

Sabre™
Engraver Option

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Welcome

Thank you for purchasing the Engraver Option for your Sabre™ router. This option provides higher quality engraving than can be achieved by using a standard router motor or the high frequency spindle.

About this booklet

This booklet contains a list of the kit contents and instructions for unpacking, assembling, installing, using, and maintaining the Engraver Option. The booklet also provides a section on engraving basics, such as material and tool selection, and types of engraving operations.

In order to prepare and engrave a job, you should be familiar with ART Path™ and the Sabre operating controls and control pad.

Special information in this booklet is presented in notes, cautions, and warnings as follows:

- *Note: A note contains important information which could affect successful completion of a task.*
- **CAUTION: A caution statement contains information which, if not observed, could result in damage to the equipment.**
- **WARNING: A warning statement contains information which, if not observed, could result in personal injury.**

Getting help

If you have questions regarding the installation or use of the Engraver Option, please contact the Gerber Router Support Group at:



860-528-1028
860-290-5568 (fax)

Unpacking the Engraver Option

The engraver motor and casting are attached to a palette with two screws. Use a Phillips screwdriver to remove the screws and save the screws and pallet.

After unpacking, inspect the following:

1. Verify that the part numbers on the packing slip and invoice match the part numbers on the motor.
2. Verify that the kit contents listed below have been received.
3. Check for shipping damage. If any part of the engraver is damaged or missing, notify the shipper immediately.

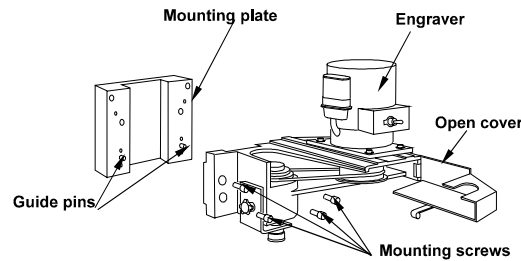
Kit contents

1 engraver motor and casting
1 mounting plate
4 M6 x 45 screws
4 M6 x 25 screws
8 M6 washers
4 M6 lock washers
20 tie wraps
6 self-adhesive power cord clips
1 cutter knob wrench (handle and separate spline insert)
1 cleaning brush
1 .03" or .75 mm diameter engraving cutting tool
1 .06" or 1.5 mm diameter engraving cutting tool
1 spare drive belt
1 vacuum nose cone
1 pressure foot with foam ring
1 spare foam ring
a vacuum hose for use with the Engraver Vacuum Option

Assembling the engraver and mounting plate

Before installing and using the engraver, you must attach the engraver and casting to the mounting plate. This assembly operation is only performed once – afterward, the mounting plate is considered part of the engraver.

The mounting plate, shown below, has guide pins on both the front and back surfaces. Attach the mounting plate to the motor casting in the orientation shown in the illustration (the lower guide pins on the front going into the back of the casting so that the mounting plate extends above the top of the casting).



After sliding the guide pins into the back of the casting, secure the casting to the mounting plate using four M6 x 25 screws and washers provided in the kit. To gain access to the two screw holes on the right, open the engraver cover.

Installing the Engraver Option

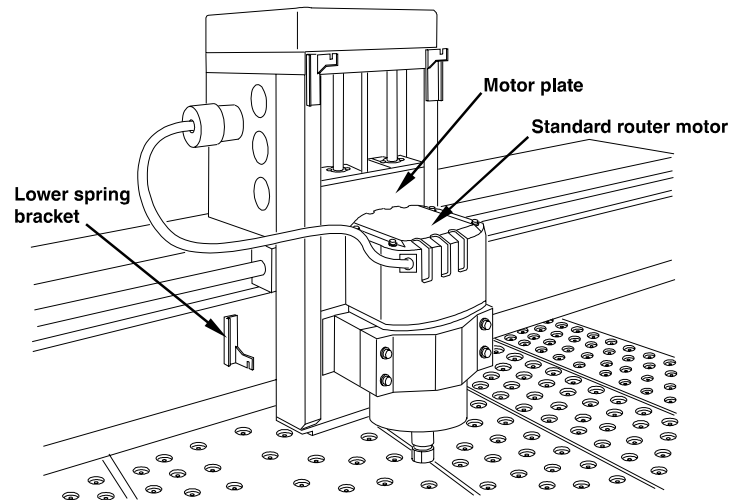
This section provides procedures for:

- removing and reinstalling the standard router motor or high frequency spindle
- mounting and removing the engraver
- changing the engraver nose cones

Removing the motor or spindle

Note: The word "motor" in the following procedure refers to either the standard router motor or the high frequency spindle. They are both removed from the carriage in the same way.

1. Shut off power to the Sabre by turning off the main power breaker on the electrical cabinet.
2. Unplug the motor power cord from the carriage.
3. Remove any tool or collet in the motor.
4. Disconnect the chip removal system vacuum hose from the vacuum shroud and tuck it behind the carriage.
5. Remove the pressure foot and vacuum shroud from the carriage by removing two screws from each side of the shroud. Store the screws with the shroud.
6. Unhook and remove the side springs.



7. Remove the two lower screws attaching the lower spring brackets and motor plate to the carriage, then remove the spring brackets.
8. Remove the two upper screws attaching the motor plate and motor to the carriage. The motor and plate remain attached to the carriage by two alignment pins in the plate.
9. Pull the motor plate and motor from the carriage.

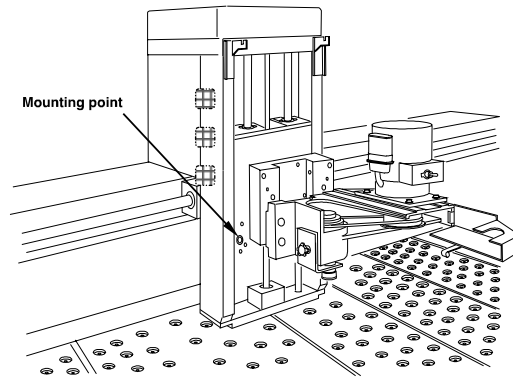
Reinstalling the motor or spindle

1. Shut off power to the Sabre by turning off the main power breaker on the electrical cabinet.
2. Manually lower the Z axis to approximately 8" (203.2 mm) above the router table surface.
3. Slide the motor into position by aligning the pins in the mounting plate to the mounting points in the carriage.
4. Attach the motor plate and motor to the carriage using 2 M6 x 1.0 screws, flat washers, and lock washers in the upper left and right mounting holes. Hand tighten.
5. Attach the left and right spring brackets to the lower mounting holes using 2 M6 x 1.0 screws, flat washers, and lock washers.
6. Tighten all mounting screws.
7. Turn on Sabre power and use the control pad to raise the Z axis all the way up.
8. Install the springs by hooking one eye of each spring to the lower bracket and the other eye to the upper bracket.

9. Attach the pressure foot and vacuum shroud to the carriage with two screws on each side of the shroud.
10. Connect the chip removal system vacuum hose to the vacuum shroud.
11. Plug the motor power cord into the receptacle on the Z hood connector panel.

Mounting the engraver on the carriage

1. Slide the engraver into position by aligning the pins in the mounting plate to the mounting points in the carriage.
2. Attach the mounting plate to the carriage using four M6 x 45 screws, washers, and lock washers.



WARNING: Set the engraver motor switch to off before performing the next step.

3. Plug in the engraver motor power cord into the receptacle labeled P191 on the left side of the Z hood.
4. Clean the left side of the carriage with isopropyl alcohol (in the areas indicated by the cross-hatched rectangles in the above illustration), then attach three self-adhesive power cord clips to the carriage.
5. Slide the power cord into the power cord clips.
6. Turn the engraver motor switch to on.

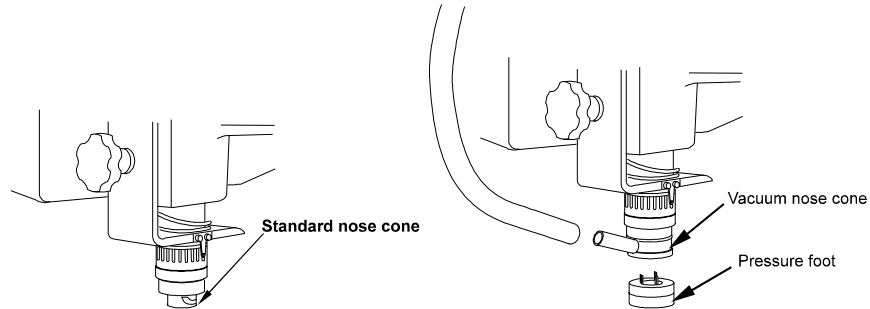
Note: You should normally leave the engraver motor on so that you are controlling the engraver motor with the Sabre power controls.

Removing the engraver

1. Turn the engraver motor switch to off.
2. Unplug the engraver motor power cord from the Z hood and remove the cord from the power cord clips.
3. Remove the four M6 x 45 screws, washers, and lock washer attaching the engraver to the carriage. The engraver and mounting plate remain attached to the carriage by the two alignment pins in the plate.
4. Pull the engraver and mounting plate from the carriage.

Changing the engraver nose cones

The engraver is shipped with a standard nose cone installed. The Engraver Option kit contains a vacuum nose cone, pressure foot with foam ring, and vacuum hose for use with the separately-purchased Gerber Engraver Vacuum Option.



CAUTION: Do not install the vacuum nose cone without connecting it to a vacuum source such as the Gerber Engraver Vacuum Option. Engraving chips may fill the nose cone, possibly damaging the cutting tool. For more information regarding the Engraver Vacuum Option, contact the Gerber Router Support Group.

WARNING: Set the engraver motor switch to off before changing the nose cone.

To remove the standard nose cone, first remove the cutting tool, then unscrew the locking ring by turning it counterclockwise. To install the vacuum nose cone, screw the cone's locking ring clockwise onto the bottom of the micrometer dial. To install the pressure foot, put the foam ring on the pressure foot then snap it into the bottom of the vacuum nose cone.

For information on connecting the vacuum hose and using the Gerber Engraver Vacuum Option, refer to the literature supplied with the Engraver Vacuum Option.

Engraving Basics

This section presents information about materials, cutting tools, and types of engraving operations.

Materials and cutting tools

Engraving materials have the following general properties:

- hardness
- surface layer thickness
- finish

Cutting tools have the following properties:

- sharpness
- width
- purpose of the engraving type

The following paragraphs describe the relationships among the material and tool properties, as well as other factors such as speed and feed rates.

Hardness, sharpness, cutter rpm, and feed rate

It is important to match the proper cutter to the material you are engraving. If you use a cutter sharpened for soft plastics, it will quickly dull when used on a hard material. Likewise, cutters sharpened for metal usually do not produce as clean a cut in a softer material.

A general rule is the harder the material, the slower the rpm for the best results. The factory setting for the Engraver Option is medium (9,000 rpm with 60 Hz power, 7,500 rpm with 50 Hz power). The setting is suitable for engraving softer metals such as brass and aluminum, as well as plastics and wood. If you increase the rpm to the fast setting (11,000 rpm with 60 Hz power, 9,000 rpm with 50 Hz power) when cutting plastics and wood, you will increase cutting tool life while still producing good results. Decrease the rpm to the slow setting (7,000 rpm with 60 Hz power, 5,800 rpm with 50 Hz power) for engraving harder metals such as steel or stainless steel.

Note: To change the rpm, refer to "Changing the cutter rpm" on page 19.

The feed rate also contributes to the smoothness of the engraving cuts. At a given rpm, a slower feed rate usually produces smaller cuts and finer finishes. You set the feed rate in the ART Path™ program as described in the *ART Path* user's manual.

Surface layer thickness and tool depth

Most standard flexible or plastic engraving material has a surface layer approximately 0.010" (.254 mm) thick. To cut through the surface layer to expose the bottom layer, you:

- generate tool paths in ART Path specifying a total depth and a depth per pass slightly deeper than the surface layer (approximately .013" (.33 mm) in this example)
- engrave in float mode as described on page 14
- set the engraver micrometer to the depth specified in ART Path

Use deeper settings for materials with a thicker surface layer.

Tool width and engraving types

The width of the tool you install depends on the type of engraving you are doing.

Single line engraving (also called *single stroke*) is a type of engraving when the cutting tool is "drawing a line" on the material rather than removing large amounts of material. The general rule is that the tool width is approximately 12% of the letter height. For example, for a letter 1/2" high, the cutter tool is .060" diameter.

single line

Note: Single line engraving is usually performed in the float mode as described on page 14.

Clean out engraving is when the cutting tool is either routing out all the material within a letter (as in the top example) or all the material around a letter to create raised letters (as in the bottom example). The general rule is that the tool width is approximately 6% of the letter height. For example, for a letter 1" high, the cutter tool is .060" diameter.

clean out



Cut out engraving is when the cutting tool is cutting all the way through the material to the surface of the table or to a sacrificial material (the dark thick border in the example). The general rule is that if you use a smaller cutter, you must run at a higher rpm. If your motor is set for low rpm, use a larger size cutter.



The cutting tools provided with the Engraver Option are .030" and .060" (or .75 mm and 1.5 mm). For information about obtaining other dimension cutters and their uses, contact the Gerber Router Support Group.

Note: Because the consistency of the cutting depth is normally not critical in clean out engraving, this operation is usually performed in the fixed mode as described on page 16.

Finish

Finish refers to both the surface of the engraving material – matte, metal, slick, or textured – and what you plan to do to the surface – engraving type described above, burnishing, or reverse cutting. For instance, matte and textured acrylic or plastic surfaces usually accept detail engraving very well, while burnishing is normally used only on metal surfaces.

You may want to avoid scratching or marring the finish, especially a slick surface engraving material. To prevent the nose cone from scuffing the surface, set the engraver in the fixed mode as described on page 16.

For additional information on material finishes and applications, contact your material supplier or the Gerber Router Support Group.

Using the Engraver Option

This section presents information and procedures for operating the Engraver Option as follows:

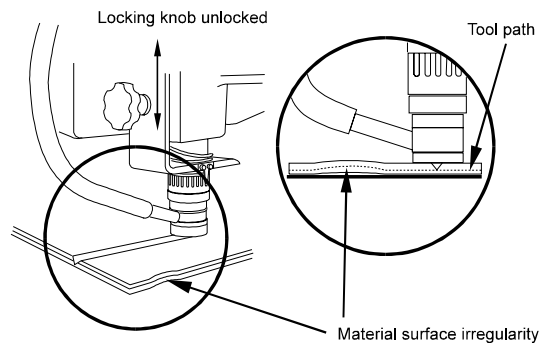
- the two operating modes
- installing cutting tools
- initializing for different types of engraving
- changing the cutter rpm

Operating modes

The Engraver Option has two operating modes – float mode and fixed mode.

Float mode

The float mode is used for most engraving operations. The nose cone is in constant contact with the material surface and follows the surface contours. This results in a uniform cut depth and width even if the surface is not perfectly flat.

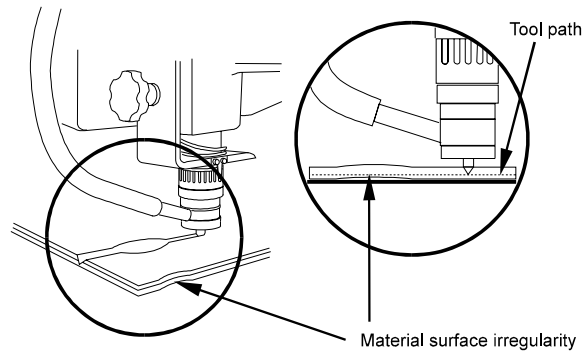


To operate the engraver in the float mode, refer to "Setting up and initializing for different types of engraving" on page 14.

Fixed mode

Using the engraver in the fixed mode is similar to operating the Sabre with the router motor. The spindle is locked so that it cannot move vertically and the tool cuts at a fixed depth disregarding an uneven material surface.

When the cutter moves through the material with an uneven surface at a fixed depth, two things happen as shown in the illustration:



- some areas of the engraving are deeper than others with respect to the material surface
- some of the engraving lines or strokes are wider than others as the cutter moves deeper into the material with respect to the surface

The fixed mode is most appropriate when:

- the consistency of the cutting depth is not critical, as in clean out or cut out types of engraving
- reverse engraving (engraving the back of material which will be viewed from the front)
- nose cone scuffing may be a concern on softer material. In this case, setting the nose cone about 1/4" (6 mm) above the material surface in the fixed mode prevents the cone from contacting and scuffing the material surface. The material must be firmly secured to the table surface if you set the nose cone above the material surface.

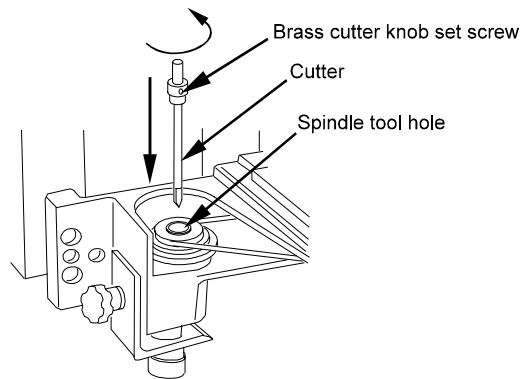
To operate the engraver in the fixed mode, refer to "Setting up and initializing for different types of engraving" on page 14.

Installing cutting tools

Before installing a cutter, determine if you will be initializing from the material surface or the table mat. Refer to "Setting up and initializing for different types of engraving" on page 14 to make this determination.

WARNING: Always store cutting tools with the protective cap over the cutting end. Cutters are extremely sharp and you can suffer serious injury if you do not store and handle them carefully.

1. Put the initialization gage on the material surface or table mat.
2. Open the engraver cover.
3. Use the cutter knob wrench to loosen the set screw in the brass knob on the cutting tool.
4. To prevent the cutter tip from hitting the gage when it is inserted in the spindle, slide the brass knob about 2" (50 mm) down the cutter shaft, then tighten the set screw.
5. Remove the protective cap from the cutter, then insert the cutter tip into the spindle tool hole.
6. Hold the spindle pulley and screw the cutter knob counterclockwise into the spindle so that it is finger tight and snug.
7. Hold the cutter shaft and loosen the cutter knob set screw.
8. Gently slide the cutter shaft down through the knob and spindle until the cutter tip rests on the gage.
9. Tighten the set screw in the cutter knob.



To remove a cutter, unscrew the cutter knob clockwise, lift the cutter out of the spindle, then put the protective cap over the cutter tip.

Setting up and initializing for different types of engraving

There are three different setup and initialization procedures you use depending on the mode and type of engraving:

- float mode
- fixed mode clean out
- fixed mode cut out

For additional information on Z axis initialization, refer to your *Sabre Owner's Guide*.

Float mode

The float mode works best if you have an Engraver Vacuum Option installed on the engraver because cutting accuracy depends on the nose cone maintaining constant contact with the material surface. You do not use the foam ring and pressure foot because the foam ring will compress and reduce the effectiveness of the nose cone contact.

If you do not have a vacuum installed, use the standard nose cone and blow a stream of compressed air on the nose cone while you are engraving. This prevents chips from the engraving process getting between the nose cone and the material surface and lifting the cone from the surface.

Setting up to engrave in the float mode is a two-step sequence:

- initializing the cutter
- setting the cutting depth

Initializing the cutter

1. Loosen the locking knob to the left of the spindle so that the spindle bracket moves freely up and down.
2. Remove the pressure foot and foam pad if they are attached to the vacuum nose cone.
3. Raise the nose cone by turning the micrometer dial to the left (counterclockwise) until it stops.
4. Lower the nose cone by turning the micrometer dial to the right (clockwise) about seven revolutions. Stop with the dial pointer on zero.
5. Secure the material to the table surface with clamps, tape, adhesive spray, or turn on the T-Vac™ vacuum.

6. Move the engraver spindle to the start position over the material, then put the initialization gage on the material under the spindle.
7. Press the Z axis down arrow key on the control pad so that the nose cone just touches the gage.
8. Install the cutter as described on page 13.
9. Press MATL INIT on the control pad. The display reads:

MATERIAL INIT	1/2
Init from material	
A: Initialize	

10. Press A to initialize the spindle.
11. Remove the gage.
12. Press ADJ DEPTH on the control pad. The display reads:

ADJUST DEPTH
0.000 in
A: Increase
B: Decrease

13. Press A until the display reads 0.100 inches then press ENTER on the control pad. This increases the depth slightly so that the spindle spring slightly compresses and holds the nose cone firmly on the material surface.
14. Press EXIT on the control pad until you get to the Status menu.

Setting the cutting depth

The micrometer establishes the cutting depth in the float mode. The cutting depth must be set to the same total depth specified in the ART Path file.

On engravers equipped with the english spindle, the micrometer dial is divided into increments of .001". The dial is labeled with numbers every .005". One complete revolution of the dial is .025".

On engravers equipped with the metric spindle, the micrometer dial is divided into increments of .03 mm. The dial is labeled with numbers every .13 mm. One complete revolution of the dial is .60 mm.

1. Look at the file in ART Path to determine the total depth that you entered.

CAUTION: When performing the next step, be sure to turn the micrometer dial to the left so that you turn past the numbers in ascending order (for example, if you want to cut .020 deep, turn the dial past .005, .010, and .015 to .020). If you turn the dial to the right to .020, you will set an incorrect depth.

2. Turn the micrometer dial to the left (counterclockwise) until the dial indicates the same depth as the depth specified in ART Path.
3. Verify that the engraver motor is turned on.
4. Send the job from ART Path.

Fixed mode

There are two different sequences for preparing to engrave in the fixed mode. The difference is initializing to the material surface for clean out type engraving and initializing to the table mat for cut out type engraving. Either the standard nose cone or the vacuum nose cone (with the vacuum hose attached and the vacuum turned on) can be used for fixed mode engraving.

Clean out engraving setup and initialization

1. Tighten the locking knob to the left of the spindle. The position of the spindle bracket (up or down) and the micrometer dial is not important.
2. If you are using the vacuum nose cone, snap the foam ring and pressure foot into the vacuum nose cone.
3. Secure the material to the table surface with clamps, tape, adhesive spray, or turn on the T-Vac vacuum.
4. Move the engraver spindle to the start position over the material, then put the initialization gage on the material under the spindle.
5. Press the Z axis down arrow key on the control pad so that the nose cone just touches the gage. If you are using the vacuum nose cone, lower the nose cone so that the foam ring compresses slightly.

Note: If nose cone scuffing of softer material is a concern, set the nose cone about 1/4" (6 mm) above the material surface to prevent the cone from contacting and scuffing the material surface.

6. Install the cutter as described on page 13.

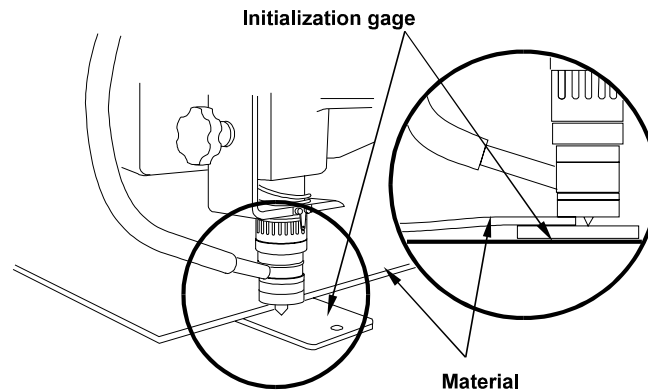
- Press the MATL Z INIT on the control pad. The display reads:

MATERIAL INIT	1/2
Init from material	
A: Initialize	

- Press A to initialize the spindle.
- Remove the gage.
- Verify that the engraver motor is turned on.

Cut out engraving setup and initialization

- Tighten the locking knob to the left of the spindle. The position of the spindle bracket (up or down) and the micrometer dial is not important.
- If you are using the vacuum nose cone, snap the foam ring and pressure foot into the vacuum nose cone.
- Secure the material to the table surface with clamps, tape, adhesive spray, or turn on the T-Vac vacuum.
- Put the initialization gage under the edge of the material with approximately half the gage showing as seen in the illustration.



- Move the spindle over the gage so that the pressure foot or nose cone opening straddles the edge of the material (half over the material and half over the gage). The objective is to have the nose cone rest on the material while the cutter tip can be lowered to the gage.
- Press the Z axis down arrow key on the control pad so that the nose cone presses lightly on the material surface. If you are using the vacuum nose cone, lower the nose cone so that the foam ring compresses slightly.

Note: If nose cone scuffing of softer material is a concern, set the nose cone about 1/4" (6 mm) above the material surface to prevent the cone from contacting and scuffing the material surface.

7. Install the cutter as described on page 13.
8. Press the TABL Z INIT on the control pad. The display reads:

TABLE INIT	1/2
0.063 in (thick)	
A: Increase	
B: Decrease	

9. Look at the file in ART Path to determine the tool depth that you entered.

CAUTION: When performing the next step, enter the same material thickness as the tool depth entered in ART Path. If the number is not the same, the table protection feature will not be effective.

10. Enter the material thickness by pressing the A or B key to increase or decrease the number.

Note: Material thickness can range from .063" to 6.0" in .063" increments (16 mm to 150 mm in 152 mm increments).

11. Press ENTER. The display reads:

TABLE INIT	1/2
Init from table	
A: Initialize	

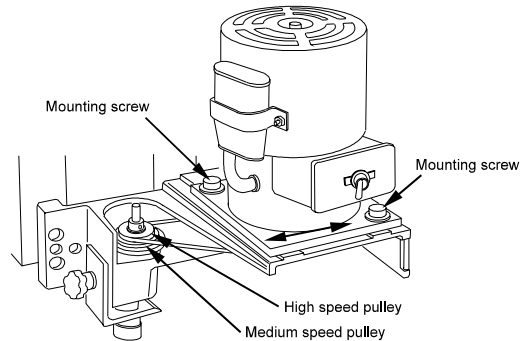
12. Press A to initialize the spindle.
13. Remove the gage.
14. Verify that the engraver motor is turned on.

Changing the cutter rpm

The engraver motor runs at a constant rpm, so to change the cutter rpm, you move the belt to another pulley on the top of the spindle. The Engraver Option is shipped from the factory with the belt around the center pulley for medium rpm. Moving the belt to the top pulley changes the cutter rpm to maximum or high speed. Moving the belt to the bottom pulley changes the cutter rpm to minimum or low speed.

WARNING: Set the engraver motor power switch to off before performing this procedure.

1. Open the engraver cover.
2. Determine the present rpm.
3. Loosen the two motor bracket mounting screws and slide the motor to the left to reduce belt tension.
4. Move the belt to a different pulley.



CAUTION: When performing the next step, do not stretch the belt excessively. Only slight tension is required on the belt. Too much tension can damage the spindle bearings.

5. Slide the motor to the right until the belt is snug and hold the motor in this position.
6. Tighten the two motor bracket mounting screws.
7. Turn on the engraver motor power switch.

Maintaining the Engraver Option

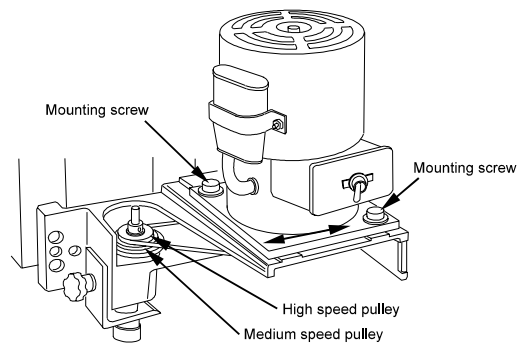
The Engraver Option requires very little maintenance. Occasionally the belt may need to be tightened or replaced, and it is important to keep the nose cone, micrometer dial, and spindle clean. This section provides the procedures for these tasks.

Tightening or replacing the belt

Indications that the belt may need to be tightened or replaced include hearing slipping sounds, a different gear noise, or a clicking type of sound. Visual indications is a deterioration in the crispness of the engraving when you are using the proper cutting tool and the cutter is sharp.

WARNING: Set the engraver motor power switch to off before performing this procedure.

1. Open the engraver cover.
2. Loosen the two motor bracket mounting screws and slide the motor to the left to reduce belt tension.
3. If necessary, put a new belt around the motor pulley and the spindle pulley.



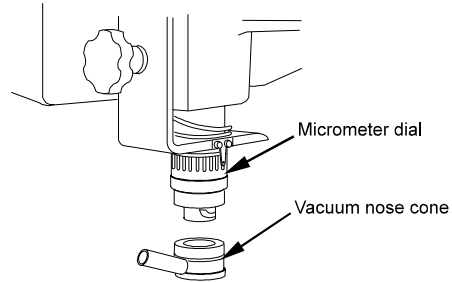
CAUTION: When performing the next step, do not stretch the belt excessively. Only slight tension is required on the belt. Too much tension can damage the spindle bearings.

4. Slide the motor to the right until the belt is snug and hold the motor in this position.
5. Tighten the two motor bracket mounting screws.
6. Turn on the engraver motor power switch.

Cleaning the nose cone and micrometer dial

WARNING: Set the engraver motor power switch to off before performing this procedure.

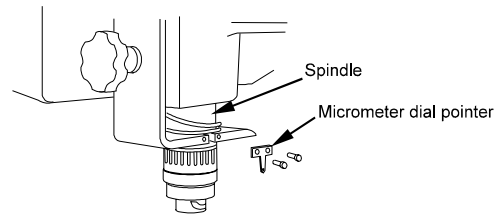
1. Remove the foam ring and pressure foot from the vacuum nose cone (if installed).
2. Unscrew the installed nose cone locking ring by turning it counterclockwise.
3. Unscrew the micrometer dial by turning it clockwise until it separates from the spindle
4. Blow compressed air on the nose cone, locking ring, foam ring, pressure foot, and micrometer dial.
5. Clean the inside threads on the micrometer dial and the outside threads of the bottom of the spindle with the brush from the accessory kit and a clean, lint-free cloth moistened with isopropyl alcohol.
6. Reassemble the micrometer and nose cone.



Cleaning and lubricating the spindle

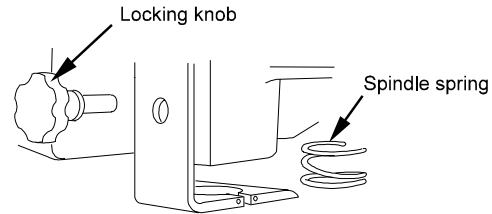
WARNING: Set the engraver motor power switch to off before performing this procedure.

1. Remove and clean the nose cone and micrometer dial as described above.
2. Remove the two screws securing the micrometer dial pointer to the spindle housing.



CAUTION: When you perform the next step, the spindle spring will fall from between the bottom of the spindle housing and the spindle bracket.

3. Lift the spindle out of the spindle housing.
4. Completely unscrew the locking knob so that the spindle bracket separates from the spindle housing.



5. Clean the locking knob, spindle bracket, spindle housing, and spindle with the brush provided in the accessory kit and with a clean, lint-free cloth moistened with isopropyl alcohol.
6. Lubricate the exterior of the spindle with a light lithium grease (not lithium spray). Do not lubricate the pulley area of the spindle.
7. Reassemble the spindle in the spindle housing and secure it with the micrometer dial pointer and the two screws.
8. Wipe the top and bottom of the spindle housing to remove excess lithium grease.

CAUTION: Do not lubricate the spindle bracket or the spindle housing.

9. Put the spindle spring over the bottom of the spindle and secure it in place with the spindle bracket.
10. Attach the spindle bracket to the side of the spindle housing with the locking knob.
11. Reassemble the micrometer and nose cone.

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