set on "0") you can spot-check the horizontal centering in the same way.

4-3-1-2. ONE COPY SLIDE ONLY:

Engraving more than one line with a single copy slide is easiest with an odd number of lines. The reason is that you can first engrave the center line, and then position subsequent lines around the center.

In the first example, let's say you want to engrave three $\frac{1}{4}$ "-high lines on a piece of engraving material that is $1\frac{1}{4}$ " high:

1. First, you want to make sure that there is enough room for the lines to fit. Add up the total height of the engraved lines ($\frac{1}{4}" + \frac{1}{4}" + \frac{1}{4}" = \frac{3}{4}"$). Subtract that amount from the total height available ($1\frac{1}{4}"$ less $\frac{3}{4}" = \frac{1}{2}"$). If the precise spacing between the line is not crucial, all you really need to know is that you have a reasonable amount of space in which to position each engraved line (below, we'll show you how to control that spacing precisely.) (See figure 4.3.1.2.A).



2. Compose the center line of type and engrave it, using the machine's automatic centering feature.
3. Compose the top line of text. Now, shift the forward/back position of the workholder, and spot-check the top and bottom of the engraved line to see where it will fall (see previous paragraph for spot-checking tips). When you have located the suitable position, lock the workholder in place, and record the workholder scale setting. Then, engrave the top line.

4. Positioning the bottom line is now easy. Simply shift the workholder toward you, past the "0" mark on the scale. Continue moving it until the arrow points to the same number that you recorded for the top line. Lock the workholder in this position, compose the bottom line of type, and engrave it.

If the precise spacing between the line is important, then you must decide how to distribute the $\frac{1}{2}"$ of blank space surrounding the engraved lines.

Note that there are three engraved lines on the plate, but there are four spaces left. Regardless of how many lines are on an engraved item, this is always true; there will be one more space than the number of engraved lines.

If we want to distribute that space evenly between all the engraved lines, then each of the four spaces will have to be $\frac{1}{2}"$ divided by 4 = $\frac{1}{8}"$ in height (you don't have to distribute the space evenly, but the total height must add up to $\frac{1}{2}"$). Now, proceed as follows:

With a fine-marking pencil or sharpened crayon, make a mark $\frac{1}{8}"$ from the top of the plate, and another $\frac{1}{8}"$ from the bottom.

Proceed as described above, engraving the center line first. Then, in shifting the workholder position to engrave the top line, place the tracing stylus at the top of the top line of type. Now, move the workholder so that the tip of the cutter, or the point of the diamond graver, falls directly on the mark previously set at $\frac{1}{8}"$ from the top of the plaque.

Engrave the top line, and repeat positioning and engraving operation for the lower line.

4-3-2. TO ENGRAVE AN EVEN NUMBER OF LINES WITH ONE COPY SLIDE:

Because you will not have a middle line that can be automatically centered and used as a reference point, the best procedure is to lay out the engraving positions beforehand.

Let's use the same example as above, except that we will engrave two instead of three lines.

In this case, the total height of the engraved lines ($\frac{1}{4}" + \frac{1}{4}"$) will be $\frac{1}{2}"$. The total amount of vertical space remaining on the plate ($1\frac{1}{4}"$ less $\frac{1}{2}"$) will be $\frac{3}{4}"$.

If we want to position the two lines evenly within that $\frac{3}{4}"$, divide that space by the number of spaces between the engraved lines (recall that this number is always one more than the number of engraved lines). Thus, the height of each space between the letters will be $\frac{3}{4}"$ divided by 3 = $\frac{1}{4}"$.

With a marking pencil or crayon, mark off the top and bottom of each engraved line. Then, insert type for each line, positioned so that the top and bottom of the line corresponds to the marks, and engrave.

The same principles of allocating available space and laying out engraving positions apply to more complex multiple-line jobs, including these where the height of various engraved lines are different from each other.

4-3-3. ENGRAVING A VERY LONG LINE OF TYPE:

Sometimes you may not be able to engrave a long line of type in a single set-up. There may be two reasons for this:

1. The line of type is too long for the copy slide;
2. The type fits on the slides, but the plate being engraved is so long that it cannot be supported firmly from underneath along its entire length.

The solution is relatively simple:

1. Lay out the entire line of type on a table or the floor, and measure it. Find the exact center of the line and mark it with a crayon or a felt-tipped pen.
2. Measure the plate to be engraved and mark its center as well.
3. Insert the left-half of the line of type, including the marked letter, and clamp in place. You don't have to bother centering it precisely.
4. Clamp the plate loosely in the workholder.
5. Select the pantograph ratio and place the tracing stylus precisely on the marked center letter. Slide the plate until the center mark falls directly below the cutter. Lock the plate in place.
6. Engrave the left-half of the line, including the marked letter.
7. Remove all type except the marked letter, and insert the remaining type.
8. Loosen the plate in the workholder, and repeat Step 5 above.
9. Do not retrace the center letter, but engrave all the letters to its right. The job is done.

NOTE: For very long lines, you may need to engrave in three or more stages, instead of two. In that case, you will have to divide the type and item being engraved into thirds or more. Otherwise, the operation is the same.

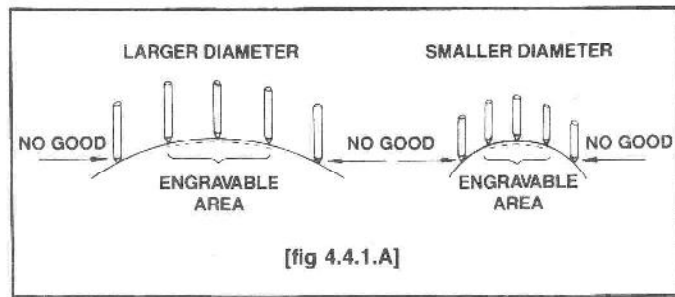
4-4. DIAMOND ENGRAVING ON CYLINDRICAL OBJECTS:

4-4-1. SINGLE ITEM

When engraving metal cups and bowls, you cannot simply clamp the item, insert the type, and engrave from beginning to end. Because the item is curved, you can only engrave a limited number of letters at one time. Then you must rotate the object to bring a new portion of its surface in range of the diamond graver. If you attempt to engrave too many letters at once on a curved surface, the result will be either to obtain distorted letters, or to risk the danger of making the cylindrical object rotate (see figure 4.4.1.A).

NOTE: On the GTX-3/ITX-3, a lever screw is located on the top of the back jaw to secure the object in place and prevent its rotation during engraving. Always tighten the lever screw while engraving.

In any case, the object will be ruined. If you are engraving a cup or bowl with two handles, you must center the



engraving between the handles. To find the center, measure the distance between the handles with a flexible ruler. Mark the center with a crayon or marking pencil. On a cup with one handle, the engraving is traditionally centered in the region to the right of the handle.

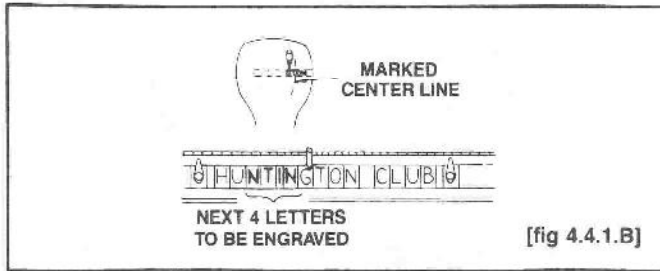
If you are engraving more than one line, you will need to mark a center line on the object, even if it has no handles. The purpose of this center line will become clear further on. The position of this line can be arbitrary for items with no other identifying features, such as silver goblets.

CAUTION: Handles on cups and bowls can sometimes block rotation by contacting the workholder or the spindle housing. Before engraving such an item, rotate it from side to side, to make sure you can access the area designated for engraving.

The engraving procedure:

1. Set up the workholder for cylindrical engraving, as described in paragraph 3-1-3. Clamp the cup or bowl between two suitable cones, making sure that the item clears the diamond graver, and making sure the mug is secured properly and centered on the cones.
2. Insert the first line of type into the copy slide, center it as usual, and lock it in place.
3. Set an appropriate ratio setting as usual.
4. If you have indicated the center line of the item, place the tracing stylus on the "0" mark of the centering scale. Rotate the object to be engraved until the center mark falls directly below the diamond graver.
5. You will be engraving small groups of letters at a time, beginning with the letters at the very center of the copy slide. As shown below, the larger the diameter of the object, the "flatter" its surface will be, and the more letters you will be able to engrave before you need to rotate the items. If you try to engrave too many letters at once, the diamond will no longer touch the object; instead, the diamond metal housing will contact it, and scratch the piece.
6. Let's say that you were able to safely engrave four letters; two on either side of the "0" mark. From here on, you'll be engraving four letters at a time, and then shifting the bowl (and type) to a new position.
7. Loosen the end stops and shift the type so that the four letters to the immediate left of the first

four are now centered on the scale. Lock the end stops (see figure 4.4.1.B).



8. Place the tracing stylus on the leftmost letter of the four just engraved. Now, turn the object to be engraved using the worm gear handle until the diamond graver is over precisely the same spot on the engraved letter. (Lower the diamond graver lightly to the surface of the cup, to be sure.) You may have to "fine-tune" the position of the item until the diamond graver locates the letter exactly.
9. Engrave the four letters that are now in the center.
10. Continue the sequence: shift the letter/rotate the item/locate the last letter engraved/engrave the next four letters.
11. When the left-hand portion of the engraved line is completed, proceed in the identical manner with the right-hand side portion (actually, it does not matter whether you start by engraving the left-hand or the right-hand portion of the engraving).
12. For multiple-line engraving, turn the item until the marked center line once again corresponds to the "0" mark of the copy scale. The item is now positioned for the next line of engraving.

4-4-2. REPETITIVE ITEMS

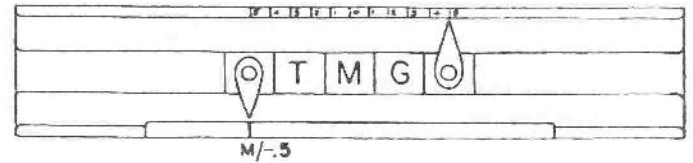
The engraving procedure for cylindrical items is more time consuming than for flat items. If you are in a situation where you are being asked to engrave more than one of the same item with the same type, you will save considerable time by using the auto-indexing system.

This system helps you record the different positions of the object before shifting the copy, so that you can shift copy and item quickly during the engraving of the subsequent items. The system comes standard on models ITX-L/GTX-L and ITX-3/GTX-3. To install it, replace the existing gear wheel with the one purchased and mount the index marker on top of the jaw, securing it in place with the screw. Bring the index marker as close to the protractor as possible to avoid parallax errors (on the ITX-3 and GTX-3, the index marker must be installed with double-face tape).

To record the various positions, install first the blank scale on the side of the copy holding slide closest to the operator. Follow steps 1 through 6 of the engraving procedure described in paragraph 4-4-1.

Using an example with the three initials "T M G", you

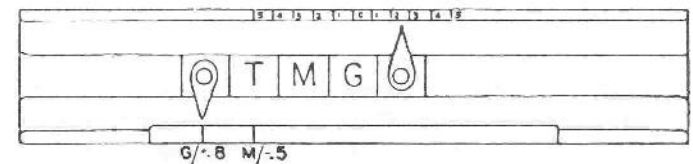
would then be engraving the center letter "M". At that point, record the graduation indicated on the protractor by the index, and write it on the blank scale, e.g. M/- .5 (see figure 4.4.2.A). *Note:* the protractor is graduated with positive and negative numbers. Do not omit the sign.



[fig 4.4.2.A]

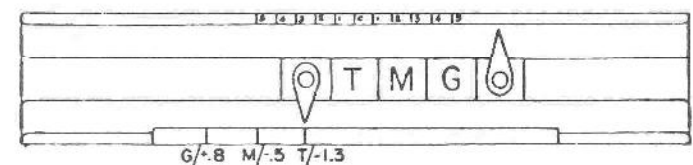
Continuing the engraving sequence:

7. Loosen the end stops and shift the type so that the next letter to the immediate right ("G") of the first is now centered on the scale. Lock the end stops.
8. Place the tracing stylus on the rightmost side of the letter just engraved. Now, turn the object to be engraved using the worm gear handle until the diamond graver is over precisely the same spot on the engraved letter. (Lower the diamond graver lightly to the surface of the cup, to be sure.) You may have to "fine-tune" the position of the item until the diamond graver locates the letter exactly. At that point, record the graduation indicated on the protractor by the index, and write it on the blank scale, e.g. G/+ .8 (see figure 4.4.2.B).



[fig 4.4.2.B]

9. Loosen the end stops and shift the type so that the last letter ("T") is now centered on the scale. Lock the end stops. Place the tracing stylus on the leftmost side of the letter first engraved ("M"). Now, turn the object to be engraved using the worm gear handle until the diamond graver is over precisely the same spot on the engraved letter. (Lower the diamond graver lightly to the surface of the cup, to be sure.) You may have to "fine-tune" the position of the item until the diamond graver locates the letter exactly. At that point, record the graduation indicated on the protractor by the index, and write it on the scale, e.g. T/- 1.3 (see figure 4.4.2.C).



[fig 4.4.2.C]

10. When the engraving is complete, rotate the object back to the setting indicated for the first letter, i.e.
 - .5 for "M". Center the entire line of text. Remove the object and place the next one. At this point:
 - A. Engrave the letter "M".
 - B. Turn handle until index aligns with graduation + .8. Center "G" on copy holding slide and engrave letter.
 - C. Turn handle until index aligns with graduation – 1.3. Center "T" on copy holding slide and engrave letter.
 - D. Turn handle until index aligns with graduation – .5. Center "M" on copy holding slide. Remove object and replace it with the next one.

Note: The example only includes three initials. Should you have longer text, use segments of text as dividers and markers, and engrave as described in paragraph 4-4-1.

4-5. ROTARY ENGRAVING ON CYLINDRICAL OBJECTS:

Rotary engraving on cylindrical objects and on curved surfaces in general is more difficult than diamond engraving, and should be avoided whenever possible. The illustration on figure 4.4.1.A shows why: because the bottom of the depth-nose is flat, the cutter quickly goes out of range from the engraving surface.

If you must perform rotary engraving on a cylindrical object, follow these suggestions:

1. Use a narrow-angle cutter (such as stencil cutter, or optical lens cutter) with as small a tip size as possible.
2. Use a narrow depth-nose. The wider the nose, the more quickly the cutter goes out of range of the engraving surface.
3. Unless the size of finished engraving is very small, or unless the diameter of the object is very large, engrave just one or two letters at a time before turning the item.
4. Use a very light touch when engraving to avoid marring the surface with the depth-nose.

If you need to do a lot of rotary engraving on cylindrical objects, ask your New Hermes representative about our TC-2 Glass Machine. This machine turns the item continuously, so that the cutter is always perpendicular to the engraving surface. It is also the only machine on which connecting-script lettering can be engraved easily on cylindrical objects.

5. SPECIAL ENGRAVING OPERATIONS:

5-1. REVERSE ENGRAVING:

Reverse engraving produces a three-dimensional

effect that makes the engraved letters seem almost solid, even though they are the part of the plastic that has been cut away. The lettering is viewed through the material, instead of straight-on, as with other types of engraving. You can perform reverse engraving on two types of material: Clear acrylic and laminated 2-Plex, in which one layer is clear, and the other (the one you're engraving onto) is opaque.

In most engraving operations, it is undesirable to engrave too deeply into the material. Instead, if you want to engrave a wide line, you will use a cutter with a wide tip. That way, you can engrave just a few thousandths of an inch into the material, and still produce a wide line. You can also use a multi-line type.

In reverse engraving, however, depth is what makes the engraved line attractive, and tip size is less important. To produce a wide line, you engrave more deeply into the material. To give an added dimension to the engraving, we recommend you purchase radius (U-shaped) cutters, specially ground on request by our cutter department. You can also grind your own radius cutters with our CG-5 Cutter Grinder. Contact your New Hermes representative for details.

To Perform Reverse Engraving:

1. Purchase Acrylic or Reverse 2-Plex. Then, purchase a set of reverse-type, from the Master Copy type Catalog.
2. Insert masters from the left, into the copy slide, so that the entire message (including punctuation, if any) is reversed. Take extra care to insure correct spelling.
3. Set depth at a shallow setting, and engrave one or two letters at a test of depth. Increase depth gradually, until the width of the engraved line at the surface corresponds to the proper width for the letter height.
4. Engrave as usual, but go slowly if you are making a deep cut. Engraving too quickly could cause melting. If necessary, engrave entire message at a shallow setting, increase to full depth and retrace.
5. If you wish, you can fill reverse engraved acrylic with engravers' enamel (see Accessories Catalog). 2-Plex can be backed with a metallic foil to produce the illusion of solid metal lettering.

5-2. BURNISHING ON POLISHED METAL:

This is a method of engraving on polished metals, usually brass, that produces a wider line than would have been possible with diamond engraving. Burnishing is often used in conjunction with an oxidizing agent (Gravoxide) that will blacken the newly exposed surface of the metal.

The tip size of a burnishing cutter is selected in the usual manner. However, do not try to engrave in depth with burnishing cutters. They are only meant to skim the surface of the metal, using very light pressure.

6. CARE AND MAINTENANCE:

6-1. DIAMOND INSERT STANDARD ON MODEL GTX-L AND GTX-3:

Replace the diamond insert, if it is producing a double-line or is not engraving smoothly. To replace the diamond insert, open the set-screw with an Allen wrench, #31-202-00. Remove the insert and replace with a new one, making sure that the flat surface of the insert faces the set screw. Tighten the set screw.

6-2. TRACING STYLUS:

Check the tracing stylus periodically for signs of wear or shipping, and check it immediately if it is slipping out of the type as you engrave. The stylus tip can be returned for resharpening to New Hermes.

CAUTION: A bad stylus will ruin your brass type.

To Replace the Stylus Tip:

1. Open the set-screw with an Allen wrench, and remove the stylus tip.
2. Reverse the procedure with new or resharpened stylus, making sure the top is set deeply enough into the hole, and that the set screw holds the stylus tip securely in place. The flat of the stylus tip shaft must face the set screw.

6-3. CLEANING AND LUBRICATION:

Cleaning is as important as lubrication, especially if you do rotary engraving. Take care to wipe engraving debris from the machine after each engraving job, and at the end of the day.

The lead screw, locking knob, transport knob, as well as the inside shaft of the rotating spindle, are all particularly vulnerable to interference from engraving chips.

Inspect them regularly, and wipe them clean. For most applications, we recommend spraying lightly with WD-40 Lubricant.

Do not attempt to lubricate motor, bearings, rotating spindle bearings, or pantograph bearings. These parts have been positioned to extremely close tolerances, and any attempt to change them could put them out of alignment. All bearings are pre-lubricated at the factory.

6-4. MOTOR BRUSHES

Motor brushes should be changed when the remaining carbon reaches $\frac{1}{4}$ ". To replace the motor brushes, you must first obtain a kit from New Hermes (Part No. 31-025-00).

WARNING: DO NOT ATTEMPT TO REMOVE AND INSPECT MOTOR BRUSHES WITHOUT DISCONNECTING POWER CORD FROM ELECTRICAL OUTLET TO PREVENT SERIOUS INJURIES FROM ELECTRICAL SHOCK.

Using a screwdriver, remove the two caps located on each side of the motor. Remove spring and carbon and discard. Place the new carbon brushes included in the kit, the new springs and new caps.

6-5. FREQUENTLY NEEDED SPARE PARTS

Item	Part Number
Belt	30-213-00
Brushes	31-025-00
Cutter Wrench	31-210-00
Diamond Insert	40-235-020
Stylus Tip (Insert Only)	58-642-32

To order spare parts and/or accessories, refer to the New Hermes Engraving Machines and Accessories Catalog.

7. TROUBLE-SHOOTING CHECKLIST:

7.1 Engraving slopes "uphill" or "downhill".

- Copy Slides are not aligned properly on the table.
- Pantograph is set Improperly.
- Pantograph is out of alignment.
- Workholder is out of alignment.
- Make sure the copy slide lines up with the guidemarks on the side of the table. Also make sure the copy slide is tightened securely.
- Scales A and B must be set exactly on the same number (see 3-2-A).
- If the line not only slopes but is curved, the pantograph is out of alignment. Contact New Hermes before returning the machine for repair.
- Return the machine to New Hermes for repair.

7.2 Type "jiggles" when clamped in copy slide.	<ul style="list-style-type: none"> ● End stops are loose. ● Type is old or worn. 	<ul style="list-style-type: none"> ● If end stops won't lock when tightened as far as they will go, replacements are needed. ● Replace with new type.
7.3 Stylus slips out of type when engraving.	<ul style="list-style-type: none"> ● Stylus is worn. ● Type is old or worn. 	<ul style="list-style-type: none"> ● Resharpen or replace stylus ● Replace with new type.
7.4 Engraving material melts or beads up during engraving.	<ul style="list-style-type: none"> ● Incorrect cutter ● Cutter is dull or chipped. 	<ul style="list-style-type: none"> ● Match cutter with the engraving material, using chart in the Machine & Accessories Catalog. ● Return to New Hermes for re-sharpening, or purchase Model CG-5 Cutter Grinder. (See Machine & Accessories Catalog).
7.4 Engraving material melts or beads up during engraving.	<ul style="list-style-type: none"> ● Spindle bearings are worn. 	<ul style="list-style-type: none"> ● To check, test spindle shaft for end play, (there shouldn't be any). Also, give spindle pulley a spin by hand. If spindle shaft spins with a rattling or "wheezing" sound, ball bearings are beginning to wear out. Return spindle to New Hermes for repair.
7.5 Rotating spindle cannot reach the item.	<ul style="list-style-type: none"> ● Vertical travel may be blocked by side micrometer. ● Item out of range of the spindle. 	<ul style="list-style-type: none"> ● Check side micrometer for proper depth. ● Raise the workholder.
7.6 Micrometer indicator assembly cannot be lowered all the way down to the item.	<ul style="list-style-type: none"> ● Indicator assembly is worn. 	<ul style="list-style-type: none"> ● Contact New Hermes Order Department about purchasing micrometer indicator assembly.
7.7 Stylus and spindle are blocked from engraving a letter all the way to the top or bottom.	<ul style="list-style-type: none"> ● Spindle is blocked by the edge of the holding jig. 	<ul style="list-style-type: none"> ● For rotating engraving, try switching. ● Shim material in holding jigs so its top surface just clears the top of the holding jig. ● If practical, turn workholder 90 degrees and clamp engraving item by the sides.
7.8 Engraving line suddenly becomes wider (rotating engraving).	<ul style="list-style-type: none"> ● Micrometer setting has shifted. 	<ul style="list-style-type: none"> ● Set lock screw tighter or replace with new micrometer indicator assembly.
7.9 Engraving line suddenly becomes wider (diamond engraving).	<ul style="list-style-type: none"> ● Diamond has broken out of its metal housing. 	<ul style="list-style-type: none"> ● Order new diamond insert (#40-235-02) or non-rotating diamond graver (#42-036-02).

- 7.10 Motor is turning but rotating cutter is not turning properly.
- Motor belt is worn.
 - Motor pulley or spindle pulley is loose.
 - Cutter is rubbing against inside of depth nose.
 - Spindle bearings have frozen.
 - Replace belt.
 - Check that set screws are securely tightened on both motor and spindle pulleys.
 - On motor pulley, make sure that the set screw is flush with the flat surface on both the motor shaft and spindle shaft.
 - Switch to wider nose, or regulate depth with the side micrometer.
 - Return to New Hermes for repair. Purchase backup spindle.

- 7.11 Rotary engraving leaves circular marks around lettering ("nose rubs").
- Hand pressure too great.
 - Depth nose is scratched or burred.
 - Material is scratch-prone.
 - Engrave with a lighter "touch".
 - Inspect depth nose to make sure it is highly polished and has no nicks or scratches. Run it over your finger and feel for any roughness. Replace if not perfectly smooth.
 - Switch to narrower depth nose, if possible.
 - If material is perfectly flat, use side mechanism to engrave without nose.
 - Engrave through a protective coating, such as Scotch tape. Brush away debris every few letters, to prevent remnants of coating from interfering with depth regulation.

- 7.12 Rotating cutter tip breaks or wears out rapidly.
- Feed rate too fast.
 - Engraving depth too deep for one pass.
 - Material is hard or abrasive.
 - Incorrect cutter for material.
 - Engrave at slower feed.
 - Reduce depth setting and proceed with successive passes at progressive depth settings.
 - Ease up the friction by using lubricating oil such as Engravolube for (Brass, Aluminum, Steel . . .) and other metals.
 - Change cutter.

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