

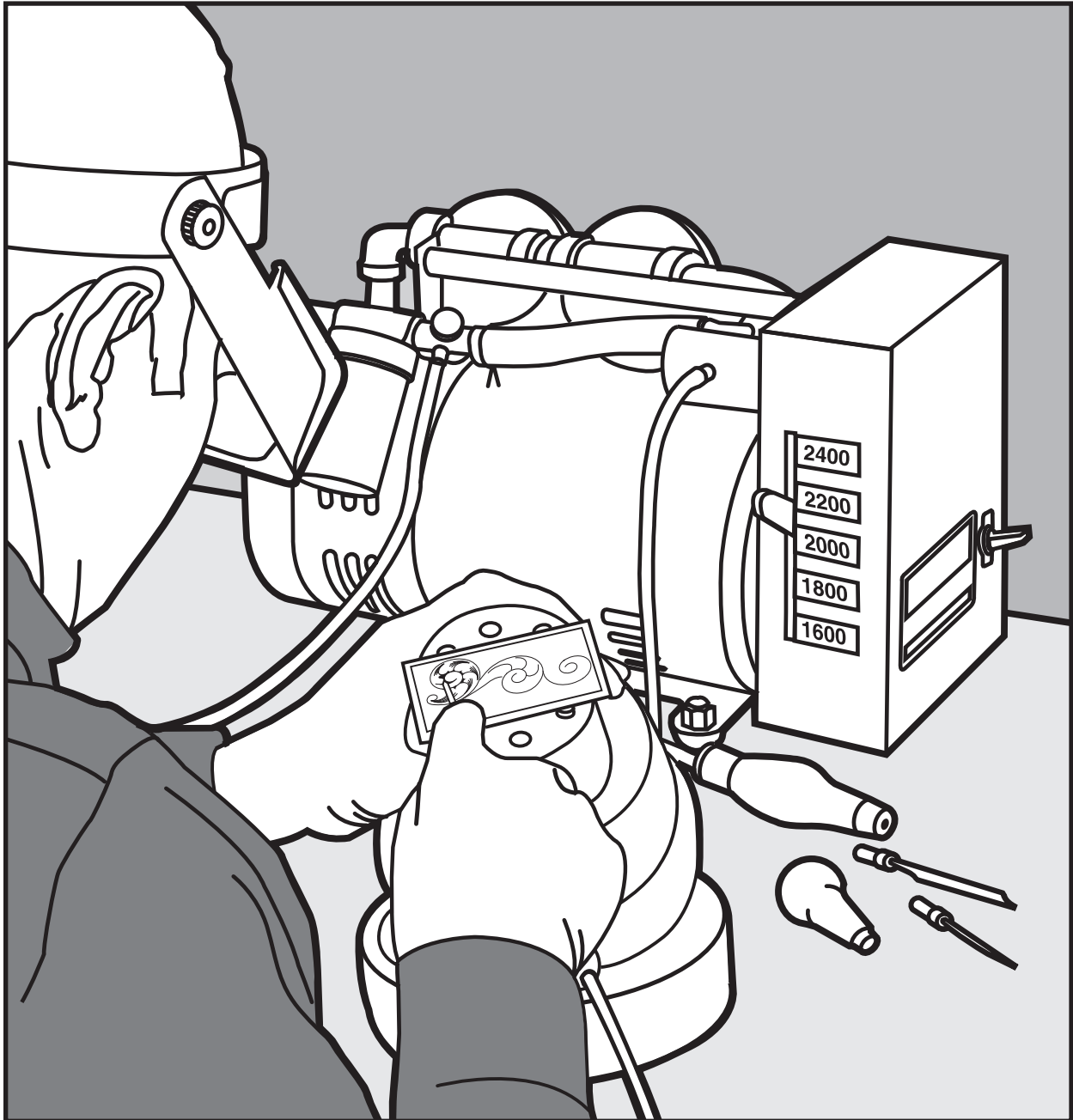
Gravermeister®

MODEL GG

OPERATION

MAINTENANCE

PARTS LISTING



900 Overlander Road • Emporia, Kansas 66801

The GRAVERMEISTER fulfills the need for a machine capable of allowing rapid but precise cutting and carving of metal, stone, and wood, as well as many other materials. The precise impact control feature of the machine also makes it an ideal tool for stone setting, stippling, matt finishing on jewelry, and stipple engraving on crystal, etc.

The skills required to properly operate the GRAVERMEISTER, while not within the ability of everyone, are easily mastered by one who possesses certain obvious, natural skills.

The GRAVERMEISTER acts on the principle of an air-operated hammer capable of delivering controlled impacts at speeds from 1600 to 2400 strokes per minute. The speed of the stroke is varied by positioning an adjusting lever arm. The impact force is controlled by depressing a foot pedal in much the same way the gas pedal on a car is operated.

Because of both the large range of adjustments available, and the precise control possible, delicate cuts can be combined with heavy material-removal cuts for the desired effect.

To realize the full capability of the GRAVERMEISTER, it is necessary for you to become totally familiar with both the operation and proper maintenance of all the components of your machine.

It is also important to become familiar with various proven techniques for use of the GRAVERMEISTER, and the wide variety of tools used to produce the various effects desired. Tool geometry and proper sharpening are as important as skillful use of the GRAVERMEISTER. The first section of this manual is intended to help you avoid many of the difficulties others have experienced in achieving the desired results with the machine. This section is worthy of frequent review until you master both the machine and the proper preparation of the tool, or graver, that does the work.

This manual is broken down into the following four sections:

1. TIPS FOR EFFECTIVE USE OF THE GRAVERMEISTER
2. MACHINE OPERATION
3. MAINTENANCE
4. PARTS LISTING

TIPS FOR EFFECTIVE USE OF THE GRAVERMEISTER

1.1 The GRAVERMEISTER provides an effective, unique method for performing a variety of functions in many materials. You may not achieve effective results with the machine at first. In fact, your initial attempts may be disappointing or downright discouraging! Begin by expecting a learning period - whether you have had experience engraving by another method, or are a novice. This claim is also made: After the initial learning period, the results and the satisfaction derived from use of the machine are fantastic! It takes a little practice, some learning, and perhaps some re-learning. It may seem awkward and ineffective at first - like your first attempt to ride a bicycle - remember?

1.2 The easiest and most productive way to learn quickly is to work with someone who is accomplished in the use of the GRAVERMEISTER. If this is not possible, we hope the information contained in these "TIPS" will be helpful. A most valuable and useful information source is James B. Meek's book, THE ART OF ENGRAVING. We recommend it highly.

1.3 Most of the information in this section is directed toward the task of metal engraving. Even if your purpose for using

the GRAVERMEISTER differs, this information is relevant and helpful. The engraving of metal, especially steel, is most difficult and demanding. When the principles of metal engraving are understood, then other uses are easily achieved. We have never known a person who could effectively carve a deep relief scene in steel, who could not easily and effectively... set a stone... florentine or engrave a ring... matt finish a piece of jewelry...carve wood... or prepare a fossil.

1.4 Here are some reasons why you may not achieve effective results with the GRAVERMEISTER at first:

- A. The concept of variable power applied to the tool holder, or handpiece, seems strange at first and must be experienced.
- B. Coordination of power and tool cutting action with the foot throttle might feel awkward, but a small amount of practice makes it natural and automatic.
- C. It seems strange and different at first - but extremely effective when mastered. Again, remember how easy it was to ride a bicycle after you learned how. Successful cutting requires just the right amount of forward pressure on the handpiece. Too much pressure creates fatigue and impairs tool control. Too little pressure quickly dulls the tool point.

1.5 Try these techniques - then review results and try them again:

- A. Turn the machine ON, hold the handpiece in your hand, and work the foot throttle to get the feel of the power variation from light, short strokes to heavy, long strokes. You will begin to anticipate the foot throttle position for the various power settings desired.
- B. Be sure the tool is seated fully and tight in the handpiece chuck. (see OPERATING TECHNIQUES on page 9)
- C. When cutting or engraving, hold the handpiece as you would a table knife - not as a pencil. Place your index finger on the graver, or chisel, as you would on a knife blade to exert slight downward pressure. You hold it like a pencil only when stippling, background matting, chipping, etc. (see How to Hold the Handpiece on page 8)
- D. Place the tool cutting point on the work piece before applying power with the throttle. Attempting to enter the cut with the power ON and the handpiece stroking will quickly dull the tool point.
- E. Apply power with the throttle only after positioning the tool on the work. Use slight pressure to keep the tool point moving forward into the cut. Both tool angle and downward pressure control depth of cut. Too much downward pressure will tire you, though.
- F. Vary the power input with the throttle to control the speed and depth of cut. Do not let the cutting action get ahead of your ability to guide the tool. Stop the throttle action to reposition the work. Leave the tool point in position in the cut.
- G. Overcome the tendency to let the handpiece continue to stroke when not actually cutting (by failing to manipulate the Throttle). With practice, control of the Throttle becomes an automatic response.
- H. Use a stable vise, or heavy engraver's block to hold the work. If the work is not held solidly, vibration will decrease effectiveness of the machine power and will more quickly dull or chip the tool point. The GRS MAGNABLOCK is the most effective work-holding block, allows the needed rotation of the work, and was designed for use with the GRAVERMEISTER. (see OPERATING TECHNIQUES on page 10)
- I. Don't push hard! If your hand becomes tired or cramped, you aren't using the power of the machine to do the work - or you may not have the tool properly sharpened or heeled. (see 1.12 "B" page 4)

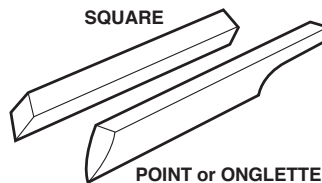
- J. Keep the tool sharp and properly heeled. Sharpen frequently - before you lose the point entirely. With practice you will begin to "feel" when the point is beginning to dull. At this time, only a slight amount of sharpening is necessary to bring it back to the desired sharpness. Hardness of the material you are cutting will greatly affect tool life.
- K. There should be no noticeable vibration of the tool point in the cut. If the point is allowed to vibrate in the cut, the point will dull quickly.

The Important Tool Sharpening Techniques

1.6 While the GRAVERMEISTER is a tremendous aid in solving the most difficult task in engraving or carving, it does not help in another important area - the task of tool sharpening. In fact, it perhaps even emphasized that problem. You will be cutting faster and deeper, and point geometry and condition will soon become apparent. Be prepared to go through a learning period in the tool sharpening task. Here too, a few minutes spent with someone who knows how to sharpen tools properly can save hours of frustrating experimentation. A word of caution though! BE SURE YOUR ADVISOR REALLY KNOWS.

1.7 If a session with someone who knows how is not possible, read the following information - and practice. In the end, you must learn an effective technique so that when you put the tool into the work, you know the result will be as you planned.

1.8 Various types of gravers are used for different types and styles of cutting, but the square and point (Onglette) are the most important in metal cutting, and once you master the sharpening techniques for them, you should have little difficulty with others.



1.9 In the book, THE ART OF ENGRAVING, Mr. Meek's excellent illustration and discussion of the importance of proper tool sharpening technique and geometry is especially helpful. He relates to this subject in chapters 2, 4 and 7. This subject is of utmost importance, and this reference material is most helpful.

1.10 Gravers should be ground on the face first. The approximate 45-degree angle should be maintained. Keep the graver in the handpiece for free hand sharpening. First, this will save time. Second, the additional length provided is an aid in maintaining the proper angle on the stone. It requires a considerable amount of care and practice to maintain the proper angle while sweeping the tool point across the stone.

1.11 A common error in sharpening is the tendency to increase the angle of the face gradually each time the graver is resharpened. To help prevent this and to reduce the sharpening time, it is helpful to remove some of the excess material near the point with a bench grinder.



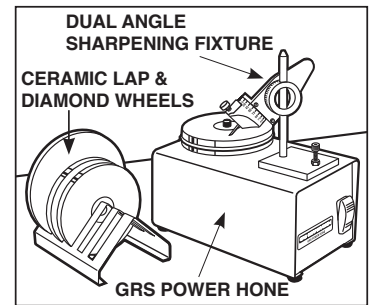
1.12 GRS sharpening equipment is a most valuable aid in tool sharpening. It is especially helpful for beginners in the art of engraving, and has been readily accepted by accomplished engravers who have found that it is faster and produces more

consistent results.

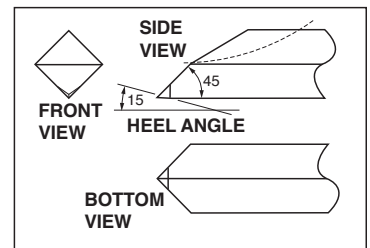
A. The GRS Power Hone is a valuable aid. Since the stone or lap rotates, it is necessary only to hold the graver at the correct angle. You may leave the graver in the Handpiece as the added length provides a convenient handle.

B. The combination of the GRS Power Hone and the Sharpening Fixture

provides the ideal sharpening system. The Sharpening Fixture is designed specifically for use with the Power Hone. With this combination, you can sharpen repeatedly with consistent results time after time. It is easy to learn - you merely follow the instructions. A square graver can also be "heeled" with the fixture.



1.13 For good results, the graver must be heeled, or set-up. This task takes some experimentation and practice to produce satisfactory results. The finish of the engraved cut is greatly affected by the finish of the graver heel. For a bright cut, finish the heel using polishing paper or a ceramic lap. Here is what the heel accomplishes:



- A. It raises the working angle of the graver to a convenient height from the work surface.
- B. It provides depth control.
- C. It gives clearance when working on irregular surfaces, and prevents the bottom surface of the graver from dragging on the edges of the cut when making curved cuts.
- D. It improves the quality and appearance of the cut.

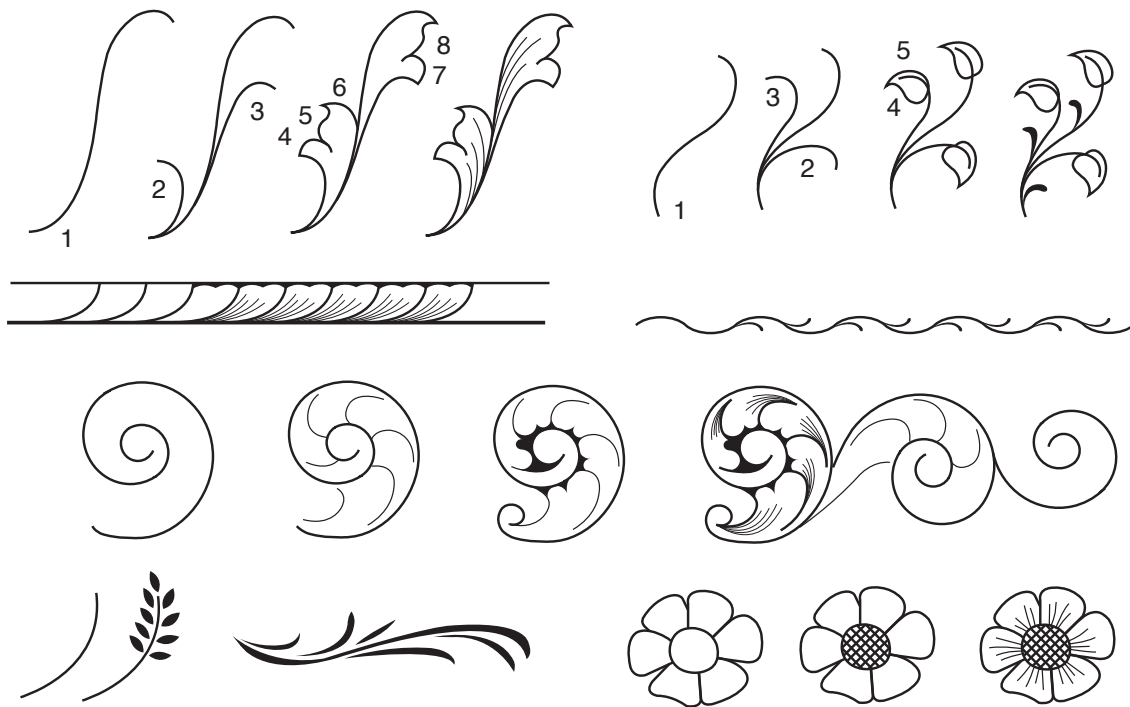
Usually a heel angle of 15 degrees is used. Only a small amount of material need be removed. A few light strokes on a fine, hard stone is sufficient. Don't be confused by the tremendous number and variety of gravers available in the supply catalogs; virtually all work can be accomplished with a small variety of points.

Tips for Practice Sessions

1.14 Start with simple cuts. Using a square or point (Onglette) graver, begin by cutting straight lines - then simple curves. Practice depth control, cutting both fine shallow lines, and deep cuts. It is good practice to master the technique of varying the depth of cut to produce a pleasing shaded effect. These practice sessions will help you acquire the necessary skills in both tool control and tool sharpening technique.

1.15 After you have mastered the basic skill, you can concentrate on learning the more difficult and intricate designs. With confidence in your ability to control the tool, you will be able to execute progressively more difficult patterns with varying depth of cut and subtle shading - and finally on curved or irregular surfaces.

1.16 Simple exercises like those sketched on the top of the next page are good beginning practice designs as they are relatively simple. It is easy to determine the progression of the cuts to generate the design, and they do not require a large amount of rotation or manipulation of the work piece. This type of design is also good practice for the beginning woodcarver.



MACHINE OPERATION

The operation section is divided into the following five parts:

- 2.1 MACHINE STARTUP
- 2.2 HANDPIECE
- 2.3 THROTTLE
- 2.4 STROKE SPEED CONTROL
- 2.5 PUMP

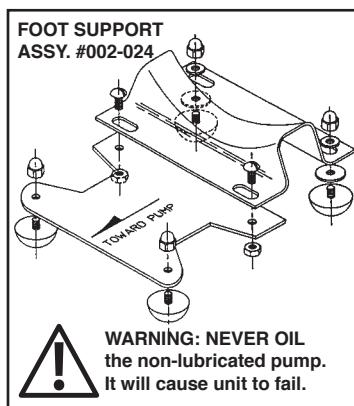
2.1 Machine Startup

The GRAVERMEISTER has been completely checked out and set for proper operation at the factory. It is shipped with the throttle, handpiece, and accessories disassembled and packed separately in the carton. The throttle hose is connected to the proper location on the machine. To unpack:

- A. Remove the machine from the shipping carton.
- B. Install the Foot Support Assembly on the Pump Mount. (Refer to instructions on the foot support package or the illustration below for proper installation).
- C. Connect the hose already attached to the machine to the foot throttle. Connect the handpiece hose, the shorter one, to the machine valve assembly. Do not interchange these hoses.

The handpiece hose must be shorter than the throttle hose for proper operation.

- D. The machine is now ready for operation, but please familiarize yourself with all sections of the manual, and keep it handy for future reference. It is valuable aid for successful use of the GRAVERMEISTER.



which acts as an air-driven hammer, and is used to hold and provide power to the tool. It consists of the Chuck and Body Assembly, Piston, Spring, and Air Connector. Currently five handpieces are available for use with the GRAVERMEISTER, and they are easily interchanged.

- A. The Handpieces are designed to work with a wide variety of gravers, liners, wood chisels, chippers, etc. GRS gravers fit all GRS handpieces. Most other brand gravers will need to be altered to fit the handpiece chuck. Normal tool shank diameter for each handpiece is 1/8 inch.
- B. The Piston is the stroking element. Its reciprocating action delivers the impact to the tool.
- C. The Spring holds the Piston in its proper position in the Handpiece body and is an important element in the stroke control characteristics of the machine.
- D. Only one handpiece can be connected to the Gravermeister at a time. GRS offers a Quick Disconnect Kit (#004-615) that allows you to switch from one handpiece to another in seconds.

HOW TO HOLD THE HANDPIECE

Normally, you should hold the handpiece like a table knife, not like a pencil. A few exceptions are hammering and stippling. Resist the urge to grip the handpiece tightly. Train yourself to hold it as softly as you can.



IMPORTANT

Gravermeister handpieces have an internal piston that creates some vibration during operation. A few people are more sensitive to this hand vibration than others. Should the user experience hand or finger numbing, excessive tingling, pain, etc. the use of this tool should be discontinued. There are many variables and several steps can be taken to reduce the effect of this vibration.

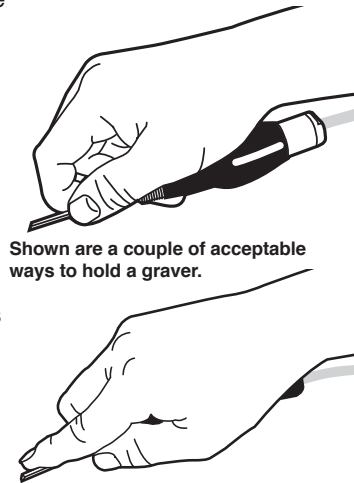
Operator Tips that lessen hand fatigue and vibration:

- 1. Hold the handpiece as loosely as possible. Studies done on a variety of power tools indicate that strong tool gripping significantly aggravates hand vibration problems.

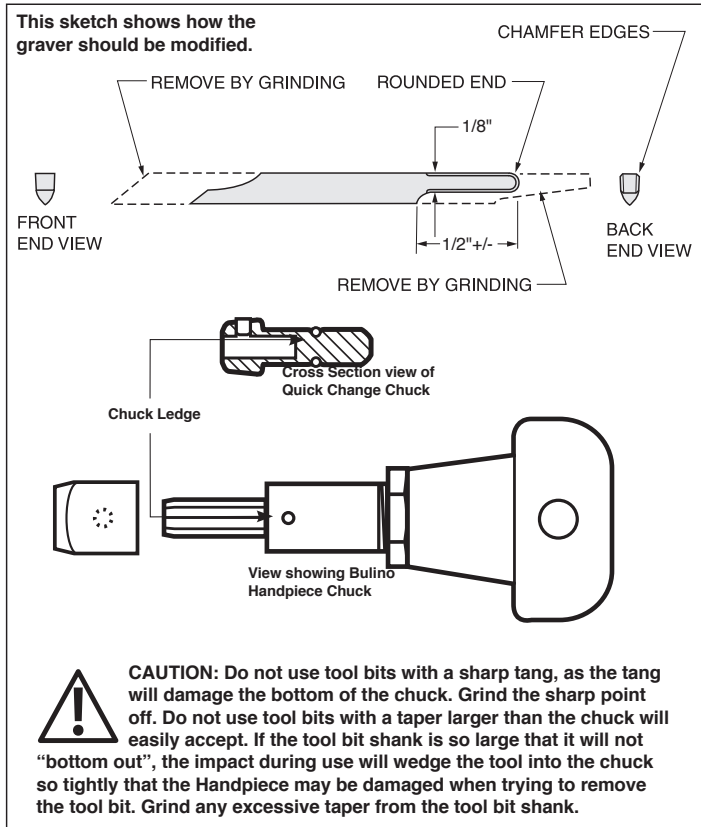
2.2 Handpiece

The GRAVERMEISTER Handpiece is that portion of the machine

2. Keep hands warm. Cold fingers can be more susceptible to the effects of vibration.
3. Use only as much power as you need and apply power smoothly. Some operators apply excessive power with the foot control and then "hold back" the tool with their hand. In this case the operator's hand must absorb the excess power that isn't needed to do the work!
4. Maintain sharp and accurate tools. Using the correct tool can significantly reduce the power needed to work. When a lot of metal must be moved by hammering, use a small nose tool to concentrate the hammer power. A properly prepared engraving tool (graver) will "stay in the cut" with little or no hand force. If the tool must be pushed downward or forward excessively, then something is probably wrong with the tool or work technique.
5. Let the Gravermeister do the work! Many handworkers were trained using hand power alone. Even after switching to a power tool such as the Gravermeister, many traditional handworkers strongly grip and push out of habit. Although it is difficult to break, these old hand habits reduce the effectiveness of the Gravermeister while increasing hand vibration.



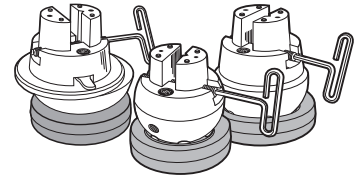
Like the warnings on items used everyday, this vibration information is intended to educate and not unnecessarily frighten the user from enjoying the benefits of this new Gravermeister.



seated inside the Chuck resting on the ledge provided in the chuck jaws. This will prevent slippage and transmit maximum impact to the cutting edge.

Standard gravers normally used with wood handles (point, knife, liners, etc.) may be used in all handpieces. The tang (or shank) end must be modified by grinding to fit the chuck properly. These gravers are clamped, with a set screw, into the chuck or Quick Change Holder with the tang end inserted clear to the bottom. Gravers purchased from GRS Tools are made to fit our equipment and may be used as a guide for modifying gravers you already own or purchase from other sources.

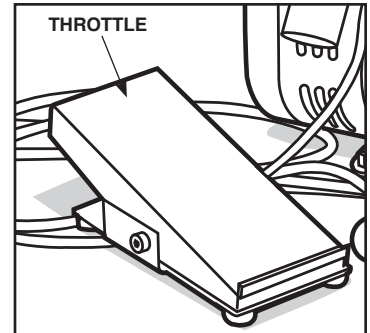
- B. Always be sure that the tool point is sharp. Sharpness enhances cutting control and allows crisp, clean material removal. Refer to the TIPS section of the manual for further information on sharpening technique.
- C. Hold the Handpiece firmly, but you need not grip it tightly. Train yourself to hold it as softly as you can.
- D. Do not push hard on the tool while cutting. Because of the reciprocating impact action of the machine, it requires only slight forward pressure.
- E. The depth of the cut is controlled by varying the angle of approach of the tool to the workpiece. After the cut is started, decrease the angle and maintain sufficient downward pressure on the tool to keep it from slipping from the cut.
- F. For best control, the workpiece must be held as firmly as possible. If it is not, much of the power and cutting capability of the tool is lost. When cutting curved lines, it is best to use either an engraver's ball or a vise which can be rotated with your free hand to position the work as the cut progresses. We recommend the GRS MAGNABLOCK.



Left to right: GRS Positioning Vise (for microscope work), GRS Standard Block, and GRS Magnablock.

2.4 Throttle

- A. DESCRIPTION: The Throttle controls the impact force of the tool. The more the Throttle is depressed, the greater the stroke impact. The Throttle is essentially an air valve. The depressing action progressively closes a Vacuum valve. As this valve closes, vacuum to operate the handpiece piston is increased.



B. OPERATING TECHNIQUES

1. The ability to exercise precise control under all operating conditions is the most important feature of the GRAVERMEISTER. Coordination of the Throttle and Handpiece is very similar to steering your car while depressing the gas pedal.
2. Place the cutting point of the tool in position before depressing the Throttle. Stop the stroking action before repositioning the tool, or at the end of a cut. Then, lift the tool from your work.
3. Use sufficient impact force to perform the cutting with a minimum of hand pressure. (If your hand and arm become tired quickly, you are pushing the tool and using too light a

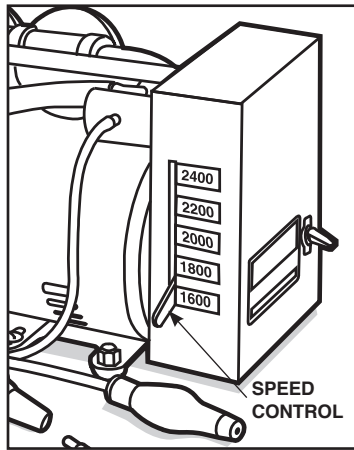
2.3 Operating Techniques

- A. When inserting the desired tool into the Chuck, it is not necessary that it be aligned perfectly; however, it must be firmly

stroke.) Remember, let the machine do the cutting. Use only enough hand pressure to maintain complete control over the cutting edge. If the tool bit slips out of position and gouges your work, you are using too much hand pressure.

2.5 Stroke Speed Control

The Gravermeister has a range of 1600 to 2400 strokes per minute. This is adjusted using the lever on the side of the front cover. Never adjust the stroke lever unless the Gravermeister is running. The strokes per minute adjustment allows you to fine-tune the handpiece for power and control. Each type of handpiece has a different response. Some handpieces will be erratic and hard to control at certain stroke speeds. If this happens, change the stroke speed to a different setting. Usually, a slower stroke speed will be less erratic, but try several settings and see how you like it. Even though some handpieces may work strangely at certain stroke speeds, this will not damage the handpiece. You can never hurt a handpiece with the wrong strokes per minute setting.



2.6 Operating Techniques

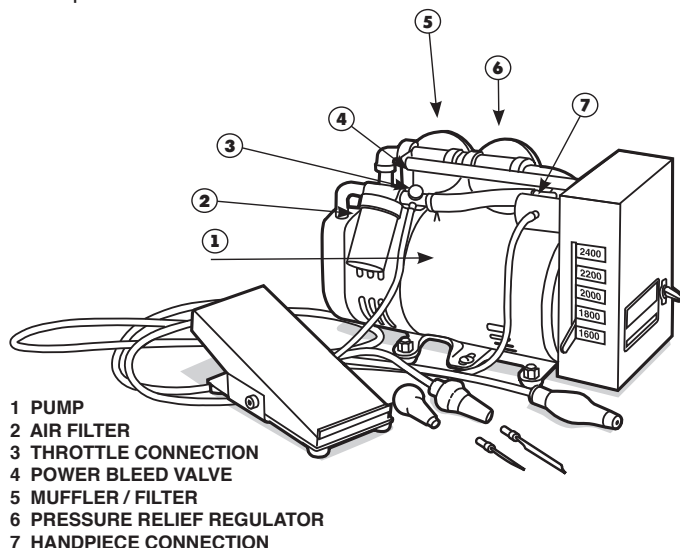
Stroke speed is a matter of personal preference and experience. Generally, a medium speed is desired; however, there are two conditions under which slower stroke speeds are more fitting:

- A. When using beading, matting or staking tool.
- B. For cuts requiring maximum power. This is an inherent characteristic of the speed/power relationship in the machine.

NOTE: Change speed settings while the machine is running. This practice increases belt life.

2.7 Pump

- A. DESCRIPTION: The Pump is the power source of the GRAVERMEISTER. It is a specially designed and constructed combination vacuum/pressure pump. The Pump, which is a rotary-vane type, is combined with the motor to form a very compact unit.



- 1 PUMP
- 2 AIR FILTER
- 3 THROTTLE CONNECTION
- 4 POWER BLEED VALVE
- 5 MUFFLER / FILTER
- 6 PRESSURE RELIEF REGULATOR
- 7 HANDPIECE CONNECTION

- B. The Vacuum inlet of the Pump is equipped with a Filter and contains a hose fitting for the Throttle inlet.
- C. A Power Bleed Valve is also located on this fitting. This Valve reduces the Maximum impact power of the machine when it is unscrewed. This provides more precise control for delicate work (it acts like a governor).
- D. For normal operation, this valve should be closed for maximum power range. To adjust for reduced maximum power; open the valve until maximum power is reduced to the desired level. Limiting power in this manner makes the throttle less sensitive and easier to control for delicate work.
- E. The pressure outlet of the pump is provided with two special Muffler/Filters. The first Muffler/Filter contains a filter element for cleaning the pump exhaust air. The second Muffler/Filter contains a Pressure Relief Valve set at the factory for 3 P.S.I. DO NOT ADJUST THIS VALVE. Be sure the aluminum jars are tight to prevent leakage.

MAINTENANCE

The maintenance section is divided into the following four parts:

- 3.1 HANDPIECE
- 3.2 THROTTLE
- 3.3 STROKE SPEED CONTROL
- 3.4 PUMP

3.1 Handpiece

The Handpiece must be kept clean for proper operation. It must "breathe" through the bleed holes around the Handpiece body. If the Handpiece operation becomes sluggish, erratic, or fails to operate, it may need cleaning.

- A. To clean the Handpiece:
 1. Remove the Hose Connector, Spring and Piston, and clean all parts thoroughly with solvent.
 2. Reassemble
 3. Do NOT oil the Piston or bore of a Handpiece. Oil will soon become gummy and cause erratic handpiece action.

- B. Oiling - Occasionally place a drop of oil on the Handpiece Chuck or Quick Change Holder. This will extend the useful life of the chuck components, and make them easier to open and close.

3.2 Throttle

- A. Cleaning - The Throttle should require little maintenance. However, if operated in dusty or dirty conditions, it may be necessary to clean the valve inlet periodically. The valve inlet is located inside the hinge plate, directly opposite the Throttle Valve hose connection.
- B. Oiling - Periodically place a drop of oil on the Throttle Hinge and the sliding surface of the Throttle Inlet.

3.3 Stroke Speed Control

- A. Cover removal - To remove cover, loosen the screws on each side of the cover and lift off. It is necessary to spring the cover open slightly to clear the Idler Arm.

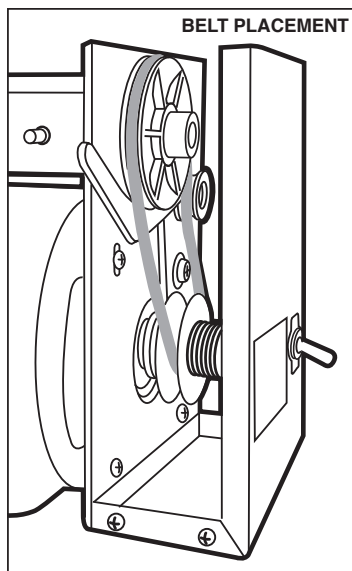
NOTE: When installing the cover, be sure the locating flanges at the top properly engage the switch cover and back plate.

- B. Switch Cover removal - Two screws fasten the Switch Cover to the Back Plate. If it becomes necessary to remove this cover, the switch must also be removed; however, most maintenance can be performed without doing so.



WARNING: BE SURE TO UNPLUG THE MACHINE BEFORE WORKING IN THIS AREA.

- C. Belt removal - The belt can be easily removed by positioning the idler arm to 2400 and rolling the Belt from the valve sheave. When installing the belt, place it around the variable sheave and pull on it, just enough to expand the sheave and allow the belt to be placed on the valve sheave.

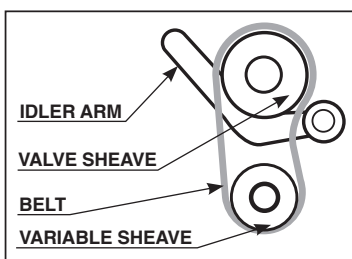


3.4 Pump



WARNING: NEVER OIL this non-lubricated pump. It will cause unit to fail.

- A. Vacuum Filter - The Vacuum Filter may be visually inspected for dirt. Clean the jar periodically to prevent the possibility of foreign particles passing through the pump. Remove the felt filter elements occasionally and clean them with a solvent.



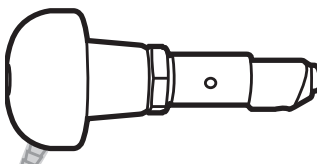
CAUTION: ALWAYS BE SURE ALL FILTER JARS ARE TIGHTLY INSTALLED. A LEAK CAUSES A DRASTIC REDUCTION IN MACHINE PERFORMANCE.

- B. Muffler/Filter Jar - Periodically remove and clean the aluminum Muffler/Filter Jar. The Pressure Relief Valve (inside the second jar) is set at the factory for the proper operation pressure of 3 P.S.I. No further adjustment of this valve should be made.
- C. Maintenance - for satisfactory performance of the Pump, consult the Pump manual for any maintenance required. A local GAST distributor may be near you, and can supply replacement parts. GRS also maintains a large supply of replacement of parts.



CAUTION: A considerable amount of heat is generated by the pump, especially on the pressure side. This is normal. The Muffler / Filters will normally become so warm that they are uncomfortable to touch. This is due to the heat rise associated with the compression of air.

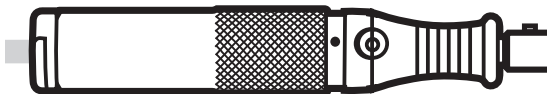
SELECTION AND USE OF HANDPIECES



#004-564 • Bulino

Recommended Strokes/Minute: 1600-2400

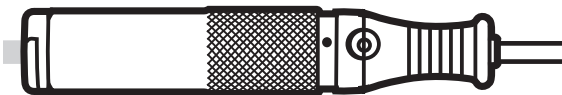
Uses: The smallest handpiece for fine work including shading and small stone setting. Almost as small as a hand graver handle!



#004-612 • Hammer

Recommended Strokes/Minute: 1600-2100

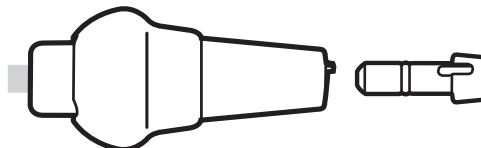
General purpose to heavy engraving, stone setting, carving and hammering. Made from stainless steel. Has set screw chuck.



#004-611 • Hammer

Recommended Strokes/Minute: 1600-2100

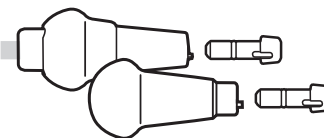
Same as #004-612 above, but for threaded hammer tips only. Includes one tip.



#004-821 • #821 QC

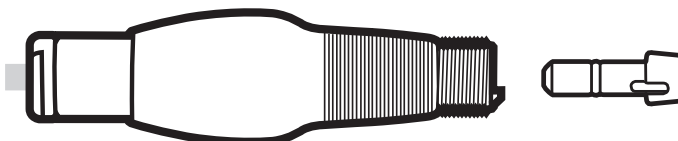
Recommended Strokes/Minute: 1600-2400

Fine to general purpose engraving and stone setting. Has "graver handle" feel and GRS Quick Tool Change feature.



#004-830 • QC Set

Includes #004-821 handpiece and #004-805 Quick Change Hand Engravers plus QC Holders

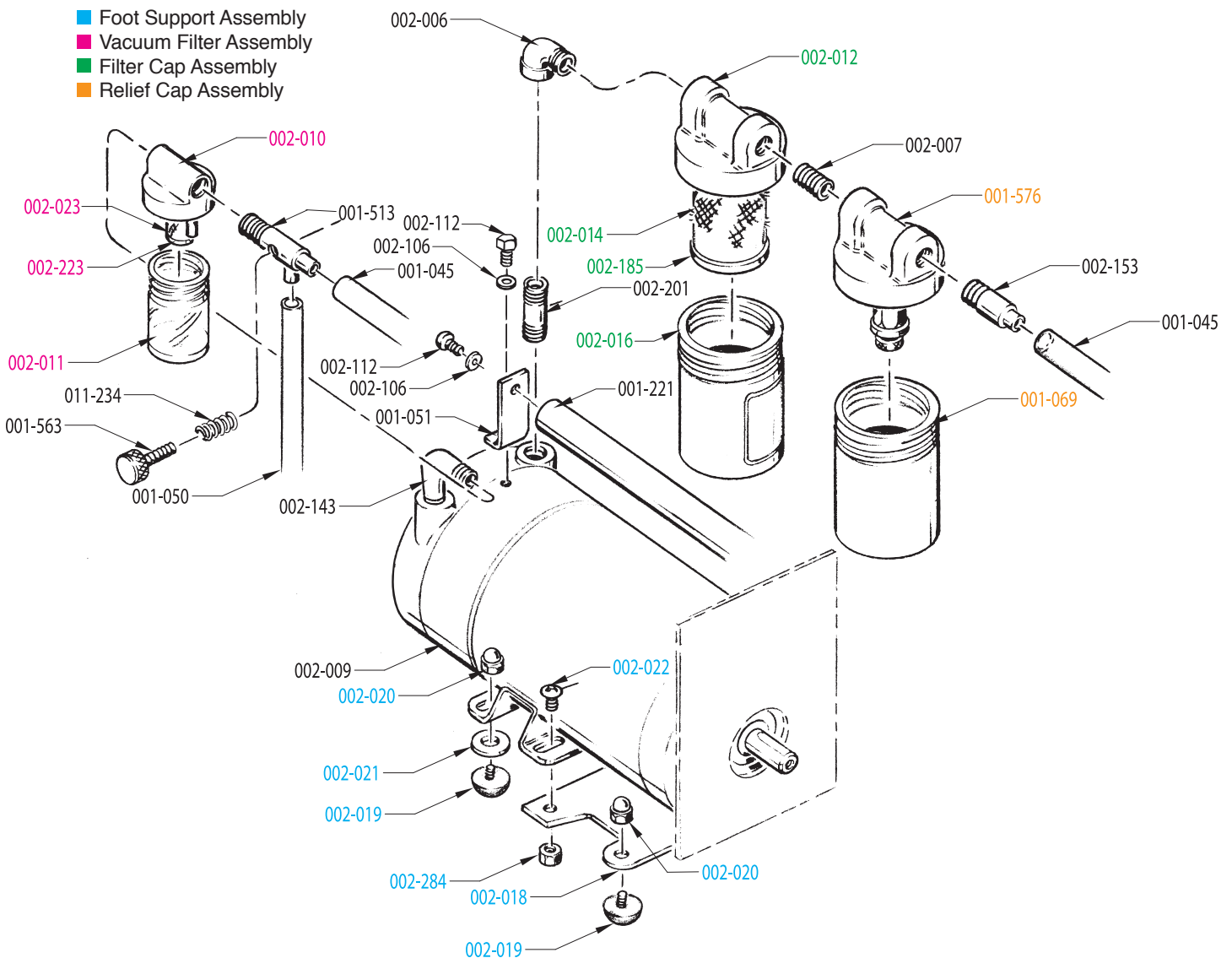


#004-712 • #712 QC

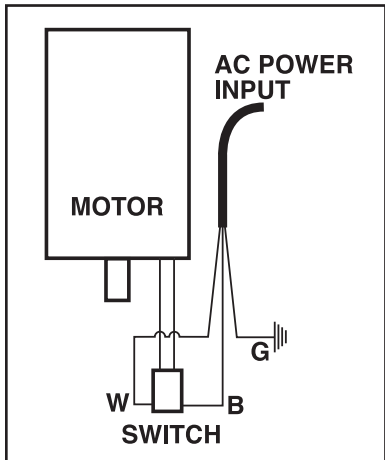
Recommended Strokes/Minute: 1600-2100

General purpose to heavy engraving, stone setting and hammering. Has contoured shape and GRS Quick Tool Change feature.

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
002-024	Foot Support Assy.	002-106	1/4 Flat Washer
002-018	Base	002-112	5/16-18 x 3/4 H.H.B.
002-019	Bumper	002-106	1/4 Flat Washer
002-020	Nut	001-051	Handle Bracket
002-021	Washer	001-221	Handle
002-022	1/4-20 R.H.M.S.	002-201	Nipple
002-284	Nut	002-006	Elbow
002-009	Pump	002-044	Filter Cap and Assy.
002-143	Elbow	002-012	Cap
002-165	Vacuum Filter Assy.	002-014	Filter
002-158	Gasket (not shown)	002-016	Jar
002-223	Filter Holder	002-033	Gasket (not shown)
002-010	Filter Cap	002-185	Filter Frame
002-023	Felt Filter (3 reqd.)	002-007	Nipple
002-011	Vacuum Filter Jar	002-045	Relief Cap and Assy.
001-513	Vacuum Tee Assy.	001-576	Relief Cap
011-234	Spring	002-074	Pipe Bushing (not shown)
001-563	Metering Screw Assy.	002-013	Pressure Relief
001-050	Throttle Hose	002-033	Gasket (not shown)
001-045	Pressure Hose	001-069	Relief Jar
002-112	5/16-18 UNC x 3/4 HHB	002-153	Hose Fitting

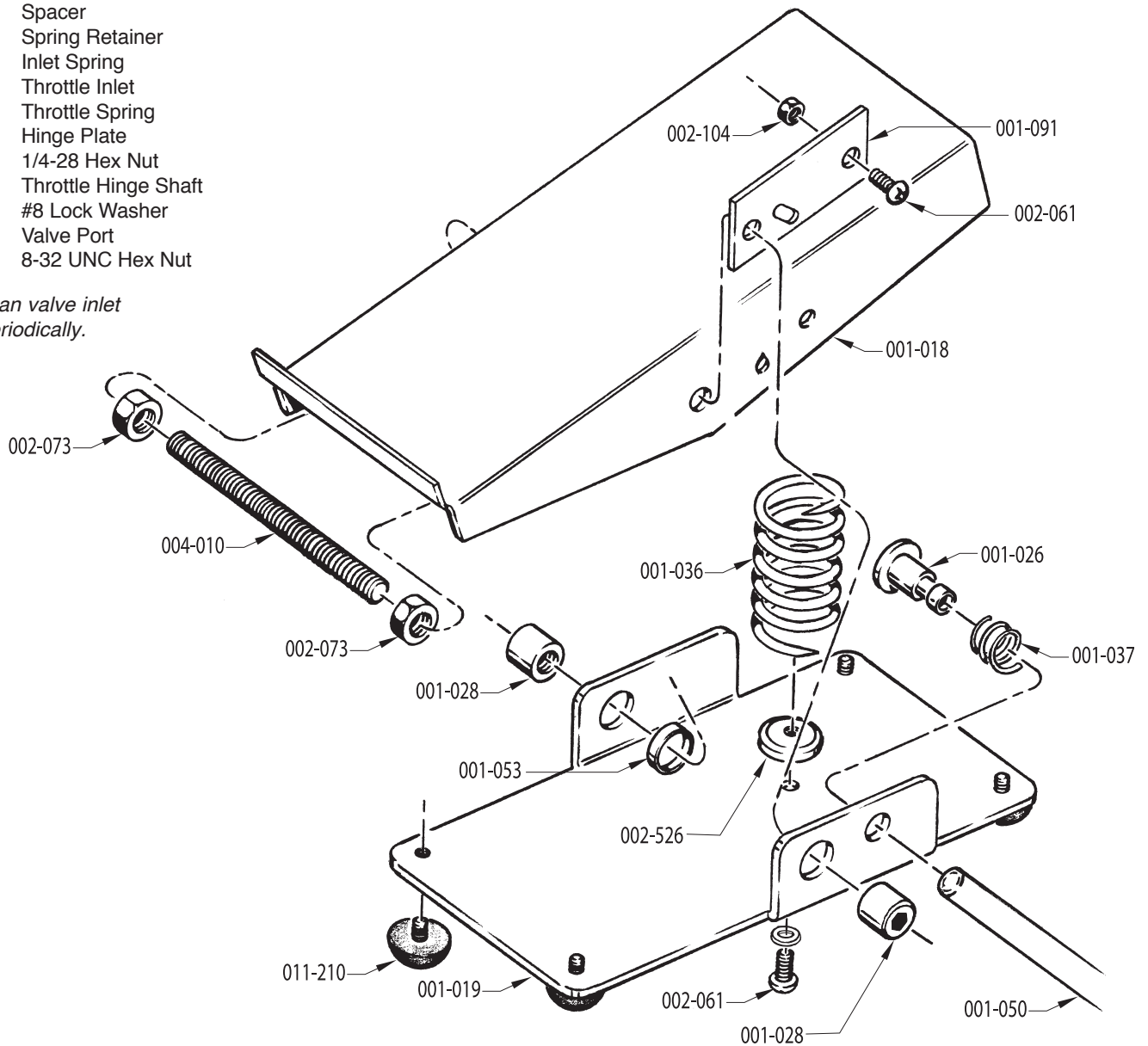


002-001	Grommet
001-002	Idler Arm
001-182	Brake Washer
001-510	Cover Assy.
002-109	#10-32 UNF Hex Nut
001-827	Idler Roller Assy.
001-068	Idler Arm Bolt
001-560	Sheave Face Assy. (inner)
001-559	Sheave Face Assy.
001-015	Spring
011-385	Belt
001-017	Spring Retainer
002-067	#10-32 x 1/2 S.H.C.S.
002-004	Switch
001-040	Switch Cover
002-003	Switch Plate
002-043	Retainer Ring

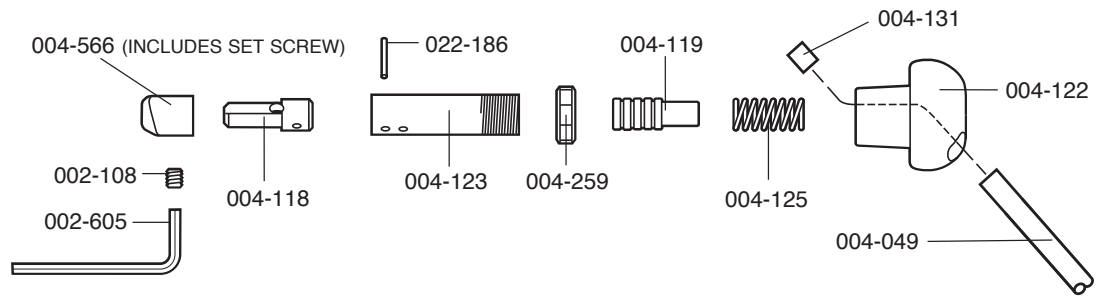


PART NO.	DESCRIPTION
001-050	Throttle Hose
001-028	Throttle Hinge Nut
002-061	#8-32 x 3/8 R.H.M.S.
001-019	Throttle Base Plate
011-210	Rubber Foot Assy.
001-053	Spacer
002-526	Spring Retainer
001-037	Inlet Spring
001-026	Throttle Inlet
001-036	Throttle Spring
001-018	Hinge Plate
002-073	1/4-28 Hex Nut
004-010	Throttle Hinge Shaft
002-063	#8 Lock Washer
001-091	Valve Port
002-104	8-32 UNC Hex Nut

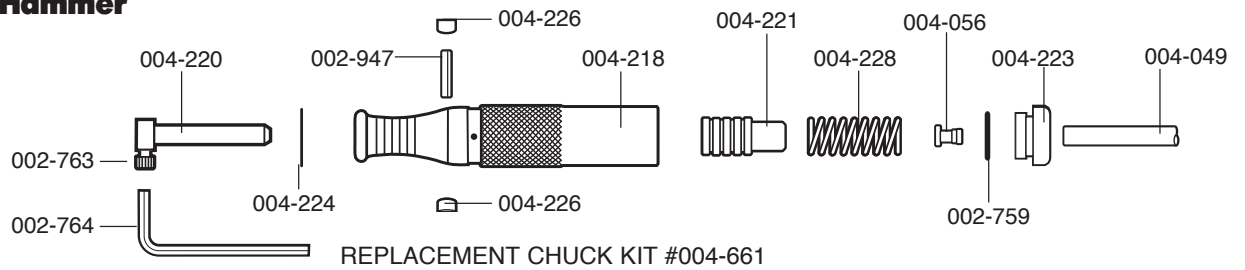
NOTE: Clean valve inlet opening periodically.



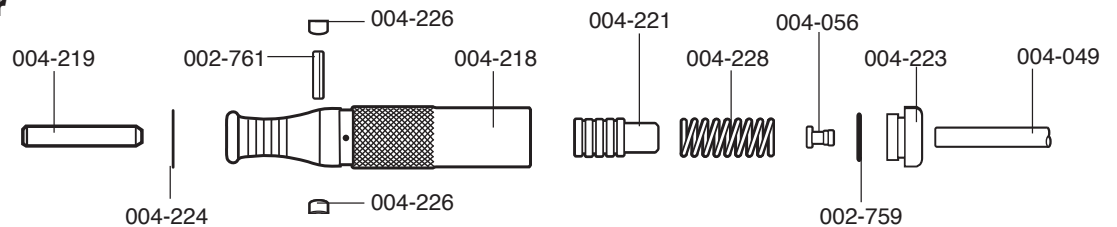
#004-564 • Bulino



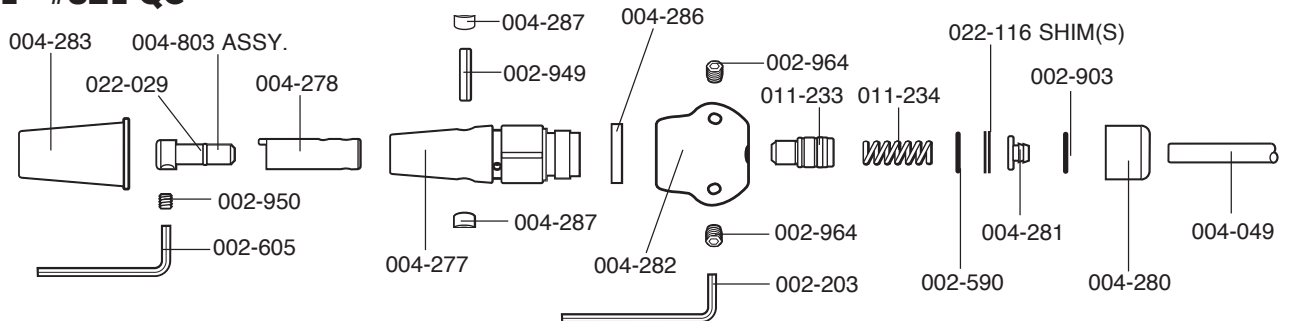
#004-612 • Hammer



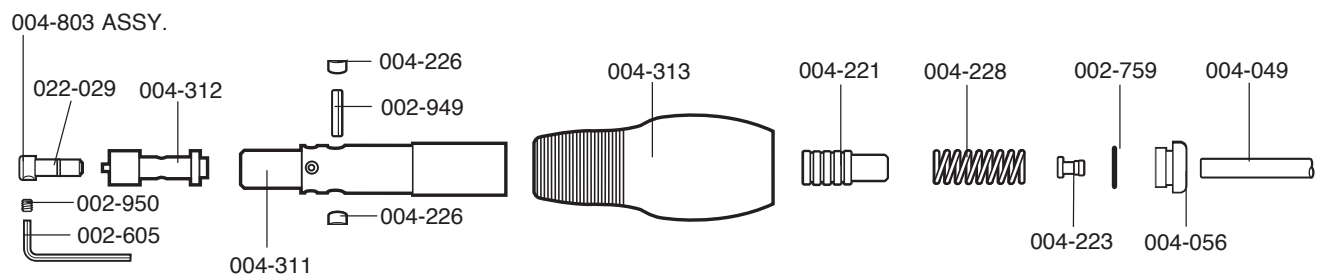
#004-611 • Hammer



#004-821 • #821 QC



#004-712 • #712 QC





Glendo LLC

900 Overlander Road
Emporia, KS 66801 USA

Tel: 620-343-1084

Fax: 620-343-9640

e-mail: glendo@glendo.com

USA Toll Free

800-835-3519

Visit our website:

www.grstools.com

Last Update: 2016/11/16