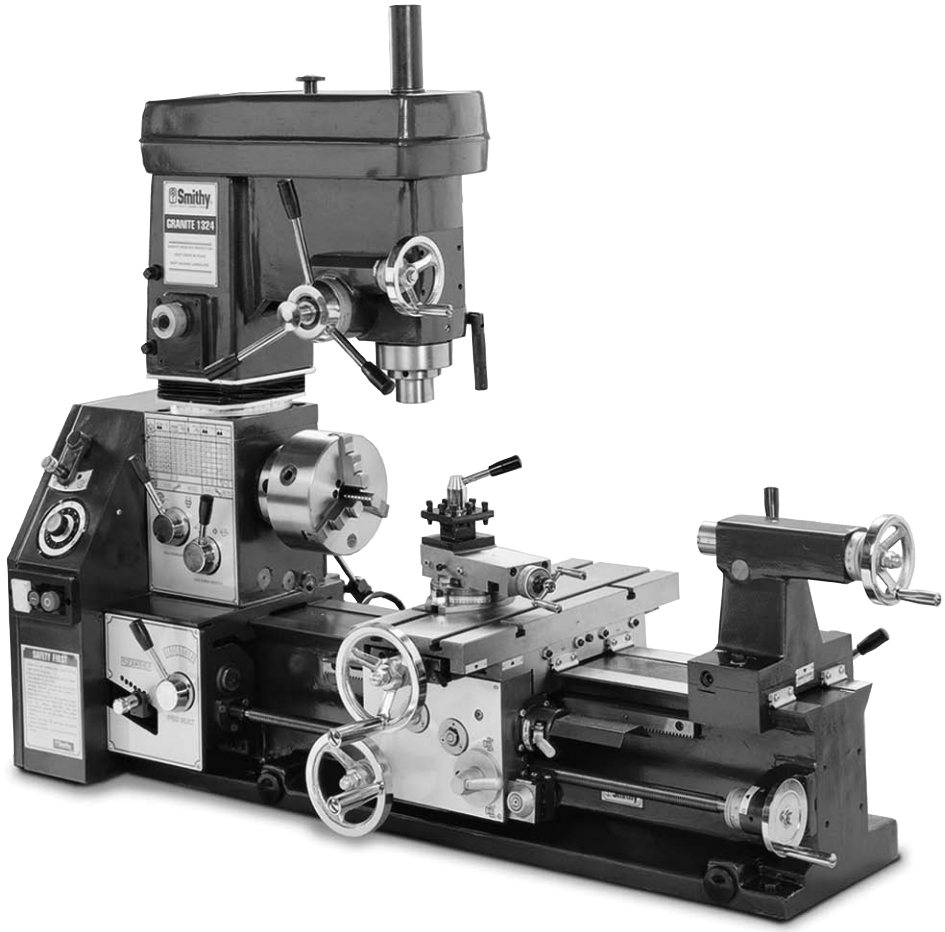
Smithy®

GN-1300 Series Operating Manual



Smithy Company • 170 April Drive • Ann Arbor, MI 48103
1-800-476-4849 • www.smithy.com

Section 1: Introduction

Welcome

Congratulations on the purchase of your Smithy Granite machine. We welcome you to the Smithy family. Smithy strives to provide you with the best in machine tools. Please read through this manual carefully to ensure that you get the most out of your Granite 3-in-1 lathe-mill-drill.

The purpose of this manual is to give beginning or advanced machinists the information needed to operate the Smithy Granite 1300 series. It will teach you about the machine's parts and how to care for them. Most of the photographs in this manual show the GN-1324 model. Individual model variations will be noted as necessary. This manual is complete and current at the time of printing*. In our continuing effort to bring you the best in machine tools, changes may be made. Please visit us at **www.smithy.com** for the latest updates.

This manual—and any other manuals associated with this Smithy machine—should remain with the machine. If ownership changes, please include the Quick-Start Manual and the Operating Manual with the machine.

Please read the operating manual carefully and closely follow the procedures described. If you don't understand how your machine works, you risk injury to yourself or others. Misuse of the machine can lead to damaging it or your project. To learn more about general machining practices, Smithy offers books that meet the needs of machinists with varying levels of experience. We also suggest your local library as a resource. Enrolling in a machining class will give you the best knowledge of machining.

*Last Update: 12/10/2006
Version 1.02

Suggestions or Comments

We are interested in any suggestions you might have to improve our products and services. Feel free to contact us with your suggestions by phone or in writing. If you have comments about this operator's manual, or if you have a project you'd like to share with other Smithy owners, contact the Smithy Company, P.O. Box 1517, Ann Arbor, MI 48106-1517. You can also e-mail info@smithy.com 24 hours a day.

Questions

If you have questions not covered in the manuals, please call our toll-free number:

1-800-476-4849

Our friendly service technicians are available Monday through Friday from 8:00 a.m. to 5:00 p.m. Eastern Standard Time. You can also e-mail your questions 24 hours a day to info@smithy.com.

Customer Information

Please record the information below about your Smithy machine. Having this information readily available will save time if you need to contact Smithy for questions, service, accessories, or replacement parts.

Model number

Serial Number

Purchase Date

Delivery Date

We look forward to a long working relationship with you, and thank you again for putting your trust in Smithy.

Overview

Smithy machines are proven to be safe and reliable; however, if abused or operated improperly, any machine can cause injury. Please read this manual carefully before you start machining. Proper use will create a safe working environment and prolong the life of your machine.

Symbols Used In This Manual

In this manual, the symbols below draw attention to specific operating issues.

⚠ CAUTION

Potential hazard, unsafe situation, or potential equipment damage that may result in injury to yourself or damage to your machine.

⚠ DANGER

Hazardous situation which if not avoided could result in series injury or death.

⚠ WARNING

Potential hazard, unsafe situation, or equipment damage could result in death or serious injury.

! NOTICE !

Alerts user to helpful and proper operating instructions.

Shop Safety Rules

Your workshop is only as safe as you make it. Take responsibility for the safety of those who use or visit it. This list of rules is by no means complete, so remember that common sense is a must.

⚠ DANGER

Smithy strongly discourages the use of casters or wheels on metal-working machine benches. The weight of the machine could result in the bench tipping while being moved. Once the machine is mounted, consider your workbench to be permanent. If you must move the machine, first remove it from the bench

⚠ WARNING

1. **Read this manual thoroughly before operating your machine**. Don't try to do more than you or your machine can handle. Understand the hazards of operating a machine tool. In particular, remember never to change speeds or setups until the machine is completely stopped and never operate it without first rolling up your sleeves.

2. **Wear proper clothing.** Avoid loose-fitting clothes, gloves, neckties, or jewelry that could get caught in moving parts. If you have long hair, tie it up or otherwise keep it from getting into the machine. Always wear non-slip footwear.

3. Protect yourself. Use ANSI approved safety glasses, goggles, or a face shield at all times. Use safety glasses designed for machinery operation; regular glasses will not do. Have extras available for visitors. Know when to wear a face mask or earplugs as well.

4. Keep your work area clean and organized. Cluttered work areas and benches invite accidents. Have a place for everything and put everything in its place.

5. Childproof your work area and keep children away from the machine while it is in use. Childproof your shop with padlocks, master switches, and starter keys or store the machine where children do not have access to it.

6. Never operate your machine under the influence of drugs and alcohol.

7. Keep track of tools. Remove adjusting keys and wrenches from the machine before operating. A chuck key or misplaced Allen wrench can be a safety hazard.

8. Avoid accidental starts. Turn the switch to the **OFF** position before plugging in the machine. Turn the speed dial to zero before starting your machine.

9. Ground your machine. The machine has a three-conductor cord and three-prong, grounding-type plug. Never connect the power supply without proper grounding

10. Keep your mind on your work. By paying attention to what you are doing and avoiding distractions you will spend many safe, enjoyable hours in your workshop.

11. Never leave your machine running unattended.

Machine Safety Rules

⚠ WARNING

1. Disconnect the machine before servicing. Disconnect the machine before making changes, removing debris, or measuring your work.

2. Don't over reach. Don't reach over the machine when it's operating. Keep your hands out of the way.

3. Turn the switch OFF. Turn the switch to off before plugging in the machine. Turn the speed dial to zero before starting your machine.

4. Use proper tooling. Use only recommended accessories and understand how they should be used before trying them out. Don't try to make a tool into something it isn't or attempt to use a tool in inappropriate ways. Remember to always use the proper tooling for the material you are cutting. Reference a general machining guide such as Machinist Ready Reference for recommended tooling for your material.

5. Secure your work. Before starting your machine, be certain that your workpiece is properly and securely mounted. Flying metal is dangerous! Loose work can also bind tools.

6. Do not run you machine beyond its limits of travel. Before starting your project, ensure that your work area does not go beyond the limits of travel on your machine. Going beyond the limits of travel will cause serious damage to your machine which will not be covered by your warranty.

7. Run your machine at recommended

spindle speeds and feed rates. Always cut at the recommended speed and feed rates for the type of metal that you are cutting for optimum performance. Do not begin your cut until the machine has reached the full and proper speed.

8. Do not change the direction of the spindle rotation or leadscrew rotation while your machine is running. Changing rotation direction of the spindle or leadscrew while your machine is running could cause serious damage to your machine.

9. Do not stop the spindle by hand. Always use your on/off switch to stop the spindle from rotating.

10. Do not clear chips by hand. Metal chips are very sharp and can easily cut your hand. Use a brush to clear chips.

11. Protect bed ways. When removing or installing tooling from your lathe spindle, place a piece of wood or other protection material across the bed to protect the ways from being damaged if the tooling is dropped.

12. Keep your machine maintained. Always replace worn or damaged parts before using your machine to prevent damage to your machine or the operator. Follow the maintenance schedule outline in this manual for peak performance.

Smithy® Section 3: Inventory Check List

Overview

It is a good idea to take inventory of the parts of your machine soon after it is unpacked. By doing so, you can quickly determine if any parts are missing. In addition, should you find it necessary to return the machine to Smithy for any reason, the inventory will ensure that all the parts you received have been returned.

A third reason to perform an inventory is to become familiar with the names of all of the parts of your Smithy machine. To aid with this, the following parts lists have individual photos of the items listed.

Items Mounted to Your Machine

The items listed below are shipped mounted on the Smithy Granite.

6" 3 Jaw Chuck
Part # G03046
Quantity 1 ❑

Compound Angle Toolpost
Part # 45-110
Quantity 1 ❑

7/16" Drawbar
Part # K99-168
Quantity 1 ❑

Items Mounted to Your Machine

The following items are packed in the larger of the two Smithy boxes.

Air Mask
Part # 15-020
Quantity 1 ❑

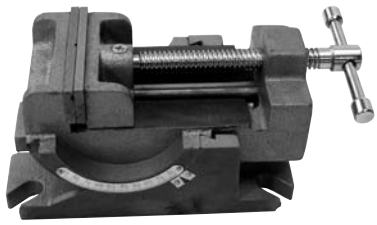
Protective Goggles
Part # 15-015
Quantity 1 ❑

Ear Plugs
Part # 15-025
Quantity 1 Set ❑

Oil Can
Part # 80-100
Quantity 1 ❑

7/16" T-Slot Nuts
Part # 35-105
Quantity 2 ❑

Vise, 0-90º Adjustable Angle
Part # 32-110
Quantity 1 ❑

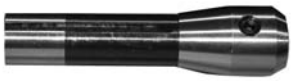


End Mill, 4 FL HSS 1/4" w/3/8" Shank
Part # 50-402
Quantity 1 ❑

End Mill, 4 FL HSS 3/8" w/3/8" Shank
Part # 50-406
Quantity 1 ❑

End Mill, 4 FL HSS 1/2" w/3/8" Shank
Part # 50-410
Quantity 1 ❑

End Mill Adapter R-8
Part # 65-028
Quantity 1 ❑



Lathe Bit Set
Part # 43-000
Quantity 1 Set
(AR-8,AL-8,BR-8,BL-8 & E8) ❑

Lathe Chuck Key
Part # C30532
Quantity 1 ❑

Drill Chuck, JT3, 0.8-16 mm with key (for millhead)
Part # 72-003
Quantity 1 ❑

Drill Chuck Arbor, R-8/JT3
Part # 73-080
Quantity 1 ❑

Drill Chuck, JT33, 0.8-13 mm with key (for tailstock)
Part #72-001
Quantity 1 ❑

Drill Chuck Arbor, MT3/JT33
Part # C30523
Quantity 1 ❑

Arbor Plug (M12 x 1.5 x 20 mm setscrew)
Part # S12898
Quantity 1 ❑

MT3 Dead Center
Part #41-003
Quantity 1 ❑

MT4 Dead Center
Part # 41-004
Quantity 1 ❑

6” Adjustable Wrench
Part # G20006
Quantity 1 ❑

13/16 mm Open End Wrench
Part # G20131
Quantity 1 ❑

10/12 mm Open End Wrench
Part # G20101
Quantity 1 ❑

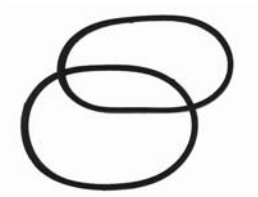
Allen Wrench, 3 mm
Part # G20003
Quantity 1 ❑

Allen Wrench, 4 mm
Part # C30540
Quantity 1 ❑

Allen Wrench, 5 mm
Part # C30542
Quantity 1 ❑

Allen Wrench, 8 mm
Part # C30536
Quantity 1 ❑

Allen Wrench, 10 mm
Part # G20002
Quantity 1 ❑



Belt Set
Millhead Belt-(Shipped On Machine)
Part # G05042 -A900 Or
Part # G05042A 1/2” x ???
Quantity 1 ❑

Spindle to Speed Reduction Pulley Belt
Part # G02043-A630 Or
Part # G02043A 1/2” x 27
Quantity 1 ❑

Speed Reduction Pulley To Motor
Part # G02034-A710 Or
Part# G02034A-1/2” X 30
Quantity 1 ❑

Spindle to Motor Pulley (Shipped On Machine)
Part # G03020 Or
Part # G03020A-1/2” x 41”
Quantity 1 ❑

Crossfeed Handle & Rack & Pinion Travel Handle
Part # G08031
Quantity 2 ❑

Items Packed in Smaller Smithy Box

Outside Jaws for lathe chuck
Part #
Quantity 1 ❑

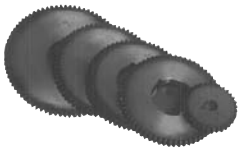
Spindle Cover
Part # G05057
Quantity 1 ❑

Millhead Crank
Part # G05123
Quantity 1 ❑

Handle for leadscrew handwheel
Part # G01028
Quantity 1 ❑

Wrench, Compound Angle Toolpost
Part # G06039
Quantity 1 ❑

Spanner Wrench
Part # G20001
Quantity 1 ❑



Metric Gear Set
Gear,33 Teeth
Part # G10116
Quantity 1 ❑

Gear,63 Teeth
Part # G10117
Quantity 1 ❑

Gear,64 Teeth
Part # G10118
Quantity 1 ❑

Gear,66 Teeth
Part # G10119
Quantity 1 ❑

Gear,80 Teeth
Part # G10120
Quantity 1 ❑

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Items Packed in Plastic Bag

DVD, Machine Tool Basics
Part # 12-003
Quantity 1 ❑

Manual Cover
Part # 83-942
Quantity 1 ❑

Operator's Guide
Part # 83-950
Quantity 1 ❑

Missing Items

If you find that an item is missing or defective from your Quick Start Tool Pack, please call Smithy at 1-800-476-4849 within 30 days of receiving your machine so that we may assist you. W

Overview

This chapter will help you to familiarize yourself with the Smithy Granite 1300 models and standard accessories. Figures 4.01 through 4.12 identify the major components and functions of your machine. The photographs in this section depict a Granite 1324 model. Distinguishing features are noted.

Major Features Identified

Figure 4.01
GN-1324 Front View

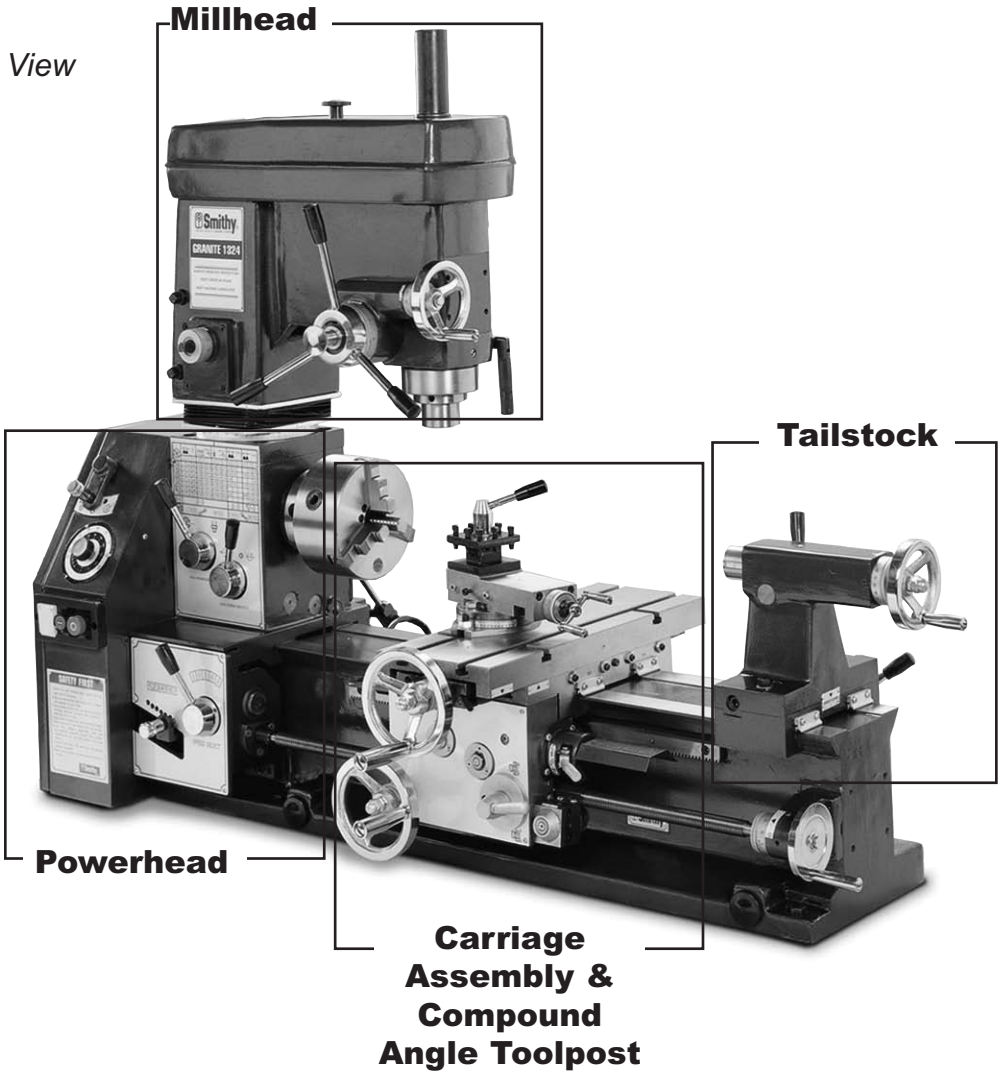
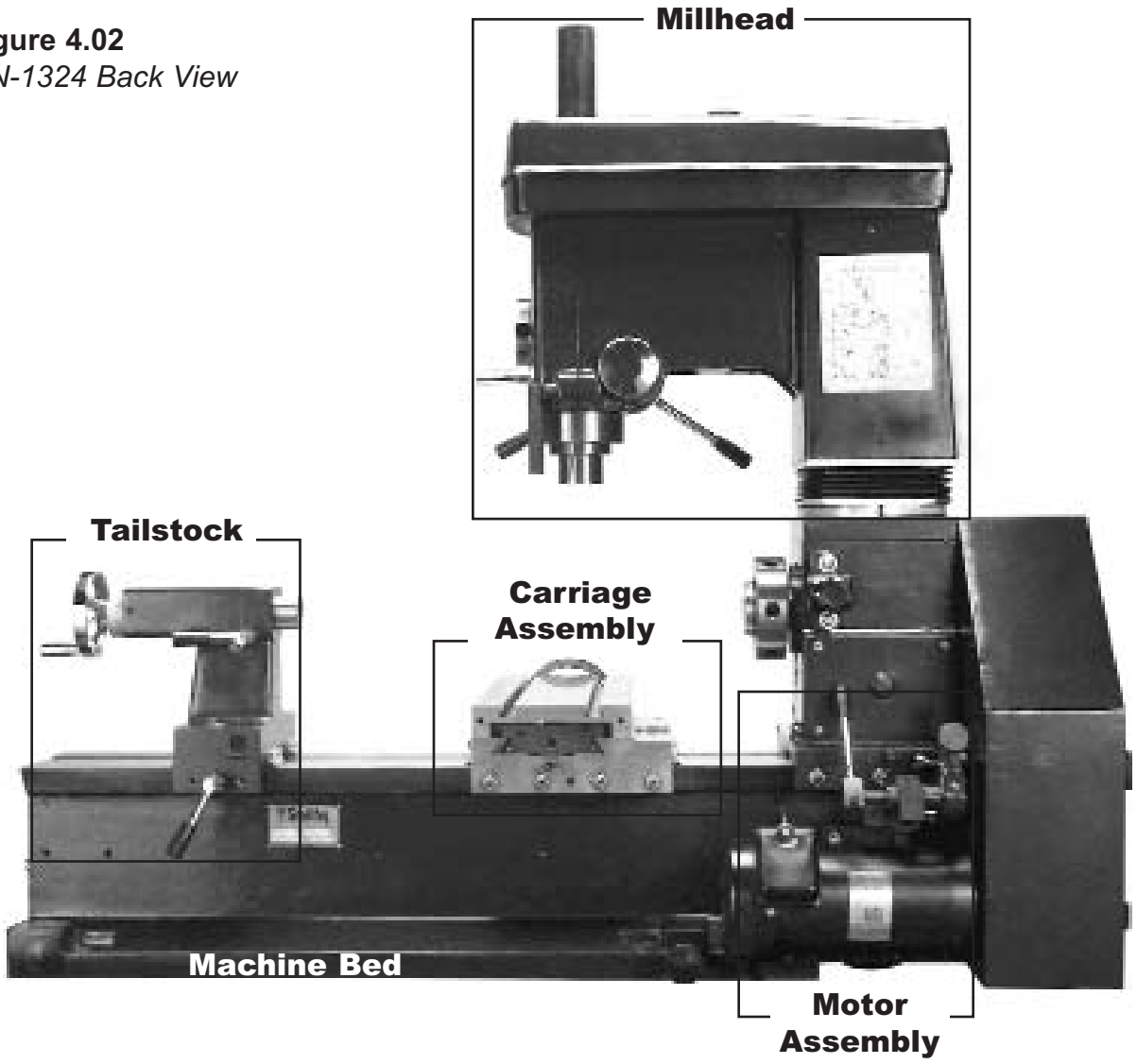


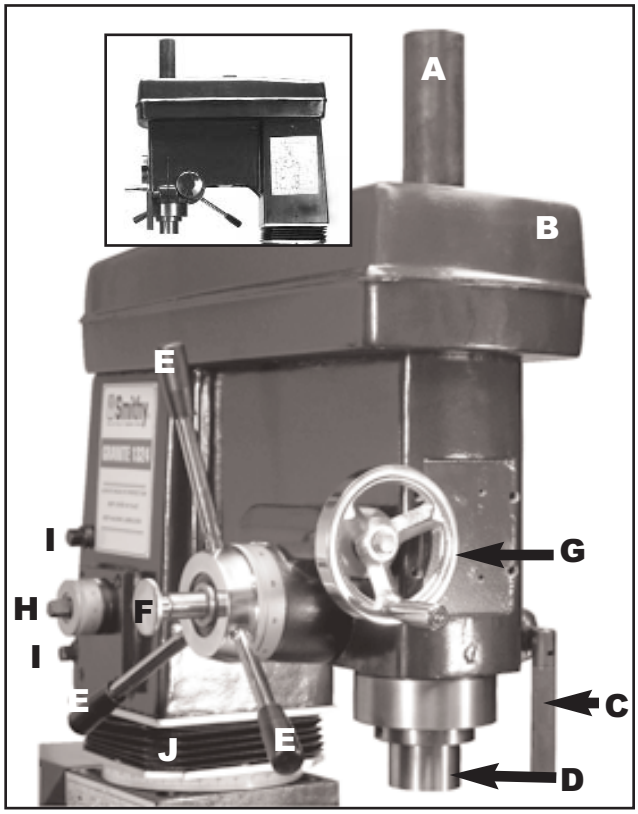
Figure 4.02
GN-1324 Back View



Millhead Components & Functions

The photos below show the front and back of the millhead of the Smithy Granite machine. The millhead holds the tooling necessary to perform milling and drilling operations. The following section identifies the components and functions of the millhead.

Figure 4.02
Millhead Front & Back



A. Spindle Cover - The spindle cover protects the spindle from dust and debris. It also protects the operator from injury. The spindle cover should be in place whenever the machine is in operation.

B. Millhead Cover - The Millhead cover protects the belt and pulleys of the millhead. The cover should always be in place when the machine is in operation.

C. Quill Lock - The quill lock locks the mill/drill quill in place during a horizontal milling operation or while changing tools.

D. Mill/Drill Spindle - The mill drill spindle is an R-8 taper. It holds and rotates the the tooling used during milling and drilling operation. The spindle also moves in and out of the millhead quill. The quill is an internal part which is not seen in this picture.

E. Drill Press Handles - The drill press handles move the quill in and out of the mill head during a drilling operation. Rotating the handles in a clockwise direction moves the quill down ward, out of the millhead casting.

E. Coarse Feed/Fine Feed Clutch - Pulling out the coarse feed/finde feed clutch knob engages the drill press handles/coarse feed. Pressing the knob in engages drill/mill fine feed hand wheel. To easily engage/disengage the clutch, rotate the drill press handles slightly while pulling/pushing the knob.

G. Drill/Mill Fine Feed Handwheel - The handwheel controls the fine feed movement of the quill in and out of the millhead.

H. Height Adjustment Stud - The height adjustment stud works with the millhead crank to raise and lower the millhead. Insert the millhead crank over the stud, as in figure 4.03, rotate clockwise to raise the millhead and counter clockwise

Figure 4.03
Adjusting Millhead Height

to lower the millhead.

One revolution of the crank handle will move the millhead 0.25 inches.

I. Millhead Locking Studs - The locking studs secure the millhead in position. Insert the millhead crank over the upper stud, rotate counterclockwise to unlock the stud. Repeat the process on the lower stud. Position the millhead in the desired position and lock BOTH locking studs before starting your machine.

J. Bellows - Bellows keep debris off of the Z-Axis column and rack.

Powerhead Components & Functions

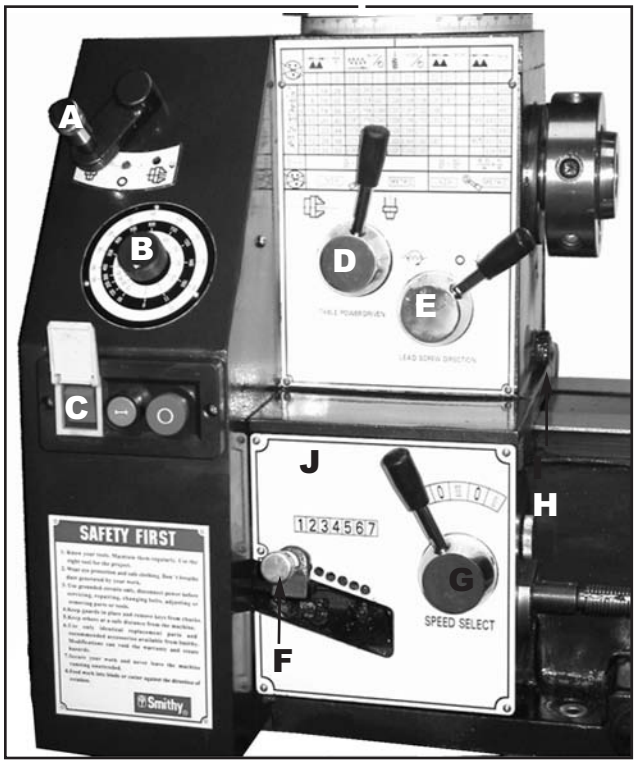


Figure 4.04
Granite Powerhead (Front)

The photo above depicts the powerhead of the Granite machine. This section will identify and define major components and functions of the Granite powerhead.

A. Lathe/Mill Clutch - This clutch engages the mill portion of the Smithy Granite Lathe-Mill-Drill when pulled out and moved to the left. When moved to the right the lathe is engaged. Center position is neutral.

B. Speed Dial - The speed dial controls the motor rpm. Rotating clockwise increases the speed.

C. Forward/Reverse & On/Off Switch - The red toggle button reverses the direction of the motor. The green middle button is the “power-on” button. The large red button is the stop button and cuts power to the machine.

D. Powerfeed Function Lever - By moving the lever to the left, powers the lathe powerfeed. Moving the lever to the right powers the mill powerfeed.

E. Leadscrew Rotation Direction Handle - Positioning this handle to the right causes the leadscrew to rotate clockwise. Positioning to the left causes the leadscrew counterclockwise.
to rotate.

F. Selector Lever 1-7 - Used in conjunction with Selector Lever I-III to set feed rate or pitch setting for cutting threads.

G. Selector Lever I-III - Used in conjunction with Selector Lever I-7 to set feed rate or pitch setting for cutting threads.

H. Jog Knob - Assists in meshing gears inside the quick change gear box which is controlled by selector levers 1-7 and I-III. Rotating the knob helps align gears

I. Spindle Nose - Secures D1-4 style lathe tooling.

J. Quick Change Gear Box - Houses the gears that determine feed rates and gear setings for cutting threads.

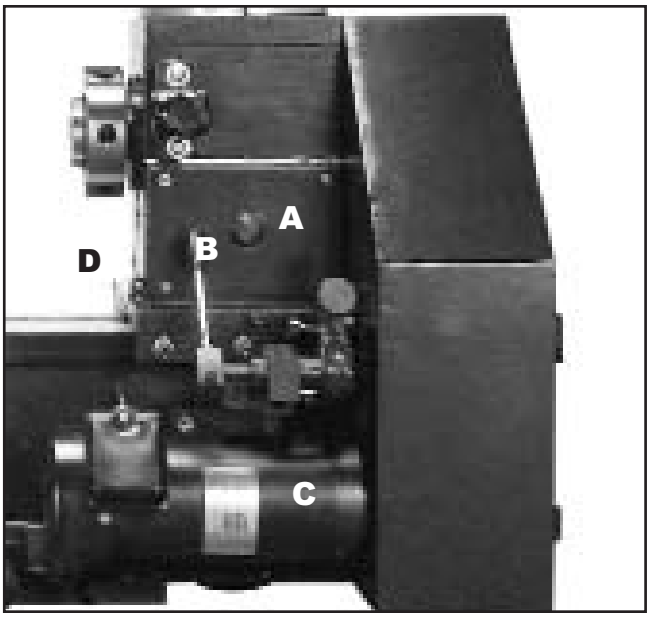


Figure 4.05
Granite Powerhead (Back)

A. Oil Fill Port - Located directly above the motor holds 8-10 oz of 30 weight oil. Remove the screw to add oil as necessary.

B. Belt Tension - Moves the motor pulley up and down releasing tension on the belts. Pull the lever down to loosen the tension on the belt and push the lever up to add tension to the belts.

C. DC Motor - Runs on standard 110 volt power.

D. Oil Level Sight Glass - Located under the spindle of all Granite machines. Normal oil level is at the half way point, add oil if the level of oil in the sight glass drops below this level.

Pulley Box

The pulley box houses the drive pulley, gears and power components.

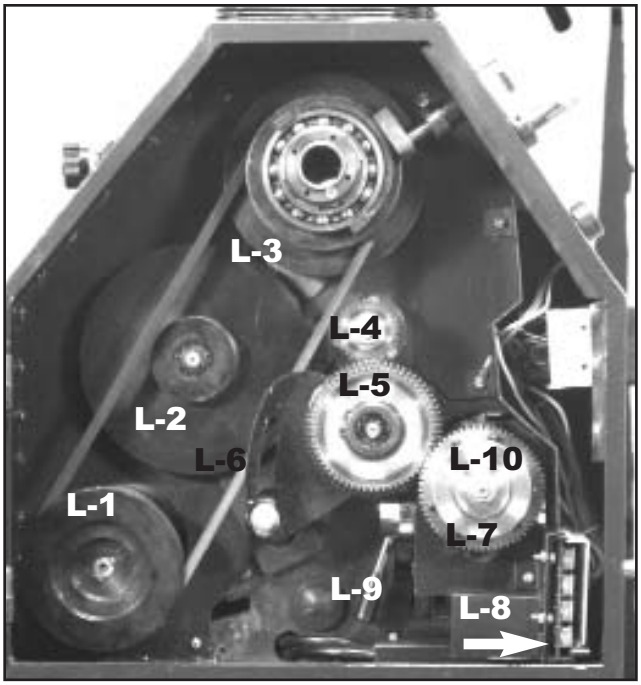


Figure 4.05
Granite Pulley Box (Inside)

L-1. Motor Pulley - A three-step pulley attached to the shaft of the motor.

L-2. Speed Reduction Pulley - Sits between the motor and idler pulley and is used for low speed operations when increased torque is desired.

L-3. Spindle Pulley - A two-step pulley attached to the main lathe spindle.

L-4. Change Gear A - A 30-tooth gear installed at the factory. The change gears only need to be reconfigured when cutting metric gears or feeding at a metric rate.

L-5. Change Gear B - A 60 tooth gear installed at the factory. The change gears only need to be reconfigured when cutting metric gears or feeding at a metric rate.

L-6. Change Gear C - A 66 tooth gear that rides behind change gear B, a 60 tooth gear, and is installed at the factory. The change gears only need to be reconfigured when cutting metric gears or feeding at a metric rate.

L-7. Change Gear D - A 60 tooth gear installed at the factory. The change gears only need to be reconfigured when cutting metric gears or feeding at a metric rate.

L-8. SCR Module - Converts the AC power coming into the machine to DC power for the motor.

L-9. Inch/Metric Selector - Used when cutting threads. Pull the lever out toward the operator when cutting metric threads. When cutting inch (SAE) threads, make sure the lever is pushed in toward the machine.

! NOTICE !

There is a neutral position with this selector. Be sure that it is completey engaged in either the metric or inch mode before you begin your threading operation.

L-10. Leadscrew Clutch- Used when cutting threads. Pull the lever out toward the operator when cutting metric threads. When cutting inch (SAE) threads, make sure the lever is pushed in toward the machine.

Carriage Assembly

The carriage assembly consists of:
• The cross-slide table
• The carriage, the lower portion of the table that rides on the bed ways,
• The apron, the portion that hangs from the cross-slide table in front of the machine.

The carriage moves by hand or by power along the bed ways. Its function is to support the cutting tool rigidly while in the lathe mode and to secure the workpiece while in the mill mode. The carriage can be locked into place with the lock found on the back of the cross-slide table.

The figure to the above right identifies and defines the major components of the carriage assembly.

A. Cross-SlideTable - The top portion of the carriage assembly. It supports the compound angle toolpost (not pictured) which holds the lathe cutters and tooling. The table also supports your workpiece when operating the mill. The cross-slide table has four 7/16” t-slots for securing tooling and mounting workpieces.

B. Cross-Slide Handwheel - This handwheel moves the table toward and away from the operator along the Y-Axis. Rotating the handwheel clockwise moves the table away from the operator while moving it counterclockwise moves the table toward the operator.

C. Longitudinal Handwheel - This handwheel is located at the bottom left of the carriage assembly. Manually rotating the handwheel clockwise will move the carriage assembly along the X-Axis towards the tailstock end of the machine. Rotating the handwheel counter clockwise will move the the carriage assembly towards the headstock end of the machine.One

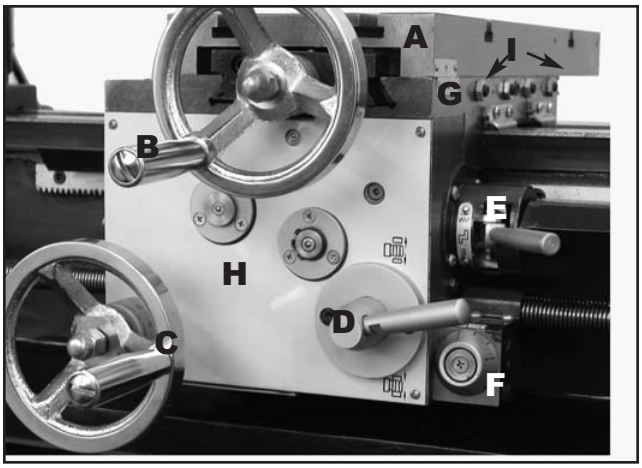


Figure 4.06
Carriage Assembly

revolution moves the assembly approximately .040”.

NOTE: This handwheel is for coarse movementsonly. Use the handwheel at the end of the leadscrew for fine movement (0.001”)

D. Half-Nut Engagement Lever - This lever closes the half-nut on to the leadscrew. When the half-nut is engaged, in the down position, the table assembly will be powered to move right and left along the X-Axis leadscrew.

! NOTICE !
The half-nut engagement lever is only engaged for rapid travel or threading operations.

E. Longitudinal and Lateral Powerfeed Selector - This selector determines whether the carriage will be powered to move along the X-Axis (longitudinal axis) or the Y-Axis (lateral axis). When the lever is in the upper position the table will move along the Y-Axis. When moved into the lower position, the table will move along the X-Axis. Center position is neutral.

F. Threading Dial - The threading dial is used to coordinate consecutive cuts when cutting threads. Restarting each cut from the same point on the dial ensures that each cut follows the same path, leading to accurately machined threads.

! NOTICE !

The threading dial can only be used when cutting inch (SEA) threads.

G. Carriage - The carriage supports the cross-slide table and moves along the the X-Axis of the machine.

H. Apron - The apron houses the gear mechanism for the X and Y-Axis powerfeed.

I. Carriage Gib Adjustments Screws - These screws press a small metal plate (the gib) to the ways of the bed, increasing or decreasing the tension when moving the cross-slide assembly. (Figure 4.07)

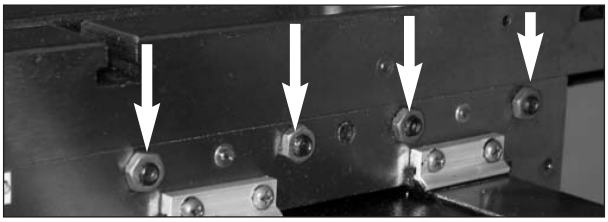


Figure 4.07
Cross-slide Table Gib Adjustment Screws

J. Carriage Lock (X-Axis) - is an M6 screw. Turning the screw clockwise will prohibit movement of the carriage along the X-Axis. (Figure 4.08)

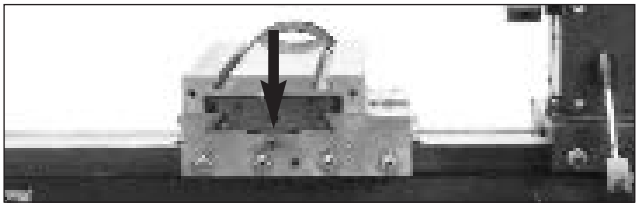


Figure 4.08
Carriage Lock Y-Axis-Located on the backside of the machine

K. Carriage Lock Y-Axis - is an M8 cap screw located on the back side of the carriage. Turning this screw clockwise locks the carriage to the bedways.

L. Travel Indicators - mark the limit of travel on the crossfeed table. Running the the top portion of the indicator located on the tailstock side of the cross-slide table past the lower indicator on the bottom portion of the table (carriage) will cause serious damage to your machine.

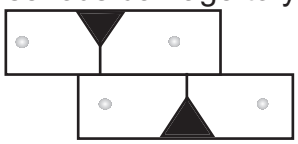


Figure 4.09
Travel Indicaor Marks

⚠ WARNING

Do not let the top indicator mark travel past the bottom indicator mark on the right side (side facing tailstock) of the carriage assembly.

M. Carriage Gib Adjustments Screws - press a small metal plate (the gib) to the ways of the bed, increasing or decreasing the tension when moving the carriage assembly along the bed ways.

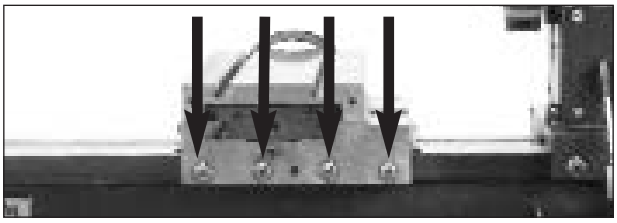


Figure 4.10
Gib Adjustment Screws-Located on the backside of the machine

Carriage Assembly- Compound Angle Toolpost

The compound angle toolpost is bolted to the cross-slide table with 10 T-Bolts. The compound angle toolpost swivels to any angle horizontal to the lathe axis. The calibrations on the swivel base are in degrees, (60º-0º-60º). The following section identifies and explains the functions of the toolpost.

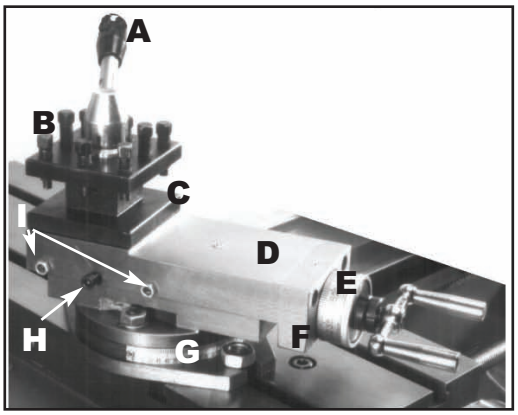


Figure 4.10
Compound Angle Toolpost

A. CATP (Compound Angle Toolpost) Lock down handle- The lock rotates clockwise to loosen the tension on the four position turret, allowing the user to turn the turret 90 to 270º.

B. Turret Bolts - These bolts secure your tooling to the turret.

C. 4 Position Turret - The turretholds up to 1/2” tooling. The turret can support up to 4 tools.

D. Compound Slide - The compound slide moves the tooling in towards and away the workpiece.

E. Floating Dial - The floating dialcan be repositioned to zero at any point to measure tool feed in or out.

F. CATP Carriage -The carriage supports the compound slide and is bolted directly to the swivel base.

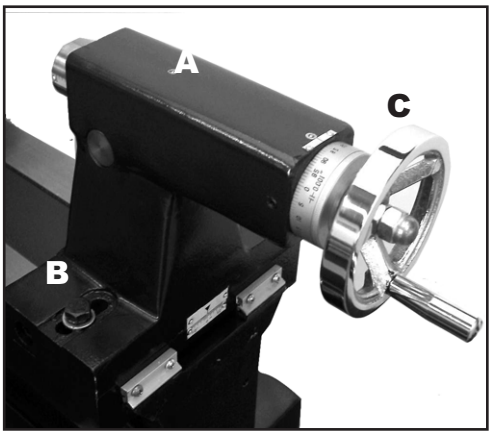
G. Swivel Base - The swivel base secures the CATP and allows it to rotate 360º in either direction. A calibrated scale at the bottom of the base shows positioning in degrees from 60º-0º-60º.

H. Slide lock - This slide lock locks the compound slide to the carriage to secure the slide in position.

I. Compound Gib Adjustment screws - These screws press a small metal plate (the gib) to the ways of the bed, increasing or decreasing the tension when moving the compound slide.

Tailstock

The tailstock holds tooling that supports the end of a workpiece. It also holds tooling such as center drills, reamers and taps. It moves along the bed of the machine and can be stopped and locked in to position at any point on the bedways. The photos above depict the tailstock of the Granite machine. This section will identify and define major components and functions of the Granite tailstock.



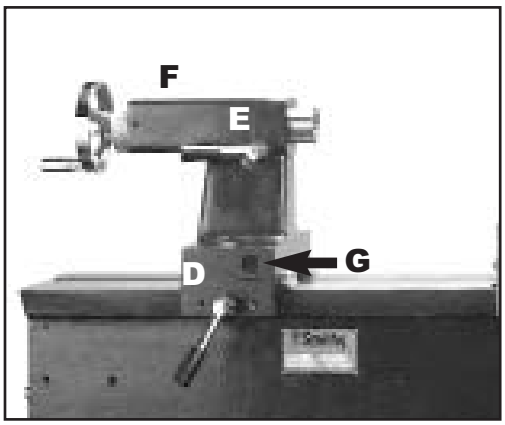


Figure 4.11
Tailstock (Front & Back)

A. Tailstock Body - This is the main casting of the tailstock.

B. Off-Setting Lock Bolts -These bolts lock the top base of gthe tailstock and prevent it from moving off center.

C. Tailstock Handwheel -This hadnwheel moves the tailstock barrel in and out of the tailstock body.

D. Tailstock Lock -This locks the tailstock body to the bed ways.

E. Tailstock Barrel Lock -This locks the barrel into position.

F. Tailstock Barrel -The barrel holds the MT3 tooling that supports the end of the workpiece.

G. Tailstock Off-Setting Bolts -These bolts allow the user to offset the toolpost for cutting tapers.

Section 5: Preparing Your Machine for Operation

Overview

The Quick-Start Manual you received before delivery of your Smithy machine provides detailed instructions for mounting and locating your machine. Please complete those instructions if you have not already done so. As you unpack, it is a good idea to inventory the parts. (See chapter 3 for a complete list.) Before operating your machine, you should assemble the remaining components of your machine, clean the machine, and lubricate it. Once those steps are complete is importatn to become familiar with the controls used for basic operations. This section will guide you through those steps.

Assembly of Minor Components

The installation of the drill chuck, arbor and arbor plug; mill spindle covers; and several handles should be completed according to the procedures described below.

Drill Chuck and Arbor

Before proceeding both the arbor and the chuck should be thoroughly cleaned to ensure a good fit. Once cleaned attach the chucks to the respective arbors. Follow the steps below to achieve the best possible fit.

Figure 5.01
Installing Arbor into Chuck

Step 1: Place the arbor in a freezer for about 1 hour to slightly shrink the metal.

Step 2: Remove the cold arbor from the freezer and place it into the drill chuck.

Step 3: Use a soft mallet or a block of wood to tap the end of the arbor.

Step 4: Allow the arbor to return to room temperature.

! NOTICE !

Arbor Plug

Install the plug setscrew (S12898 into the tailstock arbor before inserting the arbor into the tailstock. A plug is installed in the tailstock arbor (the MT3 to JT33 arbor, part number C30523), which allows the ejector pin inside the tailstock to eject the arbor when the tailstock barrel is retracted.

Morse Taper 3 (MT3) tooling is used in the tailstock of the machine. R-8 tooling is used in the millhead of the machine and used in conjuction with a drawbar.

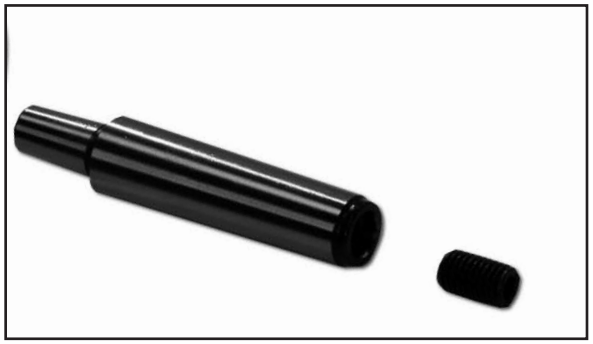


Figure 5.02
Installing Arbor Plug

Mill Spindle Cover

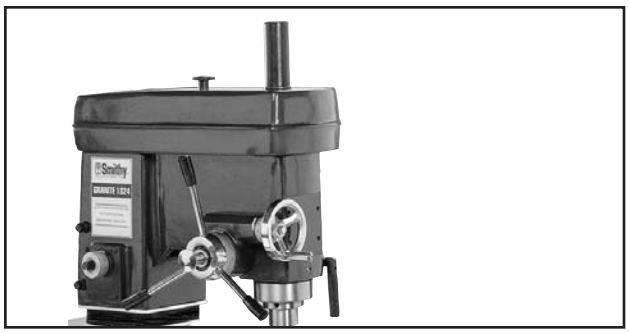


Figure 5.03
Mill Spindle Cover Installed

The mill spindle cover slides over the flange on the top of the millhead.

⚠ WARNING

Do not operate your machine without the mill spindle cover. Doing so could cause harm to yourself or your machine

Handles

Install any handles or handwheels that have

Figure 5.04
Installing handles

been removed for shipping. Handles can be hand installed and tightened with a flat-head screwdriver.

Cleaning & Lubricating Your Machine

Smithy machines are shipped with a light protective grease coating that must be removed prior to use. Use a noncorrosive kerosene or white mineral spirits to remove the coating. WD-40® also works well.

Once cleaned, your Smithy must be lubricated. Make sure to lubricate carefully and thoroughly before starting the machine. Use a pump oil can and a supply of good-quality SAE30 weight nondetergent oil or 30-weight compressor oil. Lubricants can be obtained at most home and building supply stores. A lubrication point chart can be found on the backside of the millhead.

Lubrication Schedule

Lubrication depends a lot on the use of your machine and your climate. The schedule below is intended to be used as guide, use your best judgement for lubricating your machine based on your use and environment.

Check Oil	**Every 8 Hours/Monthly**
Oil Ports	**Every 8 Hours/Monthly**
Add Oil	**As Needed**

See **APPENDIX B** for a complete maintenance schedule.

Section 5: Preparing Your Machine for Operation

Lubrication Points

Follow the instructions below and refer to the lubrication chart on the backside of the millhead.

Gearbox

Open the gearbox door. Lightly grease the gears with a good quality molybdenum or lithium grease or motorcycle-chain lubricant.

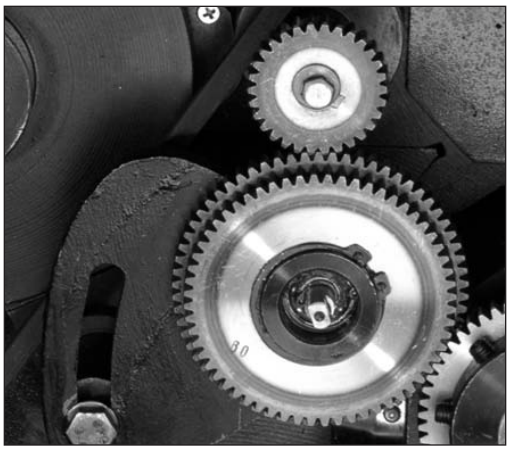


Figure 5.05
Brush a thin layer of lithium grease over the gear quandrant in the pulley box

Check the oil sight glass under the chuck. If necessary, add oil until the sight glass is half full. The oil-fill plug is at the back of the headstock above the motor. Be careful not to overfill, the gearbox requires only 8 to 10 ounces of oil.

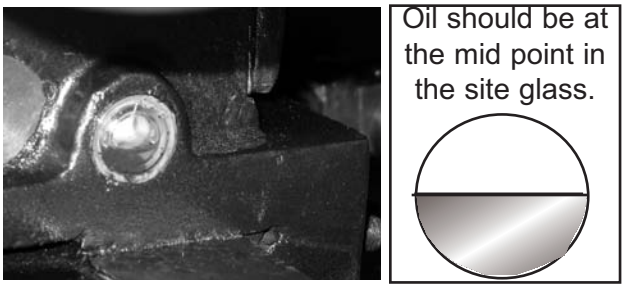


Figure 5.06
The only level should be half way in the oil site glass located under the lathe spindle

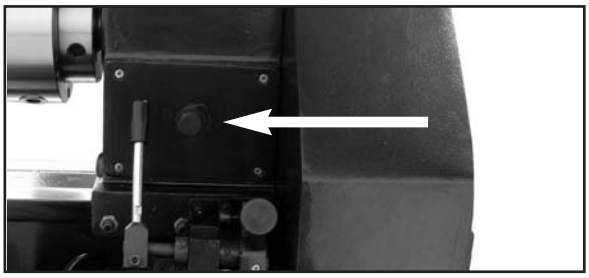


Figure 5.07
Add oil through the oil port located on the back side of the headstock

Ways

Run the carriage as far to the left as possible. Put a few drops of oil on the ways. Run the carriage to the extreme right and repeat.

Carriage Assembly-Saddle

Lubricate the six oil buttons of the cross-slide table

There are two buttons on both the right (tailstock) side and left side (head stock) of the saddle for the ways.

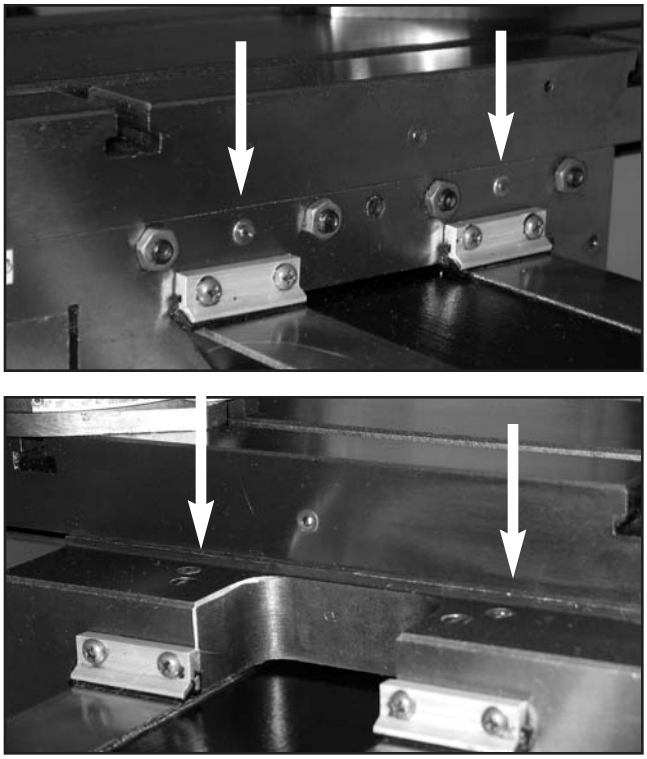


Figure 5.08
Carriage Assembly-Saddle Oil Points

Carriage Assembly-Cross-Slide Table

There is one button on each side of the cross slide for the cross-slide ways.

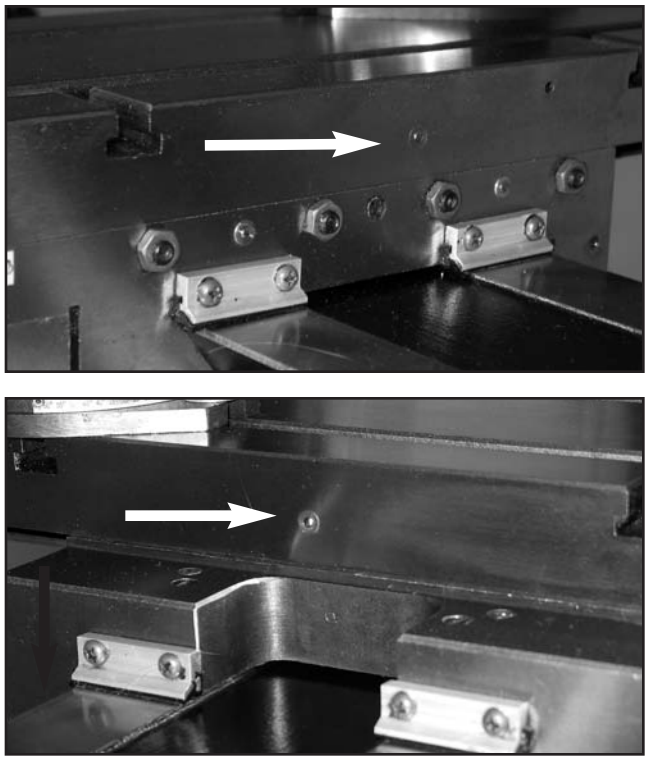


Figure 5.09
Carriage Assembly-Cross-Slide Table Points

Compound Angle Toolpost

Oil the two buttons on the top of the compound rest.

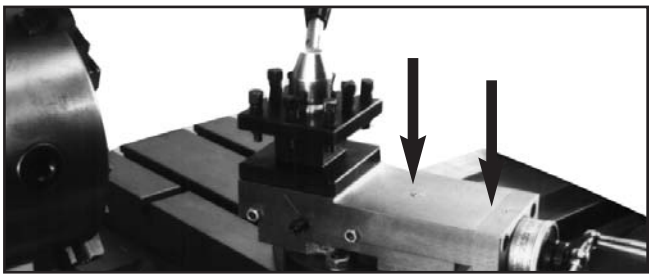


Figure 5.10
Oil the compound angle toolpost

Cross Feed Screw

Oil the cross-slide screw. The first oil button is located on the apron next to the cross-feed dial and the other is found on the top or the cross-slide table.

Oil the buttons between the cross- feed and longitudinal-feed handwheels (at right).

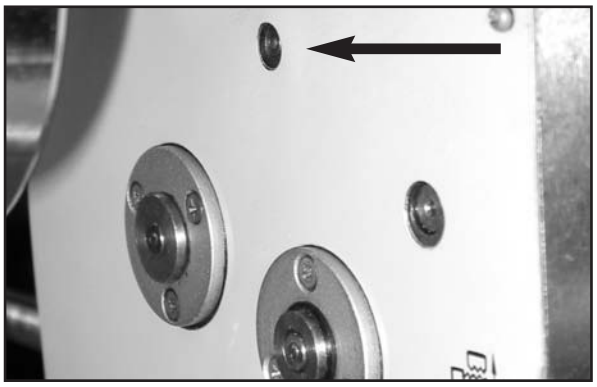


Figure 5.11
Cross-Slide Screw-Apron Oil Points

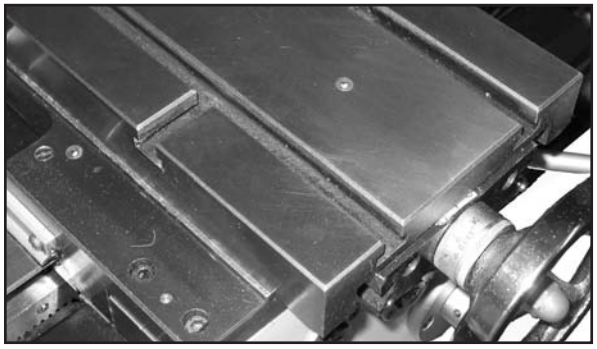


Figure 5.11A
Cross-Slide Screw-Table Oil Point

Leadscrew

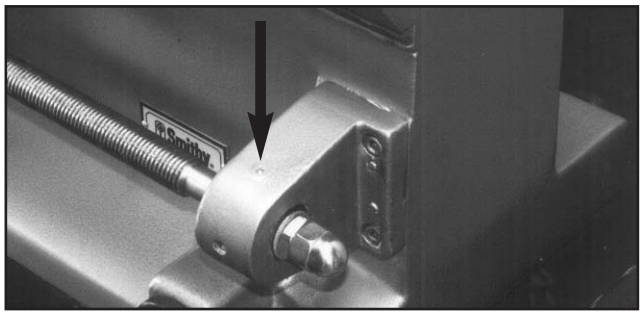


Figure 5.12
Leadscew Oil Point

Oil the support for the right end of the leadscrew. Put a few drops of oil along the leadscrew itself.

Oil Drip

Oil the end of the oil-drip trough from inside the gear box.

Figure 5.13
Oil Drip

Quick Change Gear Box

Use a spray can of lithium grease or motorcycle-chain lubrican. Spray inside the quick-change gearbox through the slot for the powerfeed (1-7) selector.

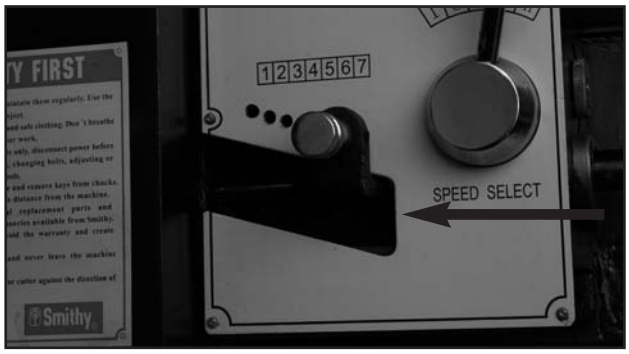


Figure 5.14
Oil the Quick Change Gear Box through the powerfeed slot

Tailstock Barrel

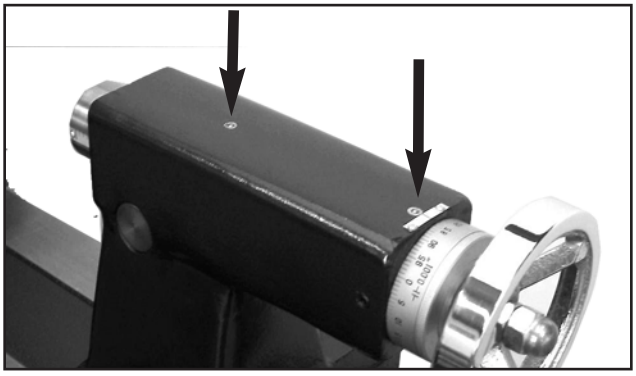


Figure 5.15
Tailstock Barrel Oil Points

Oil the two buttons on top of the tailstock.

Mill/Drill Clutch

Oil the button on top of the mill/drill clutch housing.

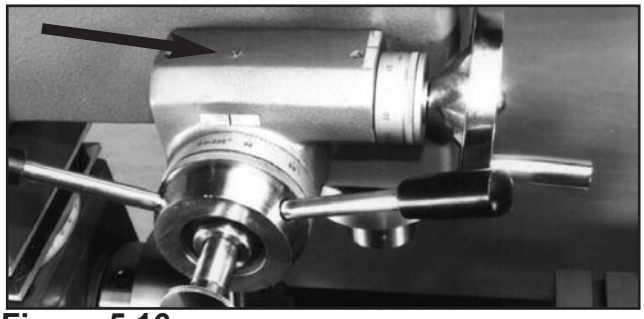


Figure 5.16
Oil the mill/drill clutch

Adjusting Gibs

The Granite 1300 models have aseries of straight gibs. The gibs are found on the carriage, the cross-slide table, compound angle toolpost and the tailstock. These gibs should be adjusted periodically to maintain accuracy and smooth operation.

! NOTICE !

Always make sure your machine is well lubricated before adjusting the gibs.

Carriage Assembly-Carriage

Adjust the gibs on the cross-slide assembly using the procedure below.

Step1: Back out the gib adjusting screws found on the back side of the carriage two turns with the 4 mm allen wrench.

Step 2: Loosen the four jam nuts on the table back side of the saddle with the 6” adjustable

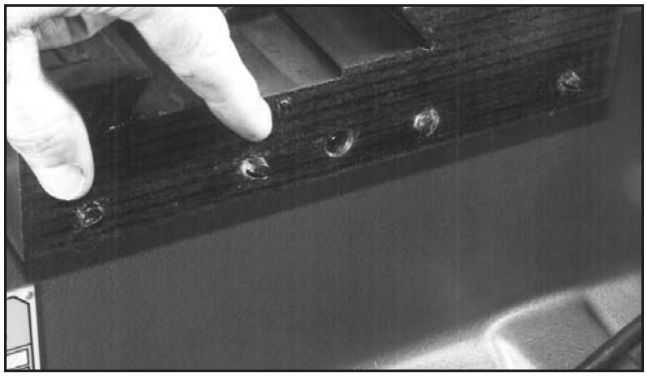


Figure 5.17
Carriage Gibs

wrench that was shipped with your machine.
Step 3: Using the 4 mm Allen wrench, tighten each of the four gib adjustment screws until they are lightly touching the gib.

⚠ CAUTION

Do not apply excessive force.

Step 4: Back the gib adjustment screws out 1/8 to 1/4 turn.

Step 5: With the adjustment screws now set at roughly the same position, make the fine adjustments on each individual screw. Starting with one of the inner screws, slowly tighten the screw while moving the carriage assembly by turning the leadescrew handwheel until you feel *slight* resistance.

Step 6: Once slight resistance is felt, hold the gib adjustment screw in position and tighten the jam nut.

Step 7: Repeat steps 5 and 6 with the other iinner screw and then with the two outer screws.

Adjusting the Gibs on the Carriage Assembly-Cross-Slide Table

Adjust the gibs on the cross-slide table using the procedure below.

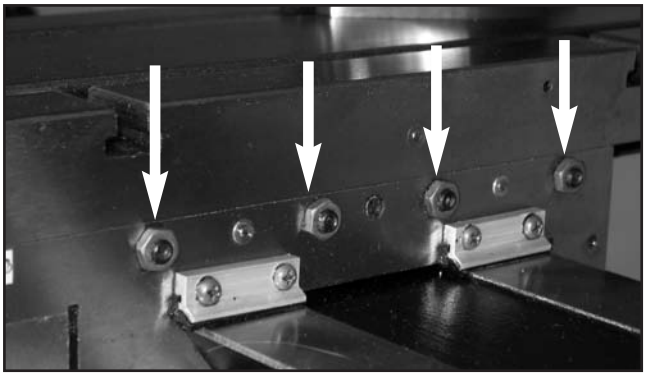


Figure 5.18
Gib Adjustment Screws-Cross -Slide Table

Step 1: Back out the gib adjusting screws two turns.

Step 2: Loosen the four jam nuts on the tailstock side on the table with the 13/16 mm wrench.

Step 3: Using the 4 mm Allen wrench, tighten each of the four gib adjustment screws until they are lightly touching the gib.

⚠ CAUTION

Do not apply excessive force.

Step 4: Back the gib adjustment screws out 1/8 to 1/4 turn.

Step 5: With the adjustment screws now set at roughly the same position, make the fine adjustments on each individual screw. Starting with one of the inner screws, slowly tighten the screw while moving the cross-slide table by turning the cross-slide handwheel until you feel slight resistance.

Step 6: Once slight resistance is felt, hold the gib adjustment screw in position and tighten the jam nut.

Step 7: Repeat steps 5 and 6 with the other inner screw and then with the two outer screws.

Adjusting the Gibs on the Compound Angle Toolpost

Adjust the gibs on the compound-angle toolpost using the procedure below.

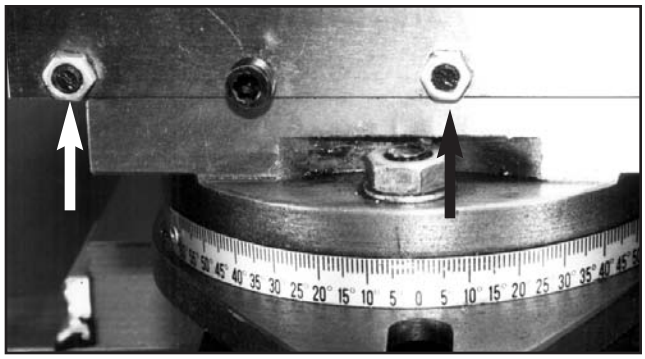


Figure 5.19
Gib Adjustment Screws-Compound Angle Toolpost

Step 1: Back out the gib adsjusment screws out two turns

Step 2: Loosen the jam nuts on the side of the compound-angle toolpost with the 6-inch adjustable wrench.

Step 3: Using the a flat-head screw driver, tighten the two gib adjustment screws until they are lightly touching the gib.

⚠ CAUTION

Do not apply excessive force.

Step 4: Back the gib adjustment screws out 1/8 to 1/4 turn.

Step 5: With the adjustment screws now set at roughly the same position, make the fine adjustments on each individual screw. Starting with the screw closest to the handle, slowly tighten the screw while moving the compound slide by turning the compound-slide handle until you feel *slight* resistance.

Step 6: Once slight resistance is felt, hold

the gib adjustment screw in position and tighten the jam nut.

Step 7: Repeat steps 5 and 6 with the remaining gib adjustment screws.

Adjusting the Gibs on the Tailstock

Adjust the gibs on the tailstock using the procedure below.

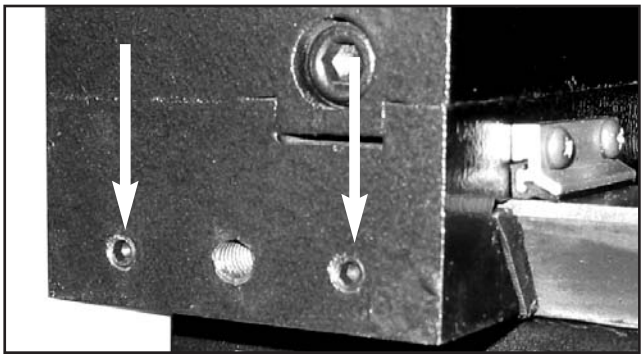


Figure 5.20
Gib Adjusting Screws-Tailstock (Shown with tailstock lock removed)

Step 1: Unlock the tailstock.

Step 2: Remove the outer setscrews with the 4 mm Allen wrench provided.

! NOTICE !

There are two setscrews in each hole. To tighten the tailstock gibs the outer setscrews need to be removed.

Step 3: Using the 4 mm Allen wrench, tighten each gib adjustment screw until it touches the gib lightly.

Step 4: Back each gib adjustment screw out 1/4 turn.

Step 5: Reinstall each outer setscrew and bottom it against the inner screws to lock the corresponding inner screw in place.

Step 6: Repeat steps 2 through 5 on the remaining screw.

! NOTICE !

Unlike the carriage, cross-slide and compound-angle toolpost gib adjustments, you will not feel a slight resistance when moving the tailstock. The tailstock will be locked to the ways with the tailstock lead. The objective of adjusting the tailstock is to ensure that the tailstock remains parallel to the ways.

Adjusting Backlash

Backlash is lost motion in the screw. The user will notice an initial small movement in the handle of wheel before the screw responds. The procedures in this section will help minimize backlash.

Adjusting Backlash from the Cross-Slide Screw

Before making any adjustments to the cross-feed screw system, all the gibs on the table and carriage system should be checked and adjusted as described previously.

Excessive backlash in the cross-slide can come from three different places.

- The fit of the cross-slide screw to the front screw mount
- The fit of the cross-slide screw into the brass crossfeed nut
- The fit of the brass cross-slide nut into the carriage casting

There are adjustments for each of these fits. Follow the procedures below to make each adjustment.

Adjusting Backlash Cross-Slide Screw to the front screw mount

Step 1: Loosen the two nuts that hold the cross-slide handwheel on to the end of the cross-slide screw.

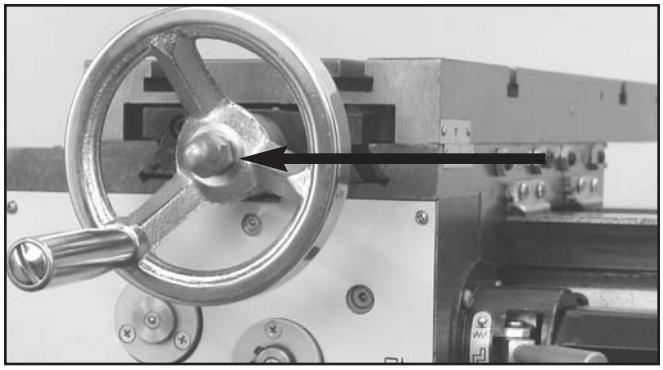


Figure 5.21
Loosen the two outer nuts holding the handwheel

Step 2: Tighten the inner nut slowly while checking the ease of movement of the cross-slide handwheel. When the screw starts to become difficult to turn, loosen the nut slightly so that the screw turns freely.

Step 3: Hold the inner nut in place with a wrench and tighten the outer nut against the inner nut to lock both nuts in position.

Step 4: Recheck the backlash.

Cross-Slide Screw to Brass Nut and Nut to Carriage

If there is still excess backlash after the adjustment above, the backlash is either between the cross-slide screw and the brass nut or between the brass nut and the carriage. The following procedure covers both adjustment.

Step 1: Remove the rear support on the backside of the cross-slide table.

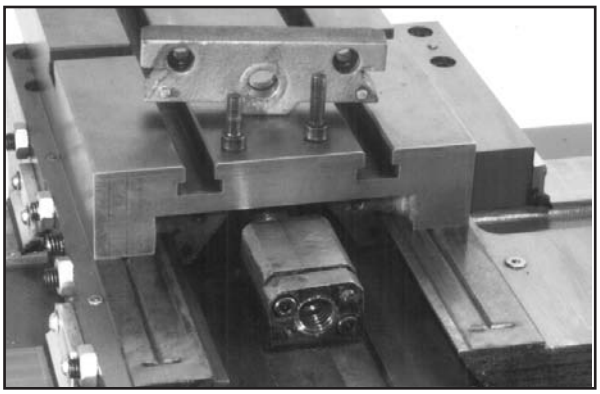


Figure 5.22
Remove mount on backside of the table to access the brass cross slide nut

Step 2: Loosen the hex-head bolt that locks the brass nut into the carriage.

Step 3: Use the handwheel to move the cross-slide table toward the operator side of the machine. Watch under the table from the backside and stop before the cross-slide screw comes out of the brass nut.

Step 4: Slowly tighten the four adjusting screws on the brass nut, one at a time, until a slight drag is felt while turning the cross-slide handwheel. It is best to continue turning the handwheel back and forth while adjusting the nut to balance ease of operation and backlash.

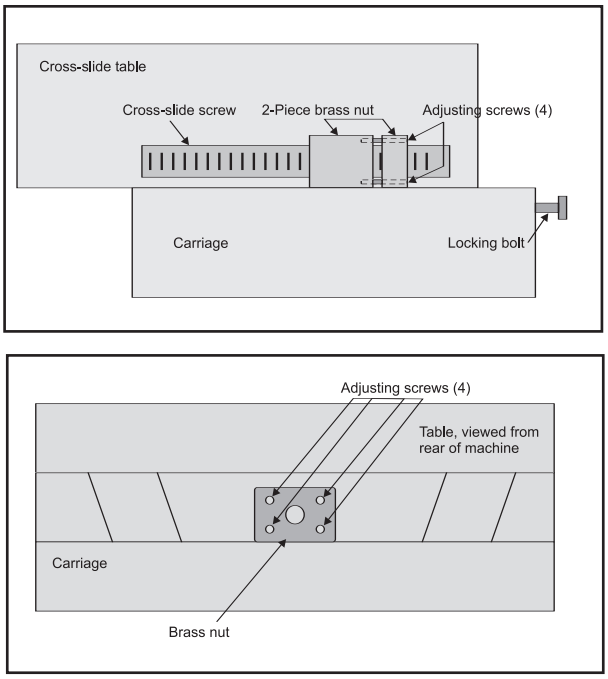


Figure 5.23
Tighten the adjusting screws on the brass nurt

Step 5: Reinstall the rear support and tighten the locking bolt for the brass nut.

Step 6: Recheck the backlash on the cross-slide.

! NOTICE !

If you find that the four adjusting screws will not stay in place, use a small amount of thread-locking compound to keep the screws tight. If you use a Lock-Tite® product, use the Lock-Tite® Purple, not Red which will not allow for furue adjustments

Adjusting Backlash from the Longitudinal Leadscrew

Excessive backlash in the longitudinal feed can come from two places.

- The fit of the longitudinal feed screw to the right-hand mounting trestle
- The fit of the handwheel to the feed screw

Engage the half-nut lever. Slowly turn the longitudinal handwheel clockwise as viewed from the right end of the machine and watch the gap between the dial and the feed screw mounting trestle. Reverse the direction you are turning the feed screw and see if the gap increases slightly. If so then there is some backlash in the mounting. Follow the procedure below to reduce the backlash.

Adjusting the fit of the longitudinal feed screw to the right-hand mounting trestle

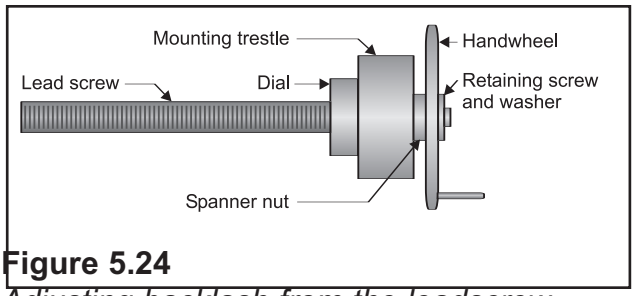


Figure 5.24
Adjusting backlash from the leadscrew

Step 1: Remove the retaining screw and washer in the right end of the longitudinal feed handwheel.

Step 2: Unscrew the handwheel from the end of the feed screw.

Step 3: Using a punch and a small hammer, tighten the spanner nut about one-eighth of a turn and recheck the backlash in the leadscrew.

Step 4: If backlash is acceptable, replace the handwheel, washer, and retaining screw. If more adjustment is needed, repeat step 3 above.

Adjusting the fit of the hand wheel to the feed screw

! NOTICE !

The longitudinal handwheel is intended for rapid, coarse feed and is not calibrated for fine measurement. There is no backlash procedure for this mechanism.

Half-Nut to Screw Backlash

Worn threads on the half-nut can cause excessive backlash in the longitudinal direction. Half nuts are made of a brass-like material and do wear out over a period of time. The only fix for a worn half nut is to replace the worn nut with a new one.

Adjusting Mill Feed Back Lash

Excessive backlash in the vertical fine feed can come from two places.

- The fit between the worm gear and the pinion gear shaft
- The fit of the quill gear to the quill rack

Adjusting the fit between the worm gear and pinion gear shaft

Follow the procedure below to adjust the fit between the worm gear and pinion gear.

Step 1: Remove the fine-feed handwheel and dial.

Step 2: Loosen the two setscrews that hold the left and right worm gear bearing supports in place. They are located on top of the vertical feed housing at the left and right end of the worm gear.

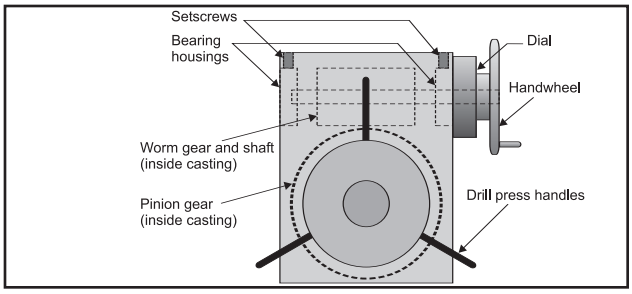


Figure 5.25
Adjusting backlash from the leadscrew

! NOTICE !

The bearing housing has two holes in the outside surface to allow a punch or spanner wrench to turn the housing.

! NOTICE !

Step 3: Use a small spanner wrench or a punch with a small mallet to rotate the bearing supports one at a time. The support bearings are mounted slightly off center in these housings and rotation of the housings will raise or lower the worm gear down towards the pinion gear. The bearing support on the right should be rotated clockwise and the left should be rotated counter clockwise. Rotating the right and left bearing supports should be done in conjuction with each other.

Step 4: Turn the right housing and watch the worm gear shaft to see in which direction it moves. Turn the housing in the direction that will move the worm gear down towards the pinion gear.

Step 5: Move to the left housing and repeat step 4.

Step 6: Alternate moving the front a little and then the rear a little while turning the worm gear to check for binding.

Step 7: Stop as soon as resistance is felt in the rotation of the worm gear. The adjustment is completed.

Step 8: Tighten the setscrews to the bearing housings to lock adjustment in place.

Adjusting the fit of the quill gear to the quill rack

Adjusting the fit between the quill shaft feed gear and the quill rack is done using the split section of the feed gear. The feed gear is made up of two parts.

• A wide section that is locked to the feed shaft by a key and has a fixed position on the shaft

• Another section that is not as wide and is not keyed to the shaft. It is held in place on the shaft via a locking nut and can be repositioned as desired.

The narrow section can be offset from the wide section to give the effect of a gear with thicker teeth. This in turn will give a tighter tooth-to-tooth fit between the feed shaft gear and the rack on the spindle.

Adjustments are made on the split gear from up inside the mill head casting. This is accessible from under the mill head between the quill and the support column. Follow the procedure below to make these adjustments.

Step 1: Look into the millhead casting and locate the items shown in the drawing 5.26.

Step 2: Turn the feed shaft with the coarse feed handwheel until the locking tab of the locking washer is accessible. Lock the quill in that position with the quill lock lever on the rear of the millhead.

Step 3: Bend the locking tab straight and use a small punch to loosen the spanner nut just enough to be able to rotate the adjustable gear with the same punch and small hammer.

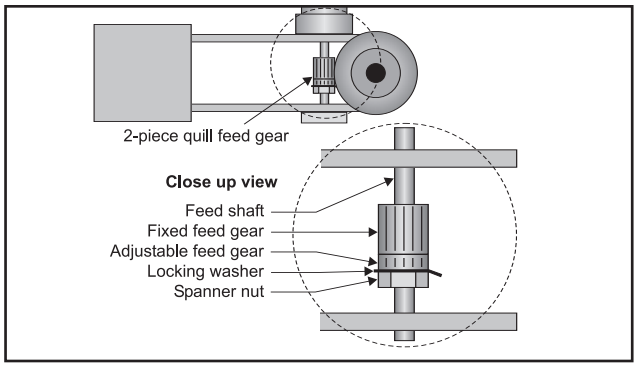


Figure 5.26
Adjusting the quill gear to the quill rack

Step 4: With the quill still locked in position, have someone turn the coarse feed handwheel clockwise until it removes any backlash. Then have them ***hold the handle in this position until the completion of step 6!*** This will move the bottom part of the wide fixed gear to the left as viewed from below.

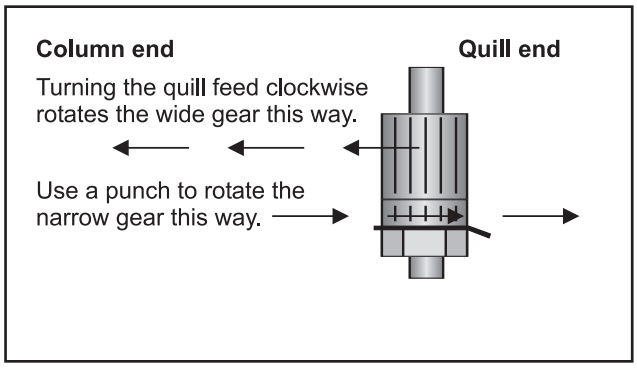


Figure 5.26
Adjusting the quill gear to the quill rack

Step 5: Using the punch and small hammer, tap the narrow movable gear toward the right. This will make the gear assembly appear to have thicker teeth.

Step 6: Tighten the spanner nut with the punch and hammer.

Step 7: With the quill still locked, move the

coarse feed handle and check for a reduction in backlash.

Step 8: Bend the locking tab back into one of the slots in the spanner nut.

Adjusting Drive Belt Tension

Adjust the belt tension before using your machine and recheck it periodically.

Adjusting millhead belt tension

Step 1: Remove the millhead cover.

Step 2: Position the roller to the outside of the belt.

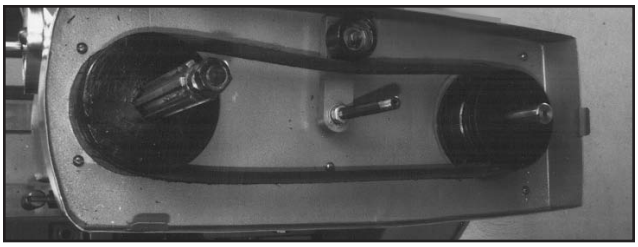


Figure 5.27
Adjusting Millhead Belt Tension.

Step 3: Loosen the nut at the base of the roller shaft.

Step 4: Position the roller against the flat side of the belt to tension the belt.

Step 5: Tighten the nut at the base of the roller.

Adjusting Lathe Belt Tension

The lathe-belt tensioner handle is located on the back side of the machine above the motor.

Step 1: To apply more tension to the lathe belt, move the belt tensioner handle upward. To release tension push the handle downward.

Step 2: If additional adjustment is needed, turn the knurled knob clockwise to tighten the belt and counterclockwise to loosen the belt.

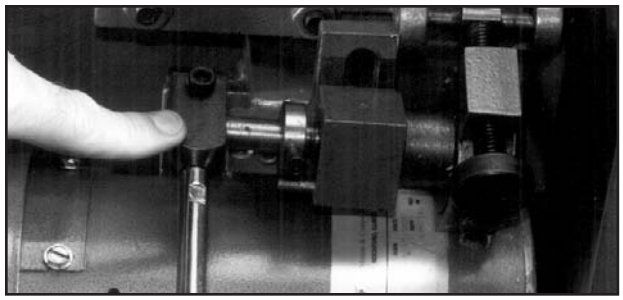


Figure 5.27
Adjusting Lathe Belt Tension-Shown in the down position

Becomng Familiar with Operating Your Smithy Granite

Once the machine has been lubricated and adjusted and before you begin working, take time to become familiar with the operation of your Smithy machine.

Although all Smithy machines are run at the factory, it is wise to put your machine through a break-in run before putting it to work.

Follow the steps below.

Step 1: With the machine unplugged, set the variable speed selector to 0.

Step 2: Set the leadscrew direction selector in neutral and disengage the powerfeed/thread selector (1-7).

Step 3: Verify that the single belt on the machine in the pulley box is on the medium-speed range. (Granite machines are shipped in this position, but it is always best to confirm this before starting your machine.)

Step 4: Place the lathe/mill clutch selector into the lathe position.

Step 5: Plug the machine into an appropriately grounded circuit.

Step 6: Push the green button to start the motor. There is an intentional 6 to 8 second delay before the lathe chuck begins turning.

To reverse the motor, **push the red button to stop the button.** Lift the cover over the rocker switch only after the motor has stopped, and push the rocker switch only after the motor has stopped. Press the rocker switch either up or down to reverse the motor rotation. Set the variable speed selector to zero and then push the green button to start the machine

⚠ CAUTION

Do not change motor rotation until the motor and spindle are fully stopped. Changing directions while the motor is running can damage the motor.

Step 7: Use the variable speed selector to increase the speed ***gradually*** to approximately 1000 rpm and let the lathe run for 15 minutes.

Step 8: Turn tithe variable speed selector to zero and push the red stop button.

Running in the Lathe

Perform these operations to familiarize yourself with lathe operation.

Step 1: Position the carriage and cross-slide table to a mid-range position.

Step 2: Keep the lathe/mill clutch in the lathe position from the previous steps.

Step 3: Position the powerfeed function selector to lathe operation.

Step 4: Position the leadscrew direction selector. This is just an operation check, it doesn't matter if the position is in the clockwise or counter clockwise position.

Step 5: Position the powerfeed/thread selector lever (1-7) in position 7.

Step 6: Position the powerfeed/thread selector lever (I-III) in position III.

Step 7: Push the green button to start the motor.

Step 8: Use the variable speed selector to slowly increase motor speed to between 150 and 200 mph.

Step 9: Engage the half nut engagement lever and observe the longitudinal movement of the carriage assembly. Disengaged the half nut.

! NOTICE !

The half nut engagement lever is used primarily for threading operations and for manual longitudinal feed movement.

Step 10: Move the longitudinal and lateral powerfeed selector to the longitudinal position. (Move the handle down,toward the bed ways.) Observe the slower longitudinal movement of the carriage assembly.

Step 11: Move the longitudinal and lateral powerfeed selector to the neutral position.

The longitudinal and lateral powerfeed selector is used to move the carriage assembly longitudinally for all lathe operations except threading.

Step 12: Move the longitudinal and lateral powerfeed selector to the lateral position. (Move the handle up away from the bed ways.) Observe the lateral movement of the cross-slide table.

Step 13: Move the longitudinal and lateral powerfeed selector to the neutral position.

Step 14: Turn the variable speed selector to zero.

Step 15: Push the red mushroom stop switch to stop the lathe.

⚠ CAUTION

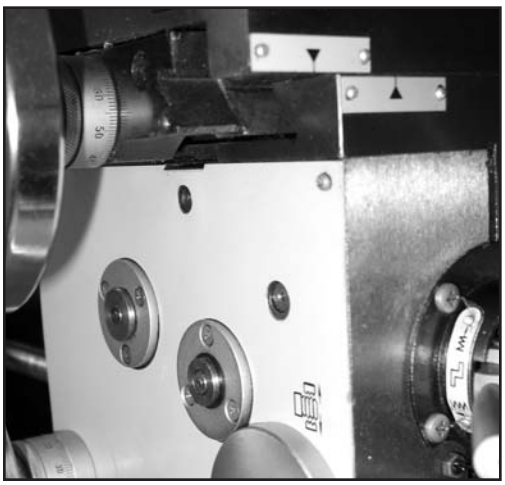


Figure 5.28
To prevent damage to your machine, do not run the table past the travel indicator marks.

Remain aware of travel limits during the initial running in.

Running in the Mill/Drill

Perform these operations to familiarize yourself with mill and drill press operation.

Step 1: Position the carriage and cross-slide table to a mid-range position.

Step 2: Engage the mill with the lathe/mill clutch.

Step 3: Position the powerfeed function selector to mill operation.

Step 4: Push the green button to start the motor.

Step 5: Use the variable speed selector to slowly increase motor speed to rpm. Verify that the speed rotation is crroect. It the rotation is not correct, the STOP the machine, reverse the toggle switch under the yelloow cover on the main switch panel and then restart.

Step 6: Move the longitudinal and lateral powerfeed selector to the longitudinal position. (Move the handle toward the bed ways.) Observe the slower longitudinal movement of the carriage assembly.

Step 7: Move the longitudinal and lateral powerfeed selector to the neutral position.

Step 8: Move the longitudinal and lateral powerfeed selector to the lateral position. (Move the handle away from the bed ways.) Observe the lateral movement of the cross-slide table.

Step 9: Move the longitudinal and lateral powerfeed selector to the neutral position.

Step 10: Turn the variable speed selector to zero.

Step 11: Push the red mushroom stop switch to stop the mill or drill press.

Overview

This section contains information on installing tooloing for your lathe and mill.

Setting Up Lathe Tooling

There are three main areas to set-up tooling for whne you are using the lathe protion of your Granite 1300 series tool:

•Lathe Spindle
•Compound Angle Toolpost
•Tailstock

Lathe Spindle

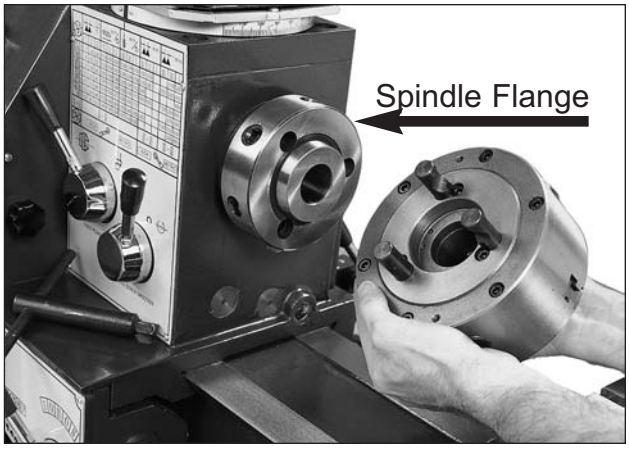


Figure 6.01
D1-4 Lathe Chuck

Any tooling that is mounted to the lathe spindle will use the D1-4 camlock mounting system.

Three studs on each attachment are inserted into matching holes in the lathe spindle. (See figure 6.01 for example.) A camlock socket on each stud is rotated with the lathe chuck key to lock it securely in place. Index marks on the spindle as well as the camlock sockets must be aligned properly for installation or removal of the studs from the holes.

The position of the index marks on the spindle flange and on the tooling should meet at the 12 o'clock position when they are in the unlocked position. Standard rotation is clockwise to lock the studs into postion and counterclockwise to loosen. Each cam should turn approximately 180º for a secure lock on the stud. Adjustment of stud depths can be made if necessary to obtain proper rotation.

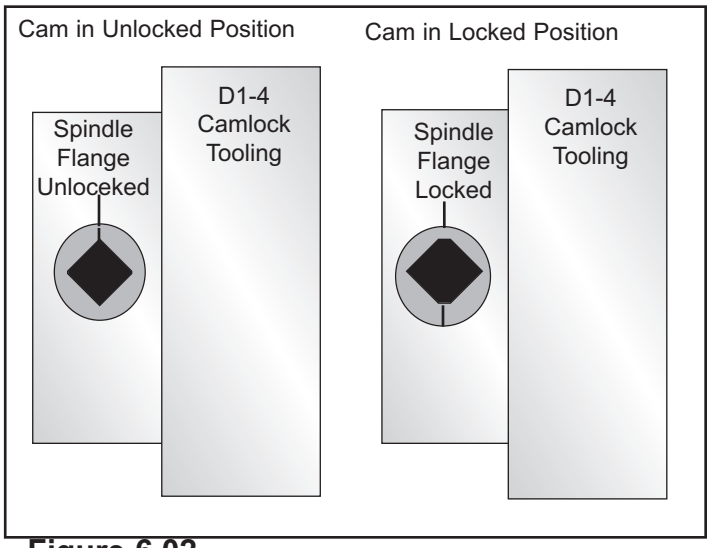


Figure 6.02
D1-4 Lathe Chuck Cams in locked and unlocked postion

Removing D1-4 Camlock Tooling From the Lathe Spindle

Step 1: Protect the ways by placing a wooden board or protective material such as styrofoam on the ways below the lathe spindle.

Step 2: Insert the chuck key provided into each of the three camlock sockets on the spindle nose and turn counterclockwise to the unlocked position.

Step 3: Using a soft mallet, tap the tooling off the spindle.

If you prefer you can also mount a piece of stock in the chuck and then “wiggle” the tooling loose.

When the tooling comes loose, be prepared to support it immediately.

WARNING

Installing Tooling D1-4 Camlock Tooling

Tooling attaches quickly to the lathe spindle with three camlocks.

Step 1: Check the sockets on the spindle flange to make sure the index marks are at the 12 o’clock/unlocekd position.

Step 2: Align the three mounting studs to the spindle nose and slide the chuck into place.

Step 3: With the chuck in position, insert the chuck key provided into each socket on the spindle flange and rotate each camlock clockwise to the locked position. The indicator hashmark on each camlock socket should be somewhere between the 5 and 9 o’clock position.

If the desired rotation on any cam lock cannot be obtained, the mounting studs may need to be adjusted. (See Section 12: Troubleshooting.)

Tailstock

The tailstock will accept any tooling with a Morse Taper #3 shank or arbor. This type of mount is a friction-fit taper, so it is important that the mounting surfaces be clean and dry. You will need to extend the tailstock barrel approximately 1/2-3/4 inches before inserting any tooling, and then firm hand pressure is all that is needed to lock tooling into the taper.

! NOTICE !

You can use either the tang or drawbar style arbors, however, it is important that the threaded drawbar hole be plugged with a bolt or setscrew before inserting into the barrel so that the item will be automatically ejected when you retract the barrel.

Figure 6.03
Intall a plug into MT3 arbors when using them in the tailstock of your Grantie Machine

Installing Compound Angle Toolpost

The compound-angle toolpost (CATP) is mounted to the top of the cross-slide table using 10mm t-studs, washers and nuts. You can substitute t-nuts and the proper length bolts in place of the t-bolts if desired. Mount the toolpost on the table surface wherever there is a t-slot that allows the tooling to reach your workpiece.

Installing Toooling Into Compound Angle Toolpost

The four-sided turret can hold up to four individual cutters up to 5/8 inches in size. To insert tooling, loosen the screws on top of the turret with the provided wrench. Insert tooling and tighen the screws again. Each cutter can be moved into place by loosening the top turret lock and rotating the turret counterclockwise 90º. Each cutter in the turret must be adjusted so that the cutting tip is aligned with the center line of the workpiece. This is achieved by installing shims or feeler gauges under the cutter before tightening it in place.

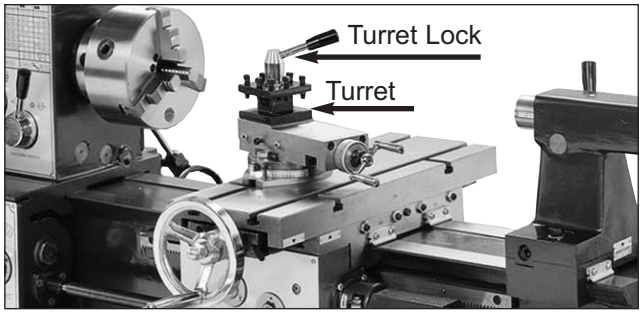


Figure 6.04
Compound Anlge Toolpost Installed on Cross-Slide Table

Setting-Up Tooling in the Mill/Drill Spindle

This seciton will explain tool mounting in the mill/drill spindle.

The mill spindle of the Granite 1300 series machines is an R-8 (Bridgeport®) standard. It features a straight shank with a flared nose for centering the tool and a keyway for alignment.

Aligning Tooling

Use the procedure below to align your tooling in the R-8 spindle..

Step 1: Select the appropriate tool or fixture.

Step 2: Wipe the surfaces of the tooling and spindle interior to ensure a proper fit. Grease or debris on either surface will cause misallignment.

Step 3: Align the keyway in the mill spindle and insert the fixture in the lower mill spindle opening.

You can feel the key in the mill spindle with your finger. It is located just beyond the tapered portion of the spindle.

Installing R-8 Tooling with the Drawbar

Use the procedure below for the drawbar.

Step 1: Remove the mill spindle cap located on the top of the mill belt cover and insert a drawbar (SAE standard 7/16-20) from the top of teh spindle.

Step 2: Tighten the drawbar clockwise

into the fixture or tooling that is inserted into the mill spindle opening. Use the spanner wrench to stabilize the spindle while tightening the drawbar.

Step 3: Use a wrench to apply torque to the drawbar. This will draw the fixture firmly into the spindle.

Step 4: Reinstall the spindle cap when the fixture/tooling is in place.

Figure 6.05
Use the supplied spanner wrench to hold the spindle in place while tightening thedrawbar

When installing or removing tooling with sharp edges, always cover the

! NOTICE !

sharp edges with a shop towel or appropriate covers or guards to prevent injuries. Always shield yourself appropriately when using hammers.

Removing R-8 Tooling from the Drawbar

Use the procedure below to remove tooling using the drawbar method.

Step 1: Stabilize the drawbar with the spanner wrench and use a wrench to apply force counterclockwise to the drawbar

Step 2: .Loosen the drawbar two to three turns counterclockwise.

Step 3: Use a deadblow or brass hammer to strike a downward blow on the top of the drawbar to loosen the fixture from the spindle.

Unscrew the drawbar only two to three turns before striking. Unscrewing it further before striking the drawbar can damage the threads on the drawbar or the fixture.

Step 4: Continue turning the drawbar until it unscrews from the tooling.

Step 5: After the tool is free from the spindle, hold the fixture with your free hand or use a catch box to prevent the tooling from dropping onto your machine or workpiece.

A common catch box consists of a cardboard or wooden box eight to ten inches square with four- to six-inch high sides. Rags loosely thrown in the bottom of the box provide padding for the tool to land in when the drawbar is removed from the fixture and the fixture falls from the mill spindle.

Section 7: Manual Operations

Overview

This section contains information on manual machine operations that are specific to the Granite 1300 series machines. General machining practices can be found in the one of the many machining reference books that Smithy carries such as the Machinist Handbook, item 10-005.

General Safety Operations

⚠ CAUTION

For your own safety and the safety of those around you, follow the rules below.

⚠ DANGER

Never leave or walk away from an operating machine.

⚠ DANGER

Do not change motor rotation direction until the motor and spindle are fully stopped. Changing directions while the motor is running can damage the motor.

! NOTICE !

Observe all general safety rules as presented in Section 2.

Instructions in this section apply to both lathe and mill operations.

Changing Between Lathe and Mill Operation

The lathe/mill clutch lever is located on the upper front surface of the lathe pulley box. Turning the spindle slowly by hand will help align the drive gears smoothly when engaging the lathe/mill clutch.

To change the position of the selector, pull the knob outward and move the selector to the desired position. There are three positions for the selector.

- The center position is marked with an “O.” This is the neutral position where neither the mill or lathe spindle are engaged.

- The right position is marked with a lathe-chuck icon. This position engages the lathe spindle for all lathe operations.

- The left position is marked with a mill-spindle icon. This position engages the mill spindle for all mill operations

Figure 7.01
Lathe/Mill Clutch Shown in the Neutral Position

WARNING

Turn the machine off and wait for the motor and spindle to stop turning when shifting between positions.

Manual Feeding

Feeding is the act of moving the cutter through the workpiece or moving the workpiece along the cutter while the machine is in operation.

Manual feeding uses a handwheel to move the quill or the carriage and cross-slide table.

When manually feeding your machine, make sure the selector lever (1-7) is not engaged into any position before attempting to manually feed the carriage assembly or cross-slide table.

Position the carriage assembly and table in the mid-range position at the beginning of any setup to ensure the pending operation will not proceed past the mechanical limits of travel on any moveable axis.

Mill/Drill Spindle

When in the mill mode, the rotating cutter can be fed down into the stationary workpiece one of two ways.

- The spindle coarse feed is used for positioning during setup and for feeding drill-press operations.

- The spindle fine feed is used for milling operations and can also be used for drilling where a more precise control of the drill bit may be required.

Coarse Feed Operation

Pull the fine-feed clutch knob outward while slowly rotating the drill press handles back and forth. Once the knob is pulled out, the drill press handles can be used for coarse feeding by rotating the handles clockwise to feed into the workpiece and counter clockwise to feed away from the workpiece.

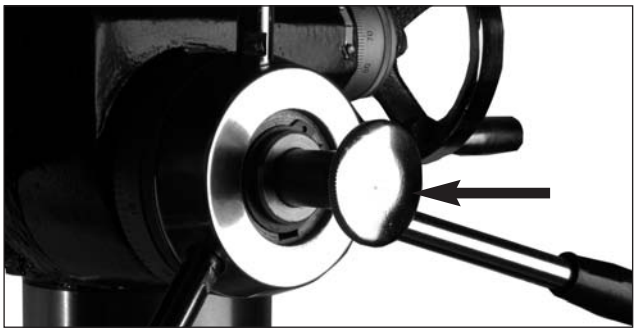


Figure 7.02
Mill/Drill Press Clutch pulled out engaging the Drill Press

Fine Feed Operation

Push the fine-feed clutch knob inward while slowly rotating the drill press handles to engage the fine feed. Turning the fine-feed handwheel allows for slow and precise movement of the spindle up or down. The dial behind the handwheel indicates the amount of

Figure 7.03
Mill/Drill Press Clutch pushed in engaging the Drill Press

vertical movement. The dial is calibrated in 0.001”

There is no powerfeed available for vertical movement of the mill spindle.

Cross-Slide Table and Carriage Assembly

In milling, the crossfeed table and carriage assembly feed the workpiece into the rotating cutter. In lathe work, the same mechanisms move the tool into the rotating workpiece.

Cross-Slide Table

The cross-slide table is moved laterally by rotating the cross-slide handwheel. Rotate the handwheel clockwise to move the cross-slide table away from the operator or counterclockwise to move it toward the operator.The dial is calibrated in 0.001”. One rotation moves the table 0.010”.

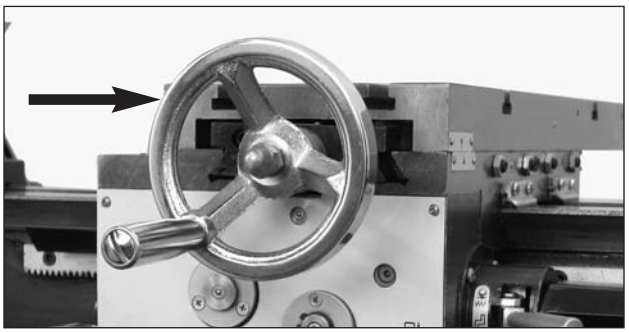


Figure 7/04
The Cross-Slide Table Handwheel

Carriage Assembly

The carriage assembly (crossfeed table and saddle) is moved left and right by the longitudinal handwheel (coarse feed) on the front of the apron or the fine-feed handwheel on the right end of the leadscrew.

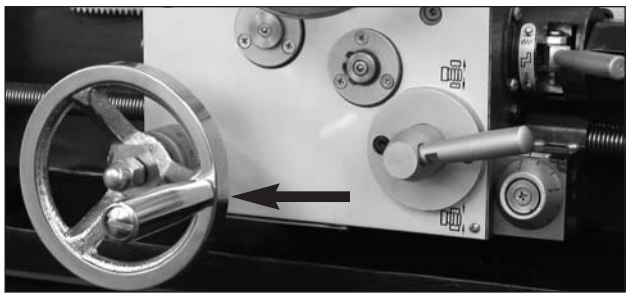


Figure 7.05
Manually moving the carriage assembly-coarse feed

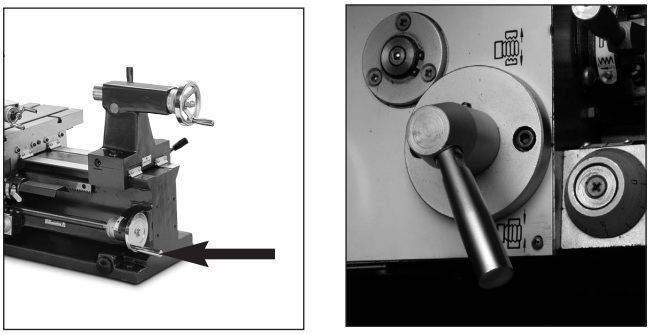


Figure 7.06
Longtidutinal Fine Feed Handwheel (Left) Half-Nut Engaged (Right)

Rotate the handwheel clockwise to move the carriage assembly toward the tailstock end of the machine and counter-clockwise to move the carriage assemble toward the headstock end of the machine.

The longtidutinal handwheel is always engaged and movement is measured by the dial behind the handwheel. This feed is typically used for rapid

movement of the carriage assembly.

Before using the longitudinal fine feed handwheel disengage Selector Lever (1-7) and the Selector Lever (I-III)). Move the half-nut engagement lever to the engaged position (handle pointing down). Turn the leadscrew handwheel to feed the carriage assembly left or right. The movement is measured by the dial on the right end of the leadscrew. This is a very precise feed that is used for most lathe and mill operations.

Section 8: Speeds and Feeds

Overview

Before using the more advance features of your Granite 1300 Series Lathe-Mill-Drill, it is important to have a basic understanidning of feeds and speeds. This section contains information on how to set the speed and feeds rates fo your machine. We encourage you to learn and understand as much as you can about this fundamental element of machining. A general reference guide such as the Home Machinist Handbook or the Machinist Handbook are good reference guides to assist you with this task. As always, remember to follow the general safely rules listed below and in section 2 of this manual.

⚠ CAUTION

For your own safety and the safety of those around you, follow the rules below.

⚠ DANGER

Never leave or walk away from an operating machine.

⚠ WARNING

Do not change motor rotation direction until the motor and spindle are fully stopped. Changing directions while the motor is running can damage the motor.

Define Speed and Feed Rates

Speed is how fast the spindle rotates. Feed rate is how fast the cutter moves along the workpiece.

Speed and feed rates are calculated based on the type of material you are cutting, the size of the material and the type of cutter being used. Refer to the Machinist Handbook (Smithy item # 10-005) or Ready Reference (Smithy item #10-015) for more detail. Remember, speed and feed rates are given in a range and you will need to adjust within that range for your machine's size and power.

Setting the Spindle Rotational Speed

Once you have determined the proper speed and feed rate for the material that you are cutting and the type of cutter that you will be using, you will need to setup your machine to cut within the range of the selected speeds and feed rates.

Setting the spindle speed is a two-stage operation consisting of an initial belt position setting and a final adjustment with the variable speed selector on the front of the gearbox.

The drive system on your machine is much like a car with a manual transmission. It has a "transmission" with several gear ranges and a "throttle" to vary the speeds within each gear selection.

The belt positions give you three speed ranges and the electronic control gives

fine adjustments within the selected range. The variable speed selector dial shows the speeds for each of the three speed ranges. These speeds are applicable to both the lathe and mill spindles.

Figure 8:01
Use the Granite Speed Dial for fine adjustments

Step 1: Refer to a machining reference guide such as the Home Machinist Handbook or Ready reference to determine the optimal rotational spindle speed for the materials and tooling you are using.

! NOTICE !

Many reference charts give feed and speed rates for high speed steel cutters. Most work today is done with carbide cutters which can cut at much faster rates. If you are using carbide cutters, make sure the charts you are referencing are for carbide cutters.

Step 2: Examine the decal that surrounds the variable speed selector dial to determine which of the three belt positions need to be selected inside of the gearbox. The low-speed range located on the inner ring of the dial(0-400 rpm) will require using the low-speed idler pulley and a dual-belt setup. The mid and high-speed ranges will use a single belt that bypasses the center idler pulley.

Step 3: Set up the belts as necessary to obtain the desired speed range. The variable speed selector dial can be used to adjust the speed within the range.

! NOTICE !

The life of the electrical system will be greatly extended and available machine torque increased by using the lower pulley setting and keeping the motor speed up.

! NOTICE !

Machines purchased after mid-2003 have the speed reducer pulley with the machine. A retrofit kit, part number 40-300G, to add this feature to earlier machines is available from the Smithy Sales Department at 1-800-476-4849 or at www.smithy.com.

High-Speed Set-up

Use the procedure below to set up for high speed (1500 to 3000 RPM) operations.

Step 1: Release the belt tensioned at the motor by rotating the tension lever down.

Step 2: Position the belt around the largest sheave of the motor and the smallest sheave on the spindle pulley.

Step 3: Tension the belt by rotating the tension lever on the motor all the way up.

Mid-Speed Set-up

Use the procedure below to set up for middle speed (400 to 1500 RPM) operations.

Step 1: Release the belt tensioned at the motor by rotating the tension lever down.

Step 2: Position the belt around the center sheave of the motor and the largest sheave on the spindle pulley.

Step 3: Tension the belt by rotating the tension lever on the motor all the way up.

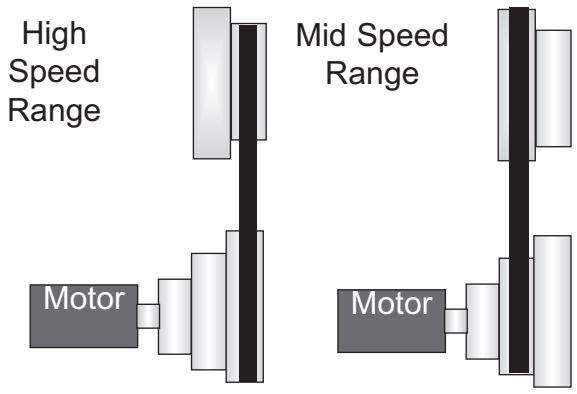


Figure 8.02
The high and mid-speed ranges only require the use of one belt.

Low-Speed Set-up

For low-speeds (optional on early machines), you must convert to a double drive belt configuration. Use the procedure below to set up for low speed (30 to 400 RPM) operations.

Step 1: Release the belt tensioned at the motor by rotating the tension lever down.

Step 2: Remove the belt from the motor pulley by following steps 3-6 below.

Step 3: Loosen the cap screw on the shaft of the lathe/mill clutch inside the pulley box and pull the selector lever outward to move the shifter fork arm away from the shifter fork.

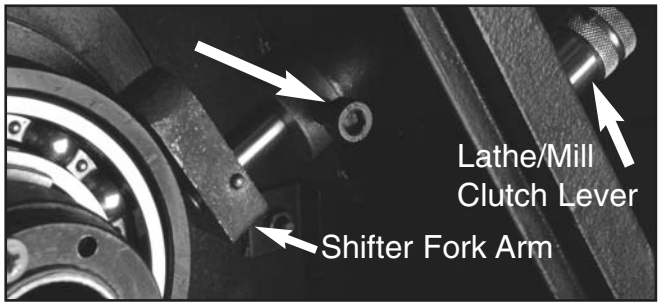


Figure 8.03
Loosen the cap screw from the lathe-mill clutch lever

Step 4: Slide the single belt off the spindle pulley and the end of the main drive spindle.

Step 5: Loosen the bolt that holds the gear quadrant and the reduction pulley bracket in place. This will allow the two belts you are about to install to be properly tensioned.

Step 6: Place the larger of the two belts on the smallest motor pulley

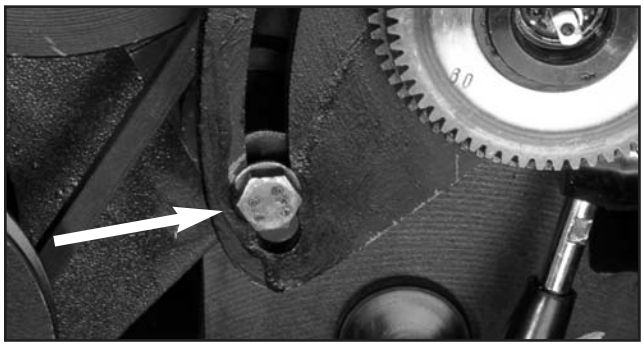


Figure 8.04
Loosen the bolt of the speed reduction pulley bracket when installing belts for the low speed

sheave and on the largest pulley sheave of the speed reduction pulley. Place the smaller belt on the smallest sheave on the speed reduction pulley and the largest sheave on the main drive spindle pulley.

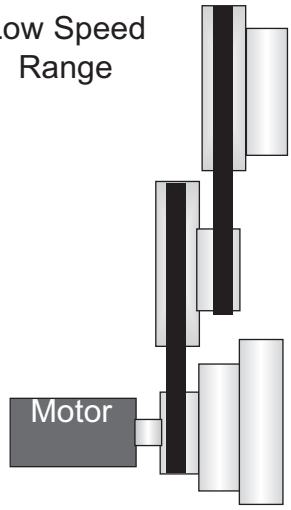


Figure 8.05
Low Range Belt Setting

Step 7: Tension the belts by rotating the tension lever on the motor all the way up. Tighten the bolt on the gear quadrant to lock the quadrant and the reduction pulley in place.

Step 8: Reassemble the lathe/mill selector arm and tighten the cap screw to secure the selector shaft in place.

Feed Chart Explained

Before setting the feed rates, it is important to know how to correctly read the feed rate and threading chart found on the headstock of your Granite 1300 series machine.

The chart is comprised of six vertical sections (one header and five data sections) and four horizontal sections (one header and three data sections).

Section 1 is headed by the symbol at the left. T**he meaning is "Do NOT change selector handle positions while the machine is running".** Please stop the machine while changing feed directions, gear selections, feed-rate selections, etc."

Below the symbol is a representation of the feed gears, A, B, C, and D on the gear quadrant. These gears are located inside the pulley box. Immediately to the right of the gear symbols are the numbers 1 through 7, which refer to the position of the powerfeed selection lever (1-7) on the feed transmission.

$\frac{A}{C} \times \frac{B}{D}$ Below the gear symbols is the location guide for the gear numbers which are stamped on the face of the gears. This formula refers to which gear number belongs in which location in order to move the carriage or table for threading and powerfeeding. Refer to page 4-5 for a diagram of the gear set-up.

Header	Section 1			Section 2			Section 3			Section 4			Section 5		
	1"/N			mm/○			mm/○			mm			mm		
	I	II	III	III	II	I	III	II	I	III	II	I	III	II	I
1	7	14	28	0.125	0.250	0.500	0.039	0.079	0.157	0.35	0.70			1.75	3.50
2	8	16	32	0.109	0.218	0.437	0.034	0.069	0.138	0.40	0.80		1.00	2.00	4.00
3	9	18	36	0.097	0.194	0.388	0.031	0.061	0.122	0.45					4.50
4	10	20	40	0.087	0.175	0.349	0.028	0.055	0.110	0.50	1.00		1.25	2.50	5.00
5	11	22	44	0.079	0.159	0.317	0.025	0.050	0.100					2.75	5.50
6	12	24	48	0.073	0.146	0.291	0.023	0.046	0.092	0.60			1.50	3.00	6.00
7	13	26	52	0.067	0.134	0.269	0.021	0.042	0.085					3.25	6.50
A/C X B/D	30/66 X 60/60									33/80 X 63/60			66/64 X 63/60		
	INCH					METRIC				INCH			METRIC		

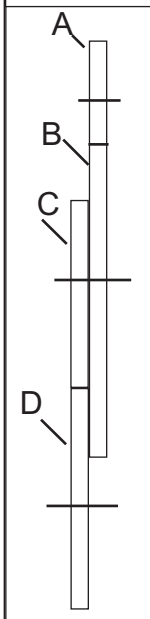


Figure 8.06
Feed Rate Chart

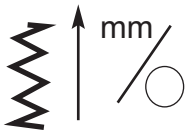
Below the gear formula is a repetition of the **"Do not change selector handle positions while the machine is running"** symbol.

The Header Row contains a number of symbols explained below:

This symbol refers to inch thread pitches (threads per inch). The "N" represents the distance the carriage assembly travels for each rotation of the spindle based on the positions of the selector lever (I-III) and selector lever 1-7. For example, if the distance traveled in one rotation of the spindle is 1/10 inch per rotation, the machine will travel 1 inch in 10 rotations, yielding 10 threads per inch (tpi).

This symbol represents the longitudinal (X-Axis Travel) in millimeters per

spindle revolution.



This symbol represents the lateral Y-Axis Travel) in millimeters per spindle revolution.

This symbol refers to the the metric thread pitch. Metric pitches measures the distance between each thread pitch.

Directly below this set of symbols is a row of Roman Numbers I-III, This row represents the position of the selector lever (I-III) when cutting a threads or determining a feed rate.

Section one of the chart list the inch thread pitches that can be cut with the Granite series machines. The last row corresponding with the gear location guide shows the position of the gears inside the pulley box. When cutting inch threads the following gears are required:

A=30
B=60
C=66
D=60

This is the default setting from the factory.

Section two of the chart list the feed rates for the X-Axis (longitudinal feed). The same gear set-up is required as for cutting inch threads.

Section three of the chart list the feed rates for the Y-Axis (lateral feed). The same gear set-up is required as for cutting inch threads.

Section four and five of the chart list the metric thread pitches when using the following gear set-up:

Section 4	Section 5
A=33	A=66
B=63	B=63
C=80	C=64
D=60	D=60

Changing gears will be covered in the Section 10: Threading.

Example Settings

Here are a couple examples to illustrate the speed/feed chart.

Example 1
Settings to thread 10 threads per inch.

In section 1, locate number 10. Follow the row over to the column next to the meshing gears which is the number 4. Follow the column up to the Roman Numerals which is Roman Numeral I. To cut this thread you will need:

1. Selector lever (1-7) in position 4
2. selector lever (I-III) in position I
3. 30 tooth gear in position A
4. 60 tooth gear in position B
5. 66 tooth gear in position C
6. 60 tooth gear in position D.
7. Set the Inch/Metric selector, found in the gear box, to Inch.

Example 2
Setting to move the carriage assembly 0.159 mm per spindle revolution.

Locate the rate 0.159 in section 2. Follow the row over to the column next to the diagram of the meshing gears

which is 5. Follow the column up to the Roman Numerals which is II. To feed your carriage at this rate you will need to:

1. Selector lever (1-7) in position 5
2. selector lever (I-III) in position II
3. 30 tooth gear in position A
4. 60 tooth gear in position B
5. 66 tooth gear in position C
6. 60 tooth gear in position D.
7. The Inch/Metric selector found in the gear box would need to be set to Inch.

These example settings will aid you in correctly setting up your machine for powerfeeding which will be covered in the next section of this manual.

! NOTICE !

The feed chart on your machine is in millimeters per spindle revolution. Please see Appendix A for feed rates based in inches per spindle revolution.

Section 9: Powerfeeding

Overview

The previous section of this manual explained speeds and feed and how they are determined. This section will give you step by step instructions for using the powerfeed on your Granite 1300 series lathe-mill-drill.

General machining practices can be found in the one of the many machining reference books that Smithy carries such as the Machinist Handbook, item 10-005.

General Safety Operations

⚠ CAUTION

For your own safety and the safety of those around you, follow the rules below and those listed in chapter 2 of this manual.

⚠ DANGER

Never leave or walk away from an operating machine.

⚠ CAUTION

Do not change motor rotation direction until the motor and spindle are fully stopped. Changing directions while the motor is running can damage the motor.

Power Feeding

Power feeding is using the motor and gear train of the machine to provide power to move the cross-slide table and carriage assembly along the X and Y-axes.

The carriage can be moved longitudinally and the cross-slide table laterally using the powerfeed capabilities of the machine. Power feeding will give a more uniform finish on the workpiece and is available for both milling and lathe work.

⚠ CAUTION

The two-position powerfeed function selector must be in either the lathe or mill position according to which machine function is being used at the time.

Figure 9.01
Always engage the Powerfeed Function lever to the appropriate operation

! NOTICE !

If the mill/lathe clutch is in the mill position, you must also position the powerfeed function selector in the mill position to enable the machine to move

the table
.
The powerfeed operates in either the x- or y-axis. It incorporates the quick change gear box by engaging the Selector Lever (1-7) and Selector Lever (I-III) as well as the carriage gearing by engaging the powerfeed lever into the proper position.

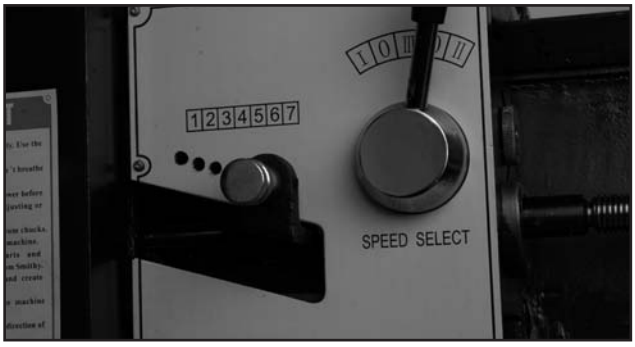


Figure 9.02
Selector Lever (1-7) and Selector Lever (I-III) engaged

The powerfeed engagement lever is located on the upper right side of the carriage and has a three-position gate with neutral, longitudinal (x axis) and cross feed (y axis). The powerfeed engagement lever can be operated while the machine is running.

Figure 9.02
Powerfeed Engagement Lever
Shown with Y-Axis powerfeed engaged

Engagement of the x axis is achieved by moving the lever to the left and pushing down and the y axis is to the right and lifting up.

DANGER

Don't allow the table to move beyond the travel limitations. Before running the powerfeed, do a "dry run" by manually feeding the cross-slide table and carriage assembly the distance that you will be feeding your project. This will prevent any unnecessary crashes that can cause serious damage to your machine.

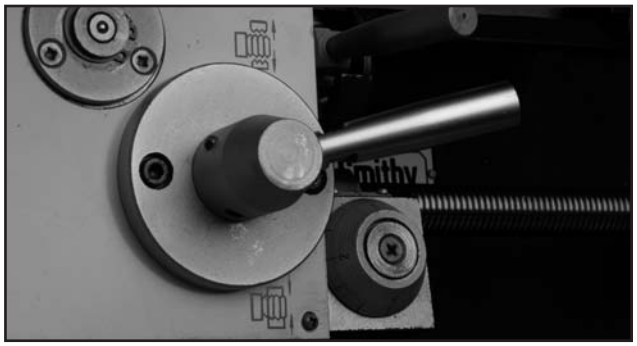


Figure 9.03
Half Nut Disengaged

! NOTICE !

When using the X-Axis powerfeed for a given feed rate, make sure the the half nut is DISENGAGED.

! NOTICE !

If the powerfeed lever will not engage, first check the half-nut lever. The powerfeed will not engage if the half-nut is engaged (down position). You may also have a situation where the teeth on the respective gears are not meshing.

Rotate the leadscrew handwheel slightly to allow the teeth to mesh.

The Jog Knob

The chrome knurled knob located on the upper side of the gearbox can be used manually turn the gear shafts and allow the cut gears to mesh easier when moving the powerfeed selector levers.

Figure 9.04
Jog Knob

Step-By-Step Lathe Powerfeeding

Step 1: Determine the proper speed and feed rate for the material you are cutting and the cutter you will be using from a general reference guide such as the Machinist Ready Reference.

Step 2: With your workpiece and tooling properly mounted, place the powerfeed selection lever in the lathe mode by moving the lever to the lathe chuck icon all the way to the left.

Step 3: Referencing the chart on the front of the machine's headstock, find the desired feed rate (or the closest to the listed range for your work material and cutting material.) See section 8 for detailed a detail chart explanation.

Step 4: Position the selector (1-7) into the position listed on the chart for the desired feed rate.

Step 5: Position the selector (I-II) into the position listed on the chart for the desired feed rate.

Step 6: Set the recommened speed for the work stock material and cutter that you are using. (See chapter 8 for setting speeds.)

! NOTICE !

For optimum performance, be certain to run in the upper portion of the suggested spindle rotation speed range.

Step 7: Before running the powerfeed do a "dry run" by manually feeding the cross-slide table and carriage assembly the distance that you will be feeding your project. Also, rotate the chuck by hand to verify tool clearances. This will prevent any unnecessary crashes.

Step 8: Once your speed has been set, engage the powerfeed selector into the desired position. (Pushing the lever up will run the powerfeed along the Y-Axis. Pushing the lever down will engage the X-Axis powerfeed.)

Step 9: To stop powerfeeding, disengage the powerfeed by moving the lever into the neutral position which is half in between the Y-Axis and X-Axis engagement.

Step I0: If you wish to reverse the

direction of your cut, move the leadscrew rotation lever, found next to the powerfeed selection lever into the opposite direction and engage the powerfeed selector lever.

Step-By-Step Mill Powerfeeding

Step 1: Determine the proper speed and feed rate for the material your cutting and the cutting material you will be using from a general reference guide such as the Machinist Ready Reference.

Step 2: With your workpiece and tooling properly mounted, place the powerfeed selection lever in the mill mode by moving the lever to the mill spindle icon all the way to the right. (Reference figure 9.1 above.)

Step 3: Referencing the chart on the front of the machine's headstock, find the desired feed rate (or the closest to the listed range for your work material and cutting material.)

Step 4: Position the selector (1-7) into the position listed on the chart for the desired feed rate.

Step 5: Position the selector (I-II) into the position listed on the chart for the desired feed rate.

Step 6: Set the recommended speed for the work stock material and cutter that you are using. (See chapter 8 for setting speeds.)

! NOTICE !

For optimum performance, be certain to run in the upper portion of the suggested spindle rotation speed range.

Step 7: Before running the powerfeed do a "dry run" by manually feeding the cross-slide table and carriage assembly the distance that you will be feeding your project. This will prevent any unnecessary crashes.

Step 8: Once your speed has been set, engage the powerfeed selector into the desired position. (Pushing the lever up will run the powerfeed along the Y-Axis. Pushing the lever down will engage the X-Axis powerfeed.)

Step 9: To stop powerfeeding, disengage the powerfeed by moving the lever into the neutral position which is in between the Y-Axis and X-Axis engagement.

Overview

This section of your manual covers threading operations on your Granite 1300 series lathe-mill-drill. This section will build onto sections 8 and 9. If you have not read these sections, please do so before continuing.

General Safety Operations

⚠ CAUTION

For your own safety and the safety of those around you, follow the rules below and those listed in section 2 of this manual.

⚠ DANGER

Never leave or walk away from an operating machine.

⚠ CAUTION

Do not change motor rotation direction until the motor and spindle are fully stopped. Changing directions while the motor is running can damage the motor.

Leadscrew Safety Clutch Adjustment

Before begining your threading operation, note the leadscrew safety clutch may need to be adjusted.

The lead screw safety clutch is designed to work in the threading mode. It will slip to prevent damage to the machine apron if the carriage is accidentally run into the head of the machine.

The clutch will not prevent damage from running the carriage or cross-slide table past the end of their mechanical limits

The clutch assembly is located inside the lathe pulley box. It is a round flat device in the change gear shaft with the gear. There are six setscrews located radially around the clutch in front of the gear. The setscrews screw inward toward the center of the clutch.

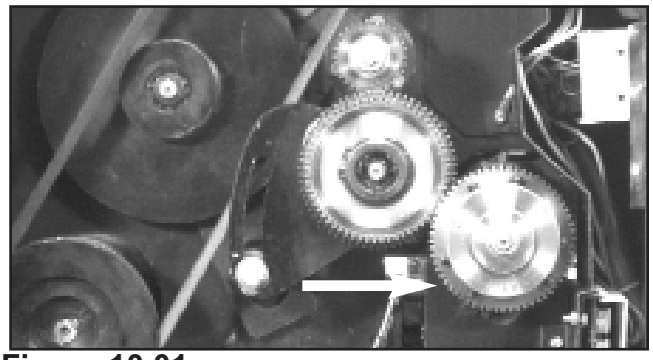


Figure 10.01
Leadscrew Safety Clutch

If slippage occurs during your threading operation adjust the safety clutch by turnign each setscrew one at a time a half turn time untill the clutch is solid and no slippage occurs.

An approximate setting is to have the set screws with two threads exposed from the surface of the clutch housing.

Basic Threading

Refer to a machining reference guide such as the Machinist Ready Reference for threading theory and spindle speeds based on the material type and diameter that you will be machining.

Step 1: Select the thread pitch which you want to cut from the chart located on the headstock of your Granite series machine (The is also reprinted on page 8-5 of this manual.) Chose the desired pitch from the chart and follow the horizontal row and vertical columns to set the correct positions for selector levers (1-7) and selector lever (I-III).

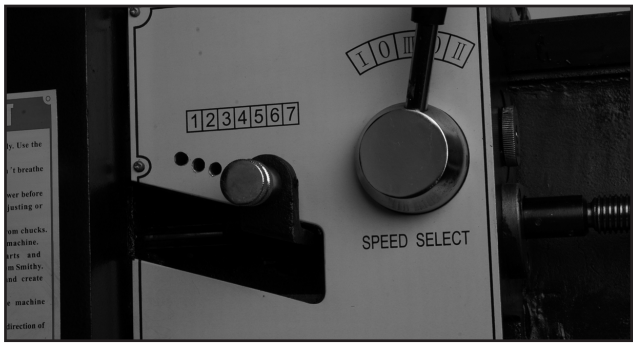


Figure 10.02
Selector Lever (1-7) and Selector Lever (I-loll) engaged

Step 2: Consult the thread chart on the headstock support column for the thread pitch that you wish to cut. The bottom row of the chart will show you the gear set-up inside the pulley box that is required to cut the desired thread pitch. (**Note:** The default factory set-up is for cutting inch, SAE threads.

Step 3: If changing the gear set-up is necessary to achieve the desired thread pitch, follow the procedure under the title “Changing Gears” in the next section.

Changing Gears

Step 1: The A gear is secured with a bolt and washer assembly and the location is fixed. To remove the gear remove the bolt and washer.

Step 2: The B and C gears share the same shaft and are secured with a snap ring. Remove the snap ring from the shaft to remove the gears.

Step 3: Place the proper gear in the A position for cutting the desired thread pitch. Reinstall the washer and bolt.

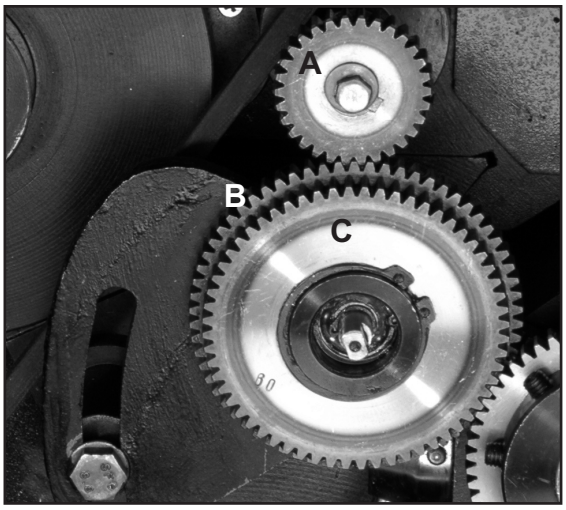


Figure 10.03
Make certain that your gears are properly set-up to obtain the desired thread pitch

Step 4: The shaft for the B/C gears moves in a slot to adjust for the different diameters of the gears. There are two flats on the end of the shaft to loosen and tighten the assembly to allow for adjustment. Adjust the B/C gear shaft as needed to accommodate the B and C gears needed for cutting your desired thread pitch.

Figure 10.04
Inch/metric Selector located inside the pulley box

Step 5: Loosen the hex head bolt. This allows the assembly to drop down.

Step 6: Position the installed B/C gear unit to mesh with the D gear.

Step 6: Rotate the gear assembly until the B gear meshes with the A gear. Lock the assembly in place by tightening the hex head bolt.

The hex head bolt also tensions the speed reduction pulley support arm. Be sure the are is in the appropriated position before tightening the hex head bolt.

Cutting Inch Threads

Step 1: Select the desired thread pitch that you which to cut from the chart located on the headstock of the Granite 1300 series lathe-mill-drill.

Step 2: Engage selector levers (1-7) and selector lever (I-III). Remember, you can use the jog knob located on the right side of the gear box to help align the gears if the levers are difficult to engage.

Step 3: Check the gear set-up inside the pulley box to confirm the gearing is set-up correctly to cut your desired thread pitch. If the gears are not correct, change gears using the procedure to the left. **NOTE**: The default factory setting is for cutting inch, SAE, threads.

Step 4: Confirm that your belts inside the pulley box are properly set-up to reach the recommended spindle speed for cutting your work piece material with your specific cutter.

Step 5: Set your compound angle toolpost to 29-1/2º and install your E8 carbide bit that came with your machine.

Step 6: Inside the pulley box at the left lower side of the gear cluster is the inch/metric lever, which must be pushed away from you for inch threading.

Step 7: Turn your machine on and adjust variable speed to the recommended speed.

Step 8: Once you have made all of your tooling and machine settings, you are ready to begin the first pass. Set

the dials on the compound angle toolpost and cross-slide table to zero. Move the compound angle toolpost into the desired position. Watch the threading dial rotate until one of the numbers is just about to the reference mark. At this point apply firm constant downward pressure on the half-nut engagement lever until you feel the lever drop into position and the carriage will begin to move. (More information to follow on the threading dial.)

Figure 10.05
Half Nut Engaged

Step 9: When you reach the end of the first cut, lift up on the half-nut engagement lever, back the cutter out and return the cutter to the starting point.

Step 10: Feed the cutter in the desired amount for the next cut, wait for the same number as before to come up on the dial and engage the half nut. Continue making passes until you have completed the full depth of cut.

Using the Threading Dial to cut inch threads

The threading dial is used for cutting inch threads only. Special procedures for cutting metric threads can be found in the section under “Metric Threading”.

The

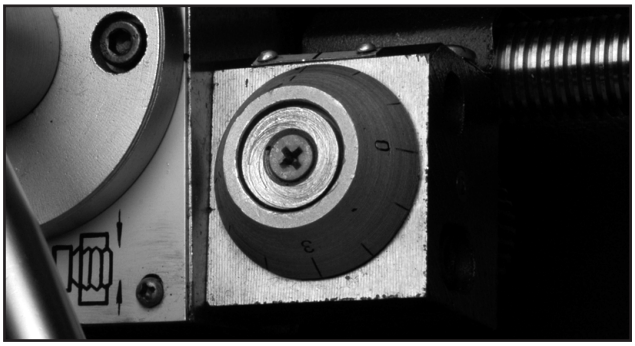


Figure 10.06
Note the number of the threading dial as your cutting tool contacts the workpiece

threading dial is a mechanical indicator for engaging the cutter at the exact same point for each consecutive pass. The numbers on the dial have no specific reference to pitch, but they provide a reference point so you can start at the earliest available point and use the same number again for each consecutive pass.

Note: When the carriage is moving and the half nut is engaged, you will notice that the dial no longer rotates. This is normal.

Cutting Metric Threads

Step 1: Select the desired thread pitch that you wish to cut from the chart located on the headstock of the Granite 1300 series lathe-mill-drill.

Step 2: Engage selector levers (1-7) and selector lever (I-III). Remember, you can use the jog knob located on the right side of the gear box to help align the gears if the levers are difficult to engage.

Step 3: Check the gear set-up inside the pulley box to confirm the gearing is set-up correctly to cut your desired thread pitch. If the gears are not correct, change gears using the procedure to the left.

Step 4: Confirm that your belt set-up inside the pulley box is properly set-up to reach the recommended spindle speed for cutting your work piece material with your specific cutting tool material.

Step 5: Set your compound angle toolpost to 29-1/2º and install your E8 carbide bit that came with your machine.

Step 6: Inside the pulley box at the left lower side of the gear cluster is the inch/metric lever, which must be pulled toward you for metric threading.

Step 7: Turn your machine on and adjust variable speed to the recommended speed.

Step 8: Once you have made all of your tooling and machine settings, you are ready to begin the first pass. Apply firm constant downward pressure on the half-nut engagement lever until you feel the lever drop into position and the carriage will begin to move.

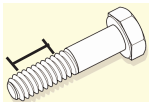
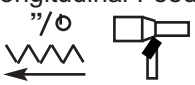
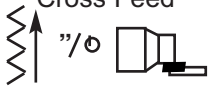
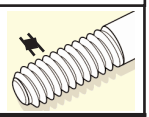
.

Step 9: Do not disengage th half nut. Stop your machine and reveres the feed direction. Rotate the handle on the compound angle toolpost counter clockwise to back out your cutter.

Step 10: Restart your machine and bring the cutter back to is original position. Stop your machine, reverse the direction again.

Step 11: Feed the cutter in the desired amount for the next cut and restart your machine. Continue this process until you have reached the desired depth of cut.

Appendix A: Inch Feed Rates

THREADING CHART		INCH THREADS			FEED RATES = Distance traveled per Spindle Revolution						METRICTHREADS					
		Inch threads are defined as the number of threads in one inch. 			Longitudinal Feed 			Cross Feed 			Metric threads are defined as the distance between two adjacent crests. 					
Selectorl - III		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
SELECTOR 1-7	1	7	14	28	0.0197”	0.0098”	0.0049”	0.0062”	0.0031”	0.0015”		0.70	0.35	3.50	1.75	
	2	8	16	32	0.0172”	0.0086”	0.0043”	0.0054”	0.0027”	0.0014”		0.80	0.40	4.00	2.00	1.00
	3	9	18	36	0.0153”	0.0076”	0.0038”	0.0048”	0.0024”	0.0012”			0.45	4.50		
	4	10	20	40	0.0137”	0.0069”	0.0034”	0.0043”	0.0022”	0.0011”		1.00	0.50	5.00	2.50	1.25
	5	11	22	44	0.0125”	0.0062”	0.0031”	0.0039”	0.0020”	0.0010”				5.50	2.75	
	6	12	24	48	0.0115”	0.0057”	0.0029”	0.0036”	0.0018”	0.0009”			0.60	6.00	3.00	1.50
	7	13	26	52	0.0106”	0.0053”	0.0026”	0.0033”	0.0017”	0.0008”				6.50	3.25	
Gear Selection		X = Teeth per gear A = 30 B = 66 C = 60 D = 60									A = 33 C = 63 B = 80 D = 60			A = 66 C = 63 B = 64 D = 60		
Lever located inside Pully Box below gear cluster		INCH  METRIC									INCH  METRIC					

Appendix B: Maintenance Schedule

Overview

To keep your Smithy Granite machine running at optimum performance, follow this basic maintenance schedule:

Before Each Use

1. Make sure your work area is clean and free of all obstructions.

2. Clear machine cross-slide table, bed ways and tool post of all chip build up from your previous job.

⚠ CAUTION

Do not clear chips by hand. Metal chips are very sharp and can easily cut your hand. Use a brush to clear chips.

3. Oil all oil buttons

4. Clean tailstock barrel taper and mill spindle taper with a clean shop towel.

5. Check the oil site gage in under the lathe chuck and oil oil if the level is below the half-way point.

6. Check all toling and holding devices for tightness before you begin turn the machine on.

7. Check the condition of the drive belts.

After Each Use

1. Clean chip build up from machine.

2. Brush chips off the longitudinal feed screw.

3. Remove any excess cutting fluid that may have accumulated on the machine.

4. Apply protective oil coating to all bare metal surfaces that may rust or corrode.

10 Hours (Daily)

1. Clean chip build up from machine.

2. Brush chips off the longitudinal feed screw.

3. Check the oil site gage in under the lathe chuck and oil oil if the level is below the half-way point.

4. Oil all oil buttons

25 Hours (Daily)

1. Check the oil site gage in under the lathe chuck and oil oil if the level is below the half-way point.

2. Oil all oil buttons

3. Apply a light coating of oil to the outside of the mill spindle and the top of the mill spindle splines.

4. Lubricate the change gears in the lathe pulley box with an aerosol chain lubricant.

5. Lubricate the inside of the quick change gearboxwith an aerosol chain lubricate by spraying through the openings in the front of the gearbox.

6. Remove and clean the lathe chuck and the spindle nose. Lubricate the chuck and the cam locks with oil.

7. Check all gib adjustments.

8. Check and adjust backlash as necessary.

9. Check the condition of all drive belts and replace if necessary.

100 Hours (Yearly)

1. Change oil in the headstock.

2. Remove the X and Y-Axis gibs and clean with solvent. Coat gibs with way oil and reinstall.