

The **EASTWOOD 7" X 12" MINI LATHE** is equipped with all the features found on large lathes in a compact, home workshop-friendly size. Auto-feed and selectable gear train components allow complex threading operations with a high degree of precision. The included inside and outside 3-Jaw Chuck set will accommodate a wide range of workpiece configurations for most turning and cutting operations.

SPECIFICATIONS

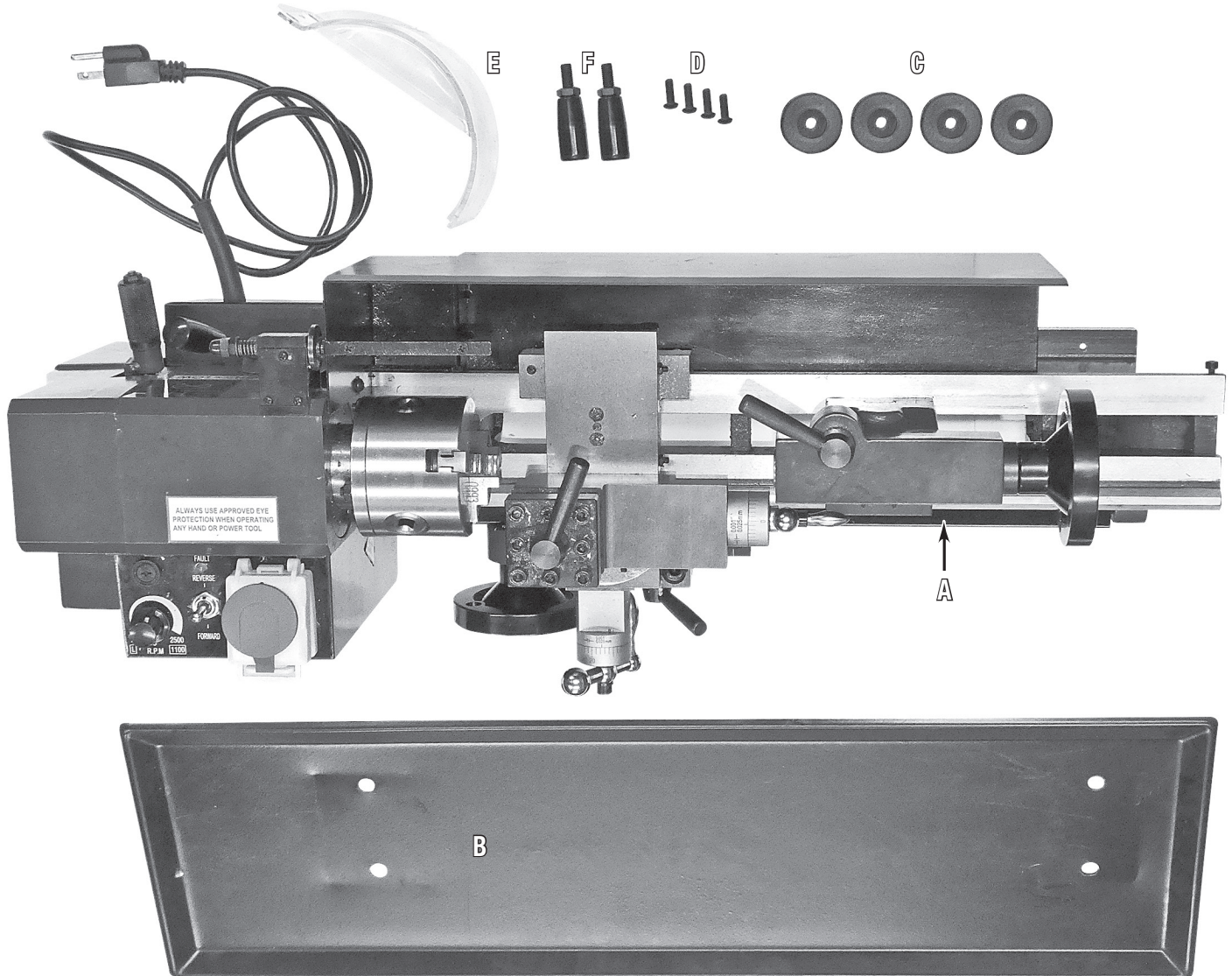
Power Requirements: 120 VAC, 60hz.
Maximum Tool Size: 5/16" x 5/16" [8mm x 8mm]
Compound Travel: 2.75" [69.8mm]
Headstock Spindle Size: 3" [76.2mm]
Headstock Spindle Bore: 0.78" [19.8mm]
Swing Over Bed: 7" [177.8mm]

Distance Between Centers: 12" [304.8mm]
Headstock Spindle Taper: Morse Taper 3
Spindle Speed Range: 0-2500 RPM
Spindle Bearings: Sealed and Permanently Lubricated
Tailstock Spindle Quill Travel: 2.5" [63.5mm]
Tailstock Taper: Morse Taper 2
Compound Slide Graduations: 0.001"

CONTENTS

PARTS

- (1) Main Lathe Unit with 3-Jaw Chuck (installed) **[A]**
- (1) Chip Tray **[B]**
- (4) Rubber Mounting Feet **[C]**
- (4) M6 Pan Head Mounting Screws **[D]**
- (1) Clear Plastic Chuck Guard **[E]**
- (2) Handwheel Crank Handles **[F]**

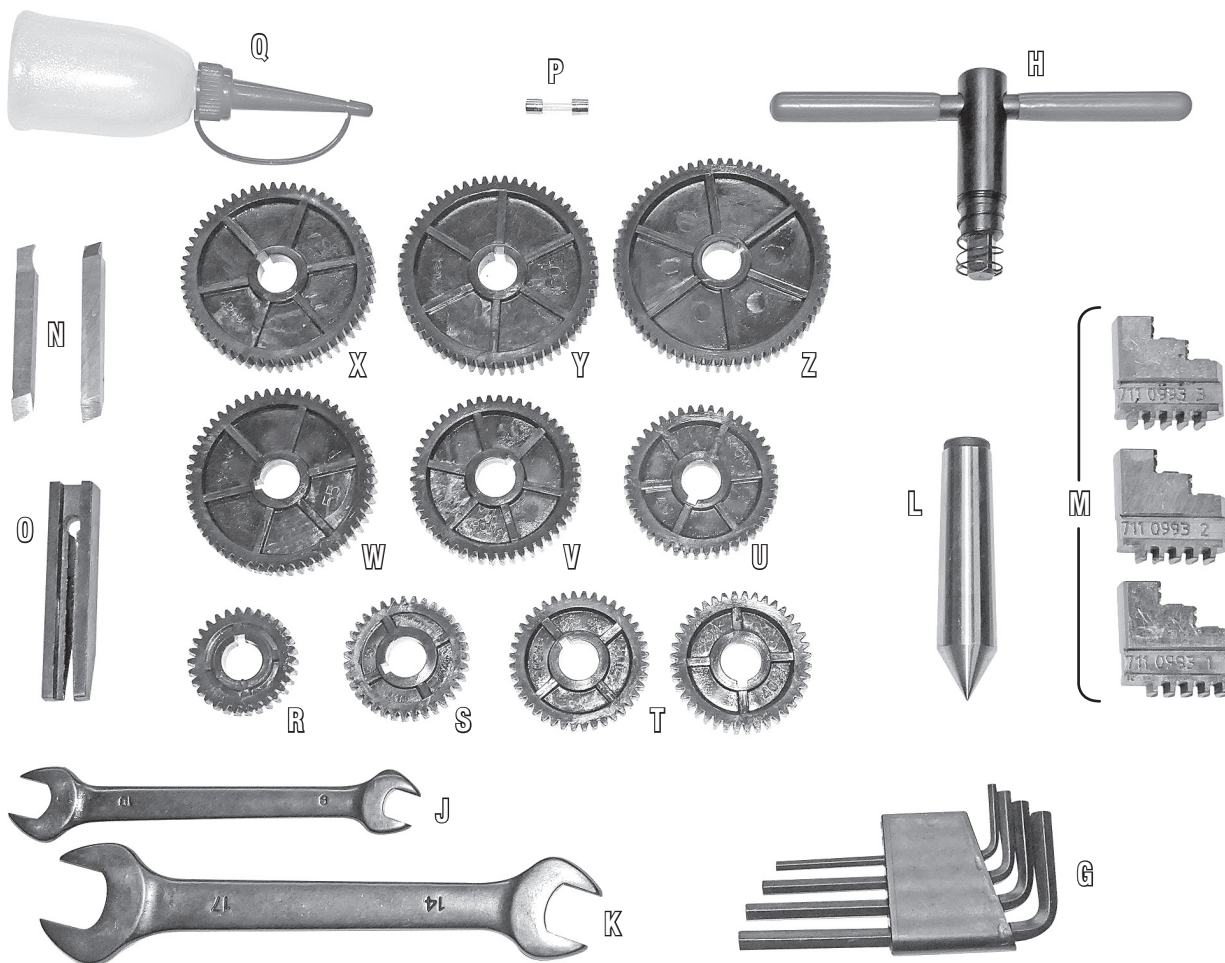


CONTENTS

ACCESSORIES

- (1) Set of 4 Hex Keys (3mm, 4mm, 5mm, 6mm) [G]
- (1) Chuck Key [H]
- (1) 8mm x 10mm Double Open-End Wrench [J]
- (1) 14mm x 17mm Double Open-End Wrench [K]
- (1) Morse Taper No. 2 Dead Center [L]
- (3) External Chuck Jaws [M]
- (1) 2 Pc. HSS Cutter Set [N]
- (1) Tool Holder [O]
- (1) Spare Fuse [P]

- (1) Oil Dispenser [Q]
- (1) 30 Tooth Plastic Gear [R]
- (1) 35 Tooth Plastic Gear [S]
- (2) 40 Tooth Plastic Gears [T]
- (1) 45 Tooth Plastic Gear [U]
- (1) 50 Tooth Plastic Gear [V]
- (1) 55 Tooth Plastic Gear [W]
- (1) 57 Tooth Plastic Gear [X]
- (1) 60 Tooth Plastic Gear [Y]
- (1) 65 Tooth Plastic Gear [Z]





LEARN HOW TO SET UP AND USE YOUR LATHE
 with FREE Instructional Videos Available at eastwood.com – keyword search “LATHE”

SAFETY INFORMATION

The following explanations are displayed in this manual, on the labeling, and on all other information provided with this product:

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠ NOTICE

NOTICE is used to address practices not related to personal injury.



⚠ READ ALL INSTRUCTIONS BEFORE USING THIS LATHE!

- Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury. The term electrical equipment in all of the warnings listed below refers to your mains-operated (corded) electrical equipment or battery-operated (cordless) electrical equipment.



⚠ WARNING PINCH AND CRUSH HAZARD!

- Keep fingers and hands away from moving parts when operating.



⚠ WARNING CUT HAZARD!

- Contacting metal edges on work pieces and chips from the cutting process can cause serious cuts. Wear thick, well-fitting work gloves to prevent cuts from handling sharp metal.



⚠ WARNING INJURY HAZARD!

- This tool can quickly start up while connected to an electrical supply causing serious personal injury. Always disconnect the Lathe from the electrical supply before making adjustments, changing tooling or performing maintenance.



⚠ WARNING EYE INJURY HAZARD!

- The cutting process ejects chips at high velocity. Always wear ANSI approved eye protection when operating this equipment.



⚠ CAUTION INJURY HAZARD!

- The Lathe includes changeable components which can present hand/finger pinch hazard injuries if dropped. Avoid pinching hands while handling parts during assembly and/or operation.



⚠ CAUTION

- The Lathe was specifically designed to be operated by one person only. Never have one person operate some of the controls while another handles the adjustments or serious injury could occur.
- Inspect all tooling, fixtures and mechanical components of the Lathe before beginning any work. Attempting to operate the Lathe with damaged tooling or fixtures can result in serious injury and severe Lathe damage.

⚠ NOTICE

- Operation of this Lathe should be performed only by those with an acceptable level of knowledge of standard machining practices. For novices or those unfamiliar with machining equipment, Eastwood strongly recommends the use of a book dedicated to the subject. For example: **Basic Lathework For Home Machinists by Stan Bray (Eastwood # 22286)** or **Mini-Lathe for Home Machinists by David Fenner (Eastwood item #22290)**.

GENERAL SAFETY RULES

Read all instructions. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury. The term “power tool” in all of the warnings listed below refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

SAVE THESE INSTRUCTIONS

1) WORK AREA SAFETY

- a) Keep work area clean and well lit. Cluttered or dark areas invite accidents.
- b) Do not operate electrical equipment in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Electrical equipment creates sparks which may ignite the dust or fumes.
- c) Keep children and bystanders away while operating electrical equipment. Distractions can cause you to lose control.

2) ELECTRICAL SAFETY

- a) Electrical equipment plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) electrical equipment. Unmodified plugs and matching outlets will reduce risk of electric shock.
- b) Avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is earthed or grounded.
- c) Do not expose electrical equipment to rain or wet conditions. Water entering electrical equipment will increase the risk of electric shock.
- d) Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the electrical equipment. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.
- e) When operating electrical equipment outdoors, use an extension cord suitable for outdoor use. Use of a cord suitable for outdoor use reduces the risk of electric shock.

3) PERSONAL SAFETY

- a) Stay alert, watch what you are doing and use common sense when operating electrical equipment. Do not use electrical equipment while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating electrical equipment may result in serious personal injury.
- b) Use safety equipment. Always wear eye protection. Safety equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.
- c) Avoid accidental starting. Ensure the switch is in the off position before plugging in. Carrying electrical equipment with your finger on the switch or plugging in electrical equipment that have the switch on invites accidents.
- d) Remove any adjusting key or wrench before turning the electrical equipment on. A wrench or a key left attached to a rotating part of the electrical equipment may result in personal injury.
- e) Do not overreach. Keep proper footing and balance at all times. This enables better control of the electrical equipment in unexpected situations.
- f) Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.
- g) If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used. Use of these devices can reduce dust-related hazards.

4) ELECTRICAL EQUIPMENT USE AND CARE

- a) Do not force the electrical equipment. Use the correct electrical equipment for your application. The correct electrical equipment will do the job better and safer at the rate for which it was designed.
- b) Do not use the electrical equipment if the switch does not turn it on and off. Any electrical equipment that cannot be controlled with the switch is dangerous and must be repaired.
- c) Disconnect the plug from the power source and/or the battery pack from the electrical equipment before making any adjustments, changing accessories, or storing electrical equipment. Such preventive safety measures reduce the risk of starting the electrical equipment accidentally.
- d) Store idle electrical equipment out of the reach of children and do not allow persons unfamiliar with the electrical equipment or these instructions to operate the electrical equipment. Electrical equipment is dangerous in the hands of untrained users.
- e) Maintain electrical equipment. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the electrical equipment operation. If damaged, have the electrical equipment repaired before use. Many accidents are caused by poorly maintained electrical equipment.
- f) Keep cutting tools sharp and clean. Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- g) Use the electrical equipment, accessories and tool bits etc., in accordance with these instructions and in the manner intended for the particular type of electrical equipment, taking into account the working conditions and the work to be performed. Use of the electrical equipment for operations different from those intended could result in a hazardous situation.

5) SERVICE

- a) Have your electrical equipment serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the electrical equipment is maintained.

LATHE SAFETY FEATURE

NOTICE

Should a malfunction occur during the operation of the Lathe, Hitting the RED STOP BUTTON will stop all motion immediately.

INSTALLATION LOCATION

- The Lathe **MUST** be installed on a solid and level surface for proper operation, accuracy and safety.
- There **MUST** be a minimum of 3 ft. of open space surrounding the Lathe.
- This Lathe **MUST** be located in a clean, dry, well lighted environment free of dust, grit or other contaminants.

NOTICE

For maximum stability, it is recommended that the Lathe be permanently mounted to a solid, secure workbench with a solid top surface of a minimum of 1/2" [13mm] thick. To do so:

- Place the Chip Tray over the selected location.
- Trace the four mounting holes in the Chip Tray on the mounting surface.

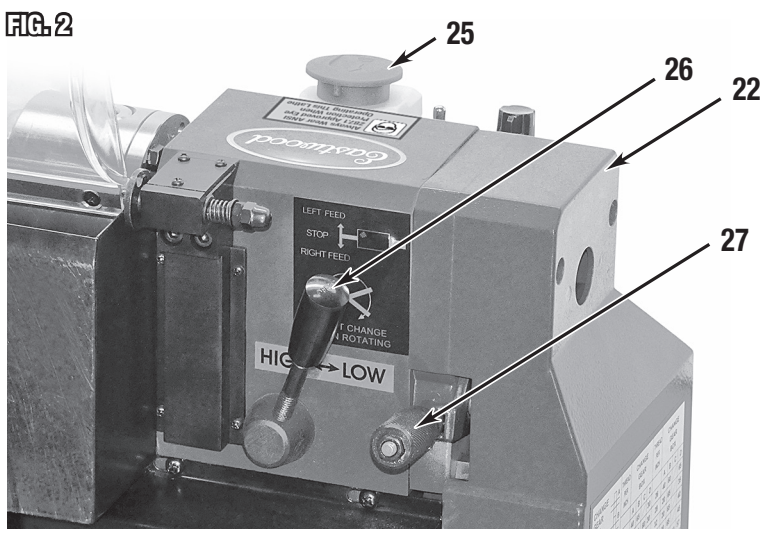
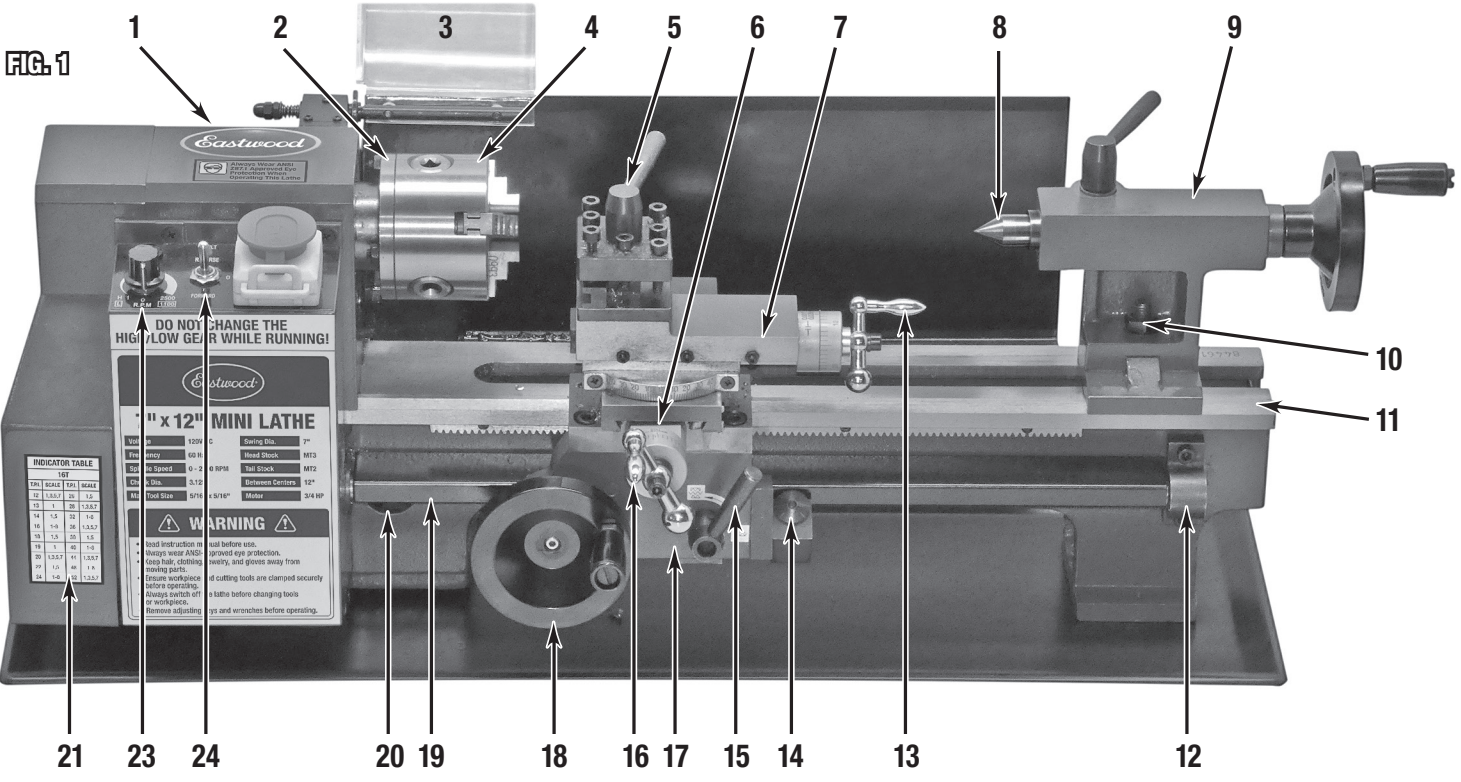
CAUTION

Check that no electrical wires or other hazards exist under the mounting surface before drilling.

- Drill four 1/4" [6mm] holes in the surface.
- Secure with four m6 screws of adequate length (Not Included) with washers under the heads by threading into the mounting feet of the Lathe Base.

FEATURES AND COMPONENT DESCRIPTIONS (FIGS 1 & 2)

- "1" Headstock
- "2" Spindle Flange
- "3" Chuck Guard
- "4" 3-Jaw Chuck
- "5" Tool Post
- "6" Cross-Slide
- "7" Compound Slide
- "8" Tailstock Center
- "9" Tailstock
- "10" Tailstock Securing Nut
- "11" Bed
- "12" R.H. Leadscrew Bearing
- "13" Compound Slide Feed Handle
- "14" Thread Dial Indicator
- "15" Automatic Feed Lever
- "16" Cross-Slide Feed Handle
- "17" Apron
- "18" Manual (Saddle) Feed Handle
- "19" Leadscrew
- "20" Motor Brush Cap
- "21" Thread Dial Indicator Chart
- "22" Running Gear Cover
- "23" Variable Speed Control Knob
- "24" Forward/Off/Reverse Switch
- "25" Emergency Stop Switch
- "26" High/Low Speed Range Lever
- "27" Leadscrew Forward/Neutral/Reverse Lever



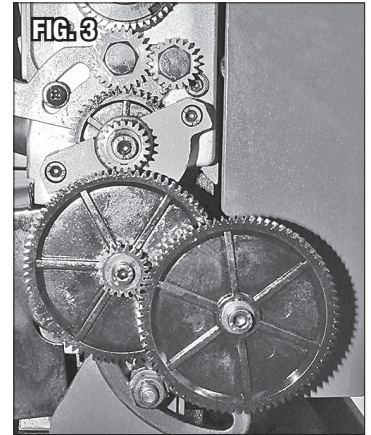
LATHE FEATURES AND COMPONENTS

THE HEADSTOCK

- The motor provides a direct drive to the Spindle via an internal tooth type drive belt. Spindle speed is variable and is regulated by the Speed Control Knob “23” located on the main control panel.
- The Spindle is designed 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 “4” is mounted on the Spindle Flange “2”. 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 interchangeable External Jaws [M] are also included which extend the capacity and flexibility of the chuck. Their uses and method of assembly is described under the 'Accessories' section of this Manual.
- The spindle has 6 holes drilled in its flange to accommodate a range of optional fixtures such as Face Plate, 4-Jaw chuck etc., (not included).

THE RUNNING GEAR

- The Running Gear located at the left side of the unit is protected by a cover “22”, which is removed by removing two counterbored socket-head screws.
- The gear train (FIG 3), transmits drive power to the acme threaded Lead Screw. The Lead Screw acts as a worm drive, and by operating the Auto Feed Lever “15”, which engages a nut with the Lead Screw or (worm), drive is transmitted to the saddle, and consequently the cutting tool, thereby providing a power feed for screw cutting or general turning operations.
- The rotational speed of the lead screw, and the rate of feed of the cutting tool, is determined by the selected gear train configuration. This is explained in greater detail under the Screw Cutting Section of this Manual.
- The drive to the Leadscrew may be disconnected by moving Lever “27” to the NEUTRAL position. The same lever is used to drive the Leadscrew in a FORWARD or REVERSE direction. (These actions are described in detail in the Screw Cutting section of this Manual).



THE TAILSTOCK

- The Tailstock “9”, may be moved along the bed to any desired position and is secured in position by a single Locking Nut “10”, at its base.
- The Tailstock Spindle “8” is designed with an internal No.2 Morse Taper for use with the included Morse Taper No. 2 Dead Center [L].

THE SADDLE

- The Saddle carries the Cross-Slide “6”, on to which is mounted the Compound Slide “7” with the Tool Post “5” allowing intricate and delicate operations to be performed. It may be driven by the Leadscrew, via a Drive Nut, to provide automatic feed when the Auto Feed Lever “15”, mounted on the Apron “17”, is operated.
- The position of the tool is controlled by turning the Cross-slide Feed Handle “16”, which moves it across the Lathe, and the Saddle or Manual Feed Handle “18”, which moves it longitudinally. Additionally, the Compound Slide Feed Handle “13” may be used to move the tool by small increments at right angles to the Cross-Slide, or the Slide may be set at an angle to the Cross-Slide so that short tapers or bevels may be cut. This is described in greater detail under the 'Bevel Cutting' section of this Manual.
- The Cross-Slide “6” and Compound Slide “7” feeds each feature a scale. These scales are used to move the tool by precise amounts - one division being equivalent to 0.001" [0.25mm]. As the feed handle is turned so does the scale. The scale on the Cross-Slide feed may also be held stationary while the handle is turned, allowing the scale to be 'zeroed'. The procedure in which these scales are used is discussed in greater detail in the 'Operation' section of this manual.
- The Tool Post “5” carries 8 socket head screws which are used to secure a cutting tool in any possible position. A maximum of four tools can be mounted for convenience and to speed up the operation.
- The Tool Post “5” is rotated by loosening the Lever located on top. Rotate the Lever counter-clockwise sufficiently to allow the Tool Post to be lifted slightly and then turned to the desired position. Rotate the Lever clockwise to lock the Tool Post into position.

⚠ CAUTION

ALWAYS check to make sure the Post and the Tool are secured by locking down the Lever firmly and tightening the socket head screws before attempting to perform any cutting operations.

THE MOTOR

- The Motor has no user serviceable parts inside however it does have replaceable Brushes accessible from the outside. Brush Replacement is described in the Maintenance section of this manual.

ASSEMBLY

Identify and separate the following items from the parts and accessories in the carton:

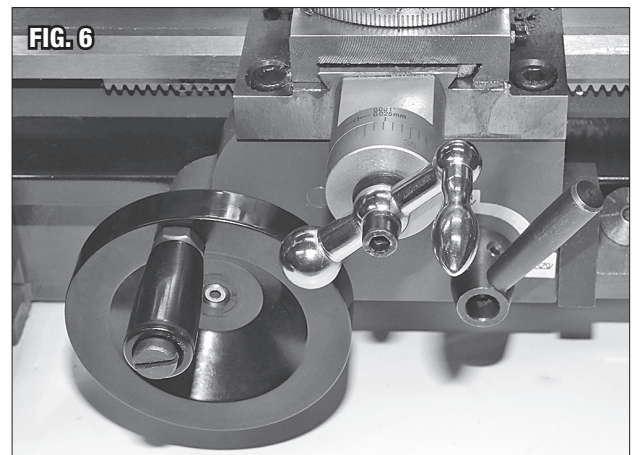
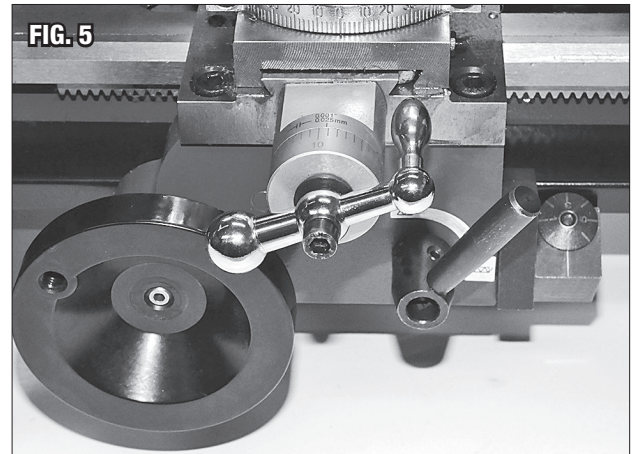
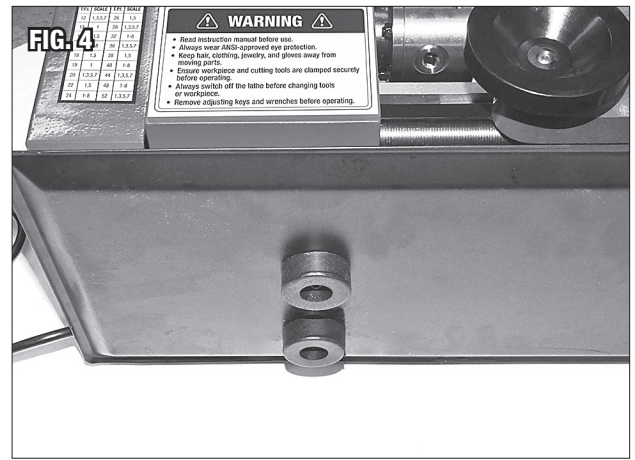
- (1) Main Lathe Unit [A]
- (1) Chip Tray [B]
- (4) Rubber Mounting Feet [C]
- (4) M6 Pan Head Mounting Screws [D]
- (1) Clear Plastic Chuck Guard [E]
- (2) Handwheel Crank Handles [F]

CHIP TRAY [B] AND RUBBER [C] FEET TO MAIN UNIT [A]

- Carefully lay the Main Lathe Unit [A] on its back on a clean, level work surface (FIG 4).
- Set the Chip Tray [B] under the Main Lathe Unit with the raised, beaded edges facing toward the Main Lathe Unit (FIG 4). Note that the four mounting holes are offset toward one edge. When attached, that edge is biased toward the rear of the Main Lathe Unit.
- Insert an M6 Pan Head Screw [D] through the recess in each of the four Rubber Mounting Feet [C].
- Align the holes in the Chip Tray with the tapped holes in the Lathe Base then insert and thread the M6 Screws into the tapped holes.
- Tighten the four screws securely then rotate the Assembly to an upright position resting on the Rubber Mounting Feet.

CROSS-SLIDE HANDLE REVERSAL

- The Cross-Slide Handle is assembled with the Knob mounted inward for protection during shipment and must be removed and reversed (FIG 5).
- Loosen and remove the socket head mounting screw in the center, pull off the handle, reverse and re-install it with the Knob facing outward and secure it with the socket head screw and washer (FIG 6).

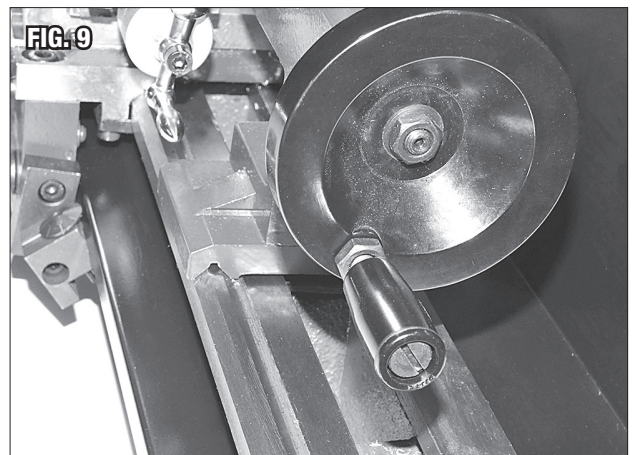
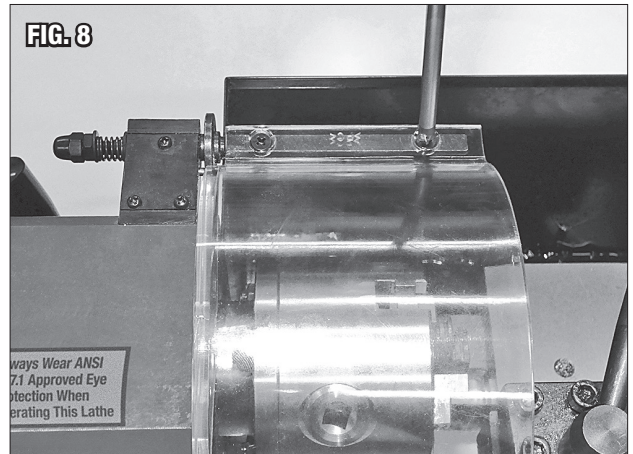
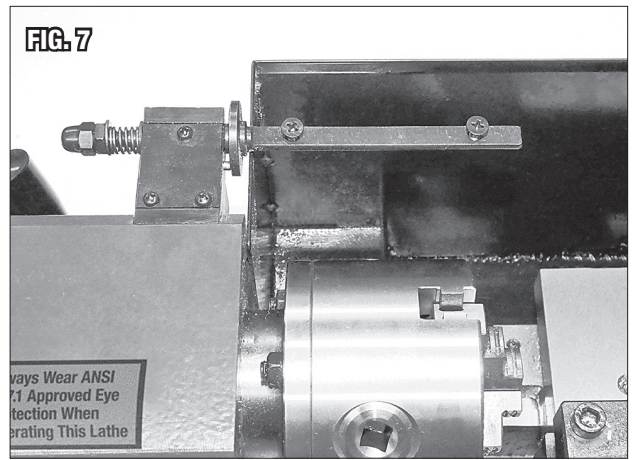


INSTALL CLEAR PLASTIC CHUCK GUARD [E]

- The Chuck Guard Hinge Bar is supplied with two countersunk Phillips screws pre-installed (**FIG 7**).
- Remove the two Phillips screws, place the Clear Plastic Chuck Guard [E] with the flange over the Hinge Bar, align the holes and re-install the screws (**FIG 8**).

HANDWHEEL CRANK HANDLES [F]

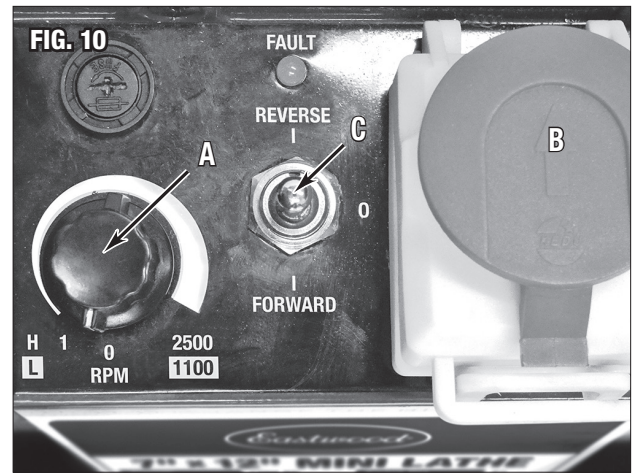
- There are 2 Handwheels already installed in the Tailstock "9" and the Saddle Feed "18" however the Crank Handles [F] are left uninstalled to prevent damage. **To install:** Thread the exposed threaded post of the Crank Handle [F] into the tapped hole of the Handwheel using a screwdriver in the slot on the outer end (**FIG 9**). When fully threaded in, tighten the locknut to secure in place. Verify that the Handle freely rotates.
- Saddle, cross-slide and compound slide adjustments are all factory set to ensure smooth movement in both directions. If, however the adjustments have been upset during transit, indicated by stiff or erratic movement. refer to the 'Settings and Adjustments' section of this manual for the methods of adjustment.



STARTUP PROCEDURE

Refer to the Control Panel (FIG 10).

1. Check that the Compound Slide is away from the Chuck and the Chuck is free to rotate.
2. Check that the Power Cord is unplugged from the power source.
3. Verify that the FORWARD / OFF / REVERSE Switch (C) is OFF.
4. Verify STOP Button is not activated (B).
5. Set Speed Control Knob (A) to 0 RPM.
6. Verify Plastic Chuck Guard is in the DOWN position over Chuck.
7. Plug power cord into Properly Grounder 120VAC, 60hz receptacle.
8. Set the FORWARD / OFF / REVERSE Switch (C) to FORWARD.
9. Rotate the Speed Control Knob to approx. 20%. The Chuck should now rotate.
10. Always use the FORWARD / OFF / REVERSE Switch (C) to stop the Lathe or a Fault Condition will be triggered.



▲ NOTICE

If at any time the Amber LED is illuminated, this indicates a Fault condition and the Lathe will not run. Potential Fault causes are:

- The Lathe was overloaded.
- The Lathe was stopped by depressing the Emergency Stop Button.
- The Plastic Chuck Guard was lifted while the Lathe was running.

The microprocessor in the Control Unit records the Fault Condition and will not allow restarting until the Fault is reset.

To reset: Set the FORWARD / OFF / REVERSE Switch (C) to the OFF position for 5 seconds.

▲ CAUTION

**NEVER attempt to switch from FORWARD to REVERSE while the lathe is running, otherwise severe drive train damage will occur.
NEVER attempt to shift from HIGH to LOW range while the lathe is running, otherwise severe drive train damage will occur.**

▲ NOTICE

The Plastic Chuck Guard is an important safety feature and should be checked frequently for physical damage and proper function.

To perform a function check:

- Unit plugged in to power source.
- Emergency Stop Button not activated.
- Speed Control Knob to off (0 RPM).
- Chuck Guard in DOWN position.
- Switch the FORWARD / OFF / REVERSE Switch to Forward.
- Lift the Chuck Guard and the Fault Indicator should illuminate.
- Set the FORWARD / OFF / REVERSE Switch to OFF and the Fault Indicator will go out.

BASIC OPERATION

1. Check that the Compound Slide is away from the Chuck and the Chuck is free to rotate.
2. Set the Speed Range Lever "26" (FIG 2) to HIGH or LOW as required.
3. Set the FORWARD / OFF / REVERSE Switch "C" (FIG 10) to the FORWARD position.
4. The Automatic Feed Lever "15" (FIG 11) may be positioned as Engaged or Dis-engaged depending on whether Automatic Feed is required.

▲ NOTICE

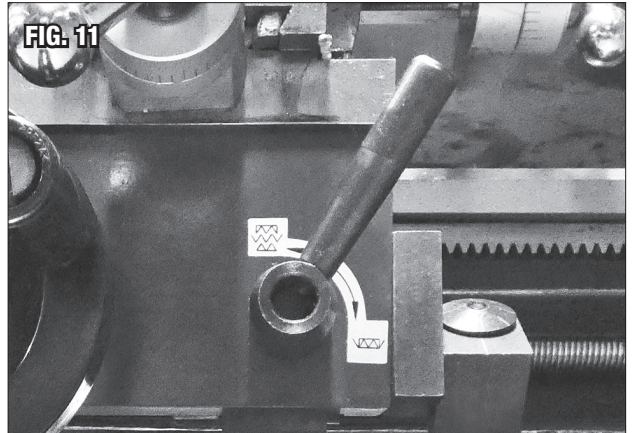
The Automatic Feed must always be intentionally selected, and the operator **MUST** be aware of this choice.

If Automatic Feed is selected, the Leadscrew Forward/Neutral/Reverse Lever "27" (FIG 2) should be set to FORWARD.

If Automatic Feed is not selected, the Leadscrew Forward/Neutral/Reverse Lever "27" should be set to NEUTRAL.

To do this:

- Firmly grasp the Knurled Handle and pull it OUT against spring pressure.
- While holding the Knurled Handle in this position, move the Lever until the Pointer is aligned with the Notch in the housing casting.



5. Proceed to start the Unit as described in the Startup Procedure above.
6. When work with the Lathe is completed, ALWAYS set the FORWARD / OFF / REVERSE Switch to OFF then unplug the Power Cord.

▲ CAUTION INJURY HAZARD!

ALWAYS turn the Lathe OFF at the FORWARD / OFF / REVERSE Switch BEFORE changing ANY settings or making ANY adjustments. This includes shifting from High to Low range.

OPERATION

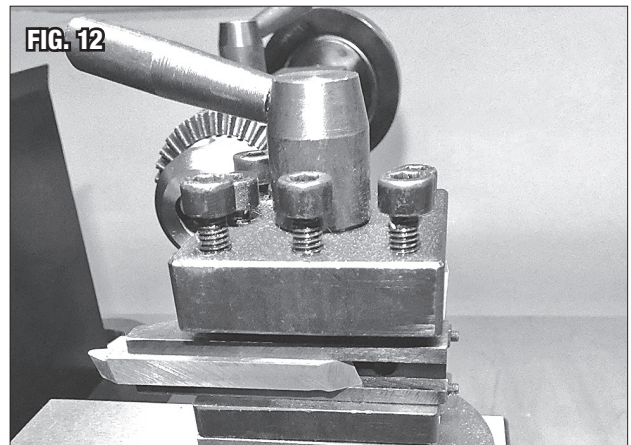
SET-UP FOR SIMPLE TURNING

Before beginning any project, it is critical that the Lathe unit be properly set up for the type of work to be performed.

The following section describes how to set up the Lathe in order to perform a simple turning operation.

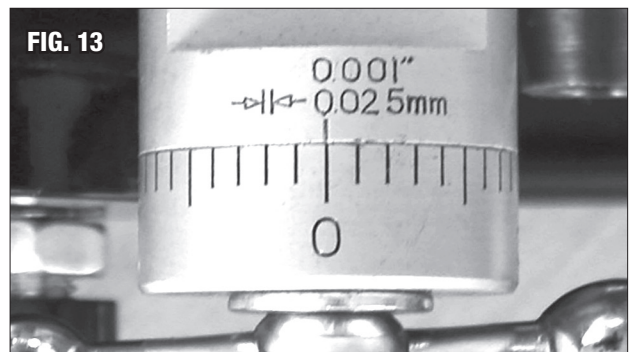
ALWAYS plan for the work to be done. Detailed drawings or notes along with any required measuring equipment such as micrometers, verniers, calipers etc. should be on hand.

- 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 at least two of the socket Head screws as shown in **(FIG 12)**. Ideally, the overhang should be 0.38" [10mm] but not more than 0.59" [15mm] for a straight tool.
- It is **IMPORTANT** that the tip of the cutting tool is on the center line of the work, or very slightly below it. It **MUST NEVER** be above the center line.
- At the correct cutting height, the tip of the tool should be in exact alignment with the point of the Tail Stock center. If not, it may be necessary to make adjustments using shims, grinding the cutting tool tip, or selecting another tool.
- When adjusted, mount the workpiece, either in the chuck or on a faceplate, and if necessary, use the Tailstock Center for additional support (If the work cannot be adequately secured by the chuck, if it is an excessively long piece, or of small diameter). Additionally, optionally available 'Steadies' may be used (not included).
- If the Tailstock is not to be used, it may be removed completely by loosening the securing nut at the base and sliding it free of the bed.
- Mark the surface of the work at the point where the cut is to end using a scribe or similar tool, and move the Saddle so that the cutting tool is directly opposite the mark, then wind in the Cross-Slide so that the tool touches the surface of the work.
- While making these adjustments, rotate the Chuck by hand to prevent anything from contacting it when turning takes place and that there is adequate clearance between the Saddle, Cross-Slide, Tool Post or cutting tool and the Chuck.
- It may be necessary to adjust the position of the Compound Slide or reposition the work in the Chuck to guarantee that there is adequate clearance.
- When ready for cutting, retract the Cutting Tool and wind the Saddle away from the Headstock.



"ZEROING" PROCEDURE

- Next, wind the Cutting Tool up to the workpiece somewhere along the length to be cut while slowly rotating the Chuck by hand. Continue to advance the Cutting Tool slowly until it just touches the workpiece surface. Record this position by "zeroing" the scale on the Cross-Slide Scale by turning the moveable scale until the "zero" marks are in alignment **(FIG 13)**.
- Once "zeroed", retract the Cross-Slide one complete turn then move the Saddle until the Tool is a short distance from the right edge of the workpiece.
- Slowly wind the Cross-Slide back in one full turn until the Zero marks are once again aligned.



▲ NOTICE

If the number mark moves past the previously "zeroed" alignment, back off again at least 1/2 turn then slowly rotate the Cross-Slide to bring the scale back into Zero alignment.

It should be noted that whenever the Scale is used to advance the Cross-Slide or Compound Slide, ALWAYS use this procedure to compensate for any backlash and clearances in the gearing, slides etc.

- Continue to turn the Handle an amount equal to the desired finished depth of cut.
NOTE: It is recommended for rough cutting not to exceed 0.010" [0.25mm] as a depth of cut.

The Set-Up is now complete to begin the cutting operation but as a checklist before starting, check the position of:

- The Auto Feed Lever. **MUST** be in the "UP" position for manual feed.
- FORWARD/NEUTRAL/REVERSE Leadscrew Lever. If Auto-Feed is not required, set to "NEUTRAL"
- HIGH/LOW Lever. Select required speed range.

SIMPLE TURNING WITH POWER FEED

- The same basic setup is used as described above, except that, before starting, the Leadscrew FORWARD/NEUTRAL/REVERSE Lever “27” is set to the ‘Forward’ position and the Auto-Feed Lever “15”(FIG 11), is operated in order to drive the Saddle.
 - As mentioned previously, the rotational speed of the Leadscrew, and the rate of feed of the Tool, is dependent upon the gear configuration of the Gear Train.
 - The feed rate for normal turning is considerably less than that used for screw cutting.
 - The Lathe Gear train is factory configured for normal turning, however, if it was reconfigured for screw cutting, always remember to reset the gear configuration to that for normal turning.
 - Please refer to the charts further on in this Manual which shows the gear configurations and the explanation of how to change the gears in the same section.
1. Taking all precautions previously mentioned, position the cutting tool a short distance to the right of the workpiece with the appropriate depth of cut set on the Cross-slide.
 2. Check that the FORWARD/NEUTRAL/REVERSE Lever is set to ‘Forward’ and select ‘Forward’ on the FORWARD / OFF / REVERSE Switch on the main control panel. Switch on the machine.

Turn the Speed Control Knob to achieve the desired Spindle RPM with your right hand, push down on the Auto Feed Lever until the nut becomes firmly engaged with the Leadscrew.

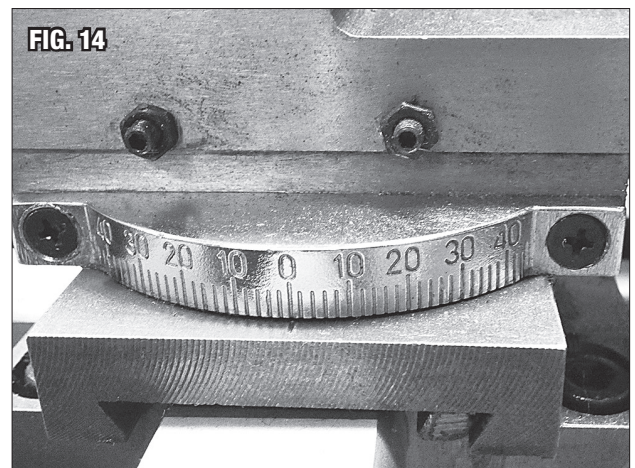
▲ NOTICE

The left hand should always be free in order to hit the Emergency Stop Button should it become necessary.

3. Carefully observe the movement of the tool and as it approaches the mark on the surface, denoting the end of cut, pull the Auto Lever UP sharply and ensure it stays UP. If a degree of accuracy is required, it is recommended that you finish the cut by hand.
NOTE: If a shoulder with perfectly clean corners is required, then an appropriately shaped tool must be used.
4. Retract the tool one or two complete turns on the cross-slide feed. then wind the saddle so that the tool is at the start point once again. Advance the tool the same number of turns, plus the depth of cut, and when ready, push down the auto feed lever and proceed to take another cut.

TAPER CUTTING

- The same basic setup is used as described above, except that, before starting, the Leadscrew FORWARD/NEUTRAL/REVERSE Lever “27” is set to the ‘Forward’ position and the Auto-Feed Lever “15”, is operated in order to drive the Saddle.
- Taper cutting involves the use of the Compound Slide “7”, which is mounted on the Cross-Slide “6” and set at right angles to it for all normal cutting operations. This is indicated by the zero mark, on the scale, (FIG 14), lining up with the mark etched on the body of the Cross-Slide.
- To set the Compound Slide “7” so that the Cutting Tool will cut a taper, first retract the Slide, until the two socket head screws are revealed (FIG 14).
- Loosen the socket head 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.
- The taper, or bevel, is cut by setting the Cross-Slide angle appropriately then using the Compound Slide Feed Handle to advance the cutting tool.



SCREW CUTTING

▲ NOTICE

This operation requires an advanced degree of experience skill and accuracy and should not be attempted unless you are completely familiar with all aspects of the Lathe.

Essentially, the Saddle will move towards the Headstock under power, the same as cutting using Auto Feed, except the rate of feed is greater, as determined by the selected gear configuration. The cutting tool, therefore, is moving ever closer to the rotating Chuck.

▲ CAUTION

Great care and concentration must be exercised to ensure that the Cutting Tool and Chuck do not collide when the machine is operating, Operator injury and severe damage to the Lathe will likely occur.

This Lathe is supplied with a Leadscrew that will produce SAE 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 to be 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., consult a detailed handbook, a qualified Lathe operating course or obtain advice from a qualified person.

The general procedure for screw cutting is as follows:

1. Try to get as much distance from the Chuck to the end of the proposed screw thread as possible, and if the design allows, cut a 'run-off' section into the workpiece which is of a smaller diameter than the root diameter of the proposed screw thread.
NOTE: For long threads it may be necessary to use a steady rest (not included).
Install the appropriate gears for the thread required, and correctly mount the cutting tool. Set the 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.
2. Take all necessary precautions previously stated and start the machine with the Automatic Feed Lever in its' disengaged position (**UP**).
3. Engage the Auto-Feed Lever sharply and turn the FORWARD/OFF/REVERSE switch (**C**) to "**FORWARD**". As the Tool approaches the end of the desired thread, turn the Switch (**C**) to "**OFF**". DO NOT disengage the Automatic Feed Lever.
4. Retract the tool, using the Cross-Slide Feed Handle, noting the exact position on the Scale and the exact number of turns.
5. Turn the FORWARD/OFF/REVERSE switch (**C**) to '**REVERSE**', the Saddle winds back to the beginning then turn the FORWARD/OFF/REVERSE switch (**C**) to "**OFF**".
6. Reset 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.
7. Repeat steps 4, 5, 6 & 7. Proceed in this manner until the thread is completed.

CHANGING GEARS FOR SCREW CUTTING

The Leadscrew is driven, via a Gear Train, by a Pinion Gear on the Spindle. The gear ratio will therefore determine the rotational speed of the Leadscrew with relation to the Spindle. Conversely, one turn of the Spindle will turn the Leadscrew a corresponding amount determined by the gear ratio.

By setting the gears to a known ratio, threads can be cut to a known size, and as the Leadscrew supplied produces SAE threads, the known values will be in Threads Per Inch (TPI), or if the Leadscrew supplied produces Metric threads, the known values will be in mm pitch.

As previously mentioned, 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 below shows the thread sizes that may be cut using the gear configuration shown in the corresponding columns.

NOTE: The factory default setup for the lathe provides for normal turning using the power or auto feed, and the gear configuration is as follows:

- Gear A = 20T
- Gear B = 80T
- Gear C = 20T
- Gear D = 80T

SAE Gear Train Examples :

1. (FIG 15)

To cut 12 TPI, use:

- 40T in position A
- 30T in position D
- Any gear that fits as an idler to connect A and D

2. (FIG 16)

To cut 13 TPI, use:

- 40T in position A
- 65T in position B
- 60T in position C
- 30T in position D

METRIC Gear Train Examples:

1. (Fig 15)

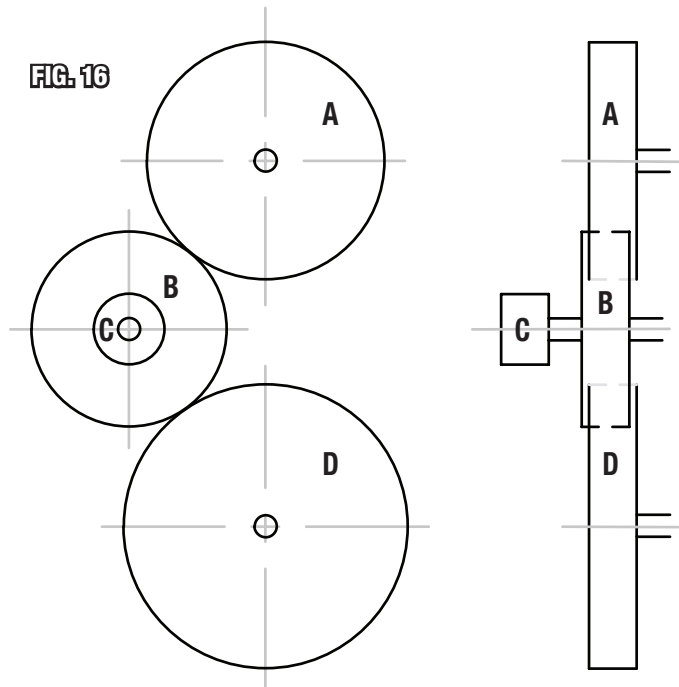
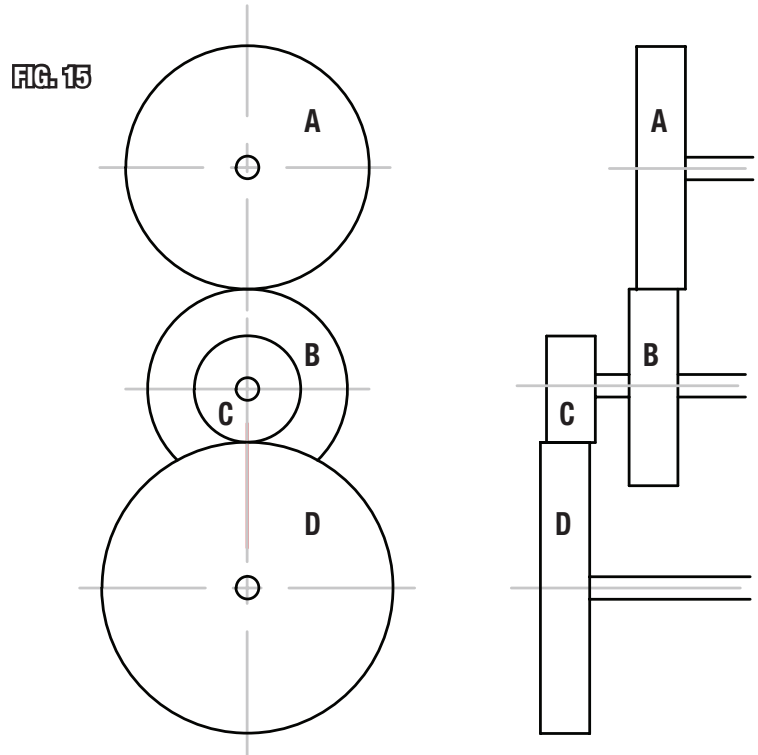
To cut 0.5mm/T, use:

- 20T in position A
- 50T in position B
- 60T in position D
- Any gear that fits as an idler in position C

2. (Fig 16)

To cut 0.4mm/T, use:

- 20T in position A
- 50T in position B
- 40T in position C
- 60T in position D



GEAR SELECTION CHART FOR CUTTING SAE THREADS

TPI	GEAR			
	A	B	C	D
12	40T			30T
13	40T	65T	60T	30T
14	40T			35T
16	40T			40T
18	40T			45T
19	40T	50T	60T	57T
20	40T			50T
22	40T			55T
24	40T			60T
26	40T			65T
28	20T			35T
32	20T			40T
36	20T			45T
38	20T	50T	50T	57T
40	20T			50T
44	20T			55T
48	20T			60T
52	20T			65T

GEAR SELECTION CHART FOR CUTTING METRIC THREADS

mm PITCH	GEAR			
	A	B	C	D
0.4	20T	50T	40T	60T
0.5	20T	50T		60T
0.6	40T	50T	30T	60T
0.7	40T	50T	35T	60T
0.8	40T	50T	40T	60T
1.0	20T	60T		30T
1.25	50T	40T		60T
1.5	40T	60T		40T
1.75	35T	60T		30T
2.0	40T	60T		30T

CAUTION

Before changing Gears, the Lathe must be set to the "OFF" position and the power cord unplugged from the receptacle.

Remove the gear train cover which is secured with two socket head cap screws (FIG 17).

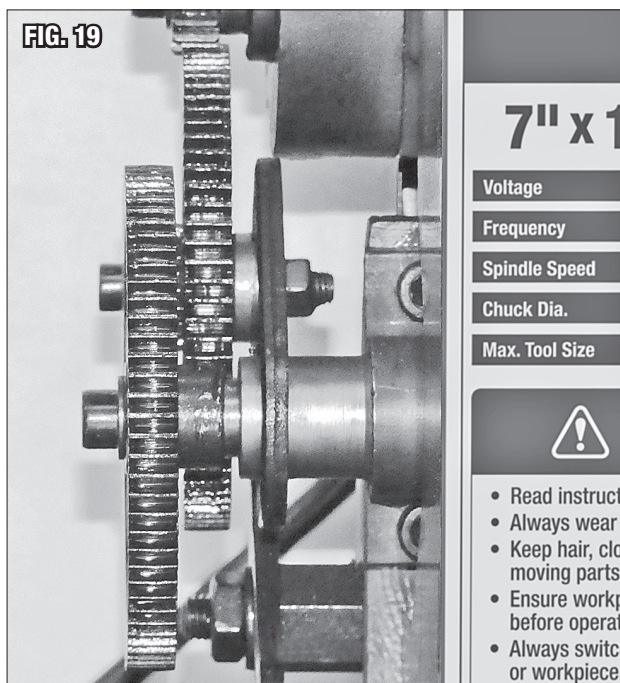
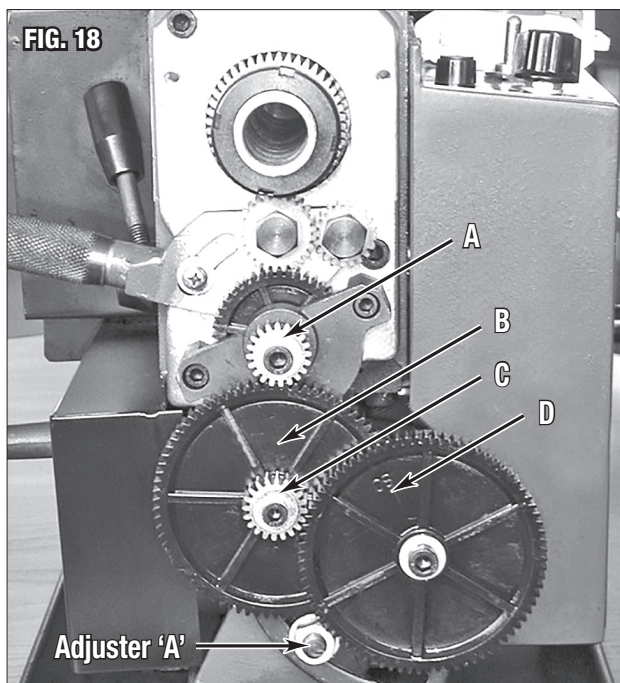
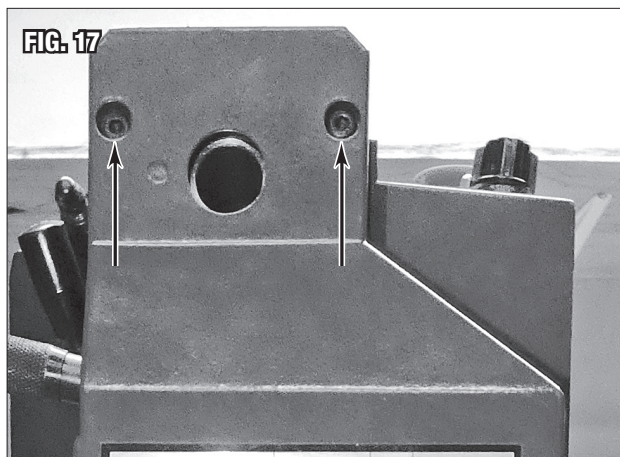
Gear A may be considered as the Driving Gear, and Gear D as the Driven Gear.

When a simple gear train is configured, as illustrated in (FIG 15), Gear B acts as an Idler and its size is therefore irrelevant - any gear that fits will suffice to connect Gears A and D. This is denoted by a blank space in the column in the gear chart.

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 'A', (FIG 18).

To change Gears:

1. Loosen and remove the socket head cap screws securing Gears A and D followed by the socket head cap screw securing Gears B and C.
2. To remove lash and allow Gears B and C to disengage completely and provide easier re-assembly, loosen and remove the nut retaining the Shaft carrying Gears B and C, and the nut retaining the Adjuster 'A' (FIG 18).
3. Carefully remove the Gears, taking care not to dislodge the small Keys on each shaft.
4. Install the Gears as determined by the requirements of the desired screw thread. **NOTE:** The number of teeth is clearly molded in the face of each gear.
5. Replace the retaining screws and washers making sure the washer is fully against the hub of each gear without binding. **NOTE:** If a compound Gear Train is required (FIG 19) (Gears in two planes) make sure the Spacer, which is keyed to the shaft carrying Gear D, is located on the shaft **BEFORE** the Gear. This is necessary to align Gear D with Gear C.
6. Test rotate the shaft carrying Gears B and C and the Adjuster 'A' so that all Gears mesh correctly, then tighten the Adjuster retaining nuts. This may require several repeated attempts however it is important to produce as little backlash as possible without binding (turn the spindle by hand while checking backlash).
7. Replace the Gear Train Cover and secure with the two socket head cap screws.



SETTINGS AND ADJUSTMENTS

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

CROSS-SLIDE ADJUSTMENTS

The Cross-Slide is mounted on a Dovetail Slide. Between the sloping surfaces on one side of the Dovetail, a 'Gib Strip' (**FIG 20**), is inserted, which may be tightened against the dovetail by three adjuster, or 'Gib' Screws, mounted along its' length (**FIG 21**).

The Gib Screws are located on the right-hand side of the Slide, directly beneath the Compound Slide Handle. In time, wear will occur on the mating surfaces resulting in a 'sloppiness' of action.

To adjust the Gib Strip, make up for normal wear and keep the Slide moving evenly and smoothly, proceed as Follows:

1. Loosen and back off all lock nuts then thread in the Gib Screws an even amount (the same number of turns).
2. The Slide should be held firmly. Test by trying to rotate the handle, but do not force it.
3. Back out each Gib Screw 1/4 of a turn only then retighten the lock nuts.
NOTE: do not allow the Gib Screws to turn while tightening the lock nuts.
4. Test once again by turning the Handle. The Slide movement should be even and smooth along the complete length.
5. If movement is too loose, loosen the lock nuts, turn in each Gib Screw 1/8 of a turn and re-tighten locknuts without moving the Gib Screws.
6. If movement is too tight, loosen the lock nuts, back out Gib Screws 1/8 turn each and re-tighten locknuts without moving the Gib Screws.
7. Test once again and repeat steps 4 and 5 or 6 if required.
8. When adjustments are completed, retract the Slide fully and apply a light machine oil to all mating surfaces and the Feed Screw thread then wind the Slide back to the normal position.

CROSS-SLIDE FEED HANDLE

The Cross-Slide Feed should operate smoothly, and the Scale must rotate with the Handle.

If any resistance occurs, it is likely the result of swarf or chips lodging between the mating surfaces. If this occurs:

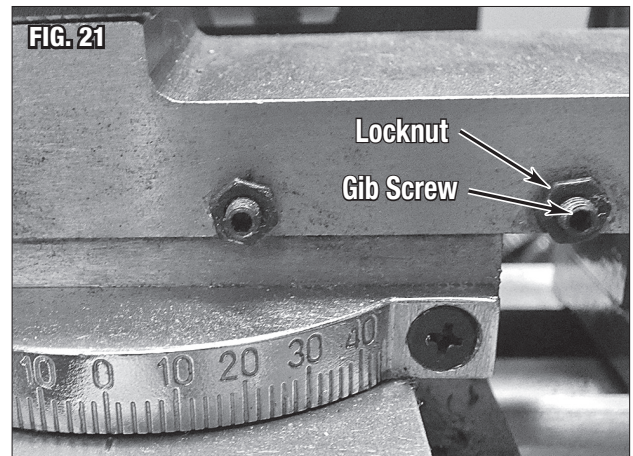
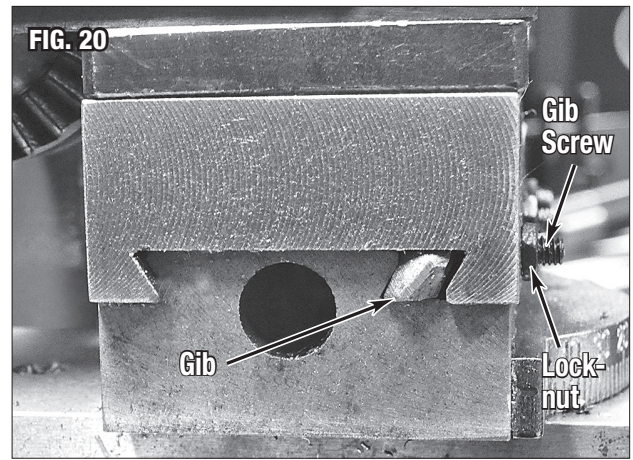
1. Loosen and remove the socket head cap screw attaching the handle then remove the Handle and pull off the Collar along with the Scale.
NOTE: There is a small Tension Spring Plate located in a recess under the Collar. Use extreme care to avoid losing it.
2. Clean the entire assembly and reassemble it. **NOTE:** It will be necessary to hold the Spring Tension Plate in place with a small screwdriver while applying pressure to allow the Collar to locate on the shaft.
3. Reattach the Handle and secure with the socket head cap screw.

COMPOUND SLIDE ADJUSTMENTS

Compound Slide adjustments are made in the same way as those for the Cross-Slide described previously in this manual.

The Gib Screws are located on the left-hand side of the Slide as viewed from the front of the Lathe. **NOTE:** It is extremely important that the Cross-Slide and Compound Slide adjustments are correctly performed, and that no "sloppiness" exists.

Any mis-adjustments will have an adverse effect on the ability of the Lathe to hold tolerances and will transfer to the Tool Tip. It is critical to have as little movement of the Tool as possible.

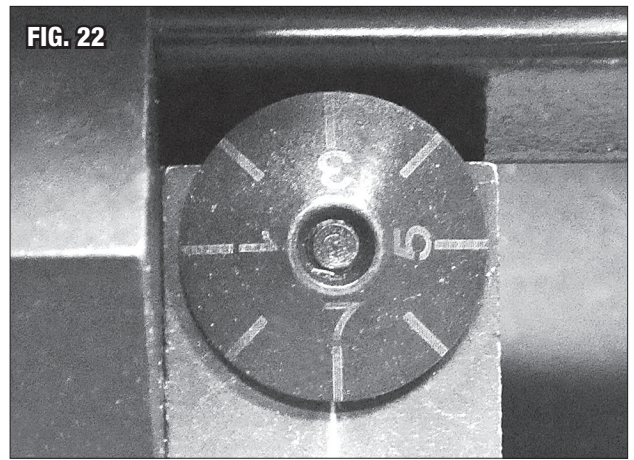


USING THE THREAD DIAL INDICATOR

Mounted on the Base, adjacent to the Auto Feed Lever, is the Thread Dial Indicator (**FIG 22**). This is directly connected to the Leadscrew. As the Leadscrew turns, the Dial rotates. Eight radial markings are etched into the Dial face and are used to determine the exact position of the Leadscrew thread in relation to the Saddle.

The numbers on the "SCALE" column of the THREAD SCALE INDICATOR TABLE refer to the numbers on the radial lines of the Dial.

For example: If a 20TPI thread is to be cut, the numbered marks 1,3,5 or 7 may be used.



THREAD SCALE INDICATOR TABLE			
SAE TPI	SCALE	mm PITCH	SCALE
12	1, 3, 5, 7	0.4	1, 3, 5, 7
13	1	0.5	1 to 8
14	1, 5	0.6	1 to 8
16	1 to 8	0.7	1, 4, 5
18	1, 5	0.8	1, 5
19	1	1.0	1 to 8
20	1, 3, 5, 7	1.25	1, 3, 5
22	1, 5	1.5	1 to 8
24	1 to 8	1.75	1, 4, 5
26	1, 5	2.0	1 to 8
28	1, 3, 5, 7		
32	1 to 8		
36	1, 3, 5, 7		
38	1, 5		
40	1 to 8		
44	1, 3, 5, 7		
48	1 to 8		
52	1, 3, 5, 7		

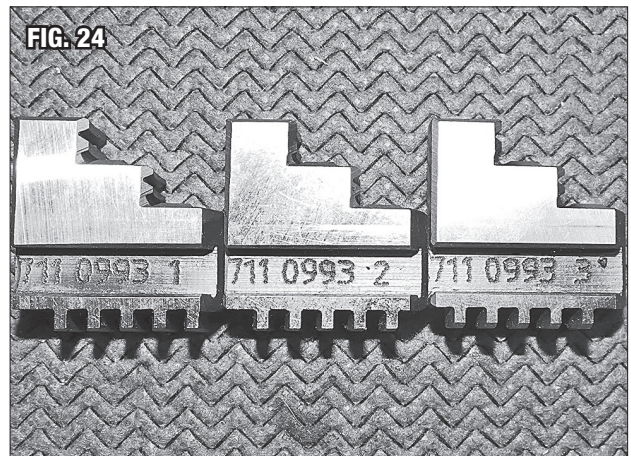
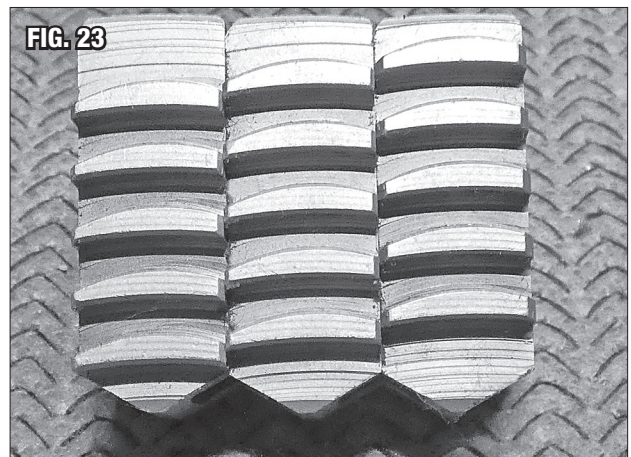
Procedure:

1. With the Dial rotating, choose one of the numbered marks etched on the Thread Dial Indicator which corresponds to the "SCALE" number in the THREAD SCALE INDICATOR TABLE (in this example, this could be 1, 3, 5 or 7).
2. As the selected marked line of the Dial passes the etched reference mark on the Dial Indicator Housing, quickly and firmly engage the Auto Feed Lever and thread cutting will begin.
3. As the Cutting Tool approaches the end of the desired thread, quickly Disengage the Auto Feed Lever. Do Not switch off the Lathe.
4. Retract the Cutting Tool using the Cross-Slide Feed Handle, noting the exact position on the Scale and the exact number of turns.
5. Crank the Saddle back to the beginning and reset the Cutting Tool by WINDING IN the Cross Slide the exact number of turns previously wound OUT and then continue to wind IN to the desired depth of cut.
6. With the Lathe still running, observe the Dial Indicator and as the same selected marked line of the Dial from Step 2 passes the etched reference mark on the Dial Indicator Housing, quickly and firmly engage the Auto Feed Lever and once again, thread cutting will begin.
7. As in Step 3, quickly Disengage the Auto Feed Lever as the Cutting Tool approaches the end of the thread.
NOTE: Engaging the Auto Feed Lever on the same exact number on the Dial Indicator while it passes the etched reference mark on the Dial Indicator Housing will guarantee that the Half Nuts of the Auto Feed mechanism engage on the same thread on the Leadscrew every time, on every pass which produces a perfect thread.

SWITCHING TO EXTERNAL JAWS

The Lathe is assembled with the Internal Jaws installed for clamping on the Outside of a workpiece. The following procedure details how to replace them with the Included set of Three External Jaws for clamping on the Inside of a hollow workpiece.

1. The thread area of the three Jaws are not identical but are progressively "stepped" (**FIG 23**). They are also numbered 1, 2 & 3. This is to accommodate the lead of the drive screw thread inside the Chuck. It is absolutely necessary to install the Jaws in the correct order.
2. Arrange the Jaws as depicted in (**FIG 24**) and assemble them in this order, clockwise in the slots of the Chuck, turning the Chuck Key as they are inserted.
3. Close the Jaws fully and make sure they all meet in the center. If a Jaw is out, open the Jaws fully and exert pressure on the outstanding Jaw while turning the Chuck Key until it snaps down into position.
4. Re-check Jaws to make sure they all meet in the center. Repeat previous step if one is out of position.



LATHE MAINTENANCE

For maximum performance, maximum operating safety and long life, it is critical that the Lathe be properly maintained.

BEFORE EACH USE

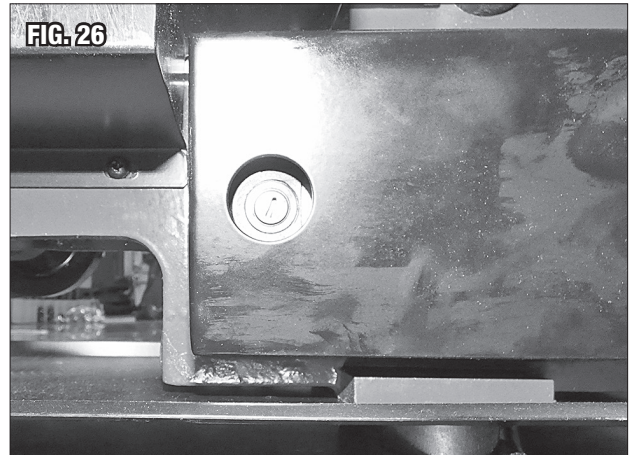
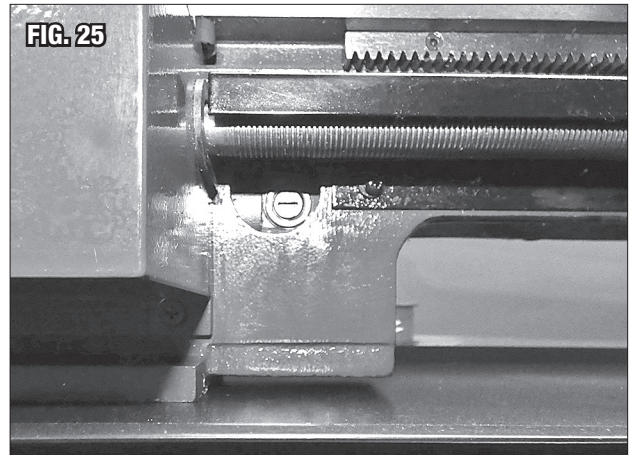
1. Fully inspect the Lathe for any damage. Any damage should be repaired before use.
2. Any damage or scratches to machined surfaces should be worked out with a good quality Oil Stone.
3. WITH UNIT UNPLUGGED and POWER OFF, operate all manual Handwheels, Cranks and Levers by hand to make sure they all operate smoothly and accurately.
4. If any operating features are found to be loose or out of adjustment, follow the adjustment procedures outline in the appropriate section of this manual.
5. Add a good quality, medium bodied machine oil to the fittings at both Leadscrew bearings (each end).
NOTE: It is necessary to remove the Gear Train Cover to access the left side Leadscrew bearing.
6. Add a few drops of a good quality, medium bodied machine oil to all sliding, rotating and pivoting points. Lubricate the Compound Slide Oilway located on the top surface of the Bed, adjacent to the guide rail. (**FIG 25**).

AFTER EACH USE

1. Carefully remove all swarf and metal chips from the Lathe.
2. If coolant has been used, make sure it is all removed from the Chip Tray.
3. All components must be dry. All machined surfaces should be coated with a light bodied machine oil to prevent surface rust.
4. Remove all cutting tools, cover machine and store in a dry, temperature stabilized location.

MOTOR BRUSH REPLACEMENT (not included)

1. The Motor Brush Retainer Caps are accessible by access holes at the front and rear of the Lathe Base under the Headstock (**FIG 26**).
2. Remove by unthreading the Caps and pulling out the Brushes from their bores.
3. Replace the Brushes into the bores using extreme care not to chip them or damage the springs.
4. Replace the Retainer Caps.



TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Does Not Run When Switch is Turned On	No power	Check 120 VAC power source and connection to unit.
	Emergency Stop Button was used and not reset	Unlatch cover and pull out Stop Button.
Motor Stops Running	Workpiece too large for size of lathe	Re-plan work to accommodate limits of machine.
	Too aggressive/deep of cut being attempted	Re-plan work to accommodate limits of machine.
	Too fast of a feed rate	Slower feed rate.
Motor Runs Too Slow/ Develops Low Power	Excessive voltage drop	Under-sized and or too long of an extension cord used. Extension cord not recommended. If necessary, use only 16 Gauge or larger cord and limit length to 25'.
	Workpiece too large for size of lathe	Re-plan work to accommodate limits of machine.
	Too aggressive/deep of cut being attempted	Re-plan work to accommodate limits of machine.
	Too fast of a feed rate	Slower feed rate.
Motor Overheating	Motor overloaded	Reduce workload on motor.
	Workpiece too large for size of lathe	Re-plan work to accommodate limits of machine.
	Too aggressive/deep of cut being attempted	Re-plan work to accommodate limits of machine.
	Too fast of a feed rate	Slower feed rate.
Excessive or Unusual Lathe Vibration and Noise While Running	Workpiece is unbalanced	Re-install workpiece to align with spindle bore.
	Broken or damaged gear	Replace faulty gear.
	Too aggressive/deep of cut being attempted	Re-plan work to accommodate limits of machine.
	Too fast of a feed rate	Slower feed rate.
Excessive or Unusual Cutting Tool Vibration and Noise While Running	Tool Holder not sufficiently tightened	Tighten Tool Holder.
	Tool extended too far out of Tool Holder	Reinstall Cutting Tool so that a maximum of its length extends out of the Tool Holder.
	Worn Tool cutting surface	Sharpen Tool.
	Too fast or too slow of a Spindle speed	Adjust Spindle speed as required.

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Poor surface Finish on Workpiece	Too fast of a feed rate	Slower feed rate.
	Worn or incorrect Tool profile	Sharpen Tool or select better profile.
	Too much play in the Gibs	Adjust Gibs per procedure described in this manual.
	Tool mounted too high or above center.	Adjust Tool below center.
Inaccuracies in Tolerances/ Dimensions Along Entire Workpiece	Headstock and Tailstock center lines are not in alignment	Realign Headstock and Tailstock center lines per procedure described in this manual.
	Worn or incorrect Tool profile	Sharpen Tool or select better profile.
	Too much play in the Gibs	Adjust Gibs per procedure described in this manual.
	Tool mounted too high or above center	Adjust Tool below center.
Cross-Slide, Compound Slide or Carriage Feed loose or sloppy	Too much play in the Gibs	Adjust Gibs per procedure described in this manual.
	Handwheel loose	Tighten Handwheel attachment.
	Leadscrew worn or out of adjustment	Tighten or adjust Leadscrew attachment.
Cross-Slide, Compound Slide or Carriage Feed Difficult to Move	Gib Screws adjusted to tightly	Adjust Gib Screws per procedure described in this manual.
	Buildup of dirt or chips in Gibs	Loosen and remove Gibs to clean and lubricate. Readjust Gib Screws per procedure described in this manual.
	Bedways dirty and/or dry	Clean and lubricate Bedways.
Cross-Slide Binding	Backlash adjusted to tightly	Readjust Cross-Slide backlash per procedure described in this manual.
Chuck Jaws Binding or Stuck	Chips jammed in Jaws	Remove Jaws, clean and lubricate Chuck Threads and re-install Jaws.
Carriage Fails to Feed	Gears not fully meshed	Adjust Gear positions/check installation.
	Gears broken or damaged	Replace failed Gears.
	Feed Handle attachment loose	Tighten Feed Handle screw.

ADDITIONAL ITEMS

- #22286 *Basic Lathework for Home Machinists* Book
- #22290 *Mini Lathe for Home Machinists* Book
- #22285 *Mini Lathe Tools & Projects for Home Machinists* Book