

PHOENIX ENGRAVING TABLE

OPERATING MANUAL

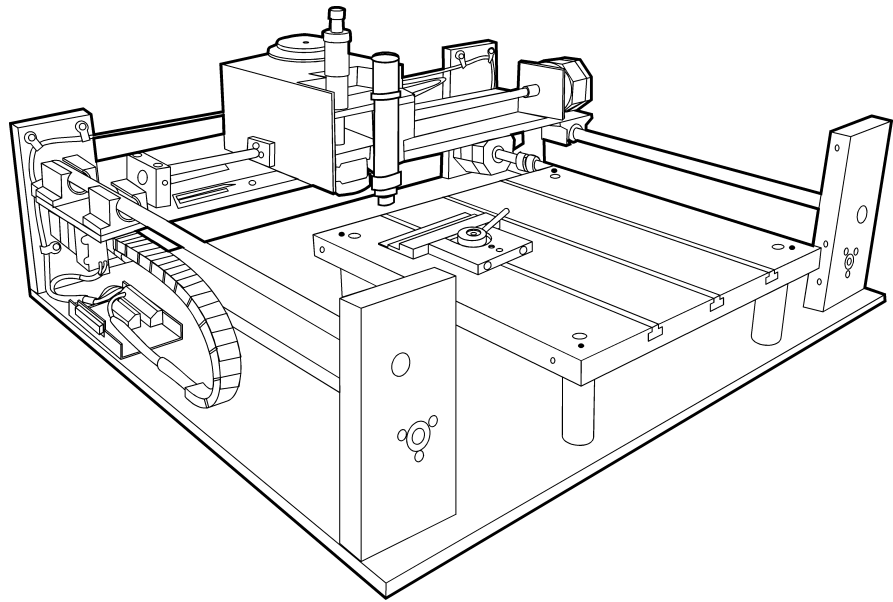


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This manual is designed to provide you with information about your Vision Computerized Engraving and Routing Systems table, beginning with unpacking the table and continuing through installation and lifetime table maintenance. This manual does not attempt to teach you how to engrave, how to use a computer, or how to use your engraving software. Some previous knowledge of engraving terms and the engraving process is assumed. For information on your individual computer system, see your computer's user manual or contact your computer distributor. For information on the engraving software you use to drive your engraving system, see the manual for the individual software package supplied by the software developer.

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Vision Computerized Engraving and Routing Systems Warranty For The Vision Table:

Vision Computerized Engraving and Routing Systems warrants that for a period of one (1) year from the date of delivery to the user of the Vision table, that the table will be free from defects in material and workmanship under normal use and service. It is specifically understood that this warranty covers normal use only and shall be null and void in the event that the Vision table is altered or modified by the user without authorization, or is subject to abuse, neglect, or other misuse by the user. The spindle is covered by a ninety-day (90) warranty. Other equipment may be purchased which is not included in this warranty, and may have a separate manufacturer's warranty, which applies. Other items considered "consumable", are not covered and are excluded from any and all warranties. Specifically these items include spindle motor brushes, spindle belts, lubricant, and cutters furnished with the table.

In the event a defect is discovered during the warranty period, the user shall contact Vision Computerized Engraving and Routing Systems for instructions regarding resolution of the problem. Vision Computerized Engraving and Routing Systems shall at its option, replace the Vision table or correct the defect or problem by repair at Vision's manufacturing facility or at one of its authorized field service offices. In the event of either replacement or repair, Vision Computerized Engraving and Routing Systems shall be liable only for the cost of repairs, including parts and labor. Any incidental costs, including the cost of shipment from the user's location to the point of repair, and subsequent return, shall be at the expense of the user. Vision Computerized Engraving and Routing Systems shall have no further liability hereunder. Vision Computerized Engraving and Routing Systems shall have no obligation or liability to repair or replace, during the warranty period, those items that form a part of the Vision table and are considered expendable by design, including but not limited to, cutters, spindle motor brushes, and spindle belts.

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Any software supplied by Vision Computerized Engraving and Routing Systems in conjunction with the purchase of the Vision Engraving table, for use therewith, shall be governed by its own separate software license and warranty agreement.

Safety Precautions for The Phoenix Engraver

Safety

- ✓ Keep hands clear of the spindle belt during operation.
- ✓ Keep hands clear of the bottom of the spindle during operation.
- ✓ Always stop the machine before making any adjustments.
- ✓ Disconnect the table cable before servicing.
- ✓ Do not operate the system with covers removed.
- ✓ Wear safety glasses when cutting any materials that emit chips. Use of the optional vacuum system will remove most chips
- ✓ Use extreme caution when inserting or removing cutters.





Chapter 1: Unpacking and Taking Inventory

The engraving system has been shipped in more than one carton. Examine the condition of all containers for external damage. In the event of apparent external damage, notify your carrier upon receipt, and call your sales representative or Vision immediately.

Note: The shipping containers are considered reusable and should be stored for use in the event of service need or upgrade.

Step 1.

Open the foam packed shipping cartons. The following items should be included:

- a. The table
- b. Control unit
- c. Control unit accessory kit (with power strip)
- d. Optional accessories you may have purchased

Check all the items in the cartons to assure they are of the correct type. Should any of the contents be missing, damaged, or of the incorrect type, please call your sales representative immediately.

Step 2.

Prepare a clean, level surface to put the engraving table and controller on. Carefully lift the table and controller out of the cartons and place each on the table.

Step 3.

After unpacking the table and control unit, SAVE THE CARTONS AND FOAM PACK and ANY OTHER BOXES. They can be reused in the event the system must be transported to another location or returned for service. Improper packaging for shipment can damage the table or controller and may void the warranty.





Chapter 2: Table Description

This chapter briefly describes the major components of the Phoenix table. Figure 2.1 shows a labeled drawing of the Phoenix Engraver. This chapter will help you identify the parts of your table discussed elsewhere in the manual.

**Optional equipment such as accessory vises, clamps, fixtures or vacuum systems may have been included with your system. For information regarding this equipment, see the individual instructions for these options. For descriptions of controllers, computers, and software used in your system, see the manuals from the manufacturers of these units.*



TABLE SPECIFICATIONS:

Z-Axis Clearance

(definition: the distance between the bottom of the spindle and the work surface)

Phoenix Table: 3-Inches (76 mm) Clearance

Z-Axis Stroke

(definition: the travel distance of the Z-axis mechanism or spindle)

Phoenix Table: 1 Inch (25.4 mm)

Table Resolution

(definition: the smallest controlled motion the table is capable of)

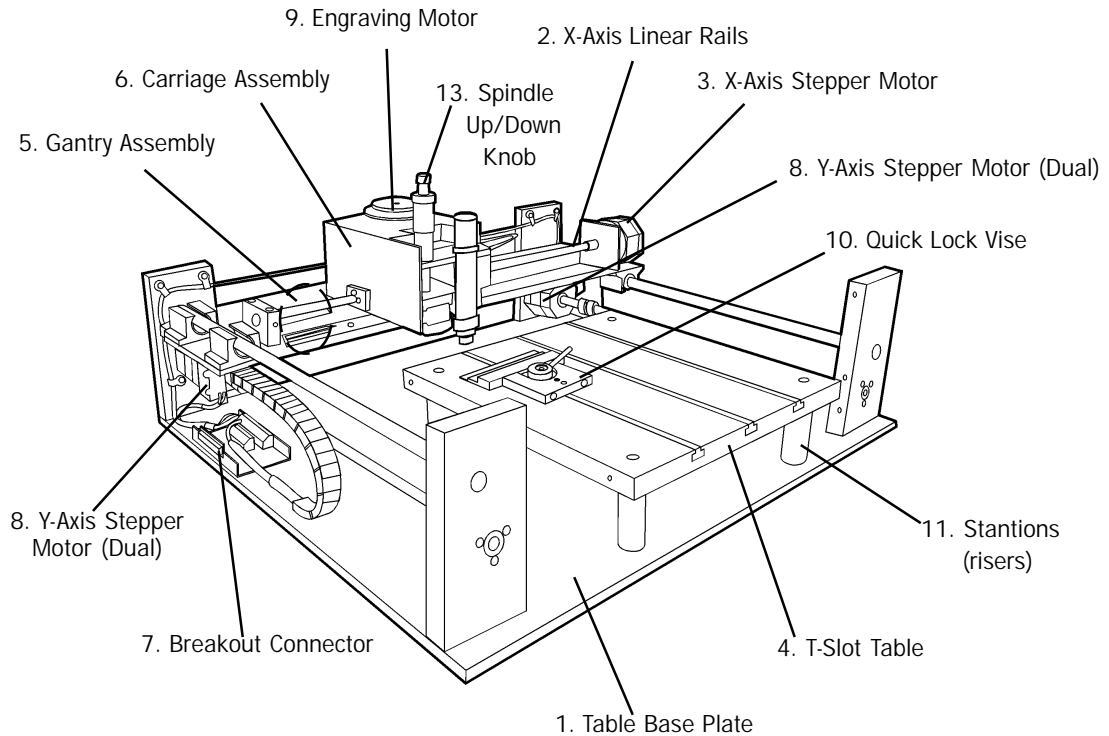
.0005 inch on all tables (when connected by a Vision Controller)

	Engraving Area	Overall Dimensions	Table Type	Shipping Weight
PHOENIX	12"x12"	21"x22"x11"	T-Slot (non-moving)	75lbs.

DEFINITION OF TERMS (as labeled in Fig.2.1)

1. Table Base Plate. This is the large flat plate upon which everything else is mounted. All mechanical alignments are referenced to this plate, so the space upon which you place the engraving table must be a reasonably level surface.
2. X-Axis Linear Rails. The steel V-rails, which allow the motion of the carriage in the X-axis direction.
3. X-Axis Stepper Motor. Drives the carriage in the X-Axis.
4. T-Slot Table. Also referred to as the work surface, this aluminum bed supported by the linear rails allows placement of the engraving material or special clamps and fixtures. The slots in this table are shaped with an upside-down T, with the bottom of the T being a single-line slot across the top of the table. The slots are used to hold various accessory holders, clamps, and jigs. (A selection of various T-slot accessories appears in chapter 7).
5. Gantry Assembly. The gantry or "bridge" is a large, rectangular bar suspended across the width of the table in the X-axis. Supports the carriage assembly and travels along the Y-axis.

(Figure 2.1) The Phoenix 1212 (non-moving T-slot table)



6. Carriage Assembly. The carriage assembly houses the engraving spindle, Z-Axis mechanism and engraving motor. The carriage moves along the gantry assembly on a V-Rail. The carriage assembly holds the engraving spindle; it raises and lowers the spindle during the engraving process using a lead screw and stepper motor.

7. Breakout Connector. This electrical access is used to connect the table to the system controller. The breakout connector is located on the left side of the table near the back.

8. Y-Axis Stepper Motors (2). Drives the carriage in the Y-Axis. Incorporates a dual drive mechanism.

9. X-Axis Stepper Motor. Drives the carriage in the X-Axis. Located under the protective sheet metal cover.

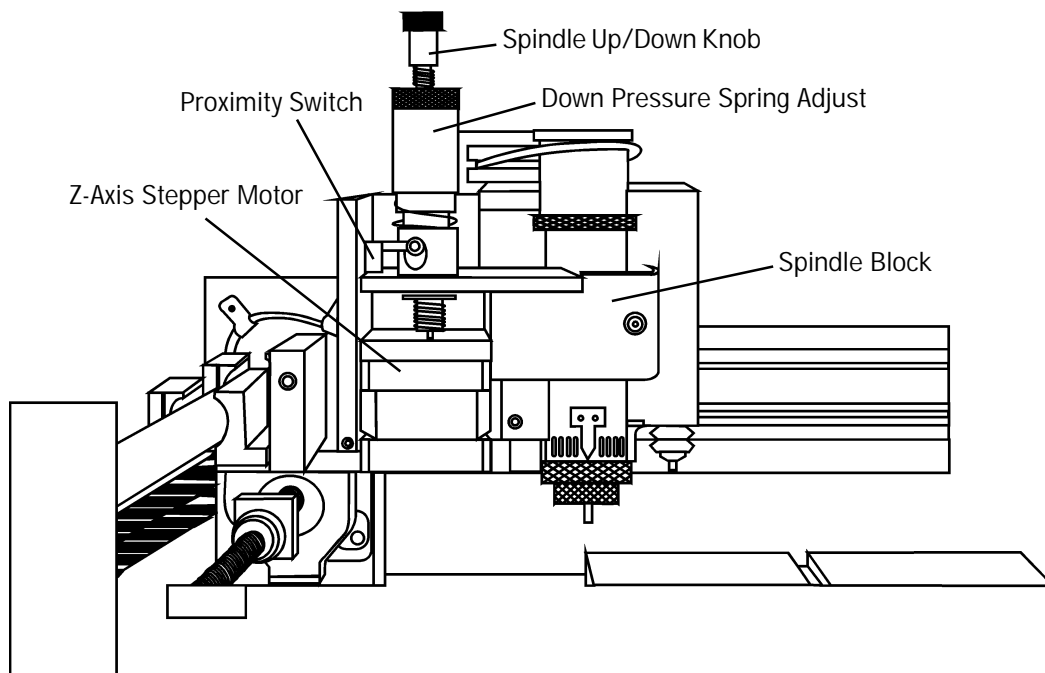
10. Engraving Motor. Drives the spindle for rotary engraving.

11. Quick-Lock Vise. A "cam" type locking device that allows quick change of parts for engraving..

12. Stantions (Risers). Larger ones are pictured in Fig.2.1.and come standard with the Phoenix Engraver. For added clearance, shorter ones may replace these to get more distance between the T-Slot table and the spindle.

13. Spindle Up/Down Knob. Raises and lowers head when power is off the the stepper motor

(Figure 2.2) Current Phoenix Carriage Front view with metal covers removed





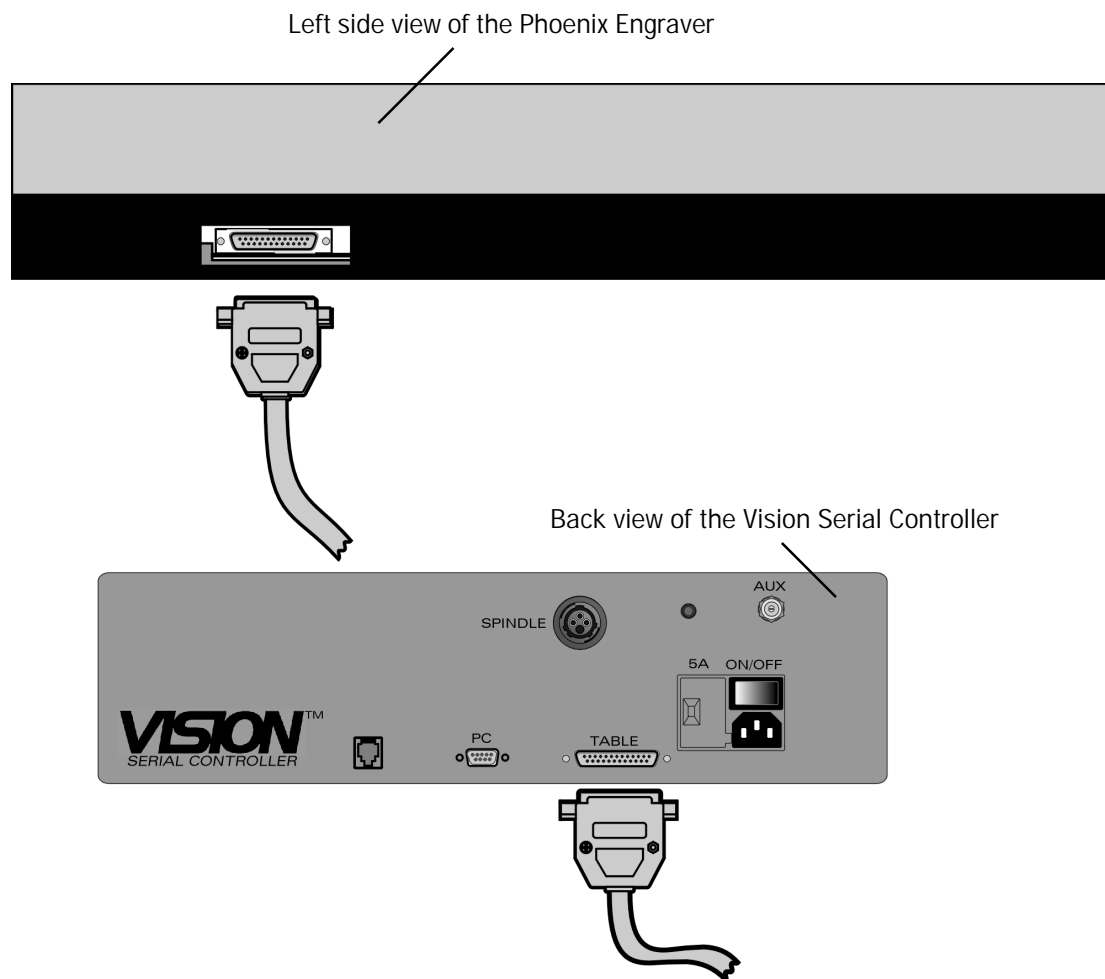
Chapter 3: Setting Up The Table

Connection of Power, Cables, and Controllers

Additional boxes may have been shipped along with your table, depending on the system ordered. These will typically include a control unit and associated cables. The proper connection of these cables is essential. Check the appropriate user's manuals for your controller before attempting to connect them to the table. After connection of the cables as directed by your controller manual, power can be connected to the system. It is suggested that a surge protector be used. (Surge protectors--often called "power strips" can be purchased inexpensively at your local hardware store.) This will allow powering all of the elements of the system at once.

NOTE: Most of the newer Vision Serial Controllers include a surge protector.

(Figure 3.1) 25-pin Breakout Connector to the Vision Serial Controller

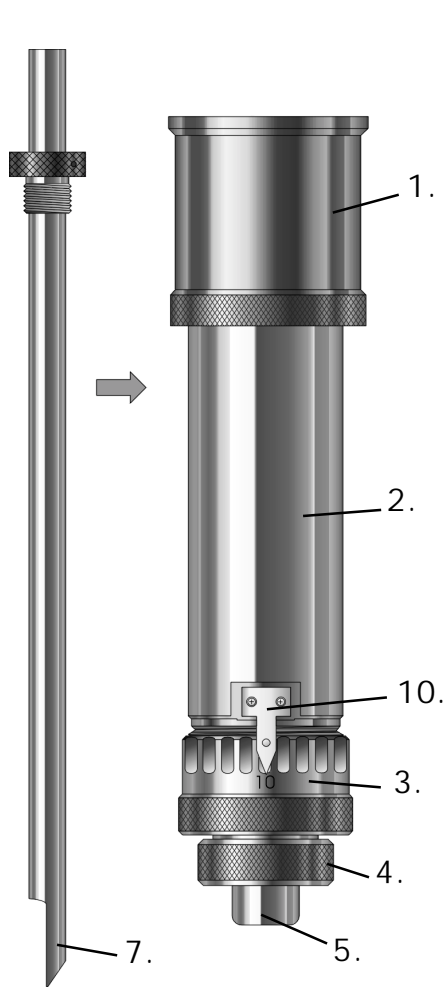




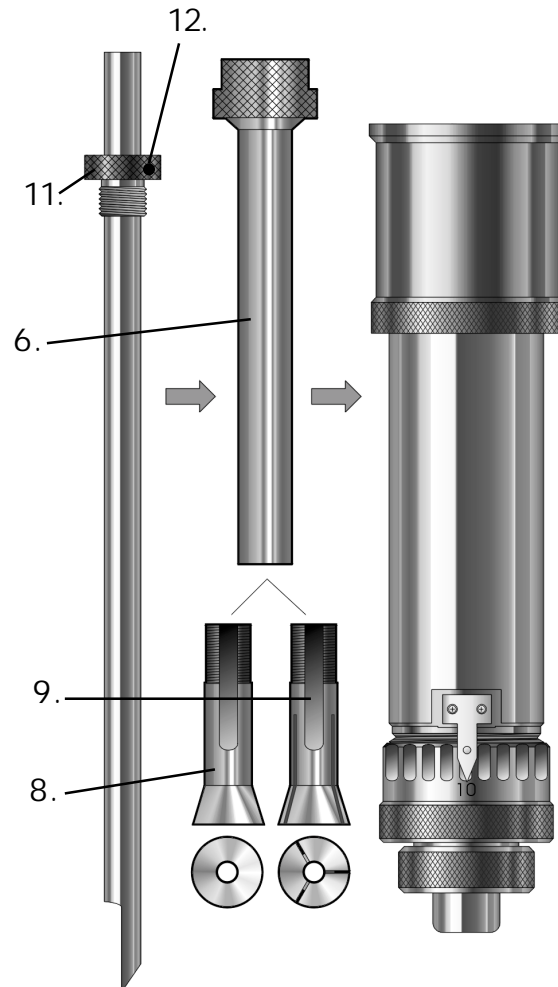
Chapter 4: Table Adjustments

All Phoenix Table models include one of the following spindles:

(Figure 4.1) Top-Loading Spindle



(Figure 4.2) Top-and-Bottom Loading Collet Spindle



- 1. Pulley
- 2. Spindle Housing
- 3. Micrometer
- 4. Retainer Ring
- 5. Nose cone
- 6. Draw Bar

- 7. Cutter
- 8. Solid Collet
- 9. Split Collet
- 10. Pointer
- 11. Cutter Knob
- 12. Cutter Knob Setscrew

Zeroing Cutters for Top-Loaded Spindles (see figure 4.1)

1. Turn the micrometer to zero. This provides a starting point and reference for setting the depth accurately. It's important to note that the micrometer should be threaded onto the spindle housing sufficiently to prevent excessive play in the micrometer and nosecone. If there are too few threads holding the micrometer in place it will move during the engraving process. The best starting position is 3 or 4 complete revolutions from the top.

CAUTION: When you loosen the setscrew in this step, the cutter may easily fall out of the spindle and can cause cutter tip damage. Use one hand to hold the cutter before loosening.

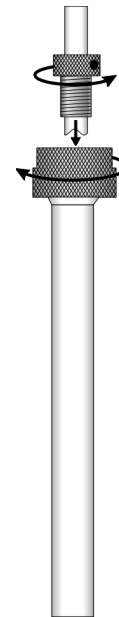
2. With the appropriate cutter installed in the spindle, loosen the setscrew in the brass cutter knob with a spline wrench (commonly referred to as the cutter wrench).

3. Gently place a piece of metal (brass preferred) against the nosecone so as to push the cutter even with the bottom of the nosecone. Now the cutter should be flush with the nosecone. Retighten the cutter knob setscrew. Your cutter is now zeroed. Rotating the micrometer clockwise will adjust the depth of the cut. Each click of the micrometer = .001". A full revolution is .025".

Zeroing Cutters for Top-and-Bottom-Loaded Collet Spindles (see figure 4.2)

The collet spindle can be used for either top loaded or bottom loaded cutters. To install a top loaded cutter in the collet spindle, first set the micrometer to zero. Loosen the knurled draw bar on the very top of the spindle slightly. Remove the cutter knob from the cutter, and slide the cutter into the spindle. Place a piece of flat material against the bottom of the nosecone and lower the cutter until it rests against the material. Tighten the draw bar around the cutter, make sure it is tight. Then reattach the cutter knob to the top of the cutter and screw it in counterclockwise until secure. Be careful screwing the cutter knob in, as counterclockwise is the direction to unscrew the draw bar (see fig 4.3). Never use pliers! The cutter depth can be adjusted by turning the micrometer counter clockwise. Note: If using 2" short cutters, install them from the bottom. Use the draw bar on the very top of the spindle to tightly secure the cutter.

A solid collet, if purchased, can be installed in place of the split collet for burnishing. Install the collet in the bottom of the spindle and tighten the draw bar firmly. The spindle now acts as a normal top loaded spindle for ease of operation. The split collet can be reinstalled when required.

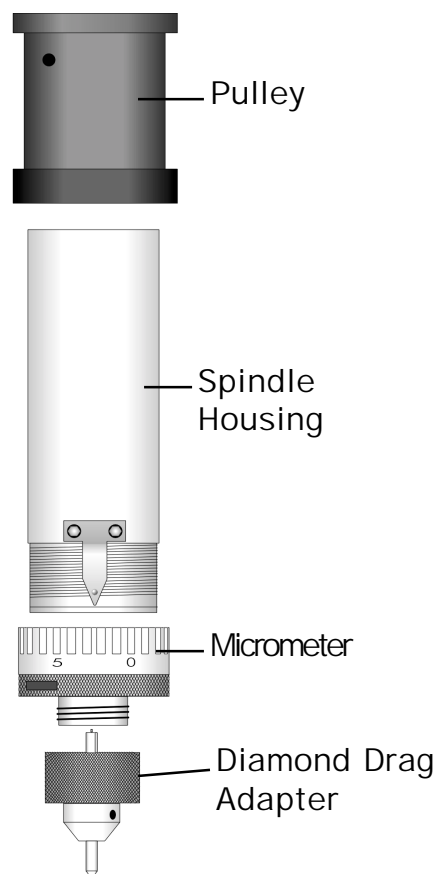


(Figure 4.3) Tightening the cutter knob in the draw bar.

Diamond Engraving

To install a diamond drag adapter, remove the retainer ring and nose cone from the bottom of the spindle and replace with the diamond drag adapter. (See fig.4.4) For diamond drag cutting, the engraving motor is turned off and the cutter "drags" across the material. This is accomplished with the motor on/off switch in the "off" position. Down pressure against the material can be reduced or increased as necessary by adjusting the spindle pressure knob as described in the next section.

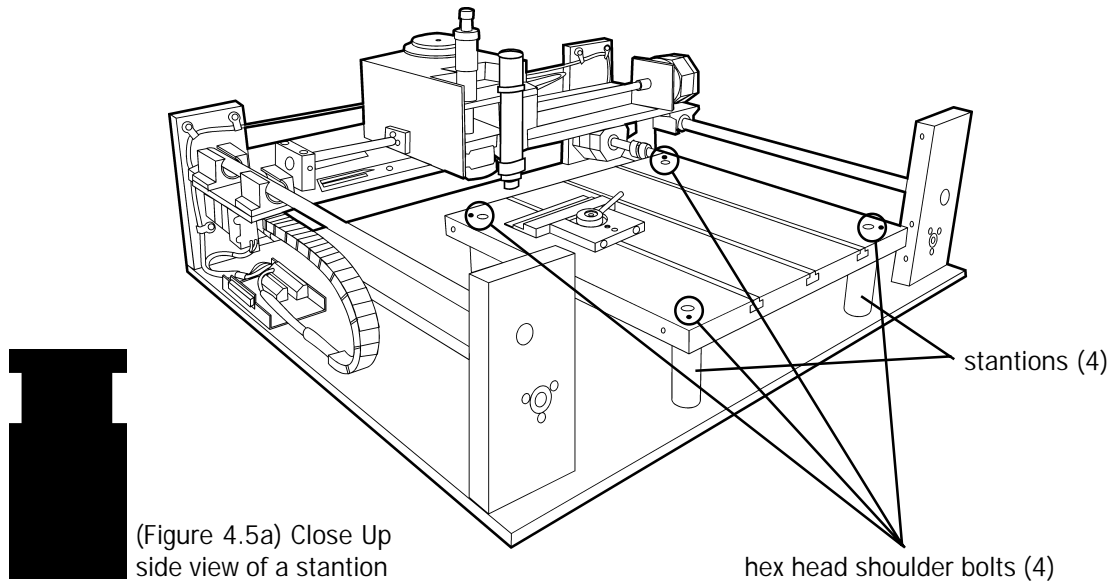
(Figure 4.4) Diamond Drag Adapter



Leveling the Phoenix Table (see fig.4.5)

All current Phoenix tables will have table level adjustments. The table may be leveled by first loosening the 4 hex head screws that secure the t-slot table to the risers (see figure 4.5), and then tightening or loosening the small set screws located next to the hex head screws. Once level, the hex head screws can be re-tightened. This is a tricky process without a dial indicator to measure accurately the run out from corner to corner. Table level adjustment can be made without the indicator but the accuracy and time may be prohibitive.

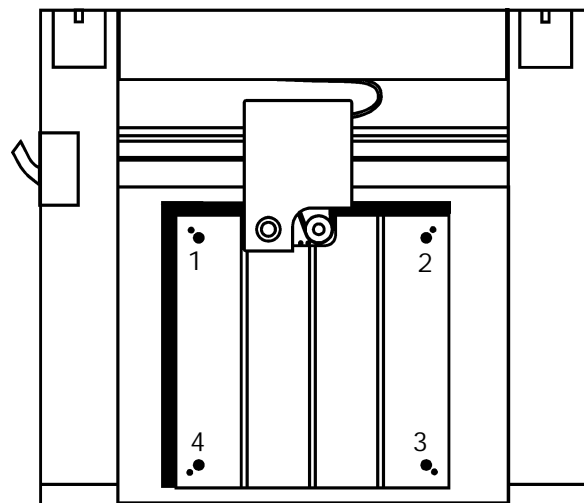
(Figure 4.5) Front Angled View of Phoenix Table
Showing the location of hex head shoulder bolts



Replacing The Stantions For Additional Clearance (see fig.4.5 and 4.6)

This procedure will allow the user to lower the t-slot table for fixturing of taller objects. It's important to understand that the total Z-axis stroke does not increase, however some additional reach can be achieved by lowering the spindle in its block.

To change from the standard 2 3/8" stantions (risers) to the shorter 1 5/8" stantions, remove the 4 shoulder bolts from the top of the t-slot table. Use a 1/8" hex key. Be careful not to strip the bolt head when removing or replacing. After the bolts are removed, the t-slot table may be set aside. Mark the 4 stantions as shown in fig.4.6. Keep the orientation the same when you replace the stantions. This will ensure that the table will be level when the taller stantions are put back in place. A flat groove has been machined into the sides (near the top) of the stantions (see fig.4.5a). Use a 7/8" open end or crescent wrench to remove the stantions by turning counterclockwise. You can add the shorter stantions to the table base by following the above procedure in reverse order. Tighten the station in place and replace the t-slot table. If the table is equipped with leveling screws, you may further level the table using the procedure mentioned in the previous section.



(Figure 4.6) Top View of Current Phoenix Model

Chapter 5: Table Maintenance

Vision strives for the highest quality in their manufacturing process to provide you with the most cost effective, reliable engraving machine in use today. Please remember that proper maintenance and care is necessary to achieve maximum product life expectancy.



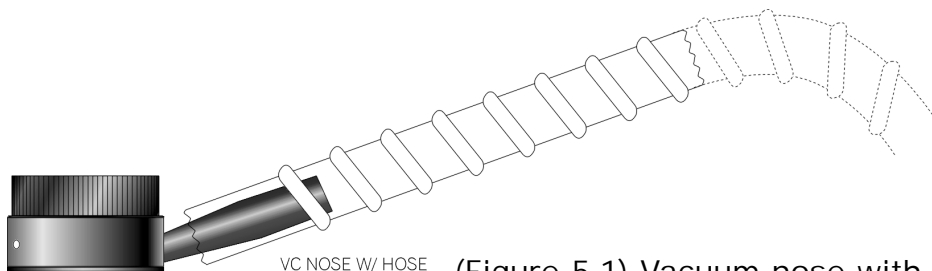
The engraving environment generates small plastic and metal chips as well as other particles during operation. As with any machinery, your engraving system should be kept as clean as possible to minimize wear and tear, and to improve final quality of the engraved product.

REMOVING CHIPS

Plastic and metal chips, generated during the engraving process, should be removed from the engraving surface periodically. A portable vacuum is suggested for chip removal, but applying direct suction to the spindle area is not recommended.

Note that this cleaning can be minimized and greatly simplified through the use of the optional vacuum chip removal system. The vacuum chip removal system removes chips and dust created by engraving. This system can also extend the life of other components in the system, as prompt removal of chips reduces contamination and overheating in the spindle area. The vacuum chip removal system also keeps the nose cone from skipping over letters due to chips on the engraving surface.

Cleaning The Nose Cone



(Figure 5.1) Vacuum nose with hose

The nose cone around the cutter may accumulate dust and chips that cannot be removed by sucking them off or blowing on them with low pressure air. (CAUTION! High pressure air can damage the spindle.) Two types of nose cones are available; one nose cone is designed to be used with the vacuum system, the other is not. Cleaning methods depend on the type of nose cone in use.

With a vacuum chip removal system (see fig 5.1), most of the chips will be removed during the engraving process. If the suction nozzle becomes clogged, remove the hose connection to the nose cone. Remove the cutter, then unscrew the vacuum nose cone. Using a vacuum or an air hose, clean out the nose and the vacuum tube leading to the nose cone. Reinstall the nose cone and the vacuum hose.

Without a vacuum chip removal system you should remove the cutter before attempting to clean the nose cone. The nose cone retainer ring, the nose cone, and the micrometer collar should all be removed and cleaned using a vacuum or blowing air. The three nose cone components should be removed and cleaned at least every day, and as frequently as necessary. Failure to clean the nose cone regularly will result in premature spindle failure.

Cleaning the Vacuum Filter (only with the vacuum chip removal option)

On systems with a vacuum chip removal system, frequent cleaning of the vacuum filter is necessary for proper performance. When engraving with the vacuum filter system, the filter should be checked and cleaned several times a day, depending on the amount of engraving done. If the vacuum does not appear to be functioning efficiently, clean the filter more frequently as needed.

To clean the vacuum filter system, disconnect the vacuum hose from the canister. On the lid of the canister, note the three wing nuts. Loosen these nuts enough to allow the attached bolts to swing away from the lid, allowing removal of the lid. Do not loosen the nuts enough to remove them completely. Remove the canister lid and inside you will find two filters. Carefully remove the inner, paper filter. (The paper and cloth filters tend to stick together.) Empty the paper filter, and shake it out completely, being careful not to damage it as the filters are reusable. After shaking out the paper filter remove and empty the cloth filter in the same manner as the paper filter. Do not wash either filter. Place the paper filter back inside the cloth filter, and place the cloth filter back inside the vacuum canister.

LUBRICATION FOR PHOENIX MODELS

Lubricating the Z-Axis Assembly

A light amount of oil (3-in-1 preferred) should be used to coat the V-rails. Do not allow any excess oil to accumulate on the rails since it will attract dust and engraving chips. After applying lubricant, run the mechanism up and down the rail to evenly distribute the oil.

Lubricating the X-Axis Bridge Assembly

Same as above.

Lubricating the Y-Axis Linear Rails

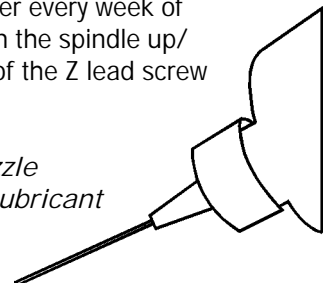
Apply 2-3 drops of light oil on the rail and rub in with your fingers. XY jog the bridge back and forth to evenly distribute the oil.

Lubricating the X-Y-Z-Axis lead screws

A light lubrication of the X and Y lead screws should be performed after every week of usage. *Use silicone lubricant only.* To reach the Z-Axis lead screw, turn the spindle up/down knob to the furthest down position, which exposes the portion of the Z lead screw that requires lubrication. Spray a light coating along the lead screw.



HINT: To avoid having to remove the metal covers, use a nozzle extension for your can of spray lubricant. DO NOT use any lubricant other than silicone, as it may become sticky and cause a buildup that can cause mechanical failure.



What not to lubricate

Many of the bearings and assemblies in your engraving machine are sealed and/or coated using special low-friction methods and should not be lubricated.

DO NOT attempt to lubricate the spindle or the spindle bearings. If you suspect lubrication problems, call your dealer/representative for instructions, as further lubrication may harm the machine.

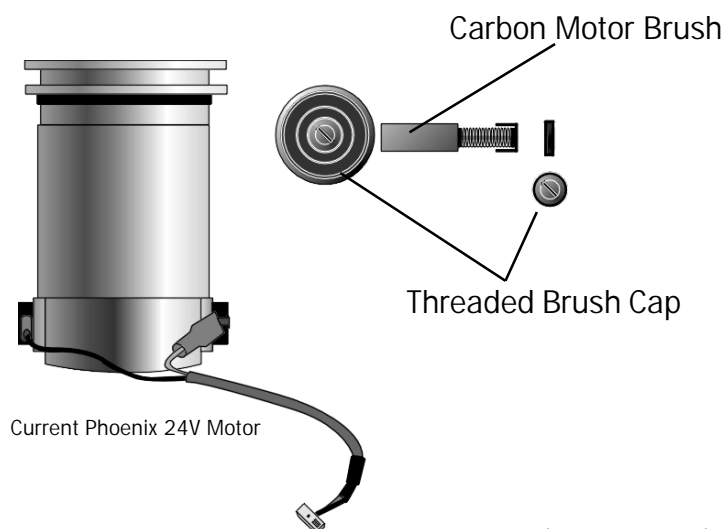
DO NOT oil the X or Y stepper motors. The only motor that requires lubrication is the Z-motor and lead screw combination. (See lubricating the Z-axis assembly above.) Oiling the stepper motors can permanently damage the motors.

REPAIRS, REPLACEMENTS, AND ADJUSTMENTS

How to replace a belt

A belt is used to drive the spindle engraving system. It runs between a drive pulley and the spindle pulley. If it needs replacement, remove the old belt by rolling it to the top of the spindle pulley, and give it a slight stretching motion to snap it off the end. Once loose, it can easily be removed from the machine. Now position the new belt around the drive pulley, then stretch it to snap over the top of the pulley.

Motor Brushes



(Figure 5.2) The Phoenix engraving motor and brushes
Shown from front and side view

The motor brushes on the engraving motor should be inspected regularly, and replaced when worn. Two brush assemblies are included with the accessories package. (One for each side of the motor.)

Inspect the brushes for possible replacement annually using the following procedure (see figure 5.3).

The engraving motor is located under the sheet metal top cover. Remove the cover to gain access to the engraving motor.



CAUTION: Disconnect the gray table cable from the Phoenix table. This will ensure that no power is applied to the table.

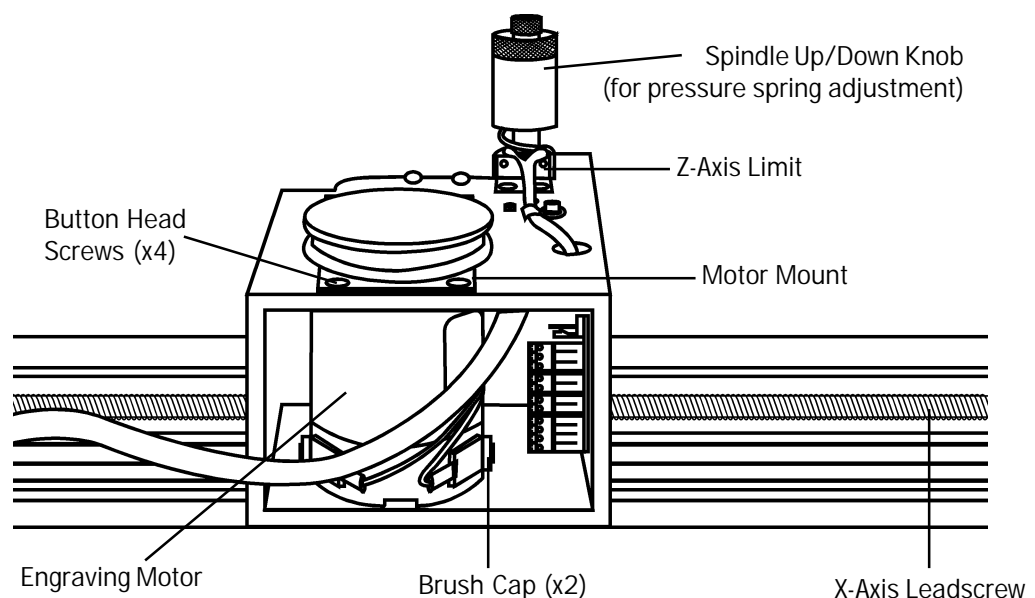
Locate and remove the 4 button head screws that mount the engraving motor to the carriage. This will allow the engraving motor to be rotated to gain access to the motor brush caps. You do not need to remove the motor from the carriage to get to the brush caps. Simply rotate the motor left or right 1/4 turn to fully see the brush cap. Using a flat tip screwdriver, carefully remove the motor brush caps and inspect the carbon brush for wear. **DO NOT ATTEMPT TO SEPARATE THE MOTOR BRUSH FROM THE SPRING.** Replace brushes as necessary.

To complete the job, reverse the order of the above listed steps and ensure that the motor mount is secure to the carriage before replacing the carriage top cover.



If either brush needs to be replaced, replace both brushes as a set.

(Figure 5.3) The Phoenix Carriage
Shown from rear view with top cover removed



MAINTENANCE SCHEDULE

Following is a suggested maintenance schedule. Remember that in conditions of prolonged use, unusual environments, or unusual applications, maintenance items may need to be performed more frequently than suggested in this schedule.

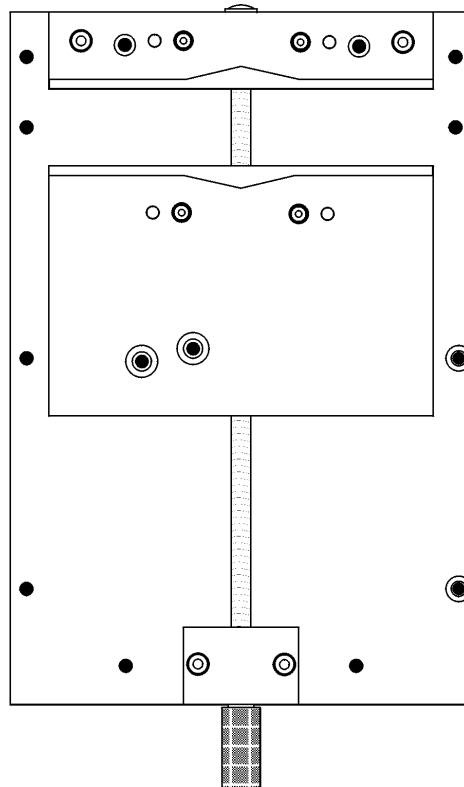
Frequency	Maintenance Items
As needed	<ol style="list-style-type: none">1. Vacuum and/or brush2. Clean vacuum canister filters
Every Day	<ol style="list-style-type: none">1. Remove chips form the spindle if you do not have a vacuum chip removal assembly.
Every Week	<ol style="list-style-type: none">1. Lubricate steel X, Y lead screws
Every Month	<ol style="list-style-type: none">1. Lubricate the Z-Axis lead screw
Every Six Months	<ol style="list-style-type: none">1. Check the brushes and replace if necessary.2. Lubricate the Z-Axis linear bearing



Chapter 6: Optional Accessories and Uses

Versa Vise

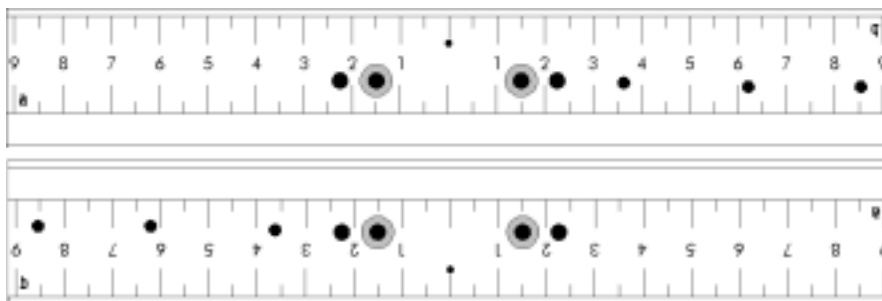
This low profile vise features a fixed top jaw and a moveable bottom jaw. Total opening is 3.5". It adapts to most systems with at least 1" clearance under the spindle. This vise is designed to be directly mounted to many engraving tables and includes T-nuts to allow quick placement on T-slot tables. The jaws will hold a variety of clamps and jigs to secure odd shaped or difficult-to-hold items.



(Figure 7.1)
Versa Vise

Universal Clamping Bars (9" Jaws)

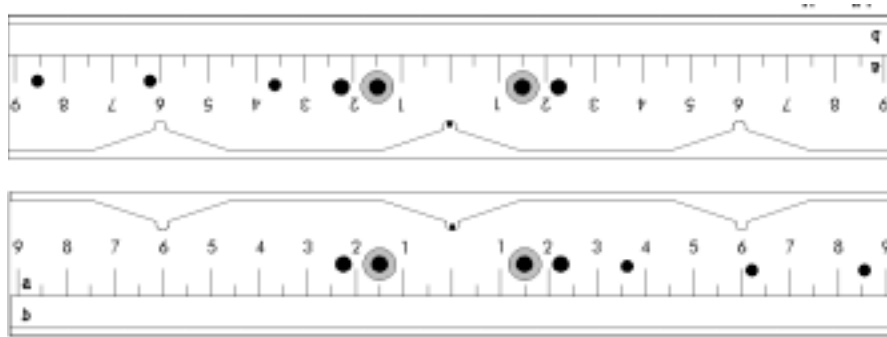
These clamping bars are specially designed to hold both 1/16" and 1/8" thick materials and allow engraving up to the edge of the material without nosecone interference. Other uses include: holding metal engraving stock, name badges or other rectangular shapes. The bars will fit the Versa Vise or can be used directly on most T-slot table surfaces. The bars will also fit Pantographs and other computerized systems that use the dowel pin system.



(Figure 7.2) 9" Jaws

Universal Seal / Medallion Holder

This universal clamp will hold 1-3 round objects at a time. It also has a place for the "eye" of a medallion or tag. This clamp may be used to any diameter of notary seal. These clamps will fit the Versa Vise or can be used directly on most T-slot table surfaces. They will also fit Pantographs and other computerized systems that use the dowel pin system.

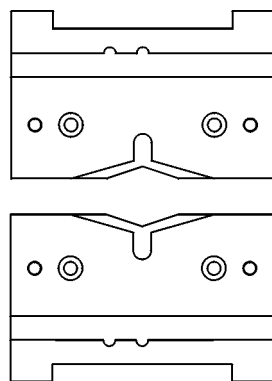


(Figure 7.3) Universal Seal / Medallion Holder

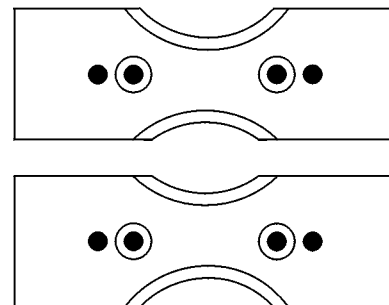
Pen & Seal Jig

These jaws enable engraving on all types of pens and other small cylindrical objects. Rotating the jaws 180° allows engraving on medallions, notary seals, pet tags and other round objects. These jaws will fit the Versa Vise or can be used directly on most T-slot table surfaces. They will also fit Pantographs and other computerized systems that use the dowel pin system.

(Figure 7.4) Pen & Seal Jig



(Figure 7.5) Seal Jig

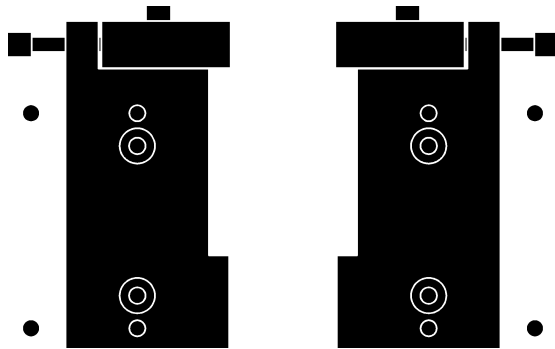


Seal Jig

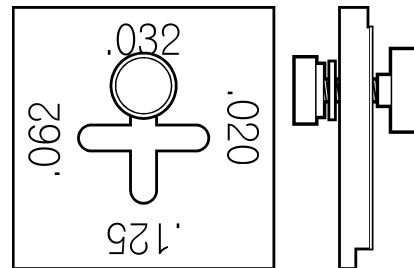
Designed for notary seals of all diameters. Rotating the jaw 180° will allow clamping of both large and small sizes. These jaws will fit the Versa Vise or can be used directly on most T-slot table surfaces. They will also fit Pantographs and other computerized systems that use the dowel pin system.

Adjustable Pen Jig

Designed specially for pens and cylindrical items whose shape is not symmetrical. The adjustment allows the capture of the small tapered diameter of pens or odd shaped items. These jaws will fit the Versa Vise or can be used directly on most T-slot table surfaces. They will also fit Pantographs and other computerized systems that use the dowel pin system.



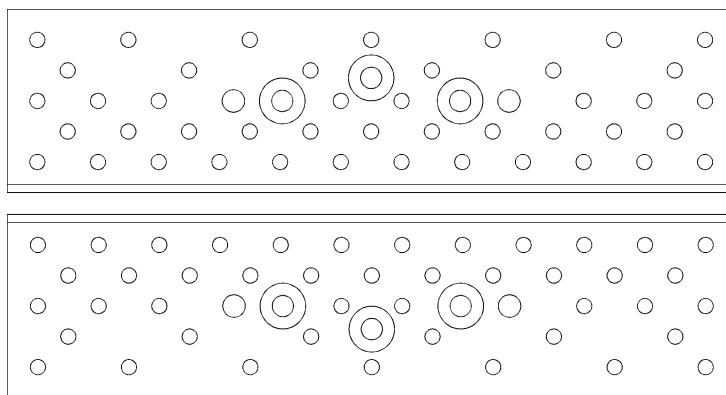
(Figure 7.6) Adjustable Pen Jig



(Figure 7.7) Edge Clamp
Top view and side view

Edge Clamps

This clamp is designed to secure plastic or metal engraving stock from the top. This avoids bowing of the material in some applications. This clamp can be moved anywhere on a T-slot table and will hold material thicknesses of .020, .032, .062, and .125 by simply tightening a thumbscrew.

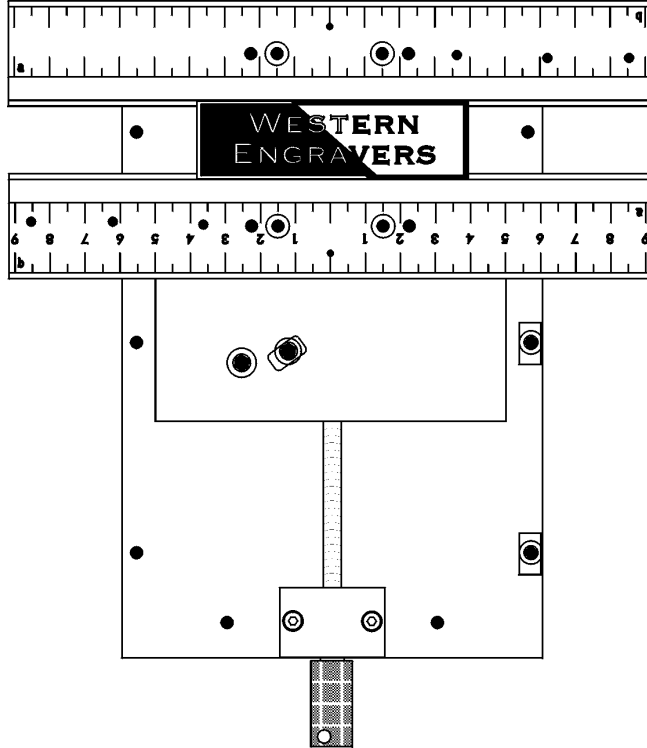


(Figure 7.8) Universal Pin Jig

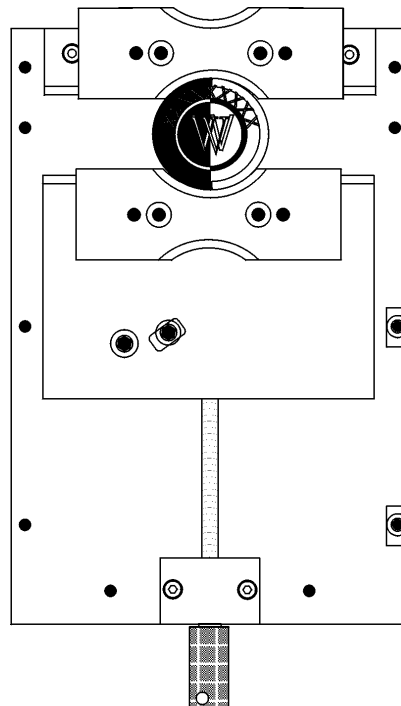
Universal Pin Jig

This is a true universal clamp designed for holding odd shaped items such as state badges, hearts, and medallions with unusual borders, pet tags, jewelry and more. The dowel pins may be moved anywhere on the jaw to accommodate any odd shape. These jaws will fit the Versa Vise or can be used directly on most T-slot table surfaces. They will also fit Pantographs and other computerized systems that use the dowel pin system.

TYPICAL VERSA VISE COMBINATIONS

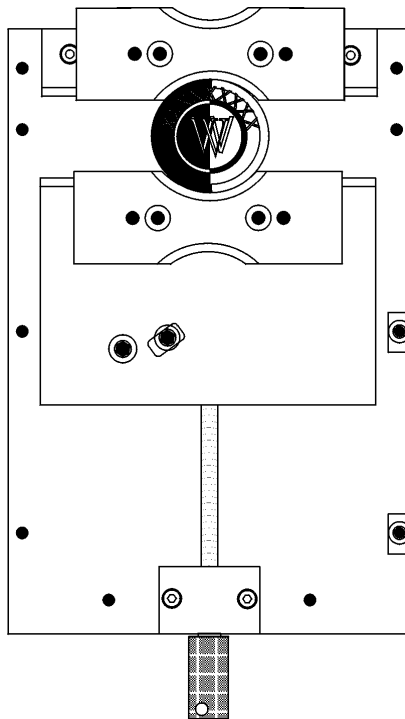


(Figure 7.9)
Versa Vise with
9" Jaws

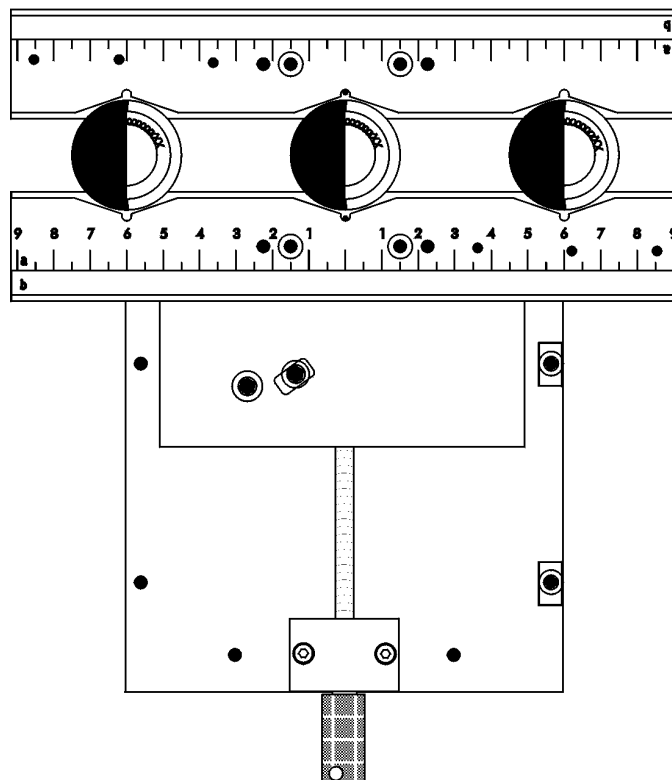


(Figure 7.10)
Versa Vise with
Pen & Seal Jig

(Figure 7.11)
Versa Vise with
Seal Jig



(Figure 7.12)
Versa Vise with
Universal Seal /
Medallion Holder

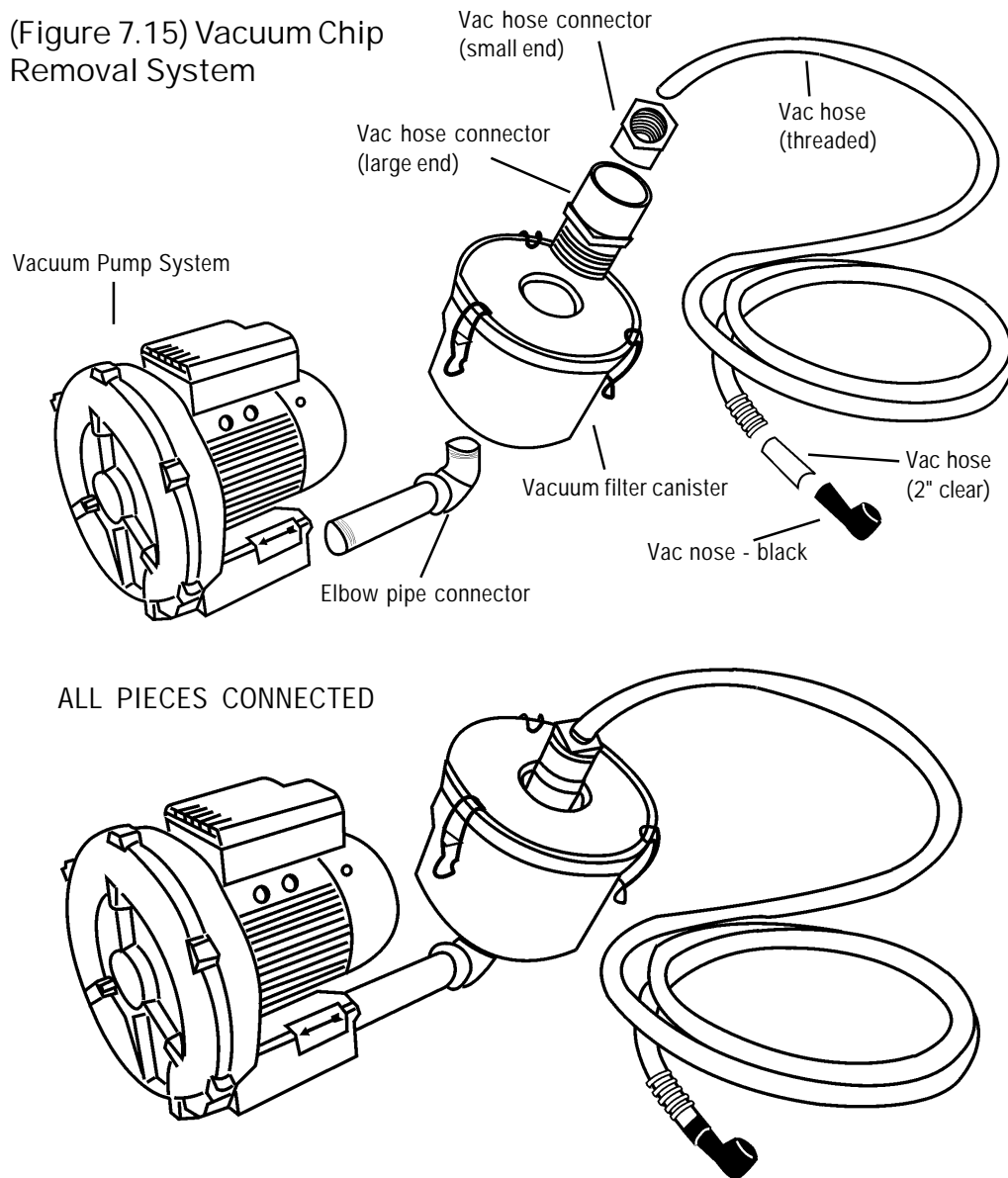


The Vacuum Chip Removal System

The optional vacuum chip removal system is designed to simplify the engraving process and minimize wear and tear on the engraver. The vacuum chip removal system uses a vacuum nose cone to remove chips created during the engraving process before they have the chance to create problems. The quiet pump, coupled with the microfine-layered filters assures that your unwanted chips are whisked away effortlessly. The vacuum pump canister uses replaceable filters that can also be reused, to assure maximum efficiency and cost-effectiveness.

The vacuum chip removal system allows prompt removal of chips and dust created in the engraving process, reducing contamination and overheating in the spindle area. Chip removal also prevents the cutter from skipping over letters due to stray particles. This vacuum chip removal system is available with or without a Vision vacuum nose cone.

(Figure 7.15) Vacuum Chip Removal System



VACUUM CHIP REMOVAL SYSTEM ASSEMBLY AND INSTALLATION (approximate installation time = 10-15 minutes)

You should have:

- 1 Vacuum Pump System (silver with a box, and power cord attached)
- 1 Elbow pipe connector (black metal with USA stamped on it)
- 1 Vacuum filter canister (blue metal, with 3 wing-nut fastners)
- 1 Vacuum hose connector (white plastic, 2 pieces)
- 1 Vacuum hose (white/clear spiral, 3/4" diameter) 10'
- 1 Vacuum hose (clear, 2")
- 1 Vacuum nose (large or small)

Also included are 2 Hose clamps (black, 3/4" + hardware to attach vac hose to carriage assembly. See below for instructions.)

To assemble the vacuum pump unit:

- Examine the vacuum pump system, you will find two large screw-holes. The "in" hole is labeled with the arrow label on the side of the vacuum pump.
- Find the elbow-pipe.
- Make sure the screw-threads are clean on both the pump system and the elbow-pipe. (Clean with a rag and water, do not use solvents. A dirty thread can make assembling screw-in parts significantly more difficult.)
- Screw the elbow-pipe into the pump system through the port on the side with the yellow/black arrow label (It will not screw all the way in, make sure the elbow is tightly screwed in and will not unscrew—some threads will show).
- Find the vacuum filter unit, and make sure the bottom thread is clean. (The bottom has three triangle-shaped spines, and an extended "nose". The inside of the "nose" is threaded to accept the pipe connector.)
- Screw the canister onto the vacuum pipe, making sure the canister is tightly screwed on. (The canister will not screw in completely.)
- Check the vacuum hose connector to make sure it is clean and trimmed. Brush off any plastic bits that may be stuck to it, and make sure the threads on the inside are clean. Separate the two pieces and make sure the inside is clean. (The two pieces separate so you can remove the vacuum hose for convenient cleaning.)
- Screw the long threaded part of the vacuum hose connector (the larger end) into the top of the vacuum canister, making sure the hose is securely screwed in.
- Check to make sure the vacuum hose is not tangled.

The following steps may have already been done if you purchased the entire assembly together.

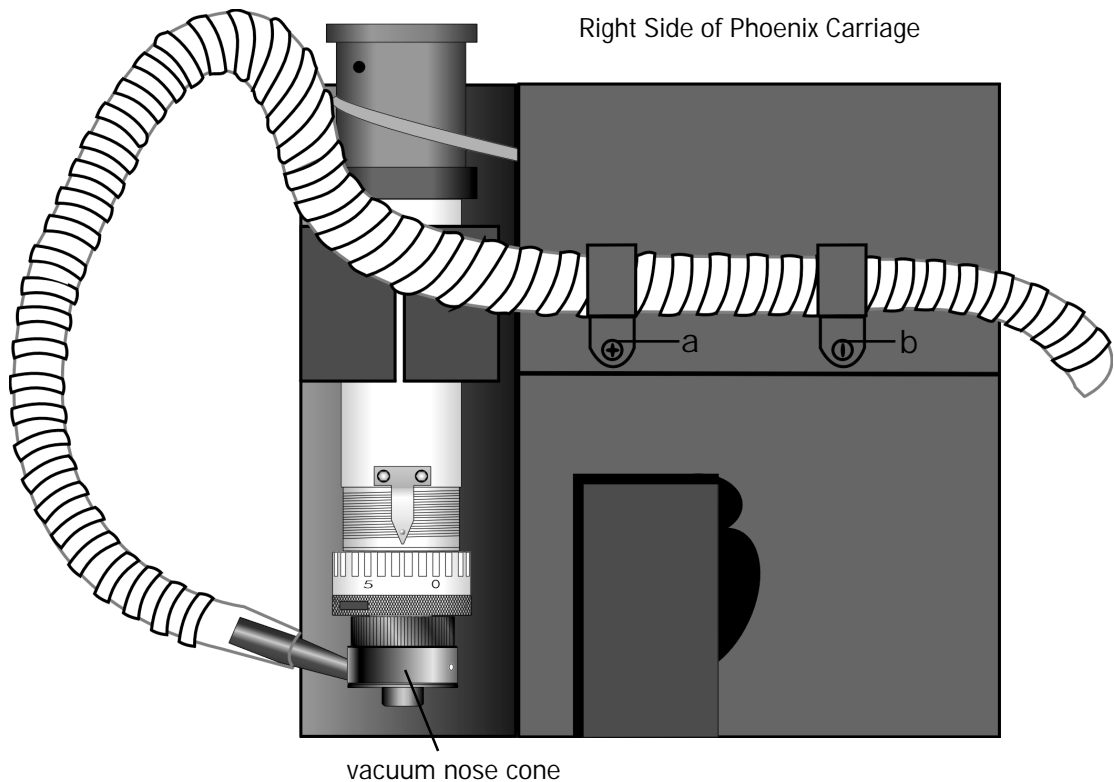
- Screw the vacuum input hose into the top of the vacuum hose connector (small end). The hose has a clear plastic nozzle and a threaded end; you want to use the threaded end, it screws into the hexagonal-part of the larger end of the white hose connector.
- Plug the clear plastic end of the vacuum hose onto the long nose that comes off the black vacuum nose attachment. (The clear plastic will cover about half of the black vacuum nose.)

Attaching the Vacuum System to the Phoenix (see 7.14 next page)

The following items should be requested for attaching the vacuum system to the Phoenix:

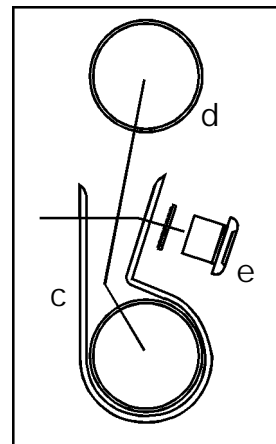
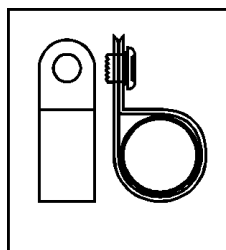
- 2 Plastic Clamps (5/8" for snug fit; 3/4" for loose fit)
- 2 Lock Washers
- 2 Screws
- 1 Hex Wrench

(Figure 7.14) Attaching the Vacuum Hose to the Phoenix Carriage



To Install:

1. Remove two screws from carriage (a & b).
2. Spread apart plastic clamps (c) and place around hose (d)
3. Place lock washer on the new longer screw & insert through holes in the clamp (e).
4. Screw clamp (with hose inside) onto carriage using the supplied hex wrench.
5. Put new vacuum nosecone on spindle (adjust micrometer if needed).
6. Attach clear end of hose to new vacuum nosecone.



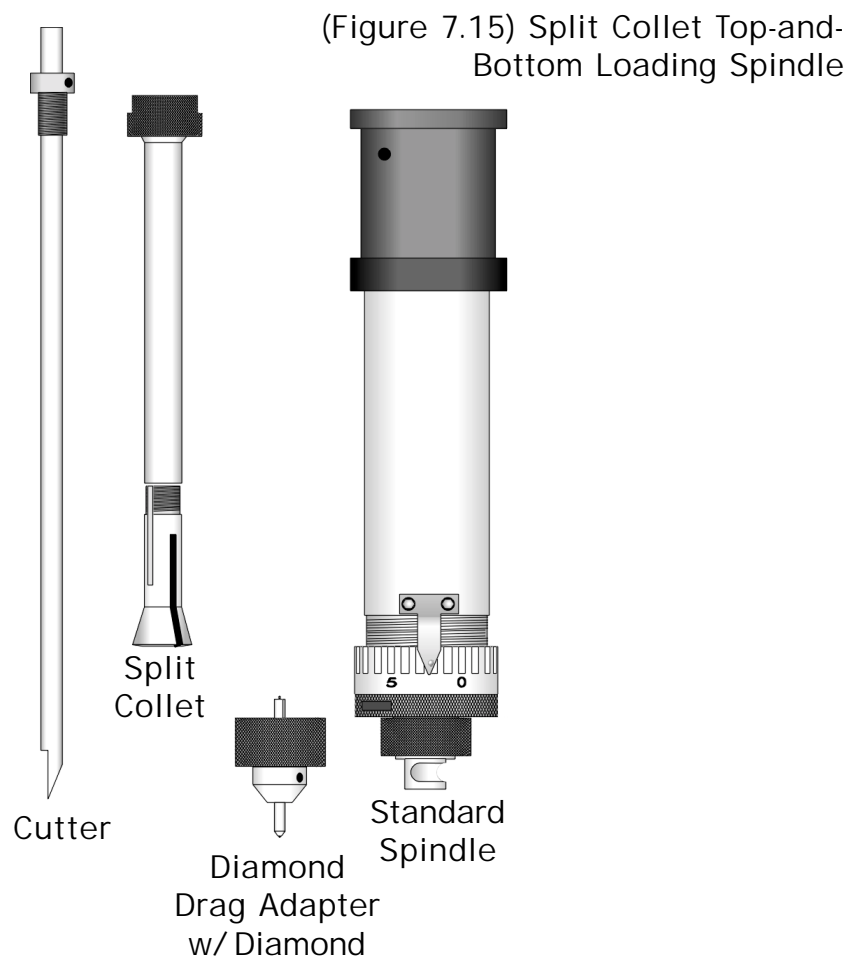
Spindle Options

Increase your profits and engraving quality with the split collet spindle (see fig 7.15). Designed to be extremely accurate and durable, the collet spindle is simple to use. This collet retracts around the cutter gripping it at the bottom, while firmly holding on the top. By holding the cutter in two places the cutter is virtually vibration-free and nearly eliminates play and runout. The split collet spindle can engrave with excellent clarity and resolution while averaging a longer product life than any other spindle.

The collet spindle accepts both top loaded and bottom loaded cutters, including 2" short shank cutters such as drill bits, router bits, dremel tools etc. Should you ever want your split collet spindle to act like a standard spindle, simply install our solid collet in the spindle (available separately).

Diamond Drag Adapters

Using your plastic cutters to engrave metal can seriously damage them. There is a better option; Western offers high-quality diamond drag adapters. Don't burn out your bearings on a job that can be done just as easily as cutting plastic. The diamond drag adapter engraves virtually all-metallic surfaces, at high resolution and high speed. The results achieved with a diamond drag adapter can be even more amazing when used with double- and triple-line fonts.





Chapter 7: Troubleshooting

ENGRAVING PROBLEMS

Problem: Engraving on the plate is “slanted”.

ENGRAVING

Possible solutions:

1. Check material for squareness. Maybe your shear does not cut squarely.
2. Check to see if the material on the table is indeed at a true home and is square to your scale bars or stops.
3. If your table is equipped with scale bars insure that they are secure and flush to your T-Slot table.

Hint: Always inspect your job before removing your plate from the system. You may be able to salvage it by re-engraving the job, or at a minimum, you may be able to analyze the problem and prevent repeating it. Perhaps the plate moved during engraving. Removing it without inspection would prevent you from detecting this problem.



Problem: You are using a nosecone, but your engraving is “shallow” across the top or left margin of your plate. It engraves properly when the spindle is away from the edge.

Possible solutions:

1. Your nosecone is riding on the scale bars or side stops. Loosen and lower the scale bars so that they are below the level of your material surface. Retighten the thumbscrews.
2. Check to see if your material is riding on the scale bars or side stops. It’s not hard to miss during set-up especially if the plate is thin material.

ENGRAVING

Problem: You are using a nosecone and your engraving is uneven.

Possible solutions:

1. Your spindle is not “zeroed” to your material. Follow the steps in “Chapter 4” to zero your spindle.
2. You are not using enough float and need to adjust the down stroke until your nosecone touches the material with some pressure.
3. You may be engraving too fast for the type of material you are cutting. Check the manufacturer’s recommendation. The cutter may be bouncing on the surface. Some hard materials may exhibit this problem.
4. You may have a defective or broken cutter. Replace it.
5. Your material may be defective.
6. Your vac chip removal system is plugged and engraving chips are caught between the nosecone and the material.
7. The nosecone or vac nose is loose.

Problem: “Shadowing” occurs while engraving certain materials.

Possible solutions:

1. Leave the protective film on the engraving material during engraving.
2. Use a plastic nosecone instead of a metal one.
3. The nosecone may be damaged. Inspect for burrs or roughness. Try using an emory cloth to polish the nose.
4. Back off on the spring pressure. Excessive down pressure will leave a rub mark on almost any plastic material.

Problem: You are *not* using a nosecone and you have uneven engraving.

Possible solutions:

1. Switch to a nose-riding method.
2. Use a different method of holding the material. If you use double sided tape, it may be thick enough to change your surface flatness by a few thousandths.
3. Parcel the job if possible so that you can have more direct control over the depth of each specific area. This may be effective if you have uneven material or a large engraving bed.
4. Table tolerances may not be able to maintain the accuracy level you want.
5. Table may not be on a level surface.



Hint: While it's true that you can do non-nose riding engraving, it's not easy to hold any controlled accuracy on the depth. This takes flat material, a very flat bed and some degree of skill and confidence. It also takes an application where some amount of uneven engraving may be tolerated.

Problem: I'm getting "tails" or "swirls" in the corners of my engraving.



Possible solutions:

1. Your cutter speed is too fast relative to your x-y speed. Slow your spindle speed down or increase your table speed.
2. Your cutter is worn or damaged. Replace.
3. Turn down the dwell speed.

Problem: I'm getting "fuzz", "fur" or can see lines in the bottom of my cut showing each cutter path. I can even see steps in the bottom of my cut.



Possible solutions:

1. This problem is tough. Sometimes caused by dull cutters, the wrong cutter, or not enough overlap for each cut. Try changing cutter size slightly. You may get better clean up.
2. Try taking a second pass cut at .001-.002 deeper. This may clean up the roughness.
3. Resharpen the cutter. There are various cutter angles that can cause these kinds of problems. There is a relief angle that if too great can cause noticeable ridges in the bottom of the cut.
4. Ensure that the spindle is square in the mount or block. An unsquare spindle means an unsquare cutter to the material surface.
5. Turn spindle speed up.

Problem: Poor letter quality.

Possible solutions:

1. You may be engraving too fast. Engraving quality improves with the right engraving and spindle speeds.
2. If you are diamond drag engraving, you have too much down pressure or you are engraving too deep. Also, check the grain of the material; it should be left to right.
3. You may have a worn or dull cutter.
4. Your material is not securely fastened to the table.

Problem: Ragged Type.

Possible solutions:

1. If the quality of cut is ragged or exhibits steps, you may have play in the cutter.



This could be in the gap between the cutter and the spindle shaft. Maybe the shaft is worn or the spindle bearings need to be replaced. Once a shaft starts to wear and a cutter is loose, the problem can worsen quickly.

2. The spindle is loose in the housing or block.
3. The carriage is loose or has excessive play, check the z-axis bearings or slide.
4. Lubricate lead screws with recommended lubricant.

Problem: My baseline is off.

Possible solutions:

1. You're not at the mechanical or software home. Maybe the table or carriage was bumped during set-up. Maybe the previous job was cut short and the system did not return back to its mechanical home or limit switches. Move the table, bridge or carriage physically to home or send it home via the software.
2. Check your software layout for keystroke errors.

Problem: While burnishing aluminum I have voids or non-engraved areas.

Possible solutions:

1. Try re-engraving the same plate again. Some of the anodized aluminum plates have very hard surfaces and two passes are required.
2. Switch to a diamond burnisher. The more common carbide tools may have difficulty getting through the tough surface and are more easily worn down, thus sometimes skipping across the surface.
3. Increase the pressure of the z-axis or burnishing adaptor.
4. Try other materials. Same reasons as above. Some materials, from some vendors, are just plain tough.

Hints:

Always try to solve the problems yourself before seeking help. A little patience goes a long way.

Never work on any problem that gets you so frustrated that you become irritated at the machine, the service technician, or the salesman. It's only a machine, don't let it get the best of you. Contact your dealer.



MECHANICAL PROBLEMS

Problem: No X, Y or Z-Axis movement.

Possible solutions:

1. Check that the controller power is on.
2. Check that the drives are turned on.
3. Check the table cable for a solid connection. It may be helpful to remove the cable, reconnect and tighten the hold down screws to ensure a good connection.
4. Ensure that the job has been transferred to the controller (Green start light is ON).
5. Ensure that the emergency STOP button is not depressed, then turn the drives on.

Problem: System has no movement in any *one* axis.

Possible solutions:

1. Try to jog the problem axis using the X/Y/Z jog keys on the control unit. If OK, retry the job.
2. Check the table cable for a solid connection.
3. Call service technician for further instructions.

Problem: Unusually loud noises during the engraving process.

Possible solutions:

1. Isolate the cause of the unusual noise by:
 - a. Remove the cutter.
 - b. Turn the engraving motor to OFF.
 - c. Run the engraving job, or X/Y jog the system.

If the noise persists, it may be confined to the X, Y or Z-axis. Check for proper lubrication of lead screws. Follow lubrication instructions in chapter 5.

If the noise goes away and to further isolate the cause, do the following:

- a. Remove the motor belt.
- b. Run the engraving motor without starting a job. Loose motor belts may cause some noises, so removal will narrow down the problem. If the noise is present with the spindle motor on, check the motor brushes.

If there is no unusual noise when running the spindle motor with no belt attached, do the following:

- a. Attach the motor belt.
- b. Run the spindle motor and vary the RPM by changing the control unit potentiometer. Noise levels may vary. If the noise persists, check the spindle for overheating. Excessive overheating of the outside housing of the spindle is a sign of defective bearings. The noise may be caused by the bearings.

Problem: Spindle is hot.

Possible solutions:

1. Ensure that the nose cone area is free of debris. Check the vacuum system (if used) for clogging.
2. Inspect the spindle for other obstructions that may prevent proper rotation.
3. Bearings may need to be replaced.

Problem: Spindle motor will not come on.

Possible solutions:

1. Check the auto/on/off switch to ensure the proper operational mode.
2. Check motor brushes.

Problem: Motor belt will not stay on pulley.

Possible solutions:

1. Motor belt is probably worn and needs to be replaced.