# Operating Instructions and Parts Manual

# Benchtop Lathe

**Model PL-714VS-V2**


**Baileigh Industrial**
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**BA9-1228214**
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# 1.0 Table of Contents

# 2.0 Safety Instructions

**⚠WARNING** **Failure to follow these rules may result in serious personal injury**

1. FOR YOUR OWN SAFETY, READ INSTRUCTION MANUAL BEFORE OPERATING THE MACHINE. Learn the machine's application and limitations as well as the specific hazards.
2. Only trained and qualified personnel can operate this machine.
3. Make sure guards are in place and in proper working order before operating machinery.
4. Remove any adjusting tools. Before operating the machine, make sure any adjusting tools have been removed.
5. Keep work area clean. Cluttered areas invite injuries.
6. Overloading machine. By overloading the machine, you may cause injury from flying parts. DO NOT exceed the specified machine capacities.
7. Dressing material edges. Always chamfer and deburr all sharp edges.
8. Do not force tool. Your machine will do a better and safer job if used as intended. DO NOT use inappropriate attachments in an attempt to exceed the machine's rated capacity.
9. Use the right tool for the job. DO NOT attempt to force a small tool or attachment to do the work of a large industrial tool. DO NOT use a tool for a purpose for which it was not intended.
10. Do not overreach. Maintain proper footing and balance at all times. DO NOT reach over or across a running machine.
11. Stay alert. Watch what you are doing and use common sense. DO NOT operate any tool or machine when you are tired.
12. Check for damaged parts. Before using any tool or machine, carefully check any part that appears damaged. Check for alignment and binding of moving parts that may affect proper machine operation.
13. Observe work area conditions. DO NOT use machines or power tools in damp or wet locations. Do not expose to rain. Keep work area well lighted. DO NOT use electrically powered tools in the presence of flammable gases or liquids.
14. Blade adjustments and maintenance. Always keep blades sharp and properly adjusted for optimum performance.
15. Dress appropriately. DO NOT wear loose fitting clothing or jewelry as they can be caught in moving machine parts. Protective clothing and steel toe shoes are recommended when using machinery. Wear a restrictive hair covering to contain long hair.
16. Use eye protection. Always wear ISO approved protective eye wear when operating machinery. Wear a full-face shield if you are producing metal filings. Eye wear shall be impact resistant, protective safety glasses with side shields which comply with ANSI Z87.1 specification. Use of eye wear which does not comply with ANSI Z87.1 specification could result in severe injury from breakage of eye protection.
17. Keep children away. Children must never be allowed in the work area. DO NOT let them handle machines, tools, or extension cords.
18. Keep visitors a safe distance from the work area.
19. Store idle equipment. When not in use, tools must be stored in a dry location to inhibit rust. Always lock up tools and keep them out of reach of children.
20. DO NOT operate machine if under the influence of alcohol or drugs. Read warning labels on prescriptions. If there is any doubt, DO NOT operate the machine.
21. Turn off power before checking, cleaning, or replacing any parts.
22. Be sure all equipment is properly installed and grounded according to national, state, and local codes.
23. Inspect power and control cables periodically. Replace if damaged or bare wires are exposed. Bare wiring can kill! DO NOT touch live electrical components or parts.
24. DO NOT bypass or defeat any safety interlock systems.

**Familiarize yourself with the following safety notices used in this manual:**

**⚠CAUTION** This means that if precautions are not heeded, it may result in minor injury and/or machine damage.

**⚠WARNING** This means that if precautions are not heeded, it may result in serious injury or death.

**⚠DANGER** This means that if precautions are not heeded, it will result in serious or fatal, injury.

**Save the Instructions**

# 3.0 About This Manual

This manual is provided by Baileigh Industrial, covering the safe operation and maintenance procedures for a Baileigh Model PL-714VS-V2 Benchtop Lathe. This manual contains instructions on installation, safety precautions, general operating procedures, maintenance instructions and parts breakdown. Your machine has been designed and constructed to provide consistent, long-term operation if used in accordance with the instructions as set forth in this document.

Technical Support handles questions on setup, operation, schematics, warranty issues, and individual parts needed. Our Technical Support department can be reached at 920-684-4990.

If there are questions or comments, please contact your local supplier or Baileigh Industrial. We can also be reached at our web site: www.baileigh.com.

Retain this manual for future reference. If the machine transfers ownership, the manual should accompany it.

**⚠WARNING** **Read and understand the entire contents of this manual before attempting assembly or operation! Failure to comply may cause serious injury!**

Register your product online -

https://baileigh.com/product-registration

# 4.0 Product Identification

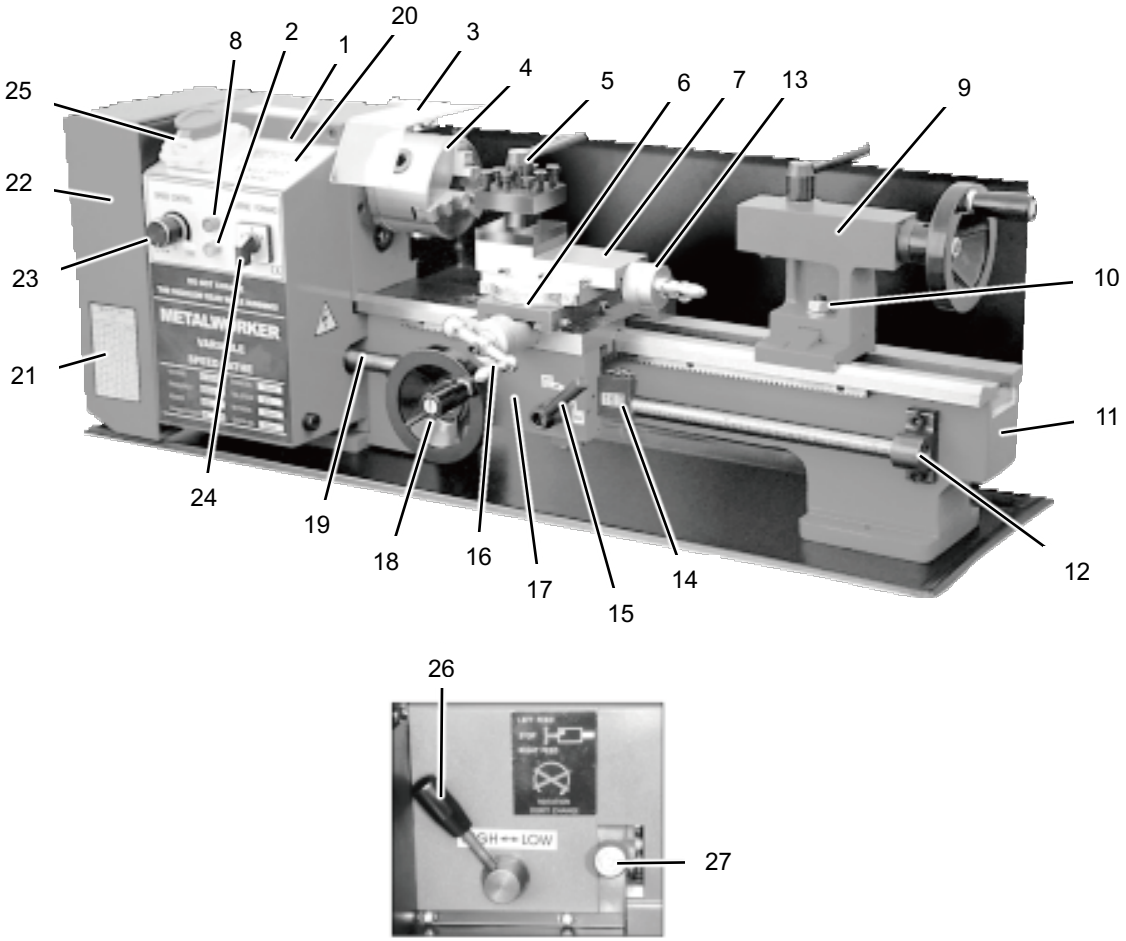



*Figure 4-1*

*Table 4-1*

| Item | Description | Item | Description |
|---|---|---|---|
| 1 | Headstock | 15 | Automatic Feed Lever |
| 2 | Yellow Lamp | 16 | Cross-Slide Feed Handle |
| 3 | Chuck Guard with Power Off | 17 | Apron |
| 4 | 3-Jaw Chuck | 18 | Manual (Saddle) Feed Handle |
| 5 | Tool Post | 19 | Lead Screw |
| 6 | Cross-Slide | 20 | Spindle Speed Show |
| 7 | Compound Slide | 21 | Thread Dial Indicator Table |
| 8 | Green Lamp | 22 | Running Gear Cover |
| 9 | Tailstock | 23 | Variable Speed Control Knob |
| 10 | Tailstock Securing Nut | 24 | Forward/Off/Reverse Switch |
| 11 | Bed | 25 | Emergency Stop Switch |
| 12 | R.H. Lead Screw Bearing | 26 | High/Low Speed Range Lever |
| 13 | Compound Slide Feed Handle | 27 | Leadscrew Fwd/Neutral/Reverse Lever |
| 14 | Thread Dial Indicator (Accessory) | 28 | Micro Switch |

# 5.0 Specifications

*Table 5-1*

| | |
|---|---|
| Model number | PL-714VS-V2 |
| Stock Number | BA9-1228214 |
| Motor and Power | |
| Power Supply | 115V / 1ph / 60hz |
| Motor | .5hp (.35kw) DC |
| General Specifications | |
| Distance Between Centers | 13.58” (345mm) |
| Swing Over Bed | 7” (180mm) |
| Swing Over Cross Slide | 4.33” (110mm) |
| Width of Bed | 3.25” (82.5mm) |
| Taper of Spindle Bore | MT-3 |
| Chuck Diameter | 3.93” (100mm) |
| Hole Through Spindle Bore | 0.787” (20mm) |
| Faceplate Diameter | 6.25” (158.75mm) |
| Speed | 0 – 3000 rpm / variable |
| Maximum Tool Bit Size | 0.3125” (7.93mm) |
| Longitudinal Feed Rate (per rev.) | 0.008” (0.203mm) |
| Number of Inch Threads Steps | 18 |
| Range of Inch Threads | 12 – 52 T.P.I. |
| Carriage Leadscrew Diameter | .625” (15.875mm) |
| Carriage Leadscrew Length | 17.75” (450mm) |
| Leadscrew TPI | 16 TPI |
| Top Slide Travel | 2” (50mm) |
| Swing Over Saddle | 5” (127mm) |
| Cross Slide Travel | 2.55” (65mm) |
| Compound Slide Travel | 2.16” (55mm) |
| Carriage Travel | 9.84” (250mm) |
| Follow Rest Capacity | 1” (25.4mm) |
| Tailstock Quill Travel | 1.57” (40mm) |
| Taper of Tailstock Quill | MT-2 |
| Tailstock Barrel Diameter | 0.87” (22mm) |
| Weights and Dimensions | |
| Shipping Dimensions (L x W x H) | 56” x 26” x 49” (1422 x 660 x 1245mm) |
| Shipping Weight | 429lbs. (195kgs.) |

**⚠WARNING**

**Read and understand the entire contents of this manual before attempting assembly or operation. Failure to comply may cause serious injury.**

# 6.0 Setup and Assembly

## 6.1 Unpacking and Checking Contents

Your Baileigh machine is shipped complete. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.

**⚠WARNING**

**SUFFOCATION HAZARD! Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.**

**⚠WARNING**

**If any parts are missing, DO NOT place the machine into service until the missing parts are obtained and installed correctly.**

## 6.2 Cleaning

**⚠WARNING**

**DO NOT USE gasoline or other petroleum products to clean the machine. They have low flash points and can explode or cause fire.**

**⚠CAUTION**

**When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.**

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. Moving items will need to be moved along their travel path to allow for cleaning the entire surface. For a more thorough cleaning, some parts will occasionally have to be removed. DO NOT USE acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.

**IMPORTANT:** This waxy coating is NOT a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.

Two Person Lift. Use an assistant or lifting devise to support the weight of the lathe.

The following loose items are to be found in the packing case.

- Open Spanner 14 x 17
- Hex Wrench 3, 4, 5, 6mm
- Gears 30t, 35t, 40t, 40t, 45t, 50t, 55t, 57t, 60t, 65t
- Oiler
- 3 Jaw Chuck Key
- External Jaws For 3 Jaw Chuck
- Dead Center MT-2
- Steady Rest
- Follow Rest
- 4 Jaw Chuck
- Face Plate
- Live Center
- 2 Support Plates with Rubber Foot and 4 Pan Head Screw M8 x 25 for mounting

*Figure 6-1*

## 6.3 Transporting and Lifting

**NOTICE**

**Lifting and carrying operations should be carried out by skilled workers, such as a truck operator, crane operator, etc. If a crane is used to lift the machine, attach the lifting chain carefully, making sure the machine is well balanced.**

**Follow these guidelines when lifting with truck or trolley:**

- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and

maintain a safe clearance zone around the transport area.

- Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Remove the securing bolts that attach the machine to the pallet.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.
- Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

## 6.4 Installation

**IMPORTANT:**

Consider the following when looking for a suitable location to place the machine:

- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, work tables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.
- Keep the floor free of oil and make sure it is not slippery.
- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- **LEVELING:** The machine should be sited on a level, concrete floor. Provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.
- **FLOOR:** This machine distributes a large amount of weight over a small area. Make certain that the floor can support the weight of the machine, work stock, and the operator. The floor should also be a level surface. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- **WORKING CLEARANCES:** Take into consideration the size of the material to be processed. Make sure that you allow enough space for you to operate the machine freely.
- **POWER SUPPLY PLACEMENT:** The power supply should be located close enough to the machine so that the power cord is not in an area where it would cause a tripping hazard. Be sure to observe all electrical codes if installing new circuits and/or outlets.

### 6.4.1 Anchoring the Machine

Two Person Lift. Use an assistant or lifting devise to support the weight of the lathe.

If you intend to mount the Baileigh machine on a workbench be aware of the following:

- Overall weight of the machine and the weight of material being processed.
- Make sure the workbench is properly reinforced to support the total weight.
- Use the drip tray as a template to layout the mounting holes if planning to bolt the lathe to a work bench.

It is recommended that the machine be firmly bolted to a sturdy workbench using the tapped holes used to secure the feet to the lathe. This is to provide added stability and consequently, safety.

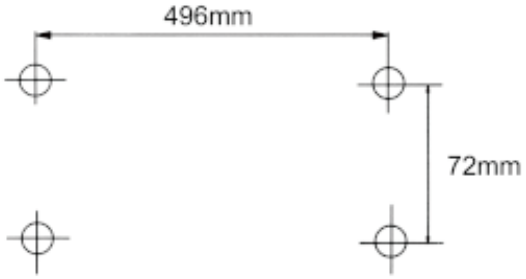



*Figure 6-1*

Remove the four M8 screws which secure the rubber feet and chip tray to the machine (if already fitted) and store the feet for use in the future if desired.

Drill four 10mm clearance holes in the bench top at the dimensions shown in the diagram.

With appropriate length M8 bolts or screws with flat washers (not supplied), secure the lathe to the worktop ensuring the chip tray is in place.

## 6.5 Assembly

**⚠WARNING**

**For your own safety, DO NOT connect the machine to the power source until the machine is completely assembled and you read and understand the entire instruction manual.**

Install the foot pads when not mounting directly to a work bench.

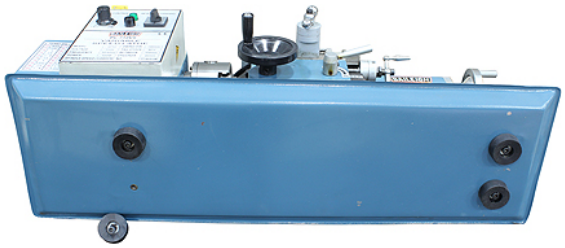


*Figure 6-2*

- Unbolt the lathe from the shipping pallet.
- Carefully lay the lathe on its back and align the drip pan to the lathe mounting holes.
- Install and tighten the four rubber pads.

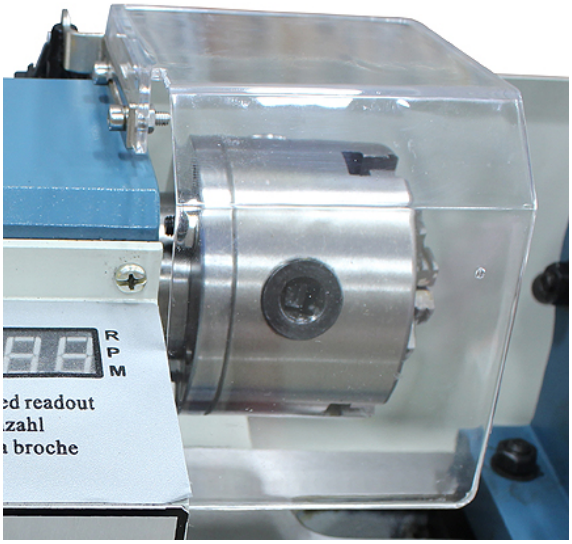



*Figure 6-3*

- Carefully set the lathe onto the rubber pads.
- Using the screws which are typically install in the guard, install the Chuck Guard onto the swing arm so that the guard is on the chuck side of the arm.
- Tighten the screws enough to hold the guard to the arm without breaking the guard.
- Verify that the guard swings over the chuck and past the head stock case. Carefully bend the swing arm as needed to create the needed clearance.
- Install the Crank Handle onto the crossfeed handwheel.
- Install top adjusting bolt on Steady Rest and Follow Rest.
- Attach the plastic handles to the rims of the manual feed and tailstock feed hand wheels respectively, ensuring the nuts are tight and the handles spin freely about the bolts, without excessive end play.

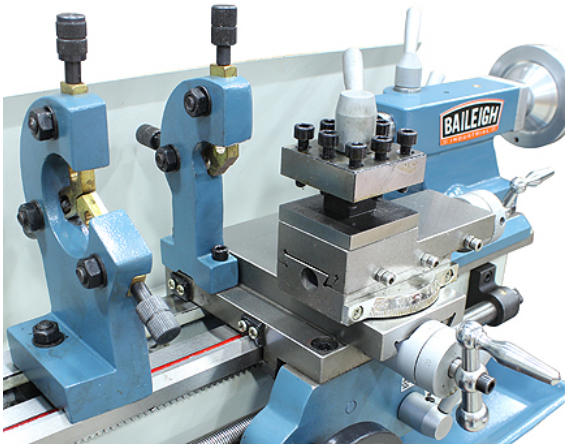



*Figure 6-4*

- The carriage/saddle, cross-slide and compound slide adjustments are all factory-set to ensure smooth movement in both directions. However, if the adjustments have been upset during transit (indicated by stiff or erratic movement), refer to 'Settings and Adjustments' for the methods of adjustment.
- All hex keys and wrench necessary to carry out the various adjustments are supplied together with a chuck key for the 3-Jaw chuck and a spare fuse. The fuse holder is located on the main control panel.
- The four rubber feet and two supporting are to be attached to the underside of the bed, using the four M8 head screws, in the tapped holes provided. These screws are also used to secure the chip tray. We strongly recommend, however, that to provide maximum stability and additional safety, you secure the lathe to a firm foundation as described under Mounting the lathe.
- The three external jaws for the 3-Jaw self-centering chuck, extend the capacity of the chuck, and are discussed in greater detail under Accessories.

# 7.0 Lathe General Description

## 7.1 Headstock

The headstock is cast from high grade, low vibration cast iron. It is bolted to the bed with four screws. The headstock houses the main spindle with two precision taper roller bearings and the drive unit.

The motor provides a direct drive to the Spindle via an internal tooth type belt. Spindle speed is variable and is regulated by the Speed Control Knob located on the main control panel.

The spindle is provided with an internal No.3 Morse taper to accommodate a center for use with a face plate or turning clamp.

The 3-jaw Self Centering Chuck is mounted on the Spindle Flange. To remove the chuck, simply remove the three securing nuts to the rear of the flange allowing it to be pulled free together with the three mounting studs.

Three external jaws are also supplied which extend the capacity of the chuck.

The spindle has 6 holes drilled in its flange to accommodate a range of fixtures such as a Face plate or 4-jaw chuck.

## 7.2 Lathe Bed


*Figure 7-1*

The lathe bed is made of high-grade iron. By combining high cheeks with strong cross ribs, a bed of low vibration and rigidity is produced. It integrates the headstock and drive unit, for attaching the carriage and leadscrew. The two precision-ground V-slideways are re-enforced by heat hardening and grinding, are the accurate guide for the carriage and tailstock.

## 7.3 Leadscrew

The leadscrew is mounted on the front of the machine bed. It is connected to the gear box at the left for automatic feed and is supported by bearing on both ends.

## 7.4 Tailstock

The tailstock slides on a V way and can be clamped at any location. The tailstock has a heavy-duty spindle with a Morse taper No. 2 socket and a graduated scale. The spindle can be clamped at any location with a clamping lever. The spindle is moved with a handwheel at the end of the tailstock.

**Note:** Verify that the stop bolt is installed and tight at the end of the lathe bed to prevent the tailstock from falling off the lathe bed.

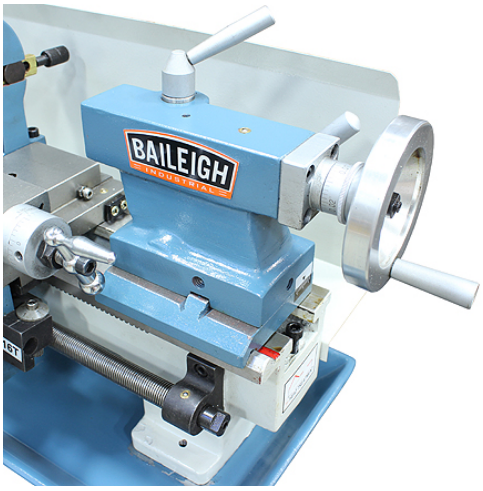



*Figure 7-2*

## 7.5 Carriage


*Figure 7-3*

The carriage is made from high quality cast iron. The slide parts are smoothly ground. They fit the V on the bed without play. The lower sliding parts can be easily and simply adjusted.

The cross slide is mounted on the carriage and moves on a dove tailed slide. Play in the cross slide may be adjusted with the gibs.

The Saddle carries the Cross-Slide onto which is mounted the Compound Slide with Tool post, allowing intricate and delicate operations to be performed. It may be driven by the Lead screw via a driver nut to provide automatic feed when the Auto Feed lever mounted on the Apron is operated.

The position of the tool is affected by turning the cross-slide feed handle which moves it across the lathe and the carriage/saddle, or manual feed handle which moves it longitudinally. Additionally, the compound slide feed handle may be used to move the tool by small amounts at right angles to the cross-slide. The slide may be set at an angle to the cross-slide so that short tapers or bevels may be cut.

The cross-slide and compound slide feeds are provided with a scale. These are used to move the tool by precise amounts with one division being equivalent to 0.001" (0.025mm). As the feed handle is turned, so does the scale. The scale on the cross-slide feed may also be held stationary whilst the handle is turned. Allowing the scale to be 'zeroed'.

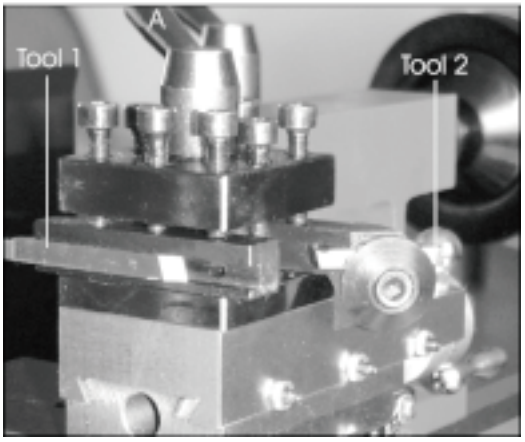



*Figure 7-4*

The tool post carries 8 hex socket head screws which are used to secure a cutting tool in any desired position. Four tool bits may be mounted for quick and easy changes. Two are shown mounted.

The tool post is rotated by slackening the top lever (A) enough so the post can be lifted slightly and then turned to the desired position.

**Note:** ALWAYS ensure the post, and hence the tool, is secured by tighten the lever firmly before attempting to cut.

## 7.6 Apron

The apron is mounted on the bed. It houses the half nut with an engaging lever for activating the automatic feed.

A rack, mounted on the bed, and a pinion operated by handwheel on the carriage allow for quick travel of the apron.

## 7.7 Running Gears

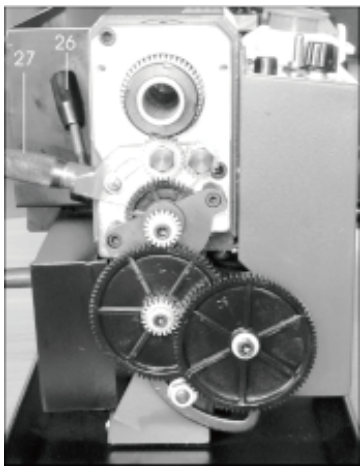



*Figure 7-5*

The Running Gear is protected by a cover which is removed by unscrewing the two securing hex screws.

The gear train, shown, transmits drive to the Lead screw. The lead Screw acts as a worm drive. By Operating the Auto Feed lever, which engages a half nut with the lead screw, drive is transmitted to the carriage/saddle and consequently the cutting tool. This in turn provides a power feed for thread cutting or general turning operations.

The rotational speed of the lead screw, and hence the rate of feed of the cutting tool, is determined by the gear configuration.

The drive to the lead screw may be disconnected by operating the lever. And the same lever is used to drive the lead screw in a forward or reverse direction.

# 8.0 Lathe Controls


*Figure 8-1*

## 8.1 Emergency Button ON/OFF Switch (A)

The machine is switched on and off with ON/OFF button located under the E-Stop Cap.

Depress the E-Stop to stop all machine functions. To restart, lift the cover and press ON button.

## 8.2 Rotation Selector Switch (B)

After the machine is switched on, turn the switch to "F" position for counterclockwise spindle rotation (forward).

Turn the switch to “R” position for clockwise spindle rotation (reverse). "0" position is OFF and the spindle remains idle.

## 8.3 Variable Speed Control Switch (C)

Turn the switch clockwise to increase the spindle speed. Turn the switch counterclockwise to decrease the spindle speed. The possible speed range is dependent from the position gear range selector.

## 8.4 Gear Range Selector (D)

Select gear speed range for the lathe to operate at.

IMPORTANT: DO NOT shift the speed range while the lathe is running!

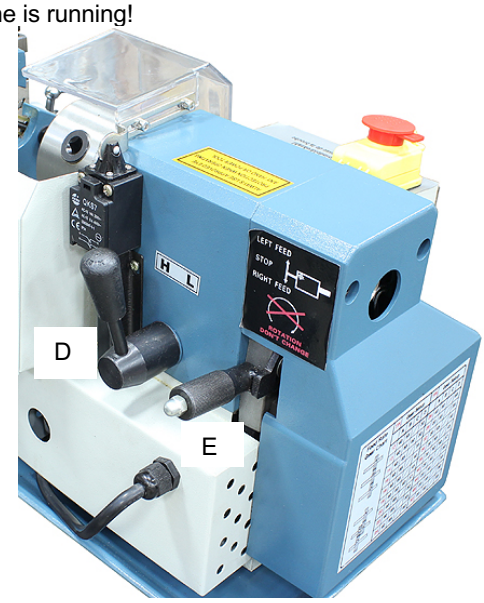



*Figure 8-2*

## 8.5 Feed Direction Selector (E)

Selects if the lead screw is engaged to feed the carriage forward toward the head stock, is disengaged (neutral), or feeds the carriage away from the headstock.

When the lathe is OFF, pull the handle outward and either lift or lower the handle to engage the detent pin into the desired position.

**Note:** The feed direction will change with the change in spindle rotation from the rotation Selector Switch.

**IMPORTANT:** DO NOT shift the speed range while the lathe is running!

## 8.6 Tailstock

The tailstock consists of the base, base lock, barrel, barrel lock, handwheel, body, and screw.

The tailstock on a lathe has many functions including supporting the piece part opposite the headstock. It also has a barrel imprinted with graduations in millimeters and inches and a #2 Morse taper for securing drill bits, and centers. The tailstock can be easily set or adjusted for alignment or non-alignment with respect to the center of the spindle. By turning the tailstock handwheel you can advance or retract the barrel in the tailstock.

## 8.7 Tailstock Quill Clamping Lever (F)

Rotate the lever clockwise to lock the spindle and counterclockwise to unlock.

## 8.8 Tailstock Release Handle (G)

Push the release handle downward to unlock and move the tailstock. Pull the handle upward to lock the position.

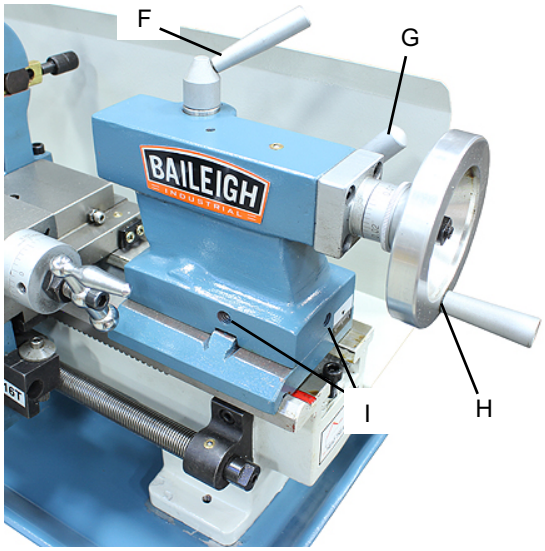



*Figure 8-3*

## 8.9 Tailstock Quill Traverse Handwheel (H)

Rotate clockwise to advance the quill. Rotate counterclockwise to retract the quill.

## 8.10 Tailstock Off-Set Adjustment (I)

Three sets screws located on the tailstock base are used to off-set the tailstock for cutting tapers. Loosen lock screw on tailstock end. Loosen one side set screw while tightening the other until the amount of off-set is indicated on scale. Tighten lock screw.

## 8.11 Steady Rest

The steady rest (J) on the lathe is used to support long, small diameter stock that otherwise could not be turned. The steady rest can also be used in place of the tailstock when access to the cutting tool is required at the outboard end of the piece part. By loosening the nut in the base, the steady rest can be re-positioned along the slide rails.

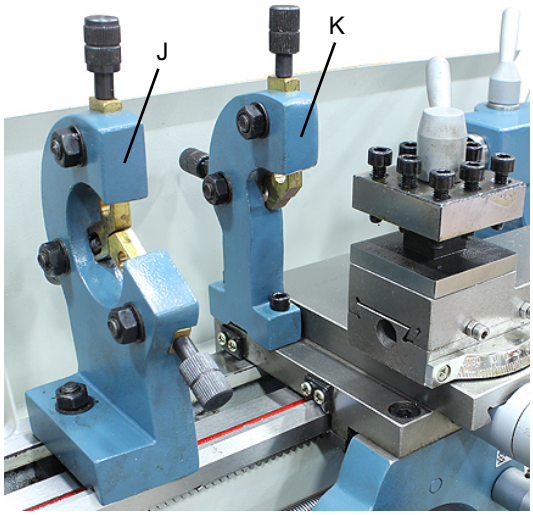



*Figure 8-4*

## 8.12 Follow Rest

The follow rest (K) is typically used for small diameter stock to prevent the piece part from “springing” under pressure from the tool. The follow rests, which are opposite the tool post, act as supports to counter balance the force exerted on the piece part by the tool. The tool and the supports form a triangle around the part to help minimize vibration. The follow rest has two adjustable brass points to allow rotation of jobs without causing abrasive scratches. The soft points will need replacement when they wear out.

## 8.13 Faceplate

*Figure 8-5*

The faceplate is used for holding work that cannot be swung between centers because of its shape and dimensions. The T-slots and other openings on its surface provide convenient locations for anchor bolts and clamps to secure the piece part. The faceplate can be mounted to the spindle after removing the chuck.

**IMPORTANT:** DO NOT exceed speeds greater than 770 rev./min. for a 10” faceplate.

# 9.0 Dead Center

Stock protruding more than 2-1⁄2 times its diameter should be supported by a dead or live center.

Oil the tip of the dead center and use a very slow RPM during use. Heat from friction will reduce the life of the center and may damage the workpiece.

To install the dead center, make sure the dead center and tailstock quill are clean and free of any dirt, dust, grease, or oil. Morse tapers will not interlock when dirt or excessive oil is present on the mounting surfaces.

Extend the quill approximately 1" by turning the tailstock handwheel.


*Figure 8-6*

Slide the dead center into the tailstock quill. The tapers will hold the center in place. During use, do not retract the quill less than 0, nor extend the quill greater than 1.5" on the quill scale.

To remove the tailstock dead center:

1. Use the tailstock handwheel to move the tailstock quill all the way back into the tailstock. This will push the dead center out of the quill.

The tool post can rotate to four 90 degree preset stops or at any angle in between and hold a maximum of four tools at a time.

# 10.0 Electrical Connections

**⚠CAUTION**

**HAVE ELECTRICAL UTILITIES CONNECTED TO MACHINE BY A CERTIFIED ELECTRICIAN!**

**Check if the available power supply is the same as listed on the machine nameplate.**

**⚠WARNING**

**Make sure the grounding wire (green) is properly connected to avoid electric shock. DO NOT switch the position of the green grounding wire if any electrical plug wires are switched during hookup.**

## 10.1 Power Specifications

Your machine is wired for 115 volts, 60hz alternating current. Before connecting the machine to the power source, make sure the power source is OFF.

Before switching on the power, you must check the voltage and frequency of the power to see if they meet with the requirement, the allowed range for the voltage is ±5%, and for the frequency is ±1%.

## 10.2 Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with an amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your machines. Before connecting the motor to the power line, make sure the switch is in the “OFF” position and be sure that the electric current is of the same characteristics as indicated on the machine.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**⚠WARNING**

**In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.**

- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.
- Repair or replace damaged or worn cord immediately.

## 10.3 Extension Cord Safety

Extension cord should be in good condition and meet the minimum wire gauge requirements listed below:

*Table 10-1*

| | Length | | |
|---|---|---|---|
| Amp Rating | 25ft | 50ft | 100ft |
| 1-12 | 16 | 16 | 14 |
| 13-16 | 14 | 12 | 12 |
| 17-20 | 12 | 12 | 10 |
| 21-30 | 10 | 10 | No |
| | Wire Gauge | | |

An undersized cord decreases line voltage, causing loss of power and overheating. All cords should use a ground wire and plug pin. Replace any damaged cords immediately.

## 10.4 Power Cord Connection

1. Turn the main disconnect switch on the control panel to the OFF position.
2. Unwrap the power cord and route the cord away from the machine toward the power supply.
   a. Route the power cord so that it will NOT become entangled in the machine in any way.
   b. Route the cord to the power supply is a way that does NOT create a trip hazard.
3. Connect the power cord to the power supply and check that the power cord has not been damaged during installation.
4. When the machine is clear of any obstruction. The main power switch may be turn ON to test the operation.
5. Turn the switch OFF when the machine is not in operation.

# 11.0 Starting Procedure – Initial Start

**⚠CAUTION**

**Even at low spindle speeds, metal fragments from the cutting process can be expelled by the lathe.**

**⚠CAUTION**

**Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.**

- Taking all precautions previously stated, set the High-Low range lever to Low. The chuck guard must be closed.

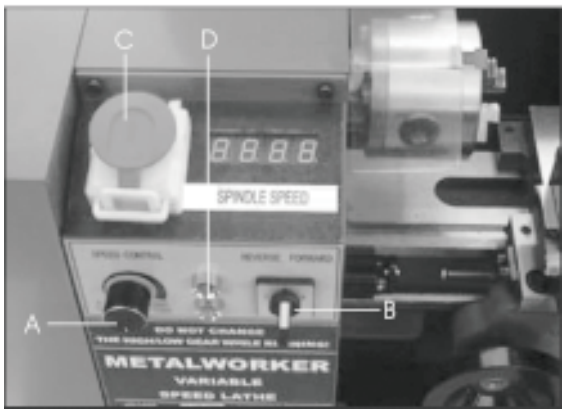



*Figure 11-1*

- Be sure the cross-slide is well away from the chuck and the automatic feed lever is in the UP, disengaged position.
- Insert the electric plug into the wall socket.
- Select FORWARD, using the Forward/Off/Reverse (F/O/R) Switch on the main control panel
- Release the Emergency Stop Switch by pushing down on the red knob slightly and pushing it in towards the headstock, as indicated by the arrow on the top of the red knob.
- The green indicator lamp will light.
- Switch on the machine by SLOWLY turning the variable speed control knob clockwise. Speed will increase progressively the further the knob is turned. You can then see the spindle speed on the digital readout.

**IMPORTANT**: Always turn the speed control to the minimum speed position before starting the lathe with the speed control set to a higher speed can damage the speed control circuit board.

- Run for a total of 5 minutes during which time gradually increase spindle speed to its maximum. Run for at least 2 minutes at this speed before stopping the machine and disconnecting from the main supply.
- Check that all components are still secure and working freely and correctly. Check also to ensure the mountings are secure.
- Repeat the procedure at the HIGH range setting.
- Should any adjustments be necessary, refer to the appropriate section under "Settings and Adjustments".

## 11.1 Starting Under Normal Conditions

- Take all necessary precautions previously stated and ensure the work piece can rotate fully without obstruction.
- Always have the speed range set to its lowest possible RPM before switching machine on.
- Set the Forward/Off/Reverse (F/O/R) switch on the main control panel, to the FORWARD position.
- Engage or ensure the Auto Feed lever in disengaged, depending upon whether automatic feed is required.

**⚠CAUTION**

**Checking the engagement or disengagement of the auto-feed lever should be performed at ach start up and should be a deliberate, conscious action.**

**Note:** If Auto feed is required, the Lead screw Forward/Neutral/Reverse Lever should be set to FORWARD. If Auto feed is not required, the lever may be set to Neutral. To do this, grasp the knurled handle and pull out against spring pressure. Holding the handle in this position, move the lever until the point end is located in the middle pit mark in the casing.

- Proceed to start the machine as described previously.
- If you are done working, or if the machine is to be left unattended, turn the F/O/R switch to the OFF position then disconnect from the wall outlet.

**NOTICE**

**ALWAYS turn the machine OFF at the Forward/off/Reverse switch BEFORE ATTEMPTING TO CHANGE ANY SETTINGS OR MAKE ANY ADJUSTMENTS, INCLUDING CHANGING FROM HIGH TO LOW RANGE.**

The power supply system has an automatic overload protective device.

If the machine is overloaded, the motor will automatically shut down, and a yellow lamp will light.

To restart, turn the Forward/Off/Reverse switch to OFF clear any trouble from the machine before attempting restart. Check machine speed range and set to minimum speed. When ready to operate again place directional switch in desired position. Green light should be on and yellow off. Adjust speed as required.

## 11.2 Change H/L Speed

**⚠CAUTION**

**Even at low spindle speeds, metal fragments from the cutting process can be expelled by the lathe.**

**⚠CAUTION**

**Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.**

1. Turn the power OFF to the lathe.
2. On the back side of the head stock is the shift lever to select either High or Low speed range.


*Figure 11-2*

**IMPORTANT:** Never change speeds with the motor running. It is recommended that the lower speed be selected whenever possible. This will provide a higher torque for machining.

# 12.0 Adjustments

After a period, wear in some of the moving components may need to be adjusted.

## 12.1 Adjustment of Cross Slide

1. The cross slide is fitted with a gib strip (C) and can be adjusted with screws (D) fitted with lock nuts (E).

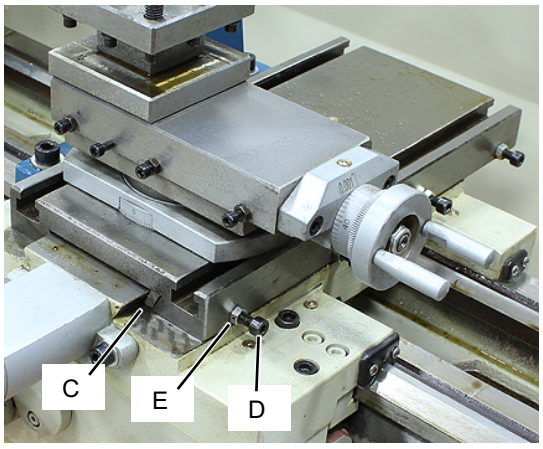



*Figure 12-1*

2. Loosen the lock nuts and tighten the set screws evenly until slide moves freely without play.
3. Tighten lock nuts to retain adjustment.
4. The movement should be even and smooth along its complete length.
5. When finished, retract the side fully and apply oil to all mating surfaces and the feed screw thread. Then crank the slide back to its normal position.

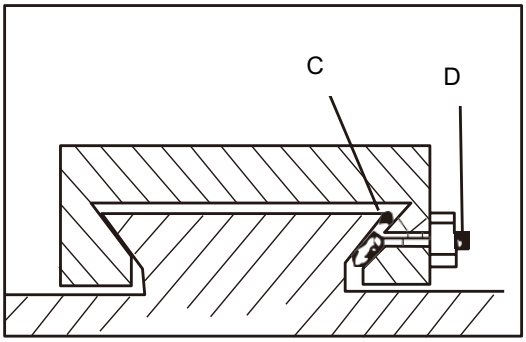



*Figure 12-2*

## 12.2 Adjustment of Top Slide

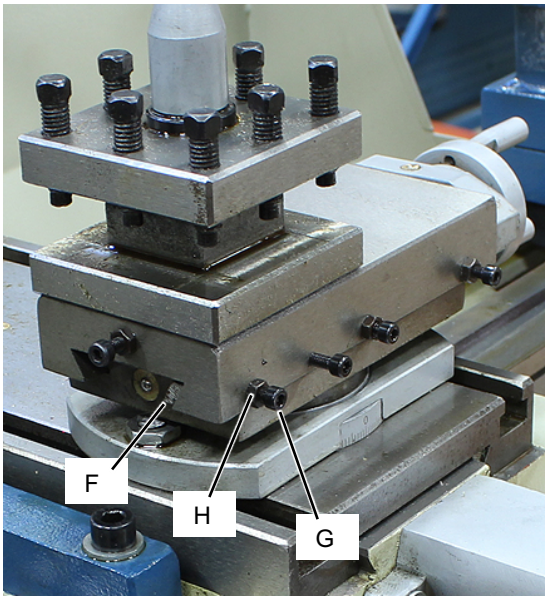



*Figure 12-3*

1. The top slide is fitted with a gib strip (F) and can be adjusted with screws (G) fitted with lock nuts (H).
2. Loosen the lock nuts and tighten the set screws until slide moves freely without play.
3. Tighten lock nuts to retain adjustment.
4. The movement should be even and smooth along its complete length.
5. When finished, retract the side fully and apply oil to all mating surfaces and the feed screw thread. Then crank the slide back to its normal position.

# 13.0 Carriage

The longitudinal movement of the carriage feed can be controlled both manually and automatically.

## 13.1 Manual Carriage Feed

Rotate the handwheel (A) clockwise to move the carriage right and rotate the handwheel counterclockwise to move the carriage left.

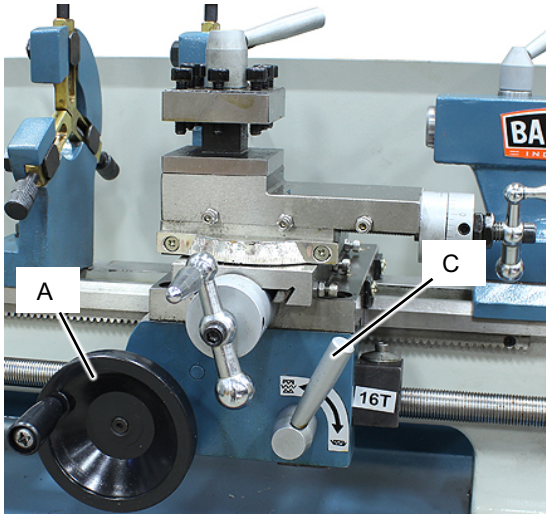



*Figure 13-1*

## 13.2 Automatic Carriage Feed

**⚠CAUTION**

**CRASHING HAZARD! Pay close attention to feed rate and direction before engaging power feed. Be alert and ready to shut OFF power feed. The carriage will crash into rotating spindle, causing damage and possible injury!**

The carriage feed direction and rate is based on the rotational direction and speed of the leadscrew. These conditions are controlled by the gear selection/configuration and shifter position on the outboard end of the headstock.

For normal turning, the feed rate is much less than what is used for screw cutting. Therefore, it is very important to pay close attention to the gear combinations you have chosen before engaging the auto feed lever. The lathe comes from the factory set up for normal turning.

- Use the manual feed handwheel to position the carriage to your desired starting point and set the scale on the handwheel to “0”.
- Set the lead screw LEFT/NEUTRAL/RIGHT Feed lever (B) to Left Feed (UP) position.
- Set the FORWARD/OFF/REVERSE selector switch to FORWARD.

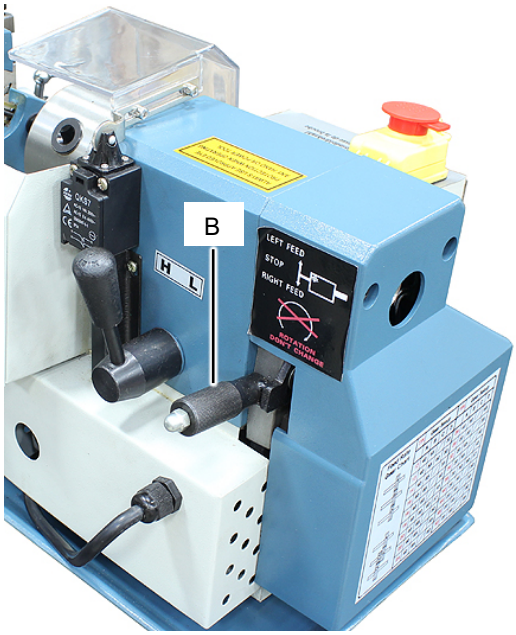



*Figure 13-2*

- Turn the VARIABLE SPEED CONTROL DIAL to the desired RPM.
- Move the feed lever (C) down to engage the half-nut, which in turn, makes the automatic carriage feed active.
- Lift the feed lever (C) to stop the automatic carriage feed.

The automatic carriage feed can also operate in the REVERSE direction by stopping the lathe and changing the leadscrew direction by shifting the Feed selector to the down position.

## 13.3 Straight Turning

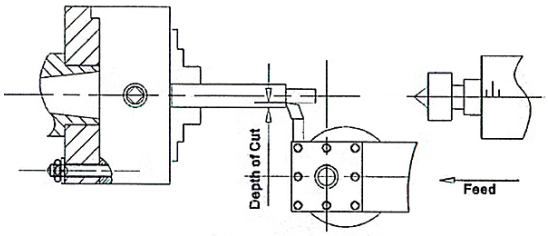



*Figure 13-3*

In the straight turning operation, the tool feeds parallel to the axis of rotation of the workpiece. The feed can be either manual by turning the handwheel on the lathe saddle or the top slide, or by activating the automatic feed. The crossfeed for the depth of cut is achieved using the cross slide.

## 13.4 Facing and Recesses

In the facing operation, the tool feeds perpendicular to the axis of rotation of the workpiece. The feed is made manually with the cross slide handwheel. The crossfeed for cut depth is made with the top slide or lathe saddle.

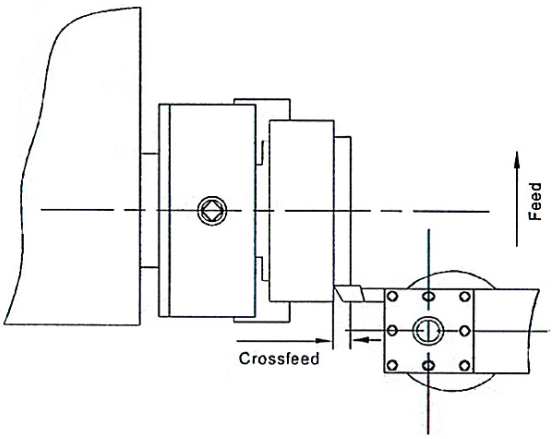



*Figure 13-4*

## 13.5 Taper Turning using Tailstock Off-Set

Work to a side angle of 5 can be turned by off-setting the tailstock. The angle depends on the length of the workpiece.

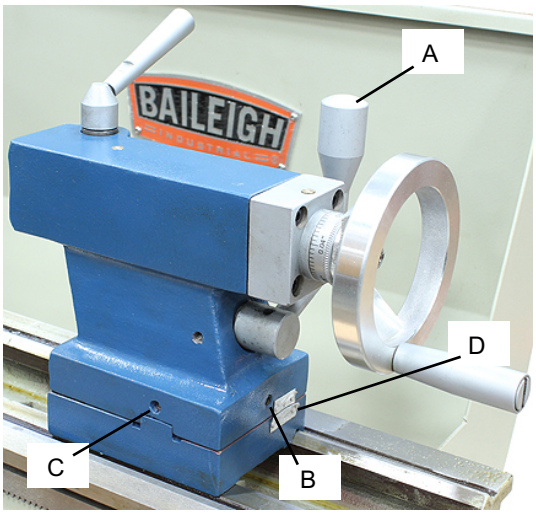



*Figure 13-5*

To off-set the tailstock, loosen locking screw (A).

Unscrew the set screws (B) on end of the tailstock.

Loosen the front adjusting screw (C) and take up the same amount by tightening the rear adjusting screw (opposite side not shown) until the desired taper has been reached. The desired cross-adjustment can be read off the scale (D).

First retighten the set screw (B) and then the two (front “C” and rear) adjusting screw to lock the tailstock in position. Slide the tailstock into position and tighten the locking screw (A) of the tailstock.

The workpiece must be held between to centers and driven by a face plate and driver dog.

After taper turning, the tailstock should be returned to its original position according to the zero position on the scale (D) of tailstock.

## 13.6 Taper Turning by Setting the Top Slide

By angling the top slide, tapers may be turned manually with the top slide.

Rotate the top slide to the required angle. A graduated scale permits accurate adjustment of the top slide. The crossfeed is performed with the cross slide. This method can only be used for short tapers.

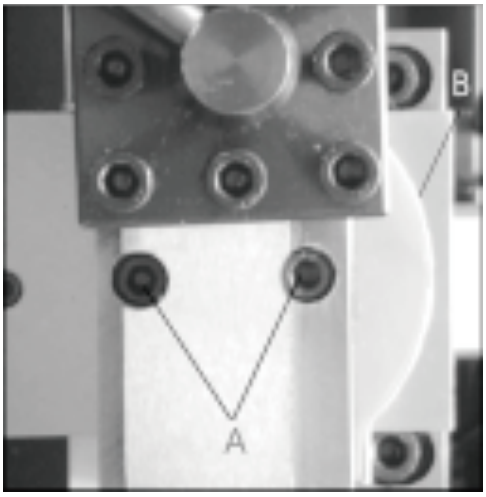



*Figure 13-6*

1. To set the compound slide so that the cutting tool will cut a bevel, first retract the slide until the two socket head screws (A) are revealed as shown.
2. Loosen the screws sufficiently to allow the compound slide to be turned to the desired angle, as indicated on the scale, and secure the slide in this position by retightening the socket head screws.
3. The taper, or bevel, is cut by setting the cross-slide appropriately then using the compound slide feed handle to advance the cutting tool in the direction of the arrow as shown below.

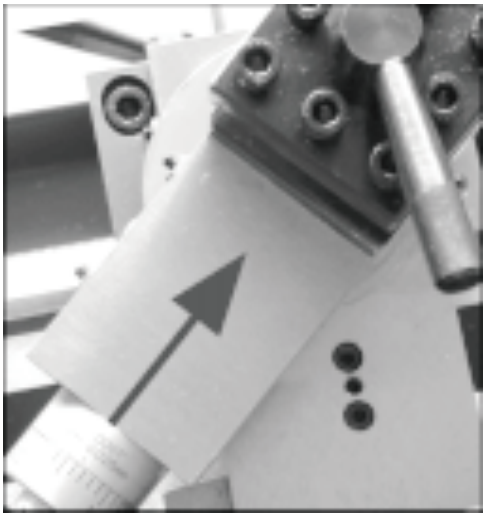


*Figure 13-7*

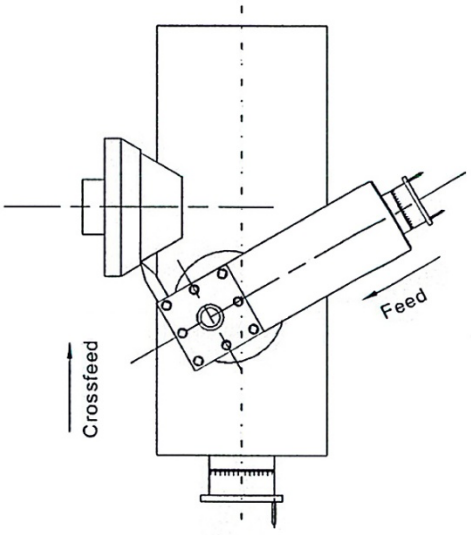



*Figure 13-8*

## 13.7 Screw Cutting

This operation requires a degree of skill and accuracy and should not be attempted unless you are completely familiar with all aspects of the lathe. Essentially, the carriage/saddle will move towards the headstock under power, the same as cutting with auto feed, except the rate of feed is greater, as determined by the gear configuration. The cutting tool, therefore, is moving ever closer to the rotating chuck. Great care and concentration must be exercised to ensure that the two do not meet when the machine is operating, as the possible damage caused could be disastrous.

The lathe is supplied with a lead screw that will produce Imperial Threads in a range from 12 to 52 threads per inch, or metric threads in a range from 0.4-2.0mm pitch. It is important to remember that the type of thread you need to cut (i.e., UNF, BA, BSP, BSW etc), will be totally dependent upon the cutting tool profile, as profiles differ from thread to thread. For detailed information regarding screw cutting techniques, cutting tools, etc., you should consult a suit- able handbook or obtain advice and/or training from a qualified person.

The general procedure for screw cutting is as follows:

Try to get as much distance from the chuck to the end of the proposed screw thread as possible, and if your design allows, cut a 'run-off' into the work piece which is of a smaller diameter than the root diameter of the proposed screw thread.

Install the appropriate gears for the thread required and correctly mount the cutting tool. Set your required depth of cut and position the tool ready to begin cutting.

**Note:** Depth of cut is vitally important and may be calculated or obtained from an appropriate reference manual.

Take all necessary precautions previously stated and start the machine with the automatic feed lever in its' disengaged position (UP).

Engage the auto-feed lever sharply, turn the FORWARD/OFF/REVERSE (F/O/R) switch (B) to 'FORWARD'.

As the tool approaches the end of the desired thread, turn the switch (B) to 'OFF'. Do not disengage the auto-feed lever.

Retract the tool, using the cross-slide feed handle, noting the exact position on the scale and the exact number of turns.

Turn the switch (B) to 'REVERSE', the carriage/saddle crank back to the beginning and turn switch (B) to 'OFF'.

Restart the tool by winding IN the cross-slide the exact number of turns previously wound OUT and then continue to wind IN the to the desired depth of cut.

Repeat the step 4 and 5. Proceed in this manner until the thread is completed.

# 14.0 Changing Gears for Screwcutting

The leadscrew is driven, via a gear train, by a gear on the spindle. The gear ratio will therefore determine the rotational speed of the leadscrew with relation to the spindle. i.e. one turn of the spindle will turn the leadscrew an amount determined by the gear ratio.

By setting the gears to a known ratio, we can therefore produce threads to a known size, and as the leadscrew supplied produces Imperial threads, the known values will be in Threads Per Inch (TPI).

The actual thread produced will be totally dependent upon the profile of the cutting tool. It is not within the scope of this manual to provide detailed information regarding types of cutting tool cutting speeds and working with various types of material etc., and it is strongly advised that you consult appropriate handbooks or seek advice from a qualified person.

The chart on the headstock case shows the thread sizes that may be cut using the gear configuration shown in the corresponding columns.

**NOTE:** The factory setup for the lathe provides for normal turning using the auto feed, and the gear configuration is Gear A 20T, Gear B 80T, Gear C 20T, and Gear D 80T.

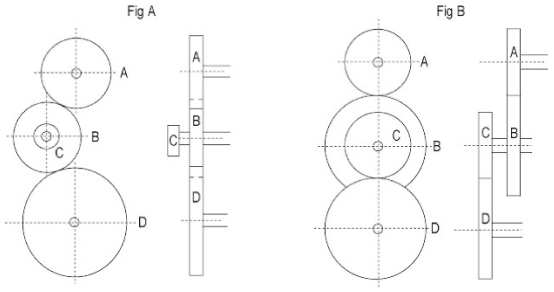



*Figure 14-1*

There are two different gear set configurations used to obtain the desired TPI.

Figure A shows the three-gear configuration. In a three-gear configuration the gear in position “C” is not active within the drive train and is used only as a spacer. Use the smallest available tooth count gear in this position. In this configuration, the chart will show a blank space in the “C” column.

Figure B shows the four-gear configuration. In the four-gear configuration, all the gear positions are used and active within the drive train. Each gear must match the chart to obtain the desired TPI.

The positions of the shafts carrying gears A and D are fixed, therefore all adjustments are carried out on the shaft carrying gears B and C and the Adjuster located at the bottom of the gear set.

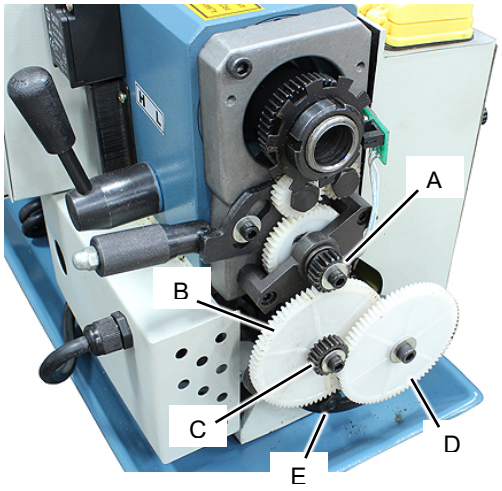



*Figure 14-2*

1. Disconnect the machine from the power source.
2. On the left end of the lathe, remove the two socket head screws and then remove the belt and gear cover.
3. Unscrew the hex socket head screws, securing gears A and D, followed by the screw securing gears B and C.
4. To allow the gears B and C to disengage completely and to provide for easier reassembly, loosen the adjuster nut (E) allowing the B and C gear shaft to pivot and clear the other gears.
5. Remove the gears, taking care to retain the small keys on each shaft and the spacers where used.
6. Replace with those necessary to produce your screw thread.
7. Install the gears following the chart. The gears may be mounted with either side out. The number of teeth on each gear is clearly marked.

**IMPORTANT:** If a four-gear train is required, as shown in Fig. B ensure the spacer, which is keyed to the shaft carrying gear D, is located on the shaft BEFORE the gear is installed, to align gear D with gear C.

8. Replace the securing screws, ensuring the flat washer is flat and tight against the gear hub.
9. Adjust the shaft carrying B and C so that all gears mesh correctly, then tighten the adjuster nut (E). This may take one or two attempts but make sure there is as little backlash as possible without being overtight. (Turn the spindle by hand to test for backlash).
10. Replace the cover and secure with the two hex socket head bolts.

## 14.1 Gear Chart for Cutting Imperial Threads

*Table 14-1*

| Threads Per Inch | Gear | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | |
| 12 | 40 | | | 30 | Examples:<br>1. Ref. Fig. 14-1 (Fig A)<br>To cut 12 TPI, use 40T in position A, 30T in position D, and any convenient gear in position B to connect A and D.<br><br>2. Ref. Fig. 14-1 (Fig B)<br>To cut 13 TPI, use 40T in position A, 65T in position B, 60T in position C, and 30T in position D. |
| 13 | 40 | 65 | 60 | 30 | |
| 14 | 40 | | | 35 | |
| 16 | 40 | | | 40 | |
| 18 | 40 | | | 45 | |
| 19 | 40 | 50 | 60 | 57 | |
| 20 | 40 | | | 50 | |
| 22 | 40 | | | 55 | |
| 24 | 40 | | | 60 | |
| 26 | 40 | | | 65 | |
| 28 | 20 | | | 35 | |
| 32 | 20 | | | 40 | |
| 36 | 20 | | | 45 | |
| 38 | 20 | 50 | 50 | 57 | |
| 40 | 20 | | | 50 | |
| 44 | 20 | | | 55 | |
| 48 | 20 | | | 60 | |
| 52 | 20 | | | 65 | |

# 15.0 Cutting Threads

1. Set the compound rest to the appropriate angle for the desired threads to be cut.
2. Set the tool tip perpendicular to the workpiece and center it vertically.
3. Make sure the thread dial is engaged with the lead screw.
4. Using the chart on the headstock cover, install the gears to match the desired TPI.
5. Turn the spindle ON and set the spindle RPM to be used. Check to see that the lead screw is turning and verify that the apron moves in the correct direction by engaging the feed lever.
6. Once you are confident the settings are correct, disengage the feed lever and turn the spindle OFF.
7. Examine the thread dial chart on the headstock cover to determine which numbers (on the thread dial) to engage the feed lever.

**Note:** There is a total of eight marks on the thread dial, ranging 1–8. To maintain accuracy and consistency, engage the half nut on the same mark on each pass. Failure to start on the same number each time may lead to cutting off the thread made in the previous pass.

*Table 15-1*

| THREAD DIAL | |
|---|---|
| TPI | SCALE |
| 12 | 1,3,5,7 |
| 13 | 1 |
| 14 | 1 or 5 |
| 16 | 1 – 8 |
| 18 | 1 or 5 |
| 19 | 1 |
| 20 | 1,3,5,7 |
| 22 | 1 or 5 |
| 24 | 1 – 8 |
| 26 | 1 or 5 |

| THREAD DIAL | |
|---|---|
| 28 | 1,3,5,7 |
| 32 | 1 – 8 |
| 36 | 1,3,5,7 |
| 38 | 1 or 5 |
| 40 | 1 – 8 |
| 44 | 1,3,5,7 |
| 48 | 1 – 8 |
| 52 | 1,3,5,7 |

**Notes:** Example: Male Thread

- The workpiece diameter must have been turned to the diameter of the desired thread.

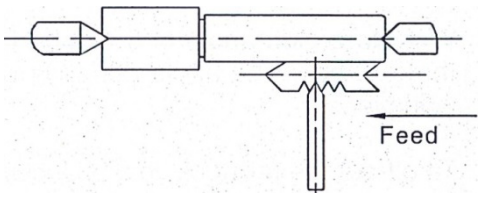



*Figure 15-1*

- The workpiece requires a chamfer at the beginning of the thread and an undercut at the thread runout.
- The speed must be as low as possible.
- The change gears must have been installed according to the required pitch.
- The thread cutting tool must be exactly the sample shape as the thread and must be absolutely rectangular and clamped so that it coincides exactly with the turning center.

## 15.1 Replacement of Chuck

The head spindle holding fixture is cylindrical. Loose the set screws (A, only two are shown) on the lathe chuck flange to remove the chuck.

Position the new chuck and fix it using the same set screws and nuts.

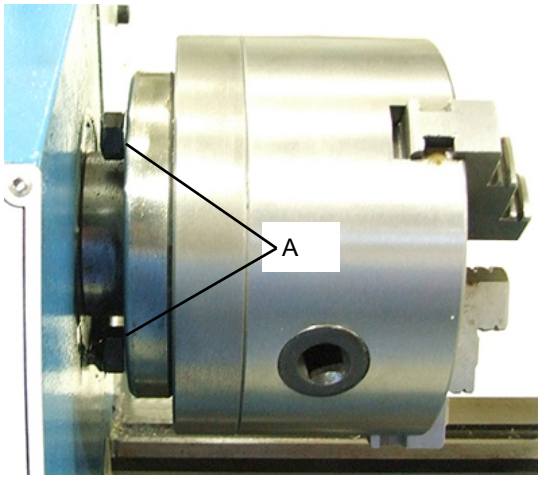



*Figure 15-2*

# 16.0 Lathe Accessories

## 16.1 Four Jaw Independent Lathe Chuck

This special chuck has four independently adjustable chuck jaws. These permit the holding of asymmetrical pieces and enable the accurate set-up of cylindrical pieces.

*Figure 16-1*

## 16.2 External Jaws for 3-Jaw Chuck

To change the jaws, insert the chuck key and open the jaws to their fullest extent, it will then be possible to remove each jaw in turn.

Replace them with the external jaws, noting the following.

*Figure 16-2*

The thread segments of the jaws are progressively 'stepped as shown. They are also numbered 1 to 3. This is to take into account the lead of the screw thread within the chuck. It is therefore necessary to assemble the jaws in the correct order.

Place them as shown and assemble in the same order, clockwise in the slots in the chuck, turning the chuck key as you insert them, Close the jaws fully and check to ensure they all meet at the center. If a

jaw is out, open the jaws fully, and retain pressure on the jaw in question while turning the chuck key until it snaps down into position. Re-check to ensure all jaws meet at the center.

## 16.3 Steady Rest

The steady rest serves as a support for shafts on the free tailstock end. For many operations the tailstock cannot be used as it obstructs the turning tool or drilling tool, and therefore, must be removed from the machine. The steady rest, which function as an end support ensures chatter-free operation. The steady rest is mounted on the bed-ways and is secured from below with a locking plate. The sliding fingers require continuous lubrication at the contact points to prevent premature wear.

## 16.4 Setting the Steady Rest

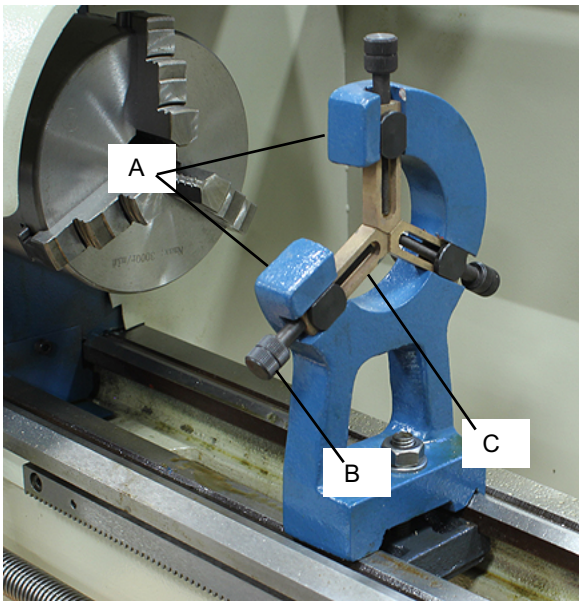



*Figure 16-3*

1. Loosen three hex nuts (A)
2. Loosen knurled screw (B) and open the sliding fingers (C) until the steady rest can be moved with its finger around the workpiece. Secure the steady rest in position.
3. Tighten knurled screws so that fingers are snug but not tight against the workpiece. Tighten three nuts (A).
4. Lubricate the sliding points with machine oil.
5. After prolonged operation the jaws will begin to wear. The tips of the fingers may be filed or re-milled to return them to the original shape. When they have been worn and reshaped down to the point that they will no longer adjust to clamp the material, they will need to be replaced.

## 16.5 Follow Rest

*Figure 16-4*

The follow rest is mounted on the saddle and follow the movement of the turning tool.

Only two sliding fingers are required. The place of the third finger is taken by the turning tool.

The follow rest is used for turning operations on long slender workpieces. It prevents flexing of the workpiece under pressure from the turning tool.

Set the fingers snug to the workpiece but not overly tight.

Lubricate the fingers during operation to prevent premature wear.

# 17.0 Operation

**⚠CAUTION**

**Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.**

## 17.1 Simple Turning

The following notes are guidelines as to how to set up the lathe to carry out a simple rough cut turning operation.

- ALWAYS plan your work. Have drawings or a plan on hand, together with any measuring instruments you may require, such as micrometers, calipers etc.

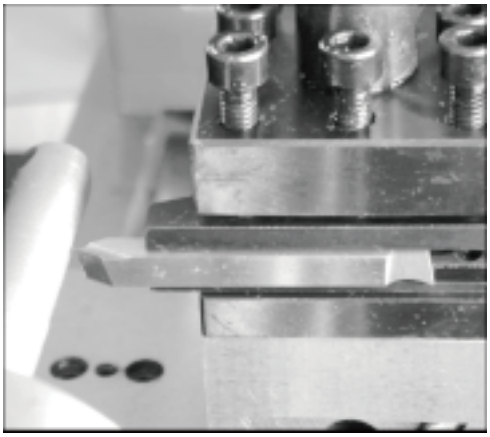


*Figure 17-1*

- Select a cutting tool that will produce the desired cut and mount it in the Tool Rest with as little overhang as possible. Securing it with the three socket head cap screws as shown. During turning, the tool has a tendency to bend under the cutting force generated during the chip formation. For best results, tool overhang should be kept to a minimum of 3/8" (9mm) or less. Ideally, the overhang should be between 0.39” (10mm) but not more than 0.59” (15mm) for a straight tool.

**IMPORTANT:** To ensure that the tip of the cutting tool is on the horizontal center line of the work, or very slightly below it. On no account should it be above the center line. When necessary, shims should be used beneath the tool to achieve the correct height. If the tip is too high, the only recourse is to select another tool or grind down the tip.

- The cutting angle is correct when the cutting edge is in line with the center axis of the work piece. The correct height of the tool can be achieved by comparing the tool point with the point of the center mounted in the headstock (A). If necessary, use steel spacer shims under the tool to get the required height.
- When the tool is properly installed and adjusted, use the apron and compound slide adjustments to move the tool clear of the work area for the installation of the work material.

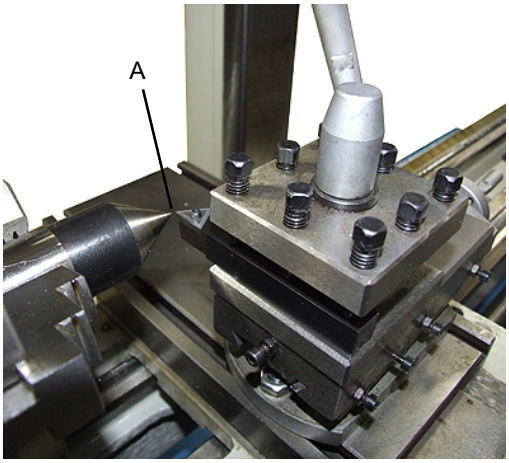



*Figure 17-2*

- Mount the work either in the chuck or on a faceplate. If necessary, use the tailstock center for additional support if the work cannot be adequately secured by the chuck, or if it is a long place or of small diameter. Use Steady rest as needed to support the material from deflection and vibration during machining.
- Retract the cutting tool and crank the carriage/saddle away from the headstock, then crank the cutting tool up to the work along the length to be cut while rotating the work by hand using the chuck. Continue to advance the cutting tool slowly until it just touches the surface. Record this position by zeroing the scale on the cross-slide, i.e. turn the moveable scale until the zero marks coincide, see diagram opposite). Once zeroed, retract the cross-slide one complete turn, then move the carriage/saddle until the tool is a short distance from the right hand edge of the work. Crank in the cross-slide again one full turn until the zero marks again coincide.

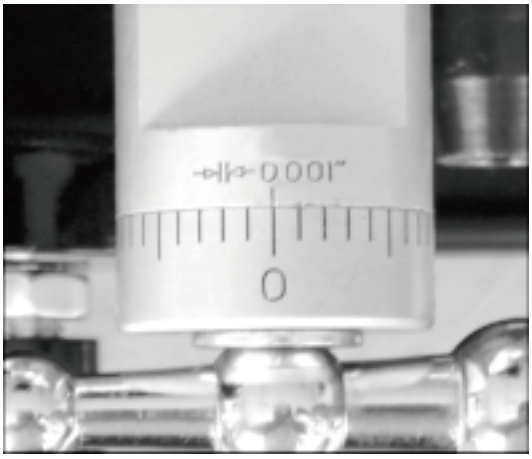



*Figure 17-3*

**IMPORTANT:** If you go past the zero marks, back off again at least one half of a turn, then slowly bring the marks back together. Whenever you use the scale, as an indicator, to advance the cross-slide or compound slide. ALWAYS use this procedure to align the marks. This is to take up any backlash or other clearances in the gearing and slides etc.

- Continue to turn the handle an amount equivalent to your desired depth of cut.

**Note:** We recommend that for rough cutting, you do not exceed 0.010" (0.25mm) as your depth of cut.

- The setup is now complete to begin your cutting operation. Before starting, check that the:
  - The Auto feed lever. Ensure it is in the UP position for manual feed.
  - The Forward/Neutral/Reverse lead screw lever. If Auto feed is not required, set to 'Neutral'.
  - The HIGH/LOW lever. Select required speed range.
- Switch the machine ON.

- Slowly feed the cutting tool into the work using the Manual Feed handle. Proceed until you reach the previously marked line on the work, then retract the tool one or two complete turns on the Cross-Slide feed handle.
- Crank the carriage/saddle back to the beginning, then crank the tool the same number of turns 'in', plus the depth of desired cut, and proceed to cut once more.

**NOTE:** This describes the procedure for general, rough cutting. For other types of cuts/finishing, cutting shoulders, etc... you should consult a suitable handbook.

# 18.0 Cross Slide Compound Slide

The cross slide moves perpendicular to the longitudinal axis and features a scale on the handwheel that displays graduations of one thousandths of an inch (0.001").

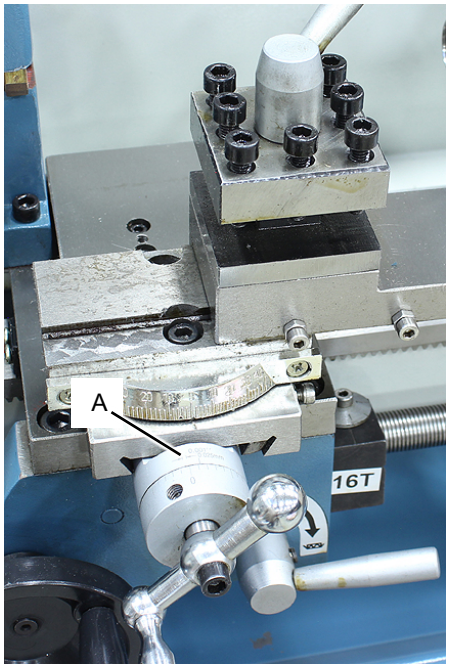



*Figure 18-1*

- Using the handwheel, back the cross slide away from the starting point by at least 0.015".
- Now move the cross slide forward to the starting point. This will clear the backlash in the lead screw so the handwheel scale reading will be accurate. A small amount of backlash is normal and must be accounted for when using the cross slide.
- Hold the handwheel still and turn the scale so the “0” mark lines up with the “0.000” mark on the cross slide. The handwheel will be accurate while movement continues in the same direction.
- After backing the cross slide away from the workpiece, remember to clear the backlash before moving the cross slide forward to the “0” mark for the next cut.

Similar to the cross slide, the compound slide features a scale that displays graduations of one thousandths of an inch (0.001"). Unlike the cross slide, the compound slide can be rotated to a set angle and then it can be moved back and forth along the axis of that angle.

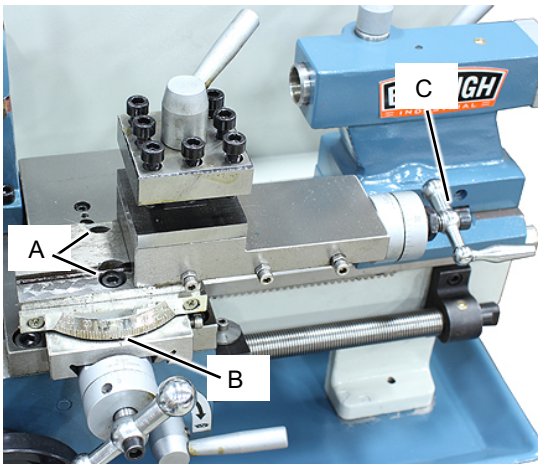



*Figure 18-2*

- Loosen the compound slide bolts (A) to allow it to be rotated.
- Rotate the compound slide to the desired angle (B).
- Tighten the compound slide bolts (A) and check the angle again to make sure it did not move during tightening.
- Use the compound slide handwheel (C) to move the tool along the axis of the angle. Similar to adjusting the cross slide handwheel, make sure the threads are engaging and all backlash has been cleared before you set the handwheel scale to “0”.

# 19.0 Maintenance

**⚠WARNING**

**Make sure the electrical disconnect is OFF before working on the machine.**

**⚠WARNING**

**Maintenance should be performed on a regular basis by qualified personnel.**

**⚠WARNING**

**Always follow proper safety precautions when working on or around any machinery.**

- Check daily for any unsafe conditions and fix immediately.
- Check that all nuts and bolts are properly tightened.

- On a weekly basis clean the machine and the area around it.
- Lubricate threaded components and sliding devices.
- Apply rust inhibitive lubricant to all non-painted surfaces.

Keep the maintenance of the machine tool during the operation to guarantee the accuracy and service life of the machine tool.

- To retain the machine's precision and functionality, it is essential to treat it with care, keep it clean, and grease and lubricate it regularly. Only through good care, can you be sure that the working quality of the machine will remain constant.

**IMPORTANT:** Disconnect the machine plug from the mains supply whenever you carry out cleaning, maintenance, or repair work.

Oil, grease, and cleaning agents are pollutants and must not be disposed of through the drains or in normal refuse. Dispose of those agents in accordance with current legal requirements on the environment. Cleaning rags impregnated with oil, grease, and cleaning agents are easily inflammable. Collect cleaning rags or cleaning wool in a suitable closed vessel and dispose of them in an environmentally sound way. Do not put them with normal refuse!

- Lubricate all slideways lightly before every use. The change gears and the leadscrew must also be lightly lubricated with lithium base grease.
- During the operation, the chips which falls onto the sliding surface should be cleaned timely, and the inspection should be often made to prevent chips falling into the position between the machine tool saddle and lathe bed guide way.

**IMPORTANT:** Do not remove the chips with your bare hands. There is a risk of cuts due to sharp-edged chips. Never use flammable solvents or cleaning agents or agents that generate noxious fumes! Protect electrical components such as motors, switches, switch boxes, etc., against moisture and humidity when cleaning.

- After daily operation, eliminate all the chips and clean different part of the machine tool and apply machine tool oil to prevent rusting.
- To maintain the machining accuracy, take care of the center, the surface of the machine tool for the chuck and the guide way and avoid mechanical damage and the wear due to improper guide.
- If the damage is found, the maintenance should be done immediately.

**IMPORTANT:** Repair work may only be carried out by qualified personnel with the corresponding mechanical and electrical knowledge.

## 19.1 Lathe Lubrication

**IMPORTANT:** Lathe must be serviced at all lubrication points before the lathe is placed into service! Failure to comply may cause serious damage!
**IMPORTANT:** Lubricate all slideways lightly before every use. Lubricate the change gears and the leadscrew slightly with lithium-based grease.

## 19.2 Daily Lubrication

Using the bottle and nozzle included, lubricate the lathe using 20W machine oil into the brass ball oil fittings (A) like those located at the top of the tailstock.

- There are oil ports on the carriage, top slide, cross slide, apron, leadscrew, and tailstock.

## 19.3 Before Use

- Always inspect before use. Any damage should be repaired, and misadjustments rectified. Damage to machined surfaces should be repaired with an oil stone. Test by hand to ensure smooth operation of all parts before use.
- Apply a few drops of oil to the oil ways at both lead screw bearings (at each end bracket) and add more once or twice during the day if used continuously. It will be necessary to remove the gear train cover in order to oil the left-hand bearing.
- Apply a few drops also to the compound slide oil way, located on the slides' top surface, between the two socket head screws.

## 19.4 After Use

- Remove all chips and debris from the machine and thoroughly clean all surfaces.
- If coolant had been used, ensure it has completely drained from the tray. Components should be dry, and all machined surfaces should be lightly oiled.
- Always remove cutting tools and store them in a safe place.

## 19.5 Oil Disposal

Used oil products must be disposed of in a proper manner following your local regulations.

## 19.6 Storing Machine for Extended Period of Time

If the Vertical Milling Machine is to be inactive for a long period of time, prepare the machine as follows:

- Disconnect the electrical supply from the power panel.
- Empty and clean the coolant reservoir.
- Clean and grease the machine.
- Cover the machine.

## 19.7 Motor Brushes

The Motor brushes may be changed by unscrewing the caps, visible at the front and rear of the machine beneath the Headstock.

The motor brushes will typically last for approximately 1000 hours.

## 19.8 Settings and Adjustments

Occasionally, it may be necessary to readjust various components to maintain optimum performance. The adjustments that may be performed follows:

## 19.9 Cross-Slide Handle

The cross slide feed should run smoothly, and the scale must rotate with the handle.

If any stiffness occurs, it is probably the result of chips or other lodging between the mating surfaces.

1. Undo the socket head screw which secures the handle.
2. Remove the handle and pull off the collar with the scale taking great care to retain the small spring plate which sits in a groove beneath the collar.
3. Clean the assembly and reassemble in reverse order.
4. It will be necessary to hold the spring plate in place with a small screwdriver, or similar tool, and pushing down on it to allow the collar to be correctly located on to the shaft.

## 19.10 Compound Slide Adjustments

Compound slide adjustments are made in the same way as those for the cross-slide. The jib screws are to be found on the left hand side of the slide, I, e. facing the front of the lathe.

**NOTE:** It is important that the cross-slide and compound slide adjustments are correctly carried out and that there is "no sloppiness" of action. Any misadjustments will have a serious effect on the quality of your work, as they will all be transferred to the tool tip, it is vital that there is as little movement of the tool as possible.

# 20.0 Troubleshooting

**⚠WARNING** **Make sure the electrical disconnect is OFF before working on the machine.**

## 20.1 Service

*Table 20-1*

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| Machine does not start or a breaker trips. | Fuse has blown. | Correct short/replace fuse on control panel. |
| | Emergency stop push-button is engaged/ faulty. | Rotate clockwise slightly until it pops out/replace it. |
| | Plug/receptacle is at fault or wired incorrectly. | Test for good contacts; correct the wiring. |
| | Computer board is at fault. | Inspect computer board; replace if faulty. |
| | Power supply is at fault/switched OFF. | Ensure hot lines have correct voltage on all legs and main power supply is switched ON. |
| | Motor ON button or ON/OFF switch is at fault. | Replace faulty ON button or ON/OFF switch. |
| | Spindle rotation switch is at fault. | Turn switch to FWD/REV; replace bad switch. |
| | Wiring is open/has high resistance. | Check for broken wires or disconnected/corroded connections, and repair/replace as necessary. |
| | Motor is at fault. | Test/repair/replace. |
| Machine stalls or is underpowered. | Wrong workpiece material (metal). | Use metal with correct properties for your type of machining. |
| | Computer board is at fault. | Inspect and replace if faulty. |
| | Motor speed rheostat is at fault. | Test and replace if faulty. |
| | Motor brushes are at fault. | Remove brushes and clean/replace. |
| | Pulley/sprocket slipping on shaft. | Replace loose pulley/shaft. |
| | Motor bearings are at fault. | Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. |
| | Spindle rotation switch at fault. | Turn switch to FWD/OFF/REV; replace bad switch. |
| Loud, repetitious noise coming from machine at or near the motor. | Pulley setscrews or keys are missing or loose. | Inspect keys and setscrews. Replace or tighten if necessary. |
| | Motor fan is hitting the cover. | Tighten fan or shim cover or replace items. |
| Motor overheats. | Motor overloaded.<br>Air circulation through the motor restricted. | Reduce load on motor.<br>Clean out motor to provide normal air circulation. |
| Motor is loud when cutting.<br>Overheats or bogs down in the cut. | Excessive depth of cut or feed rate. | Decrease depth of cut or feed rate. |
| | RPM or feed rate wrong for cutting operation. | Refer to RPM feed rate chart for appropriate rates. |
| | Cutting tool is dull. | Sharpen or replace the cutting tool. |
| | Gear setup is too tight, causing them to bind. | Readjust the gear setup with a small amount of backlash so the gears move freely and smoothly when the chuck is rotated by hand |

## 20.2 Operation and Work Results

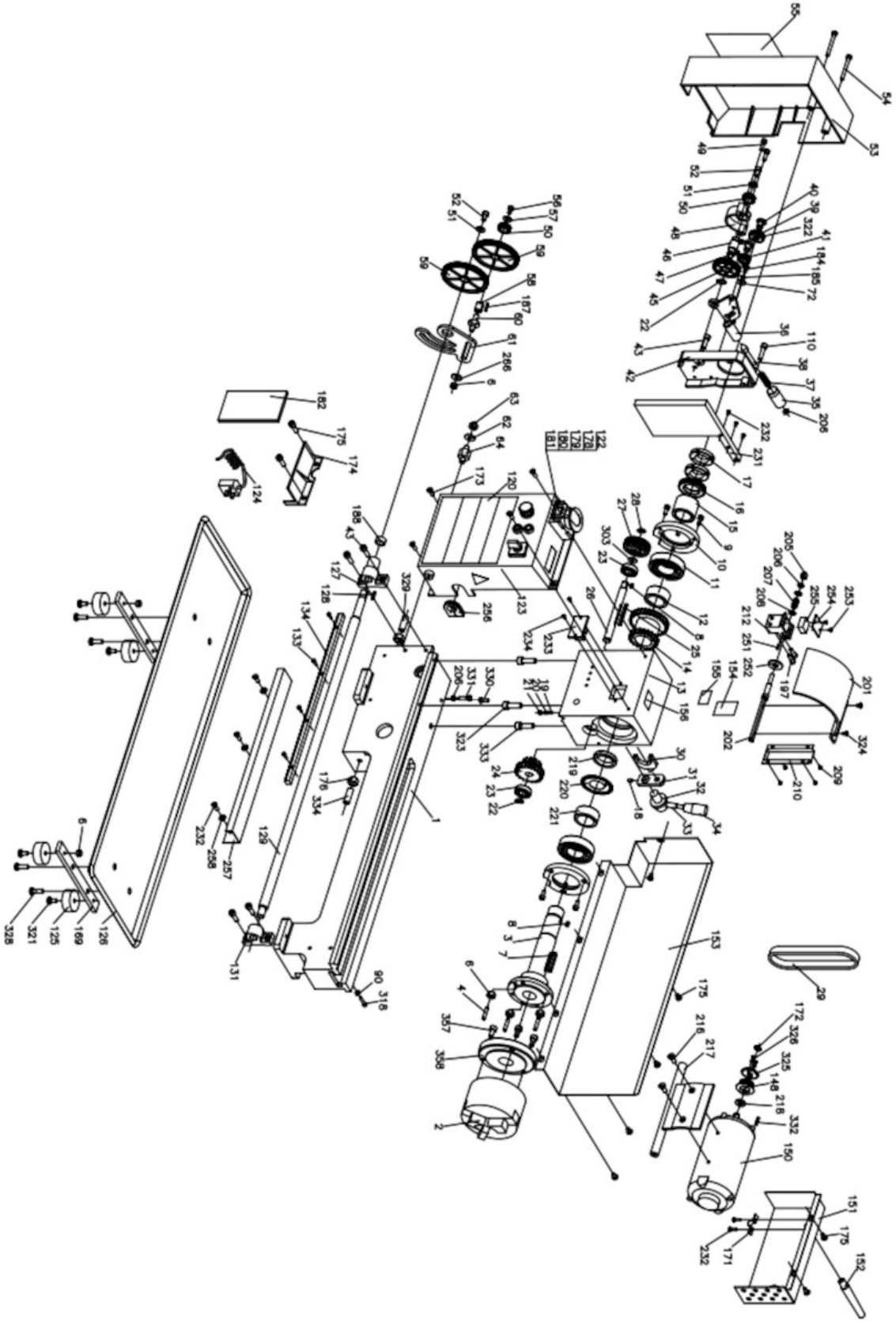
*Table 20-2*

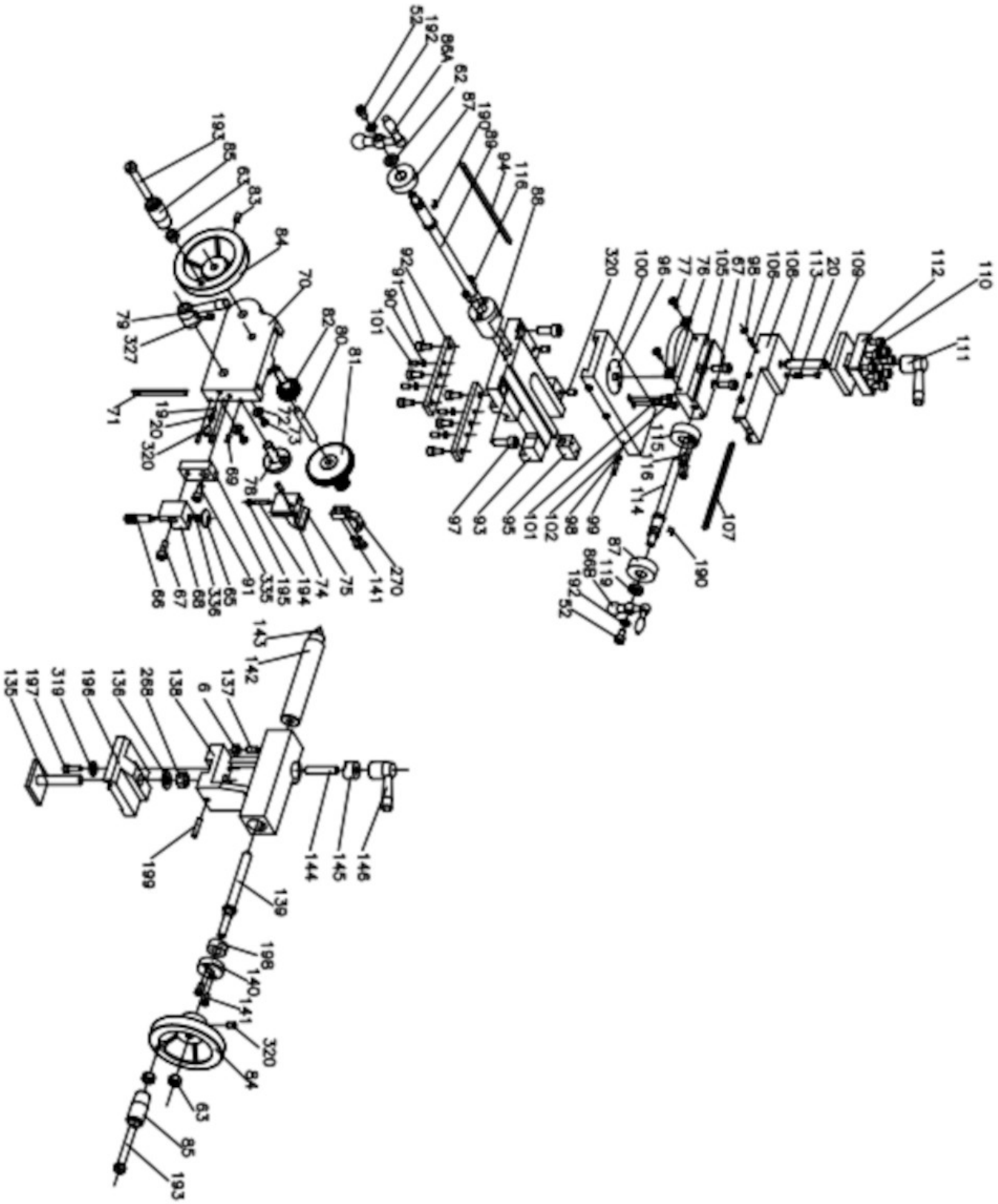
| Symptom | Possible Cause | Corrective Action |
|---|---|---|
| Entire machine vibrates excessively upon startup and while running. | Workpiece is unbalanced. | Reinstall workpiece so it is as centered with the spindle bore as possible. |
| | Loose or damaged belt(s). | Tighten/replace the belt as necessary. |
| | V-belt pulleys are not properly aligned. | Align the V-belt pulleys. |
| | Worn or broken gear present. | Inspect gears and replace if necessary. |
| | Chuck or faceplate has become unbalanced. | Rebalance chuck or faceplate; contact a local machine shop for help. |
| | Spindle bearings badly worn. | Replace spindle bearings. |
| Bad surface finish. | Wrong RPM or feed rate. | Adjust for appropriate RPM and feed rate. |
| | Dull tooling or poor tool selection. | Sharpen tooling or select a better tool for the intended operation. |
| | Too much play in gibs. | Tighten gibs. |
| | Tool too high. | Lower the tool position. |
| Can't remove tapered tool from tailstock quill. | Quill had not retracted all the way back into the tailstock. | Turn the quill handwheel until it forces taper out of quill. |
| | Debris was not removed from taper before inserting into quill. | Always make sure that taper surfaces are clean. |
| Cross slide, compound slide, or carriage feed has sloppy operation. | Gibs are out of adjustment. | Adjust gib screw(s). |
| | Handwheel is loose. | Tighten handwheel fasteners. |
| | Lead screw mechanism worn or out of adjustment. | Tighten any loose fasteners on lead screw mechanism. |
| Cross slide, compound slide, or carriage feed handwheel is hard to move. | Gibs are loaded up with shavings, dust, or grime. | Remove gibs, clean ways/dovetails, lubricate, and readjust gibs. |
| | Gib screws are too tight. | Loosen gib screw(s) slightly and lubricate bedways. |
| | Backlash setting too tight (cross slide only). | Slightly loosen backlash setting by loosening the locking screw and adjusting the spanner ring at the end of the handle. |
| | Bedways are dry. | Lubricate bedways and handles. |
| Cutting tool or machine components vibrate excessively during cutting. | Tool holder not tight enough. | Check for debris, clean, and retighten. |
| | Cutting tool sticks too far out of tool holder; lack of support. | Reinstall cutting tool so no more than 1⁄3 of the total length is sticking out of tool holder. |
| | Gibs are out of adjustment. | Tighten gib screws at affected component. |
| | Dull cutting tool. | Replace or re-sharpen cutting tool. |
| | Incorrect spindle speed or feed rate. | Use the recommended spindle speed. |
| Inaccurate turning results from one end to the other. | Headstock and tailstock are not properly aligned with each other. | Realign the tailstock to the headstock spindle bore center line. |
| Chuck jaws won't move or don't move easily. | Chips lodged in the jaws. | Remove jaws, clean and lubricate chuck threads, and replace jaws. |
| Carriage won't feed. | Gears are not all engaged. | Adjust gear positions. |
| | Gears are broken. | Replace. |
| | Loose screw on the feed handle. | Tighten. |

| Symptom | Possible Cause | Corrective Action |
|---|---|---|
| Carriage hard to move. | Carriage lock is tightened down. | Check to make sure table locks are fully released. |
| | Chips have loaded up on bedways. | Frequently clean away chips that load up during turning operations. |
| | Bedways are dry and in need of lubrication. | Lubricate bedways and handles. |
| | Longitudinal stops are interfering. | Check to make sure that stops are floating and not hitting the center stop. |
| | Gibs are too tight. | Loosen gib screw(s) slightly. |
| Gear change levers will not shift into position. | Gears not aligned in headstock. | Rotate spindle by hand until gear falls into place. |
| Loud, repetitious noise coming from machine. | Gears not aligned in headstock or no backlash. | Adjust gears and establish backlash. |
| | Broken gear or bad bearing. | Replace broken gear or bearing. |
| | Workpiece is hitting stationary object. | Stop lathe immediately and correct interference problem. |
| Tailstock quill will not feed out of tailstock. | Quill lock knob is tightened down. | Turn knob counterclockwise. |

# 21.0 Replacement Parts

## 21.1.1 Benchtop Lathe Assembly – Exploded View

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193

## 21.1.2 Benchtop Lathe Assembly – Parts List

| Index No. | Part No. | Description | Size | Qty |
|---|---|---|---|---|
| 1 | ** | Bed Way | | 1 |
| 2 | BA1-1972 | Chuck | | 1 |
| 3 | ** | Spindle | | 1 |
| 4 | ** | Socket Set Screw, Flat Point | M6X25 | 3 |
| 6 | CM9-TS-1540041 | Hex Nut | M6P1.0 | 9 |
| 7 | ** | Flat Key | 5X5X50 | 1 |
| 8 | BA1-9635 | Flat Key | 4X4X8 | 2 |
| 9 | JT9-TS-1502031 | Socket Head Cap Screw | M5X12 | 6 |
| 10 | ** | Cover | | 2 |
| 11 | ** | Ball Bearing | 62X30X16mm | 2 |
| 12 | ** | Spacer | | 1 |
| 13 | ** | Headstock Casting | | 1 |
| 14 | ** | H/L Gear 21T/29T | | 1 |
| 15 | ** | Spacer | | 1 |
| 16 | ** | Spur Gear 45T | | 1 |
| 17 | ** | Slotted Round Nut | M27 x 1.5 | 2 |
| 18 | ** | Socket Set Screw, Cone Point | M5X8 | 1 |
| 19 | ** | Ball Bearings | Φ5mm | 2 |
| 20 | ** | Spring | | 3 |
| 21 | ** | Socket Set Screw, Cone Point | M6X6 | 1 |
| 22 | ** | Retaining Rings, EXT | M12 | 3 |
| 23 | ** | Ball Bearing | | 2 |
| 24 | ** | H/L Gear 12T/20T | | 1 |
| 25 | ** | Flat Key | 4X4X45 | 1 |
| 26 | ** | H/L Gear Shaft | | 1 |
| 27 | BA1-9637 | Pulley | | 1 |
| 28 | ** | Retaining Rings, EXT | M10 | 1 |
| 29 | BA9-1227658 | Timing Belt – L136 | | 1 |
| 30 | ** | Shifting Fork | | 1 |
| 31 | ** | Shifting Arm | | 1 |
| 32 | ** | Handle Shaft | | 1 |
| 33 | ** | Double End Stub | | 1 |
| 34 | ** | Long Handle Slipcover | | 1 |
| 35 | ** | Handle Slipcover | | 1 |
| 36 | ** | Lever Quadrant | | 1 |
| 37 | ** | Spring | | 1 |
| 38 | ** | Indicator | | 1 |
| 39 | BA9-1226320 | Pinion 25T | | 1 |
| 40 | ** | Support Screw | | 2 |
| 41 | BA9-1226321 | Pinion 20T | | 1 |
| 42 | ** | Fixed Cover | | 1 |
| 43 | JT9-TS-1503051 | Socket Head Cap Screw | M6X20 | 5 |
| 45 | BA9-1226322 | Gear 45T | | 1 |
| 46 | ** | Shaft | | 1 |
| 47 | ** | Flat Key | 3X3X8 | 1 |
| 48 | ** | Mount | | 1 |
| 49 | JT9-TS-1502051 | Socket Head Cap Screw | M5X20 | 2 |
| 50 | ** | Gearwheel Z20 | | 2 |
| 51 | ** | Washer M6 | | 2 |
| 52 | JT9-TS-1503011 | Socket Head Cap Screw | M6X8 | 4 |
| 53 | BA1-10878 | Cover | | 1 |
| 54 | ** | Socket Head Cap Screw | M5X65 | 2 |
| 55 | ** | Thread Cutting Chart | | 1 |
| 56 | JT9-TS-1502011 | Socket Head Cap Screw | M5X8 | 1 |
| 57 | ** | Fender Washer | M5 | 1 |
| 58 | ** | Bush Key | | 1 |
| 59 | BA1-9636 | Gearwheel Z80 | | 2 |
| 60 | ** | Shaft | | 1 |
| 61 | ** | Support Plate | | 1 |

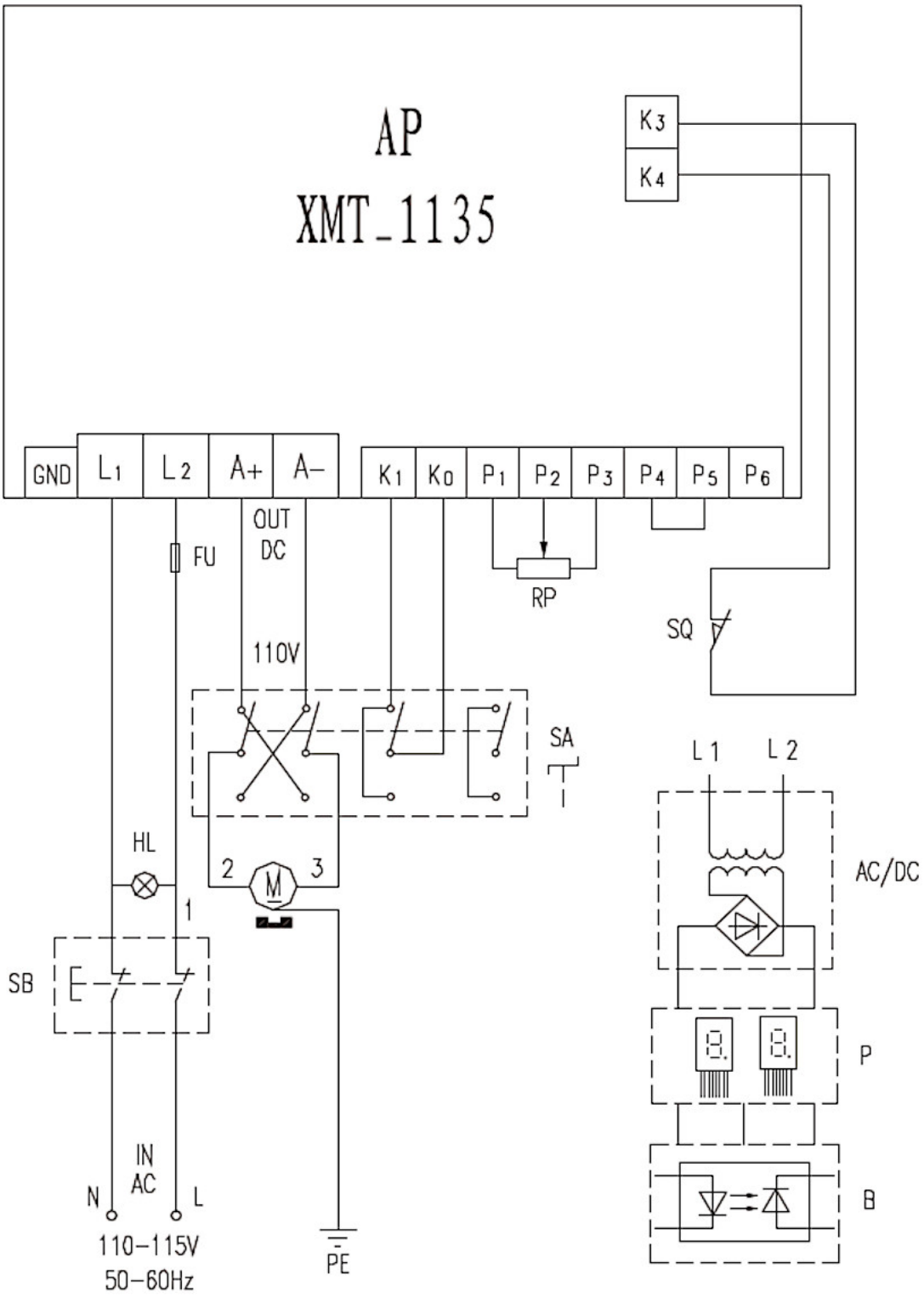
| Index No. | Part No. | Description | Size | Qty |
|---|---|---|---|---|
| 62 | JT9-TS-1550061 | Flat Washer | M8 | 2 |
| 63 | ** | Hex Nut | M8P1.25 | 4 |
| 64 | ** | Shaft | | 1 |
| 65 | ** | Discusses (English) | | 1 |
| 66 | ** | Rackling Gears | | 1 |
| 67 | CM9-TS-1503041 | Socket Head Cap Screw | M6X16 | 3 |
| 68 | ** | Unrestrained Disk Seat | | 1 |
| 69 | ** | Slotted Set Screws, Cone Point | M4X10 | 3 |
| 70 | ** | Apron | | 1 |
| 71 | ** | Gib Strip | | 1 |
| 72 | ** | Fender Washer | M4 | 3 |
| 73 | ** | Pan Head MACH Screw | M4X8 | 2 |
| 74 | ** | Roll Pin | 5X12 | 1 |
| 75 | ** | Half Nut Base | | 1 |
| 76 | ** | Angle Block | | 1 |
| 77 | ** | Roll Pin | 4X10 | 2 |
| 78 | ** | Groove Cam | | 1 |
| 79 | ** | Handle Base | | 1 |
| 80 | ** | Shaft | | 1 |
| 81 | ** | Gear 11T/54T | | 1 |
| 82 | ** | Gear 24T | | 1 |
| 83 | ** | Socket Set Screw, Cone Point | M6X12 | 1 |
| 84 | ** | Wheel | | 2 |
| 85 | BA1-1157 | Handle | | 2 |
| 86A | ** | Three Ball Handle (L) | | 1 |
| 86B | ** | Three Ball Handle | | 1 |
| 87 | ** | Dial | | 2 |
| 88 | ** | Bracket | | 1 |
| 89 | ** | Feeding Screw | | 1 |
| 90 | ** | Hex Thin Nut | M5P0.8 | 5 |
| 91 | CM9-TS-1503031 | Socket Head Cap Screw | M6X12 | 7 |
| 92 | BA9-1230484 | Slide Plate | | 2 |
| 93 | BA9-1230485 | Saddle | | 1 |
| 94 | ** | Gib Strip | | 1 |
| 95 | ** | Feeding Nut Imperial | | 1 |
| 96 | ** | Swivel Disk | | 1 |
| 97 | JT9-TS-1504041 | Socket Head Cap Screw | M8X20 | 2 |
| 98 | ** | Hex Thin Nut | M4P0.7 | 6 |
| 99 | ** | Socket Set Screw, Dog Point | M4X16 | 3 |
| 100 | ** | Cross Slide | | 1 |
| 101 | ** | Socket Set Screw, Flat Point | M5X10 | 5 |
| 102 | JT9-TS-2284082 | Socket Head Cap Screw | M4X8 | 2 |
| 105 | ** | Compound Rest (B) | | 1 |
| 106 | ** | Socket Set Screw, Dog Point | M4X14 | 3 |
| 107 | ** | Gib Strip | | 1 |
| 108 | ** | Small Rest | | 1 |
| 109 | ** | Rest Position | | 1 |
| 110 | CM9-TS-1503061 | Socket Head Cap Screw | M6X25 | 9 |
| 111 | BA1-10879 | Tool Rest | | 1 |
| 112 | ** | Square Tool Post | | 1 |
| 113 | ** | Socket Set Screw, Flat Point | M10X65 | 1 |
| 114 | ** | Small Rest Screw | | 1 |
| 115 | ** | Reading Location | | 1 |
| 116 | CM9-TS-1501041 | Socket Head Cap Screw | M4X12 | 4 |
| 119 | ** | Washer | | 1 |
| 120 | ** | Model Label | | 1 |
| 122 | ** | Switch Label | | 1 |
| 123 | ** | Control Box | | 1 |
| 124 | ** | Plug W/Cord | | 1 |
| 125 | ** | Rubber Foot | | 4 |
| 126 | BA9-1231286 | Chip Tray | | 1 |

| Index No. | Part No. | Description | Size | Qty |
|---|---|---|---|---|
| 127 | ** | Bracket | | 1 |
| 128 | ** | Flat Key | 3X3X16 | 1 |
| 129 | ** | Lead Screw | | 1 |
| 131 | ** | Bracket | | 1 |
| 133 | JT9-TS-1520041 | Socket Head Cap Screw | M3X10 | 4 |
| 134 | ** | Rack | | 1 |
| 135 | ** | Clamp Plate | | 1 |
| 136 | ** | Flat Washer | M10 | 1 |
| 137 | ** | Socket Set Screw, Dog Point | M6X14 | 1 |
| 138 | ** | Tailstock Screw | | 1 |
| 139 | ** | Tailstock Casting | | 1 |
| 140 | ** | Bracket | | 1 |
| 141 | JT9-TS-1501031 | Socket Head Cap Screw | M4X10 | 2 |
| 142 | ** | Tailstock Quill | | 1 |
| 143 | ** | Center | | 1 |
| 144 | ** | Socket Set Screw, Flat Point | M8X40 | 1 |
| 145 | ** | Stop Stock | | 1 |
| 146 | ** | Handle Base | | 1 |
| 148 | BA1-953 | Pulley | | 1 |
| 150 | BA1-9349 | Motor | | 1 |
| 151 | ** | Cover | | 1 |
| 152 | ** | Power Cord Jacket | | 1 |
| 153 | ** | Dust Cover | | 1 |
| 154 | ** | H/L Label | | 1 |
| 155 | ** | H/L Label | | 1 |
| 156 | ** | Warning Label | | 1 |
| 157 | ** | Gearwheel 30T | | 1 |
| 158 | ** | Gearwheel 35T | | 1 |
| 159 | ** | Gearwheel 40T | | 2 |
| 160 | ** | Gearwheel 45T | | 1 |
| 161 | ** | Gearwheel 50T | | 1 |
| 162 | ** | Gearwheel 55T | | 1 |
| 163 | ** | Gearwheel 57T | | 1 |
| 164 | ** | Gearwheel 60T | | 1 |
| 165 | ** | Gearwheel 65T | | 1 |
| 166 | ** | External Jaws (Set) | | 1 |
| 167 | BA9-1232884 | 3-Jaw Chuck Key | | 1 |
| 169 | ** | Support Plate | | 2 |
| 171 | ** | Clamp Block | | 1 |
| 172 | ** | Retaining Rings, EXT | M9 | 1 |
| 173 | ** | MACH Screw, Flat HD | M5X8 | 4 |
| 174 | ** | Protector | | 1 |
| 175 | ** | Pan Head MACH Screw | M5X8 | 9 |
| 176 | ** | Hex Thin Nut | M10P1.5 | 2 |
| 178 | ** | Emergency Stop | | 1 |
| 179 | ** | Fuse | | 1 |
| 180 | ** | Variable Speed Control Knob | | 1 |
| 181 | ** | Forward/Off/Reverse Switch | | 1 |
| 182 | ** | P. C. Board | | 1 |
| 184 | ** | Pan Head MACH Screw | M5X10 | 1 |
| 185 | JT9-TS-2361051 | Lock Washer | M5 | 1 |
| 187 | ** | Key | | 1 |
| 188 | ** | Spacer | | 1 |
| 190 | ** | Spring | | 2 |
| 192 | JT9-TS-2361062 | Lock Washer | M6 | 2 |
| 193 | BA1-10880 | Slotted Cheese Head Screw | M8X55 | 2 |
| 194 | ** | Socket Set Screw, Flat Point | M4X38 | 1 |
| 195 | JT9-TS-1540021 | Hex Nut | M4P0.7 | 1 |
| 196 | ** | Tailstock Plate | | 1 |
| 197 | JT9-TS-1502041 | Socket Head Cap Screw | M5X16 | 3 |
| 198 | ** | Flange | | 1 |

| Index No. | Part No. | Description | Size | Qty |
|---|---|---|---|---|
| 199 | ** | Socket Set Screw, Long Dog Point | M5X25 | 1 |
| 201 | BA1-3617 | Chuck protect cover | | 1 |
| 202 | BA1-3618 | Shaft | | 1 |
| 205 | JT9-TS-2331061 | Cap Nut | M6P1.0 | 1 |
| 206 | ** | Hex Thin Nut | M6P1.0 | 3 |
| 207 | ** | Nut M6 | | 1 |
| 208 | ** | Flat Washer | M6 | 2 |
| 209 | ** | Pan Head MACH Screw | M3X4 | 4 |
| 210 | ** | Cover | | 1 |
| 212 | BA1-1153 | Fix Base | | 1 |
| 216 | ** | MACH Screw, Flat HD | M6X8 | 2 |
| 217 | ** | Motor Fixed Plate | | 1 |
| 218 | ** | Washer 6 | | 1 |
| 219 | ** | Spacer | | 1 |
| 220 | ** | Light Beam | | 1 |
| 221 | ** | Spacer | | 1 |
| 231 | ** | Support Plate | | 1 |
| 232 | ** | Pan Head MACH Screw | M4X6 | 8 |
| 233 | ** | Photoelectricity Switch | | 1 |
| 234 | ** | Pan Head MACH Screw | M3X6 | 2 |
| 251 | ** | Roll Pin | 3X8 | 1 |
| 253 | ** | Rounded Head Drilling Screws | ST2.9×4.5 | 3 |
| 254 | ** | Cover | | 1 |
| 255 | BA1-1154 | Micro Switch | | 1 |
| 256 | ** | Dustproof Cover | | 1 |
| 257 | ** | Lead Screw Cover | | 1 |
| 258 | CM9-TS-1550021 | Flat Washer | M4 | 3 |
| 266 | ** | Fender Washer | M6 | 1 |
| 268 | BA1-4401 | Hex Nut | M10P1.5 | 1 |
| 270 | BA1-9603 | Lead Screw Support | | 1 |
| 303 | CM9-TS-1550071 | Flat Washer | M10 | 1 |
| 318 | JT9-TS-1502051 | Socket Head Cap Screw | M5X20 | 1 |
| 319 | JT9-TS-1550031 | Flat Washer | M5 | 1 |
| 320 | ** | Socket Set Screw, Flat Point | M6X10 | 4 |
| 321 | ** | Pan Head MACH Screw | M6X16 | 4 |
| 322 | ** | Flat Key | 3X3X6 | 1 |
| 323 | JT9-TS-2238251 | Socket Head Cap Screw | M8X25 | 2 |
| 324 | JT9-TS-2284081 | MACH Screw, Flat HD | M4X8 | 2 |
| 325 | BA1-954 | Flange | | 1 |
| 326 | ** | Flat Head Phillips Tapping Screws | ST2.9X9.5 | 2 |
| 327 | ** | Socket Set Screw, Dog Point | M6X8 | 1 |
| 328 | ** | Pan Head MACH Screw | M8X25 | 4 |
| 329 | ** | Socket Set Screw, Dog Point | M10X35 | 1 |
| 330 | JT9-TS-1481031 | Hex Cap Screw | M5X12 | 1 |
| 331 | JT9-TS-1482041 | Hex Cap Screw | M6X20 | 1 |
| 332 | ** | Flat Key | 3X3X14 | 1 |
| 333 | JT9-TS-1490041 | Hex Cap Screw | M8X25 | 1 |
| 334 | ** | Socket Set Screw, Dog Point | M10X40 | 1 |
| 335 | ** | Bracket | | 1 |
| 336 | CM9-TS-2361041 | Lock Washer | M4 | 1 |
| 357 | CM9-TS-1504031 | Socket Head Cap Screw | M8X16 | 3 |
| 358 | ** | Chuck Connect Flange | | 1 |

** These parts are shown for reference only and are not available for order individually. Non-proprietary parts, such as fasteners, can usually be found at local hardware stores.

## 22.0 Wiring Diagram



# 23.0 Warranty and Service

Thank you for your purchase of a machine from Baileigh Industrial. We hope that you find it productive and useful to you for a long time to come.

**Inspection & Acceptance.** Buyer shall inspect all Goods within ten (10) days after receipt thereof. Buyer's payment shall constitute final acceptance of the Goods and shall act as a waiver of the Buyer's rights to inspect or reject the Goods unless otherwise agreed. If Buyer rejects any merchandise, Buyer must first obtain a Returned Goods Authorization ("RGA") number before returning any Goods to Seller. Goods returned without an RGA will be refused. Seller will not be responsible for any freight costs, damages to Goods, or any other costs or liabilities pertaining to Goods returned without an RGA. Seller shall have the right to substitute a conforming tender. Buyer will be responsible for all freight costs to and from Buyer and repackaging costs, if any, if Buyer refuses to accept shipment. If Goods are returned in unsalable condition, Buyer shall be responsible for full value of the Goods. Buyer may not return any special-order Goods. Any Goods returned hereunder shall be subject to a restocking fee equal to 30% of the invoice price.

**Specifications.** Seller may, at its option, make changes in the designs, **specifications**, or components of the Goods to improve the safety of such Goods, or if in Seller's judgment, such changes will be beneficial to their operation or use. Buyer may not make any changes in the specifications for the Goods unless Seller approves of such changes in writing, in which event Seller may impose additional charges to implement such changes.

**Limited Warranty.** Seller warrants to the original end-user that the Goods manufactured or provided by Seller under this Agreement shall be free of defects in material or workmanship for a period of twelve (12) months from the date of purchase, provided that the Goods are installed, used, and maintained in accordance with any instruction manual or technical guidelines provided by the Seller or supplied with the Goods, if applicable. The original end-user must give written notice to Seller of any suspected defect in the Goods prior to the expiration of the warranty period. The original end-user must also obtain an RGA from Seller prior to returning any Goods to Seller for warranty service under this paragraph. Seller will not accept any responsibility for Goods returned without an RGA. The original end-user shall be responsible for all costs and expenses associated with returning the Goods to Seller for warranty service. In the event of a defect, Seller, at its sole option, shall repair or replace the defective Goods or refund to the original end-user the purchase price for such defective Goods. Goods are not eligible for replacement or return after a period of 10 days from date of receipt. The foregoing warranty is Seller's sole obligation, and the original end-user's exclusive remedy, with regard to any defective Goods. This limited warranty does not apply to: (a) die sets, tooling, and saw blades; (b) periodic or routine maintenance and setup, (c) repair or replacement of the Goods due to normal wear and tear, (d) defects or damage to the Goods resulting from misuse, abuse, neglect, or accidents, (f) defects or damage to the Goods resulting from improper or unauthorized alterations, modifications, or changes; and (f) any Goods that has not been installed and/or maintained in accordance with the instruction manual or technical guidelines provided by Seller.

**EXCLUSION OF OTHER WARRANTIES.** THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY AND ALL OTHER EXPRESS, STATUTORY, OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. NO WARRANTY IS MADE WHICH EXTENDS BEYOND THAT WHICH IS EXPRESSLY CONTAINED HEREIN.

**Limitation of Liability.** IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PARTY FOR ANY INCIDENTIAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR DOWN TIME) ARISING FROM OR IN MANNER CONNECTED WITH THE GOODS, ANY BREACH BY SELLER OR ITS AGENTS OF THIS AGREEMENT, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. BUYER'S REMEDY WITH RESPECT TO ANY CLAIM ARISING UNDER THIS AGREEMENT IS STRICTLY LIMITED TO NO MORE THAN THE AMOUNT PAID BY THE BUYER FOR THE GOODS.

**Force Majeure.** Seller shall not be responsible for any delay in the delivery of, or failure to deliver, Goods due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of war or terrorism, enemy actions, hostilities, strikes, labor difficulties, embargoes, non-delivery or late delivery of materials, parts and equipment or transportation delays not caused by the fault of Seller, delays caused by civil authorities, governmental regulations or orders, fire, lightning, natural disasters or any other cause beyond Seller's reasonable control. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

**Installation.** If Buyer purchases any Goods that require installation, Buyer shall, at its expense, make all arrangements and connections necessary to install and operate the Goods. Buyer shall install the Goods in accordance with any Seller instructions and shall indemnify Seller against any and all damages, demands, suits, causes of action, claims and expenses (including actual attorneys' fees and costs) arising directly or indirectly out of Buyer's failure to properly install the Goods.

**Work By Others; Safety Devices.** Unless agreed to in writing by Seller, Seller has no responsibility for labor or work performed by Buyer or others, of any nature, relating to design, manufacture, fabrication, use, installation, or provision of Goods. Buyer is solely responsible for furnishing and requiring its employees and customers to use all safety devices, guards and safe operating procedures required by law and/or as set forth in manuals and instruction sheets furnished by Seller. Buyer is responsible for consulting all operator manuals, ANSI or comparable safety standards, OSHA regulations and other sources of safety standards and regulations applicable to the use and operation of the Goods.

**Remedies.** Each of the rights and remedies of Seller under this Agreement is cumulative and in addition to any other or further remedies provided under this Agreement or at law or equity.
Attorney's Fees. In the event legal action is necessary to recover monies due from Buyer or to enforce any provision of this Agreement, Buyer shall be liable to Seller for all costs and expenses associated therewith, including Seller's actual attorney fees and costs.

**Governing Law/Venue.** This Agreement shall be construed and governed under the laws of the State of Wisconsin, without application of conflict of law principles. Each party agrees that all actions or proceedings arising out of or in connection with this Agreement shall be commenced, tried, and litigated only in the state courts sitting in Manitowoc County, Wisconsin or the U.S. Federal Court for the Eastern District of Wisconsin. Each party waives any right it may have to assert the doctrine of "forum non conveniens" or to object to venue to the extent that any proceeding is brought in accordance with this section. Each party consents to and waives any objection to the exercise of personal jurisdiction over it by courts described in this section. Each party waives to the fullest extent permitted by applicable law the right to a trial by jury.

**Summary of Return Policy:**
• 10 Day acceptance period from date of delivery. Damage claims and order discrepancies will not be accepted after this time.
• You must obtain a Baileigh Industrial issued RGA number PRIOR to returning any materials.
• Returned materials must be received at Baileigh Industrial in new condition and in original packaging.
• Altered items are not eligible for return.
• Buyer is responsible for all shipping charges.
• A 30% re-stocking fee applies to all returns.
Baileigh Industrial makes every effort to ensure that our posted specifications, images, pricing, and product availability are as correct and timely as possible. We apologize for any discrepancies that may occur. Baileigh Industrial reserves the right to make any and all changes deemed necessary in the course of business including but not limited to pricing, product specifications, quantities, and product availability.

**For Customer Service & Technical Support:**
Please contact one of our knowledgeable Sales and Service team members at:
(920) 684-4990 or e-mail us at Baileigh-Service@jpwindustries.com.

# 24.0 Notes

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