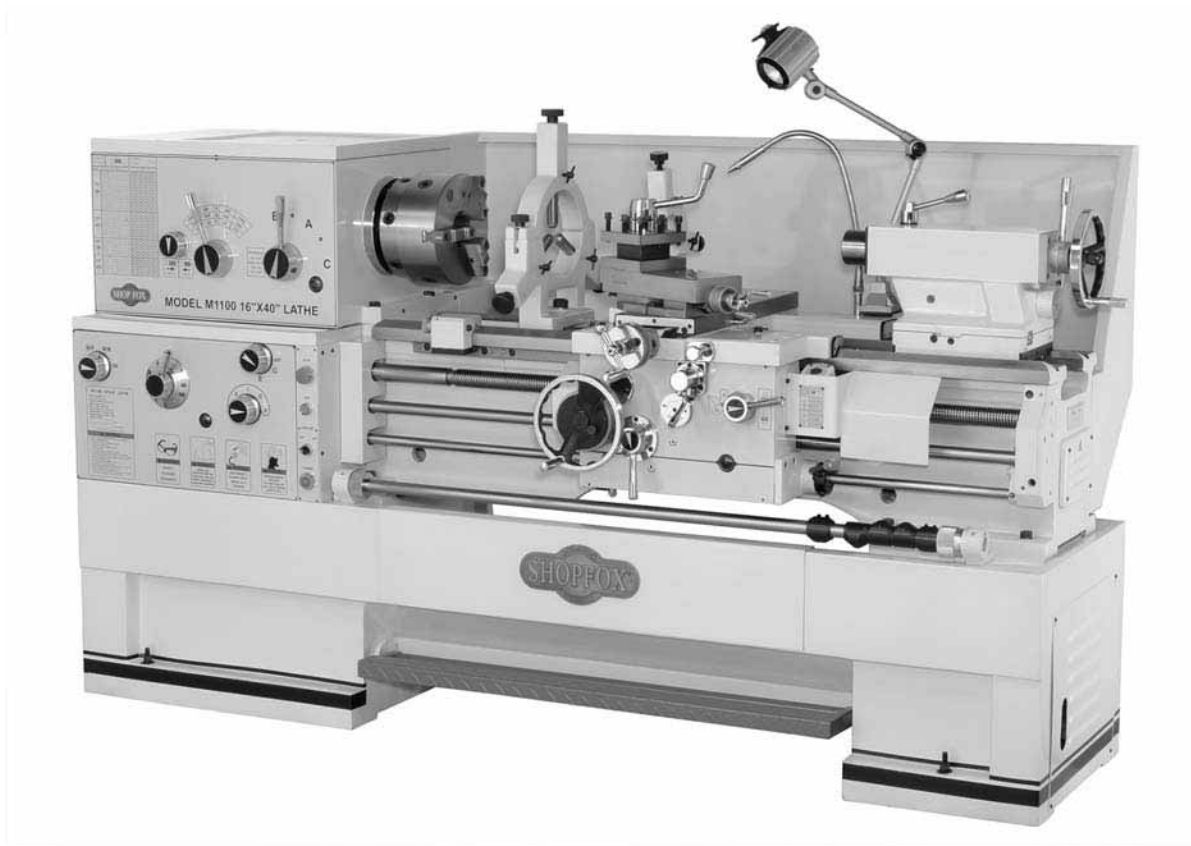




MODEL M1100 16" X 40" LARGE BORE LATHE



INSTRUCTION MANUAL

Phone: (360) 734-3482 • Online Technical Support: tech-support@shopfox.biz

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#8176CR

Printed in China



WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance and service of this machine/equipment.

Failure to read, understand and follow the instructions given in this manual may result in serious personal injury, including amputation, electrocution or death.

The owner of this machine/equipment is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, blade/cutter integrity, and the usage of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.



WARNING!

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paints.
- Crystalline silica from bricks, cement and other masonry products.
- Arsenic and chromium from chemically-treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

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INTRODUCTION

Woodstock Technical Support

Your new **SHOP FOX**® Model M1100 Lathe has been specially designed to provide many years of trouble-free service. Close attention to detail, ruggedly built parts and a rigid quality control program assure safe and reliable operation.

Woodstock International, Inc. is committed to customer satisfaction. Our intent with this manual is to include the basic information for safety, setup, operation, maintenance, and service of this product.

We stand behind our machines! In the event that questions arise about your machine, please contact Woodstock International Technical Support at (360) 734-3482 or send e-mail to: tech-support@shopfox.biz. Our knowledgeable staff will help you troubleshoot problems and process warranty claims.

If you need the latest edition of this manual, you can download it from <http://www.shopfox.biz>.
If you have comments about this manual, please contact us at:

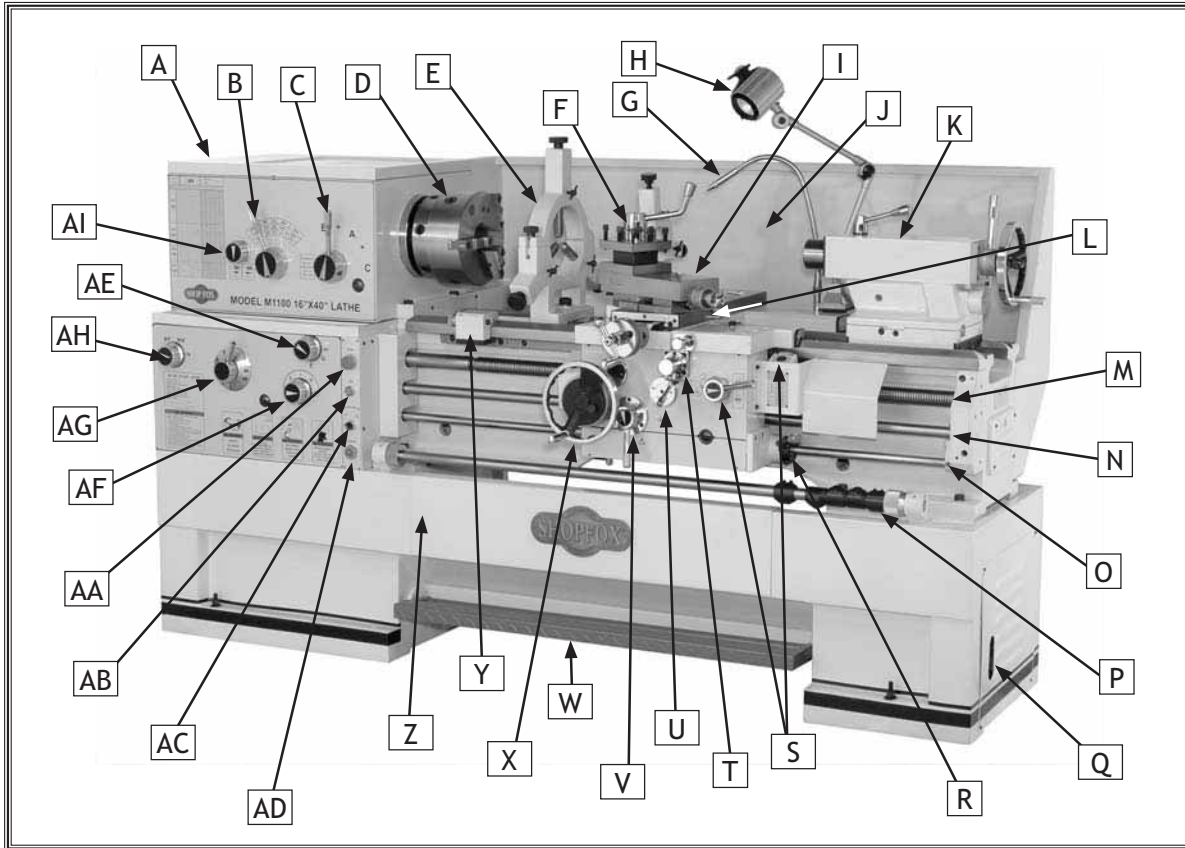
Woodstock International, Inc.
Attn: Technical Documentation Manager
P.O. Box 2309
Bellingham, WA 98227



Specifications

Spindle Motor	10 HP, 220V, 3-phase
Overall Length	97"
Overall Depth	41"
Footprint	91W" x 23 ¹ / ₂ "D
Height	51 ¹ / ₄ "
Swing Over Bed	16"
Swing Over Gap	26"
Swing Over Cross Slide	7 ² / ₃ "
Distance Between Centers	40"
Compound Slide Travel	5 ¹ / ₈ "
Cross Slide Travel	9"
Tailstock Barrel Travel	5"
Leadscrew Diameter	40 mm
Leadscrew Threads	4 TPI
Feed Rod	28 mm
Cutting Tool Maximum Size	1" X 1"
Spindle Nose Camlock System	D1-8
Spindle Bore	3 ¹ / ₈ "
Spindle Taper	MT#7
Tailstock Diameter	3"
Tailstock Taper	MT#4
Spindle Speeds	42, 73, 150, 230, 270, 300, 430, 560, 820, 1060, 1400, 1800 RPM
Cross Feed Range	0.0006"-0.0365" ^{inch} / _r
Cross Feed Lead Screw Threads	8 TPI
Thread Range (Inch)	1 ⁵ / ₈ "-72 TPI
Number of Inch Threads	61
Thread Range (Metric)	0.5-20 mm
Number of Metric Threads	24
Longitudal Feed Range	0.0015"-0.0913" ^{inch} / _r
Approximate Shipping Weight	5500 lbs.
Approximate Net Weight	5000 lbs.

Controls and Features



Model M1100 lathe.

- | | |
|------------------------------------|---------------------------------------|
| A. Headstock | S. Half Nut Lever and Dial |
| B. Spindle Speed Lever | T. Longitudinal and Cross Slide Lever |
| C. Spindle Range Lever | U. Clutch Tension Adjustment Screw |
| D. Chuck | V. Feed Engage Lever |
| E. Steady Rest | W. Break Pedal |
| F. Four-Way Tool Post | X. Manual Longitude Feed Crankwheel |
| G. Coolant Nozzle | Y. Manual Micrometer Stop |
| H. Work Lamp | Z. Chip Tray and Drip Pan |
| I. Compound Rest | AA. Emergency Stop Button |
| J. Backsplash Plate | AB. Jog Button |
| K. Tailstock | AC. Pump Switch |
| L. Cross Slide | AD. Power Lamp |
| M. Lead Screw | AE. Feed Rod/Lead Screw ON/OFF Dial |
| N. Feed Rod | AF. Pitch Range Dial |
| O. Spindle Control Rod | AG. Pitch Lever |
| P. Five-Position Apron Stop | AH. Thread Type Dial |
| Q. Cutting Fluid Level Sight Glass | AI. Feed Rod/Lead Screw Rotation Dial |
| R. Spindle ON/OFF Rotation Lever | |

SAFETY

**READ MANUAL BEFORE OPERATING MACHINE.
FAILURE TO FOLLOW INSTRUCTIONS BELOW WILL
RESULT IN PERSONAL INJURY.**



Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.

NOTICE

This symbol is used to alert the user to useful information about proper operation of the equipment, and/or a situation that may cause damage to the machinery.


Standard Safety Instructions

1. **Thoroughly read the Instruction Manual before operating your machine.** Learn the applications, limitations and potential hazards of this machine. Keep the manual in a safe and convenient place for future reference.
2. **Keep work area clean and well lighted.** Clutter and inadequate lighting invite potential hazards.
3. **Ground all tools.** If a machine is equipped with a three-prong plug, it must be plugged into a three-hole grounded electrical receptacle or grounded extension cord. If using an adapter to aid in accommodating a two-hole receptacle, ground using a screw to a known ground.
4. **Wear eye protection at all times.** Use safety glasses with side shields or safety goggles that meet the appropriate standards of the American National Standards Institute (ANSI).
5. **Avoid dangerous environments.** Do not operate this machine in wet or open flame environments. Airborne dust particles could cause an explosion and severe fire hazard.
6. **Ensure all guards are securely in place and in working condition.**
7. **Make sure switch is in the OFF position** before connecting power to machine.
8. **Keep work area clean, free of clutter, grease, etc.**
9. **Keep children and visitors away.** Visitors must be kept at a safe distance while operating unit.
10. **Childproof your workshop** with padlocks, master switches or by removing starter keys.
11. **Stop and disconnect the machine when cleaning, adjusting or servicing.**

12. **Do not force tool.** The machine will do a safer and better job at the rate for which it was designed.
13. **Use correct tool.** Do not force machine or attachment to do a job for which it was not designed.
14. **Wear proper apparel.** Do not wear loose clothing, neck ties, gloves, jewelry, and secure long hair away from moving parts.
15. **Remove chuck keys, rags, and tools.** Before turning the machine on, make it a habit to check that all chuck keys and wrenches have been removed.
16. **Keep proper footing and balance** at all times.
17. **Lock the mobile base from moving before feeding the workpiece into the machine.**
18. **Do not leave machine unattended.** Wait until it comes to a complete stop before leaving the area.
19. **Perform machine maintenance and care.** Follow lubrication and accessory attachment instructions in the manual.
20. **Keep machine away from open flame.** Operating machines near pilot lights or open flames creates a high risk if dust is dispersed in the area. Dust particles and an ignition source may cause an explosion. Do not operate the machine in high-risk areas, including but not limited to, those mentioned above.
21. **If at any time you are experiencing** difficulties performing the intended operation, stop using the machine! Then contact our technical support or ask a qualified expert how the operation should be performed.
22. **Be aware that certain materials may cause an allergic reaction in people and animals,** especially when exposed to fine dust. Make sure you know what type of material dust you will be exposed to and the possibility of an allergic reaction.
23. **Habits—good and bad—are hard to break.** Develop good habits in your shop and safety will become second-nature to you.

Additional Safety Instructions for Lathes

SAFETY



⚠️ WARNING
 READ and understand this entire instruction manual before using this machine. Serious personal injury may occur if safety and operational information is not understood and followed. **DO NOT** risk your safety by not reading!

⚠️ CAUTION
 USE this and other machinery with caution and respect. Always consider safety first, as it applies to your individual working conditions. No list of safety guidelines can be complete—every shop environment is different. Failure to follow guidelines could result in serious personal injury, damage to equipment or poor work results.

1. **UNDERSTANDING THE LATHE:** Read and understand this manual before operating this machine.
2. **CLEANING MACHINE:** Do not clear chips by hand. Use a brush, and never clear chips while the lathe is turning.
3. **USING CORRECT TOOLING:** Always select the right cutter for the job, and make sure cutters are sharp. The right tool decreases strain on the lathe components and provides a better finish.
4. **USING CHUCK KEY CORRECTLY:** Always remove chuck key. Never walk away from the lathe with the key in the chuck.
5. **SECURING A WORKPIECE:** Make sure workpiece is properly held in chuck before starting lathe. A workpiece thrown from the chuck will cause severe injury.
6. **SPEED CHANGES:** Turn lathe **OFF** before changing speeds. The lathe must be turned **OFF** and the spindle brought to a complete stop before changing gears.
7. **CHUCK SAFETY:** Get assistance when installing large chucks. Large lathe chucks are very heavy and awkward to hold, so protect your hands and the precision ground ways. Always use a chuck cradle or piece of plywood over the ways of the lathe.
8. **WORKPIECE SUPPORT:** Support a long workpiece if it extends from the headstock so it will not wobble violently when the lathe is turned on. A workpiece that extends more than 2.5 times its diameter must be supported by a center or steady rest.
9. **AVOIDING STARTUP INJURIES:** Make sure workpiece, cutting tool, and tool post have adequate clearance before starting lathe. Check chuck clearance and saddle clearance before starting the lathe. Make sure spindle RPM is set correctly for part diameter before starting the lathe. Large parts can be ejected from the chuck if the chuck speed is set too high.
10. **AVOIDING OVERLOADS:** Always use the appropriate feed and speed rates.
11. **AVOIDING ENTANGLEMENT INJURIES:** Never attempt to slow or stop the lathe chuck by hand, and tie back long hair, ponytails, loose clothing, and sleeves so they do not dangle.
12. **MAINTAINING A SAFE WORKPLACE:** Never leave lathe unattended while it is running.
13. **PREVENTING LATHE CRASHES:** Release automatic feeds after completing a job.

Avoiding Potential Injuries

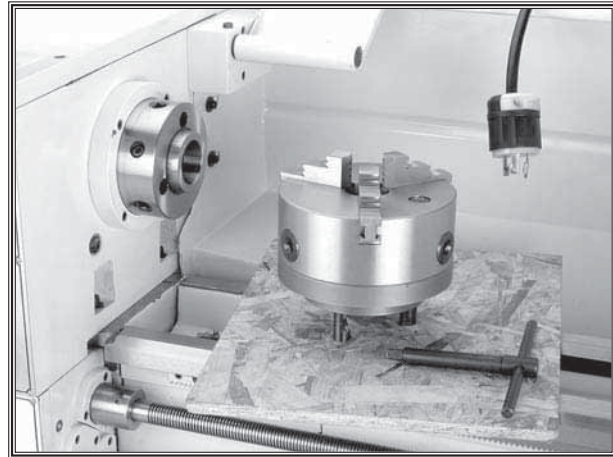


Figure 1. Always protect the bed ways, and unplug the lathe when retooling the lathe.



Figure 3. Always wear face and eye protection when using lathes.

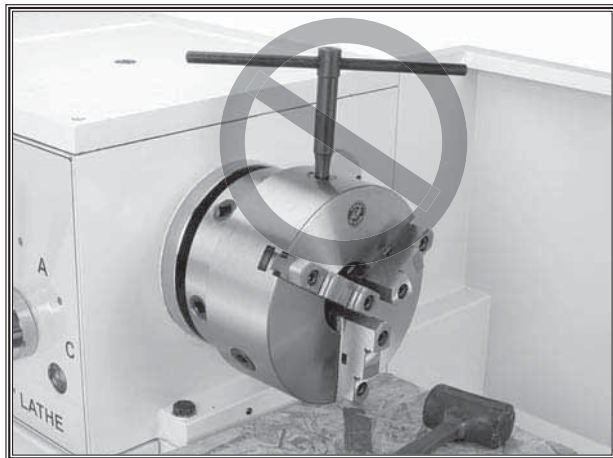


Figure 2. Never walk away from the lathe with the chuck key inserted in the chuck.

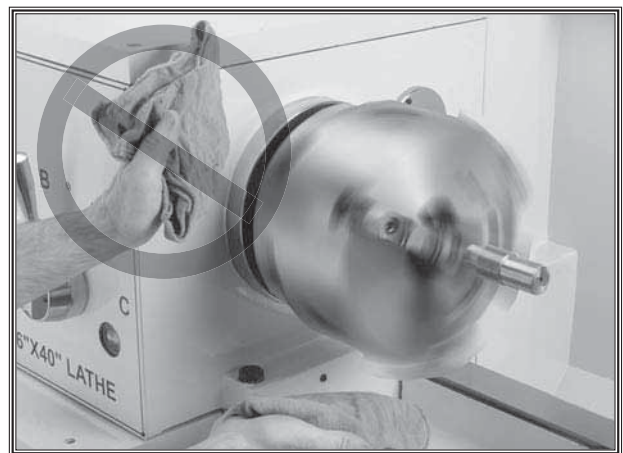


Figure 4. Never use hands to stop or slow the chuck when shutting down the lathe.

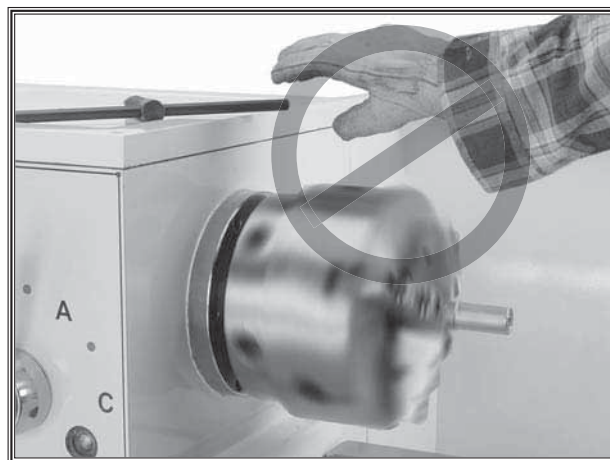


Figure 5. Never wear loose clothing or gloves when working with the lathe.

SAFETY

ELECTRICAL

220V 3-Phase Operation

The motor supplied with your lathe is rated at 10 HP and will draw approximately 27 amps during normal 220 volt 3-phase operation. If you do not have 3-phase power available, you will have to install a phase converter.

Hardwire your lathe to a circuit that is rated for at least 40 amps three phase.

We recommend connecting this machine to a dedicated circuit with a verified ground, using a 40 amp circuit breaker. Never replace a circuit breaker with one of higher amperage without consulting a qualified electrician to ensure compliance with wiring codes.

If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, you may create a fire hazard—consult a qualified electrician to reduce this risk.

Extension Cords

DO NOT use an extension cord for 220V industrial shop machines. You must follow all local electrical codes when connecting this machine to a power source.

Grounding

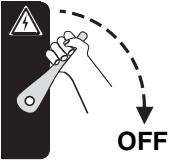
This machine must be grounded! If you have any questions about correct electrical installation, contact a qualified electrician for assistance to make sure all connections are safe and adhere to your local electrical codes.

ELECTRICAL

⚠ WARNING



DO NOT attempt to work on your shop electrical system if you are unsure about electrical codes and wiring! Seek assistance from a qualified electrician. Ignoring this warning can cause electrocution!



⚠ WARNING

TURN OFF and LOCK your master power switch so no power is available to the lathe before connecting electrical wires! If you ignore this warning serious electrical shock may occur, causing injury or death!

SET UP

Inventory

The following is a description of the main components shipped with the SHOP FOX® MODEL M1100. Lay the components out to inventory them.

Main Contents (Figure 6)	Qty
A. Three-Jaw Chuck	1
B. Steady Rest	1
C. Follow Rest	1
D. Model M1100 16" X 40" Lathe	1

Accessory Mountings (Figure 7)	
E. Four-Jaw Universal Chuck.....	1
F. Faceplate	1
G. Four-Jaw Chuck Key	1
H. Driving Plate Set	
• Drive Pins.....	1 ea.
• Camlock Studs	12
• Camlock Stud Fasteners.....	12

Tool Box Content (Figure 8)	
I. Fuses	6
J. Tool Box.....	1
K. Green Indicator Lamp Assembly	1
L. Oil Can	1
M. Stud and Foot Pad Set	1
N. #2 Screwdriver Set (Phillips and Standard)	1 ea.
O. Hex Wrench Set (2, 3, 4, 5, 6, 8, 10 mm).....	1 ea.
P. Gap-Bridge Pin Puller.....	1
Q. Touch-Up Paint	1
R. Lead Screw and Feed Rod Shear Pins	2
S. Wrench Set (9, 10, 11, 12, 14, 17, 19 mm)	1 ea.
T. Adjustable Wrench	1
U. Main Electrical Box Keys	2
V. Live Center MT#4, Dead Center MT#5	1 ea.
W. Spindle Sleeve	1
X. Wedge	1
Y. Chuck and Tool Post T-Handle Wrenches	1 ea.
Z. Spanner Wrench	1

If any parts are missing, find the part number in the back of this manual and contact Woodstock International, Inc. at (360) 734-3482 or at techsupport@shopfox.biz

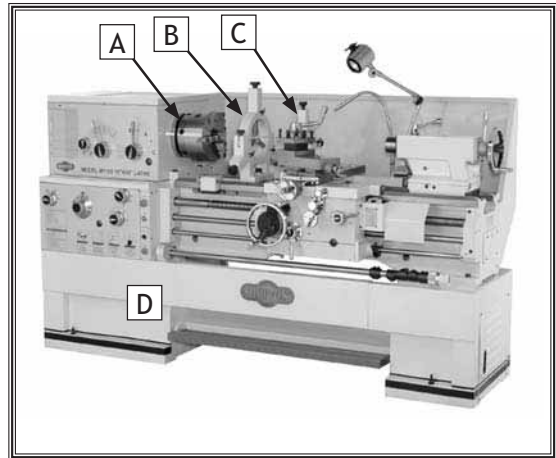


Figure 6. Main contents.

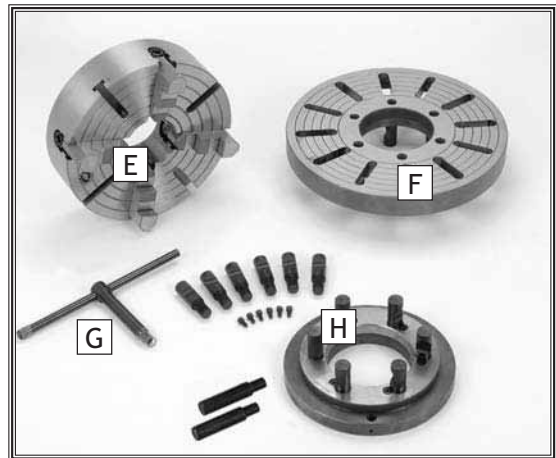


Figure 7. Accessories.

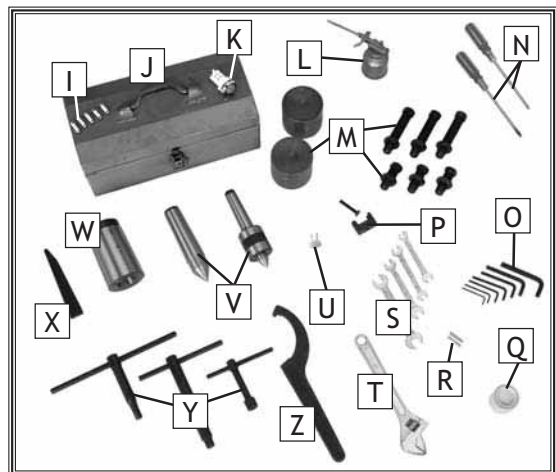


Figure 8. Tool box contents.

SETUP

NOTICE

When ordering replacement parts, refer to the parts list and diagram in the back of the manual.

Cleaning Machine

The ways and other unpainted parts of your lathe are coated with a waxy grease that protects them from corrosion during shipment. Clean this grease off with a solvent cleaner or citrus-based degreaser. DO NOT use chlorine-based solvents such as brake parts cleaner, lacquer thinner, or acetone—if you happen to splash some onto a painted surface, you will ruin the finish.

Machine Placement

- **Floor Load:** Your lathe is a heavy load (5500 Lbs.) distributed in a 91³/₄" x 23³/₄" footprint. The floor MUST be level, or the lathe frame and ways may twist and distort over time.
- **Working Clearances:** Consider existing and anticipated needs, service panel access, length of rods to be loaded into the lathe, and space for auxiliary stands, work tables or other machinery when establishing a location for your lathe (see Figure 9 for dimensions).
- **Lighting:** Lighting should be bright enough to eliminate shadow and prevent eye strain.
- **Electrical:** Outlets must be located near each machine, so power cords are clear of high-traffic areas.

SETUP

	<p>! WARNING</p> <p>ALWAYS work in well-ventilated areas far from possible ignition sources when using solvents to clean machinery. Many solvents are toxic when inhaled or ingested. Use care when disposing of waste rags and towels to be sure they DO NOT create fire or environmental hazards. NEVER use gasoline or petroleum-based solvents to clean your lathe.</p>
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	<p>! WARNING</p> <p>MAKE your shop "child safe." Ensure that your workplace is inaccessible to youngsters by closing and locking all entrances when you are away. NEVER allow untrained visitors in your shop when assembling, adjusting or operating equipment.</p>
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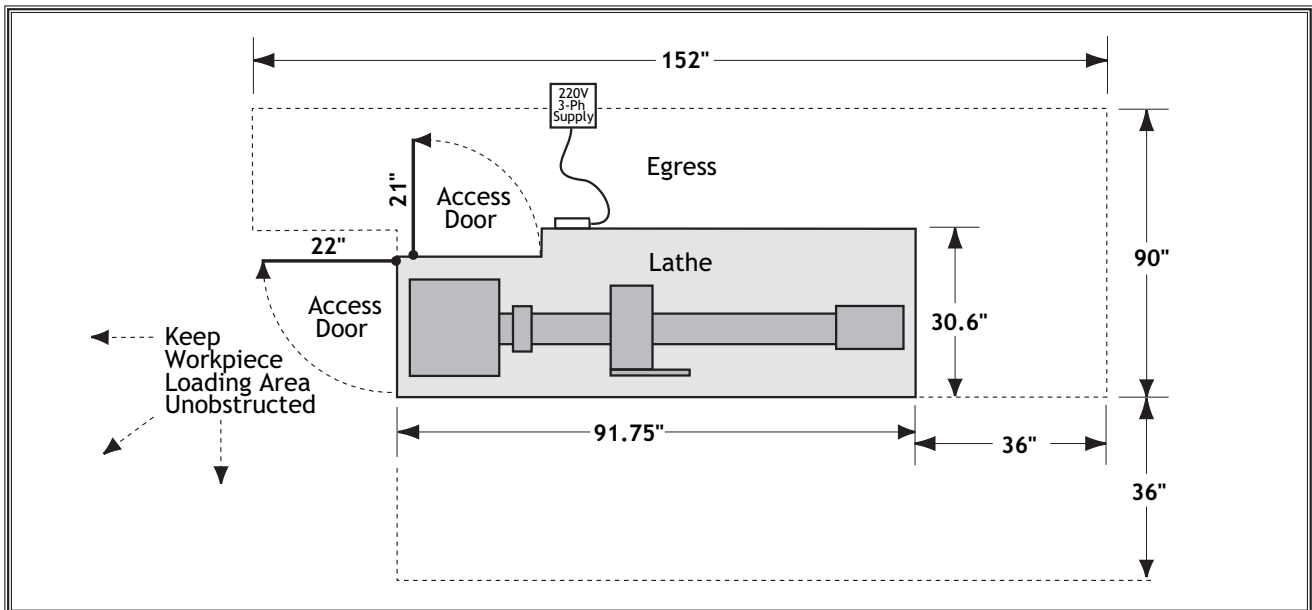


Figure 9. Minimum wall clearances.


Uncrating and Lifting

The Model M1100 lathe has been carefully crated. If you notice the lathe has been damaged, contact your authorized **SHOP FOX®** dealer immediately.

To unpack and move the lathe, do these steps:

1. Read **Pages 10** and **13** and prepare lathe location.
2. Gather the following items:
 - Fork lift or 3-ton hoist, and driver or operator.
 - 3-ton lifting straps, hooks, and lifting rods.
3. Disassemble the crate, and unbolt the lathe from the six pallet lag bolts (**Figure 10**).
4. Insert two lifting rods (not included) that can hold the weight of the lathe into the lifting holes, and make sure the apron is approximately in the center of the bedways as shown in **Figure 10**.
5. Slowly raise the lathe off of the pallet, carefully move the lathe to your prepared location, and set the lathe on wooden 2x4's (**Figure 12**), so you will be able to install the leveling feet in the next step.

⚠ WARNING



The Model M1100 weighs approximately 5500 lbs. You will need power lifting equipment and assistance to remove this machine from the crate and position it. Inspect all lifting equipment and make sure that all is in perfect working order and is rated for the load before attempting to lift and move this lathe. Ignoring this warning may lead to serious personal injury or death.

SETUP

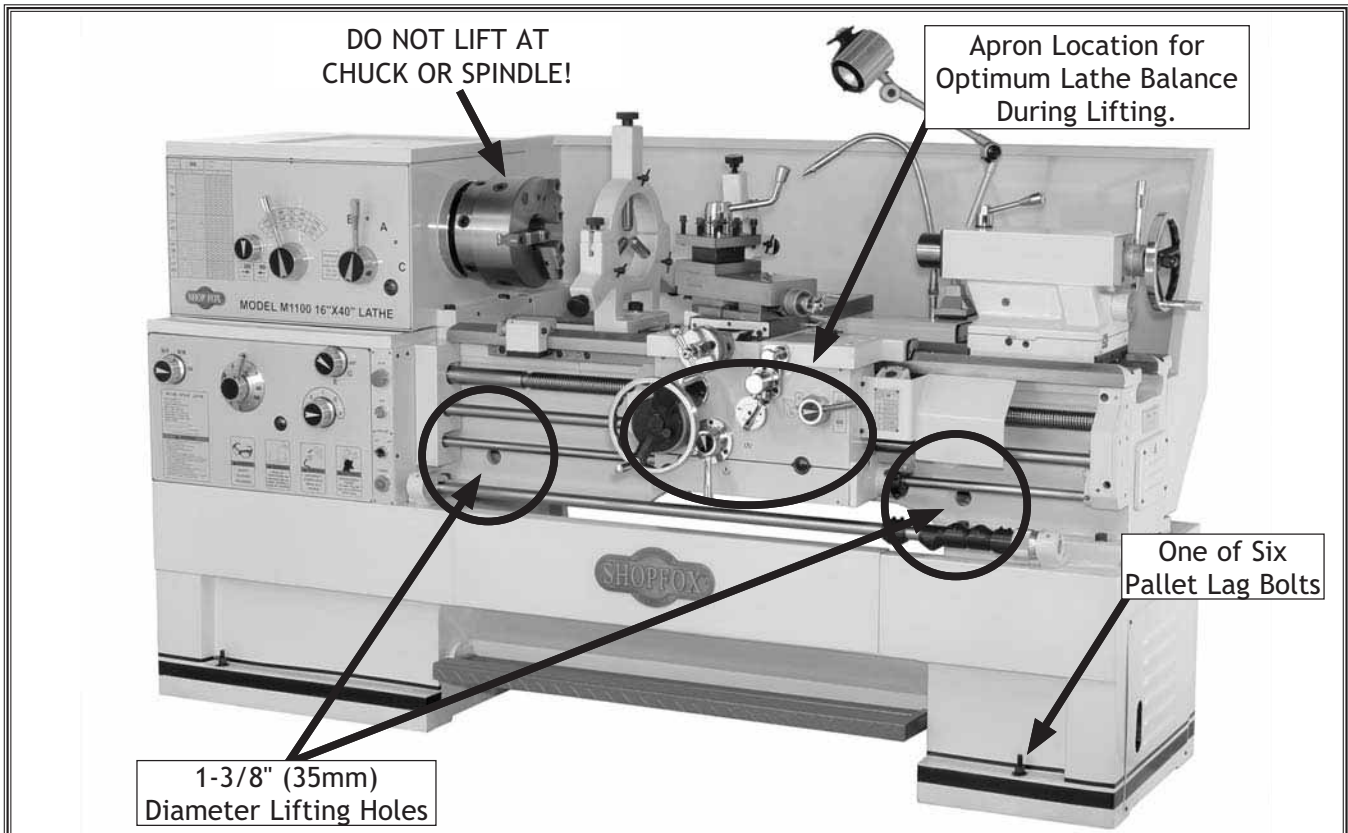


Figure 10. Lifting rod locations.

NOTICE

We do not recommend bolting this lathe to the shop floor. Most shop floors are uneven, and drawing the fasteners down (**Figure 11**) can preload the lathe stand in a manner that in time the ways may be pulled out of alignment.

If you must mount the lathe to the floor, make sure all six mounting locations are touching the floor and the lathe is perfectly level. **DO NOT** use the fasteners to pull the lathe stand downward to conform to the floor or to pull the ways into alignment. Use steel shims as needed to support the lathe at each mounting location, so at each location the lathe is supported. Then slightly snug the bolts or nuts in place by hand, **DO NOT** use an air wrench to tighten any fastener.

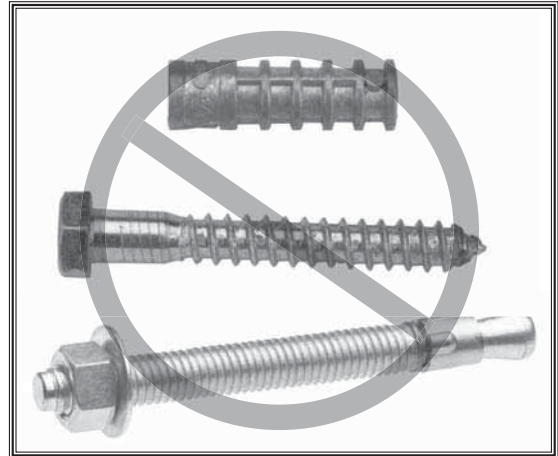


Figure 11. Unacceptable floor fasteners.

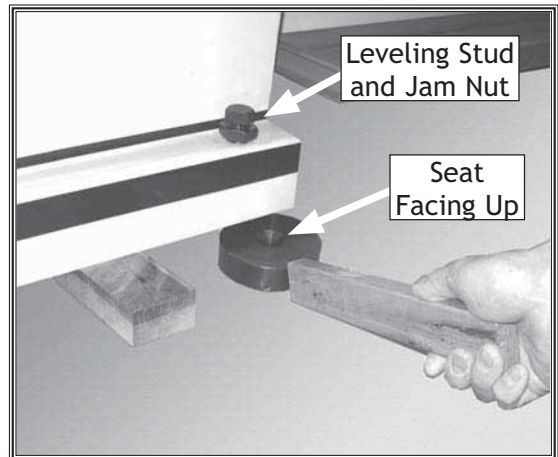


Figure 12. Leveling feet installation.

6. With the lathe securely resting on the 2x4's and still connected to the lifting apparatus, install the three short leveling studs in the stand at the back of the lathe and the long studs in the front of the lathe. Make sure all studs are ball-side down with the jam nuts at the top side of the stud, (see **Figure 12**).
7. Turn each stud so the ball protrudes approximately $\frac{1}{2}$ " below the lathe stand.
8. Using a push stick, slide the metal feet under the lathe with the seats facing up as shown in **Figure 12**, so when the 2x4's are removed and the lathe is lowered, the ball studs will sit into the foot seats.
9. Remove the 2x4's and lower the lathe.
10. Adjust the leveling studs so all six feet support equal weight, and the lathe is level as indicated by a machinist's level on the flats of the ways at all four corners and along the ways.

NOTICE

If a lathe is not level, the accuracy of the lathe will be affected, and possibly the ways can twist out of alignment. Make sure that your level is a high quality machinist's level, and that all measuring surfaces are perfectly clean. Recheck the lathe ways in a few weeks to make sure the floor has not settled, readjust as required.

11. Tighten all leveling stud jam nuts.

Test Run

The purpose of the test run is to make sure the lathe and safety features operate correctly before proceeding with additional set up.

To begin the test run procedure, do these steps:

1. Remove the chuck, inspect the camlock studs for cracks or shipping damage, (refer to **Page 18** for chuck procedures), and reinstall chuck if all is OK.
2. Rotate the feed rod and lead screw dial so it points down at 6:00 o'clock, move the headstock gear levers to "C", select 42 RPM as shown in **Figure 13**, and make sure the pump switch is **OFF**.
3. Move the spindle rotation **ON/OFF** lever to **OFF** (see **Figure 14**).

NOTICE

Make sure all power feed levers and dials are disengaged before starting the lathe! Thoroughly familiarize yourself with all the controls and their functions before using any power feed!

4. Make sure the lathe is lubricated and all gear box oil levels are full, refer to **Page 38** if required.
5. Move all power feed levers to the disengaged positions shown in **Figure 15**.
6. Make sure the chuck area is cleared of all tools.
7. Turn the master power switch **ON** (**Figure 16**) at the rear of the lathe.
8. Move the **Spindle Rotation ON/OFF** lever (**Figure 14**) up or down so the chuck turns.
 - If you hear squealing or grinding noises, turn the machine **OFF** immediately and correct any problem before further operation.
 - If the problem is not readily apparent, refer to **Troubleshooting** on **Page 46**.
9. Test the foot brake and the STOP button. The lathe should stop immediately.
10. Turn the lathe **OFF** and complete the **Lathe Break-In** on **Page 17** before putting lathe into full service.

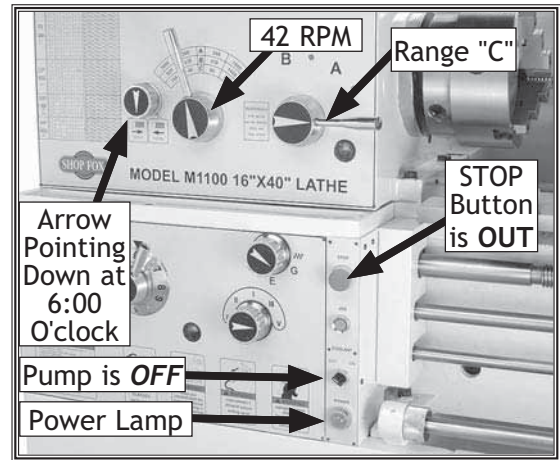


Figure 13. Headstock controls.

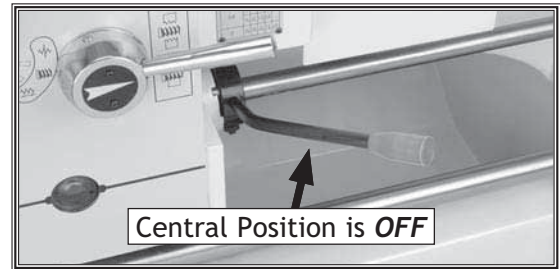


Figure 14. Spindle rotation **ON/OFF** lever.

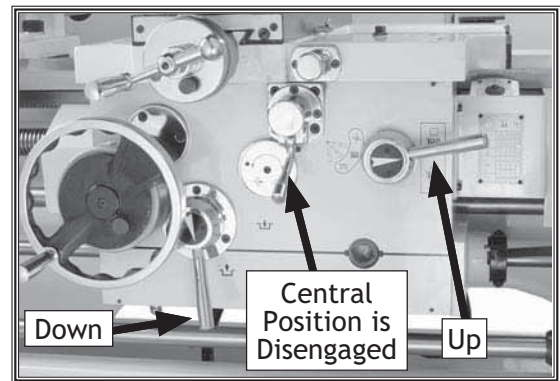


Figure 15. Disengaged carriage.

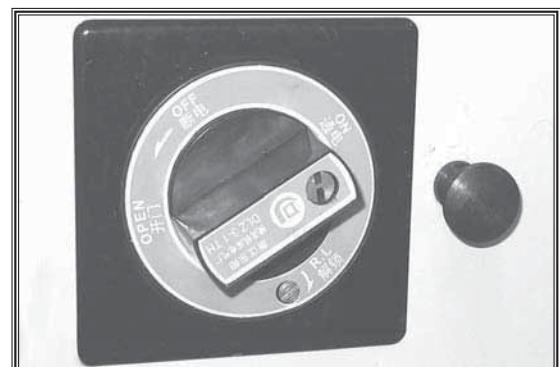


Figure 16. Master power switch and 40A overload breaker—switched **ON**.

SETUP

OPERATIONS

General

NOTICE

Complete the **Lathe Break-In** procedure on **Page 34** before using this lathe for any cutting or threading operations. **Otherwise, gear box damage may occur.**

The Model M1100 will perform many types of operations that are beyond the scope of this manual. Many of these operations can be dangerous or deadly if performed incorrectly.

The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. **If at any time you are experiencing difficulties performing any operation, stop using the machine!**

If you are an inexperienced operator, we strongly recommend that you read books, trade articles, or seek training from an experienced lathe operator before performing any unfamiliar operations. **Above all, your safety should come first!**

Power Supply

If the master power switch (**Figure 16**) at the back of the lathe is rotated to the **OFF** position, power is cut to the entire machine, but is still present at the input side of the switch. To completely disconnect all power to the lathe, the main shop power supply lever must be in the **OFF** position.

When illuminated, the power lamp (**Figure 17**) on the lathe indicates that the power is being supplied to the lathe. If you press the emergency stop button, the power light will go out and cut power to the machine. Twisting the **EMERGENCY STOP** button and letting it pop out will restore power to the machine.

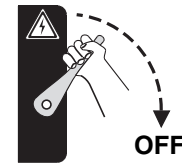
Note: *The spindle rotation ON/OFF lever on the apron starts the spindle motor in a particular direction.*

! WARNING



Always wear safety glasses when operating this lathe. Failure to comply may result in a serious eye injury resulting in blindness.

! WARNING



TURN OFF and LOCK your master power switch so no power is available to the lathe, and make sure the spindle is stopped before proceeding with any adjustments or maintenance. Failure to comply may result in serious personal injury or death.

OPERATIONS

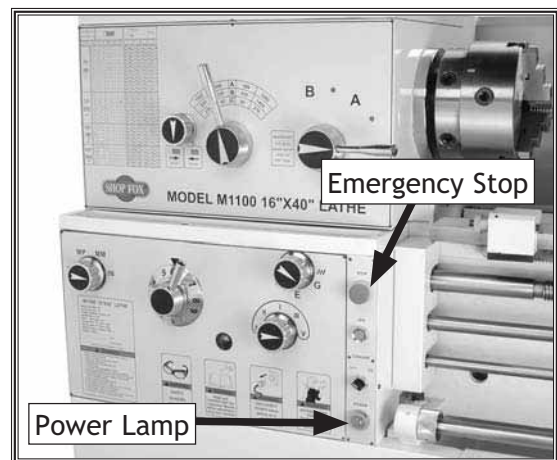


Figure 17. Power light and emergency stop locations.

Lathe Break-In

You must follow the proper break-in procedure to ensure correct bearing and gear tooth seating and mating. Complete this process once you have familiarized yourself with all instructions in this manual.

NOTICE

Make sure all power feed levers and dials are disengaged before starting the lathe! Thoroughly familiarize yourself with all the controls and their functions before using the power feed!

To begin the break-in procedure, do these steps:

1. Check and correct oil levels in headstock, gearbox, and apron with Mobil DTE® Oil or equivalent.
2. Make sure there are no obstructions around or underneath the chuck.
3. Disengage the apron as shown in Figure 18.

NOTICE

Never move the feed rod direction knob when the lathe is operating or gear damage will occur!

4. Set the spindle speed to 42 RPM, and engage the gearbox by turning the feed rod direction knob (Figure 19).
5. Set the feed rod speed as shown in Figure 20.
6. Turn the lathe power **ON**, and move the spindle rotation ON/OFF lever UP and the chuck should rotate counterclockwise as viewed from the tailstock end of the lathe.
 - If the chuck rotates clockwise, disconnect the lathe from power, and switch any two power supply wires (L1, L2, L3) in the power-in junction box shown in Figure 81. **DO NOT** switch ground wire location.
7. Let the lathe run for a minimum of 10 minutes.
8. Turn the lathe **OFF**, move levers to the next highest RPM and repeat this step for each RPM setting in low, medium, and high range.
9. Change the lubricant in the headstock, gearbox, and apron with Mobil DTE® Oil or with an equivalent.

NOTICE

Failure to follow these Lathe Break-In procedures will cause rapid deterioration of the lathe bearings and gears.

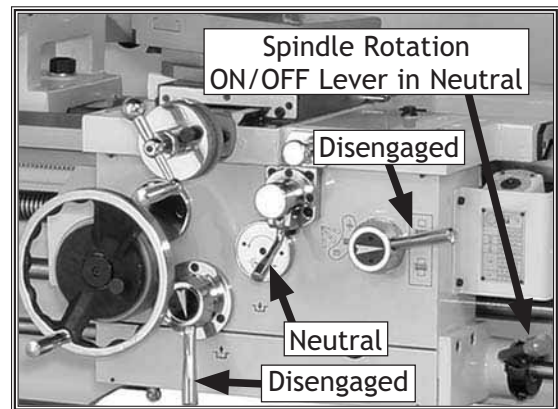


Figure 18. Apron in neutral and disengaged.

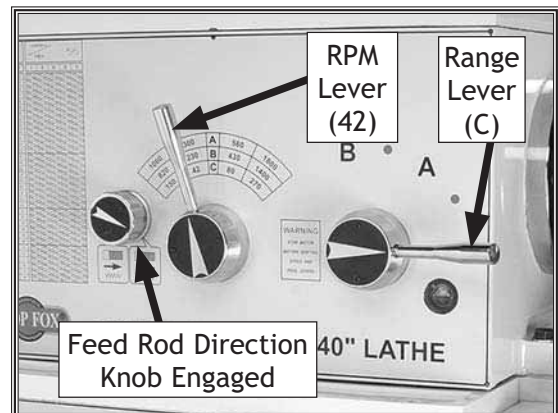


Figure 19. Headstock and gearbox speeds.



Figure 20. Feed rod speeds.

Three-Jaw Direct Mount Scroll Chuck

This three-jaw scroll chuck features hardened steel jaws that self-center the workpiece within 0.002"-0.003". The bolt-on jaws are reversible for holding the inside diameter of larger workpieces. The chuck has camlock studs that hold the chuck to the spindle nose.

To remove or mount your three-jaw direct mount scroll chuck, gather the following tools:

- Chuck key.
- Dead blow hammer.
- A chuck cradle or a piece of plywood large enough to span the bedways and support the weight of the chuck.
- Breaker bar (optional).

To remove the existing chuck, do these steps:

1. DISCONNECT POWER TO THE LATHE!
2. Lay a chuck cradle or protective layer of plywood over the bedways to protect the ways and your fingers from damage (see Figure 21).
3. Find the chuck timing marks (Figure 22). If no marks exist, get a chisel and hammer and lightly tap-in your own marks.
4. Loosen the six camlocks by turning the chuck key counterclockwise $\frac{1}{3}$ -turn or until the mark on the camlock aligns with the mark on the spindle nose (Figure 22).

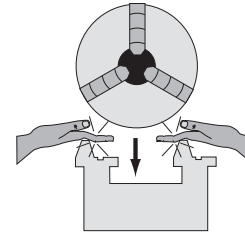
Note: If you look carefully, you will see the camlock rise up out of the spindle nose. If the camlock stud does not freely release from the camlock, wiggle the camlock until the camlock stud releases.

Note: These camlocks may be very tight. A breaker bar may be used to add leverage for camlock loosening, but never use a breaker bar to tighten.

Note: When reinstalling the chuck, make sure to align the timing marks.

5. Using a dead blow hammer or other soft mallet, lightly tap around the outer circumference of the chuck body to break the chuck free from the camlocks and from the spindle nose taper.

WARNING



PINCH HAZARD! Protect your hands and precision ground bedways with plywood when removing lathe chuck! The heavy weight of a falling chuck can cause serious injury.

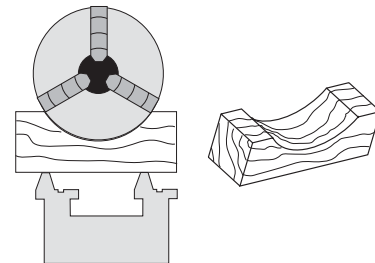


Figure 21. Simple chuck cradle made of scrap lumber.

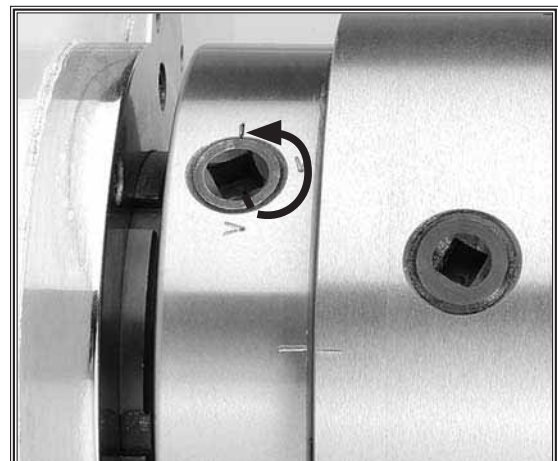


Figure 22. Disengaging the camlock.

- With a rocking motion, carefully remove the chuck from the spindle nose (see **Figure 23**).

⚠ CAUTION

Large chucks are very heavy. Always get assistance when removing or installing large chucks to prevent personal injury or damage to the chuck or lathe.

To install the three-jaw scroll chuck, do these steps:

- DISCONNECT POWER TO THE LATHE!
- Lay a chuck cradle or protective layer of plywood over the bedways to protect the ways from damage if you lose your grip and the chuck falls.
- Wipe the camlocks with white lithium grease.
- Install the camlock studs into the chuck body by threading them clockwise until the reference groove in the stud is flush with the chuck casting.
- Measure the height of the camlock studs from the previously installed chuck. If no chuck is available you will have to resort to trial-and-error.

NOTICE

Make sure when removing and reinstalling the camlocks to establish the correct height you reinstall the camlock retaining cap screws every time. If the camlock cap screws are missing and the chuck is mounted, the camlock studs can turn and you may not be able to get the chuck off.

- Adjust the camlock studs in the three-jaw chuck to match the measurement from the previous chuck.
- Once the proper camlock stud protrusion is obtained, thread the cap screws to lock the camlock studs into position.
- Use the timing marks (see **Figure 24**) and phase the chuck with the spindle and insert the camlock stud onto the spindle nose.
- In an alternating sequence, tighten each camlock clockwise slightly until you feel the camlock engage the camlock stud. In an alternating sequence, tighten the camlocks completely. You will see the chuck body draw-up to the spindle nose. The camlock mark will fall between the two pointed arrows on the spindle nose (see **Figure 24**).



Figure 23. Installing and removing a small chuck.

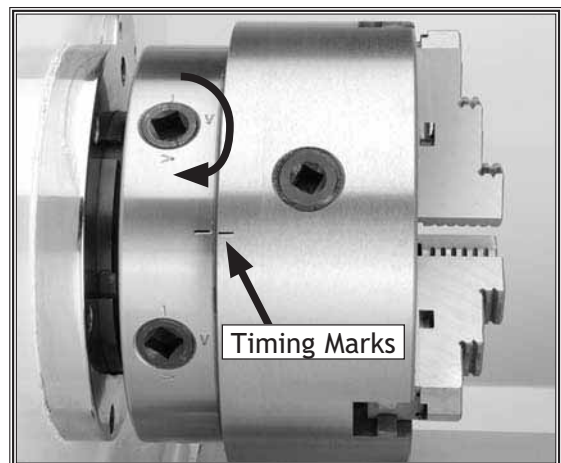


Figure 24. Tightening the camlocks when the chuck is in phase with the spindle.

To load a workpiece, do these steps:

1. With the chuck key, open the jaws so the workpiece lays flat against the chuck face and jaw step or fits in the through hole. For jaw and work holding options, see **Figure 25**.
2. Slowly turn the workpiece, and turn the chuck wrench until the jaws make contact with the workpiece.
3. Turn the chuck by hand to make sure you have even contact with all three jaws and the workpiece is not off center.
 - If the workpiece is off center, loosen the jaws and adjust the workpiece.
 - If the workpiece is seated correctly, tighten the jaws.

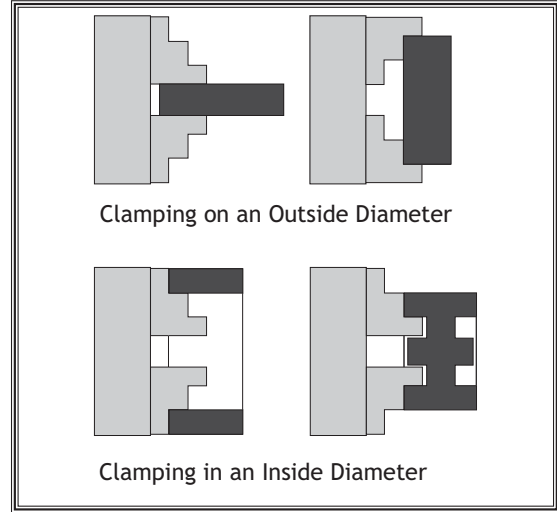
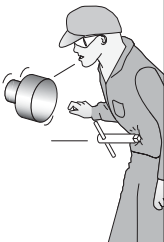


Figure 25. Loading a workpiece.

OPERATIONS



⚠ WARNING

Securely clamp your workpiece and remove the chuck key! Thrown objects from a lathe can cause serious injury or death to the operator and to bystanders many feet away.

⚠ WARNING

If the workpiece protrudes more than 2.5 times its own diameter, support it with a center, and possibly a steady rest. Otherwise the workpiece can deflect or come out of the chuck causing injury.

Swapping Jaws

For versatility and convenience, this three-jaw scroll chuck has two-piece removable hardened steel jaws (**Figure 27**). While the inner jaws are numbered from 1-3 (**Figure 26**), make sure to keep the un-numbered outer jaws with their numbered parent inner jaws. DO NOT mix them up.

To remove the outer jaws, do these steps:

1. DISCONNECT POWER TO THE LATHE!
2. Place a piece of wood over the ways to protect them from potential damage.
3. Use an 8mm hex wrench and remove the cap screws and then the outer jaw.
4. Clean the jaw mating surface and apply a film of white lithium grease to the mating surface.
5. Move to the next jaw and repeat steps.

To install the outer jaws, do these steps:

1. DISCONNECT POWER TO THE LATHE!
2. Place a piece of wood over the ways to protect them from potential damage.
3. Inspect for damage, clean jaw and mating surface, and apply a film of white lithium grease to all surfaces.
4. Position the outer jaw on the inner jaw and tap the outer jaw in place with a piece of wood. DO NOT use a metal hammer or you will damage the jaw.
5. Use an 8mm hex wrench and install the cap screws.
6. Move to the next jaw and repeat steps.

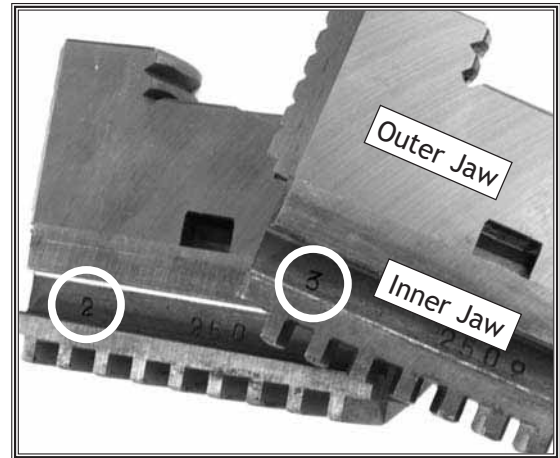


Figure 26. Inner jaw numbering and outer jaw.

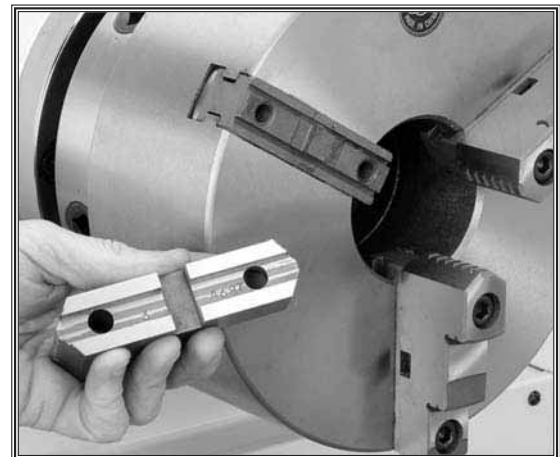


Figure 27. Outer jaw removed exposing the inner jaw.

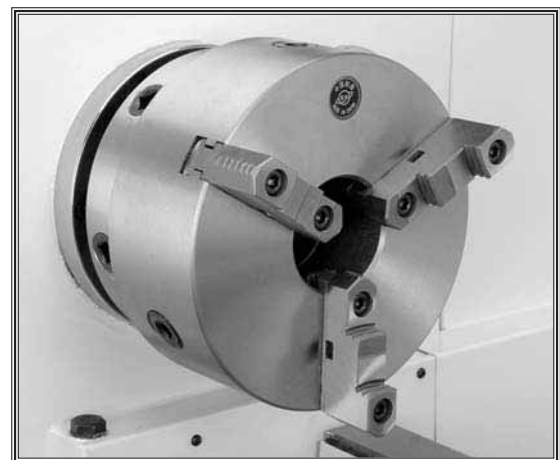


Figure 28. Typical jaw location for additional clamping options.

Four-Jaw Direct Mount Independent Chuck

Four-jaw chucks feature hardened steel jaws that are adjusted independently. Each jaw can be removed from the chuck body and reversed. Independent jaw adjustment and reversal allows for a wide range of work holding versatility.

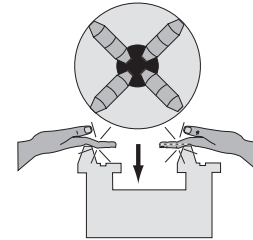
To install the four-jaw chuck, do these steps:

Refer to the **Three-Jaw Direct Mount Scroll Chuck** procedures on **Page 18** to mount the four-jaw chuck.

CAUTION

Large chucks are very heavy. Always have assistance when removing or installing large chucks to prevent personal injury or damage to the chuck or lathe.

WARNING



PINCH HAZARD! Protect your hands and precision ground bedways with plywood when removing lathe chuck! The heavy weight of a falling chuck can cause serious injury.

To load a workpiece in the four-jaw chuck, do these steps:

1. Using the chuck key, open each jaw so the workpiece will lay flat against the chuck face.
2. Support the workpiece.
3. Lock the tailstock and then turn the tailstock quill so the dead center makes contact or is close to the center point of your workpiece (see **Figure 30**).
4. Turn each jaw until it just makes contact with the workpiece.
5. In an opposing pattern, tighten each jaw in small increments. After you have adjusted the first jaw, continue tightening the opposing jaw. Check the dead center alignment frequently to make sure you have not wandered off your index point due to applying too much pressure to a single jaw.
6. After the workpiece is held in place, back the tailstock away and rotate the chuck by hand. The center point will move up and down when the chuck is rotated if the workpiece is out of center.

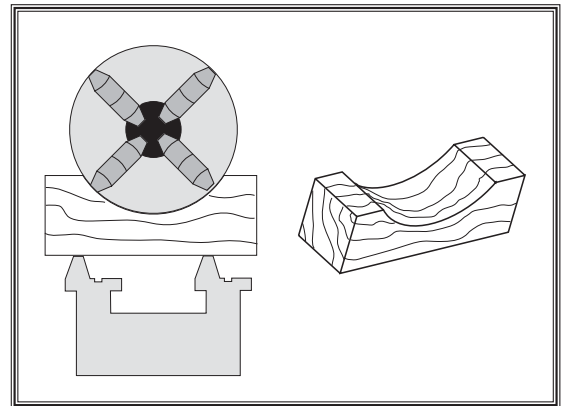


Figure 29. Simple chuck cradle made of scrap lumber.



Figure 30. Clamping workpiece.

7. Make fine adjustments by slightly loosening one jaw and tightening the opposing jaw until the workpiece is precisely aligned.
8. Use a dial indicator to fine-tune your adjustments (see **Figure 31**), and use a lower RPM when machining heavy eccentric workpieces.

⚠ WARNING

PROJECTILE HAZARD! Use a lower RPM when machining heavy eccentric workpieces. Otherwise, the workpiece can be ejected by the chuck and cause serious injury.



Figure 31. Centering workpiece.

Faceplate

The faceplate can be used to turn non-cylindrical parts or for off-center turning by clamping the workpiece to the faceplate.

To install the faceplate, do these steps:

Refer to the **Three-Jaw Direct Mount Scroll Chuck** procedures on **Page 18** to mount the faceplate.

To load a workpiece, do these steps:

1. Support the workpiece on the faceplate with a minimum of three independent clamping devices (see **Figure 32**). Failure to follow this step may lead to deadly injury to yourself or bystanders. Take into account rotation and the cutting forces applied to the workpiece when clamping to the faceplate. **Make sure your clamping application will not fail!**

Note: Depending on the workpiece, some additional support or counter-balance may be needed.

2. Slide the tailstock to the workpiece.
3. Lock the tailstock and then turn the tailstock quill so the dead center makes contact with the center point of your workpiece.
4. Lock the tailstock quill when sufficient pressure is applied to hold the workpiece in place.

Note: Use a lower RPM when machining heavy eccentric workpieces.

5. Clamp workpiece securely and counter-balance as needed.

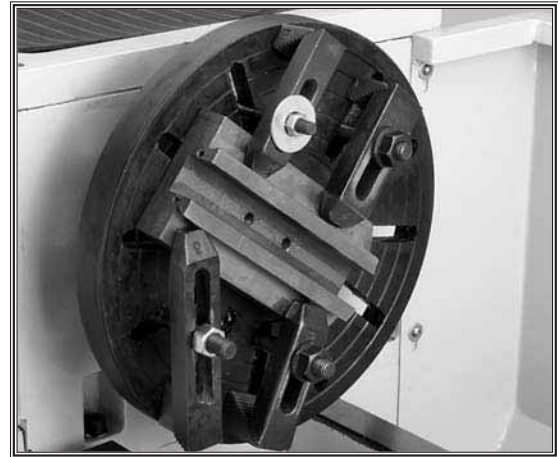
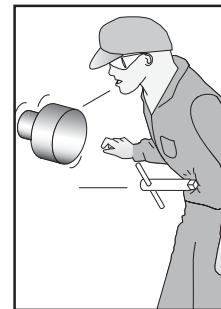


Figure 32. Faceplate with properly clamped workpiece in four locations.

WARNING

Use a minimum of three independent clamping devices when turning eccentric workpieces. Failure to provide adequate clamping will cause workpiece to eject.

WARNING



Securely clamp your workpiece and remove the chuck key! Thrown objects from a lathe can cause serious injury or death to the operator and to bystanders many feet away.

Gap Piece Removal

The Model M1100 comes equipped with a gap piece below the spindle that can be removed for turning large diameter parts or when using a large diameter faceplate.

The gap piece is installed, then ground at the factory during lathe assembly for precise fit and alignment. Factors during the remaining assembly apply additional forces to the gap; therefore, replacing the gap to the original position will be very difficult.

To remove the gap piece, do these steps:

1. Using a 10mm hex wrench, remove the four cap screws (see **Figure 33**).
2. Using a 17mm open end wrench, remove the two way bolts.
3. Position the gap pin puller on the pins and thread the puller bolt into the pin as shown in **Figure 34**.
4. Using a 14mm wrench, slowly tighten the gap puller bolt to extract the pin. Repeat this step on the adjacent pin.
5. Tap the outside of the gap piece with a dead blow hammer to loosen, and with the help of an assistant remove the gap piece.

To reinstall the gap piece, do these steps:

1. Clean all mating surfaces completely and inspect and remove any burrs. **ALL MATING SURFACES MUST BE ABSOLUTELY CLEAN!**
2. Apply a thin film of lithium grease to all freshly cleaned surfaces.
3. Carefully place the gap piece in position, and use blocks of wood and clamps to get mating surfaces back into alignment, and install the pins.
4. Lightly snug the four cap screws in place, and install the way bolts and lightly snug in place.
5. Tighten the appropriate cap screws and hex bolts to maintain the alignment.

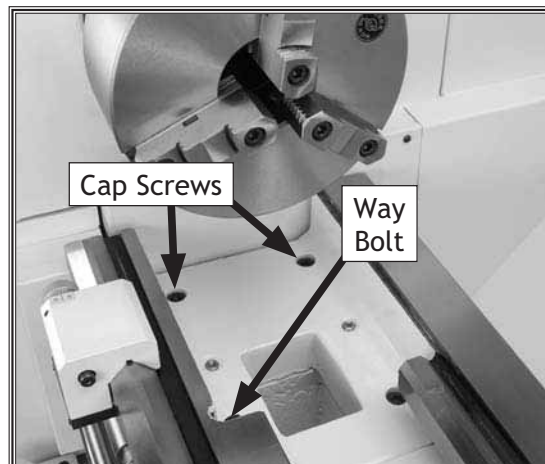


Figure 33. Lathe gap piece.

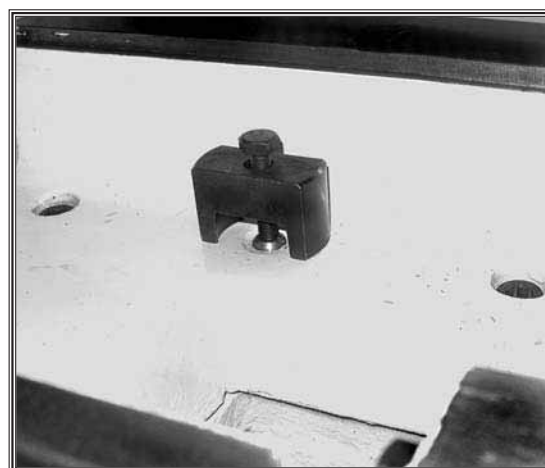


Figure 34. Gap pin puller installed on pin.

Tailstock

The MT#4 tailstock barrel can hold tapered drill bits, chucks, and an array of live and dead centers. Also, the tailstock—if offset—can hold a workpiece for cutting shallow tapers.

To operate the tailstock, do these steps:

1. Slide the tailstock to the desired position.
2. Pull up on the tailstock lock lever to lock the tailstock in place on the ways.

Note: Use the tailstock auxiliary clamp bolt (Figure 35) to add additional clamping force to lock the tailstock in place when turning extra large workpieces.

To operate the tailstock quill, do these steps:

1. With the tailstock locked, rotate the quill lock lever to unlock.
2. Turn the quill feed handle clockwise to feed/move the quill towards or away from the spindle.
3. Rotate the quill lock lever to lock the quill in place.

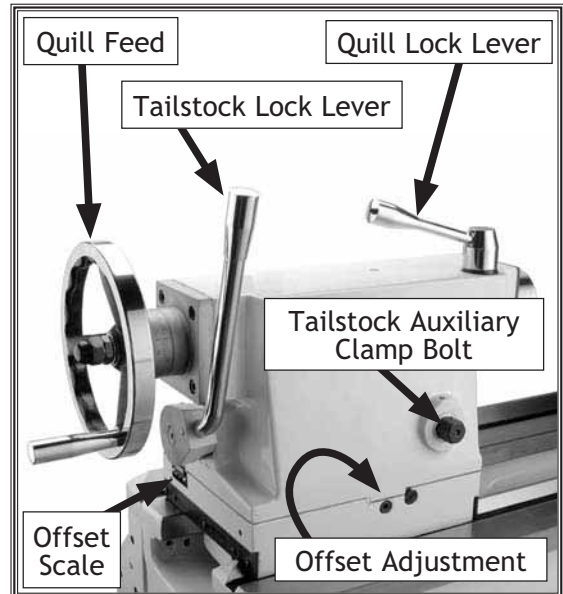


Figure 35. Tailstock and quill lock handles in locked position.

Drilling with the Tailstock

To install the tapered drill chuck, do these steps:

1. With the tailstock locked, unlock the quill lock lever.
2. Turn the quill feed handle clockwise to extend the quill about one inch.
3. Insert a tapered drill arbor (Figure 36) or the tapered drill shank into the quill until the taper is firmly seated.
4. Turn the quill feed handle clockwise to feed the drill bit into the rotating workpiece.
5. To remove the chuck taper, turn the quill feed handle counterclockwise until the chuck is pushed out from the tailstock taper.

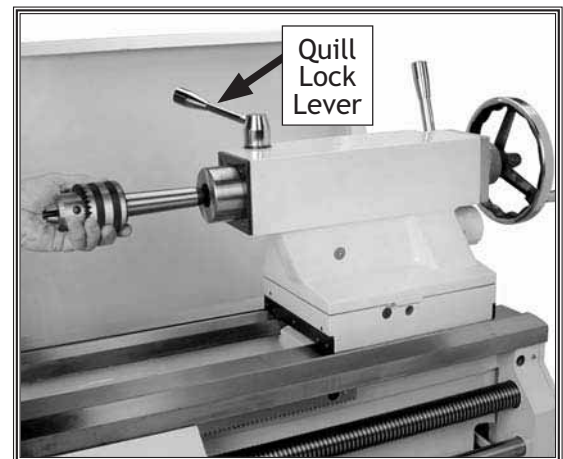


Figure 36. Setting up tailstock for drilling.

Cutting Shallow Tapers with the Tailstock

The tailstock can be offset to cut a shallow taper on a shaft.

To set up the tailstock to cut tapers, do these steps:

1. Lock the tailstock in position.
2. Alternately loosen and tighten the left and right offset adjustment screws until the desired offset is indicated on the scale (see Figures 37 and 38).
3. Retighten the lock screw.

Note: To return the tailstock back to the original position, repeat the process until the centered position is indicated on the scale.

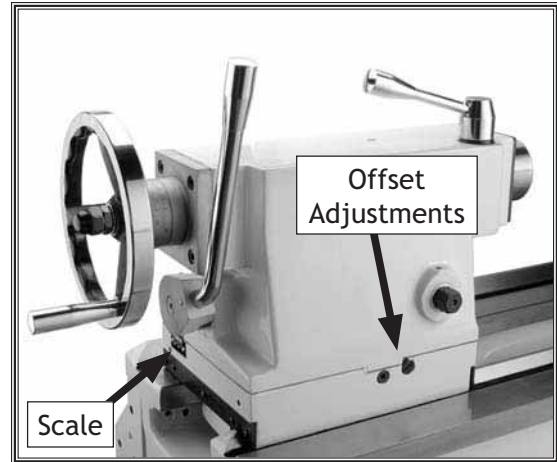


Figure 37. Right offset adjustment.

Tailstock Alignment

The tailstock on the Model M1100 is factory aligned with the headstock. We recommend that you take the time to ensure that the tailstock is aligned to your own desired tolerances.

To align the tailstock, do these steps:

1. Get two pieces of steel round stock that are 2" in diameter x 6" long.
2. Center drill both ends of one piece of the round stock. Set it aside for use in Step 6.
3. Using the other piece of stock, make a 60° dead center like the one shown in Figure 39.

Note: As long as the dead center remains in the chuck, the point of your center will remain true to the spindle axis. Keep in mind that the point will have to be refinished whenever it is removed and returned to the chuck.

4. Place the live center in the tailstock.

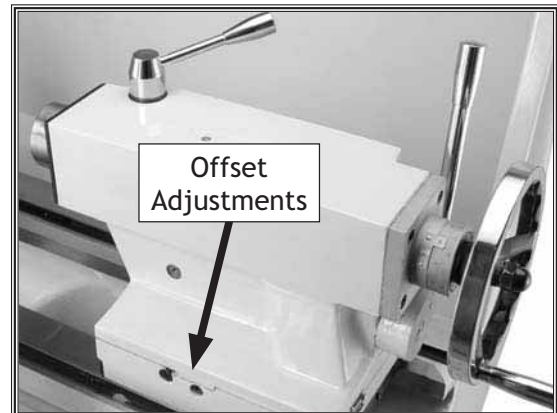


Figure 38. Left offset adjustment.

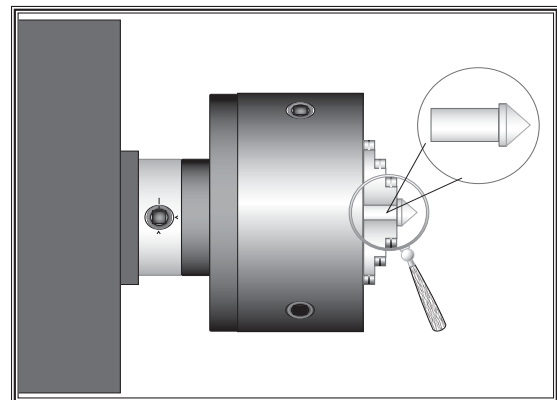



Figure 39. Tailstock centering dead center.

Continued on next page 

5. Attach a lathe eccentric to the bar stock and mount the bar stock between the centers (see **Figure 40**).
6. Turn approximately 0.010" off the diameter along the entire length.
7. Measure the stock with a micrometer.
 - If the stock diameter is thicker at the tailstock end, the tailstock needs to be moved toward the operator half the distance of the amount of the taper (see **Figure 41**).
 - If the stock diameter is thinner at the tailstock end, the tailstock needs to be moved away from the operator half the distance of the amount of the taper (see **Figure 42**).
8. Mount a dial indicator so the dial plunger is on the tailstock barrel before making adjustments to the tailstock.
9. Turn another 0.010" off of the diameter and check for a taper. Repeat this process as necessary until the desired amount of accuracy is achieved.

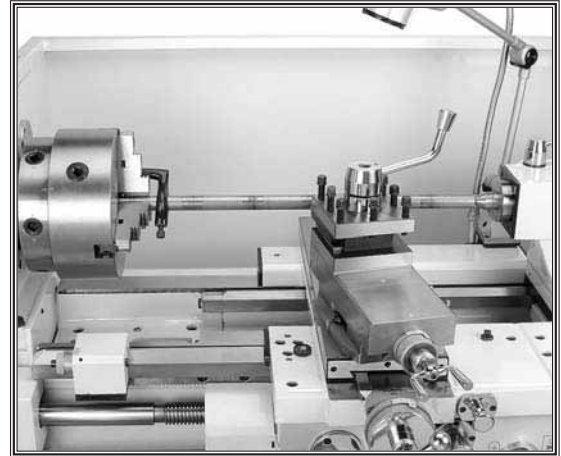


Figure 40. Checking tailstock alignment.

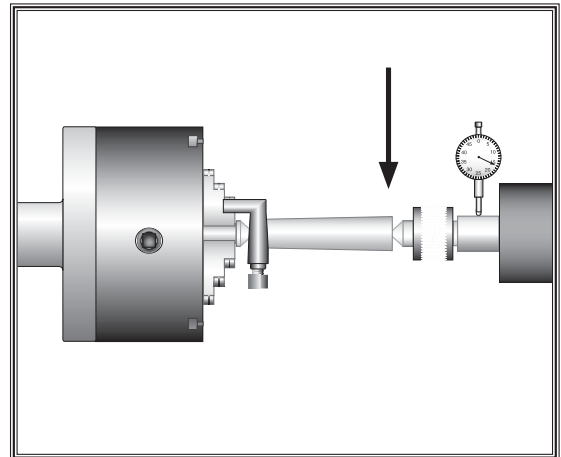


Figure 41. Tailstock adjustment option #1.

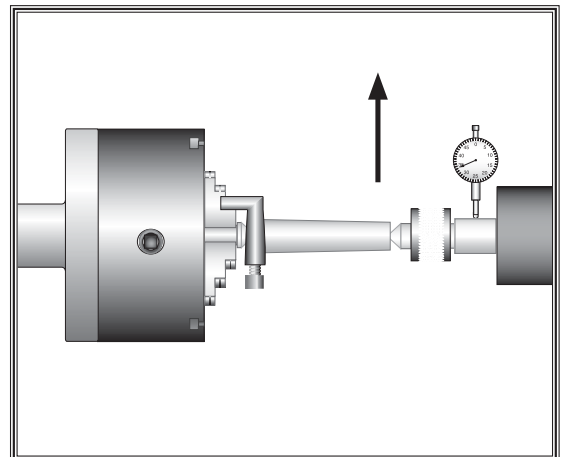


Figure 42. Tailstock adjustment option #2.

Centers

The Model M1100 lathe is supplied with an MT#4 live center and MT#5 dead center. The supplied sleeve fits into the spindle taper to hold the MT#5 dead center in the spindle. When using the dead center in the tailstock, make sure to keep the dead center tip and the workpiece lubricated.

To install a dead or live center, do these steps:

1. Feed the quill out about 1" so that the live center can be inserted. Make sure the bore and arbor are free of dirt, oil, and chips.
2. Insert the center into the quill opening. Matching tapers provide the locking action (see **Figure 43**).
3. Move the tailstock into position and lock in place.
4. Feed the quill into the workpiece.

Note: Make sure there is a center drilled hole in the end of the workpiece for the live center.

5. Lock the quill into place once the live center and the part rotate together. The quill may need to be adjusted during operation.
6. To remove the live center, retract the quill until the live center pops free.

The dead center can also be used in the spindle. This is common when using the faceplate and when turning between centers (see **Figure 44**).

To install the dead center in the spindle, do these steps:

1. Remove the chuck from the spindle.
2. Clean all mating surfaces carefully.
3. Install the dead center in the spindle sleeve.
4. Install the sleeve and center into the spindle.
5. Attach the faceplate to the spindle.

Note: When using the dead center in the spindle, use a lathe eccentric so that your part will rotate with the spindle and not spin on the dead center tip, and make sure to keep the dead center tip and the workpiece lubricated at all times.

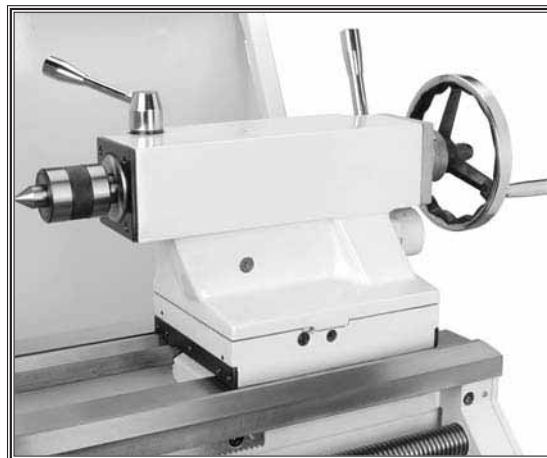


Figure 43. Live center installed.

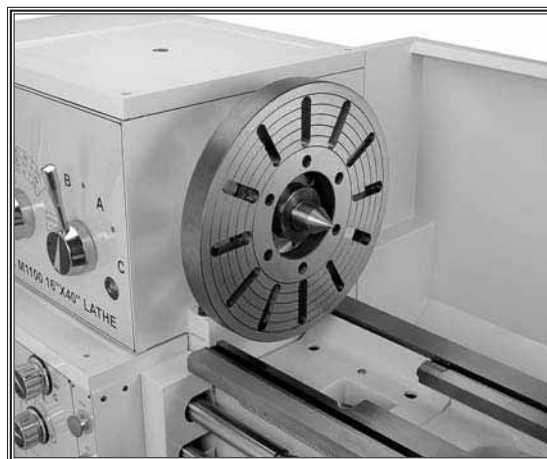


Figure 44. Faceplate and dead center setup.

NOTICE

Failure to keep dead center point well lubricated will damage dead center and workpiece.

Steady Rest

The steady rest serves as a support for long shafts. The steady rest can be placed anywhere along the length of the workpiece.

To install/use the steady rest, do these steps:

1. Place the steady rest on the lathe bedways so the triangular notch fits over the angled portion of the rear bedway.
2. Loosen the three T-bolts so the finger position can be adjusted (see **Figure 45**).
3. Loosen the knurled knob (see **Figure 45**) and open the steady rest so a workpiece can fit inside of the fingers (see **Figure 46**).
4. Position the steady rest where desired. Tighten the bolt at the base of the steady rest to secure in place.
5. Close the steady rest so that the workpiece is inside the fingers and tighten the knob.
6. Lubricate the finger tips with an anti-seize grease, and set the fingers snug to the workpiece. Secure by tightening the three T-bolts. Fingers should be snug and allow rotational movement of the workpiece.
7. Lubricate bearing surfaces during lathe operation.
8. After prolonged use, replace the fingers when necessary.

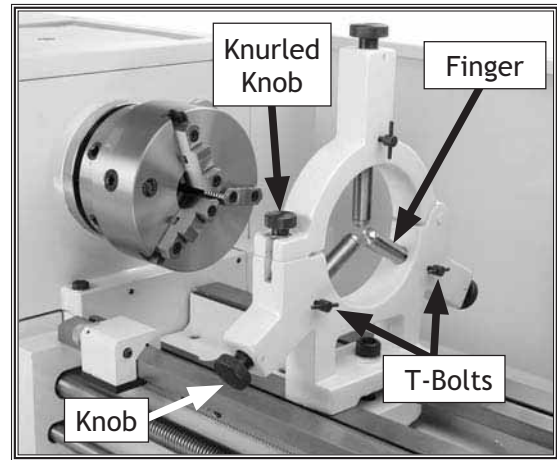


Figure 45. Steady rest adjustments.

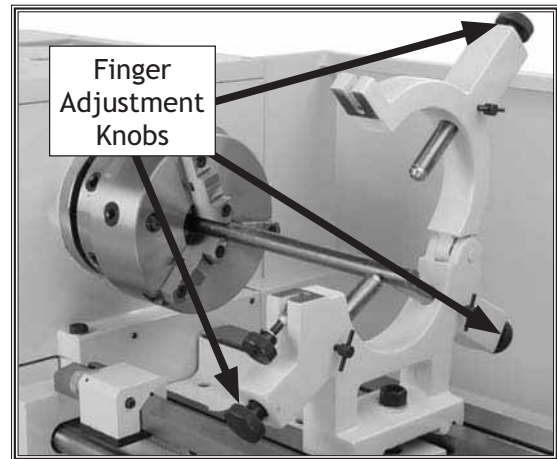


Figure 46. Positioning workpiece in steady rest.

Follow Rest

The follow rest in **Figure 47** is mounted on the saddle and follows the movement of the tool. The follow rest requires only two fingers, as the cutting tool acts as the third. The follow rest is used on long, slender parts to prevent flexing of the workpiece from the pressure of the cutting tool.

The sliding fingers are set similar to those of the steady rest—free of play but not binding. Always lubricate during operation. After prolonged use, the fingers will need to be milled or filed to cleanup the contact surface.



Figure 47. Follow rest attachment.

Setting Compound Slide

The compound slide is used to cut tapers on parts or to set the proper infeed angle when threading. It may also be used to cut specific lengths longitudinally, when set parallel to the spindle axis.

The compound slide handwheel has a graduated dial for precise inch feed increments. The base of the compound slide has a graduated scale for angular setup.

To set the angular position, do these steps:

1. Loosen the hex nuts on each side of the compound slide (see **Figure 48**).
2. Rotate the compound slide to the desired angular position. Use the scale at the base of the slide and the indicator marks on the carriage to set the position.
3. Tighten the two cap screws. Be sure to not over-tighten, as you may strip threads.

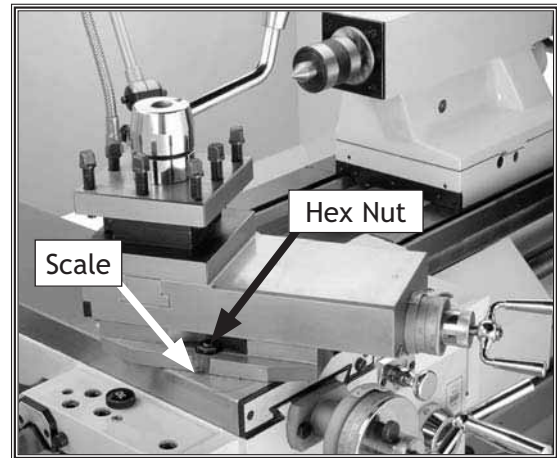


Figure 48. Compound slide set at an angle.

Four-Way Tool Post

The four-way tool post (**Figure 49**) is mounted on top of the compound slide, and allows a maximum of four tools to be loaded simultaneously.

The four-way tool post allows for quick indexing to new tools. This is accomplished by rotating the top handle counterclockwise and then rotating the tool post counterclockwise to the desired position. Rotate the top handle clockwise to lock the tool into position.



Figure 49. Four-way tool post.

NOTICE

Immediately remove tool post wrench after use to avoid contact with the workpiece during lathe operation.

Foot Brake

The Model M1100 lathe comes equipped with a foot brake (see **Figure 50**). The foot brake is intended to be used primarily as a time saving tool. The best method for using the foot brake is turn the spindle **OFF** and then use the foot brake.

Stepping on the foot brake while the spindle is **ON** will kill the power to the spindle control lever and will bring the spindle to a stop. Once stopped, the control lever will then need to be returned to the neutral position. The power light will show the power is still **ON**. Only the circuit to the spindle rotation ON/OFF lever will be interrupted.

Note: Do not confuse this feature with the emergency stop button. The emergency stop button cuts power to the machine and must be reset to restore power to the lathe.

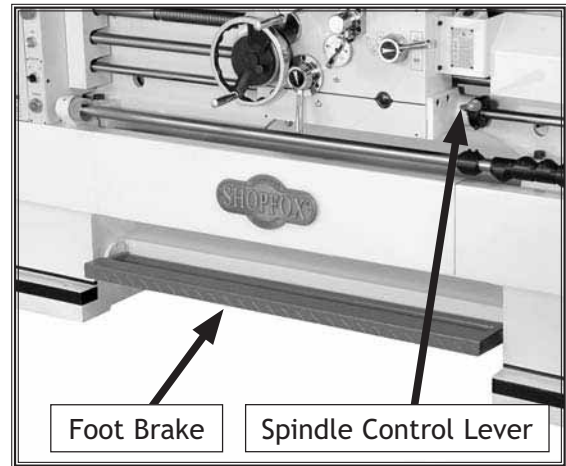


Figure 50. Foot brake and spindle control lever.

Manual Feed

You can manually move the cutting tool around the lathe with three methods. This section will review the individual controls on the carriage and provide descriptions of their uses (see **Figure 51**).

Longitudinal Handwheel

The longitudinal handwheel moves the carriage left or right along the bed. This control is helpful when setting up the machine for turning or when manual movement is desired during turning operations.

Cross Slide Handwheel

The cross slide handwheel moves the top slide toward and away from the work. Turning the dial clockwise moves the slide toward the workpiece.

Compound Slide Handwheel

The compound slide handwheel controls the position of the cutting tool relative to the workpiece. The graduated dial is adjustable using the same method as the dial on the cross slide. Angle adjustment is held by two hex nuts on the base of the compound slide.

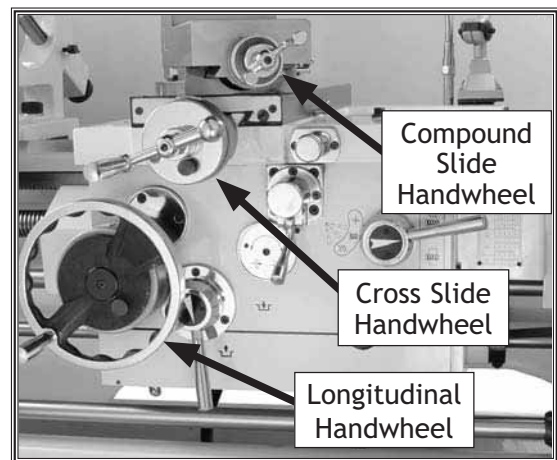


Figure 51. Carriage controls.

Setting RPM

To determine and set the needed cutting RPM:

1. Use the table in Figure 52 to determine the cutting speed required for the material of your workpiece.

⚠️ WARNING

Failure to follow RPM and feed rate guidelines may threaten operator safety from ejected parts or broken tools.

2. Determine the final diameter, in inches, for the cut you are about to take.

Note: For this step you will need to average out the diameters or work with the finish diameter for your calculations.

3. Use the following formula to determine the needed RPM for your operation:

$$\frac{(\text{Cutting Speed} \times 4)}{\text{Workpiece Diameter}} = \text{RPM}$$

4. With the calculated RPM, decide on the closest cutting RPM to what you need.
5. Make sure the spindle is completely stopped before proceeding.
6. Move the levers (Figure 53) to get the range that is closest to your calculated RPM:
 - The range lever selects A=High, B=Medium, or C=Low.
 - The RPM Lever selects the RPM within that range.

Note: You may need to rotate the chuck by hand to get the gears to engage.

Workpiece Material	Cutting Speed (sfm)
Aluminum & alloys	300
Brass & Bronze	150
Copper	100
Cast Iron, soft	80
Cast Iron, hard	50
Mild Steel	90
Cast Steel	80
Alloy Steel, hard	40
Tool Steel	50
Stainless Steel	60
Titanium	50
Plastics	300-800
Wood	300-500

Note: For carbide cutting tools, double the cutting speed. These values are a guideline only. Refer to the MACHINERY'S HANDBOOK for more detailed information.

Figure 52. Cutting speed table for HSS cutting tools.

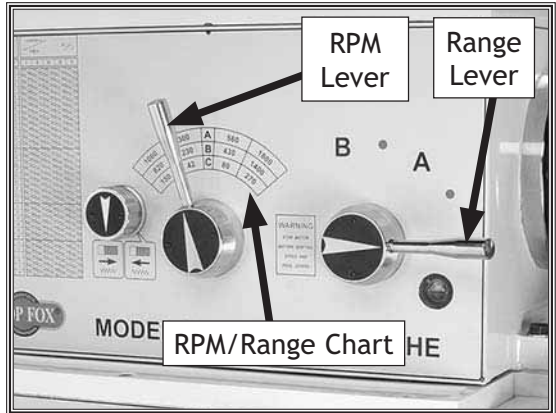


Figure 53. Spindle speed selector levers.

OPERATIONS

Setting Power Feed Rate

The carriage has longitudinal and cross slide power feed capabilities. These instructions are valid with a counter-clockwise rotation of the spindle "looking at the chuck." All directions reverse when spindle rotation is reversed.

To set and engage the power feed, do these steps:

1. Select feed rod direction (Figure 19).
2. Turn the feed rod dials (Figure 54) to achieve the needed apron power feed speed.

Note: You may need to rotate the chuck slightly or turn the feed rod to get selectors and gears to engage.

3. Move the half nut lever to the neutral position as shown in Figure 55.
4. Use the cross slide or longitudinal feed lever shown in Figure 56 to engage the cross slide or longitudinal feed when needed.
5. Use the apron feed clutch lever shown in Figure 56 to engage longitudinal feed.

Note: If an overload condition exists, the clutch will slip to help protect the apron gearing. The clutch adjustment screw (Figure 57) is set at the factory and should not need to be changed.

Note: Before using the manual micrometer stop and the five-position apron stop, refer to Page 38 for instructions and limitations.

Note: Threads can be cut by engaging the half nut lever but you must move the cross and longitudinal lever to neutral (Figure 56) first.

6. Use the spindle rotation ON/OFF lever (Figure 56) to start the lathe, and use the apron feed lever to start apron when you are ready.



Figure 54. Feed rod controls.

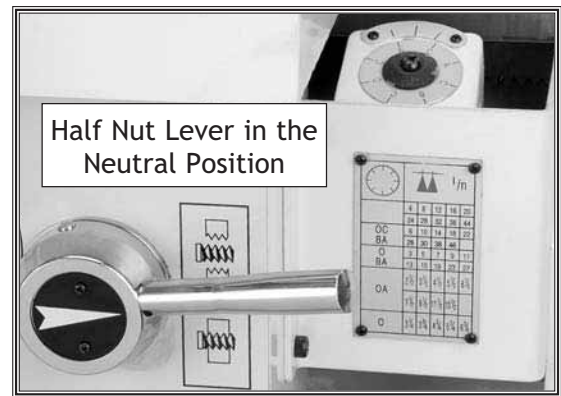


Figure 55. Disengaging half nut.

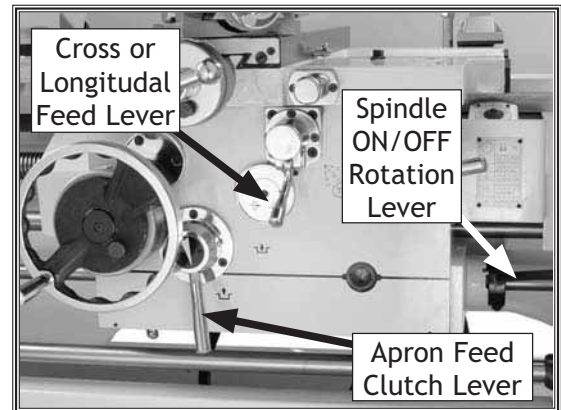


Figure 56. Feed selector lever.

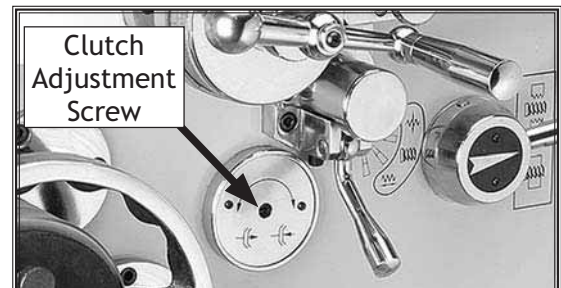


Figure 57. Clutch adjustment screw.

NOTICE

Feed rate is based on spindle RPM. High feed rates combined with high spindle speeds result in a rapidly moving carriage or cross slide. Pay close attention to the feed rate you have chosen and be ready to push the foot brake. Failure to fully understand this will cause the carriage to crash into the spindle.

Thread Settings

The Model M1100 lathe is capable of cutting inch and metric threads, and cuts that are dimetral (DM) and modular pitch (MP).

Note: You may need to rotate the chuck by hand or move the longitudinal handwheel to get selectors and gears to engage.

To determine thread settings, do these steps:

1. Calculate your required cutting speed for the material and shank diameter that you are going to thread.
2. Set the direction of lead screw rotation and the spindle RPM with the knob and levers on the headstock shown in **Figure 58**.
3. Refer to the lathe threading chart and move the three feed dials and the lever on the gearbox shown in **Figure 58** to the required threading positions.
4. Setup the cutting tool, compound rest, and cross slide to cut your threads.
5. Move the feed lever to the neutral or central position shown in **Figure 59** to disengage the cross slide and longitudinal feed.
6. Disengage the feed clutch lever as shown in **Figure 59**. (This clutch will not disengage the apron during threading operations).
7. Refer to the dial chart (**Figure 60**), and read the three conditions listed below to determine whether to use the half nut lever for threading operations:
 - If cutting inch threads, and the number of threads is not divisible by 4 (lead screw is 4 TPI), then you must use the thread dial.
 - If cutting inch threads, and the number of threads is divisible by 4, then do not use the thread dial.
 - If cutting metric threads, you will not use the thread dial. However, you must leave the half nut engaged until the threading operation is totally complete.
8. While threading, keep your foot on the brake so you are ready to stop the lathe to avoid potential apron/chuck crash.

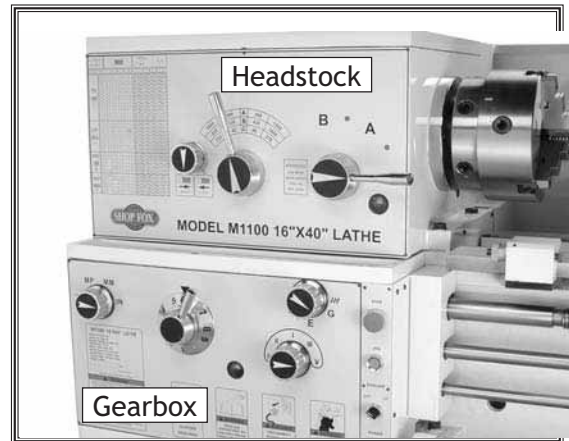


Figure 58. Lathe RPM and threading controls.

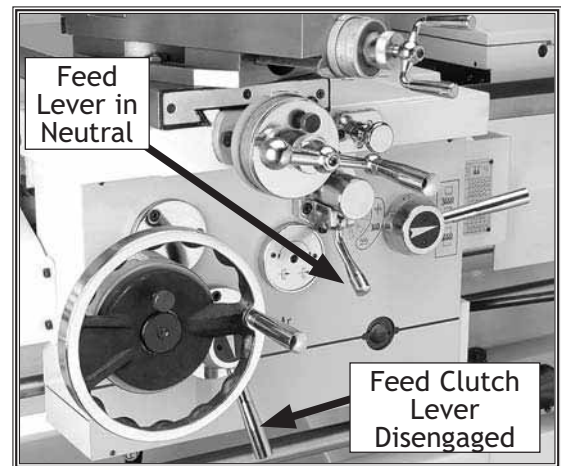


Figure 59. Apron control levers.

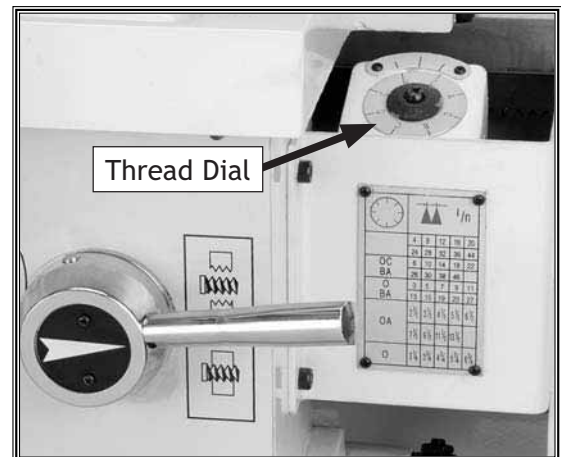


Figure 60. Thread dial chart.

LEAD SCREW 4T.P.I. CROSS SCREW 8T.P.I.							in/rev				
LEVER →		I	II	III	IV	V	I	II	III	IV	V
IN T/1"	1G	72	36	18	9	4 1/2	.0015	.0031	.0062	.0124	.0248
	4G	60	30	15	7 1/2	3 3/4	.0006	.0012	.0025	.0050	.0099
	6G	54	27	13 1/2	6 3/4	3 3/8	.0018	.0037	.0073	.0147	.0294
	1E	48	24	12	6	3	.0007	.0015	.0029	.0059	.0118
	2E	46	23	11 1/2	5 3/4	2 7/8	.0020	.0041	.0081	.0162	.0325
	3E	44	22	11	5 1/2	2 3/4	.0008	.0016	.0032	.0065	.0130
	8G	42	21	10 1/2	5 1/4	2 5/8	.0015	.0031	.0062	.0124	.0248
	4E	40	20	10	5	2 1/2	.0006	.0012	.0025	.0050	.0099
	5E	38	19	9 1/2	4 3/4	2 3/8	.0016	.0031	.0063	.0125	.0250
	6E	36	18	9	4 1/2	2 1/4	.0016	.0033	.0066	.0132	.0263
DP DP	3E	44	22	11	5 1/2	2 3/4	.0006	.0013	.0026	.0053	.0105
	8G	42	21	10 1/2	5 1/4	2 5/8	.0026	.0052	.0104	.0209	.0418
	4E	40	20	10	5	2 1/2	.0010	.0021	.0042	.0084	.0167
	5E	38	19	9 1/2	4 3/4	2 3/8	.0018	.0037	.0073	.0147	.0294
	6E	36	18	9	4 1/2	2 1/4	.0007	.0015	.0029	.0059	.0118
	7E	32	16	8	4	2	.0019	.0039	.0077	.0155	.0309
	8E	28	14	7	3 1/2	1 3/4	.0008	.0016	.0031	.0062	.0124
	9E	26	13	6 1/2	3 1/4	1 5/8	.0020	.0041	.0081	.0162	.0325
	1E	96	48	24	12	6	.0008	.0016	.0032	.0065	.0130
MM MM	2E	92	46	23	11 1/2	5 3/4	.0022	.0044	.0089	.0178	.0356
	3E	88	44	22	11	5 1/2	.0009	.0018	.0036	.0071	.0142
	4E	80	40	20	10	5	.0026	.0052	.0104	.0209	.0418
	5E	76	38	19	9 1/2	4 3/4	.0010	.0021	.0042	.0084	.0167
	6E	72	36	18	9	4 1/2	.0029	.0058	.0116	.0232	.0464
	7E	64	32	16	8	4	.0012	.0023	.0046	.0093	.0186
	8E	56	28	14	7	3 1/2	.0030	.0060	.0120	.0240	.0480
	9E	52	26	13	6 1/2	3 1/4	.0012	.0024	.0048	.0096	.0192
	1G	0.5	1	2	4	8	.0032	.0064	.0128	.0255	.0511
MP MP	1E	0.75	1.5	3	6	12	.0036	.0072	.0143	.0286	.0573
	4F		1.75	3.5	7	14	.0041	.0081	.0162	.0325	.0650
	6E	1	2	4	8	16	.0016	.0032	.0065	.0130	.0260
	7E		2.25	4.5	9	18	.0044	.0087	.0174	.0348	.0696
	8F	1.25	2.5	5	10	20	.0018	.0035	.0070	.0139	.0278
	1G	0.25	0.5	1	2	4	.0021	.0043	.0085	.0170	.0340
	1E		0.75	1.5	3	6	.0008	.0017	.0034	.0068	.0136
	4F			1.75	3.5	7	.0025	.0051	.0102	.0205	.0410
6E	0.5	1	2	4	8	.0010	.0020	.0041	.0082	.0164	
7E			2.25	4.5	9	.0028	.0057	.0114	.0228	.0456	
8F		1.25	2.5	5	10	.0011	.0023	.0046	.0091	.0182	
1G	0.25	0.5	1	2	4	.0032	.0064	.0128	.0255	.0511	
1E		0.75	1.5	3	6	.0013	.0026	.0051	.0102	.0204	
4F			1.75	3.5	7	.0037	.0073	.0146	.0293	.0585	
6E	0.5	1	2	4	8	.0015	.0029	.0058	.0117	.0234	
7E			2.25	4.5	9	.0034	.0068	.0135	.0271	.0542	
8F		1.25	2.5	5	10	.0014	.0027	.0054	.0108	.0217	
						.0034	.0068	.0135	.0271	.0542	
						.0041	.0081	.0162	.0325	.0650	
						.0016	.0032	.0065	.0130	.0260	
						.0044	.0089	.0178	.0356	.0712	
						.0018	.0036	.0071	.0142	.0285	
						.0050	.0101	.0201	.0402	.0805	
						.0020	.0040	.0080	.0161	.0322	
						.0057	.0114	.0228	.0456	.0913	
						.0023	.0046	.0091	.0182	.0365	

OPERATIONS

Manual Micrometer Stop

This lathe is equipped with a manual micrometer stop (Figure 61). Toward the end of the cut and as the tool approaches the shoulder of a workpiece, disengage the apron and then manually finish the cut by hand-operating the apron.

The micrometer stop is not an automatic apron stop. If used as such—where the dead stop forces the clutch to keep disengaging the apron—lathe damage will occur. Use the five-position apron stop for disengaging the auto feed automatically, not the manual micrometer stop.

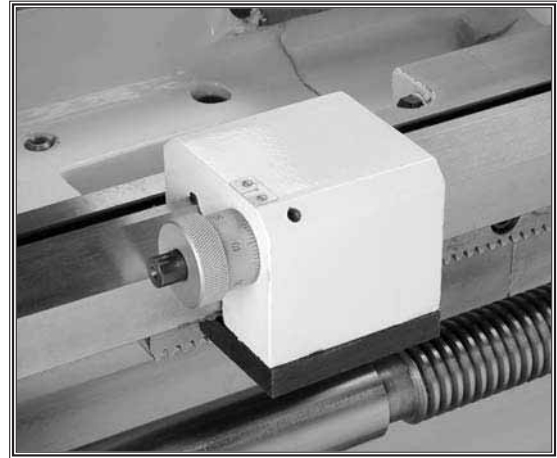


Figure 61. Micrometer stop.

Five-Position Apron Stop

NOTICE

This five-position apron stop system is only made to disengage the apron from the feed rod. When the lead screw is engaged for threading operations, the five-position apron stop system will not disengage the apron—you must manually disengage the apron from the feed rod with the half nut lever or the apron will crash into the chuck.

Use the five-position apron stop for disengaging the apron automatically at up to five different apron locations. You can tighten the eccentrics in place on the rod, each at different rotated positions, so each eccentric corresponds with a number on the dial. Then, depending which number you turn the stop selection dial (Figure 62) to, the rod will align the crown of the stop eccentric where you want the apron to stop. When the apron reaches that point, the crown of the stop eccentric will depress the clutch release piston and disengage the apron from the feed rod.

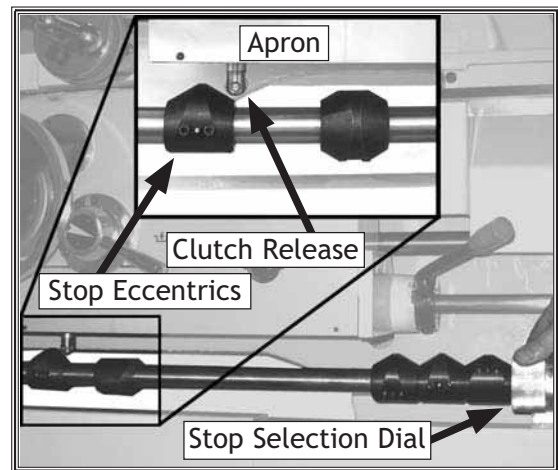


Figure 62. Five position apron stop.

MAINTENANCE

General Maintenance

Regular periodic maintenance of your lathe will ensure optimum performance. Make a habit of inspecting your machine each time you use it.

Check for the following conditions and repair or replace when necessary:

- Loose mounting bolts and chuck.
- Worn switch or safety features.
- Worn or damaged electrical.
- Damaged V-belt.
- Any other condition that could hamper the safe operation of this machine.

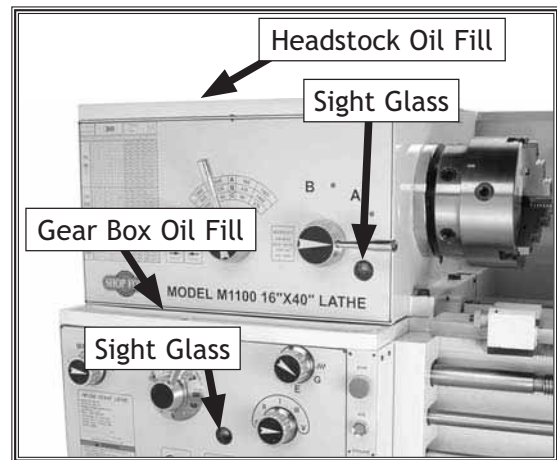


Figure 63. Sight glasses and fill plugs.

General Cleaning

Clean your machine every day or more often as needed. Make sure to disconnect the lathe from power before cleaning it. Never blow the lathe off with compressed air, otherwise you will force metal shavings deep into lathe mechanisms. Remove chips with rags, brushes, and a shop vacuum. Chips soaked with water-based coolant and left on the machine will eventually create rust and a gummy residue around moving parts.

Never use acetone, gasoline, or lacquer thinner to wipe off stains or oil from painted surfaces. These chemicals will melt the paint. Use mineral spirits or mild household degreasers.

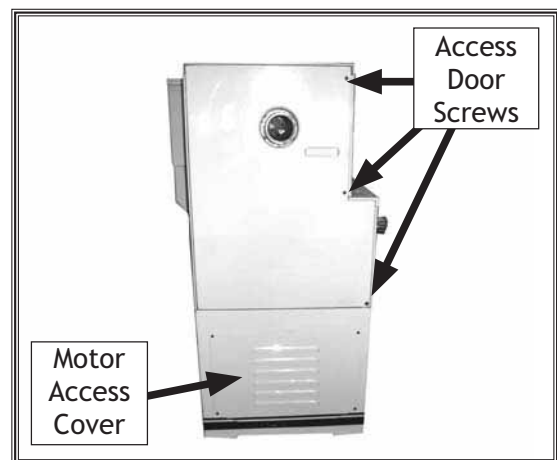


Figure 64. Access door and motor cover.

General Lubrication

The headstock, gear box, and apron need to be filled with oil so $\frac{3}{4}$ of the sight glasses are covered with oil (see Figures 63 and 66). After break-in, change all of the oils immediately, and then again after three months. After that, change the oils at the same time on an annual basis or more frequently if extreme machine use requires it.

To control surface rust on machined surfaces, wipe the unprotected metal as required with this same oil.

Paint all gears in Figure 65 with a good quality automotive wheel bearing grease as required to keep lubricated.

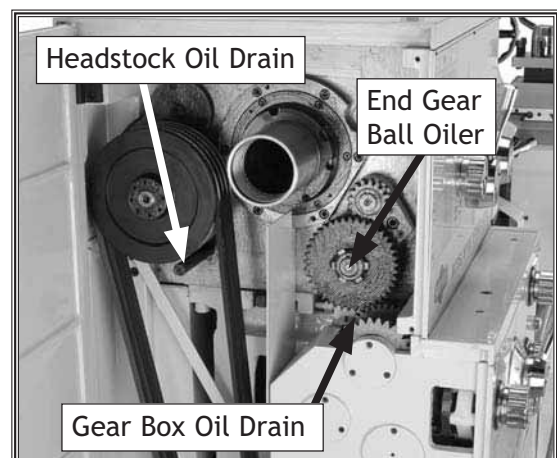


Figure 65. Headstock and gear box drain locations.

For daily lubrication of the ways and the cross feed, push the apron hand pump twice. Make sure to keep an eye on the apron oil level as the pump draws oil from the apron reservoir.

For daily general lubrication, use the manual oil gun with the same gear box lubricant to lubricate the following oil ball fittings. See **Figure 67** for some typical locations. Wipe off the oil ball with a rag and then oil the following locations:

- Apron Stop Control Bar (1 ball oiler each end)
- Apron Hand Wheel Shaft (1 ball oiler)
- Cross Slide (3 ball oilers on top)
- Cross Slide Handwheel Shaft (1 ball oiler)
- Compound Rest (2 ball oilers on top)
- Four Way Tool Post (1 ball oiler on top)
- Thread Dial Housing (2 ball oilers on right side)
- Tailstock (1 ball oilers on top)
- Feed Rod End Cap (1 ball oiler right end)
- Lead Screw End Cap (1 ball oiler right end)
- End Gear (1 ball oiler, see **Figure 65**)

Coolant System

To maintain the coolant system, do these steps:

1. Loosen the screws, lift out the pump access cover, and slide out the pump/reservoir (**Figure 68**).
2. Remove the chips, replace the coolant, and reinstall the reservoir.
3. Turn the coolant pump **ON** to prime the coolant system and to see if the coolant is cycling properly.
4. Reinstall the pump/reservoir tank and access cover.

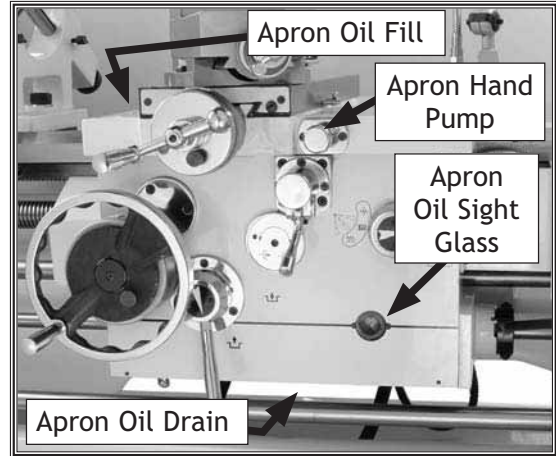


Figure 66. Apron lubrication references.

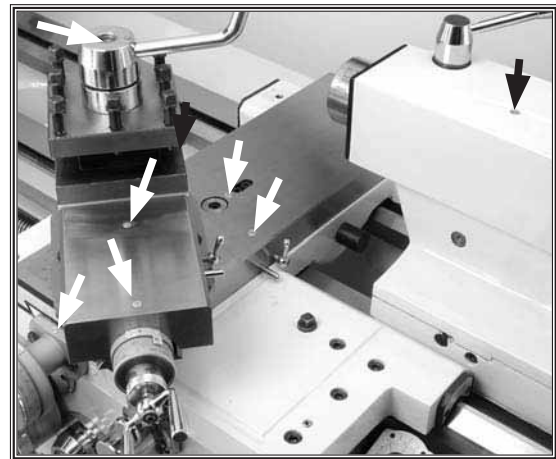


Figure 67. Typical ball fitting locations.

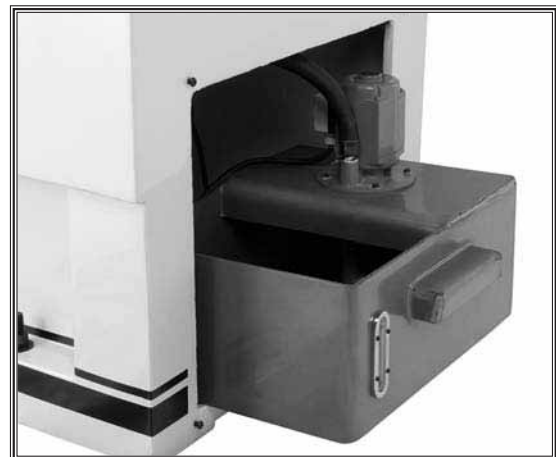


Figure 68. Coolant pump and reservoir.

! WARNING
BIOLOGICAL and POISON
HAZARD!

The reservoir on this machine is designed to store coolant. During storage some fluids grow dangerous microbes or collect toxic heavy metals in the fluid, making it a biological and poison hazard.

- To prevent infections and poisoning, use the correct personal protection equipment when handling coolant and change coolant often.
- To properly dispose of toxic coolant, follow federal, state, and fluid manufacturer procedures.

NOTICE

Failure to follow lubrication guidelines will lead to rapid deterioration of lathe components.

MAINTENANCE

SERVICE

Cross Slide Backlash

Backlash is the amount of play found in a lead screw. It can be found by turning the cross slide handwheel in one direction, and then turning the handwheel the other direction. When the cross slide begins to move, the backlash has been taken up.

Note: Avoid the temptation to overtighten the cross slide backlash screw. Overtightening will cause excessive wear to the sliding block and lead screw.

Backlash is adjusted by tightening or loosening the screw shown in **Figure 69**. This screw draws a wedge-type nut against the lead screw and main nut. If you get it too tight, loosen the screw a few turns and tap the cross feed a few times with a rubber or wooden mallet and turn the handle slowly back and fourth until the handle turns freely.

To readjust the backlash, rock the handle back and fourth and tighten the screw slowly until the backlash is at approximately 0.001" as indicated on the handwheel dial.

Note: Reducing backlash to less than 0.001" is impractical and reduces the life of the cross slide.

Cross Slide and Compound Slide Gib Adjustment

When adjusting these gibs (**Figures 70 and 71**), keep in mind that the goal is to remove sloppiness in the ways without causing the slides to bind. Loose gibs will cause a poor finish on the workpiece and may cause undue wear on the slide, lead screw, and nut. The cross slide gib is a tapered piece of iron. When the opposing front and rear gib adjustment screws are turned in opposing directions, the screws force the tapered gibs to fill the loose void in the way, thus tightening the play in the cross slide. If more play is needed turn the screws the other direction.

For the four saddle gibs, (**Figure 70**) loosen the jam nuts and turn the square-head bolts until there is slight tension felt and the gib plates are slightly preloaded against the underside of the flat-way. Tighten the jam nuts when finished.

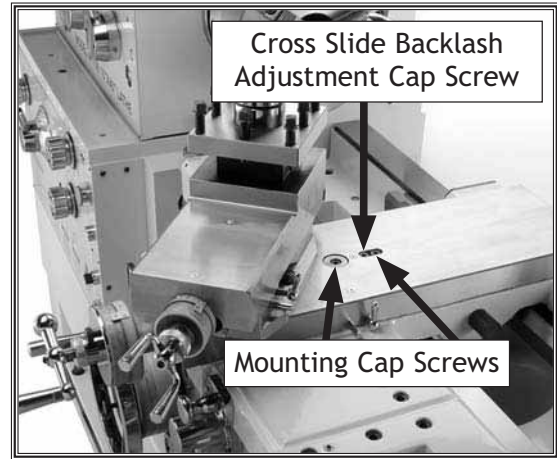


Figure 69. Cross Slide backlash adjustment socket head cap screw.

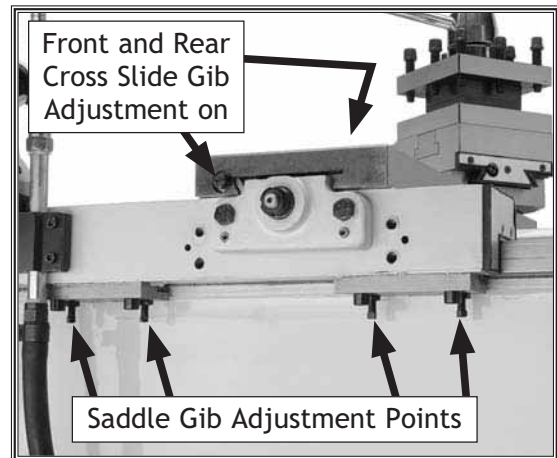


Figure 70. Saddle gib adjustments.

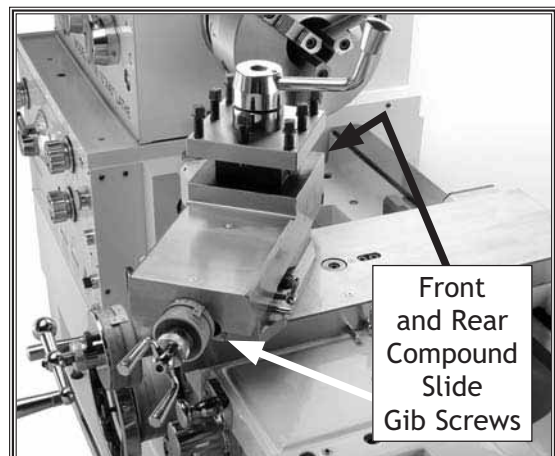


Figure 71. Compound slide gib adjustment.

SERVICE

Replacing or Adjusting the V-Belts

To replace or adjust the V-belts, do these steps:

1. DISCONNECT POWER TO THE LATHE!
2. Remove the three screws from the access door and open the door (Figure 72).
3. Loosen the four motor access cover screws, and lift the cover off (Figure 72).
4. Adjust the four motor mount stud nuts (Figure 74) to raise the motor and remove and replace the belts, or to adjust the belt tension. All four belts must have $\frac{1}{2}$ " deflection at the belt centers (Figure 73).

Note: Always replace the four belts as a matched set, or premature belt failure and poor performance will occur.

5. Close the door and reinstall the motor cover.



Figure 72. Access doors and panel.

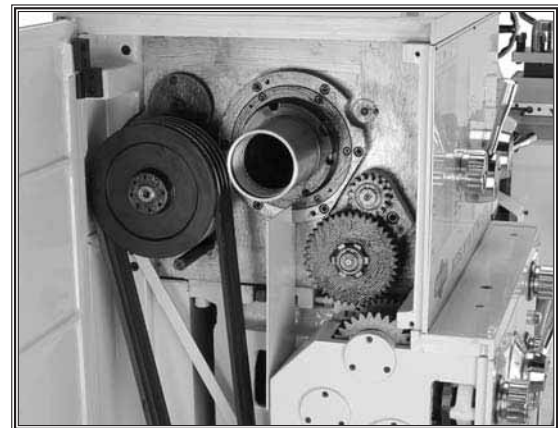


Figure 73. Upper belt access.

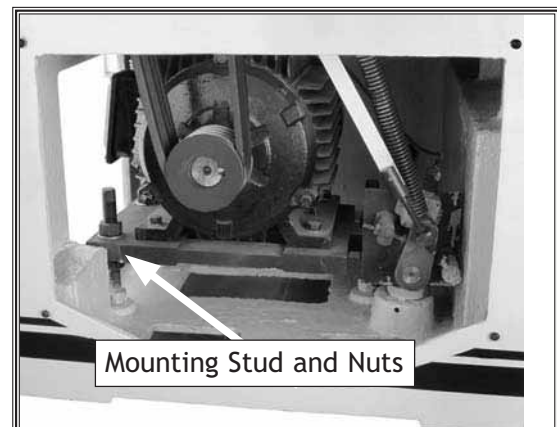


Figure 74. V-belt adjustments.

Electrical Components

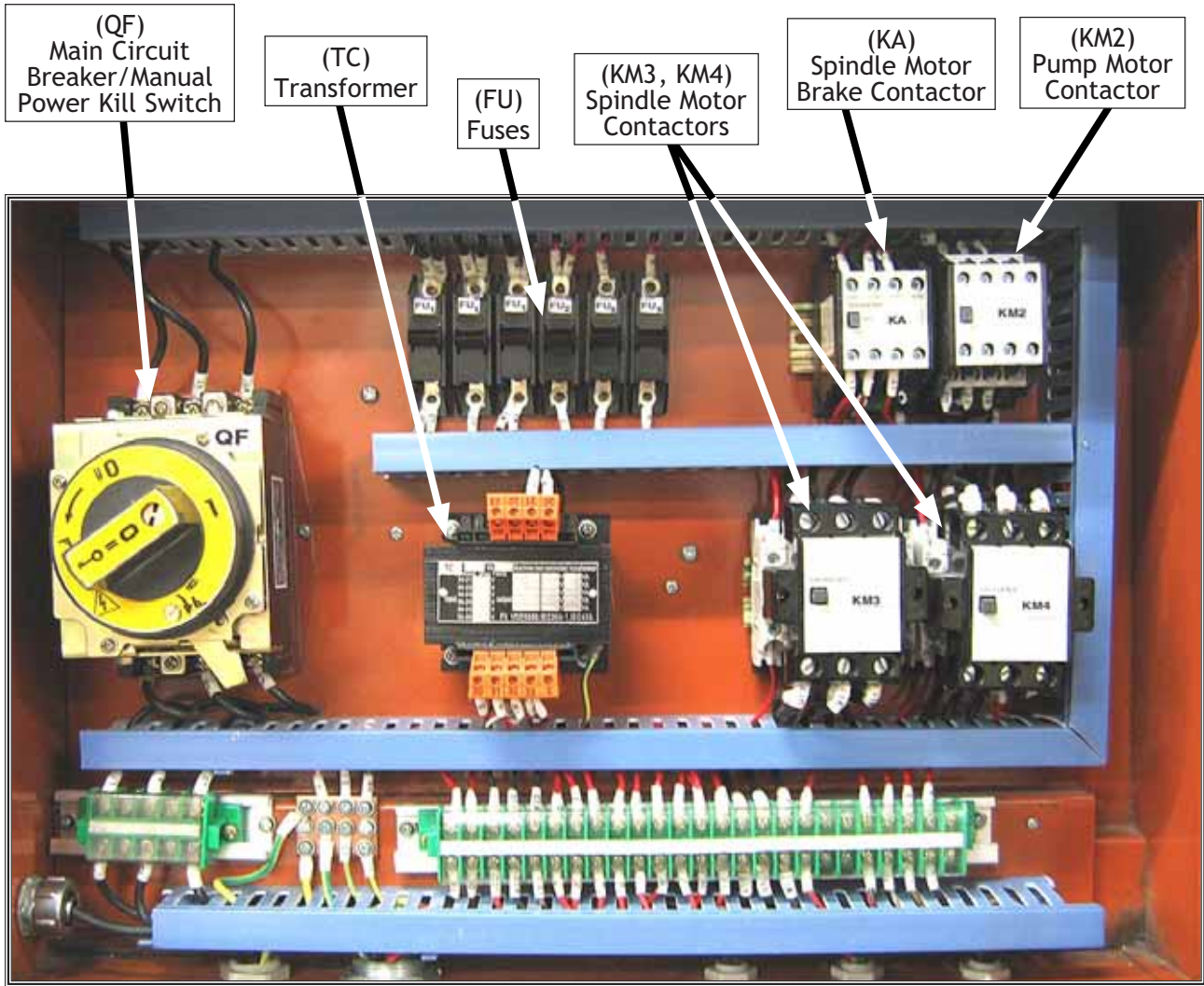


Figure 75. Model M1100 electrical panel.

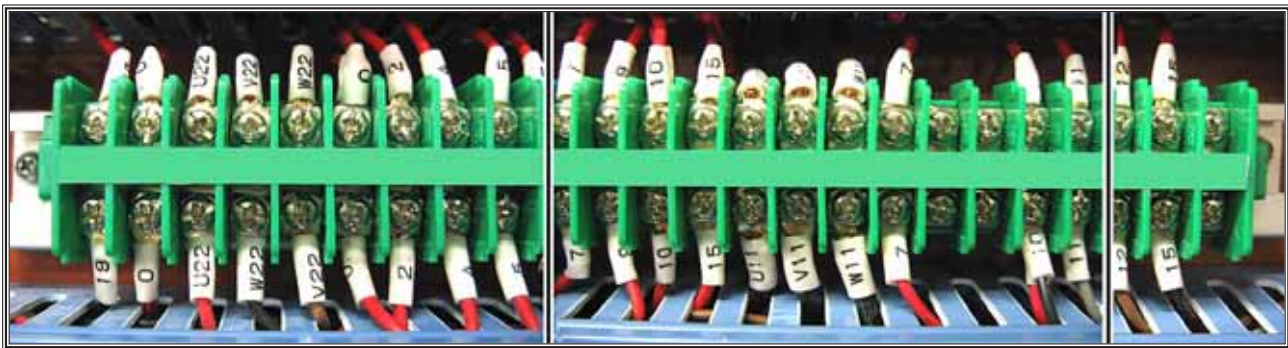


Figure 76. Main electrical box bus bar.

SERVICE

General Electrical Connections

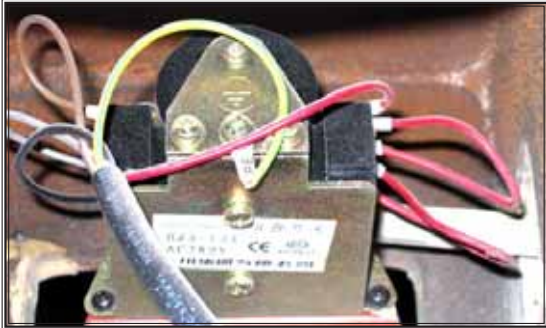


Figure 77. Spindle motor direction switch (SA3) (hidden above pump and tank assembly in lathe stand casting).



Figure 80. Spindle brake switch (SQ2).

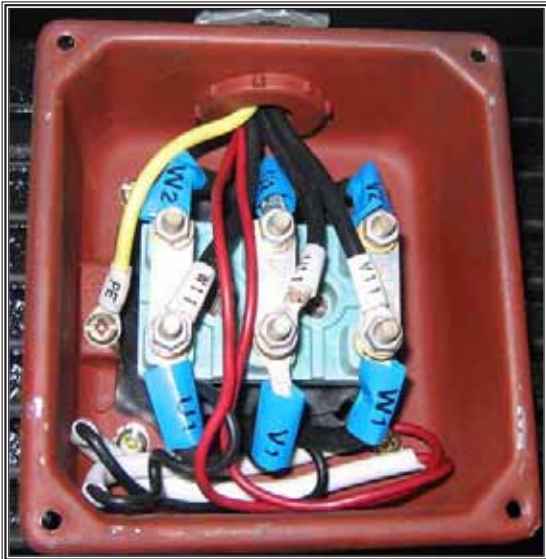


Figure 78. Spindle motor (M1) wiring.



Figure 81. Lathe power-in junction box (located at right-rear of lathe stand).



Figure 79. Pump motor (M2) wiring.

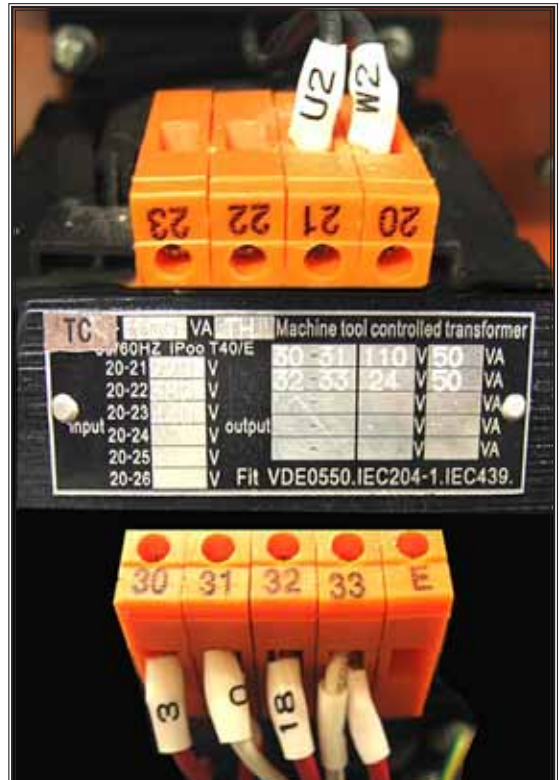


Figure 82. Transformer (TC).

SERVICE

Control Panel Electrical Connections



Figure 83. Emergency stop button (SB2).



Figure 84. Jog button (SB1).



Figure 85. Pump switch (SA2).



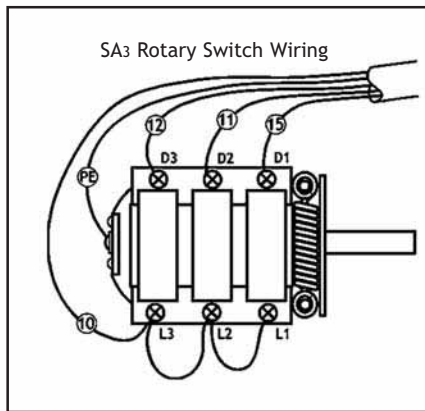
Figure 86. Power lamp (HL).

SERVICE

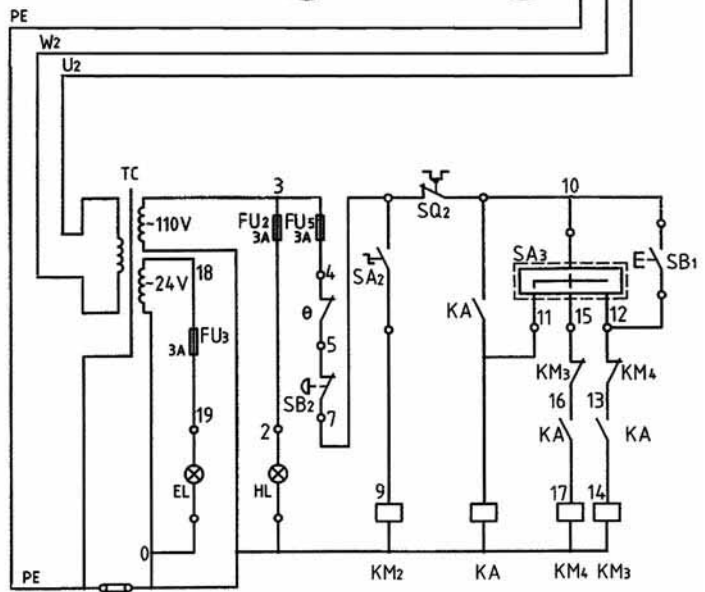
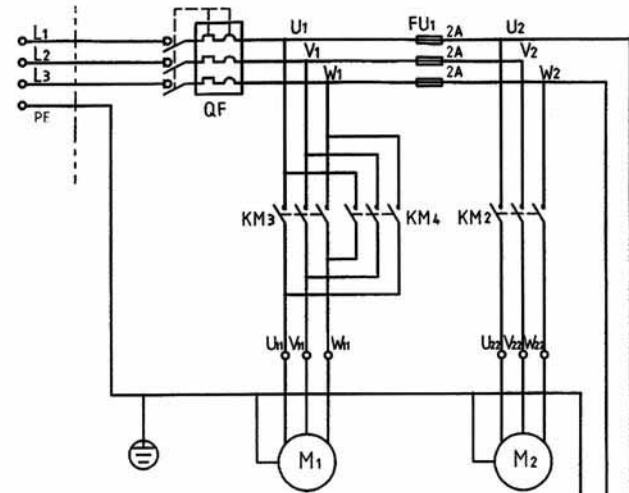
Wiring Diagram

WARNING
 Disconnect power to the lathe before performing any electrical work, service, or adjustment.

OFF



LEGEND	
M	= Motor
KM	= Contactor
KA	= Relay
EL	= Work Lamp
HL	= Indicator Lamp
SB	= Button
SA	= Switch
SQ	= Limit Switch
TC	= Transformer
QF	= Main Circuit
FU	= Fuse



SERVICE

Troubleshooting

This section covers the most common lathe problems. DO NOT make any adjustments until the lathe is disconnected from power and all moving parts have come to a complete stop.

Motor & Electrical

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Motor will not start.	<ol style="list-style-type: none"> 1. Incorrect lathe operation. 2. Main power switch is OFF. 3. Emergency switch is pushed in. 4. Circuit breaker or fuse is at fault. 5. No voltage or open connection. 6. Defective rotary or other electrical switch. 7. Motor is at fault. 	<ol style="list-style-type: none"> 1. Use the spindle direction ON/OFF lever. 2. Turn the main power switch ON at the back of the lathe. 3. Rotate emergency switch so it pops out. 4. Seek an electrician to troubleshoot and repair the shop power supply. 5. Test circuit, replace wires and connections as required. 6. Use diagram to troubleshoot the machine circuit. Replace electrical component as required. 7. Replace motor.
Fuses or circuit breakers trip open.	<ol style="list-style-type: none"> 1. Short circuit in line cord or plug. 2. Short circuit in motor or loose connections. 3. Incorrect fuses or circuit breakers in power supply. 	<ol style="list-style-type: none"> 1. Inspect cord or plug for damaged insulation and shorted wires. 2. Inspect all connections on motor for loose or shorted terminals or worn insulation. 3. Install correct fuses or circuit breakers.
Carriage hard to move.	<ol style="list-style-type: none"> 1. Chips have loaded up on bedways. 2. Bedways are dry and in need of lubrication. 3. Longitudinal stops are interfering. 4. Gibs are too tight. 	<ol style="list-style-type: none"> 1. Frequently clean away chips that load up during turning operations. 2. Lubricate bedways and handles. 3. Check to make sure that stops are floating and not hitting the center stop. 4. Loosen gib screw(s) slightly.
Machine is loud when cutting. Overheats or bogs down in the cut.	<ol style="list-style-type: none"> 1. Excessive depth of cut. 2. RPM or Feed Rate wrong for operation. 3. Dull cutters. 	<ol style="list-style-type: none"> 1. Decrease depth of cut. 2. Refer to RPM Feed rate chart for appropriate rates. 3. Sharpen or replace cutters.
Bad surface finish.	<ol style="list-style-type: none"> 1. Wrong RPM or feed rate. 2. Dull tooling or tool not centered correctly. 3. Too much play in gibs. 	<ol style="list-style-type: none"> 1. Adjust for appropriate RPM and feed rate. 2. Sharpen tooling and/or center tool correctly. 3. Tighten gibs.
Gear change levers will not shift into position.	<ol style="list-style-type: none"> 1. Gears not aligned in headstock. 	<ol style="list-style-type: none"> 1. Rotate spindle by hand until gear falls into place.
Can't remove tapered tool from quill.	<ol style="list-style-type: none"> 1. Quill had not retracted all the way back into the tailstock. 	<ol style="list-style-type: none"> 1. Turn the quill handwheel until it forces taper out of quill.

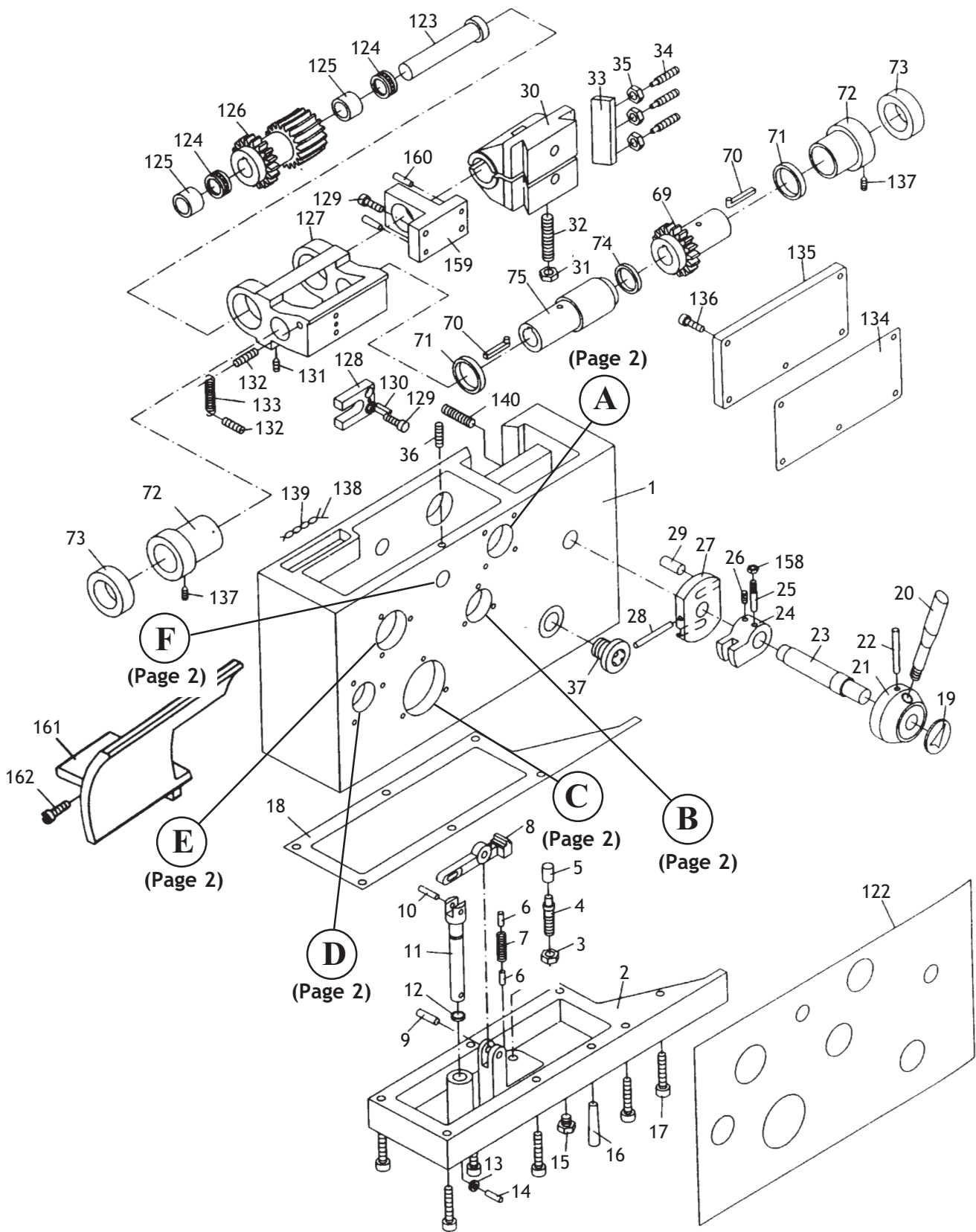
Operation and Work Results

Symptom	Possible Cause	Possible Solution
Entire machine vibrates excessively upon startup and while running.	<ol style="list-style-type: none"> 1. Workpiece is unbalanced. 2. Loose or damaged belt(s). 3. V-belt pulleys are not properly aligned. 4. Worn or broken gear present. 5. Chuck or faceplate has become unbalanced. 6. Spindle bearings badly worn. 	<ol style="list-style-type: none"> 1. Reinstall workpiece so it is as centered with the spindle bore as possible. 2. Tighten/replace the belt as necessary. 3. Align the V-belt pulleys. 4. Inspect gears and replace if necessary. 5. Rebalance chuck or faceplate; contact a local machine shop for help. 6. Replace spindle bearings.
Bad surface finish.	<ol style="list-style-type: none"> 1. Wrong RPM or feed rate. 2. Dull tooling or poor tool selection. 3. Too much play in gibs. 4. Tool too high. 	<ol style="list-style-type: none"> 1. Adjust for appropriate RPM and feed rate. 2. Sharpen tooling or select a better tool for the intended operation. 3. Tighten gibs. 4. Lower the tool position.
Can't remove tapered tool from tailstock quill.	<ol style="list-style-type: none"> 1. Quill had not retracted all the way back into the tailstock. 2. Debris was not removed from taper before inserting into quill. 	<ol style="list-style-type: none"> 1. Turn the quill handwheel until it forces taper out of quill. 2. Always make sure that taper surfaces are clean.
Cross slide, compound slide, or carriage feed has sloppy operation.	<ol style="list-style-type: none"> 1. Gibs are out of adjustment. 2. Handwheel is loose. 3. Lead screw mechanism worn or out of adjustment. 	<ol style="list-style-type: none"> 1. Tighten gib screw(s). 2. Tighten handwheel fasteners. 3. Tighten any loose fasteners on lead screw mechanism.
Cross slide, compound slide, or carriage feed handwheel is hard to move.	<ol style="list-style-type: none"> 1. Gibs are loaded up with shavings, dust, or grime. 2. Gib screws are too tight. 3. Backlash setting too tight (cross slide only). 4. Bedways are dry. 	<ol style="list-style-type: none"> 1. Remove gibs, clean ways/dovetails, lubricate, and readjust gibs. 2. Loosen gib screw(s) slightly, and lubricate bedways. 3. Slightly loosen backlash setting by loosening the locking screw and adjusting the spanner ring at the end of the handle. 4. Lubricate bedways and handles.
Cutting tool or machine components vibrate excessively during cutting.	<ol style="list-style-type: none"> 1. Tool holder not tight enough. 2. Cutting tool sticks too far out of tool holder; lack of support. 3. Gibs are out of adjustment. 4. Dull cutting tool. 5. Incorrect spindle speed or feed rate. 	<ol style="list-style-type: none"> 1. Check for debris, clean, and retighten. 2. Reinstall cutting tool so no more than 1/3 of the total length is sticking out of tool holder. 3. Tighten gib screws at affected component. 4. Replace or sharpen cutting tool. 5. Use the recommended spindle speed.
Inaccurate turning results from one end of the workpiece to the other.	<ol style="list-style-type: none"> 1. Headstock and tailstock are not properly aligned with each other. 	<ol style="list-style-type: none"> 1. Realign the tailstock to the headstock spindle bore center line.
Chuck jaws won't move or don't move easily.	<ol style="list-style-type: none"> 1. Chips lodged in the jaws. 	<ol style="list-style-type: none"> 1. Remove jaws, clean and lubricate chuck threads, and replace jaws.
Carriage won't feed.	<ol style="list-style-type: none"> 1. Gears are not all engaged. 2. Gears are broken. 3. Loose screw on the feed handle. 	<ol style="list-style-type: none"> 1. Adjust gear positions. 2. Replace. 3. Tighten.

SERVICE

Symptom	Possible Cause	Possible Solution
Loud, repetitious noise coming from machine at or near the motor.	<ol style="list-style-type: none"> 1. Pulley setscrews or keys are missing or loose. 2. Motor fan is hitting the cover. 	<ol style="list-style-type: none"> 1. Inspect keys and setscrews. Replace or tighten if necessary. 2. Tighten fan or shim cover, or replace items.
Carriage hard to move.	<ol style="list-style-type: none"> 1. Carriage lock is tightened down. 2. Chips have loaded up on bedways. 3. Bedways are dry and in need of lubrication. 4. Longitudinal stops are interfering. 5. Gibs are too tight. 	<ol style="list-style-type: none"> 1. Check to make sure table locks are fully released. 2. Frequently clean away chips that load up during turning operations. 3. Lubricate bedways and handles. 4. Check to make sure that stops are floating and not hitting the center stop. 5. Loosen gib screw(s) slightly.
Gear change levers will not shift into position.	<ol style="list-style-type: none"> 1. Gears not aligned in headstock. 	<ol style="list-style-type: none"> 1. Rotate spindle by hand until gear falls into place.
Motor overheats.	<ol style="list-style-type: none"> 1. Motor overloaded. 2. Air circulation through the motor restricted. 	<ol style="list-style-type: none"> 1. Reduce load on motor. 2. Clean out motor to provide normal air circulation.
Loud, repetitious noise coming from machine.	<ol style="list-style-type: none"> 1. Gears not aligned in headstock or no backlash. 2. Broken gear or bad bearing. 3. Workpiece is hitting stationary object. 	<ol style="list-style-type: none"> 1. Adjust gears and establish backlash. 2. Replace broken gear or bearing. 3. Stop lathe immediately and correct interference problem.
Tailstock quill will not feed out of tailstock.	<ol style="list-style-type: none"> 1. Quill lock knob is tightened down. 	<ol style="list-style-type: none"> 1. Turn knob counterclockwise.
Motor is loud when cutting. Overheats or bogs down in the cut.	<ol style="list-style-type: none"> 1. Excessive depth of cut or feed rate. 2. RPM or feed rate wrong for cutting operation. 3. Cutting tool is dull. 4. Gear setup is too tight, causing them to bind. 	<ol style="list-style-type: none"> 1. Decrease depth of cut or feed rate. 2. Refer to RPM feed rate chart for appropriate rates. 3. Sharpen or replace the cutting tool. 4. Readjust the gear setup with a small amount of backlash so the gears move freely and smoothly when the chuck is rotated by hand.

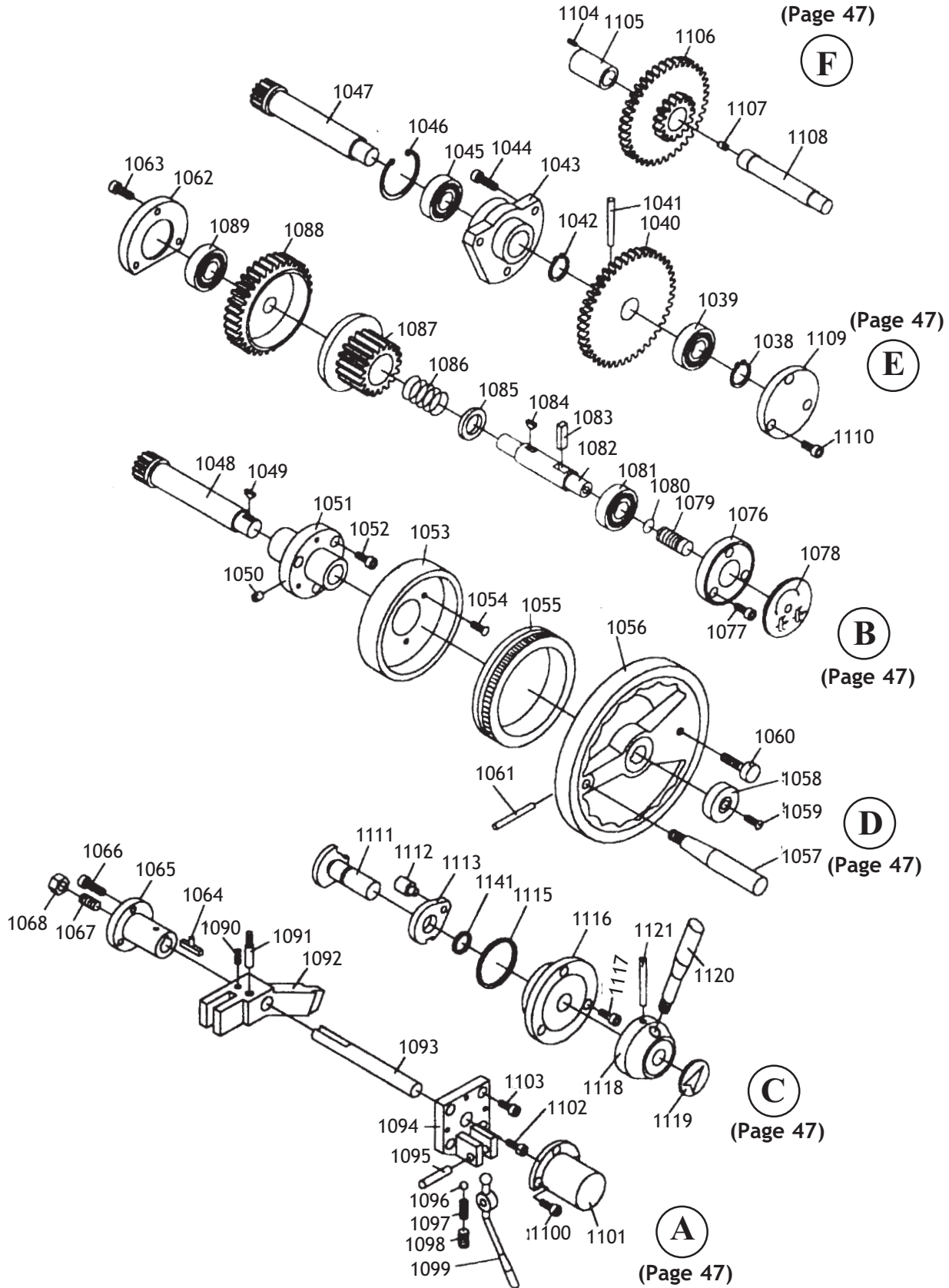
Apron Case Diagram



REF PART #	DESCRIPTION
1	XM11000001 APRON CASTING
2	XM11000002 BOTTOM COVER
3	XPNO2M HEX NUT M10-1.5
4	XPSS91M SET SCREW M10-1.5 X 70
5	XM11000005 CUSHION CAP
6	XM11000006 DOWEL PIN 6 X 16
7	XM11000007 COMPRESSION SPRING
8	XM11000008 LEVER
9	XM11000009 DOWEL PIN 8 X 30
10	XM11000010 DOWEL PIN 6 X 18
11	XM11000011 PUSHING ROD
12	XM11000012 OIL SEAL
13	XM11000013 SPECIAL LOCKING HEX NUT
14	XM11000014 SPECIAL SET SCREW
15	XM11000015 DRAIN PLUG
16	XM11000016 TAPER PIN 5 X 30
17	XPSB14M CAP SCREW M8-1.25 X 20
18	XM11000018 GASKET
19	XM11000019 SIGN PLATE
20	XM11000020 LEVER
21	XM11000021 LEVER SUPPORT
22	XM11000022 TAPER PIN 6 X 60
23	XM11000023 HALF NUT SHAFT
24	XM11000024 POSITIONING BLOCK
25	XM11000025 THREAD TAIL TAPER PIN 6 X 25
26	XPSS01M SET SCREW M6-1 X 10
27	XM11000027 HALF NUT CONTROL PLATE
28	XM11000028 TAPER PIN 6 X 55
29	XM11000029 DOWEL PIN
30	XM11000030 HALF NUT
31	XPNO2M HEX NUT M10-1.5
32	XM11000032 SPECIAL SET SCREW M10 X 60
33	XM11000033 GIB
34	XM11000034 SPECIAL SET SCREW

REF PART #	DESCRIPTION
35	XPNO3M HEX NUT M8-1.25
36	XPSS19M SET SCREW M8-1.25 X 30
37	XM11000037 OIL SIGHT GLASS
69	XM11000069 GEAR 25T
70	XM11000070 SLIDING KEY
71	XM11000071 SPACER
72	XM11000072 POSITIONING SLEEVE
73	XM11000073 SEAL 3 X 55
74	XM11000074 OIL SEAL
75	XM11000075 SLEEVE
122	XM11000122 SIGN PLATE
123	XM11000123 SHAFT
124	XP51104 THRUSTING BEARING 51104
125	XM11000125 SLEEVE
126	XM11000126 WORM
127	XM11000127 WORM SUPPORT
128	XM11000128 CONTROL PLATE
129	XPSB02M CAP SCREW M6-1 X 20
130	XM11000130 TAPER PIN 4 X 20
131	XPSS14M SET SCREW M8-1.25 X 12
132	XPS32M PHLP HD SCR M8-1.25 X 25
133	XM11000133 TENSILE SPRING LI-1.6 X 10 X 58
134	XM11000134 GASKET
135	XM11000135 BACK COVER
136	XPSB26M CAP SCREW M6-1 X 12
137	XPSS19M SET SCREW M8-1.25 X 30
138	XM11000138 IRON WIRE 1 X 50
139	XM11000139 OIL CONDUCTING CORD
140	XPSS84M SET SCREW M10-1.5 X 35
158	XPNO1M HEX NUT M6-1
159	XM11000159 BRACKET
160	XM11000160 TAPER PIN 5 X 25
161	XM11000161 BRACKET
162	XPSB01M CAP SCREW M6-1 X 16

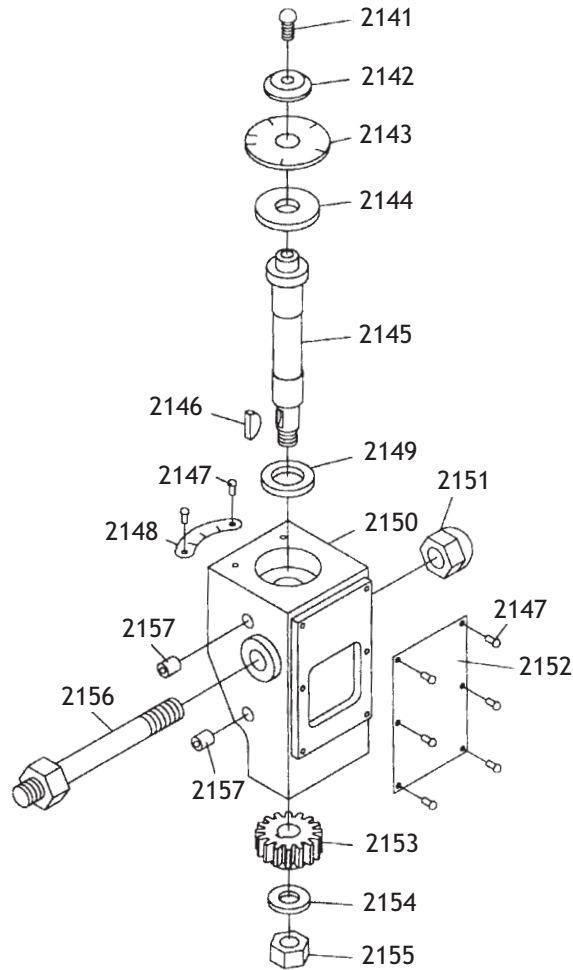
Apron Gearing Diagram



REF	PART #	DESCRIPTION
1038	XPR09M	EXT RETAINING RING 20MM
1039	XP6204	BALL BEARING 6204
1040	XM11001040	GEAR 65T
1041	XM11001041	TAPER PIN 6 X 40
1042	XPR11M	EXT RETAINING RING 25MM
1043	XM11001043	BEARING SUPPORT
1044	XPSB76M	CAP SCREW M8-1.25 X 18
1045	XP6205Z	BALL BEARING 6205Z
1046	XPR26M	INT RETAINING RING 52MM
1047	XM11001047	SHAFT
1048	XM11001048	HANDWHEEL SHAFT
1049	XM11001049	WOODRUFF KEY 4 X 16
1050	XM11001050	OIL CUP 8MM
1051	XM11001051	LEVER SUPPORT
1052	XPSB74M	CAP SCREW M6-1 X 18
1053	XM11001053	DIAL SUPPORT
1054	XPS08M	PHLP HD SCR M5-.8 X 12
1055	XM11001055	DIAL
1056	XM11001056	HANDWHEEL
1057	XM11001057	SHAFT DRIVEN LEVER
1058	XM11001058	SHAFT COVER
1059	XPS08M	PHLP HD SCR M5-.8 X 12
1060	XM11001060	THUMB KNOB M6-1 X 40
1061	XM11001061	DOWEL PIN
1062	XM11001062	END COVER
1063	XPSB26M	CAP SCREW M6-1 X 12
1064	XM11001064	T-SHAPED FLAT KEY
1065	XM11001065	FLANGE SLEEVE
1066	XPSB26M	CAP SCREW M6-1 X 12
1067	XPSS28M	SET SCREW M6-1 X 30
1068	XPN01M	HEX NUT M6-1
1076	XM11001076	FLANGE
1077	XPSB26M	CAP SCREW M6-1 X 12
1078	XM11001078	SIGN PLATE
1079	XM11001079	ADJUSTING SCREW
1080	XM11001080	OIL SEAL
1081	XP7203	BALL BEARING 7203
1082	XM11001082	SHAFT
1083	XM11001083	ADJUSTING ROD

REF	PART #	DESCRIPTION
1084	XM11001049	WOODRUFF KEY 4 X 16
1085	XM11001085	SPRING COVER
1086	XM11001086	SPRING
1087	XM11001087	GEAR 28T
1088	XM11001088	HELICAL GEAR 40T
1089	XP7006	BALL BEARING 7006
1090	XPSS01M	SET SCREW M6-1 X 10
1091	XM11001091	THREAD TAIL TAPER PIN 6 X 25
1092	XM11001092	FORK
1093	XM11001093	CONTROL ROD
1094	XM11001094	LEVER SUPPORT
1095	XM11001095	DOWEL PIN 8 X 30
1096	XM11001096	STEEL BALL 8MM
1097	XM11001097	SPRING
1098	XPSS75M	SET SCREW M10-1.5 X 16
1099	XM11001099	LEVER
1100	XPSB50M	CAP SCREW M5-.8 X 10
1101	XM11001101	COVER
1102	XM11001102	ADJUSTING SCREW M6-1 X 30
1103	XPSB74M	CAP SCREW M6-1 X 18
1104	XPSS51M	SET SCREW M4-.7 X 8
1105	XM11001105	SLEEVE
1106	XM11001106	GEAR 21T/57T
1107	XM11001107	DOWEL PIN 6 X 8
1108	XM11001108	SHAFT
1109	XM11001109	END COVER
1110	XPSB26M	CAP SCREW M6-1 X 12
1111	XM11001111	CONTROL SHAFT
1112	XM11001112	DOWEL PIN
1113	XM11001113	CONTROL BLOCK
1114	XM11001114	OIL SEAL
1115	XM11001115	OIL SEAL
1116	XM11001116	LEVER FLANGE
1117	XPSB26M	CAP SCREW M6-1 X 12
1118	XM11001118	LEVER SUPPORT
1119	XM11001119	SIGN PLATE
1120	XM11001120	LEVER
1121	XM11001121	TAPER PIN 6 X 60

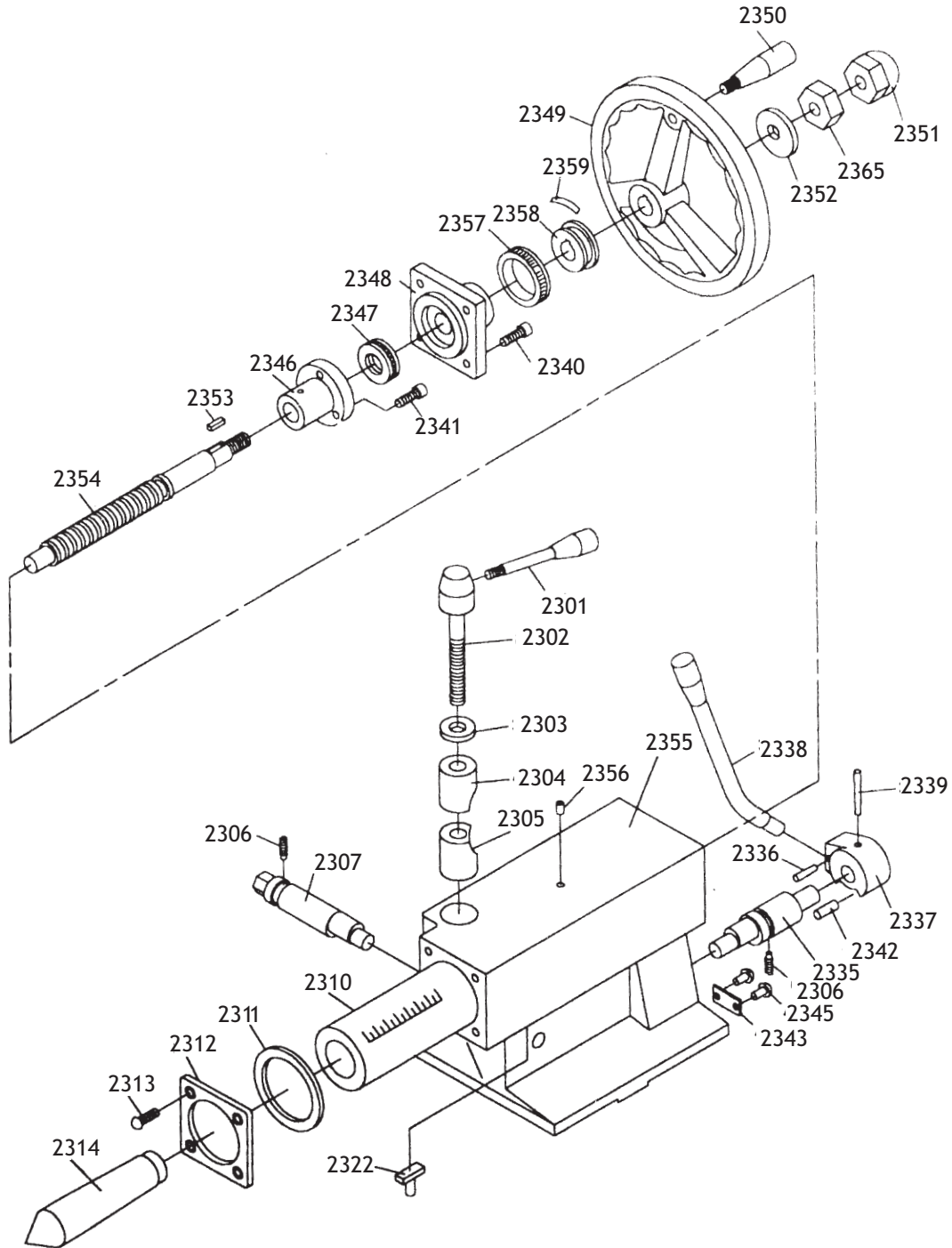
Thread Dial Diagram



REF	PART #	DESCRIPTION
2141	XPS107M	PHLP HD SCR M6-1 X 18
2142	XM11002142	SPECIAL WASHER
2143	XM11002143	DIAL
2144	XM11002144	ADJUSTING WASHER
2145	XM11002145	SHAFT
2146	XM11001049	WOODRUFF KEY 4 X 16
2147	XPS12M	PHLP HD SCR M3-.5 X 6
2148	XM11002148	POSITIONING SIGN PLATE
2149	XM11002149	ADJUSTING WASHER

REF	PART #	DESCRIPTION
2150	XM11002150	THREAD DIAL HOUSING
2151	XM11002151	ACORN NUT M12-1.5
2152	XM11002152	THREAD CHASING LABEL
2153	XM11002153	HELICAL GEAR 16T
2154	XPW04M	FLAT WASHER 10MM
2155	XPN02M	HEX NUT M10-1.5
2156	XM11002156	SPECIAL BOLT
2157	XM11001050	OIL CUP 8MM

Tailstock Diagram



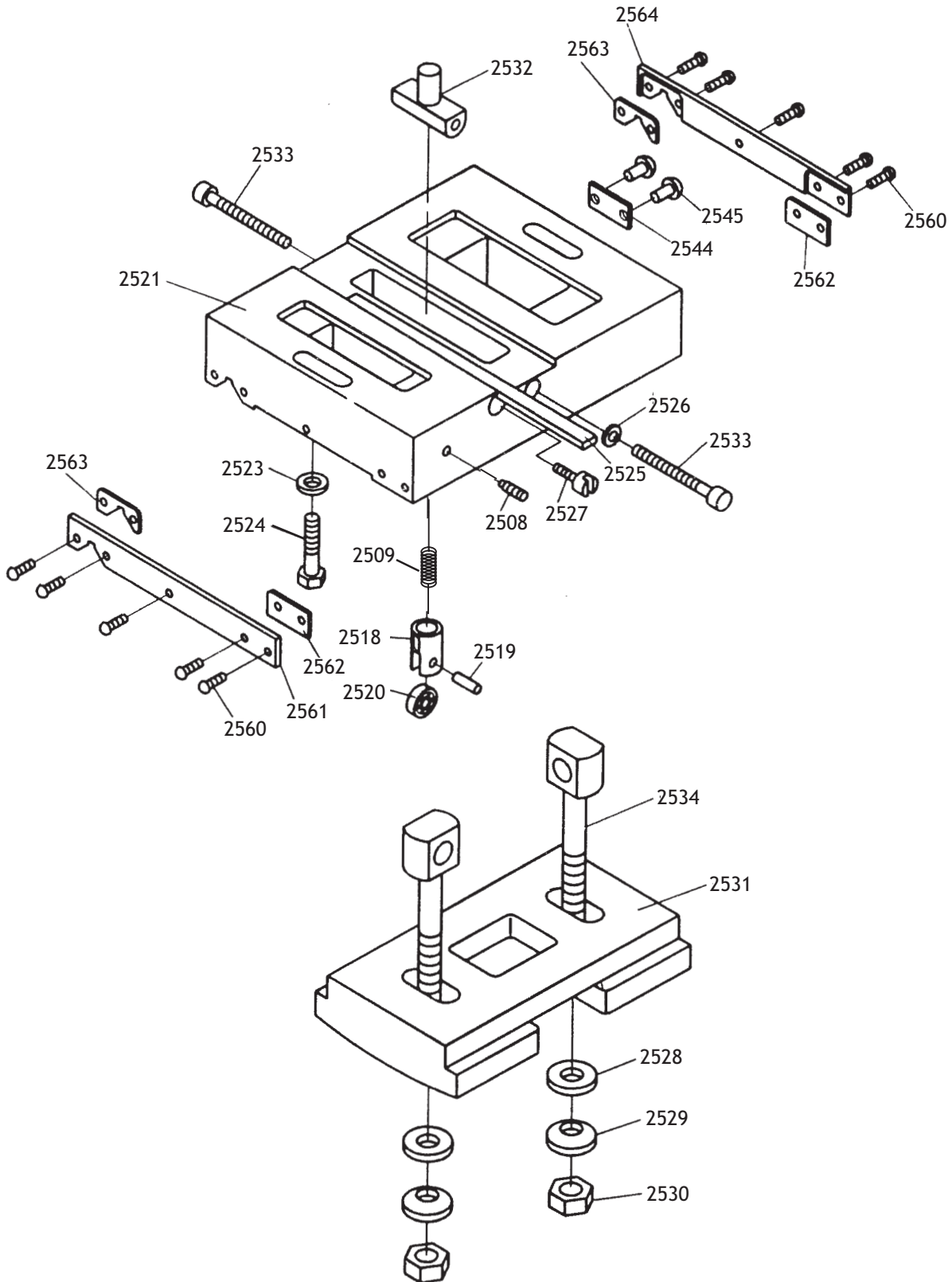
PARTS



REF	PART #	DESCRIPTION
2301	XM11002301	HANDLE
2302	XM11002302	LEVER SUPPORT
2303	XM11002303	SPECIAL FLAT WASHER
2304	XM11002304	CLAMPING BLOCK
2305	XM11002305	CLAMPING BLOCK
2306	XM11002306	SPECIAL SET SCREW M8-1.25 X 14
2307	XM11002307	ECCENTRIC SHAFT
2310	XM11002310	CENTER SLEEVE
2311	XM11002311	SEAL 75 X 2.65
2312	XM11002312	FRONT COVER
2313	XPFH07M	FLAT HD SCR M5-.8 X 10
2314	XM11002314	CENTER MORSE MT#4
2322	XM11002322	POSITIONING BLOCK
2335	XM11002335	ECCENTRIC SHAFT
2336	XM11002336	TAPER PIN 6 X 32
2337	XM11002337	LEVER SLEEVE
2338	XM11002338	LOCK HANDLE
2339	XM11002339	TAPER PIN 6 X 55
2340	XPSB62M	CAP SCREW M10-1.5 X 12

REF	PART #	DESCRIPTION
2341	XPSB31M	CAP SCREW M8-1.25 X 25
2342	XM11002342	DOWEL PIN 10 X 22
2343	XM11002343	SIGN PLATE
2345	XM11002345	NAIL
2346	XPN01M	HEX NUT M6-1
2347	XP51205	THRUST BALL BEARING 51205
2348	XM11002348	BACK COVER
2349	XM11002349	HANDWHEEL
2350	XM11002350	HANDWHEEL CRANK HANDLE
2351	XPN19M	ACORN NUT M16-2
2352	XPW08M	FLAT WASHER 16MM
2353	XPK11M	KEY 6 X 6 X 40
2354	XM11002354	LEAD SCREW
2355	XM11002355	TAILSTOCK CASTING
2356	XM11001050	OIL CUP 8MM
2357	XM11002357	DIAL
2358	XM11002358	SLEEVE
2359	XM11002359	LEAF SPRING
2365	XPN13M	HEX NUT M16-2

Tailstock Base Diagram



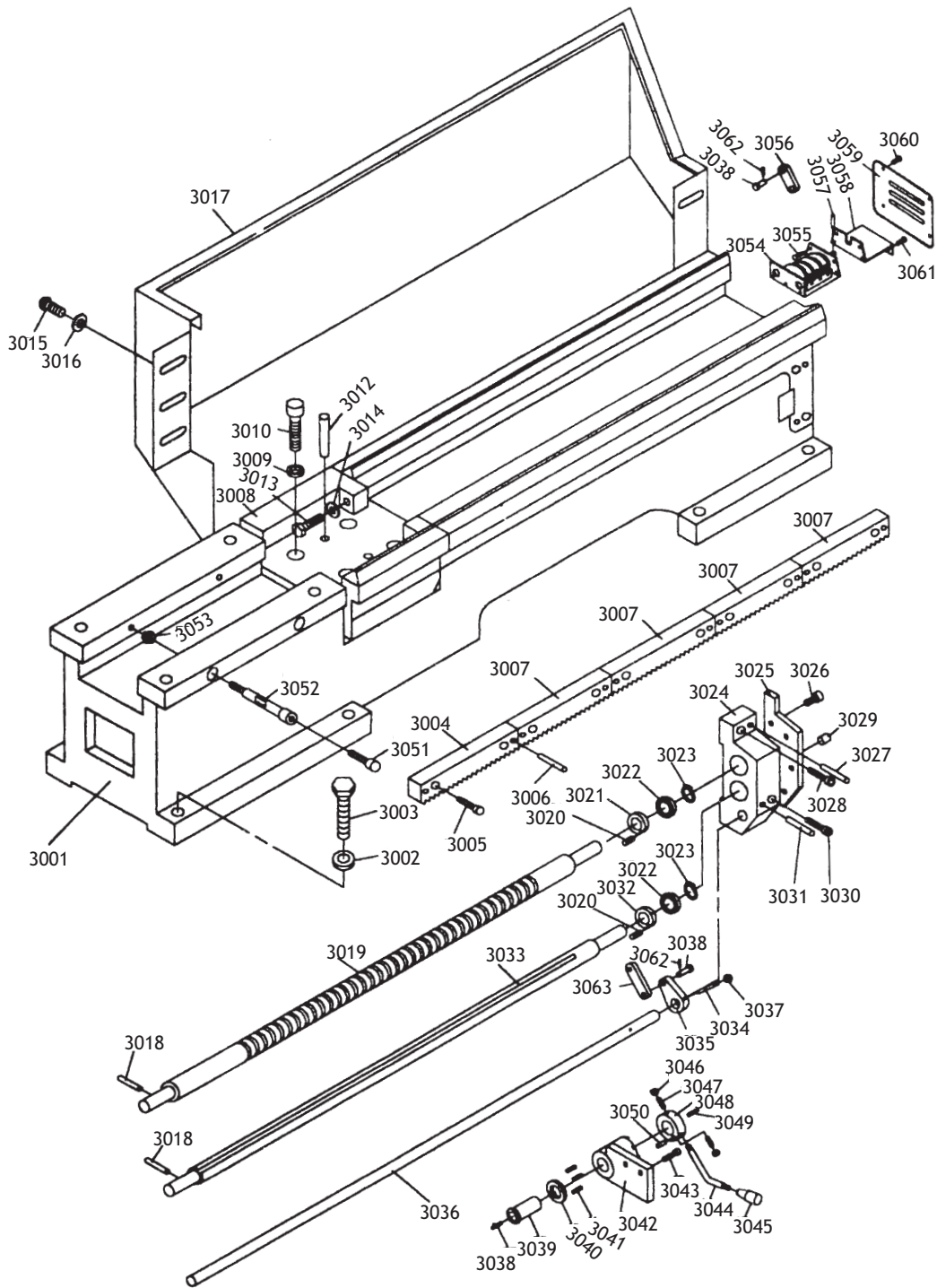
PARTS



REF	PART #	DESCRIPTION
2508	XPSS58M	SET SCREW M6-1 X 18
2509	XM11002509	COMPRESSION SPRING
2518	XM11002518	BEARING SUPPORT
2519	XM11002519	SMALL AXLE
2520	XM11002520	BALL BEARING
2521	XM11002521	SLIDING BASE
2523	XPW04M	FLAT WASHER 10MM
2524	XPB162M	HEX BOLT M10-1.5 X 90
2525	XM11002525	GIB
2526	XM11002526	SPHERICAL WASHER
2527	XM11002527	ADJUSTING SCREW
2528	XM11002528	TAPER WASHER 16MM
2529	XM11002529	SPHERICAL WASHER

REF	PART #	DESCRIPTION
2530	XPNO2M	HEX NUT M10-1.5
2531	XM11002531	CLAMPING BRACKET
2532	XM11002532	SPECIAL NUT
2533	XPSB55M	CAP SCREW M8-1.25 X 89
2534	XM11002534	PULLING ROD
2544	XM11002544	SIGN PLATE
2545	XM11002545	NAIL
2560	XPS08M	PHLP HD SCR M5-.8 X 12
2561	XM11002561	PLATE
2562	XM11002562	WIPE PLATE
2563	XM11002563	NOTCHED WIPE PLATE
2564	XM11002564	PLATE

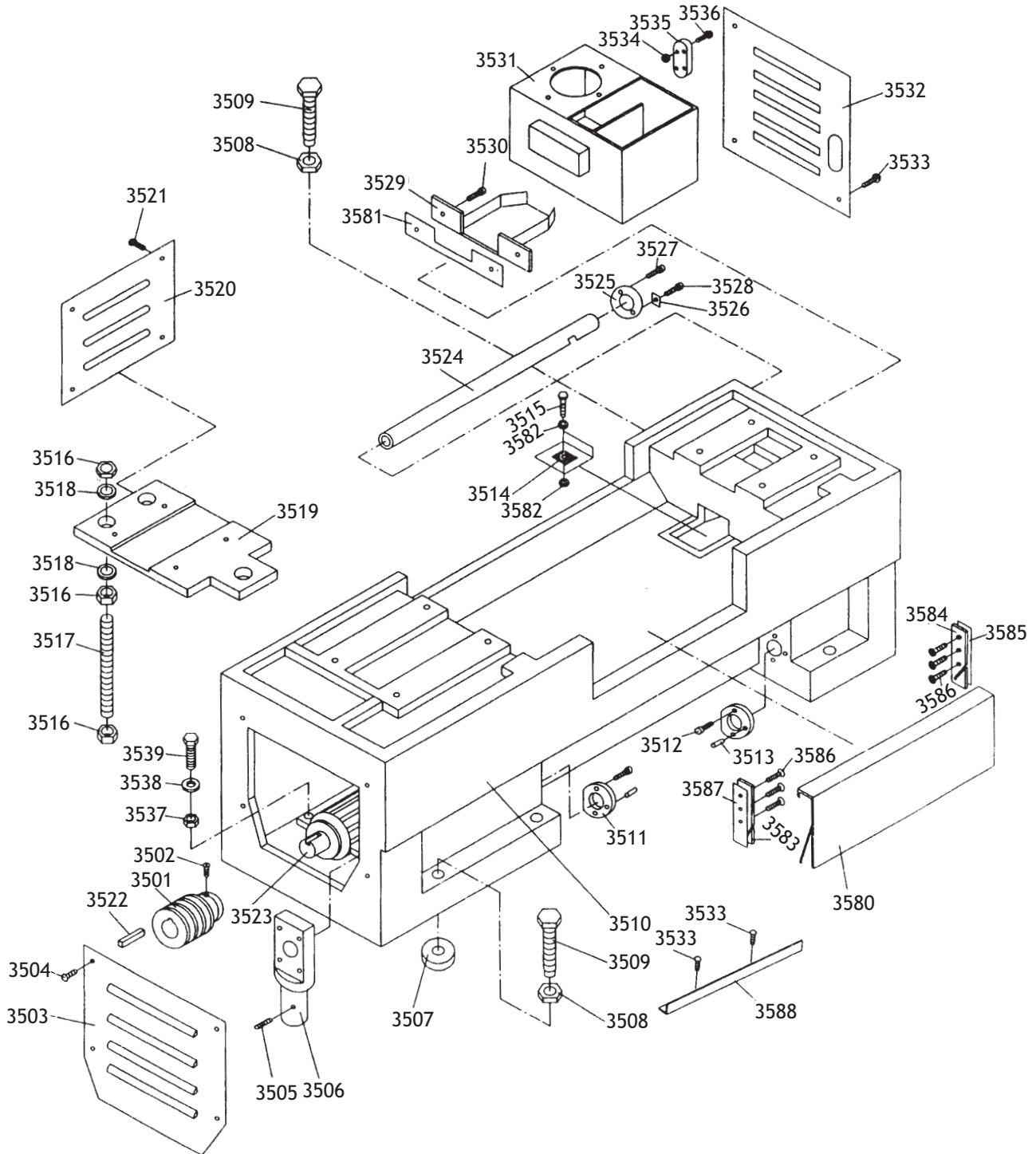
Ways and Rods Diagram



REF	PART #	DESCRIPTION
3001	XM11003001	BED
3002	XM11003002	SPECIAL FLAT WASHER
3003	XPB51M	HEX BOLT M16-2 X 50
3004	XM11003004	RACK
3005	XPSB84M	CAP SCREW M10-1.5 X 35
3006	XM11003006	TAPER
3007	XM11003007	RACK
3008	XM11003008	SADDLE
3009	XPLW05M	LOCK WASHER 12MM
3010	XPSB90M	CAP SCREW M12-1.75 X 55
3012	XM11003012	THREAD TAPER PIN 12 X 70
3013	XPB144M	HEX BOLT M10-1.5 X 55
3014	XPW04M	FLAT WASHER 10MM
3015	XPSB04M	CAP SCREW M6-1 X 10
3016	XPW03M	FLAT WASHER 6MM
3017	XM11003017	SPLASH GUARD
3018	XM11003018	SHEAR PIN 5 X 35
3019	XM11003019	LEAD SCREW
3020	XPSS01M	SET SCREW M6-1 X 10
3021	XM11003021	SLEEVE
3022	XP1204	BALL BEARING 1204
3023	XPR09M	EXT RETAINING RING 20MM
3024	XM11003024	BRACKET
3025	XM11003025	COVER
3026	XPSB27M	CAP SCREW M6-1 X 14
3027	XM11003027	TAPER PIN 6 X 60
3028	XPSB90M	CAP SCREW M10-1.5 X 55
3029	XM11003029	OIL CUP 10MM
3030	XPSB154M	CAP SCREW M10-1.5 X 100
3031	XM11003031	TAPER PIN 6 X 100
3032	XM11003032	SLEEVE

REF	PART #	DESCRIPTION
3033	XM11003033	FEED ROD
3034	XM11003034	TAPER PIN 5 X 30
3035	XM11003035	POSITIONING BLOCK
3036	XM11003036	CONTROL ROD
3037	XPN06M	HEX NUT M5-.8
3038	XM11003038	SMALL SHAFT
3039	XM11003039	SLEEVE
3040	XM11003040	SPACER
3041	XM11003041	SPRING
3042	XM11003042	BRACKET
3043	XPSB11M	CAP SCREW M8-1.25 X 16
3044	XM11003044	LEVER
3045	XM11003045	LONG LEVER SLEEVE
3046	XPN03M	HEX NUT M8-1.25
3047	XPSS87M	SET SCREW M8-1.25 X 28
3048	XM11003048	DIRECTION CHANGE RING
3049	XM11003049	DOWEL PIN 8 X 20
3050	XM11003050	TAPER PIN 3 X 20
3051	XPSB90M	CAP SCREW M10-1.5 X 55
3052	XM11003052	THREADED TUBE
3053	XPN09M	HEX NUT M12-1.75
3054	XM11003054	DRUM SWITCH
3055	XPS05M	PHLP HD SCR M5-.8 X 8
3056	XM11003056	ROCKER
3057	XM11003057	DOWEL PIN 3 X 16
3058	XM11003058	BRACKET
3059	XM11003059	VENT PLATE
3060	XPS107M	PHLP HD SCR M6-1 X 18
3061	XPB83M	HEX BOLT M6-1 X 16
3062	XM11003062	DOWEL PIN 6 X 8
3063	XM11003063	ROCKER

Cabinet and Base Diagram

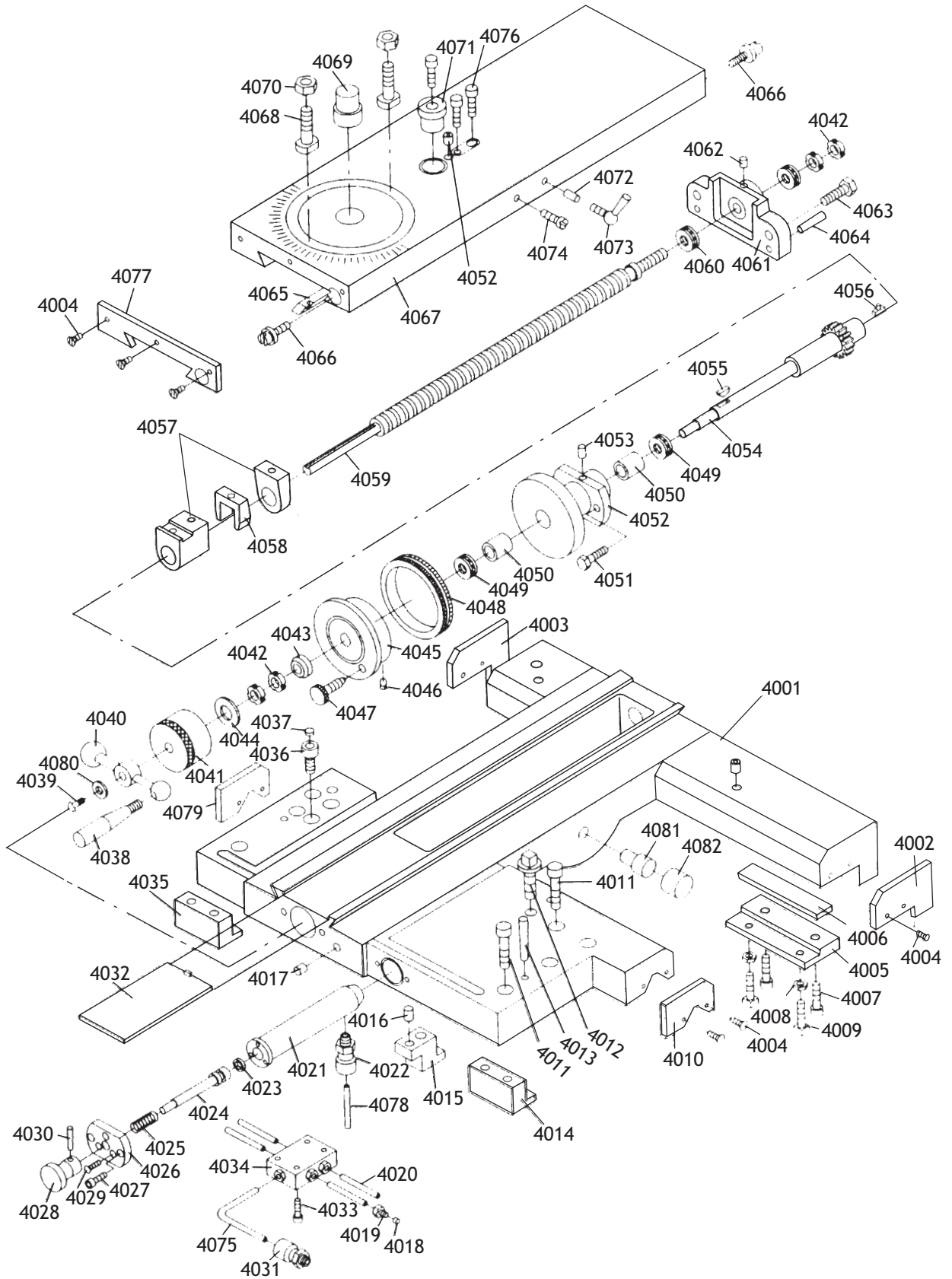




REF	PART #	DESCRIPTION
3501	XM11003501	PULLEY
3502	XM11003502	SPECIAL SET SCREW M8-1.25 X 16
3503	XM11003503	COVER
3504	XPS15M	PHLP HD SCR M6-1 X 14
3505	XM11003505	SPECIAL SET SCREW M8-1.25 X 16
3506	XM11003506	PEDAL ROD SUPPORT
3507	XM11003507	LINING
3508	PN44M	HEX NUT M24-3
3509	XM11003509	HEX BOLT
3510	XM11003510	BED STAND
3511	XM11003511	FIXED SUPPORT
3512	XPSB27M	CAP SCREW M6-1 X 14
3513	XM11003513	TAPER PIN 5 X 20
3514	XM11003514	WATER LEAKING CHIP GUARD
3515	XPS46M	PHLP HD SCR M10-1.5 X 12
3516	XPN28M	HEX NUT M20-2.5
3517	XM11003517	SPECIAL STUD
3518	XM11003518	FLAT WASHER
3519	XM11003519	MOTOR MOUNTING PLATE
3520	XM11003520	COVER
3521	XPS15M	PHLP HD SCR M6-1 X 14
3522	XPB78M	KEY 10 X 8 X 70
3523	XM11003523	MAIN MOTOR
3524	XM11003524	WIRE CONDUIT

REF	PART #	DESCRIPTION
3525	XM11003525	CONDUIT SUPPORT
3526	XM11003526	LOCKING PLATE
3527	XPS05M	PHLP HD SCR M5-.8 X 8
3528	XPS17M	PHLP HD SCR M4-.7 X 6
3529	XM11003529	WATER RECEPTION PLATE
3530	XPS15M	PHLP HD SCR M6-1 X 14
3531	XM11003531	COOLANT TANK
3532	XM11003532	COVER
3533	XPS15M	PHLP HD SCR M6-1 X 14
3534	XPN07M	HEX NUT M3-.5
3535	XM11003535	COOLANT INDICATOR
3536	XPS13M	PHLP HD SCR M3-.5 X 20
3537	XPN02M	HEX NUT M10-1.5
3538	XPW04M	FLAT WASHER 10MM
3539	XPB01M	HEX BOLT M10-1.5 X 30
3580	XM11003580	STAND FRONT COVER
3581	XM11003581	GASKET
3582	XPN06M	HEX NUT M5-.8
3583	XM11003583	LEFT TRAY
3584	XM11003584	RIGHT TRAY
3585	XM11003585	GASKET
3586	XPS40M	PHLP HD SCR M5-.8 X 16
3587	XM11003587	GASKET
3588	XM11003588	EXTENDING PLATE

Crossfeed and Carriage Diagram

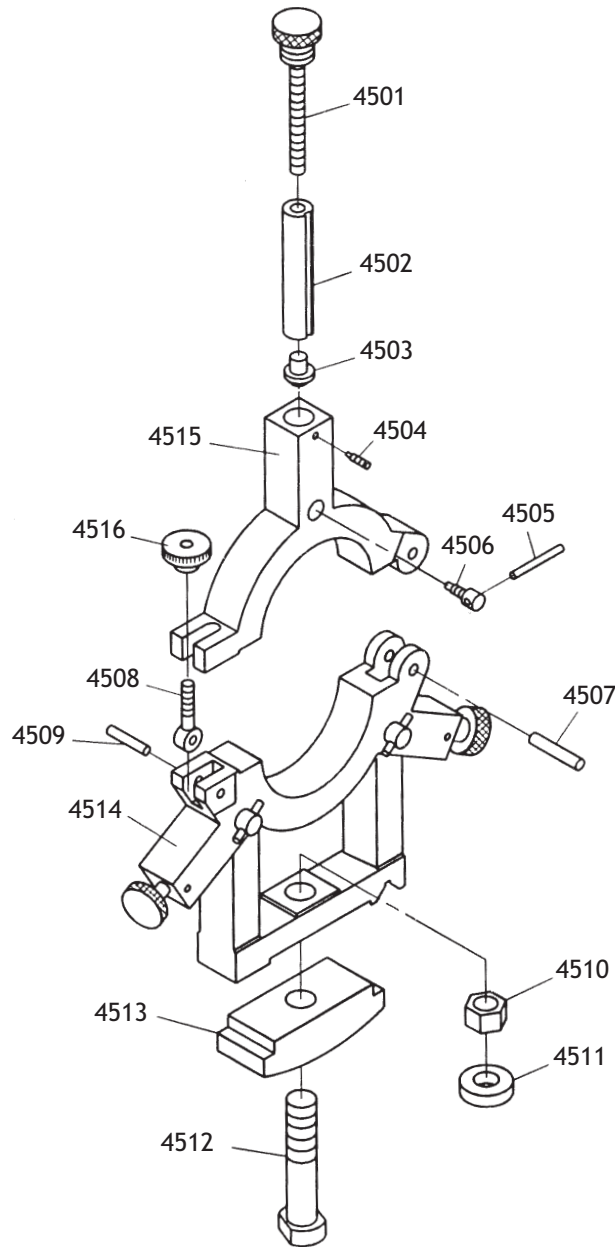


PARTS

REF	PART #	DESCRIPTION
4001	XM11004001	SADDLE CASTING
4002	XM11004002	WIPE PLATE
4003	XM11004003	WIPE PLATE
4004	XPFH39M	FLAT HD SCR MX-.8 X 16
400X	XM1100400X	CLAMPING BLOCK
4006	XM11004006	LINING PLATE
4007	XPSB72M	CAP SCREW M10-1.X X 30
4008	XPNO3M	HEX NUT M8-1.2X
4009	XM11004009	SQUARE SET SCREW M8-1.2X X 20
4010	XM11004010	WIPE PLATE
4011	XPSB70M	CAP SCREW M10-1.X X 4X
4012	XM11004012	SQUARE CAP BOLT M12-1.7X X 60
4013	XM11004013	TAPER PIN 8 X 60
4014	XM11004014	CLAMPING BLOCK
401X	XM1100401X	LOCKING PIECE
4016	XM11004016	DOWEL PIN 4 X 16
4017	XM11004017	BLOCKING PIECE
4018	XM11004018	JOINT SEAL
4019	XM11004019	HOLLOW BOLT
4020	XM11004020	COPPER TUBE
4021	XM11004021	MANUAL OIL PUMP CASTING
4022	XM11004022	IN VALVE
4023	XM11004023	OIL RING
4024	XM11004024	PISTON
402X	XM1100402X	COMPRESSION SPRING
4026	XM11004026	OIL PUMP COVER
4027	XPSB24M	CAP SCREW MX-.8 X 16
4028	XM11004028	KNOB
4029	XPFH41M	FLAT HD SCR M4-.7 X 16
4030	XM11004030	TAPER PIN 4 X 20
4031	XM11004031	OUT VALVE
4032	XM11004032	CHIP GUARD
4033	XPSB1XM	CAP SCREW MX-.8 X 20
4034	XM11004034	OIL DISTRIBUTOR
403X	XM1100403X	CLAMPING BLOCK
4036	XM11004036	OIL CAP
4037	XM11004037	OIL INDICATOR CAP
4038	XM11004038	LEVER
4039	XPS40M	PHLP HD SCR MX-.8 X 16
4040	XM11004040	HANDLE
4041	XM11004041	SLEEVE

REF	PART #	DESCRIPTION
4042	XM11004042	SPANNER NUT M12 X 1.2X
4043	XM11004043	LINING
4044	XM11004044	DISC SPRING
404X	XM1100404X	PAN
4046	XM11004046	PUSHING ROD
4047	XM11004047	POINTED KNOB
4048	XM11004048	DIAL
4049	XPX1102	THRUST BEARING X1102
40X0	XM110040X0	SLEEVE
40X1	XPB07M	HEX BOLT M8-1.2X X 2X
40X2	XM110040X2	SCREW SUPPORT
40X3	XM110010X0	OIL CUP 8MM
40X4	XM110040X4	GEAR SLIDING SLEEVE 16T
40XX	XM11001049	WOODRUFF KEY 4 X 16
40X6	XM110040X6	SPECIAL KEY
40X7	XM110040X7	NUT ASSEMBLY
40X8	XM110040X8	WEDGE
40X9	XM110040X9	LEAD SCREW
4060	XPX1101	THRUST BEARING X1101
4061	XM11004061	BRACKET
4062	XM11004062	SET SCREW
4063	XPB01M	HEX BOLT M10-1.X X 30
4064	XM11004064	TAPER PIN 8 X 30
406X	XM1100406X	GIB
4066	XM11004066	GIB ADJUSTMENT SCREW
4067	XM11004067	CROSS SLIDE
4068	XM11004068	T-BOLT
4069	XM11004069	SPINDLE
4070	XPNO9M	HEX NUT M12-1.7X
4071	XM11004071	SLEEVE
4072	XM11004072	PRESSING PIN
4073	XM11004073	LEVER
4074	XM11004074	SPECIAL SET SCREW
407X	XM1100407X	LONG COPPER TUBE
4076	XPSB31M	CAP SCREW M8-1.2X X 2X
4077	XM11004077	WIPE PLATE
4078	XM11004078	COPPER TUBE
4079	XM11004079	WIPE PLATE
4080	XM11004080	SPECIAL WASHER
4081	XM11004081	STOP PIN
4082	XM11004082	STOP PIN CAP

Steady Rest Diagram

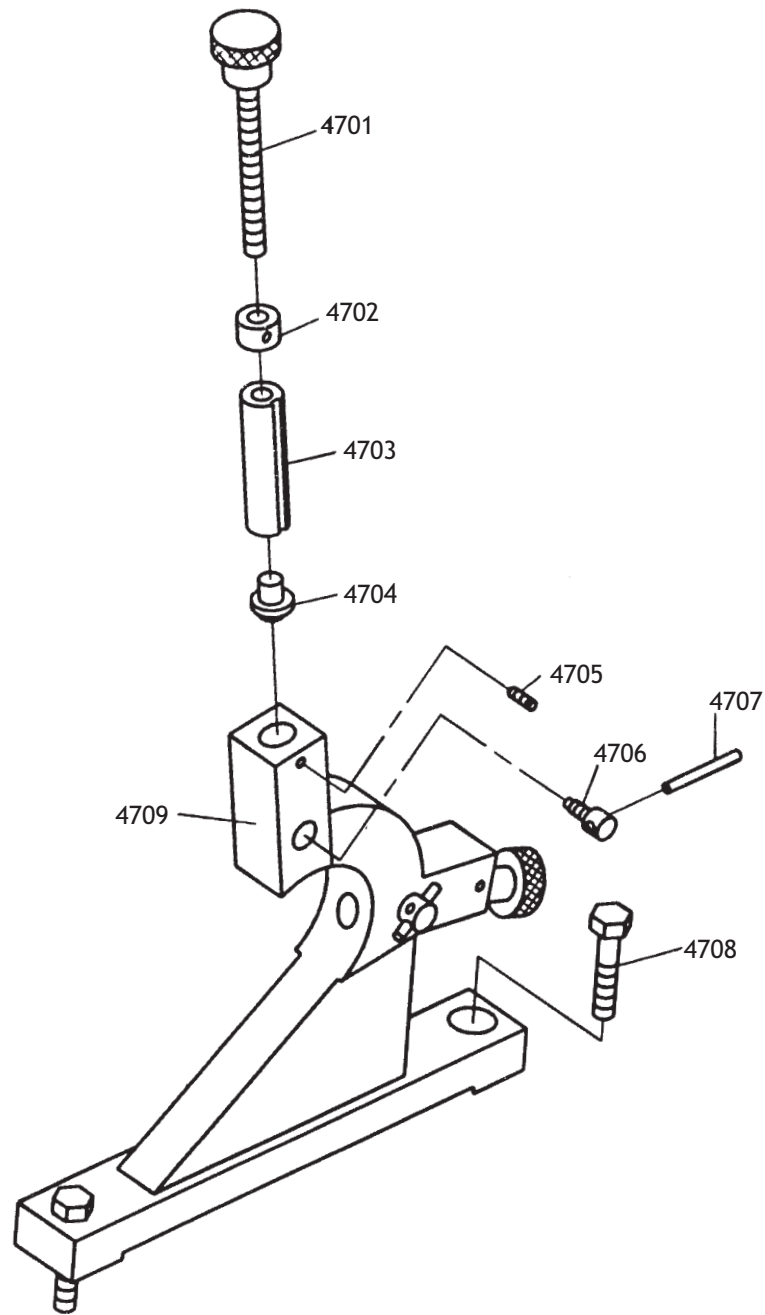


REF	PART #	DESCRIPTION
4501	XM11004501	THUMB SCREW
4502	XM11004502	SLIDING SLEEVE 0.78"-4.33"
4503	XM11004503	PUSHING BLOCK
4504	XM11004504	SLOTTED SET SCREW M6-1 X 20
4505	XM11004505	LEVER
4506	XM11004506	LOCKING SCREW
4507	XM11004507	DOWEL PIN 10 X 40
4508	XM11004508	HINGE SCREW

REF	PART #	DESCRIPTION
4509	XM11004509	DOWEL PIN 8 X 40
4510	XPN28M	HEX NUT M20-2.5
4511	XPW13M	FLAT WASHER 20MM
4512	XM11004512	TIGHTENING SCREW
4513	XM11004513	CLAMPING PLATE
4514	XM11004514	LOWER PART OF STEADY REST
4515	XM11004515	UPPER PART OF STEADY REST
4516	XM11004516	SPANNER NUT M10-1.5

PARTS

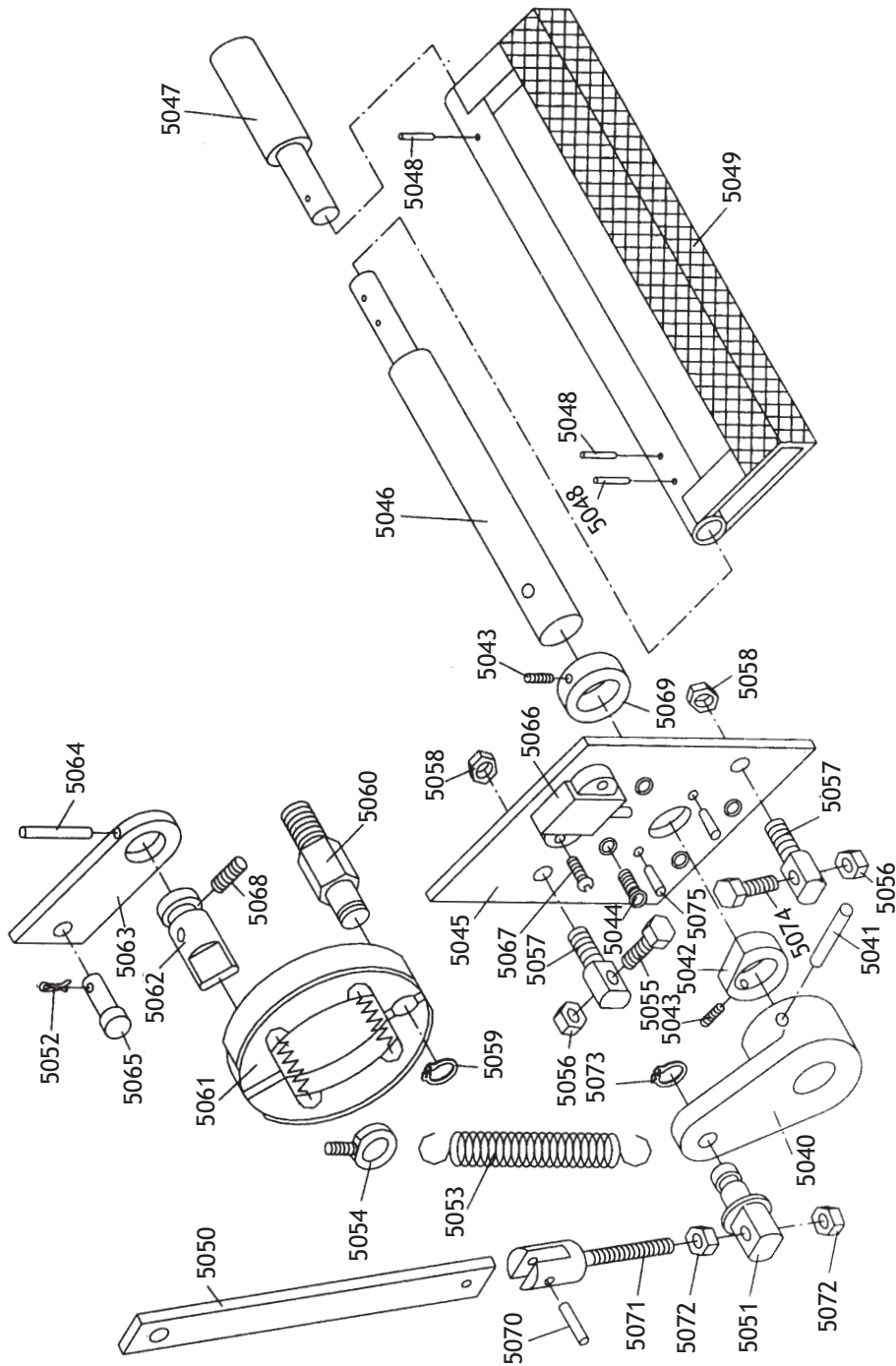
Follow Rest Diagram



REF	PART #	DESCRIPTION
4701	XM11004701	THUMB KNOB
4702	XM11004702	COLLAR
4703	XM11004703	SLIDING SLEEVE
4704	XM11004704	SUPPORTING PIECE
4705	XM11004705	SLOTTED SET SCREW M6-1 X 10

REF	PART #	DESCRIPTION
4706	XM11004706	LOCKING SCREW
4707	XM11004707	HANDLE
4708	XPB12M	HEX BOLT M12-1.75 X 55
4709	XM11004709	FOLLOW REST CASTING

Foot Brake Diagram

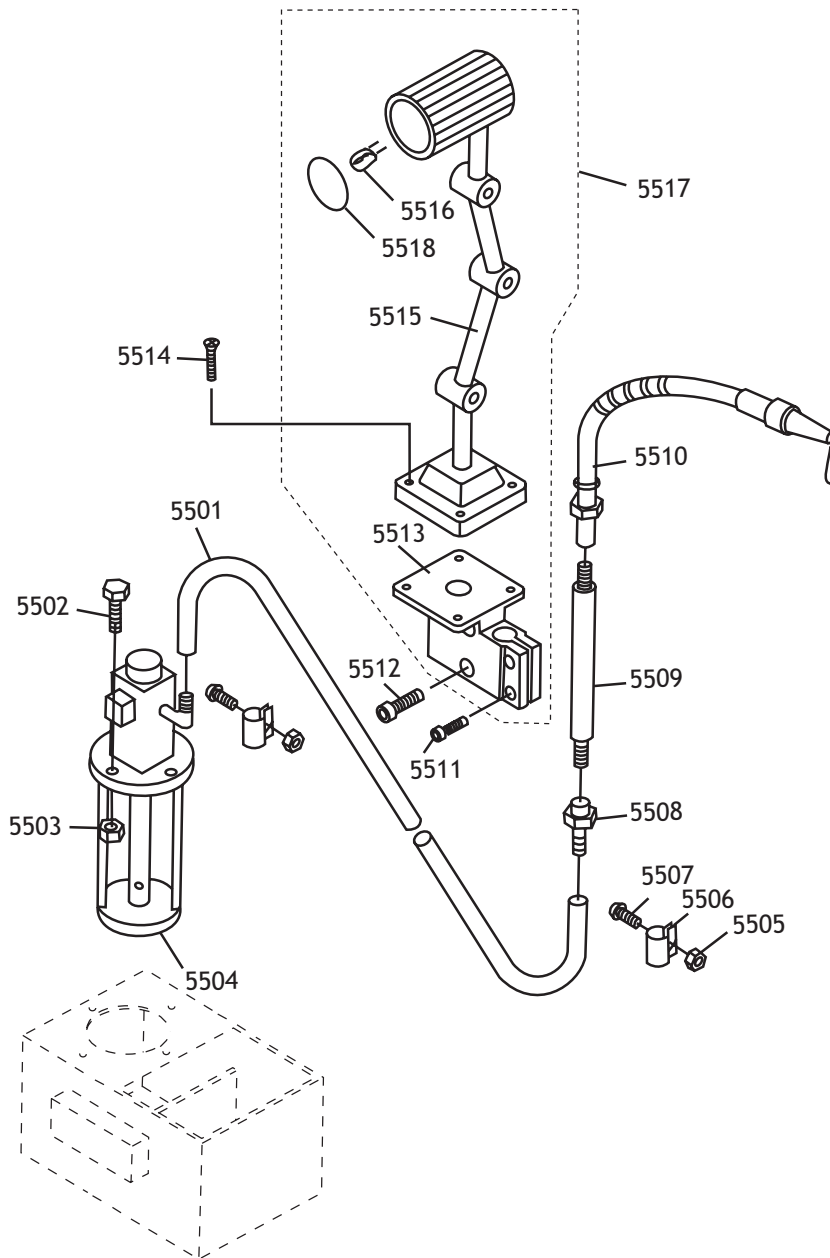


PARTS

REF	PART #	DESCRIPTION
5040	M11005040	FORK
5041	PRP28M	ROLL PIN 5 40
5042	M11005042	BUTT NAIL SUPPORT
5043	PSS01M	SET SCREW M8-1.25 10
5044	PS06M	PHLP HD SCR M5-.8 20
5045	M11005045	POSITIONING PLATE
5046	M11005046	DRIVE SHAFT (LONG)
5047	M11005047	DRIVE SHAFT
5048	PRP05M	ROLL PIN 5 30
5049	M11005049	PEDAL
5050	M11005050	TORQUE BAR
5051	M11005051	CONNECTING SHAFT
5052	PRP89M	ROLL PIN 2 20
5053	M11005053	E TENSION SPRING
5054	M11005054	EYEBOLT
5055	PB22M	HE BOLT M8-1.25 50
5056	PN03M	HE NUT M8-1.25
5057	M11005057	BUTT ROD SUPPORT

REF	PART #	DESCRIPTION
5058	PN02M	HE NUT M10-1.5
5059	PR39M	E T RETAINING RING 8MM
5060	M11005060	POSITIONING SHAFT
5061	M11005061	BRAKE SHOE
5062	M11005062	BRAKE SHAFT
5063	M11005063	CONNECTING PLATE
5064	M11005064	ELASTIC PIN
5065	M11005065	CLEVIS PIN
5066	M11005066	STROKE SWITCH
5067	PS09M	PHLP HD SCR M4-.7 25
5068	M11005068	SPECIAL SET SCREW M5-.8 10
5069	M11005069	COLLAR
5070	M11005070	DOWEL PIN 5 20
5071	M11005071	ADJUST BOLT
5072	PN03M	HE NUT M8-1.25
5073	PR03M	E T RETAINING RING 12MM
5074	PB20M	HE BOLT M8-1.25 35
5075	M11005075	TAPER PIN 5 20

Pump System and Lamp Diagram

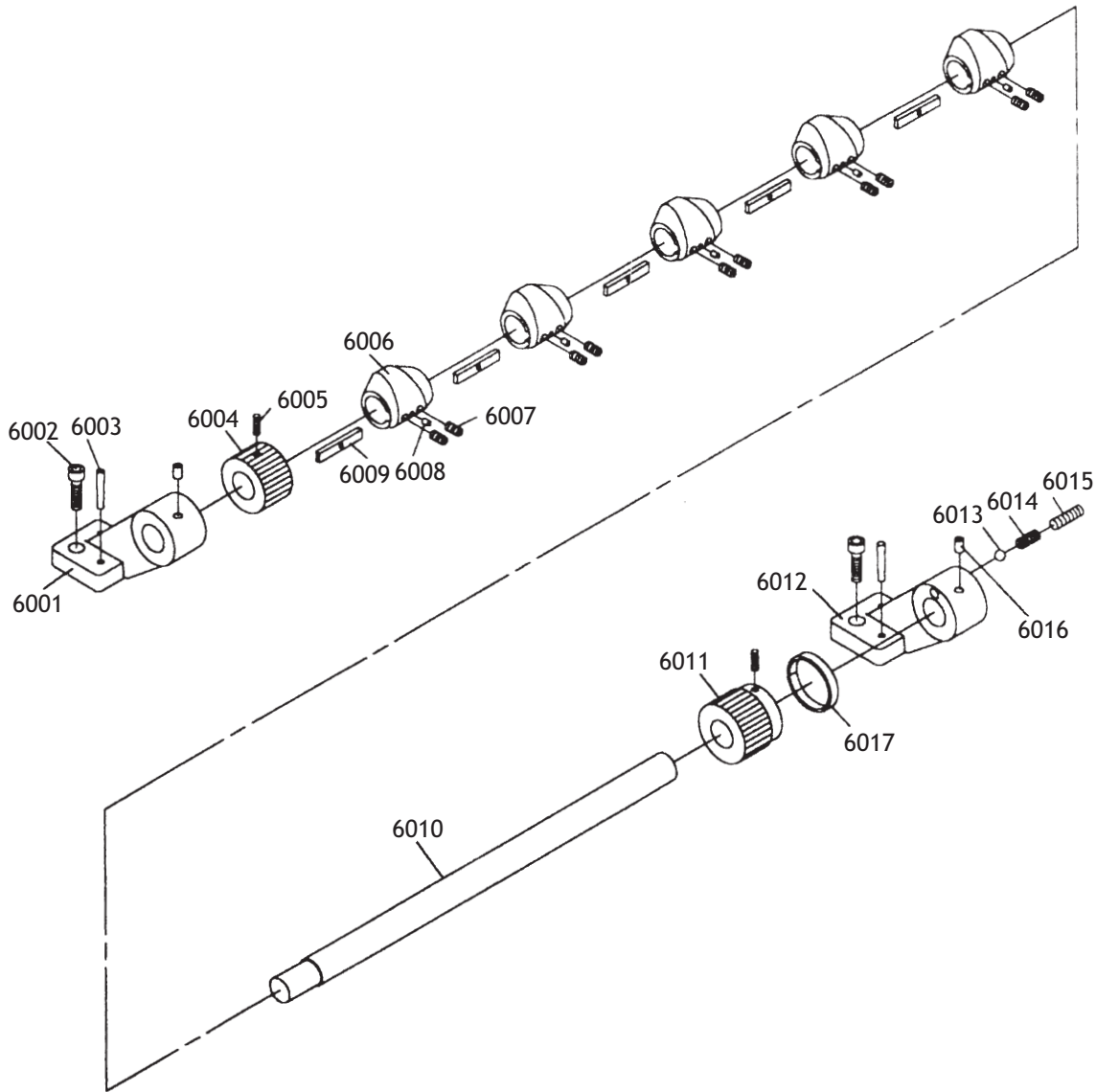


REF	PART #	DESCRIPTION
5501	XM11005501	RUBBER TUBE
5502	XPB94M	HEX BOLT M5-.8 X 25
5503	XPN06M	HEX NUT M5-.8
5504	XM11005504	COOLANT PUMP
5505	XPN01M	HEX NUT M6-1
5506	XM11005506	CLIP FOR RUBBER TUBE
5507	XPS11M	PHLP HD SCR M6-1 X 16
5508	XM11005508	FITTING
5509	XM11005509	FLOW PIPE

REF	PART #	DESCRIPTION
5510	XM11005510	COOLANT NO LE ASSEMBLY
5511	XPSB01M	CAP SCREW M6-1 X 16
5512	XPSB12M	CAP SCREW M8-1.25 X 40
5513	XM11005513	LAMP SUPPORT
5514	XPS15M	PHLP HD SCR M6-1 X 14
5515	XM11005515	LAMP FRAME
5516	XM11005516	BULB 50W, AC24V
5517	XM11005517	LIGHT ASSY
5518	XM11005518	LENS

PARTS

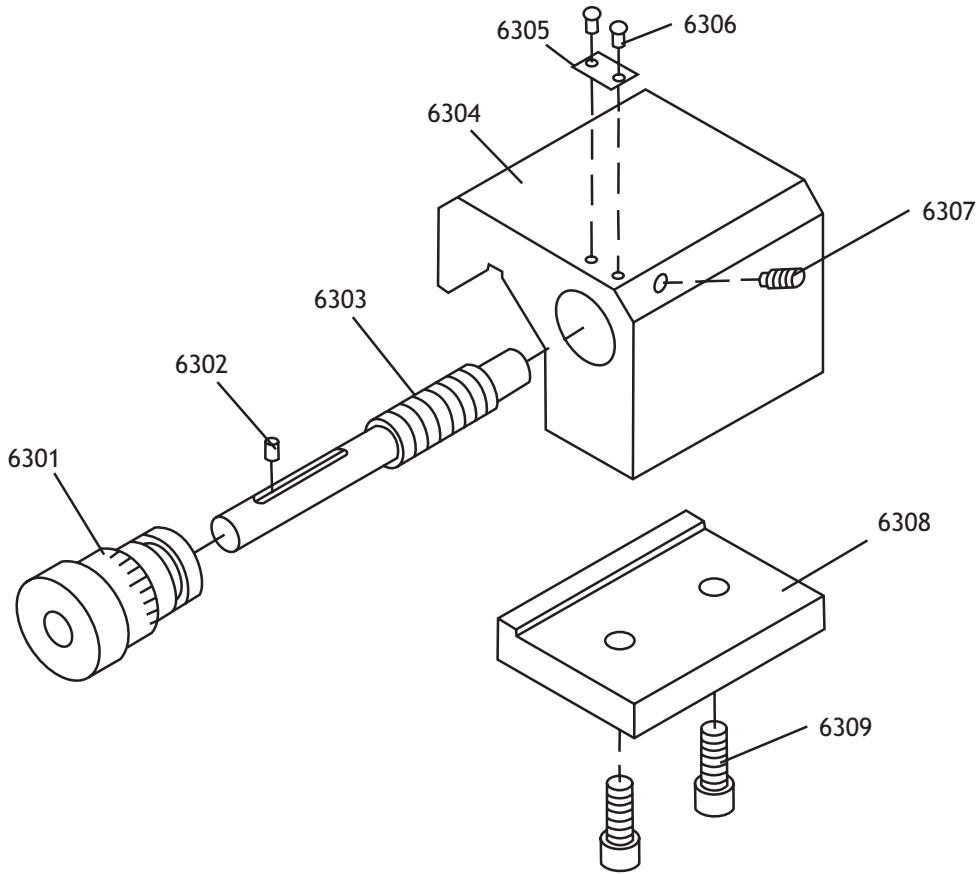
Five-Position Stop Diagram



REF	PART #	DESCRIPTION
6001	XM11006001	LEFT SUPPORT
6002	XPSS14M	CAP SCREW M8-1.25 X 20
6003	XM11006003	TAPER PIN 6 X 30
6004	XM11006004	CONTROL RING
6005	XPSS01M	SET SCREW M6-1 X 10
6006	XM11006006	ECCENTRIC RING
6007	XPSS01M	SET SCREW M6-1 X 10
6008	XM11006008	DOWEL PIN 4 X 10
6009	XM11006009	LOCKING KEY

REF	PART #	DESCRIPTION
6010	XM11006010	TRAVEL SETTING ROD
6011	XM11006011	CONTROL RING
6012	XM11006012	RIGHT SUPPORT
6013	XM11001096	STEEL BALL 8MM
6014	XM11006014	COMPRESSION SPRING 2 X 8 X 25
6015	XPSS10M	SET SCREW M10-1.5 X 20
6016	XM11001050	OIL CUP 8MM
6017	XM11006017	DIAL

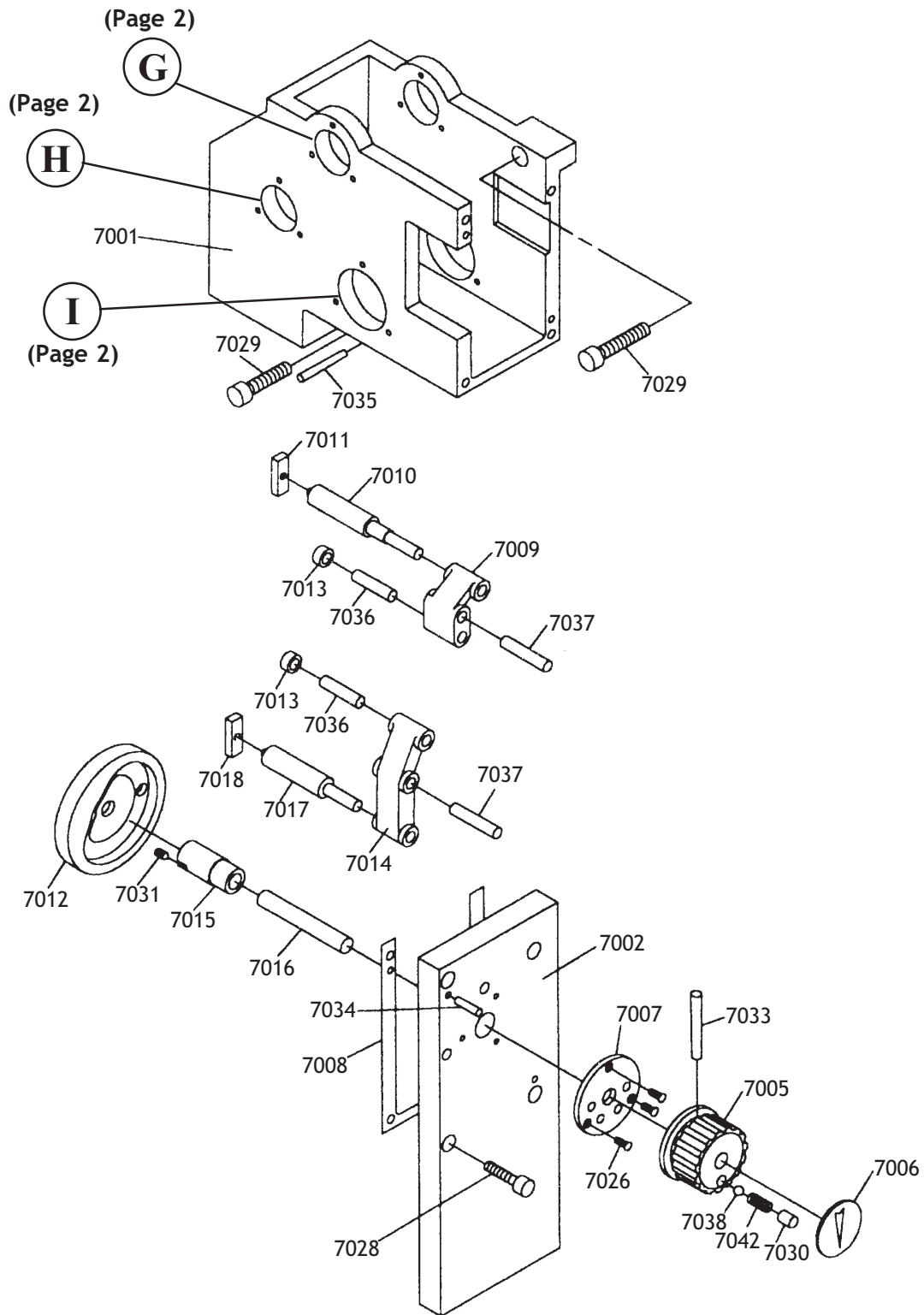
Manual-Micrometer Stop Diagram



REF	PART #	DESCRIPTION
6301	XM11006301	DIAL
6302	XM11006302	DOWEL PIN 4 X 8
6303	XM11006303	AXLE
6304	XM11006304	STOP
630X	XM1100630X	SIGN PLATE

REF	PART #	DESCRIPTION
6306	XM11006306	NAIL
6307	XM11006307	DOG POINT SET SCREW M6-1 X 12
6308	XM11006308	CLAMPING PLATE
6309	XPSB14M	CAP SCREW M8-1.2X X 20

Change-Gear Gearbox Diagram

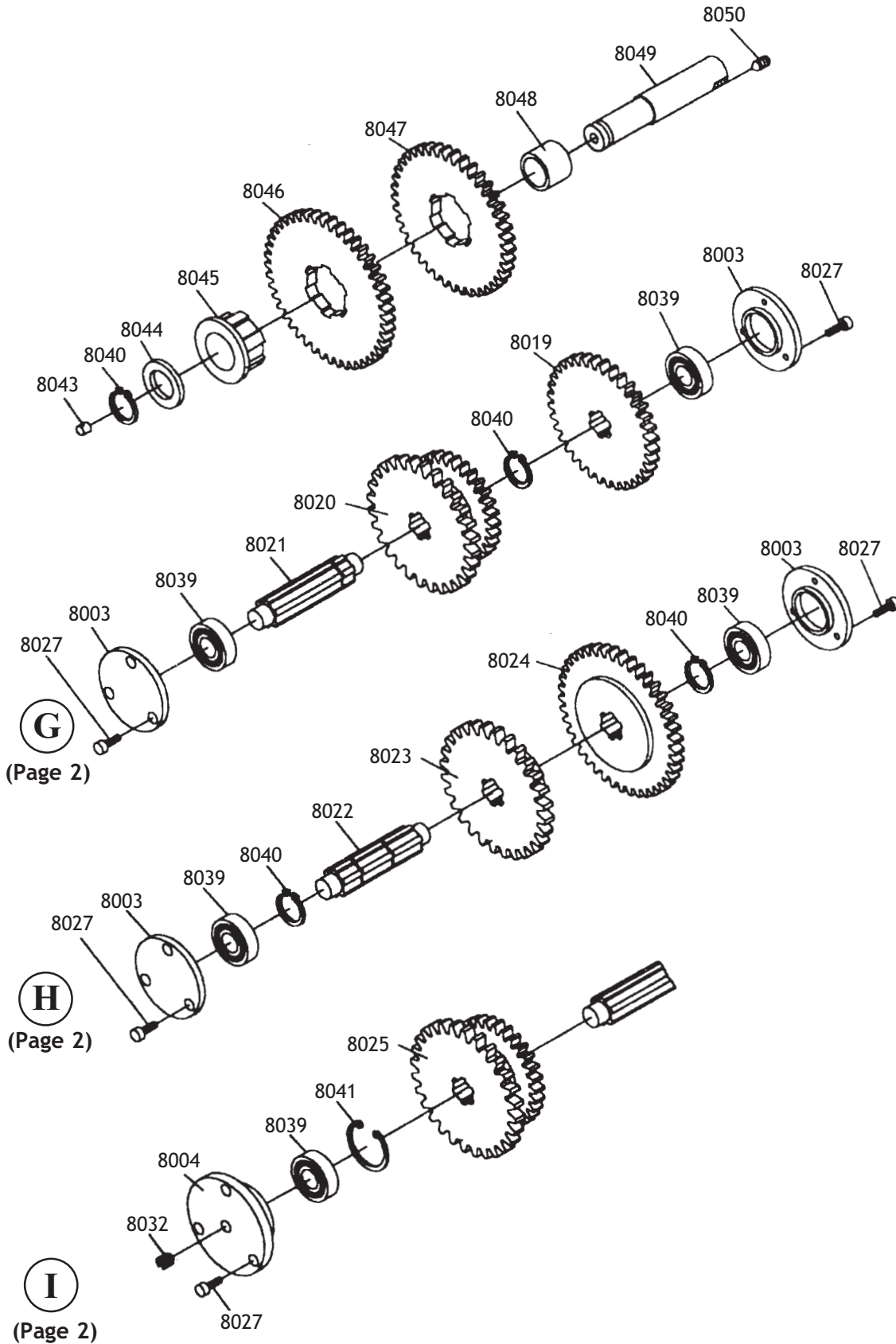




REF	PART #	DESCRIPTION
7001	XM11007001	CHANGE GEAR BOX CASTING
7002	XM11007002	FRONT COVER
7005	XM11007005	HANDWHEEL
7006	XM11007006	SIGN PLATE
7007	XM11007007	POSITIONING DISC
7008	XM11007008	GASKET
7009	XM11007009	CRANK
7010	XM11007010	CONNECTING ROD
7011	XM11007011	SLIDING BLOCK
7012	XM11007012	CAM
7013	XM11007013	ROLLER
7014	XM11007014	CRANK
7015	XM11007015	BUSHING
7016	XM11007016	ROTATING SHAFT

REF	PART #	DESCRIPTION
7017	XM11007017	CONNECTING ROD
7018	XM11007018	SLIDING BLOCK
7026	XPS02M	PHLP HD SCR M4-.7 X 12
7028	XPSB31M	CAP SCREW M8-1.25 X 25
7029	XPSB47M	CAP SCREW M10-1.5 X 40
7030	XPSS13M	SET SCREW M10-1.5 X 12
7031	XPSS13M	SET SCREW M10-1.5 X 12
7033	XM11007033	TAPER PIN 4 X 45
7034	XM11007034	TAPER PIN 6 X 30
7035	XM11007035	TAPER PIN 6 X 50
7036	XM11007036	DOWEL PIN 6 X 40
7037	XM11007037	DOWEL PIN 6 X 50
7038	XM11001096	STEEL BALL 8MM
7042	XM11007042	SPRING

Change-Gear Gearing Diagram

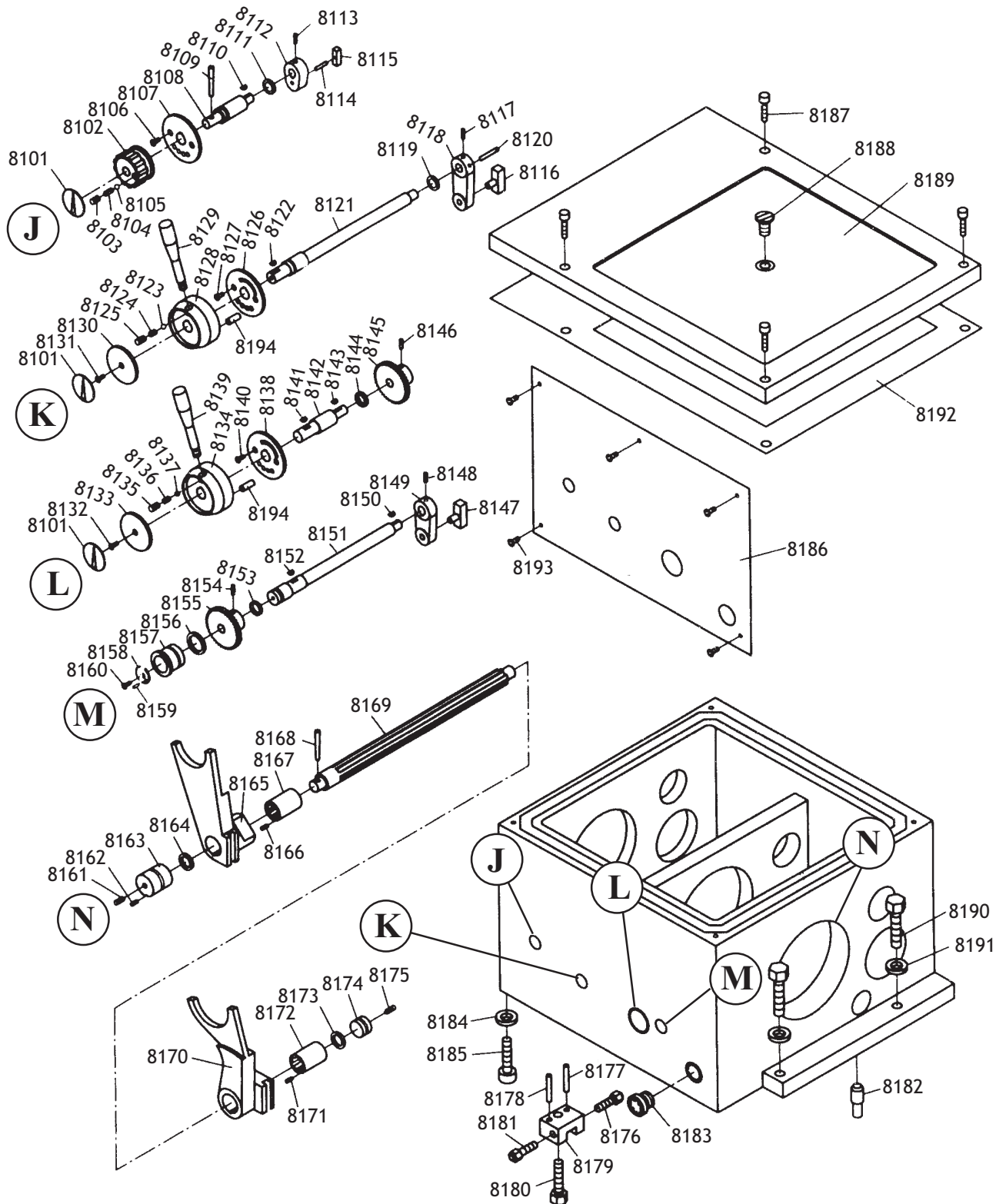




REF	PART #	DESCRIPTION
8003	XM11008003	EYD COVER
8004	XM11008004	BEARIYG SUPPORT
8019	XM11008019	GEAR 36T
8020	XM11008020	DOUBLE GEAR 28T/30T
8021	XM11008021	SHAFT
8022	XM11008022	SHAFT
8023	XM11008023	GEAR 27T
8024	XM11008024	GEAR 41T
8025	XM11008025	DOUBLE GEAR 30T/29T
8027	XPSB33M	CAP SCREW M5-.8 X 12
8032	XPSS13M	SET SCREW M10-1.5 X 12

REF	PART #	DESCRIPTION
8039	XP6203ZZ	BALL BEARIYG 6203ZZ
8040	XPR11M	EXT RETAIYIYG RIYG 25MM
8041	XPR23M	IYT RETAIYIYG RIYG 40MM
8043	XM11001050	OIL CUP 8MM
8044	XM11008044	SPECIAL FLAT WASHER
8045	XM11008045	SPLIYED SLEEVE
8046	XM11008046	GEAR 41T
8047	XM11008047	GEAR 36T
8048	XM11008048	OIL BUSHIYG
8049	XM11008049	SHAFT VB
8050	XPSS01M	SET SCREW M8-1.25 X 10

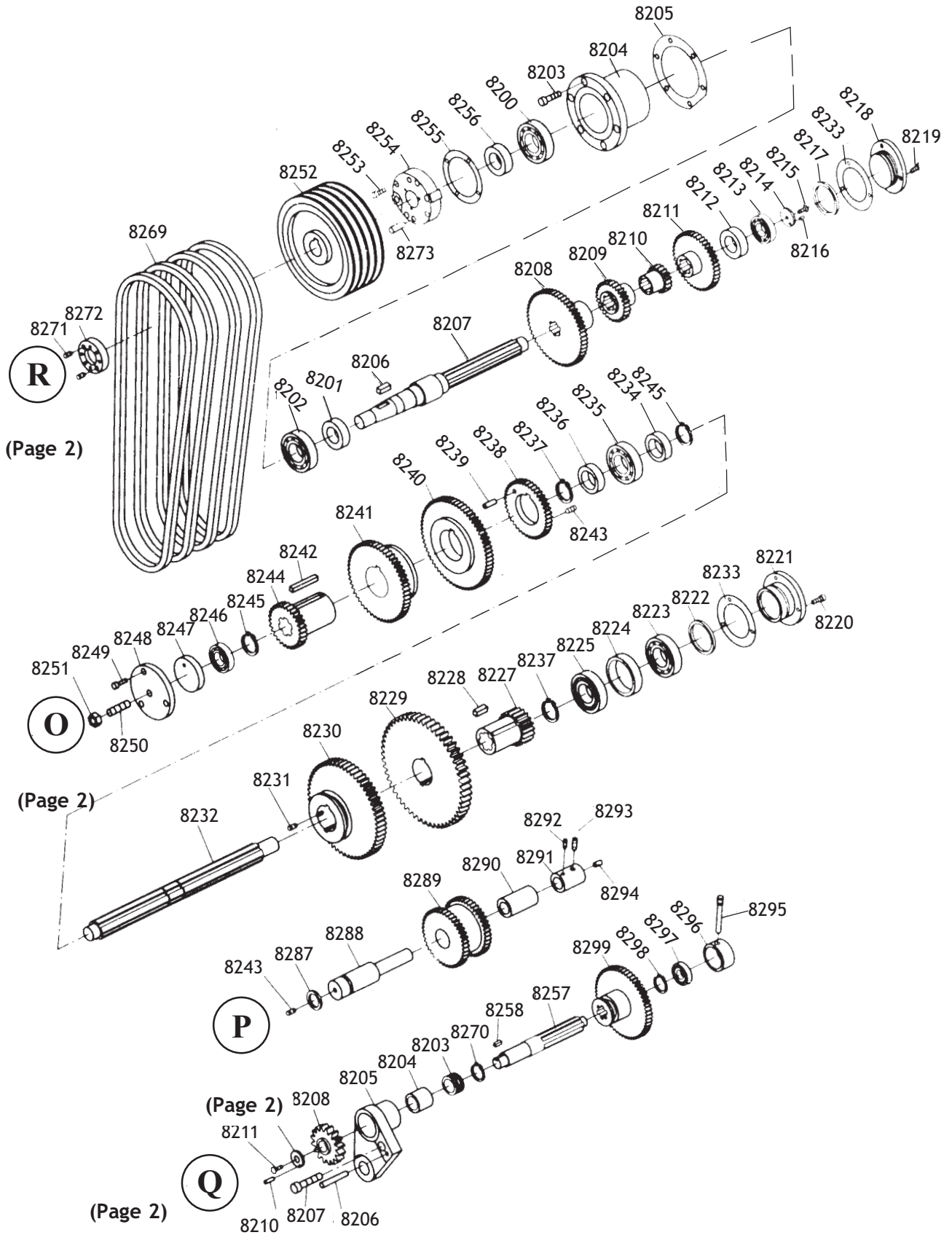
Lower Headstock and Gearing Diagram



REF	PART #	DESCRIPTION
8101	XM11008101	ROUND SIGN PLATE
8102	XM11008102	POSITIONING HANDLE
8103	XPSS13M	SET SCREW M10-1.5 X 12
8104	XM11008104	SPRING
8105	XM11001096	STEEL BALL 8MM
8106	XPFH05M	FLAT HD SCR M5-.8 X 12
8107	XM11008107	POSITIONING DISC
8108	XM11008108	SHAFT
8109	XM11008109	TAPER PIN 5 X 55
8110	XM11001049	WOODRUFF KE 4 X 16
8111	XM11008111	SEAL
8112	XM11008112	CRANK
8113	XPSS11M	SET SCREW M6-1 X 16
8114	XM11008114	DOWEL PIN 5 X 28
8115	XM11008115	POSITIONING BLOCK
8116	XM11008116	PIN BLOCK
8117	XPSS11M	SET SCREW M6-1 X 16
8118	XM11008118	CRANK
8119	XM11008119	SEAL 25 X 2.4
8120	XM11008120	DOWEL PIN 5 X 30
8121	XM11008121	SHAFT
8122	XM11001049	WOODRUFF KE 4 X 16
8123	XM11001096	STEEL BALL 8MM
8124	XM11008124	SPRING
8125	XPSS90M	SET SCREW M6-1 X 40
8126	XM11008126	LEFT POSITIONING DISC
8127	XPFH05M	FLAT HD SCR M5-.8 X 12
8128	XM11008128	LEFT LEVER SUPPORT
8129	XM11008129	HANDLE
8130	XM11008130	COVER
8131	XPFH05M	FLAT HD SCR M5-.8 X 12
8132	XPFH05M	FLAT HD SCR M5-.8 X 12
8133	XM11008133	COVER
8134	XM11008134	RIGHT LEVER SUPPORT
8135	XPSS13M	SET SCREW M10-1.5 X 12
8136	XM11008136	SPRING
8137	XM11001096	STEEL BALL 8MM
8138	XM11008138	RIGHT POSITIONING DISC
8139	XM11008139	HANDLE
8140	XPFH05M	FLAT HD SCR M5-.8 X 12
8141	XM11001049	WOODRUFF KE 4 X 16
8142	XM11008142	SHAFT
8143	XM11001049	WOODRUFF KE 4 X 16
8144	XM11008144	SEAL 25 X 2.4
8145	XM11008145	GEAR 36T
8146	XPSS11M	SET SCREW M6-1 X 16
8147	XM11008147	PIN BLOCK

REF	PART #	DESCRIPTION
8148	XPSS11M	SET SCREW M6-1 X 16
8149	XM11008149	CRANK
8150	XM11001049	WOODRUFF KE 4 X 16
8151	XM11008151	CONTROL SHAFT
8152	XM11001049	WOODRUFF KE 4 X 16
8153	XM11008153	SEAL 25 X 2.4
8154	XPSS11M	SET SCREW M6-1 X 16
8155	XM11008155	GEAR 36T
8156	XM11008156	SEAL 40 X 3.1
8157	XM11008157	BUSHING
8158	XM11008158	COVER
8159	XM11008159	DOWEL PIN 3 X 10
8160	XPFH05M	FLAT HD SCR M5-.8 X 12
8161	XPFH08M	FLAT HD SCR M8-1.25 X 12
8162	XPSS14M	SET SCREW M8-1.25 X 12
8163	XM11008163	BEARING SUPPORT
8164	XM11008164	SEAL 40 X 3.1
8165	XM11008165	DOWEL PIN 6 X 8
8166	XPSS01M	SET SCREW M6-1 X 10
8167	XM11008167	BUSHING
8168	XPSB48M	CAP SCREW M6-1 X 35
8169	XM11008169	CONTROL SHAFT
8170	XM11008170	RIGHT FORK
8171	XPSS01M	SET SCREW M6-1 X 10
8172	XM11008172	BUSHING
8173	XM11008173	SEAL 30 X 3.1
8174	XM11008174	BLOCKING PIECE
8175	XPFH08M	FLAT HD SCR M8-1.25 X 12
8176	XM11008176	ADJUSTING SCREW
8177	XM11008177	TAPER PIN 8 X 40
8178	XM11008178	TAPER PIN 8 X 40
8179	XM11008179	ADJUSTING BLOCK
8180	XM11008180	HEX BOLT
8181	XM11008181	ADJUSTING SCREW
8182	XM11008182	POSITIONING PIN
8183	XM11000037	OIL SIGHT GLASS
8184	XM11008184	FLAT WASHER
8185	XPSB122M	CAP SCREW M16-2 X 50
8186	XM11008186	CONTROL PANEL PLATE
8187	XPSB40M	CAP SCREW M8-1.25 X 35
8188	XPFH52M	FLAT HD SCR M16-2 X 25
8189	XM11008189	TOP COVER
8190	XM11008190	HEX BOLT
8191	XM11008191	FLAT WASHER
8192	XM11008192	PAPER GASKET
8193	XPS12M	PHLP HD SCR M3-.5 X 6
8194	XM11008194	DOWEL PIN 4 X 15

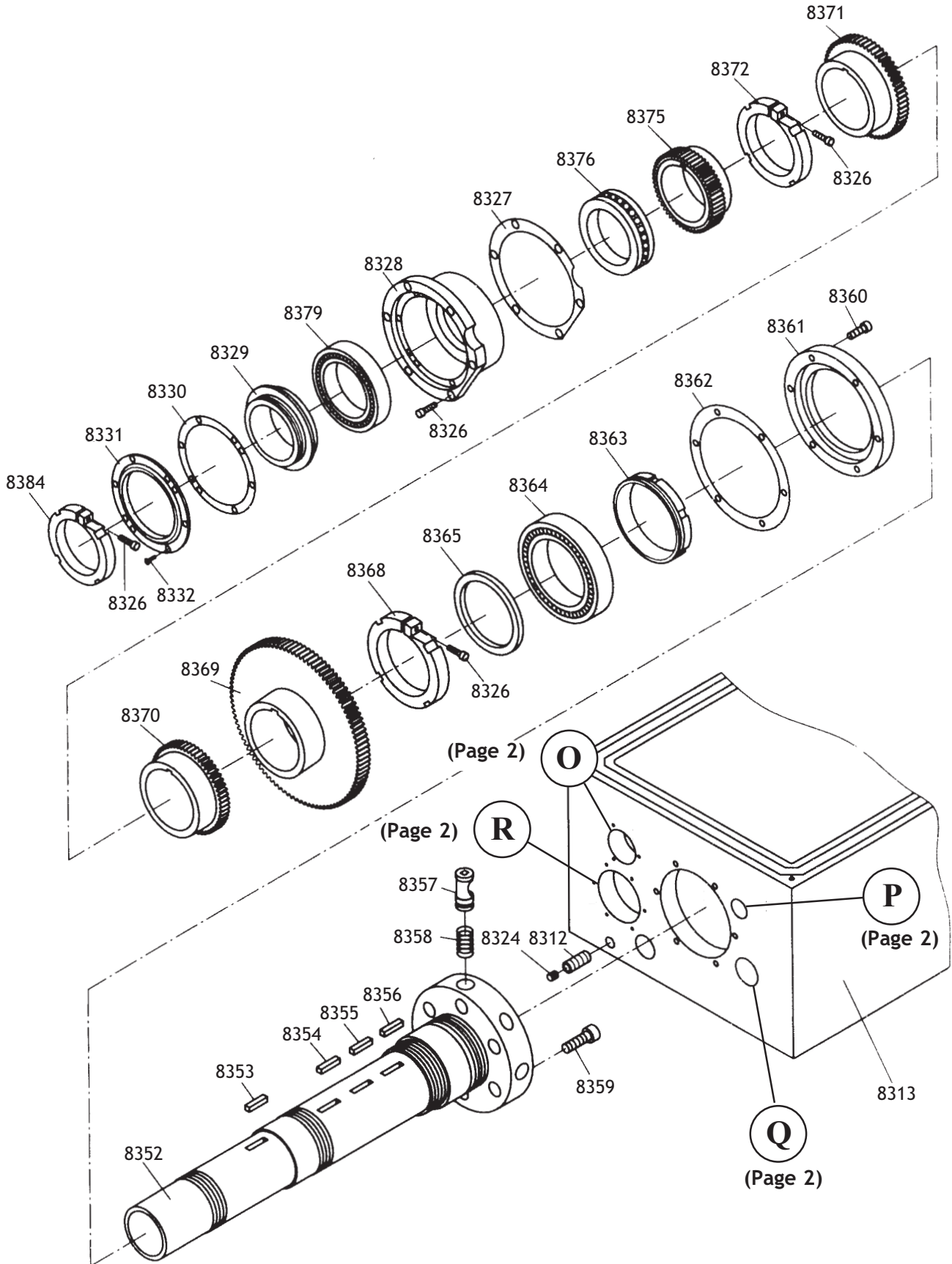
Upper Headstock Gearing Diagram



REF PART #	DESCRIPTION
8200	XP6207ZZ BALL BEARING 6207ZZ
8201	XM11008201 SPACER
8202	XP6207ZZ BALL BEARING 6207ZZ
8203	XM11008203 SPACER
8204	XM11008204 OIL BUSHING
8205	XM11008205 HOUSING
8206	XM11008206 TAPER PIN
8207	XPSB64M CAP SCREW M10-1.5 X 25
8208	XM11008208 GEAR 16T
8209	XM11008209 SPECIAL FLAT WASHER
8210	XPRP41M ROLL PIN 6 X 12
8211	XPFH39M FLAT HD SCR M5-.8 X 16
8212	XM11008212 SLEEVE
8213	XP6305 BALL BEARING 6305
8214	XM11008214 SHAFT END LOCK RING 32MM
8215	XPFH51M FLAT HD SCR M10-1.5 X 12
8216	XM11008216 DOWEL PIN 3 X 10
8217	XM11008217 SEAL 60 X 3.1
8218	XM11008218 BLOCKING FLANGE
8219	XPSB29M CAP SCREW M6-1 X 40
8220	XPSB37M CAP SCREW M6-1 X 50
8221	XM11008221 BLOCKING FLANGE
8222	XM11008222 SEAL 60 X 3.1
8223	XP6305 BALL BEARING 6305
8224	XM11008224 SLEEVE 62 X 6
8225	XP6305 BALL BEARING 6305
8226	XPR12M EXT RETAINING RING 35MM
8227	XM11008227 GEAR 67T
8228	XPK118M KEY 8 X 7 X 50
8229	XM11008229 GEAR 67T
8230	XM11008230 GEAR 59T
8231	XPSS14M SET SCREW M8-1.25 X 12
8232	XM11008232 SHAFT
8233	XM11008233 PAPER GASKET
8234	XM11008234 SLEEVE 35 X 8
8235	XP6007 BALL BEARING 6007
8236	XM11008236 SLEEVE 35 X 8
8237	XPR12M EXT RETAINING RING 35MM
8238	XM11008238 GEAR 42T
8239	XM11008239 DOWEL PIN 8 X 25
8240	XM11008240 GEAR 65T
8241	XM11008241 GEAR 55T
8242	XPK113M KEY 10 X 6 X 60

REF PART #	DESCRIPTION
8243	XPSS14M SET SCREW M8-1.25 X 12
8244	XM11008244 GEAR 31T
8245	XPR12M EXT RETAINING RING 35MM
8246	XP6305 BALL BEARING 6305
8247	XM11008247 PUSHING DISC
8248	XM11008248 COVER
8249	XPSB28M CAP SCREW M6-1 X 15
8250	XPSS92M SET SCREW M12-1.75 X 65
8251	XPN09M HEX NUT M12-1.75
8252	XM11008252 PULLEY
8253	XPSB06M CAP SCREW M6-1 X 25
8254	XM11008254 BEARING COVER
8255	XM11008255 GASKET
8256	XM11008256 SEAL 32 X 52
8257	XM11008257 SHAFT
8258	XPK06M KEY 5 X 5 X 10
8260	XM11008260 SLEEVE
8261	XM11008261 OIL BUSHING
8262	XM11008262 BRACKET
8263	XM11008263 TAPER PIN 8 X 40
8264	XPSB64M CAP SCREW M10-1.5 X 25
8265	XM11008265 GEAR 16T
8266	XM11008266 FLAT WASHER
8267	XM11008267 DOWEL PIN
8268	XPFH39M FLAT HD SCR M5-.8 X 16
8269	XPVA75 V-BELT A-75
8270	XPR19M EXT RETAINING RING 28MM
8271	XPSS17M SET SCREW M8-1.25 X 6
8272	XM11008272 CLAMPING ROUND NUT
8273	XM11008273 DOWEL PIN 8 X 30
8287	XM11008287 SEAL 35 X 3.1
8288	XM11008288 SHAFT
8289	XM11008289 DOUBLE GEAR 48T
8290	XM11008290 COPPER SLEEVE
8291	XM11008291 COUPLER
8292	XPSS01M SET SCREW M6-1 X 10
8293	XPSS80M SET SCREW M8-1.25 X 15
8294	XM11008294 DOWEL PIN 6 X 8
8295	XM11008295 SET SCREW
8296	XM11008296 SLEEVE
8297	XP6203 CAP SCREW
8298	XPR19M EXT RETAINING RING 28MM
8299	XM11008299 GEAR 65T

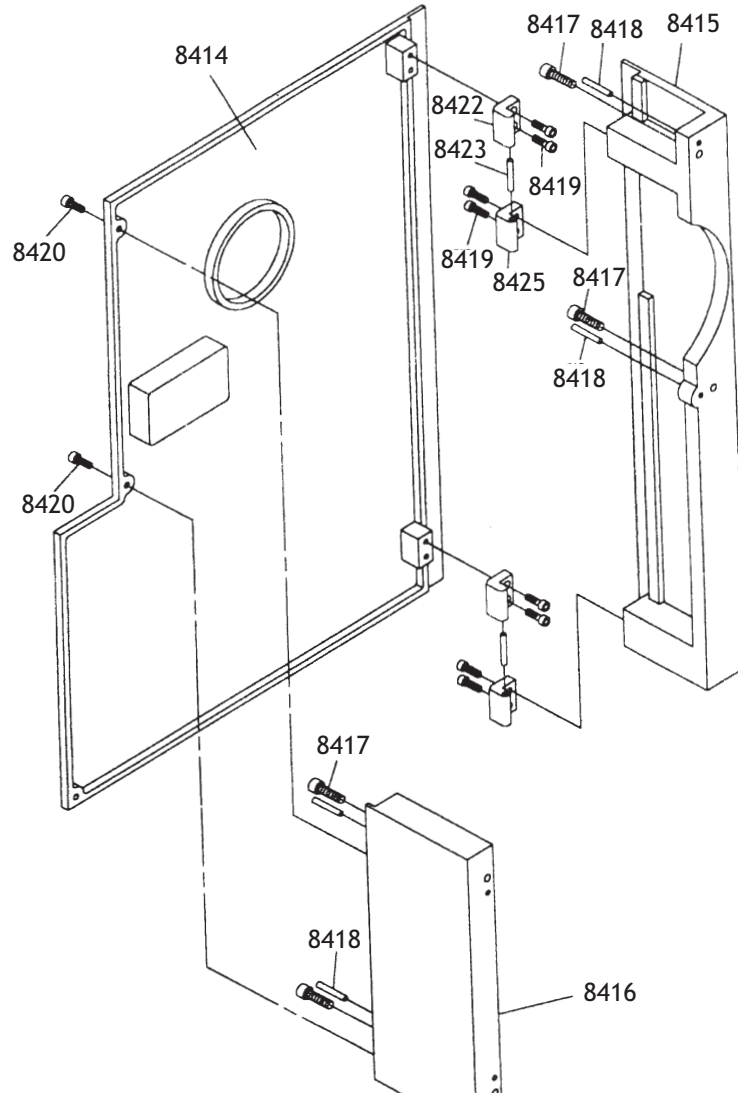
Upper Headstock and Gearing Diagram



REF PART #	DESCRIPTION
8312	XM11008312 DRAIN EXTENSION PIPE
8313	XM11008313 HEADSTOCK CASTING
8324	XM11008324 SPECIAL SET SCREW
8326	XPSB13M CAP SCREW M8-1.25 X 30
8327	XM11008327 GASKET
8328	XM11008328 BEARING SUPPORT
8329	XM11008329 SLEEVE
8330	XM11008330 GASKET
8331	XM11008331 BEARING BACK COVER
8332	XPS09M PHLP HD SCR M5-.8 X 10
8352	XM11008352 SPINDLE
8353	XPK80M KE 10 X 8 X 40
8354	XPK115M KE 10 X 8 X 50
8355	XPK116M KE 12 X 8 X 50
8356	XPK117M KE 14 X 9 X 50
8357	XM11008357 CAM LOCK
8358	XM11008358 SPRING

REF PART #	DESCRIPTION
8359	XM11008359 CAM POSITIONING SCREW
8360	XPSB72M CAP SCREW M10-1.5 X 30
8361	XM11008361 BEARING FRONT COVER
8362	XM11008362 GASKET
8363	XM11008363 OIL SPLASHING RING
8364	XP3024 TAPER ROLLER BEARING NN3024
8365	XM11008365 LINING
8368	XM11008368 SPANNER NUT W/SCREW
8369	XM11008369 GEAR 98T
8370	XM11008370 GEAR 50T
8371	XM11008371 GEAR 58T
8372	XM11008372 ROUND NUT W/SCREW
8375	XM11008375 GEAR 65T
8376	XP51120 THRUST BEARING 51120
8379	XP7020AC ANGULAR BEARING 7020AC
8384	XM11008384 ROUND NUT W/SCREW

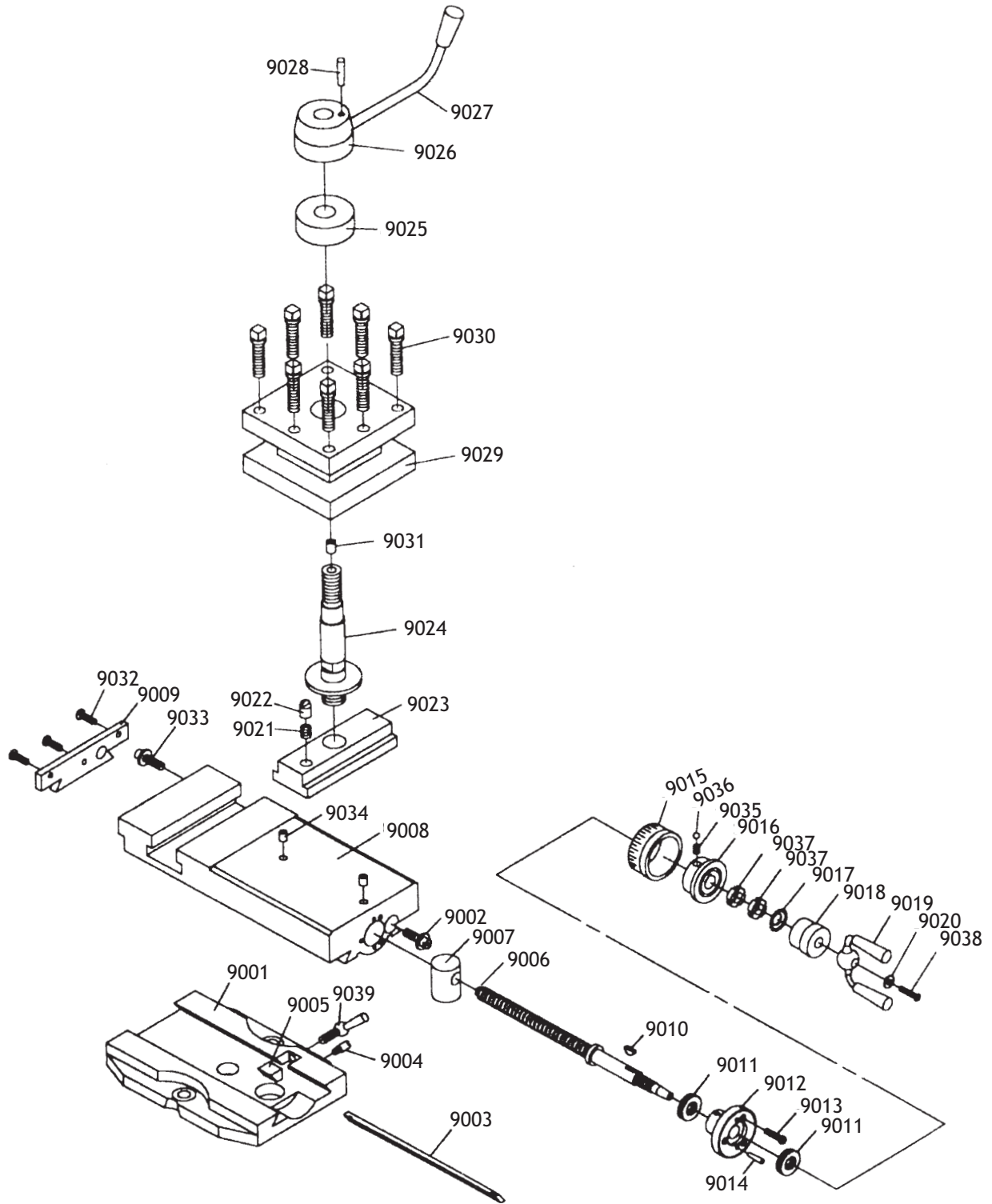
Headstock Door Diagram



REF	PART #	DESCRIPTION
8414	XM11008414	BACK COVER
8415	XM11008415	REAR SIDE PLATE
8416	XM11008416	FRONT SIDE PLATE
8417	XPSB31M	CAP SCREW M8-1.25 X 25
8418	XM11008418	TAPER PIN 6 X 25

REF	PART #	DESCRIPTION
8419	XPSB02M	CAP SCREW M6-1 X 20
8420	XPSB28M	CAP SCREW M6-1 X 15
8422	XM11008422	UPPER HINGE
8423	XM11008423	DOWEL PIN 6 X 40
8425	XM11008425	LOWER HINGE

Tool Post and Compound Rest Diagram

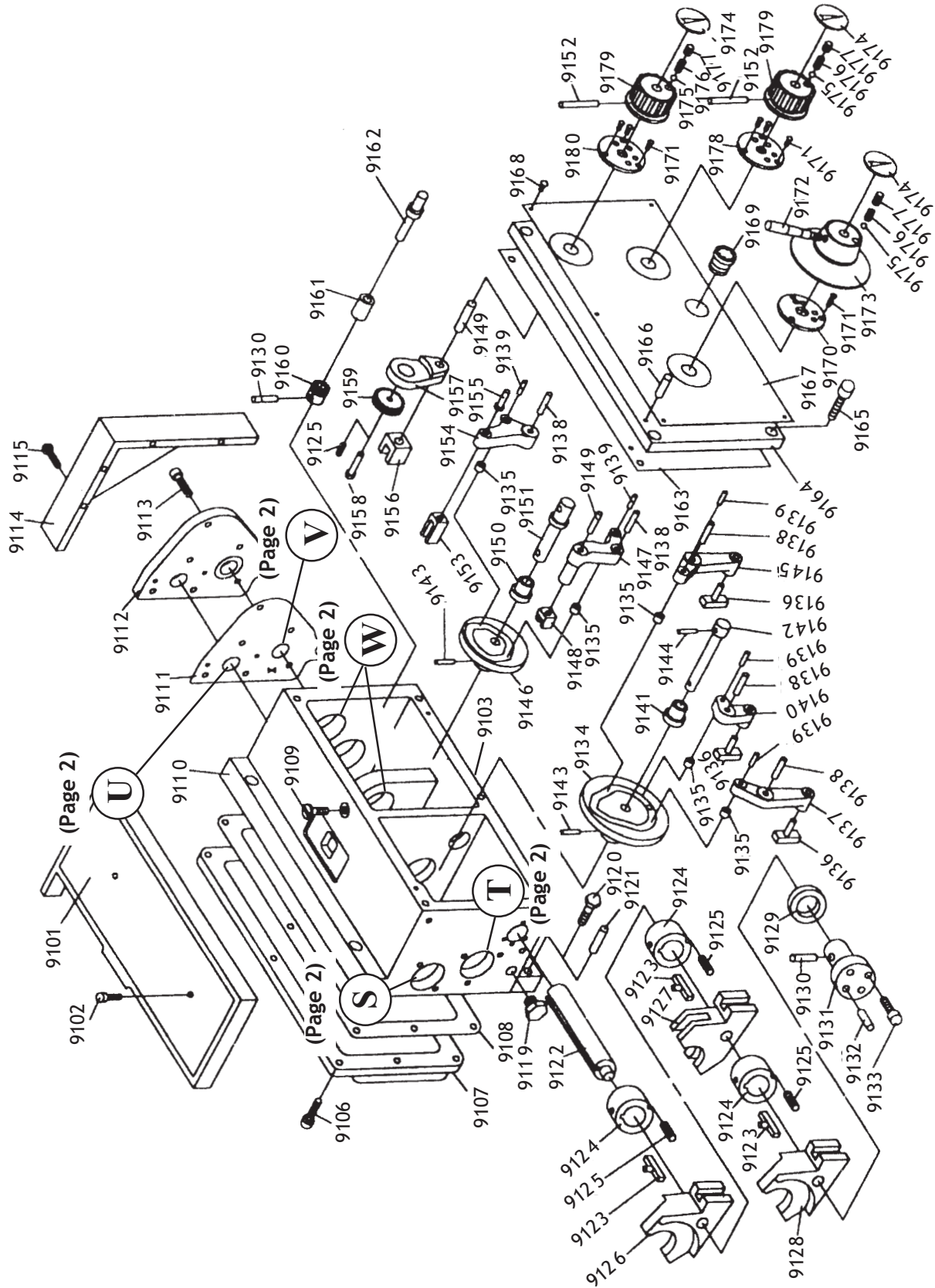


PARTS

REF	PART #	DESCRIPTION
9001	XM11009001	REVOLVING PLATE
9002	XM11009002	PHLP HD SCR
9003	XM11009003	GIB
9004	XM11009004	PHLP HD SCR
9005	XM11009005	PRESSING BLOCK
9006	XM11009006	LEAD SCREW
9007	XM11009007	HEX NUT
9008	XM11009008	TOP SLIDE
9009	XM11009009	WIPE PLATE
9010	XM11009010	WOODRUFF KE 3 X 13
9011	XP51102	THRUST BEARING 51102
9012	XM11009012	SLEEVE
9013	XPSB33M	CAP SCREW M5-.8 X 12
9014	XM11009014	TAPER PIN 3 X 18
9015	XM11009015	DIAL
9016	XM11009016	SLEEVE
9017	XM11009017	DISC SPRING
9018	XM11009018	SLEEVE
9019	XM11009019	HANDLE
9020	XM11009020	LINING

REF	PART #	DESCRIPTION
9021	XM11009021	SPRING
9022	XM11009022	POSITIONING BLOCK
9023	XM11009023	T-SLOT NUT M6-1
9024	XM11009024	SHAFT
9025	XM11009025	ADJUSTMENT LINING
9026	XM11009026	LEVER SUPPORT
9027	XM11009027	HANDLE
9028	XM11009028	TAPER PIN 5 X 35
9029	XM11009029	TOOL POST
9030	XM11009030	SPECIAL SCREW M12-1.75 X 45
9031	XM11001050	OIL CUP 8MM
9032	XPFH39M	FLAT HD SCR M5-.8 X 16
9033	XM11009033	SPECIAL SCREW
9034	XM11001050	OIL CUP 8MM
9035	XM11009035	SPRING
9036	XM11004032	STEEL BALL 6MM
9037	XM11009037	SPANNER NUT M12 X 1.25
9038	XPS40M	PHLP HD SCR M5-.8 X 16
9039	XM11009039	LOCK KNOB

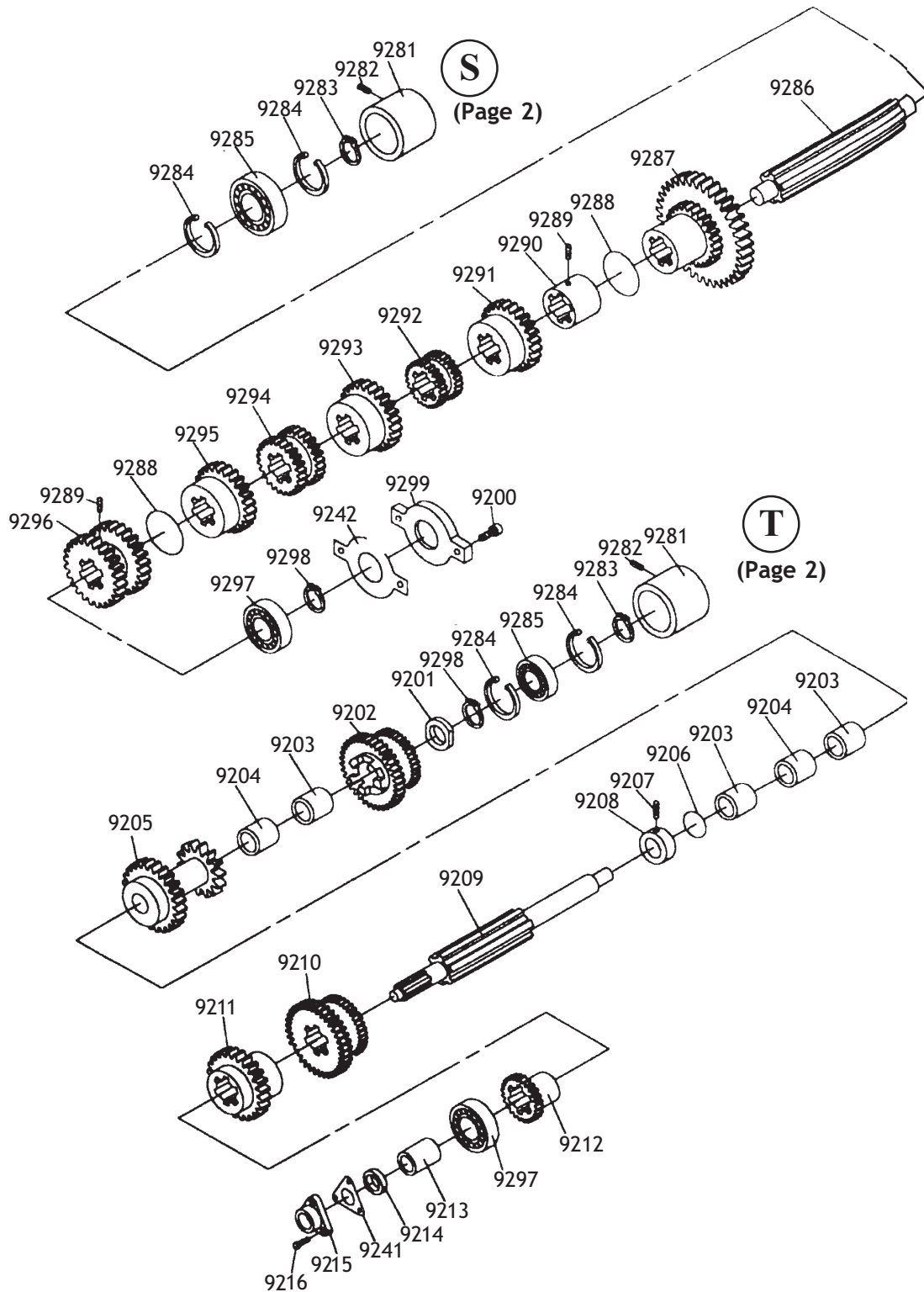
Lead Screw/Feed Rod Shifting System Diagram



REF	PART #	DESCRIPTION
9101	XM11009101	UPPER COVER
9102	XPSB07M	CAP SCREW M6-1 X 30
9103	XM11009103	CASE
9106	XPSB11M	CAP SCREW M8-1.25 X 16
9107	XM11009107	REAR COVER
9108	XM11009108	GASKET
9109	XPFH20M	FLAT HD SCR M10-1.5 X 20
9110	XM11009110	FEEDBOX CASTING
9111	XM11009111	GASKET
9112	XM11009112	FLANGE
9113	XPSB11M	CAP SCREW M8-1.25 X 16
9114	XM11009114	EXTENDING PLATE
9115	XPSB49M	CAP SCREW M6-1 X 60
9119	XPB32M	HEX BOLT M10-1.5 X 25
9120	XPB31M	HEX BOLT M10-1.5 X 40
9121	XM11009121	TAPER PIN 6 X 35
9122	XM11009122	CONTROL SHAFT
9123	XM11009123	SLIDING KEY
9124	XM11009124	SLIDING SLEEVE
9125	XPSS31M	SET SCREW M5-.8 X 8
9126	XM11009126	RIGHT FORK
9127	XM11009127	MIDDLE FORK
9128	XM11009128	LEFT FORK
9129	XM11009129	SEAL 32 X 3.1
9130	XM11009130	TAPER PIN 4 X 25
9131	XM11009131	COVER
9132	XM11009132	DOWEL PIN 6 X 50
9133	XPSB24M	CAP SCREW M5-.8 X 16
9134	XM11009134	CAM
9135	XM11009135	ROLLING SLEEVE
9136	XM11009136	POSITIONING KEY
9137	XM11009137	CRANK
9138	XM11009138	DOWEL PIN 8 X 32
9139	XM11009139	DOWEL PIN 6 X 20
9140	XM11009140	CRANK
9141	XM11009141	SLEEVE
9142	XM11009142	LEVER SHAFT
9143	XM11009143	TAPER PIN 4 X 32

REF	PART #	DESCRIPTION
9144	XM11009144	TAPER PIN 4 X 65
9145	XM11009145	CRANK
9146	XM11009146	CAM
9147	XM11009147	CRANK
9148	XM11009148	FORK
9149	XM11009149	DOWEL PIN 8 X 18
9150	XM11009150	SLEEVE
9151	XM11009151	LEVER SHAFT
9152	XM11009152	TAPER PIN 4 X 45
9153	XM11009153	FORK
9154	XM11009154	CRANK
9155	XM11009155	DOWEL PIN
9156	XM11009156	FORK
9157	XM11009157	CRANK
9158	XM11009158	SMALL SHAFT
9159	XM11009159	BIG GEAR 44T
9160	XM11009160	SMALL GEAR 22T
9161	XM11009161	SLEEVE
9162	XM11009162	LEVER SHAFT
9163	XM11009163	GASKET
9164	XM11009164	FRONT COVER
9165	XPSB64M	CAP SCREW M10-1.5 X 25
9166	XM11009166	TAPER PIN 5 X 35
9167	XM11009167	SIGN PLATE
9168	XPSS45M	SET SCREW M3-.5 X 6
9169	XM11000037	OIL SIGHT GLASS
9170	XM11009170	POSITIONING DISC
9171	XM11009171	DOWEL PIN 6 X 8
9172	XM11009172	LEVER
9173	XM11009173	LEVER SUPPORT
9174	XM11009174	POINTER PLATE
9175	XM11001096	STEEL BALL 8MM
9176	XM11009176	COMPRESSION SPRING 1 X 8 X 25
9177	XPSS13M	SET SCREW M10-1.5 X 12
9178	XM11009178	POSITIONING DISC
9179	XM11009179	HANDWHEEL
9180	XM11009180	POSITIONING DISC

Lead Screw/Feed Rod Gear System Diagram

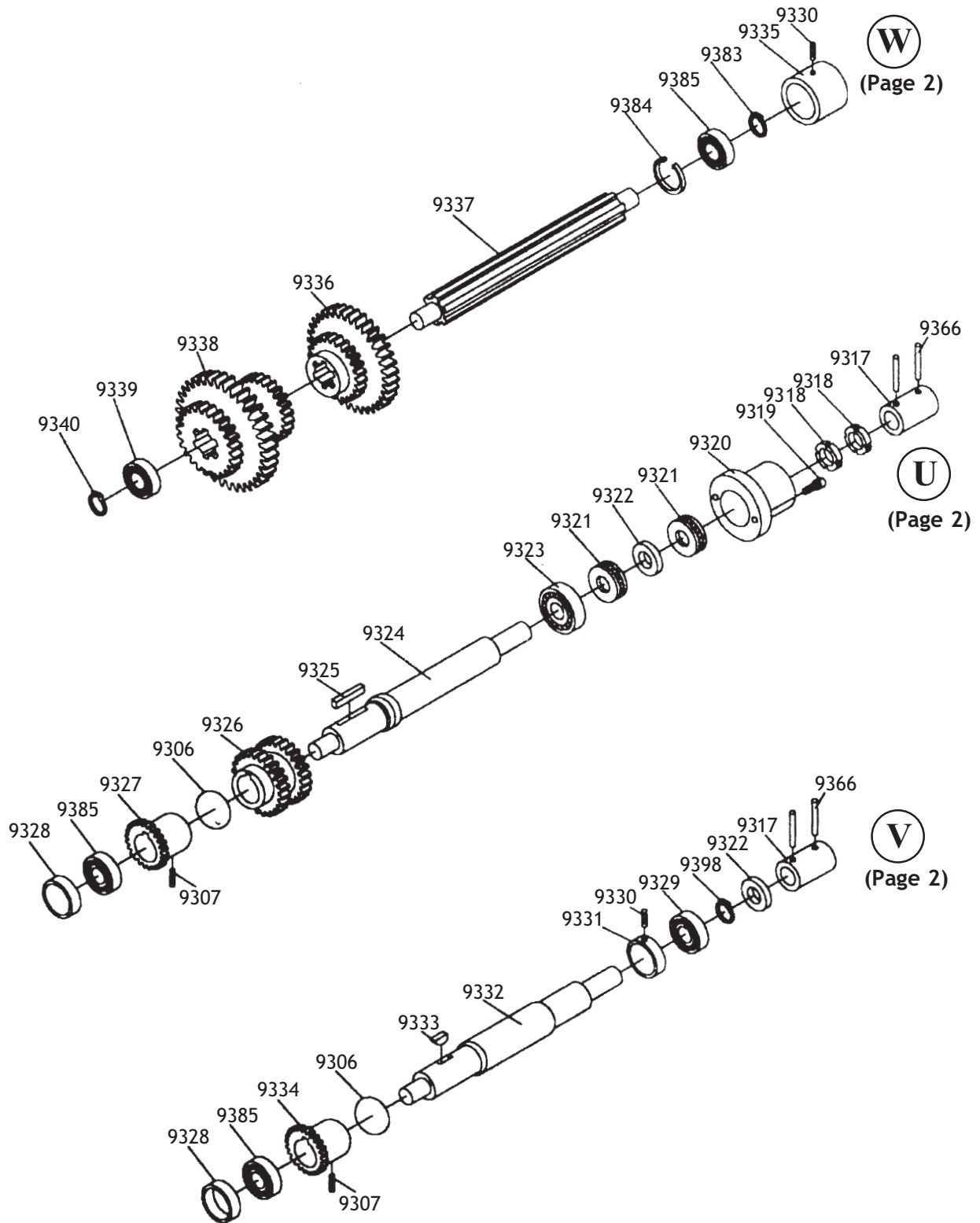




REF	PART #	DESCRIPTION
9200	XPSB76M	CAP SCREW M8-1.25 X 18
9201	XM11009201	SPACER
9202	XM11009202	DOUBLE GEAR 52T/26T
9203	XM11009203	OIL BUSHING
9204	XM11009204	SLEEVE
9205	XM11009205	DOUBLE GEAR
9206	XM11009206	IRON WIRE 1 X 160
9207	XPSS14M	SET SCREW M8-1.25 X 12
9208	XM11009208	BUSHING
9209	XM11009209	SHAFT
9210	XM11009210	DOUBLE GEAR 48T/42T
9211	XM11009211	SLIDING GEAR 24T
9212	XM11009212	SLIDING GEAR 24T
9213	XM11009213	SLEEVE
9214	XM11009214	SPACER 32MM
9215	XM11009215	BEARING SUPPORT
9216	XPSB31M	CAP SCREW M8-1.25 X 25
9241	XM11009241	GASKET
9242	XM11009242	GASKET

REF	PART #	DESCRIPTION
9281	XM11009281	MIDDLE BEARING SUPPORT
9282	XPSS75M	SET SCREW M10-1.5 X 16
9283	XPR09M	EXT RETAINING RING 20MM
9284	XPR62M	EXT RETAINING RING 42MM
9285	XP6004	BALL BEARING 6004
9286	XM11009286	SHAFT
9287	XM11009287	DOUBLE GEAR 26T/52T
9288	XM11009288	IRON WIRE 1 X 190
9289	XPSS09M	SET SCREW M8-1.25 X 20
9290	XM11009290	POSITIONING SLEEVE
9291	XM11009291	GEAR 28T
9292	XM11009292	DOUBLE GEAR 26T/28T
9293	XM11009293	GEAR 22T
9294	XM11009294	DOUBLE GEAR 18T/19T
9295	XM11009295	GEAR 22T
9296	XM11009296	DOUBLE GEAR 24T/23T
9297	XP6205	BALL BEARING 6205
9298	XPR11M	EXT RETAINING RING 25MM
9299	XM11009299	SHAFT END COVER

Lead Screw/Feed Rod Diagram

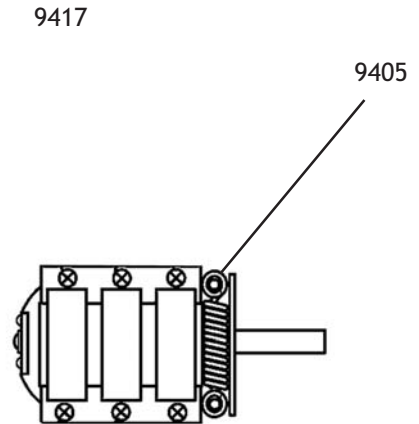
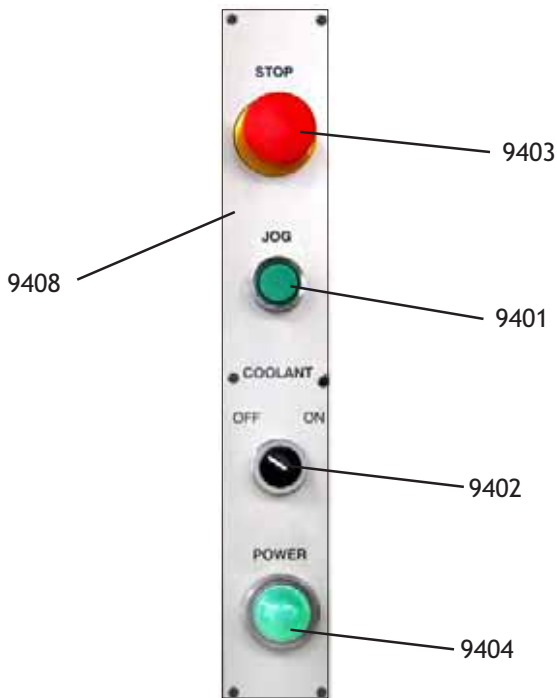
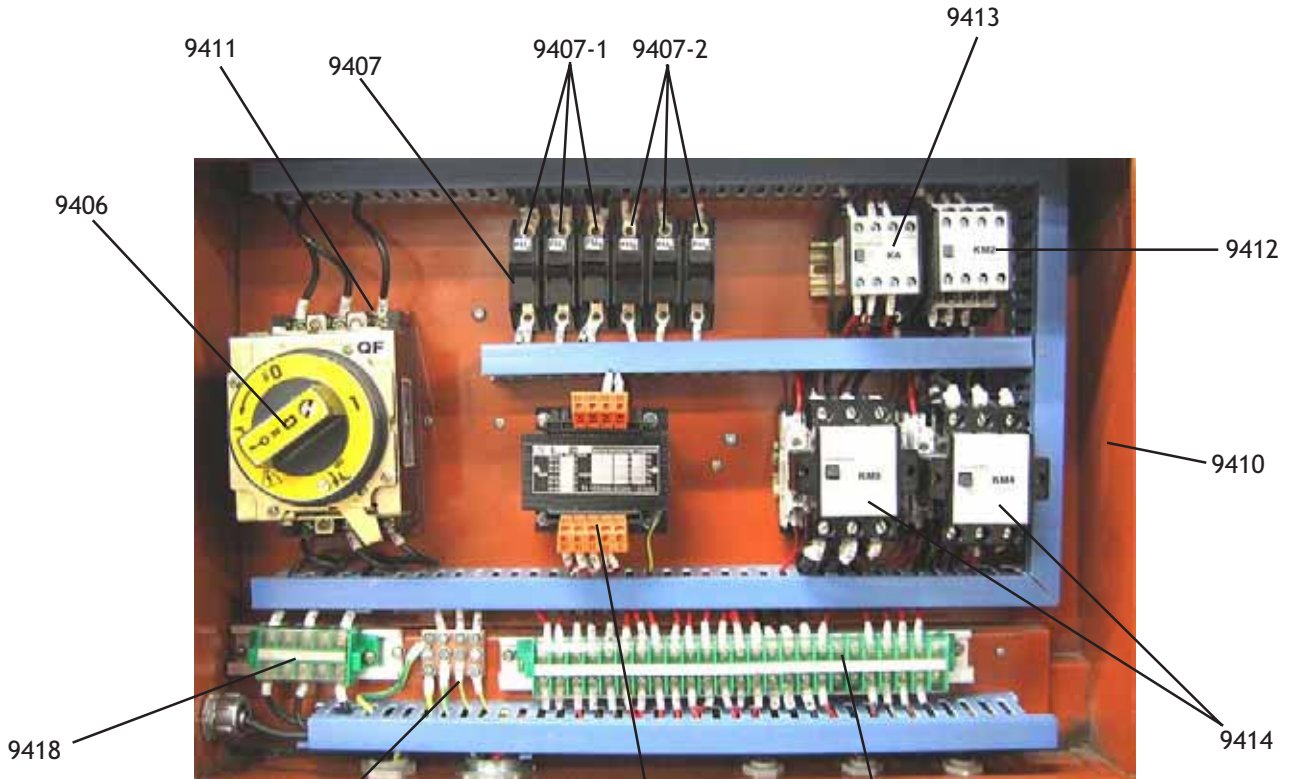


PARTS

REF	PART #	DESCRIPTION
9306	XM11009306	IRON WIRE 1 X 160
9307	XPSS14M	SET SCREW M8-1.25 X 12
9317	XM11009317	SHAFT COUPLING
9318	XM11009318	SPANNER NUT M25 X 1.5
9319	XPSB04M	CAP SCREW M6-1 X 10
9320	XM11009320	COVER
9321	XP51105	THRUST BEARING 51105
9322	XM11009322	SPACER 25MM
9323	XP6305	BALL BEARING 6305
9324	XM11009324	SHAFT
9325	XPK118M	KE 8 X 7 X 50
9326	XM11009326	DOUBLE GEAR 35T/36T
9327	XM11009327	GEAR 36T
9328	XM11009328	SLEEVE
9329	XP6005	BALL BEARING 6005
9330	XPSS13M	SET SCREW M10-1.5 X 12

REF	PART #	DESCRIPTION
9331	XM11009331	BEARING SUPPORT
9332	XM11009332	SHAFT
9333	XM11009333	WOODRUFF KE 6 X 22
9334	XM11009334	GEAR
9335	XM11009335	BEARING SUPPORT
9336	XM11009336	DOUBLE GEAR 24T/35T
9337	XM11009337	SHAFT
9338	XM11009338	TRIPLE GEAR 39T/52T/26T
9339	XP6203	BALL BEARING 6203
9340	XPR18M	EXT RETAINING RING 17MM
9366	XM11009366	TAPER PIN 5 X 35
9383	XPR09M	EXT RETAINING RING 20MM
9384	XPR24M	INT RETAINING RING 42MM
9385	XP6004	BALL BEARING 6004
9398	XPR11M	EXT RETAINING RING 25MM

Electrical Parts Diagram

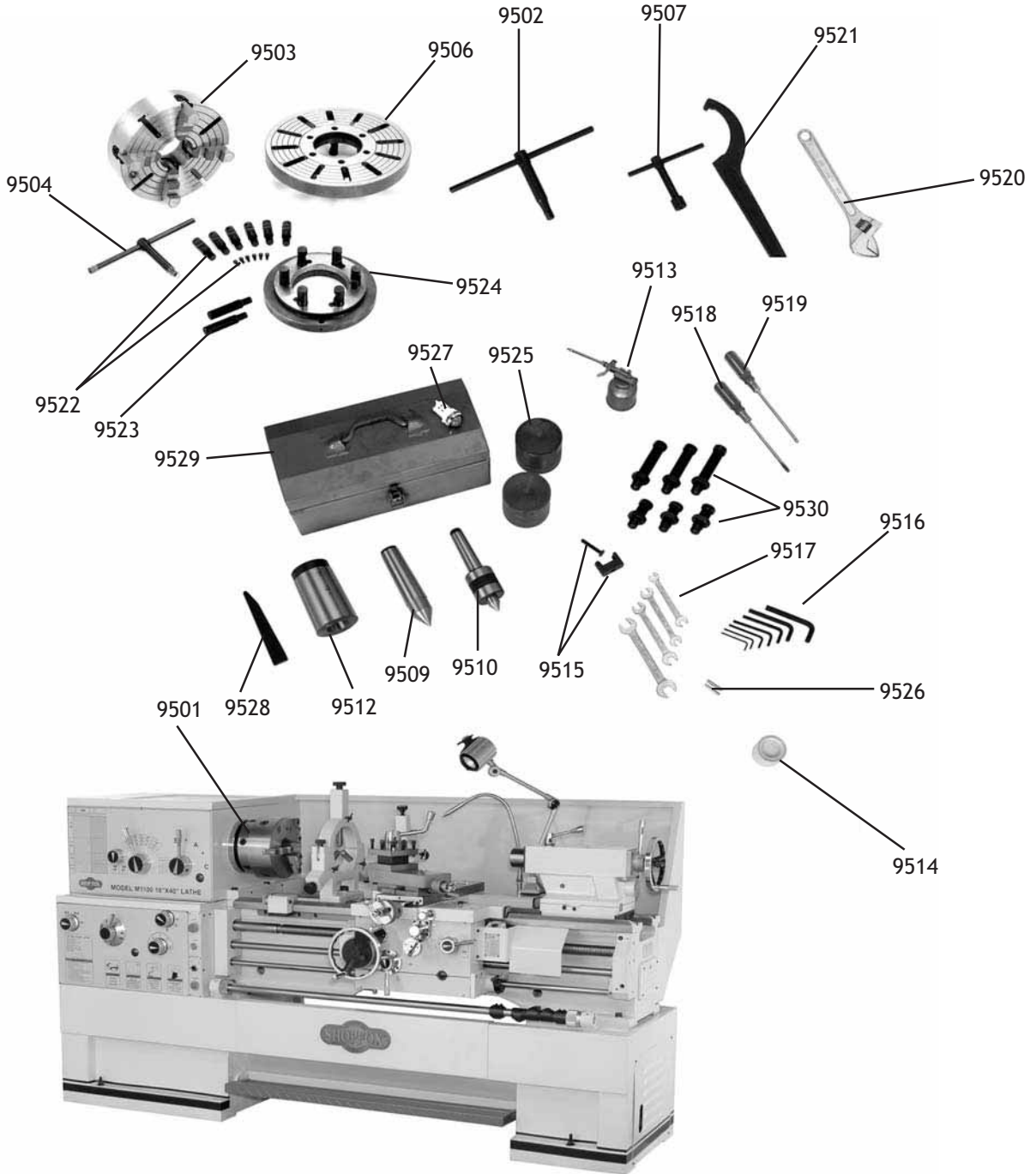


PARTS

REF	PART #	DESCRIPTION
9401	XM11009401	JOG BUTTON
9402	XM11009402	COOLANT CONTROL SWITCH
9403	XM11009403	EMERGENC STOP BUTTON
9404	XM11009404	POWER INDICATOR LIGHT
9405	XM11009405	ROTAR SWITCH HZ3-452
9406	XM11009406	MASTER SWITCH (40A) D215-40
9407	XM11009407	FUSE HOUSING
9407-1	XM11009407-1	2 AMP FUSE
9407-2	XM11009407-2	3 AMP FUSE
9408	XM11009408	PANEL

REF	PART #	DESCRIPTION
9410	XM11009410	ELECTRICAL BOX AND DOOR
9411	XM11009411	TEMPERATURE RELA JW6
9412	XM11009412	A.C. CONTACTOR 3TB40
9413	XM11009413	A.C. CONTACTOR 3TB80
9414	XM11009414	A.C. CONTACTOR 3TB43
9416	XM11009416	COPPER GROUND PLATE
9417	XM11009417	50-POST WIRING BOARD
9418	XM11009418	10-POST WIRING BOARD
9419	XM11009419	TRANSFORMER JBK3-100-TH

Accessories Diagram





REF	PART #	DESCRIPTION
9501	XM11009501	3-JAW CHUCK
9502	XM11009502	CHUCK WRENCH
9503	XM11009503	4-JAW CHUCK
9504	XM11009504	CHUCK WRENCH
9506	XM11009506	FACE PLATE
9507	XM11009507	TOOL POST WRENCH
9509	XM11009509	DEAD CENTER MT#5
9510	XM11009510	LIVE CENTER MT#4
9512	XM11009512	MORSE REDUCTION SLEEVE
9513	XM11009513	OIL GUN
9514	XM11009514	TOUCH-UP PAINT
9515	XM11009515	GAP BRIDGE PIN PULLER
9516	XM11009516	HEX WRENCH SET (2.5,4,5,6,8,10)
9517	XM11009517	WRENCH SET (9,10,11,12,14,17,19)
9518	XM11009518	FLAT BLADE SCREWDRIVER
9519	XM11009519	PHILLIPS SCREWDRIVER
9520	XM11009520	ADJUSTABLE WRENCH
9521	XM11009521	SPANNER WRENCH
9522	XM11009522	CAMLOCK STUD SET
9523	XM11009523	DRIVING PINS

REF	PART #	DESCRIPTION
9524	XM11009524	DRIVING PLATE
9525	XM11009525	IRON FOOT SET
9526	XM11009526	LEAD SCREW SHEAR PIN
9527	XM11009527	LAMP ASSEMBLY
9528	XM11009528	WEDGE
9529	XM11009529	TOOL BOX
9530	XM11009530	LEVELING STUD SET
9407-1	XM11009407-1	FUSE (2A)
9407-2	XM11009407-2	FUSE (3A)
9516-1	XPAW02.5M	HEX WRENCH 2.5MM
9516-2	XPAW04M	HEX WRENCH 4MM
9516-3	XPAW05M	HEX WRENCH 5MM
9516-4	XPAW06M	HEX WRENCH 6MM
9516-5	XPAW07M	HEX WRENCH 7MM
9516-6	XPAW08M	HEX WRENCH 8MM
9516-7	XPAW10M	HEX WRENCH 10MM
9517-1	XPWR0911	COMBO WRENCH 9-11MM
9517-2	XPWR1012	COMBO WRENCH 10-12MM
9517-3	XPWR1214	COMBO WRENCH 12 X 14MM
9517-4	XPWR1719	COMBO WRENCH 17 X 19MM

Warranty

Woodstock International, Inc. warrants all **SHOP FOX**® machinery to be free of defects from workmanship and materials for a period of two years from the date of original purchase by the original owner. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, lack of maintenance, or reimbursement of third party expenses incurred.

Woodstock International, Inc. will repair or replace, at its expense and at its option, the **SHOP FOX**® machine or machine part which in normal use has proven to be defective, provided that the original owner returns the product prepaid to the **SHOP FOX**® factory service center or authorized repair facility designated by our Bellingham, WA office, with proof of their purchase of the product within two years, and provides Woodstock International, Inc. reasonable opportunity to verify the alleged defect through inspection. If it is determined there is no defect, or that the defect resulted from causes not within the scope of Woodstock International Inc.'s warranty, then the original owner must bear the cost of storing and returning the product.

This is Woodstock International, Inc.'s sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant that **SHOP FOX**® machinery complies with the provisions of any law or acts. In no event shall Woodstock International, Inc.'s liability under this warranty exceed the purchase price paid for the product, and any legal actions brought against Woodstock International, Inc. shall be tried in the State of Washington, County of Whatcom. We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damages arising from the use of our products.

Every effort has been made to ensure that all **SHOP FOX**® machinery meets high quality and durability standards. We reserve the right to change specifications at any time because of our commitment to continuously improve the quality of our products.

Warranty Registration

Name _____
 Street _____
 City _____ State _____ Zip _____
 Phone # _____ Email _____ Invoice # _____
 Model # _____ Serial # _____ Dealer Name _____ Purchase Date _____

The following information is given on a voluntary basis. It will be used for marketing purposes to help us develop better products and services. Of course, all information is strictly confidential.

1. How did you learn about us?
 Advertisement Friend Local Store
 Mail Order Catalog Website Other:
2. How long have you been a woodworker/metalworker?
 0-2 Years 2-8 Years 8-20 Years 20+ Years
3. How many of your machines or tools are Shop Fox®?
 0-2 3-5 6-9 10+
4. Do you think your machine represents a good value? Yes No
5. Would you recommend Shop Fox® products to a friend? Yes No
6. What is your age group?
 20-29 30-39 40-49
 50-59 60-69 70+
7. What is your annual household income?
 \$20,000-\$29,000 \$30,000-\$39,000 \$40,000-\$49,000
 \$50,000-\$59,000 \$60,000-\$69,000 \$70,000+
8. Which of the following magazines do you subscribe to?

<input type="checkbox"/> Cabinet Maker	<input type="checkbox"/> Popular Mechanics	<input type="checkbox"/> Today's Homeowner
<input type="checkbox"/> Family Handyman	<input type="checkbox"/> Popular Science	<input type="checkbox"/> Wood
<input type="checkbox"/> Hand Loader	<input type="checkbox"/> Popular Woodworking	<input type="checkbox"/> Wooden Boat
<input type="checkbox"/> Handy	<input type="checkbox"/> Practical Homeowner	<input type="checkbox"/> Woodshop News
<input type="checkbox"/> Home Shop Machinist	<input type="checkbox"/> Precision Shooter	<input type="checkbox"/> Woodsmith
<input type="checkbox"/> Journal of Light Cont.	<input type="checkbox"/> Projects in Metal	<input type="checkbox"/> Woodwork
<input type="checkbox"/> Live Steam	<input type="checkbox"/> RC Modeler	<input type="checkbox"/> Woodworker West
<input type="checkbox"/> Model Airplane News	<input type="checkbox"/> Rifle	<input type="checkbox"/> Woodworker's Journal
<input type="checkbox"/> Modeltec	<input type="checkbox"/> Shop Notes	<input type="checkbox"/> Other:
<input type="checkbox"/> Old House Journal	<input type="checkbox"/> Shotgun News	

9. Comments: _____

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