

**HAFCO METALMASTER**

# LATHE

## OPERATION MANUAL



**Model.**  
**AL-336**

*Edition No* : LM366

*Date of Issue* : 01/2017

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## OPERATION MANUAL

### MACHINE DETAILS

MACHINE

METAL CUTTING LATHE

MODEL NO.

AL-336

SERIAL NO.

DATE OF MANF.

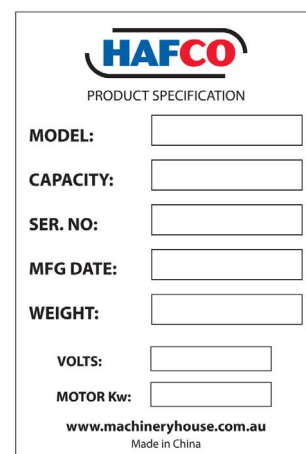
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**Note:**

This manual is only for your reference. Owing to the continuous improvement of the machine, changes may be made at any time without obligation or notice. Please ensure the local voltage is the same as listed on the specification plate before operating this electric machine.


**NOTE:**

In order to see the type and model of the machine, please see the specification plate. Usually found on the back of the machine. See example (Fig.1)



**HAFCO**  
PRODUCT SPECIFICATION

|           |                      |
|-----------|----------------------|
| MODEL:    | <input type="text"/> |
| CAPACITY: | <input type="text"/> |
| SER. NO:  | <input type="text"/> |
| MFG DATE: | <input type="text"/> |
| WEIGHT:   | <input type="text"/> |
| VOLTS:    | <input type="text"/> |
| MOTOR Kw: | <input type="text"/> |

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Made in China

Fig.1



## OPERATION MANUAL

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## OPERATION MANUAL

### 1.1. SPECIFICATIONS....

|                                   |                     |
|-----------------------------------|---------------------|
| Swing Over The Bed                | 300mm               |
| Swing Over The Cross Slide        | 180mm               |
| Swing In The Gap                  | 450mm               |
| Distance Between Centres          | 900mm               |
| Centre Height                     | 150mm               |
| Bed Width                         | 180mm               |
| Spindle Bore                      | 38mm                |
| Spindle Nose Size or Type         | D1-4 Camlock        |
| Spindle Steps / Speed Range       | 18 (65 - 1810rpm)   |
| Headstock Spindle Taper           | 5MT                 |
| Tailstock Taper                   | 3MT                 |
| Toolholder size                   | 12mm                |
| Cross Slide Travel                | 170mm               |
| Compound Slide Travel             | 75mm                |
| Leadscrew                         | Imperial            |
| Cross Feed Range (X-Axis)         | 0.009 - 0.236mm/rev |
| Longitudinal Feed Range (Z-Axis)  | 0.04 - 1.22mm/rev   |
| Metric Thread Steps & Pitch Range | 32 (0.4 - 7mm)      |
| Imperial Thread Steps & TPI Range | 36 (4 - 60tpi)      |
| Motor Power                       | 1.5kW / 2hp         |
| Voltage                           | 240Volts            |
| Weight                            | 595kgs              |

### 1.2. STANDARD EQUIPMENT

Thread Chaser Dial with one gear  
 Splash Tray  
 Chip Tray  
 3 Pce Stand

160mm 3 Jaw Chuck  
 200mm 4 Jaw Chuck  
 Fixed and Traveling Steadies.  
 Instruction Manual  
 Toolbox and Tools  
 2 x 3MT Dead Centres

**OPERATION MANUAL**


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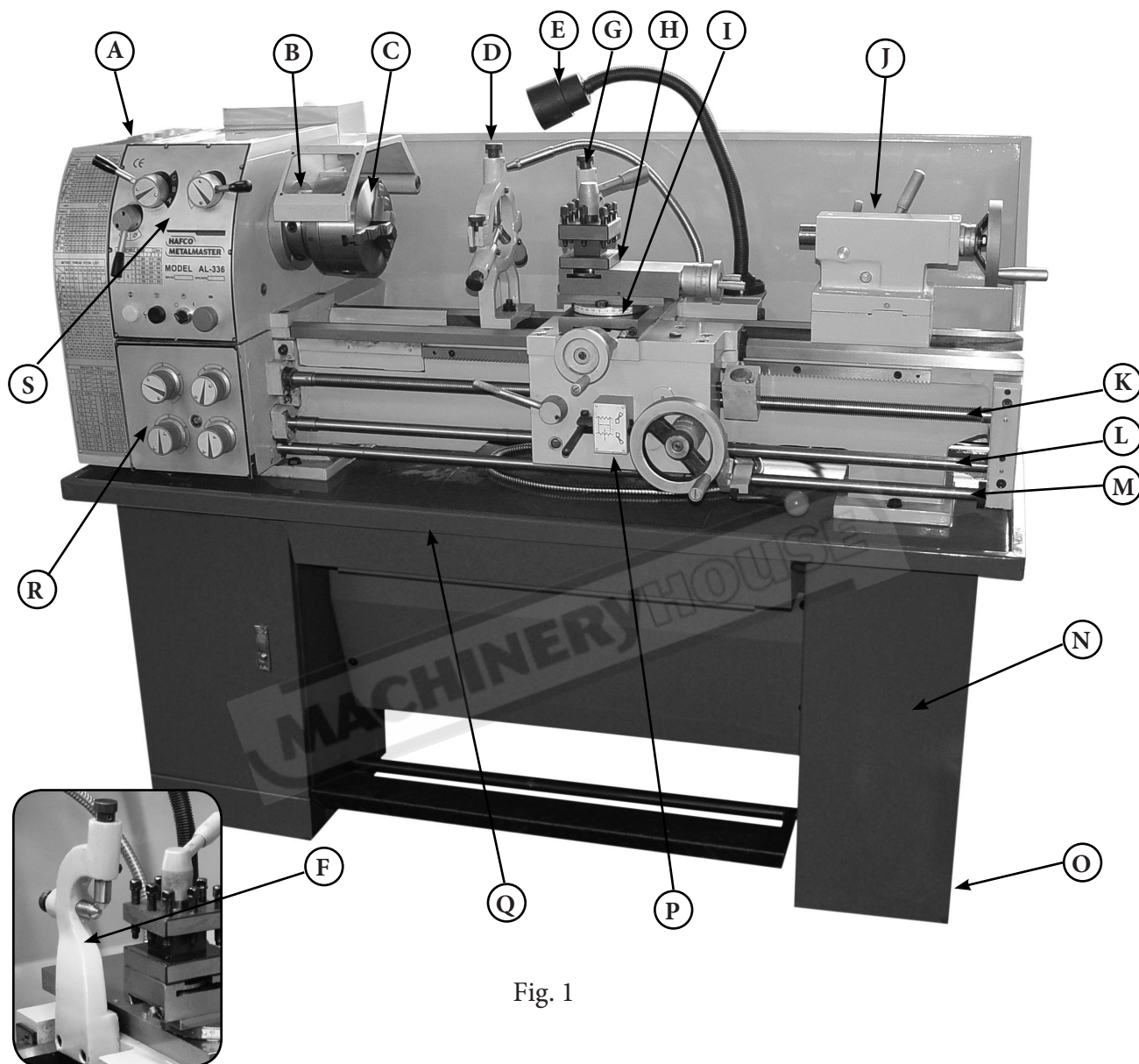
**1.3 IDENTIFICATION**


Fig. 1

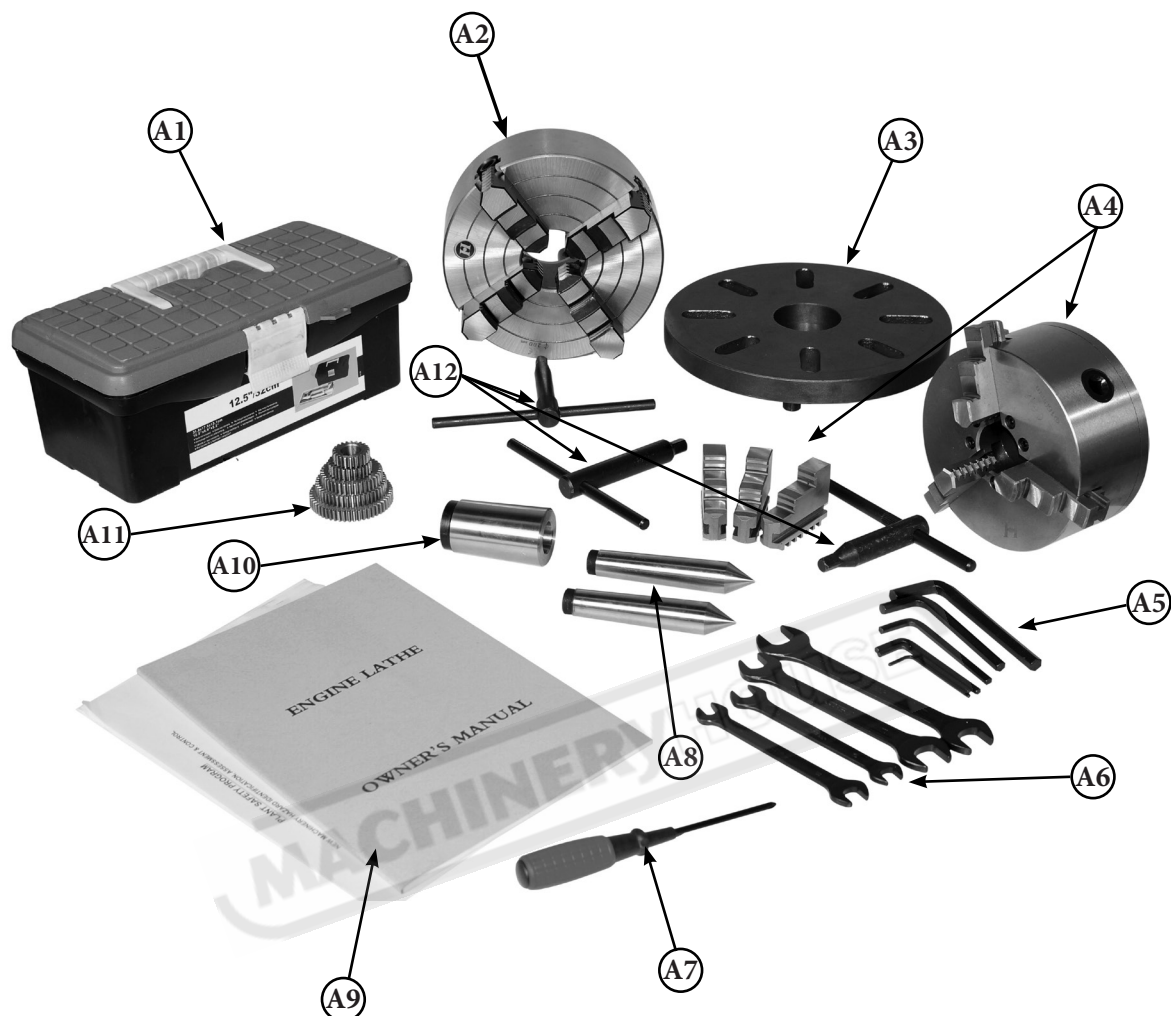
- A. Headstock
- B. D1-5 Camlock MT#5 Spindle
- C. 3-Jaw Chuck 6"
- D. Steady Rest
- E. Halogen Work Lamp
- F. Follow Rest
- G. Tool Post
- H. Compound Rest
- I. Cross Slide
- J. Tailstock (see Page 17 for details)

- K. Longitudinal Leadscrew
- L. Feed Rod
- M. Control Rod
- N. Storage Cabinet
- O. Stand Mounting Points
- P. Carriage (see Page 5 for details)
- Q. Chip Tray
- R. Quick-Change Gearbox
- S. Headstock Controls (see Page 15 for details)

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### 1.4 INCLUDED ACCESSORIES



|    |                              |     |                              |
|----|------------------------------|-----|------------------------------|
| A1 | Toolbox                      | A7  | Screwdriver                  |
| A2 | 4 Jaw Independent Chuck      | A8  | 2 x 3T Dead Centres          |
| A3 | Face Plate                   | A9  | Instruction Manual           |
| A4 | 3 Jaw Chuck and Reverse Jaws | A10 | 5 x 3MT Sleeve               |
| A5 | 5 x Hex Keys                 | A11 | Gears 22, 26, 38, 44, 52 tpi |
| A6 | 4 x Spanners                 | A12 | 3 x Chuck Keys               |

## 2. IMPORTANT INFORMATION

### 2.1 SAFETY REQUIREMENTS

DO NOT use this machine unless you have read this manual or have been instructed in the use of this machine in its safe use and operation



## WARNING

This manual provides safety instructions on the proper setup, operation, maintenance, and service of this machine. Save this manual, refer to it often, and use it to instruct other operators. Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.

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

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



Safety glasses must be worn at all times in work areas. Earmuffs should be worn if the work area is noisy.



Sturdy footwear must be worn at all times in work areas.



Gloves should not be worn when using this machine. Rings and jewelry must not be worn.



Long and loose hair must be contained with a net or under a hat

**OWNER'S MANUAL.** Read and understand this owner's manual before using the machine.

**DISCONNECT POWER FIRST.** Always disconnect the machine from power supply before making adjustments, or servicing the machine. This prevents any risk of injury from unintended start-up or contact with live electrical components.

**TRAINED OPERATORS ONLY.** Operators that have not been trained have a higher risk of being seriously injured. Only allow trained or supervised people to use this machine. When the machine is not being used, disconnect the power to the machine to prevent unauthorized use—especially around children. Make the workshop safe.



## OPERATION MANUAL

### 2.1 SAFETY REQUIREMENTS Cont.

**WEARING PROPER APPAREL** Do not wear clothing, apparel or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to avoid accidental slips, which could cause loss of operating control.

**HEARING PROTECTION.** Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

**REMOVE ADJUSTING TOOLS.** Tools left on machinery can become dangerous projectiles upon startup. Never leave chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

**USE CORRECT TOOL FOR THE JOB.** Only use this tool for its intended purpose. Do not force the machine or its attachments to do a job for which they were not designed. Never make unapproved modifications. Modifying the machine or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

**AWKWARD POSITIONS.** Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make operating control difficult. This could increase the risk of accidental injury.

**CHILDREN & BYSTANDERS.** Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction

**GUARDS & COVERS.** Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly.

**ELECTRICAL EQUIPMENT INJURY RISKS.** There is a risk of being shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

**FORCING MACHINERY.** Do not force the machine. It will do the job safer and better at the rate for which it was designed.

**NEVER STAND ON MACHINE.** Serious injury may occur if the machine is tipped or if the cutting tool is unintentionally contacted

**STABLE MACHINE.** Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and if using a mobile base it is locked in position

**USE RECOMMENDED ACCESSORIES.** Consult this manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

**UNATTENDED OPERATION.** To reduce the risk of accidental injury, turn the machine OFF and ensure all moving parts have completely stopped before walking away. Never leave the machine running while unattended.

**MAINTAIN WITH CARE.** Follow all maintenance instructions and lubrication schedules to keep the machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

**CHECK DAMAGED PARTS.** Regularly inspect the machine for any condition that may affect the safe operation. Immediately repair or replace damaged or parts that are incorrectly fitted before operating.

**MAINTAIN POWER CORDS.** When disconnecting the cord-connecting the machines from the power, hold and pull the plug—not the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

**CLEARING CHIPS.** Metal chips can easily cut bare skin—even through a piece of cloth. Avoid clearing chips by hand or with a rag. Use a brush or vacuum to clear metal chips.



## OPERATION MANUAL

### 2.1 SAFETY REQUIREMENTS Cont.

**SPEED RATES.** Operating this lathe at the wrong speed could cause machine parts to break or the workpiece to come loose, which will result in dangerous projectiles that could cause severe impact injuries. Large or non-concentric workpieces must be turned at slow speeds. Always use the appropriate feed and speed rates

**CHUCK KEY SAFETY.** A chuck key left in the chuck can become a deadly projectile when the spindle is started. Always remove the chuck key after using it. Develop a habit of not taking your hand off of a chuck key unless it has been removed from the machine.

**SAFE CLEARANCES.** Workpieces that crash into other components on the lathe may throw dangerous projectiles in all directions, leading to impact injury and damaged equipment. Before starting the spindle, make sure the workpiece has adequate clearance by hand-rotating it through its entire range of motion. Also, check the tool and tool post, chuck, and saddle clearance.

**LONG WORKPIECE SAFETY.** Long workpiece can whip violently if not properly supported, causing serious impact injury and damage to the lathe. Reduce this risk by supporting any stock that extends from the chuck/headstock more than three times its own diameter. Always turn long stock at slow speeds.

**SECURING WORKPIECE.** An improperly secured workpiece can fly off the lathe spindle with deadly force, which can result in a severe impact injury. Make sure the workpiece is properly secured in the chuck or on the face-plate before starting the lathe.

**CHUCKS.** Chucks are very heavy and difficult to grasp, which can lead to crushed fingers or hands if mishandled. Get assistance when handling chucks to reduce this risk. Protect your hands and the precision-ground ways by using a chuck cradle or piece of plywood over the ways of the lathe when servicing chucks. Use a lifting device when necessary.

**STOPPING SPINDLE BY HAND.** Stopping the spindle by putting your hand on the workpiece or the chuck creates an extreme risk of entanglement, impact, crushing, friction, or cutting hazards. Never attempt to slow or stop the lathe spindle with your hand. Allow the spindle to come to a stop on its own or use the foot brake.

**CRASHES.** Aggressively driving the cutting tool or other lathe components into the chuck may cause an explosion of metal fragments, which can result in severe impact injuries and major damage to the lathe. Reduce this risk by releasing automatic feeds after use, not leaving lathe unattended, and checking clearances before starting the lathe. Make sure no part of the toolholder, compound rest, cross slide, or carriage will contact the chuck during operation.

**TOOL SELECTION.** Cutting with an incorrect or dull tool increases the risk of accidental injury due to the extra force required for the operation. A dull tool increases the risk of breaking or dislodging components that can cause small shards of metal to become dangerous projectiles. Always select the right lathe tool for the job and make sure it is sharp. A correct, sharp tool decreases strain and provides a better finish.

## 2.2 CHUCK SAFETY INFORMATION



# WARNING

**ENTANGLEMENT.** Entanglement with a rotating chuck can lead to death, amputation, broken bones, or other serious injury. Never attempt to slow or stop the lathe chuck by hand, and always roll up long sleeves, tie back long hair, and remove any jewelry or loose apparel before operating.

**CHUCK SPEED RATING.** Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force. Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece.

**USING CORRECT EQUIPMENT.** Many workpieces can only be safely turned in a lathe if additional support equipment, such as a tailstock or steady/follow rest, are used. In some cases a combination of steadies and tailstock can be used. If the operation is too hazardous to be completed with the lathe or existing equipment, the operator should be experienced enough to know when to use a different machine or find the safest way.

**TRAINED OPERATORS ONLY.** Using a chuck incorrectly can result in workpieces coming loose at high speeds and striking the operator or bystanders with deadly force. To reduce the risk of this hazard, read and understand this document and seek additional training from someone with experience in chuck use before proceeding

**CHUCK CAPACITY.** Avoid exceeding the capacity of the chuck by clamping an oversized workpiece. If the workpiece is too large to safely clamp with the chuck, use a faceplate or a larger chuck if possible. otherwise, the workpiece could be thrown from the lathe during operation, and could result in serious impact injury or death.

**CLAMPING FORCE.** Inadequate clamping force can lead to the workpiece being thrown from the chuck and striking the operator or bystanders. Maximum clamping force is achieved when the chuck is properly maintained and lubricated, all jaws are fully engaged with the workpiece, and the maximum chuck clamping diameter is not exceeded.

**PROPER MAINTENANCE.** All chucks must be properly maintained and lubricated to achieve maximum clamping force and withstand the rigors of centrifugal force. To reduce the risk of a thrown workpiece, follow all maintenance intervals and instructions in this document.

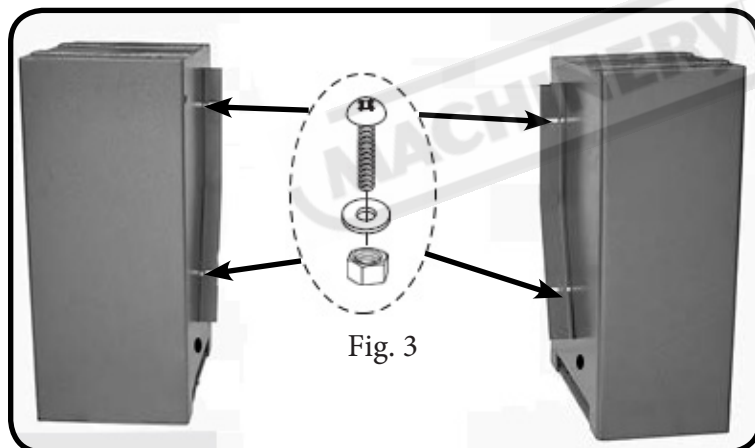
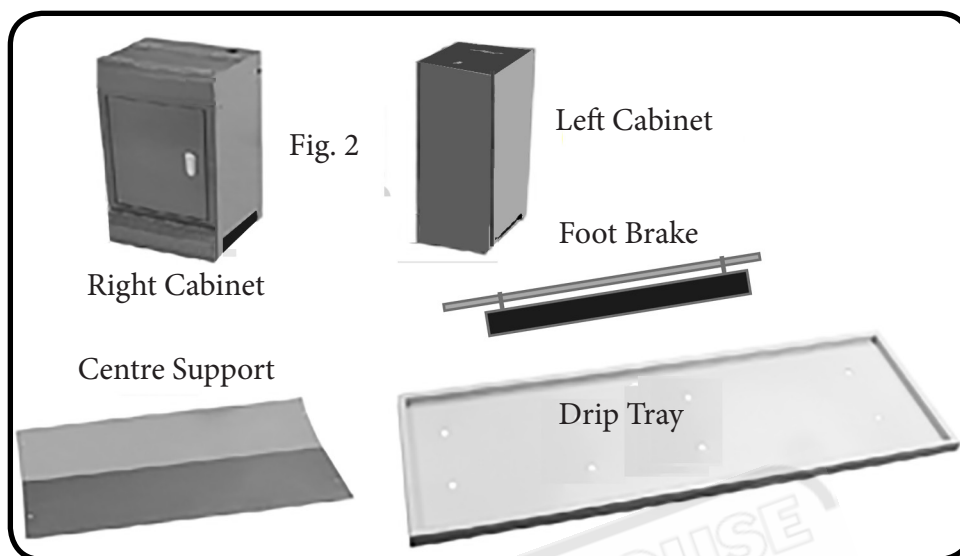
**DISCONNECT POWER.** Serious entanglement or impact injuries could occur if the lathe is started while you are adjusting, servicing, or installing the chuck. Always disconnect the lathe from power before performing these procedures.

## OPERATION MANUAL

### 3. SETUP

#### 3.1 STAND ASSEMBLY

The lathe is supplied with the stand unassembled. The stand consists of the parts below in Fig. 2 and is assembled as below.



Position the left and right cabinets approximately 1000mm apart in the location that has been selected for the lathe.

Install the front panel onto the panel brackets with four M6-1 x 10 Phillips head screws, 6mm flat washers, and M6-1 hex nuts. The centre support is held in place with 4 bolts (Fig.3)

**Note ! Ensure the foot brake assembly is installed between the stand sides on assembly of the stand**

Slide the brake shaft into the coupling  
Rotate the brake shaft until the foot plate is in position and clamp the coupling. (Fig. 4)

The chip tray and lathe can now be assembled onto the stand .

Before placing the chip tray on the stand, ensure Silastic sealer is put on chip tray around all holes before placing lathe on top and bolting down (This is needed to seal all holes to stop coolant seeping through)

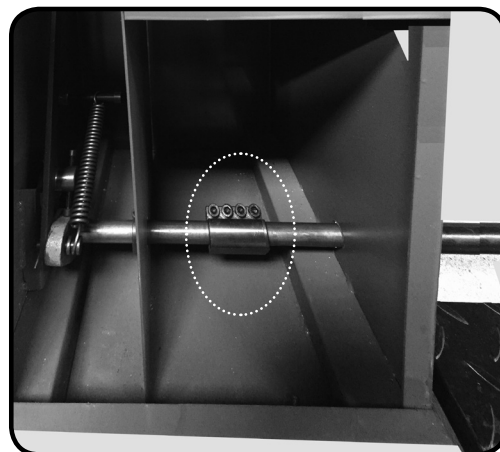


Fig. 4

### 3.2 LIFTING

Move the lathe to its prepared location while it is still attached to the shipping pallet. To balance the load for lifting, move the tailstock and carriage to the right end of the bedway, then lock them in place.

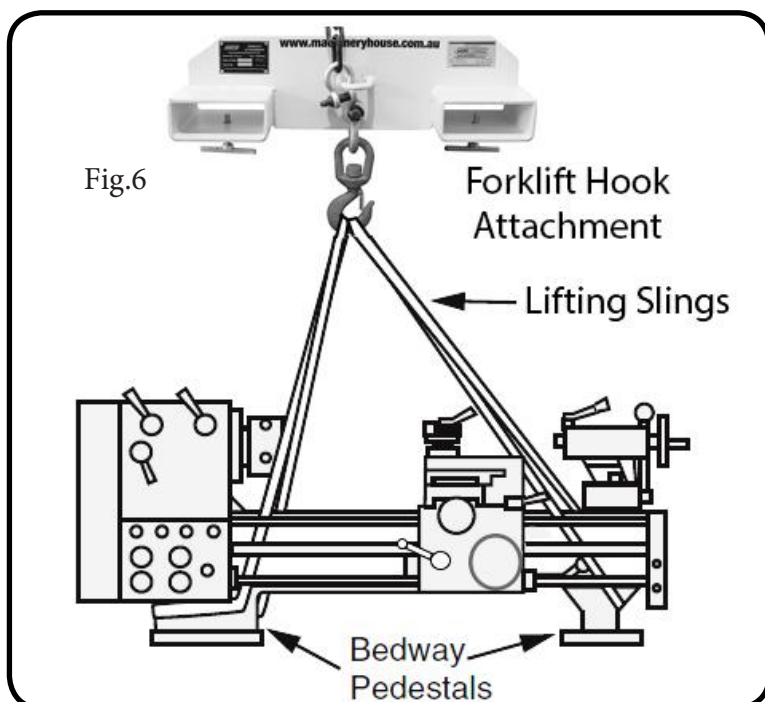
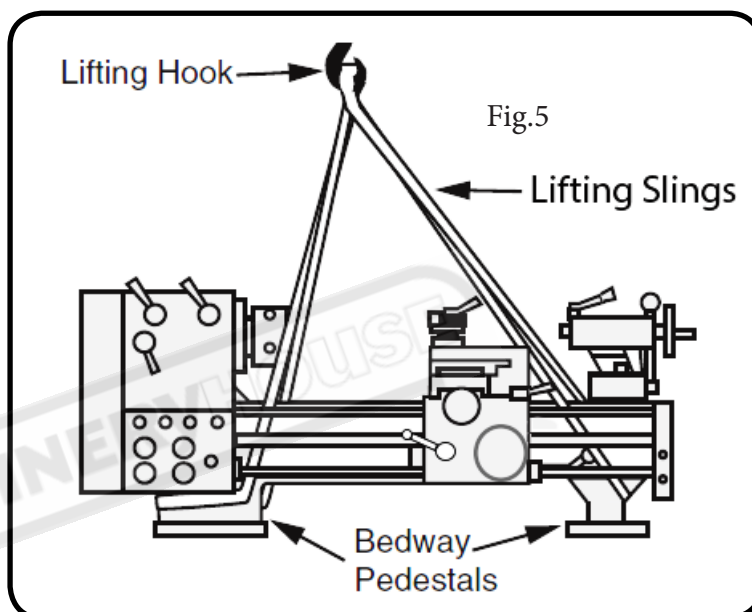
Note: Before attempting to move the carriage, make sure the carriage lock is loose, the half nut is disengaged, and the feed selection lever is disengaged. Refer to Page 15 to identify these controls.

Wrap two lifting straps around the bedway pedestals and place them behind the control rod, feed rod, and the lead screw. Either attach them to a crane with a safety hook (see Fig. 5) or to a forklift with a hook attachment (see Fig. 6).

#### NOTE !

Before lifting check that the straps will not bend any of the shaft, lead screw or any coolant hoses or electrical cables.

The straps must be certified and suitable to handle the weight of the machine



### 3.3 ELECTRICAL INSTALLATION

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure there is access to a means of disconnecting the power source. The electrical circuit must meet the requirements for 240V. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring **MUST** be done by an electrician or qualified service personnel.

**Note !** The use of an extension cord is not recommended as it may decrease the life of electrical components on your machine.

#### Electrical Requirements

Nominal Voltage.....240V  
 Cycle.....50 Hz  
 Phase..... Single-Phase  
 Power Supply Circuit.....10 Amps  
 Full Load Current.....8.2 Amps

(Full load current rating is also on the specification plate on the motor.)



#### Full-Load Current Rating

The full-load current rating is the amperage a machine draws at when running at 100% of the output power. Where machines have more than one motor, the full load current is the amperage drawn by the largest motor or a total of all the motors and electrical devices that might operate at one time during normal operations.

Full-Load Current Rating at 240V..... 10 Amps

It should be noted that the full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating and if the machine is overloaded for a long period of time, damage, overheating, or fire may be caused to the motor and circuitry.

This is especially true if connected to an undersized circuit or a long extension lead. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements.

### Extension Leads

It is not recommend to use an extension cord with this machine. If you must use an extension cord, only use it on a temporary basis until a fixed power point can be installed..

Extension cords cause voltage drop, which may damage electrical components and shorten motor life. Voltage drop increases as the extension cord gets longer or the gauge size is smaller than required

Any extension cord used with this machine must be approved.

It is recommended that the machine be plugged directly into a power point

### Safety Warnings

- ☐ Position an extension lead carefully to prevent any risk of damage.
- ☐ If the cable has to cross a pathway, cover it with a rubber protector strip.
- ☐ Always check that leads, plugs and sockets are undamaged.
- ☐ Check for damaged cable, due to leads being walked over, continually bent at the same point or stored badly.

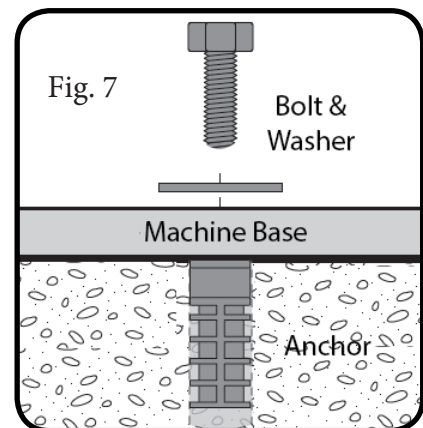
### 3.4 SITE PREPARATION

When selecting the site for the machine, consider the largest size of workpiece that will be processed through the machine and provide enough space around the machine for operating the machine safely. Consideration should be given to the installation of auxiliary equipment.

Leave enough space around the machine to open or remove doors/covers as required for the maintenance and service as described in this manual.

It is recommended that the machine is anchored to the floor to prevent tipping or shifting. It also reduces vibration that may occur during operation, Use the holes in the bottom of the cabinets as guides for drilling holes in the floor and mounting the stand.

The machine is best mounted on a concrete slab. Masonry anchors with bolts are the best way to anchor machinery, because the anchors sit flush with the floor surface, making it easy to unbolt and move the machine later, if needed. (Fig. 7)



## OPERATION MANUAL

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### 3.5 MOUNTING LATHE ON STAND

Refer to the Machine specification plate for the weight of your machine. Make sure that the lifting device available is able to lift the lathe safely. If using a stand not supplied with the machine, ensure that the stand will bear the weight of the machine.

Apply a 6mm bead of silicone around the bottom edge of the bedway pedestals  
Position the chip tray on top of the cabinet stand and align the six mounting holes with those in the cabinets. Remove the headstock end cover to gain better access to the headstock base pedestal (Fig.8)

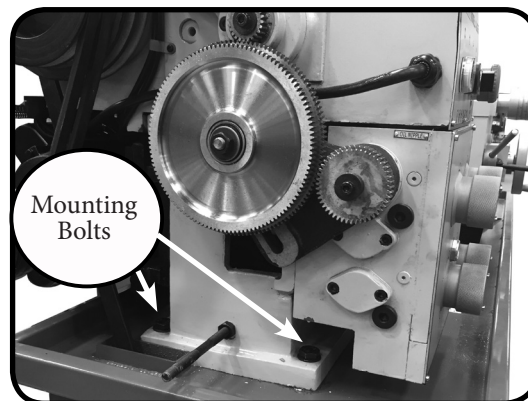
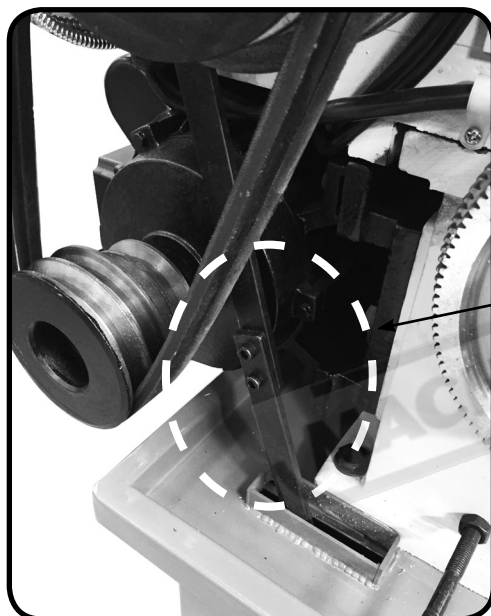


Fig. 8



Connect the brake rod at both ends. (Fig.9 & 10)  
Check and adjust the brake operation is correct before using of the lathe.

Fig. 9

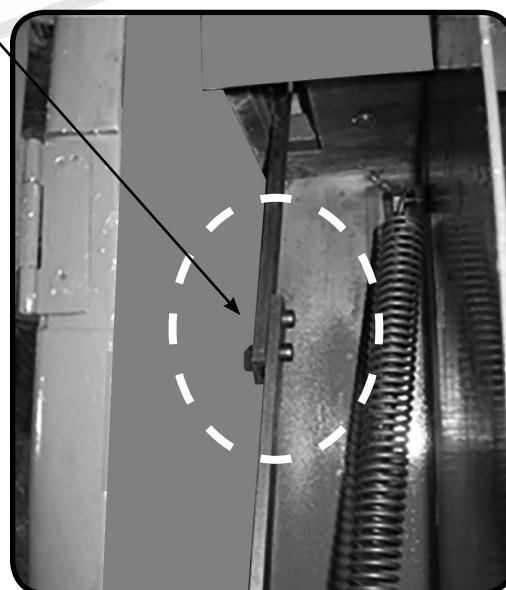


Fig. 10



Connect the coolant hoses to the drain in the splash tray and to the post and tap on the saddle  
Connect the coolant pump power supply (See Fig. 11)

Fig. 11

## OPERATION MANUAL

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### 3.6 INSTALLING SPLASH GUARD

Install the back splash guard with four M6-1 x 10 socket head cap screws and 6mm flat washers. (Fig.12)

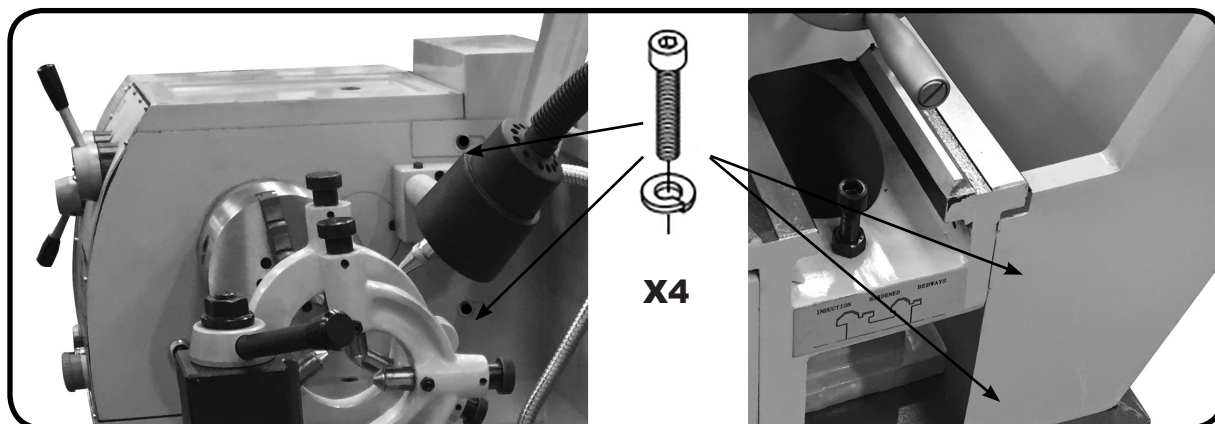
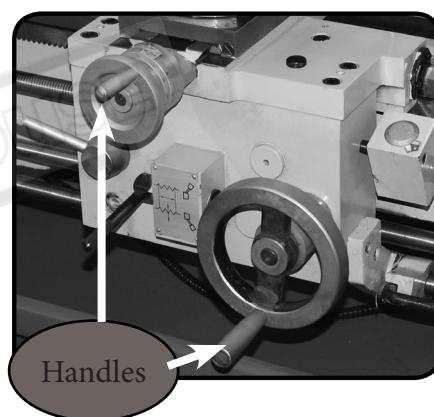


Fig. 12

Thread the handles into the saddle handwheels, as shown in Fig. 13.

Fig. 13



### 3.7 LEVELING THE MACHINE

The machine needs to be leveled. Leveling machinery helps precision components, such as bedways, remain straight and flat during the lifespan of the machine. Machines that are not level may slowly twist due to loads placed on the machine during operation. If needed, use metal shims between the the stand and the floor when leveling the machine. For best results, use a precision level that is sensitive enough. The use of machine mounts makes it easy to manage the leveling and eliminate vibration. (Hafco M0015). For the best results use a machine level (Measumax Q205)

Place the level on the bedways and on top of the cross slide to get the best position for correct leveling. (Fig. 14)



Order Code Q205



Order Code M0015

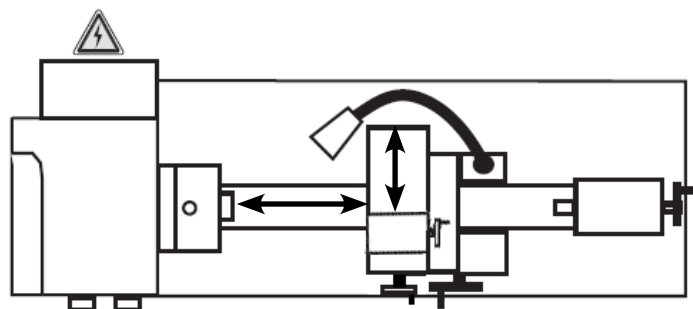


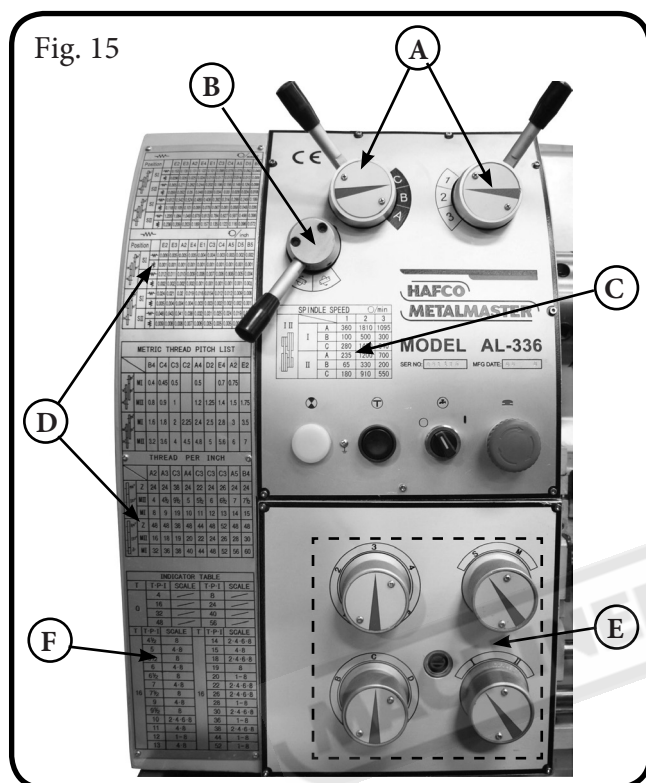
Fig. 14

## 4. COMPONENT INFORMATION

### 4.1 CONTROLS & COMPONENTS

Refer to Fig. 15 & 16 and the following descriptions to become familiar with the basic controls of this lathe.

#### HEADSTOCK



**A. Spindle Speed Levers:** Alpha (left) and numeric (right) are used to select one of the 18 available spindle speeds.

**B. Headstock Feed Direction Lever:** Controls the direction that the leadscrew and feed rod rotate.

**C. Spindle Speed Chart:** Displays the arrangement of the spindle speed levers for each of the 18 spindle speeds.

**D. Thread and Feed Charts:** Display the necessary configuration of the gearbox dials and end gears for different threading or feeding options.

**E. Quick-Change Gearbox Dials:** Control the leadscrew and feed rod speed for threading and feeding operations.

**F. Thread Dial Chart:** Indicates on which thread dial reading to engage the half nut for specific inch and metric thread pitches.

#### CARRIAGE

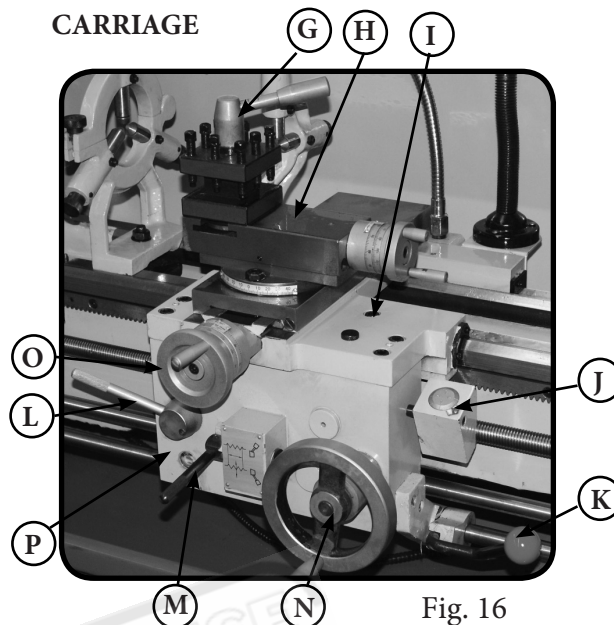


Fig. 16

**G. Tool Post:** Allows the operator to load and unload tools.

**H. Compound Rest Handwheel:** Moves the tool toward and away from the workpiece at the preset angle of the compound rest.

**I. Carriage Lock:** Secures the carriage in place for greater rigidity when it should not move.

**J. Thread Dial:** Indicates when to engage the half nut during threading operations.

**K. Spindle Lever:** Starts, stops and reverses direction of spindle rotation.

**L. Half Nut Lever:** Engages/disengages the half nut for threading operations.

**M. Feed Selection Lever:** Selects the carriage or cross slide for power feed.

**N. Carriage Handwheel:** Moves the carriage along the bed.

**O. Cross Slide Handwheel:** Moves the cross slide toward and away from the workpiece.

**P. Apron:** Houses the carriage gearing.

#### 4.1 CONTROLS & COMPONENTS Cont.

Fig. 17 Tailstock

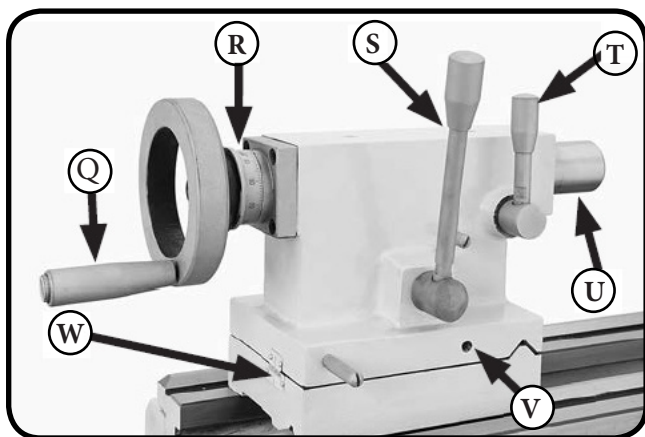
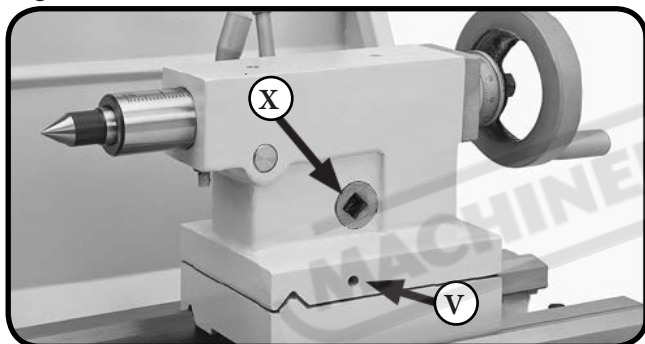


Fig. 18 Tailstock



**Q. Quill Handwheel:** Moves the quill toward or away from the spindle.

**R. Graduated Scale:** Indicates quill movement in increments of 0.02mm or 0.001" graduations.

**S. Tailstock Lock Lever:** Secures the tailstock in position along the bedway.

**T. Quill Lock Lever:** Secures the quill in position.

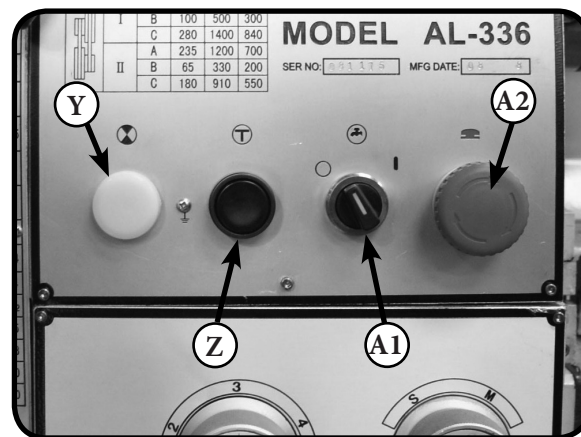
**U. Quill:** Moves toward and away from the spindle and holds centers and tooling.

**V. Tailstock Offset Screws:** Adjusts the tailstock offset left or right from the spindle centerline (1 of 2).

**W. Offset Scale:** Indicates the relative distance of tailstock offset from the spindle centerline.

**X. 1/2" Square Drive Lock-Down:** Used with a torque wrench for precise alignment of centers

Fig. 19 Control Panel



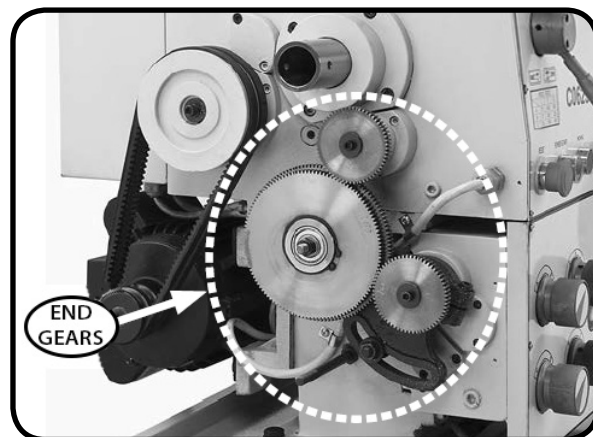
**Y. Power Light:** Illuminates when emergency stop button is reset. Indicates lathe controls are receiving power.

**Z. Jog/Inching Button:** Starts forward spindle rotation as long as it is pressed.

**A1. Coolant Button:** Starts the coolant pump when it is pressed.

**A2. Emergency Stop/RESET Button:** Stops all machine functions. Twist clockwise to reset.

Fig. 20. End Gear Components.

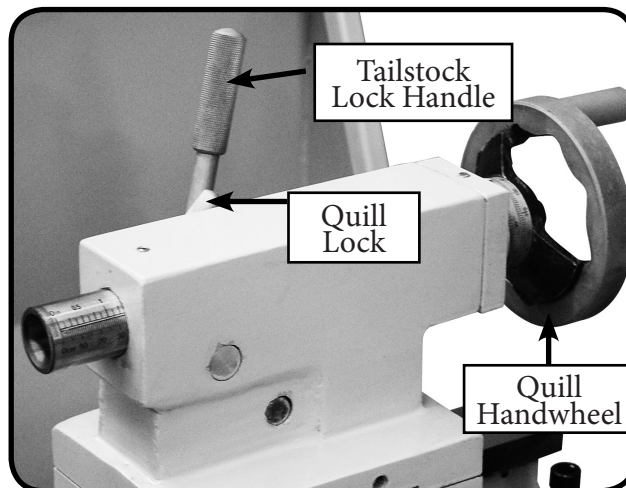


Configuring the end gears shown in Fig. 20 will control the speed of the leadscrew for threading or the feed shaft for power feed operations. The rotational speed of these components depends not only on the end gear configuration, but also the spindle speed.

## 4.2 TAILSTOCK

The tailstock is typically used to support long workpieces by means of a live or dead center. It can also be used to hold a drill or chuck to drill holes in the center of the end of a part. Custom arbors and tapers can also be cut on your lathe by using the offset tailstock adjustment (Fig. 21)

Fig. 21



### OFFSETTING TAILSTOCK

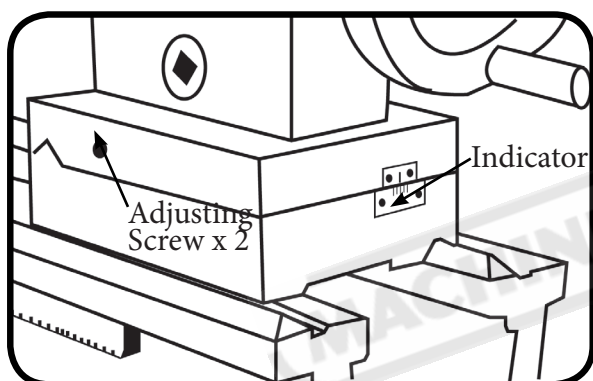


Fig. 22

The tailstock can be offset from the spindle center-line for turning tapers. Move the tailstock top casting toward the front of the lathe to machine a taper at the tailstock end. Conversely, move the tailstock top casting toward the back of the lathe to machine a taper at the spindle end

**Note:** The marks on the indicator on the end of the tailstock are only a guide. For a precise offset, use a dial indicator to check while adjusting the screws that are located on both sides of the tailstock.. (Fig. 22)

### TAILSTOCK TOOLS

#### Live Centres

A live centre has bearings that allow the centre tip and the workpiece to rotate together. It can be installed in the tailstock quill for higher speeds. It is recommended that you use **Hafco C052**.



Order Code C052

#### Drill Chuck and Arbour

The drill chuck attaches to the tailstock quill with the JT6 to MT#3 arbor. Matched tapers on the arbor and the inside of the chuck create a semi-permanent assembly when properly joined. The drill chuck can accept tooling from 0.5 – 13mm. It is recommended that you use **Hafco C289 Chuck & D443 arbour**



Order Code  
C289  
D443

### 4.3 ALIGNING TAILSTOCK TO SPINDLE CENTERLINE

This is an essential adjustment that should be checked or performed each time the tailstock is used to turn concentric workpieces between centers or immediately after offsetting the tailstock when turning a taper. If the tailstock is not aligned with the spindle centerline when it is supposed to be, turning results will not be parallel along the length of the workpiece.

#### Steps to align the tailstock to the spindle centerline:

1. Center drill both ends of one piece of round bar, then set it aside for use in a later step 4

2. Use the other piece of round stock to make a dead center, and turn it to a 60° point, as illustrated in the Fig. 23

NOTE ! Do not remove machined centre from the chuck. The point of the center will remain true to the spindle centerline

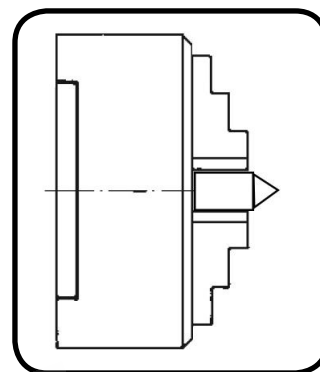


Fig. 23



Fig. 24

3. Install a center in the tailstock.

4. Attach a lathe dog to the test piece of round stock from Step 1, then mount it between the centers as shown in Fig. 24

5. Turn 1mm off the stock diameter.

6. Mount a test or dial indicator so that the plunger is on the tailstock quill and set the dial to "0" (Fig. 25)

7. Use a micrometer to measure both ends of the workpiece.

If the test stock is larger at the tailstock end, then adjust the tailstock toward the front of the lathe 1/2 the distance of the difference. ( See Fig. 22 for adjustment screws)

8. Repeat the steps until the round bar is turned parallel.

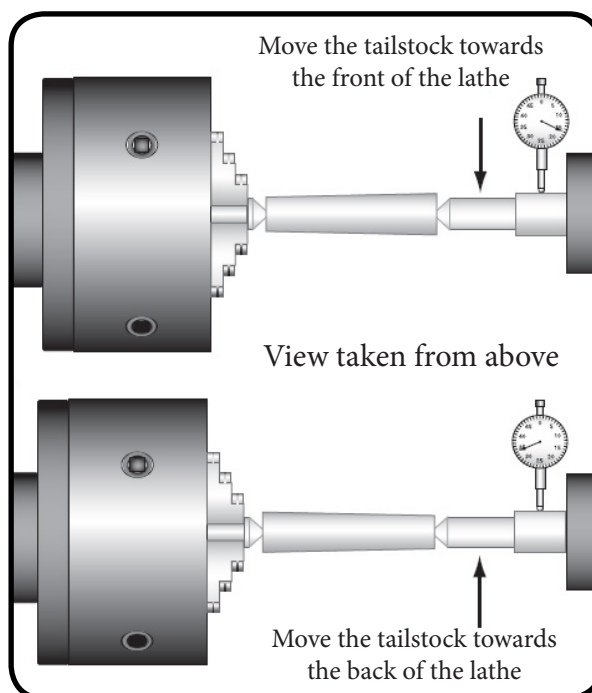


Fig. 25

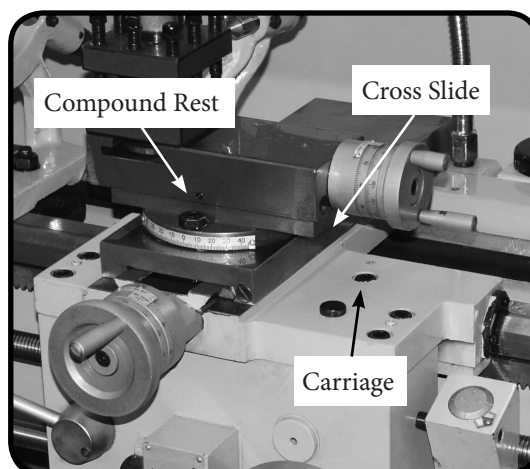
#### 4.4 CARRIAGE & SLIDE LOCKS

The cross slide, compound rest, and carriage are fitted with locks that can be tightened to increase rigidity when taking heavy turning cuts. See Fig. 26 for the locations of the locks for each device.

##### Tools Needed

Hex Wrench 3mm..... 1  
Hex Wrench 6mm..... 1

Fig. 26



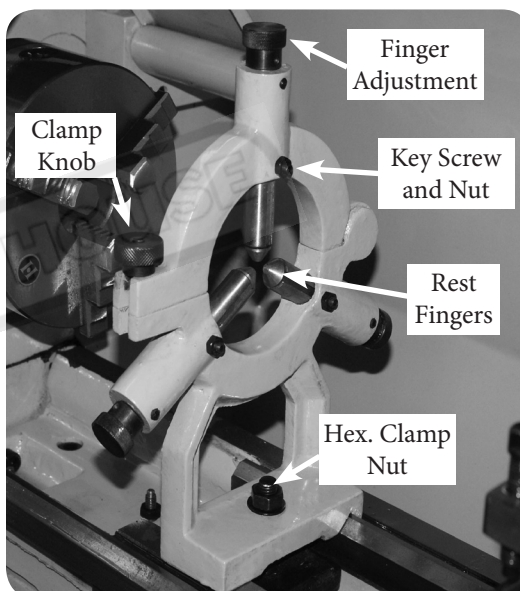
#### 4.5 FIXED AND TRAVELING STEADIES

##### STEADY REST

The steady rest supports long, small diameter shafts and can be mounted anywhere along the length of the bedway. Components are shown in Fig. 27

To install thoroughly clean all mating surfaces, then place the steady rest base on the bedways so the triangular notch fits over the bedway prism. Position the steady rest with the base clamp where required to properly support the workpiece, then tighten the hex clamp nut. Undo the clamp knob and open the steady rest. Use the finger adjustment knobs to position the bottom two centre points against the workpiece. then close the steady rest making sure that the top centre point does not touch the workpiece. Close the steady rest, then use the finger adjustment knobs to adjust all three centre points to just touch the workpiece without causing any deflection.

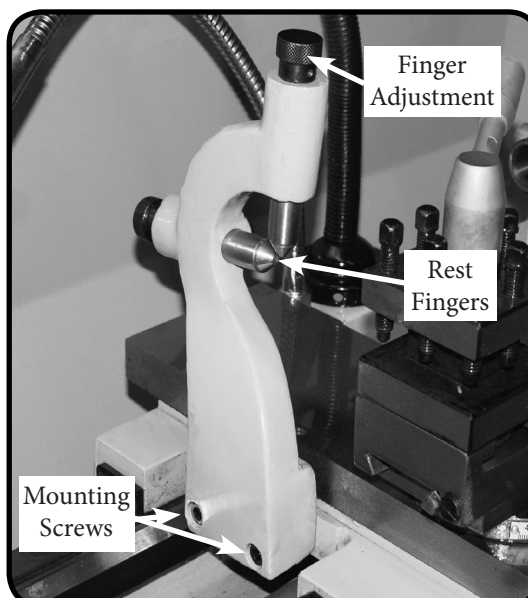
Fig. 27



##### FOLLOW REST

The follow rest mounts to the saddle with two cap screws (see Figure 28 ). It is used when turning long, slender parts to prevent the workpiece from being deflected by the pressure of the cutting tool. Adjustment of the follow rest fingers are done in the same manner as the those on the steady rest. Note: To reduce the effects of friction, lubricate the fingers with way oil during operation.

Fig. 28



## 4.6 COMPOUND REST & TOOLPOST

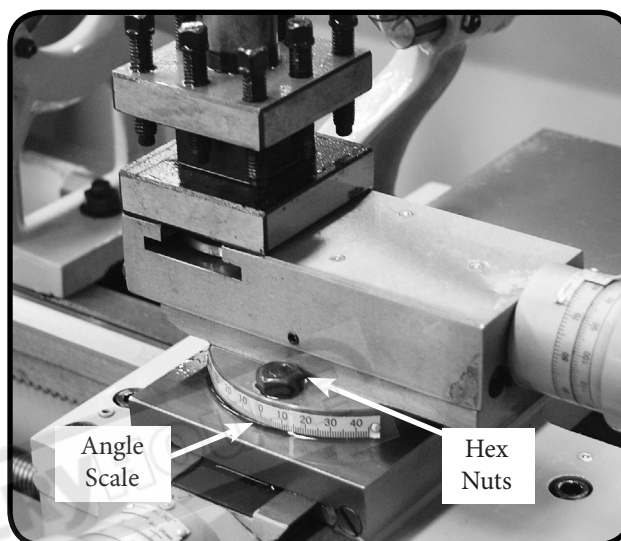
### COMPOUND REST

The compound rest provides a smaller amount of movement along its axis via another feedscrew. The compound rest axis can be adjusted independently of the carriage or cross-slide. It is used for turning short tapers, to control depth of cut when screwcutting or precision facing, or to obtain finer feeds (under manual control) than the feed shaft permits. .

#### To set the compound rest at a certain angle:

1. Loosen the two hex nuts at the base of the compound rest. (One at the front and one at the back of the compound slide.) (Fig 29).
2. Rotate the compound rest to the desired angle, as indicated by the scale at the base, then retighten the two hex nuts.

Fig. 29



### TOOL POST

The tool bit is mounted in the toolpost which is a traditional four-sided square style. Optional quick-change style is also available.(Order Code L292) The advantage of a quick change set-up is to allow an unlimited number of tools to be used (up to the number of holders available) rather than being limited to four tools with the four-sided type. Interchangeable tool holders allow all tools to be preset to a center height that does not change, even if the holder is removed from the machine.(Fig. 30)

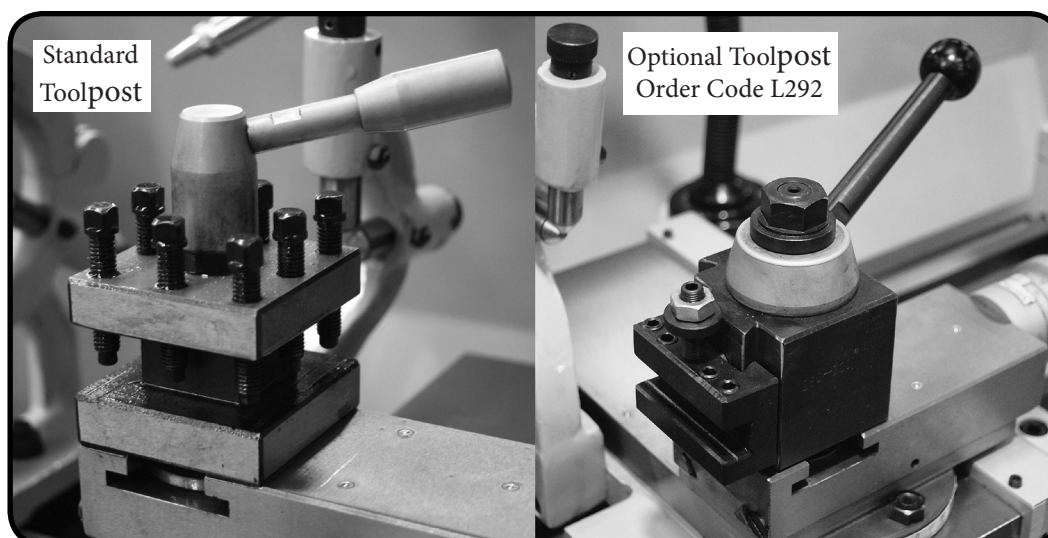


Fig. 30

#### 4.7 SETTING THE CUTTING TOOL WITH SPINDLE CENTERLINE

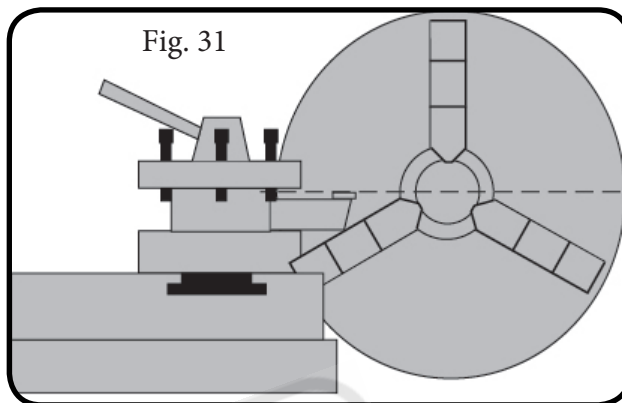
The tip of the cutting tool should be set up so that it is in line with the centerline of the spindle, as illustrated in Fig 31.

The cutting tool can be raised by placing steel shims underneath it. The shims should be as long and as wide as the cutting tool to properly support it.

There are a number of ways to check that the cutting tool is on the centre line of the spindle.

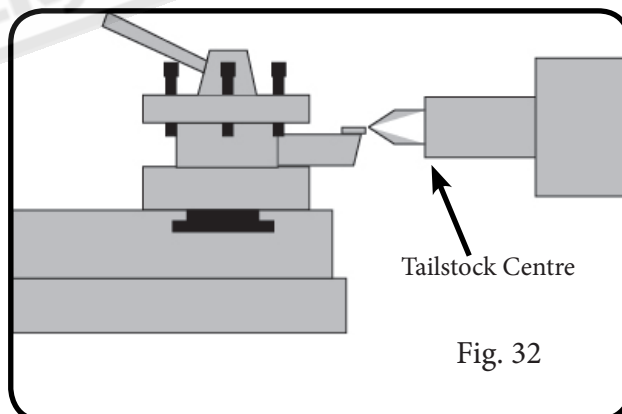
**Below are two common methods:**

- Move the tailstock center over the cross slide and use a fine ruler to measure the distance from the surface of the cross slide to the tip of the center. Adjust the cutting tool height so it is the same distance above the cross slide as the tailstock center.



- Align the tip of the cutting tool with a tailstock center, as described in the following procedure.

1. Mount the cutting tool and secure the post so the tool faces the tailstock.
2. Install a center in the tailstock, and position the tip near the cutting tool.
3. Lock the tailstock and quill in place.
4. Adjust the height of the cutting tool tip to meet the center tip, as shown. (Fig.32)



## 4.8 FEEDS AND THREADING

The machine is designed to cut most metric and inch threads. The following sections will describe how to use the threading controls to set up the lathe for a threading operation. If you are unfamiliar with the process of cutting threads on a lathe, it is strongly recommend that you read a trade manual such as Hafco L341, or seek formal training before attempting any threading projects. Consult the thread charts for the correct lever settings. The numbers on the thread dial are used with the thread dial chart to show when to engage the half nut during threading. (Fig. 33)

Order Code L341

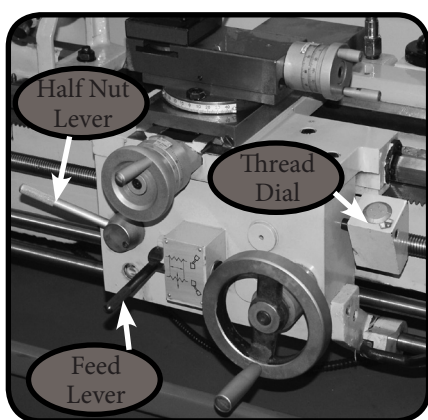
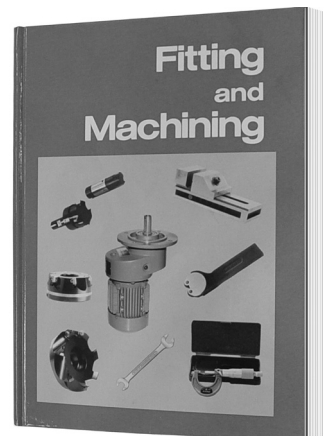
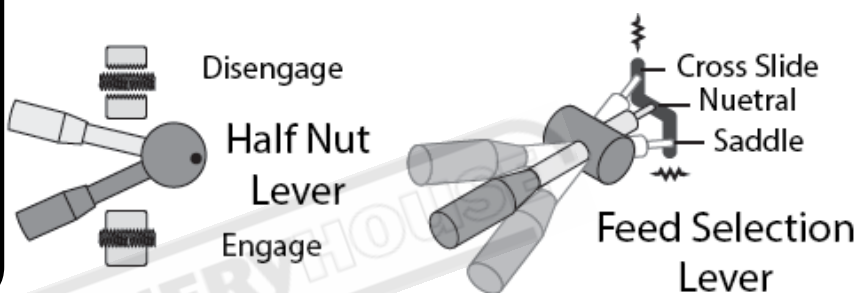


Fig. 33



Both the carriage and cross slide are equipped with power feed when the carriage is engaged with the feed rod. The rate that these components move per revolution of the feed rod is controlled by the quick-change gearbox lever positions and the end gear configuration. Consult the feed chart for the correct settings

## TOOLHOLDER SELECTION

For turning tools to suit this machine Hafco recommends **Toolmaster 12mm L450** 3 piece set complete with inserts that fit each toolholder and boring bar



Order Code L450



Order Code  
L456

For threading tools to suit this machine Hafco recommends **Toolmaster 12mm L456** 2 piece set complete with a 60 degree and 55 degree inserts that fit the toolholder and the boring bar

## POWER FEED CONTROLS

The following descriptions explain the operation of the power feed controls. Before using the power feed, you may have to re-configure the end gears, depending on how they are set up. (See page 26)

- A. Feed Direction Lever:** Selects the direction for power feed. When the lever is positioned as shown (Fig. 34), the carriage will move to the left along the bed, or the cross feed will travel toward the rear of the lathe.
- B. Feed Rate Chart:** Displays the position of the controls for the quick-change gearbox dials for the selected feed rate.
- C. Quick-Change Gearbox Feed Dials:** Position these dials to select the different feed rates.
- D. Feed Selection Lever:** This lever changes the power feed to either the cross slide or the carriage. When the lever is down and the indent pin is pointing up, the cross slide is selected. When the lever is up and the pin is pointing down, the carriage is selected. When the lever is in the middle position, no feeds are selected and the apron gears are disengaged from the feed rod and neither component will move. (Fig. 35)

**Note:** When using this lever, you may need to slightly rotate the handwheel of the component you are trying to engage, so that the apron gears can mesh.

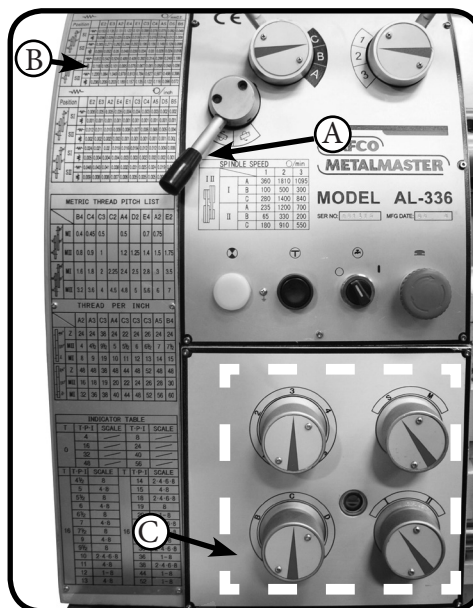


Fig. 34

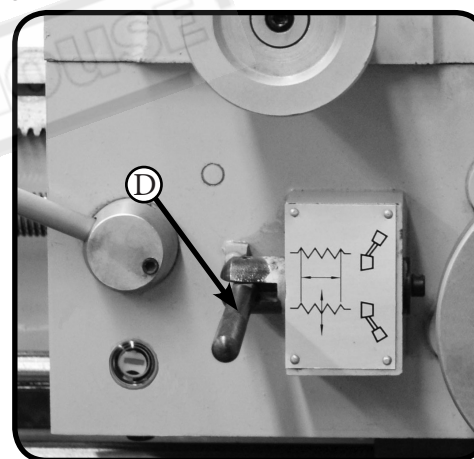


Fig. 35

## THREADING CONTROLS.

The following section describes the threading controls and charts need to be set up for a threading operation.

- A. Threading Direction Lever:** When cutting threads this lever selects the direction the thread is cut, either towards the chuck or towards the tailstock. (Fig. 35)
- C. Quick-Change Gearbox Feed Dials:** Position these dials to select the different threading selection. (Fig. 34)
- E. The Threading Charts:** Can be found on the head stock face display and cover the settings for both inch and metric threading (Fig. 36)

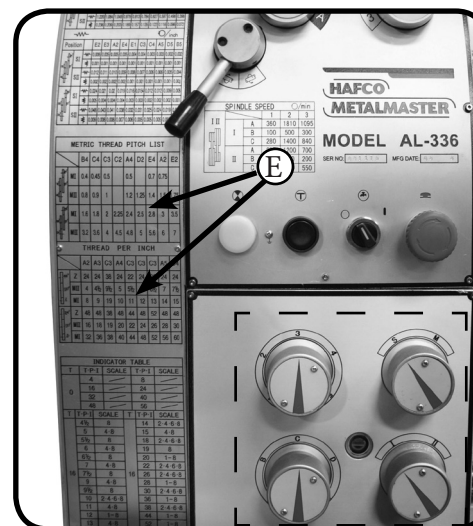


Fig. 36

## THREADING CONTROLS. Cont.

### Apron Threading Controls

The half nut lever engages the carriage with the leadscrew, which moves the carriage and cutting tool along the length of the workpiece for threading operations (see Fig. 37).

**Note !** Make sure the feed selection lever is in the disengaged (middle) position before attempting to engage the half nut.

### THREAD DIAL INDICATOR

It is advised to use the slowest speed when thread cutting. The lathe is fitted with a Thread Dial Indicator with numbers on the thread dial indicator face which are used to show when to engage the half nut during threading. Before commencing check with the thread dial chart what number should be used. (Fig.38)

**Note!** When cutting threads sometimes the pitch of the leadscrew does not allow for the half nuts to be disengaged so the tool will need to be cleared and the machine will need to be reversed.

1. Loosen the cap screw on the thread dial and pivot the gear teeth so they mesh with the leadscrew threads, then re-tighten the cap screw. (see Fig. 39),
2. When the first cutting pass is complete, disengage the carriage from the leadscrew using the half nut lever. Return the carriage for the next pass and re-engage the half nut using the same thread dial setting to resume the cut in the previous pass.

**NOTE ! If the thread required is not on the chart then the method below is used.**

1. Before taking the first cut set the crossslide dial to "0"
2. Engage the half nuts and take the first cut. When the tool reaches the end of the cut wind the tool away from the job and stop the machine. **DO NOT Disengage The Halfnuts.**
3. Reverse the spindle and return the carriage for the next pass and wind in the crossslide to "0" and add a small amount for the cut.

**NOTE ! Always use small cuts for the best results**

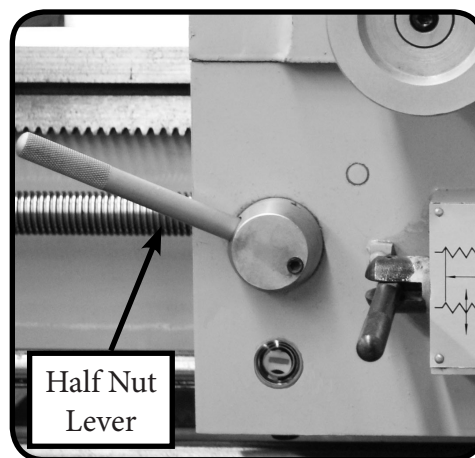


Fig. 37

| INDICATOR TABLE |       |         |    |         |       |
|-----------------|-------|---------|----|---------|-------|
| T               | T·P·I | SCALE   | T  | T·P·I   | SCALE |
| 0               | 4     | —       | 8  | —       | —     |
|                 | 16    | —       | 24 | —       | —     |
|                 | 32    | —       | 40 | —       | —     |
|                 | 48    | —       | 56 | —       | —     |
| T               | T·P·I | SCALE   | T  | T·P·I   | SCALE |
| 16              | 4½    | 8       | 14 | 2·4·6·8 | —     |
|                 | 5     | 4·8     | 15 | 4·8     | —     |
|                 | 5½    | 8       | 18 | 2·4·6·8 | —     |
|                 | 6     | 4·8     | 19 | 8       | —     |
|                 | 6½    | 8       | 20 | 1-8     | —     |
|                 | 7     | 4·8     | 22 | 2·4·6·8 | —     |
|                 | 7½    | 8       | 26 | 2·4·6·8 | —     |
|                 | 9     | 4·8     | 28 | 1-8     | —     |
|                 | 9½    | 8       | 30 | 2·4·6·8 | —     |
|                 | 10    | 2·4·6·8 | 36 | 1-8     | —     |
|                 | 11    | 4·8     | 38 | 2·4·6·8 | —     |
|                 | 12    | 1-8     | 44 | 1-8     | —     |
|                 | 13    | 4·8     | 52 | 1-8     | —     |

Fig. 38

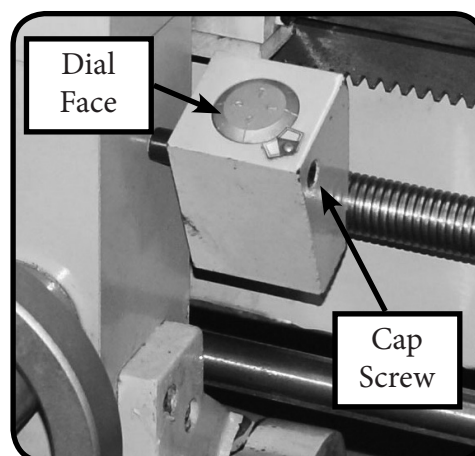


Fig. 39

#### 4.9 END GEARS

The end gears are used to setup for power feed, inch, or metric threading operations. See Figure 40 to identify the upper gear, middle 120T/127T change gears, and the lower gear. Details on which gear to use are found on the headstock feed and threading charts.

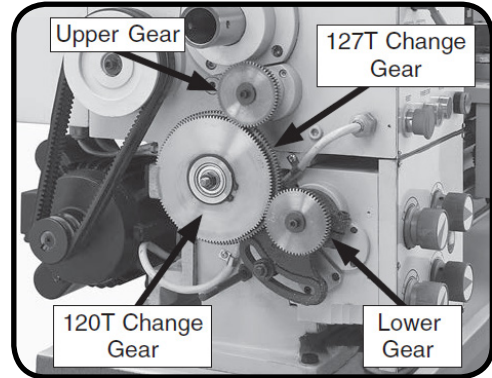


Fig. 40

#### END-GEAR CONFIGURATION

To configure the end gears, first

1. Locate the chart on the headstock that has the thread or feed option that is required.
2. DISCONNECT LATHE FROM POWER!
3. Remove the headstock end gear cover.
4. Loosen the arm support cap screw shown in Fig 41
5. While holding the 120T/127T gears, loosen the arm support locking nut and slowly let the gears pivot down and away from the upper top gear, as illustrated (Fig. 42)
6. Loosen the 120T/127T gear support hex nut and slide the middle gear away from the bottom gear. The 120t/127T gears many need to be reversed. Undo the gear support hex nut (Fig. 42) and reverse the gears.
7. Remove the cap screw and flat washer from the top gear, then slide the gear off of the shafts.
8. Slide the desired gear onto the top gear shaft and desired gear onto the bottom gear shaft making sure to align the keys and keyways. Position the flat, non-stepped face of the gears away from the headstock so they will mesh with the either the 120T or 127T gear depending on which one is required.
9. Secure the top and bottom gears with the flat washers and cap screws that were removed earlier

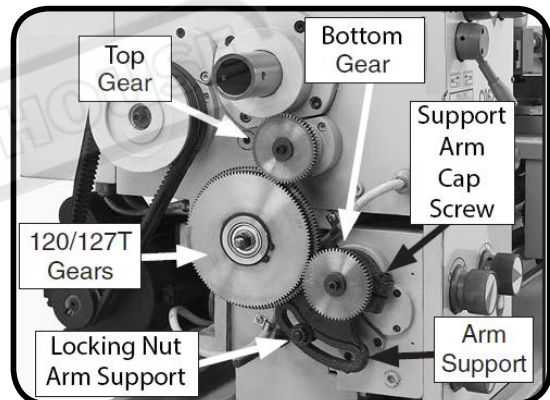


Fig. 41

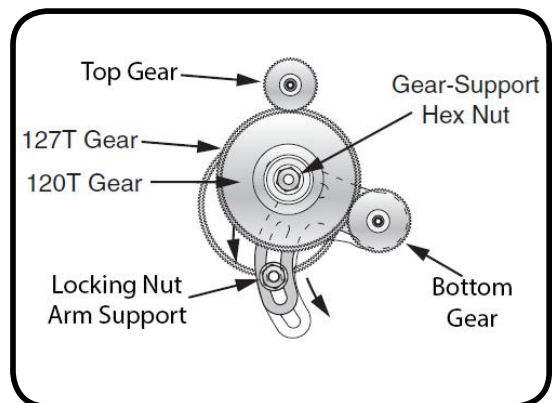


Fig. 42

## 5. TEST RUN & OPERATION

### 5.1 TEST RUN

Once the assembly is complete, test run your machine to make sure it runs properly and is ready for regular operation. The test run consists of verifying the following:

1. The motor powers up and runs correctly,
2. The emergency stop/RESET button safety feature works correctly.

If, during the test run, you cannot easily locate the source of an unusual noise or vibration, stop the machine immediately,

Read and understand the safety instructions at the beginning of this manual. Take all required safety precautions, and make sure all previous preparation steps have been followed and completed. Clear away all tools and objects used during assembly, lubrication, and preparation.

Make sure that the chuck and jaws, if installed, will swing clear, and are secure (refer to Chuck Installation on Page 29)



#### **WARNING**

Check the headstock, quick-change gearbox, and apron oil reservoirs to ensure they have the proper amount of oil in them before the lathe can be operated. Damage can be caused to the bearings and gears from running the lathe without oil in the reservoirs and will not be covered under warranty. Refer to the Lubrication section, (see Page 31 )

a. To ensure the carriage components do not unexpectedly move during the following steps, disengage the half nut lever and feed selection lever (see Fig. 43).

b. Make sure the spindle lever is in the middle OFF position (Fig. 43)

c. Rotate the emergency stop/RESET button clockwise so it pops out. The power lamp on the control panel should illuminate. Make sure the chuck guard is closed.

d. Move the spindle speed levers to B and 1 to set the spindle rotation at 100 RPM

e. Move the spindle lever (Fig. 43) down to start the spindle. The top of the chuck should turn down and toward the front of the lathe.

f. Push the emergency stop/RESET button to turn the lathe OFF, then, without resetting the RESET button, try to restart spindle rotation, as instructed in the previous step. The spindle should not start.

g. Move the spindle lever to the OFF (middle) position, and reset the RESET button by twisting it clockwise until it pops out.

The test run is now completed

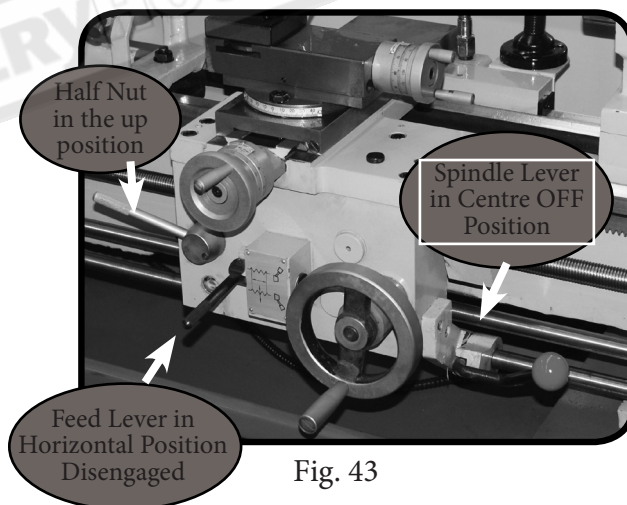


Fig. 43

## 5.2 CHUCK & FACEPLATE MOUNTING

This lathe is equipped with a D1- 4 Camlock spindle nose. This type of spindle uses cams that are adjusted with a chuck key to securely mount a chuck or faceplate with repeatable precision and ease.

Because chucks are heavy and often awkward to hold, some kind of lifting, support, or protective device should be used during installation or removal. (Fig. 44)

To ensure that the work is accurate, it is extremely important to make sure the spindle nose and chuck mating surfaces and tapers are clean. Even a small amount of lint or dirt can affect the accuracy.

The chuck is properly installed when all camlocks are tight, the spindle and chuck tapers firmly lock together, and the back of the chuck is firmly seated against the face of the spindle all the way around without any gaps.

### Mounting The Chuck

Clean and lightly oil the camlock studs, then thoroughly clean the mating surfaces of the spindle and chuck.

Install the chuck by inserting the camlock studs straight into the spindle cam holes.

**Note !** Avoid inserting the studs in from an angle or rotating the spindle. This can damage the studs or the cam holes. (Fig 45)

When the chuck is fully seated and all the camlocks are tight, check that the cam line is between the two “V” marks on the spindle nose, as shown in the following figure. Figure 46.

If the cam line is not between the “V” marks when the camlock is tight, the stud may be installed at the incorrect height. First check that the line on the cam is flush with the surface of the chuck. If it is not then adjust the stud height as shown (Fig.47 ). Make sure to re-install the stud cap screw afterward.

If adjusting the stud height does not correct the problem, try swapping stud positions on the chuck.

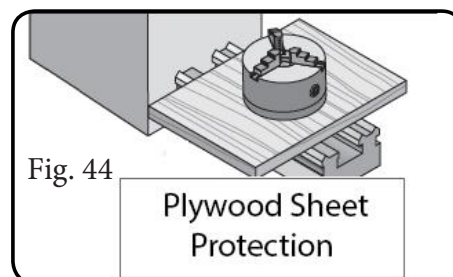


Fig. 44

Plywood Sheet  
Protection

Fig. 45

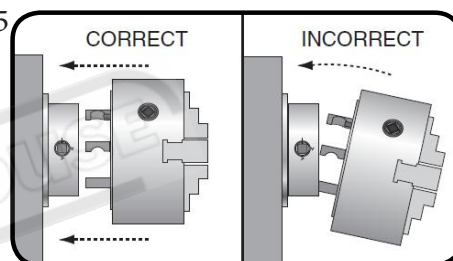


Fig. 46

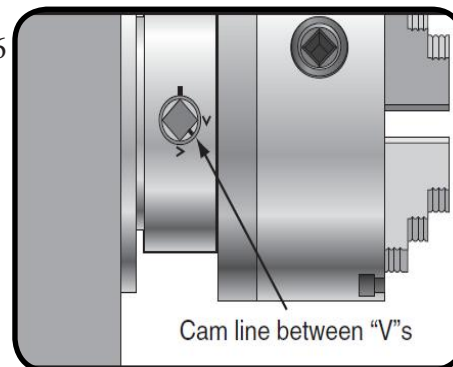
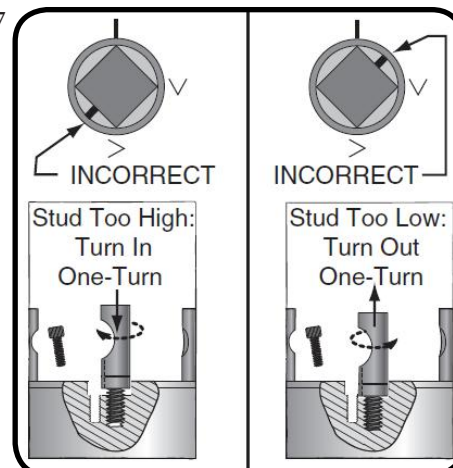


Fig. 47



### 5.3 SPINDLE SPEEDS

Using the correct spindle speed is important for getting safe and satisfactory results, as well as maximizing tool life.

To set the spindle speed for your operation, you will need to: 1) Determine the best spindle speed for the cutting task, and 2) configure the lathe controls to produce the required spindle speed.

#### Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operation, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the workpiece, as noted in the formula shown below.

$$\frac{\text{Recommended Cutting Speed (Mtrs/Min)} \times 1000}{\text{Diameter in Millimeters} \times 3.14} = \text{RPM}$$

The Fitting & Maching handbook (L341) and some internet sites, provide excellent recommendations for which cutting speeds to use when calculating the spindle speed.

These sources also provide a wealth of additional information about the variables that affect cutting speed and they are a good educational resource.

#### Example

Figure 48 shows the levers positioned for a spindle speed of 840 RPM or 550 RPM depending on the pulley configuration

**Note:** If the spindle speed levers do not easily adjust into position, rotate the spindle by hand while you apply pressure to the lever. When the gears align, the lever will easily move into place. If you have trouble rotating the spindle by hand, you can use the spindle key or a chuck key to get additional leverage—just be sure to remove the key when you are done.

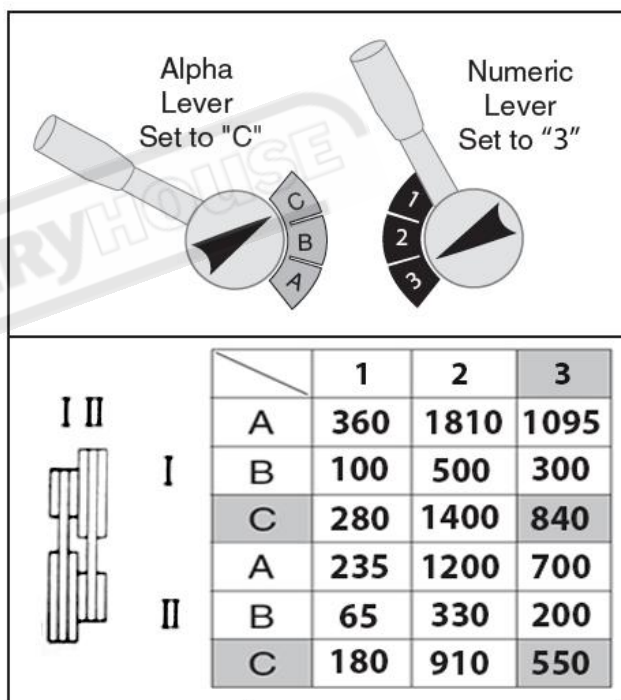


Fig. 48



## WARNING

**To avoid damaging gears, ALWAYS make sure the spindle is completely stopped BEFORE moving the spindle speed levers.**

## OPERATION MANUAL

### 6. MAINTAINANCE

#### 6.1 LUBRICATION TYPE AND FREQUENCY

Use the information in the charts below as a daily guide for lubrication tasks

| Assembly            | Part                       | Method   | Lubricant              | Interval                                    |
|---------------------|----------------------------|----------|------------------------|---------------------------------------------|
| Headstock           | Spindle Gears and Bearings | Oil Bath | Machine Oil            | 6 Months                                    |
| Feed Box            | Gears and Bearings         | Oil Bath | Machine Oil            | Check site glass daily and fill as required |
| Carriage            | Gears and Bearings         | Oil Bath | Machine Oil            | Check site glass daily and fill as required |
| End Gears           | Change gears and quadrant  | Oil Can  | Machine Oil and Grease | Once per shift                              |
| Carriage Slide      | Bedway slides              | Oil Can  | Machine Oil            | Once per shift                              |
| Cross Slide         | Slides and Screws          | Oil Can  | Machine Oil            | Once per shift                              |
| Tailstock           | Quill and Screw            | Oil Can  | Machine Oil            | Once per shift                              |
| Feed and Lead Screw | Screws and Bearings        | Oil Can  | Machine Oil            | Once per shift                              |

## 6.2 LUBRICATION POINTS

### Headstock

The headstock reservoir has the proper amount of oil when the oil level in the sight glass is approximately halfway. (Fig. 49) The oil sight glass is located below the chuck. The oil should be changed every six months by firstly draining the oil by removing the drain plug (Fig. 50) then filling by the oil filler plug (Fig. 51)

Fig. 49

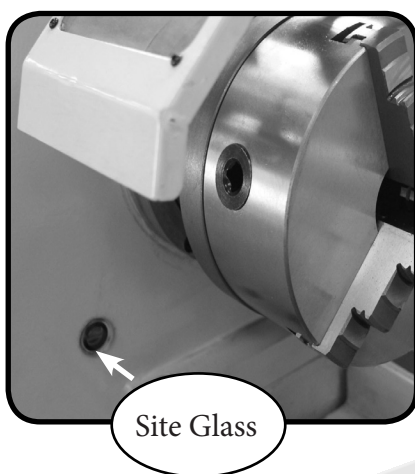
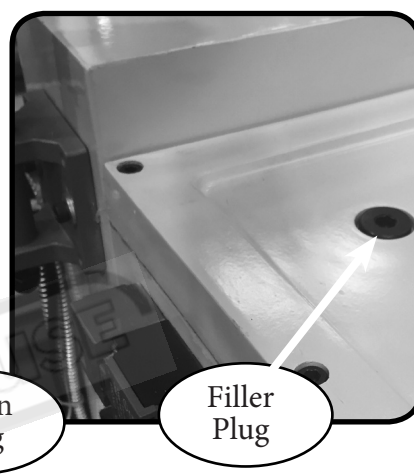


Fig. 50



Fig. 51



### APRON

The apron oil sight glass is on the front of the apron, as shown in Figure 49. Maintain the oil volume so that the level is approximately halfway in the sight glass.

### Changing Oil & Flushing Reservoir

Small metal particles may accumulate at the bottom of the reservoir with normal use. Therefore, to keep the reservoir clean, drain and flush it at least once a year. Place a catch pan under the apron drain plug (Fig. 52), remove the fill plug, then use a 6mm hex wrench to remove the drain plug and empty the reservoir. Flush the reservoir by pouring a small amount of clean oil into the fill hole and allowing it to drain out the bottom. Replace the drain plug, add oil as required, then re-install the fill plug.

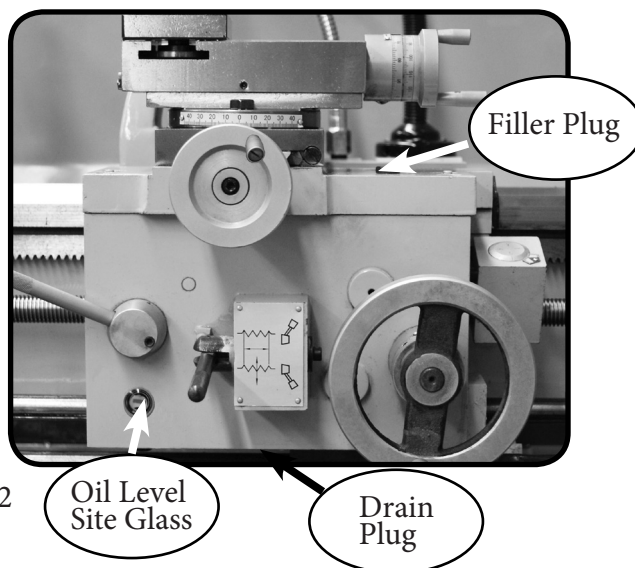


Fig. 52

### Longitudinal Leadscrew

Before lubricating the leadscrew (Fig. 53) it should be cleaned with mineral spirits. The use of a stiff brush will help clean out the threads. Move the carriage out of the way, so you can clean the entire length of the leadscrew. Apply a thin coat of oil along the length of the leadscrew. Use a stiff brush to make sure the oil is applied evenly and down into the threads.

### Ball Oilers (Fig. 54, 55)

Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip, usually supplied with the accessories. Lubricate the ball oilers before and after machine use, and more frequently under heavy use. When lubricating ball oilers, first clean the outside surface to remove any dust or grime. Push the tip of the oil can nozzle against the ball oiler to create a hydraulic seal, then pump the oil can once or twice. It is important not to press the ball oiler too hard with nozzle of the oil can as it may cause the ball to jam in the open position, allowing dirt to enter. If you see sludge and dirt coming out of the lubrication area, keep pumping the oil can until the oil runs clear. When finished, wipe away any excess oil.

- ☐ Cross-slide leadscrew & slides
- ☐ Compound-rest leadscrew & slides
- ☐ Saddle slides
- ☐ Carriage handwheel
- ☐ Feed selection lever gearing
- ☐ Tailstock ball oilers
- ☐ Leadscrew end bearing
- ☐ Feed rod end bearing

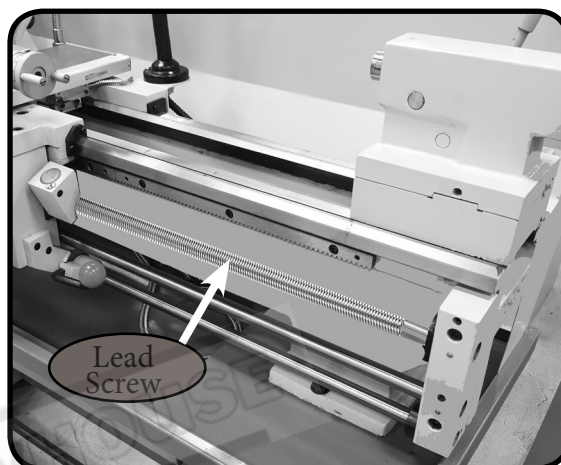


Fig. 53

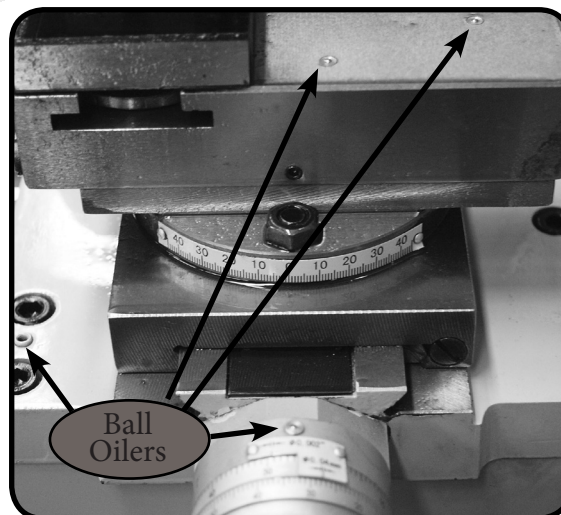


Fig. 54

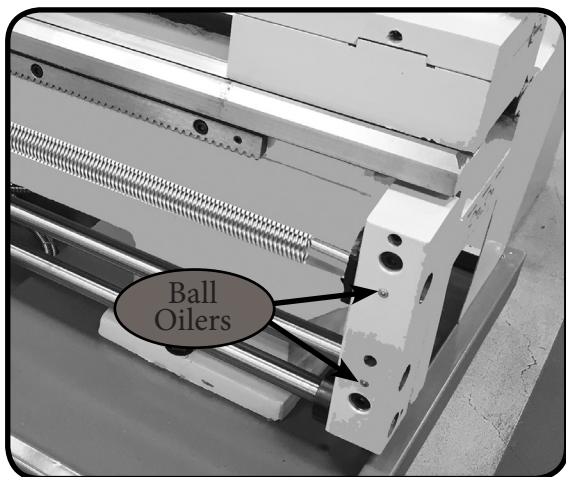


Fig. 55

## OPERATION MANUAL

### 6.3 TROUBLE SHOOTING

| Symptoms                                        | Possible Cause                                                                          | Possible Solution                                                                                                                                                         |
|-------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Machine does not start or circuit breaker trips | Emergency button needs to be reset.                                                     | Rotate the emergency stop button until it pops out and resets                                                                                                             |
|                                                 | Chuck guard open                                                                        | Close chuck guard                                                                                                                                                         |
|                                                 | Fuse has blown in the machines electrical box.                                          | Replace fuse. Determine if overload is due to heavy operation; ensure power source has high enough voltage                                                                |
|                                                 | Power supply has switched OFF                                                           | Ensure power supply is ON and the voltage is correct                                                                                                                      |
|                                                 | Thermal overload relay has tripped.                                                     | The wiring connection is correct .                                                                                                                                        |
|                                                 | Wall fuse or circuit breaker is blown/ tripped; caused by a short in electrical system; | Verify circuit is rated for machine amp load; troubleshoot and repair cause of overload; Have a qualified electrician replace weak breaker; find/repair electrical short. |
|                                                 | Start capacitor at fault                                                                | Test/replace if faulty.                                                                                                                                                   |
| Motor stalls or is under powered                | Contactors not getting energised. Has burnt contacts.                                   | Test for power supply to contactors and that contactor operation is correct. Replace unit if faulty.                                                                      |
|                                                 | Motor is at fault.                                                                      | Test/replace if faulty.                                                                                                                                                   |
|                                                 |                                                                                         |                                                                                                                                                                           |
| Loud noises coming from near the motor          | Belts slipping                                                                          | Check the tension of the belts and replace if worn.                                                                                                                       |
|                                                 | Faulty run capacitor                                                                    | Test and replace if faulty.                                                                                                                                               |
|                                                 | Motor faulty                                                                            | Test and replace if faulty                                                                                                                                                |
| Motor is noisy when the machine is cutting      | Pulley keys worn or are missing or set screws loose                                     | Inspect keys and set screws. Replace or tighten as required.                                                                                                              |
|                                                 | Motor fan is loose.                                                                     | Tighten the fan and reset the fan cover                                                                                                                                   |
| Motor is noisy when the machine is cutting      | Depth of cut is too deep                                                                | Reduce the depth of cut or feed rate.                                                                                                                                     |
|                                                 | Speed or feed rate is wrong                                                             | Consult the speed and feed charts in the machinery handbook                                                                                                               |
|                                                 | Cutting tool is dull                                                                    | Replace or sharpen the cutting tool                                                                                                                                       |
| Machined surface finish is rough.               | Incorrect spindle speed or feed rate.                                                   | Adjust for appropriate spindle speed and feed rate.                                                                                                                       |
|                                                 | Blunt tool or poor tool selection                                                       | Sharpen tooling or select a better tool for the intended operation.                                                                                                       |
|                                                 | Tapered gibs not correctly adjusted.                                                    | Tighten gibs                                                                                                                                                              |





# WARNING

## General Machinery Safety Instructions

---

Machinery House  
requires you to read this entire Manual before using this machine.

- 1. Read the entire Manual before starting machinery.** Machinery may cause serious injury if not correctly used.
- 2. Always use correct hearing protection when operating machinery.** Machinery noise may cause permanent hearing damage.
- 3. Machinery must never be used when tired, or under the influence of drugs or alcohol.** When running machinery you must be alert at all times.
- 4. Wear correct Clothing.** At all times remove all loose clothing, necklaces, rings, jewelry, etc. Long hair must be contained in a hair net. Non-slip protective footwear must be worn.
- 5. Always wear correct respirators around fumes or dust when operating machinery.** Machinery fumes & dust can cause serious respiratory illness. Dust extractors must be used where applicable.
- 6. Always wear correct safety glasses.** When machining you must use the correct eye protection to prevent injuring your eyes.
- 7. Keep work clean and make sure you have good lighting.** Cluttered and dark shadows may cause accidents.
- 8. Personnel must be properly trained or well supervised when operating machinery.** Make sure you have clear and safe understanding of the machine you are operating.
- 9. Keep children and visitors away.** Make sure children and visitors are at a safe distance for you work area.
- 10. Keep your workshop childproof.** Use padlocks, Turn off master power switches and remove start switch keys.
- 11. Never leave machine unattended.** Turn power off and wait till machine has come to a complete stop before leaving the machine unattended.
- 12. Make a safe working environment.** Do not use machine in a damp, wet area, or where flammable or noxious fumes may exist.
- 13. Disconnect main power before service machine.** Make sure power switch is in the off position before re-connecting.
- 14. Use correct amperage extension cords.** Undersized extension cords overheat and lose power. Replace extension cords if they become damaged.
- 15. Keep machine well maintained.** Keep blades sharp and clean for best and safest performance. Follow instructions when lubricating and changing accessories.
- 16. Keep machine well guarded.** Make sure guards on machine are in place and are all working correctly.
- 17. Do not overreach.** Keep proper footing and balance at all times.
- 18. Secure workpiece.** Use clamps or a vice to hold the workpiece where practical. Keeping the workpiece secure will free up your hand to operate the machine and will protect hand from injury.
- 19. Check machine over before operating.** Check machine for damaged parts, loose bolts, Keys and wrenches left on machine and any other conditions that may effect the machines operation. Repair and replace damaged parts.
- 20. Use recommended accessories.** Refer to instruction manual or ask correct service officer when using accessories. The use of improper accessories may cause the risk of injury.
- 21. Do not force machinery.** Work at the speed and capacity at which the machine or accessory was designed.
- 22. Use correct lifting practice.** Always use the correct lifting methods when using machinery. Incorrect lifting methods can cause serious injury.
- 23. Lock mobile bases.** Make sure any mobile bases are locked before using machine.
- 24. Allergic reactions.** Certain metal shavings and cutting fluids may cause an allergic reaction in people and animals, especially when cutting as the fumes can be inhaled. Make sure you know what type of metal and cutting fluid you will be exposed to and how to avoid contamination.
- 25. Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.



# WARNING

## Metal Lathe Safety Instructions

---

Machinery House  
requires you to read this entire Manual before using this machine.

- 1. Maintenance.** Make sure the lathe is turned off and disconnect from the main power supply and make sure all moving parts have come to a complete stop before any inspection, adjustment or maintenance is carried out.
- 2. Lathe Condition.** Lathe must be maintained for a proper working condition. Never operate a lathe that has damaged or worn parts. Scheduled routine maintenance should be performed on a scheduled basis.
- 3. Leaving a Lathe Unattended.** Always shut the lathe off and make sure all moving parts have come to a complete stop before leaving the lathe. An unsupervised running lathe can cause serious injury.
- 4. Avoiding Entanglement.** Remove loose clothing, belts, or jewelry items. Tie up long hair and use the correct hair nets to avoid any entanglement with moving parts.
- 5. Chuck key safety.** Never let go of a chuck key while still in the chuck to prevent leaving the chuck key in the chuck. Chuck keys left in the chuck can cause serious injury.
- 6. Changing Chucks.** When changing large heavy chucks they become awkward to hold. Always get assistance when installing large chucks. Use a board or piece of plywood across the bedway when any install or removal of chucks to avoid any possible finger pinching between a loose chuck and edge of a bedway.
- 7. Tooling selection.** Always use the correct cutting tool for the job you are turning. Make sure it is sharp and held firmly in the tool post. Adjust the toolpost to provide proper support for the tool you will be using.
- 8. Mounting the workpiece.** Make sure the workpiece is properly mounted and secure before turning on the lathe. A loose workpiece can be thrown across the room and cause serious injury to you or a bystander.
- 9. Workpiece clearance.** Rotate the workpiece by hand to check for clearance with the tool post, compound slide and carriage before turning the lathe on.
- 10. Changing speeds and Reversing.** Turn the lathe off and make sure the lathe has come to a complete stop before changing speeds or reversing the spindle. Do not slow or stop the lathe chuck by using your hand.
- 11. Speed selection.** Select the appropriate speed for the type of work, material, and tool bit. Allow the lathe to reach full speed before beginning a cut.
- 12. Clearing chips.** Always use a brush to clear chips. Never clear chips when the lathe is running.
- 13. Power outage.** In the event of a power failure during use of the lathe, turn off all switches to avoid possible sudden start up once power is restored.
- 14. Clean work area.** Keep the area around the lathe clean from oil, tools and chips.
- 15. Call for help.** If at any time you experience difficulties, stop the machine and call your nearest branch service department for help.

# PLANT SAFETY PROGRAM

## **NEW** MACHINERY HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

### Metal Lathe

Developed in Co-operation Between A.W.I.S.A and Australia Chamber of Manufactures  
This program is based upon the Safe Work Australia, Code of Practice - Managing Risks of Plant in the Workplace ( WHSA 2011 No10 )

| Item No.                                                                      | Hazard Identification         | Hazard Assessment | Risk Control Strategies<br>(Recommended for Purchase / Buyer / User)                                                                                                                              |
|-------------------------------------------------------------------------------|-------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                                                                             | ENTANGLEMENT                  | HIGH              | Eliminate, avoid loose clothing / Long hair etc.                                                                                                                                                  |
| C                                                                             | CUTTING, STABBING, PUNCTURING | MEDIUM            | Isolate power to machine prior to any checks or maintenance.<br>Do not open or clean inside until the machine has completely stopped.                                                             |
| D                                                                             | SHEARING                      | MEDIUM            | Make sure all guards are secured shut when machine is on.<br>Isolate power to machine prior to any checks or maintenance.                                                                         |
| F                                                                             | STRIKING                      | MEDIUM            | Ensure workpiece is secured in chuck and tooling is locked tight in toolpost.<br>Always wear safety glasses.<br>Do not leave chuck key in chuck.<br>Remove all loose objects around moving parts. |
| H                                                                             | ELECTRICAL                    | MEDIUM            | All electrical enclosures should only be opened with a tool that is not to be kept with the machine.                                                                                              |
| N                                                                             | HIGH - TEMPERATURE            | LOW               | Machine should be installed & checked by a Licensed Electrician.                                                                                                                                  |
| O                                                                             | OTHER HAZARDS, NOISE.         | LOW               | Wear appropriate protective clothing to prevent hot swarf.<br>Wear hearing protection as required.                                                                                                |
| Plant Safety Program to be read in conjunction with manufactures instructions |                               |                   |                                                                                                                                                                                                   |



[www.machineryhouse.com.au](http://www.machineryhouse.com.au)



[www.machineryhouse.co.nz](http://www.machineryhouse.co.nz)

Authorised and signed by:  
Safety officer:

Manager:

*[Signature]*  
*[Signature]*

Revised Date: 12th March 2012

# SPARE PARTS SECTION

The following section covers the spare parts diagrams and lists that were current at the time this manual was originally printed. Due to continuous improvements of the machine, changes may be made at any time without notification.

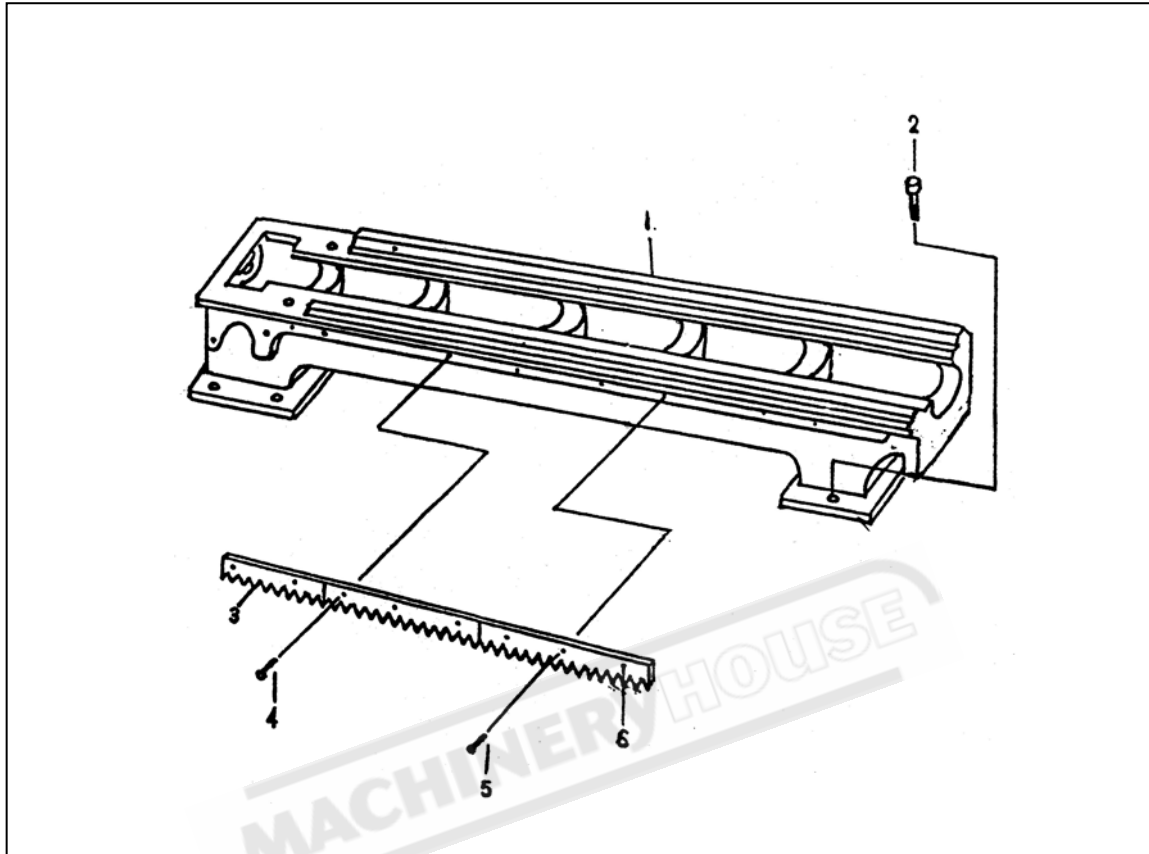
## HOW TO ORDER SPARE PARTS

1. Have your machines **model number, serial number & date of manufacture** on hand, these can be found on the specification plate mounted on the machine
2. A scanned copy of your parts list/diagram with required spare part/s identified
3. Go to [www.machineryhouse.com.au/contactus](http://www.machineryhouse.com.au/contactus) and fill out the enquiry form attaching a copy of scanned parts list.

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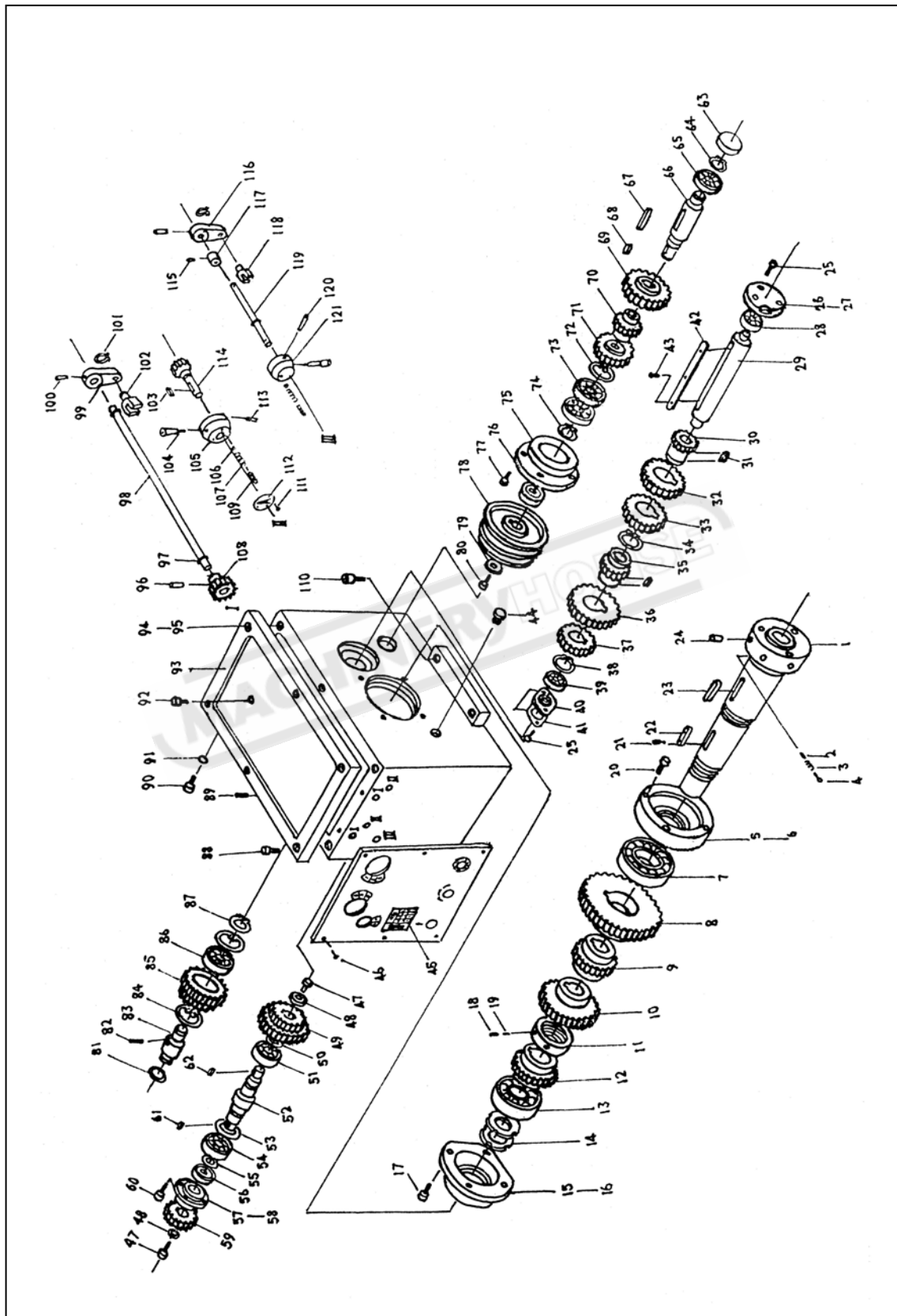
## BED ASSEMBLY



### BED ASSEMBLY

| NO. | NAME      | QTY | NOTE    | NO. | NAME      | QTY | NOTE  |
|-----|-----------|-----|---------|-----|-----------|-----|-------|
| 1   | Lathe bed | 1   | 10047   | 4   | Screw     | 6   | M6×15 |
| 2   | Screw     | 6   | M12 ×40 | 5   | Pin       | 6   | 5×20  |
| 3   | Rack gear | 1   | 1009    | 6   | Rack gear | 2   | 1011  |

## HEAD STOCK



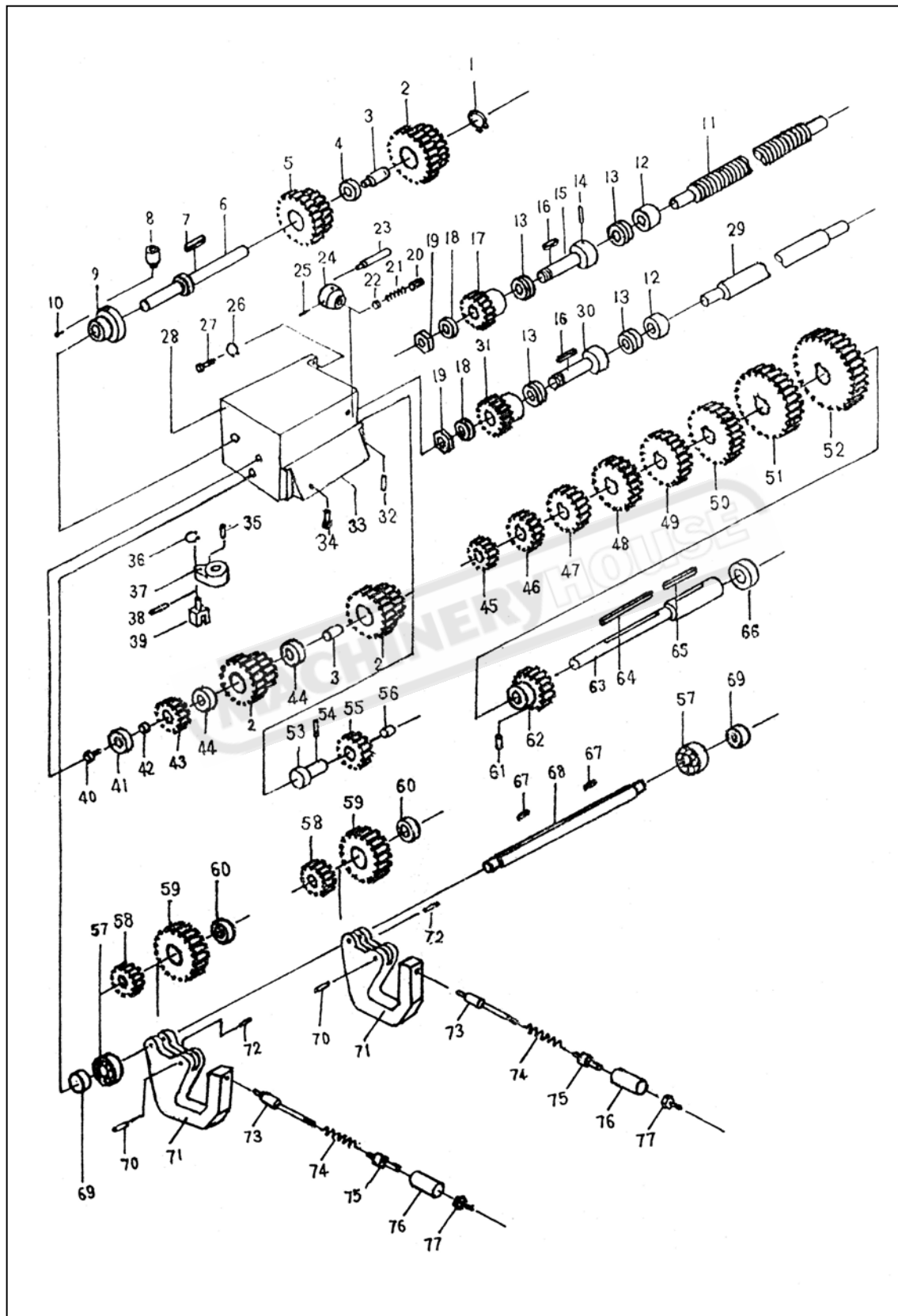
## OWNER'S MANUAL

| HEAD STOCK |          |     |          |     |          |     |           |
|------------|----------|-----|----------|-----|----------|-----|-----------|
| No.        | NAME     | QTY | NOTE     | No. | NAME     | QTY | NOTE      |
| 1          | Spindle  | 1   | 2034     | 34  | Circlip  | 1   |           |
| 2          | Lock pin | 3   | 2035     | 35  | Gear     | 1   | 2022      |
| 3          | Spring   | 3   | 0.6×4×22 | 36  | Gear     | 1   | 2020      |
| 4          | Screw    | 3   | M8×16    | 37  | Gear     | 1   | 2021      |
| 5          | Cover    | 1   | 2038     | 38  | Circlip  | 1   |           |
| 6          | Oil seal | 1   | 2006     | 39  | Bearing  | 1   | 6104      |
| 7          | Bearing  | 1   | D7212    | 40  | Cover    | 1   | 2009      |
| 8          | Gear     | 1   | 2031     | 41  | Oil seal | 1   | 2009A     |
| 9          | Gear     | 1   | 2030     | 42  | Key      | 1   | 8×108     |
| 10         | Gear     | 1   | 2029     | 43  | Screw    | 2   | M3×8      |
| 11         | Nut      | 1   | 2024     | 44  | Oil seal | 1   |           |
| 12         | Gear     | 1   | 2008     | 45  | Fascia   | 1   | 2055      |
| 13         | Bearing  | 1   | D7212    | 46  | Screw    | 6   | M3×8      |
| 14         | Nut      | 2   | 2007     | 47  | Screw    | 2   | M6×12     |
| 15         | Cover    | 1   | 2005A    | 48  | Washer   | 2   | 2003      |
| 16         | Oil seal | 1   | 2023     | 49  | Gear     | 2   | 2026      |
| 17         | Screw    | 4   | M8×16    | 50  | Circlip  | 1   | 25        |
| 18         | Screw    | 2   | M8×8     | 51  | Bearing  | 1   |           |
| 19         | Collar   | 2   | 2025     | 52  | Shaft    | 1   | 2027a     |
| 20         | Screw    | 4   | M8×16    | 53  | Circlip  | 1   | 42        |
| 21         | Screw    | 2   | M3×8     | 54  | Bearing  | 1   |           |
| 22         | Key      | 1   | 8×45     | 55  | Circlip  | 1   | 20        |
| 23         | Key      | 1   | 8×80     | 56  | Oil seal | 1   | D20×40×10 |
| 24         | Shaft    | 3   | 2037     | 57  | Cover    | 1   | 2004A     |
| 25         | Screw    | 5   | M8×16    | 58  | Oil seal | 2   | 2066      |
| 26         | Cover    | 1   | 2040     | 59  | Gear     | 1   | 2002B     |
| 27         | Oil seal | 1   | 2028     | 60  | Screw    | 3   | M6×115    |
| 28         | Bearing  | 1   |          | 61  | Key      | 1   | C5×8      |
| 29         | Shaft    | 1   | 2039     | 62  | Key      | 1   | C5×20     |
| 30         | Gear     | 1   | 2017     | 63  | Cover    | 1   | 2063      |
| 31         | Key      | 2   | 5×18     | 64  | Circlip  | 1   |           |
| 32         | Gear     | 1   | 2015     | 65  | Bearing  | 1   |           |
| 33         | Gear     | 1   | 2016     | 66  | Shaft    | 1   | 2010B     |

## OWNER'S MANUAL

| No. | NAME     | QTY | NOTE      | No. | NAME      | QTY | NOTE   |
|-----|----------|-----|-----------|-----|-----------|-----|--------|
| 67  | Key      | 1   | 5×80      | 95  | Headstock | 1   | 2033   |
| 68  | Key      | 1   | C5×24     | 96  | Pin       | 2   | 4×24   |
| 69  | Gear     | 1   | 2019      | 97  | Oil seal  | 7   | 16×2.4 |
| 70  | Gear     | 1   | 2018      | 98  | Shaft     | 2   | 2046   |
| 71  | Gear     | 1   | 2013      | 99  | Shaft arm | 2   | 2042   |
| 72  | Circlip  | 1   | 47        | 100 | Pin       | 3   | 4×24   |
| 73  | Bearing  | 2   |           | 101 | Circlip   | 3   |        |
| 74  | Circlip  | 1   |           | 102 | Shifter   | 2   | 2041   |
| 75  | Cover    | 1   | 2012B     | 103 | Key       | 2   | 5×16   |
| 76  | Oil seal | 1   | D25×40×10 | 104 | Handle    | 3   | 2058   |
| 77  | Screw    | 4   | M6×20     | 105 | Boss      | 2   | 2059   |
| 78  | Pulley   | 1   | 2014      | 106 | Ball      | 4   |        |
| 79  | Washer   | 1   | 2011      | 107 | Spring    | 4   | 1×6×20 |
| 80  | Screw    | 1   | M8×20     | 108 | Gear      | 2   | 2047   |
| 81  | Oil seal | 1   |           | 109 | Screw     | 4   | M8×8   |
| 82  | Screw    | 1   | M6×8      | 110 | Screw     | 2   | M12×25 |
| 83  | Shaft    | 1   | 2001      | 111 | Screw     | 4   | M3×6   |
| 84  | Circlip  | 2   | 47        | 112 | Fascia    | 2   | 2060   |
| 85  | Gear     | 1   | 2032      | 113 | Screw     | 2   | M6×20  |
| 86  | Bearing  | 1   |           | 114 | Gear      | 2   | 2061   |
| 87  | Circlip  | 1   |           | 115 | Screw     | 1   | M6×8   |
| 88  | Screw    | 6   | M6×30     | 116 | Shift arm | 1   | 2054A  |
| 89  | Screw    | 2   | M6×20     | 117 | Collar    | 1   | 2079   |
| 90  | Screw    | 1   | M16×1.5   | 118 | Shifter   | 1   | 2048   |
| 91  | Oil seal | 1   | 16×2.4    | 119 | Shaft     | 1   | 2052   |
| 92  | Screw    | 1   | M16×1.5   | 120 | Pin       | 1   | 5×40   |
| 93  | Cover    | 1   | 2044      | 121 | Boss      | 1   | 2051   |
| 94  | Oil seal | 1   | 2062      |     |           |     |        |

## GEAR BOX



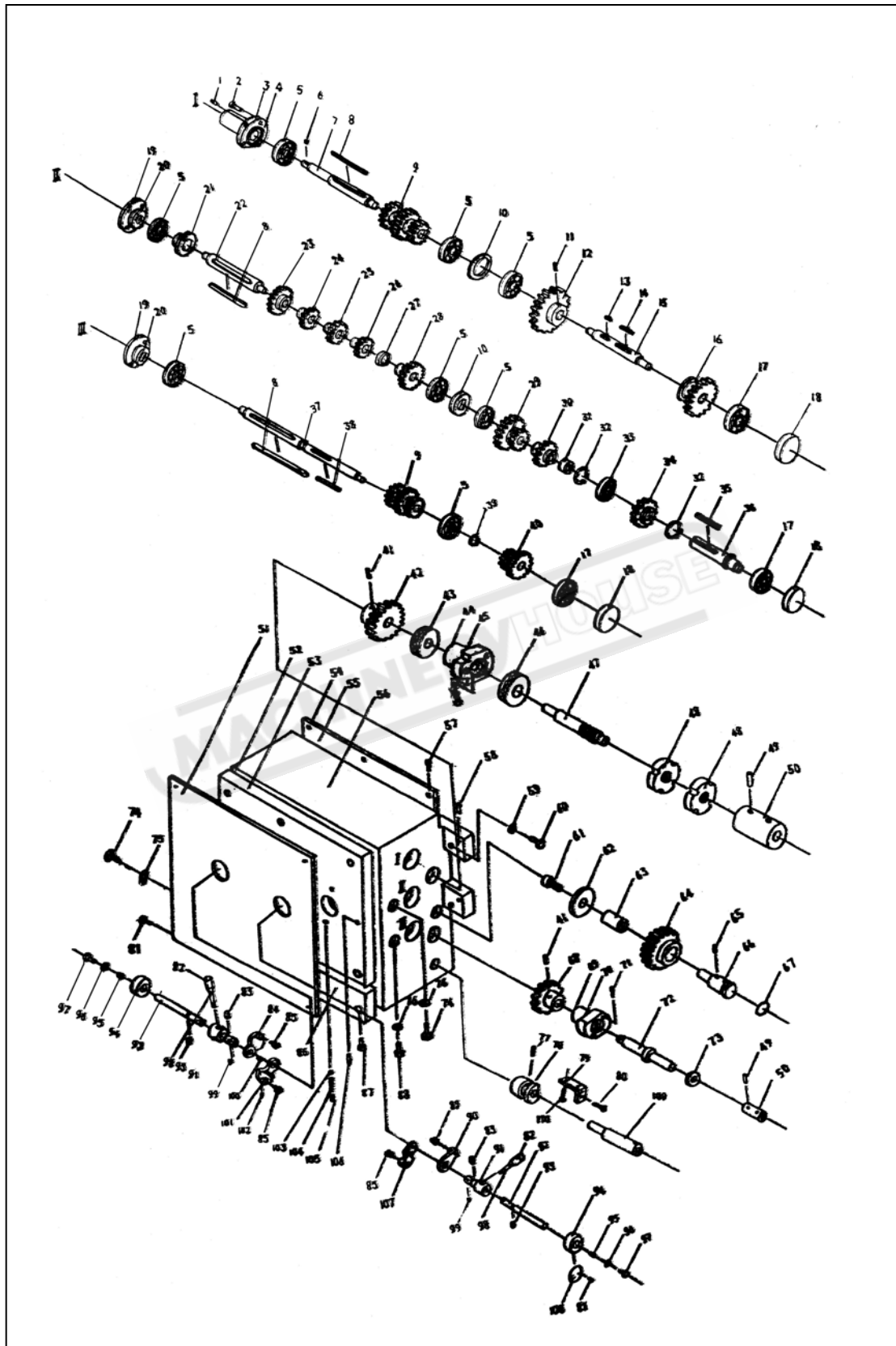
## OWNER'S MANUAL

| <b>GEAR BOX</b> |             |     |       |     |               |     |         |
|-----------------|-------------|-----|-------|-----|---------------|-----|---------|
| No.             | NAME        | QTY | NOTE. | No. | NAME          | QTY | NOTE.   |
| 1               | Oil Cup     | 1   |       | 21  | Boss          | 1   | 2057    |
| 2               | Circlip     | 1   |       | 22  | Pin           | 1   | 5×40    |
| 3               | Gear        | 3   | 3015  | 23  | Gear Box      | 1   | 3001    |
| 4               | Bushing     | 3   | 3016  | 24  | Screw         | 3   | M8×8    |
| 5               | Washer      | 1   | 3024  | 25  | Spring        | 2   | 1×4.5×7 |
| 6               | Gear        | 1   | 3023  | 26  | Sted Ball     | 2   |         |
| 7               | Shaft       | 1   | 3022  | 27  | Screw         | 2   | M10×30  |
| 8               | Key         | 1   | 5×10  | 28  | Spring washer | 2   |         |
| 9               | Cover       | 1   | 3031  | 29  | Feed Rod      | 1   | 1006    |
| 10              | Screw       | 3   | M6×16 | 30  | Shaft         | 1   | 3047    |
| 11              | Guide Screw | 1   | 1005  | 31  | Gear          | 1   | 3004    |
| 12              | Sheath      | 2   | 3084  | 32  | Plate         | 1   | 3029    |
| 13              | Bearing     | 4   | 8103  | 33  | Screw         | 4   | M6×16   |
| 14              | Pin         | 2   | 5×35  | 34  | Shaft         | 1   | 3039    |
| 15              | Shaft       | 1   | 3028  | 35  | Circlip       | 1   |         |
| 16              | Key         | 2   | 5×14  | 36  | Shifter Arm   | 1   | 3040    |
| 17              | Gear        | 1   | 3026  | 37  | Pin           | 1   | 5×30    |
| 18              | Nut         | 4   | M12   | 38  | Shifter       | 1   | 3041    |
| 19              | Washer      | 4   | 3025  | 39  | Bushing       | 1   | 3019    |
| 20              | Lever       | 1   | 6056  | 40  | Screw         | 1   | M6×12   |

## OWNER'S MANUAL

| No. | NAME          | QTY | NOTE | No. | NAME    | QTY | NOTE   |
|-----|---------------|-----|------|-----|---------|-----|--------|
| 41  | Washer        | 1   | 3021 | 61  | Pin     | 1   |        |
| 42  | Gear          | 2   | 3018 | 62  | Gear    | 1   | 3027   |
| 43  | Washer        | 2   | 3017 | 63  | Shaft   | 1   | 3020   |
| 44  | Gear          | 1   | 3012 | 64  | Key     | 1   | 5×75   |
| 45  | Gear          | 1   | 3011 | 65  | Key     | 1   | 3042   |
| 46  | Gear          | 1   | 3010 | 66  | Top     | 1   | 3043   |
| 47  | Gear          | 1   | 3009 | 67  | Key     | 2   | 3014   |
| 48  | Gear          | 1   | 3008 | 68  | Shaft   | 1   | 3003   |
| 49  | Gear          | 1   | 3007 | 69  | Pin     | 2   | 5×18   |
| 50  | Gear          | 1   | 3006 | 70  | Top     | 2   | 3002   |
| 51  | Gear          | 1   | 3005 | 71  | Screw   | 2   | M6×5   |
| 52  | Gear          | 2   | 3044 | 72  | Shaft   | 2   | 3051   |
| 53  | Pin           | 4   | 6×25 | 73  | Shaft   | 2   | 3054   |
| 54  | Gear          | 2   | 3045 | 74  | Spring  | 2   | 1×8×47 |
| 55  | Bushing       | 1   | 3046 | 75  | Sleeve  | 2   | 2053   |
| 56  | Bearing       | 2   |      | 76  | Housing | 2   | 3055   |
| 57  | Gear          | 1   | 3013 | 77  | Nut     | 2   | M6     |
| 58  | Gear          | 2   | 3049 |     |         |     |        |
| 59  | Bushing       | 2   | 3050 |     |         |     |        |
| 60  | Shifter Lever | 2   | 3052 |     |         |     |        |

## GEAR BOX- I



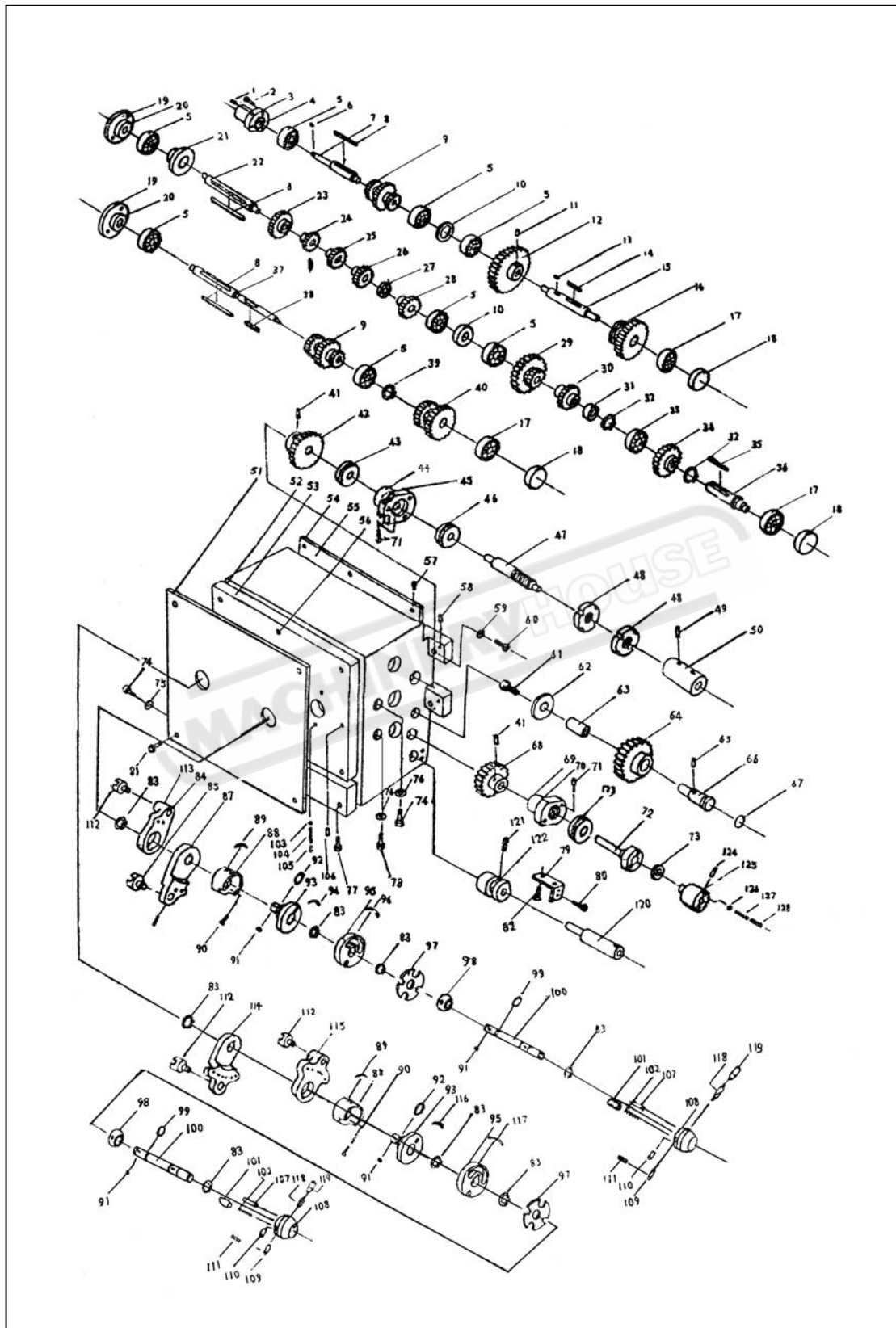
## OWNER'S MANUAL

| <b>GEAR BOX- I</b> |          |     |       |     |          |     |         |
|--------------------|----------|-----|-------|-----|----------|-----|---------|
| No.                | NAME     | QTY | NOTE  | No. | NAME     | QTY | NOTE    |
| 1                  | Oil Cup  | 1   |       | 29  | Gear     | 1   | 3026C   |
| 2                  | Screw    | 7   | M6×12 | 30  | Gear     | 1   | 3007C   |
| 3                  | Cover    | 1   | 3034B | 31  | Washer   | 1   | 3008C   |
| 4                  | Oil seal | 1   | 3035C | 32  | Circlip  | 2   |         |
| 5                  | Bearing  | 8   |       | 33  | Bearing  | 1   |         |
| 6                  | Key      | 1   | 5×13  | 34  | Gear     | 1   | 3009B   |
| 7                  | Shaft    | 1   | 3041B | 35  | Key      | 1   | C5×40   |
| 8                  | Key      | 3   | 6×90  | 36  | Shaft    | 1   | 3019C   |
| 9                  | Gear     | 2   | 3005B | 37  | Shaft    | 1   | 3004B   |
| 10                 | Washer   | 2   | 3066B | 38  | Key      | 1   | 5×35    |
| 11                 | Screw    | 1   | M6×8  | 39  | Circlip  | 1   |         |
| 12                 | Gear     | 1   | 3027C | 40  | Gear     | 1   | 3006C   |
| 13                 | Key      | 1   | 6×15  | 41  | Pin      | 2   | 5×25    |
| 14                 | Key      | 1   | 6×35  | 42  | Gear     | 1   | 3018C   |
| 15                 | Shaft    | 1   | 3067C | 43  | Bearing  | 1   | 8103    |
| 16                 | Gear     | 1   | 3025C | 44  | Cover    | 1   | 3084D   |
| 17                 | Bearing  | 3   |       | 45  | Oil seal | 1   | 3068D   |
| 18                 | Cover    | 3   | 3017B | 46  | Bearing  | 1   | 8104    |
| 19                 | Cover    | 2   | 3044B | 47  | Shaft    | 1   | 3021C   |
| 20                 | Oil seal | 2   | 3046B | 48  | Nut      | 2   | M20×1.5 |
| 21                 | Washer   | 1   | 3045B | 49  | Pin      | 1   | 5×25    |
| 22                 | Shaft    | 1   | 3033B | 50  | Bushing  | 1   | 3020D   |
| 23                 | Gear     | 1   | 3029B | 51  | Fasica   | 1   | 3060D   |
| 24                 | Gear     | 1   | 3031B | 52  | Oil seal | 1   | 3071D   |
| 25                 | Gear     | 1   | 3032B | 53  | Cover    | 1   | 3059B   |
| 26                 | Gear     | 1   | 3003B | 54  | Cover    | 1   | 3042C   |
| 27                 | Washer   | 1   | 3030B | 55  | Oil seal | 1   | 3070C   |
| 28                 | Gear     | 1   | 3002B | 56  | Gear box | 1   | 3001C   |

## OWNER'S MANUAL

| No. | NAME           | QTY | NOTE     | No. | NAME        | QTY | NOTE   |
|-----|----------------|-----|----------|-----|-------------|-----|--------|
| 57  | Screw          | 6   | M6×12    | 85  | Shifter     | 3   | 3049B  |
| 58  | Pin            | 2   | 5×25     | 86  | Cover       | 1   | 3061B  |
| 59  | Spring washer  | 2   |          | 87  | Screw       | 8   | M8×16  |
| 60  | Screw          | 2   | , 10×30  | 88  | Oil window  | 1   |        |
| 61  | Screw          | 1   | M6×12    | 89  | Shifter     | 1   | 3062B  |
| 62  | Washer         | 1   | 6×32×5   | 90  | Shifter arm | 1   | 3063B  |
| 63  | Bushing        | 1   | 3024C    | 91  | Boss        | 2   | 3057C  |
| 64  | Gear           | 1   | 3016C    | 92  | Shaft       | 2   | 3056C  |
| 65  | Screw          | 1   | M6×16    | 93  | Oil seal    | 2   | 16×2.4 |
| 66  | Shaft          | 1   | 3015C    | 94  | Hand wheel  | 2   | 3054C  |
| 67  | Oil seal       | 1   | 22×2.65  | 95  | Key         | 2   | 5×8    |
| 68  | Gear           | 1   | 3014C    | 96  | Washer      | 2   |        |
| 69  | Cover          | 1   | 3022F    | 97  | Screw       | 2   | M6×10  |
| 70  | Oil seal       | 1   | 3086D    | 98  | Lever       | 2   | 3051C  |
| 71  | Screw          | 5   | M6×25    | 99  | Key         | 2   | 5×8    |
| 72  | Shaft          | 1   | 3013E    | 100 | Pin         | 1   |        |
| 73  | Oil seal       | 1   | 25×40×10 | 101 | Shifter arm | 1   | 3058C  |
| 74  | Screw          | 2   | M16×1.5  | 102 | Screw       | 4   | M3×6   |
| 75  | Washer         | 2   |          | 103 | Ball        | 4   | Ø15    |
| 76  | Oil seal       | 2   | 16×2.4   | 104 | Spring      | 4   | 1×5×14 |
| 77  | Screw          | 1   | M6×10    | 105 | Screw       | 4   | M8×5   |
| 78  | Position piece | 1   | 3012E    | 106 | Pin         | 2   | M5×25  |
| 79  | Support        | 1   | 7003C    | 107 | Shifter arm | 2   | 3065C  |
| 80  | Screw          | 2   | M4×20    | 108 | Sign board  | 2   | 2060   |
| 81  | Screw          | 8   | M8×16    | 109 | Shaft       | 1   | 3011D  |
| 82  | Knob           | 2   | M8×40    | 110 | Screw       | 2   | M4×40  |
| 83  | Oil seal       | 2   | 25×2.65  |     |             |     |        |
| 84  | Shifter Arm    | 1   | 3053B    |     |             |     |        |

## GEAR BOX- II



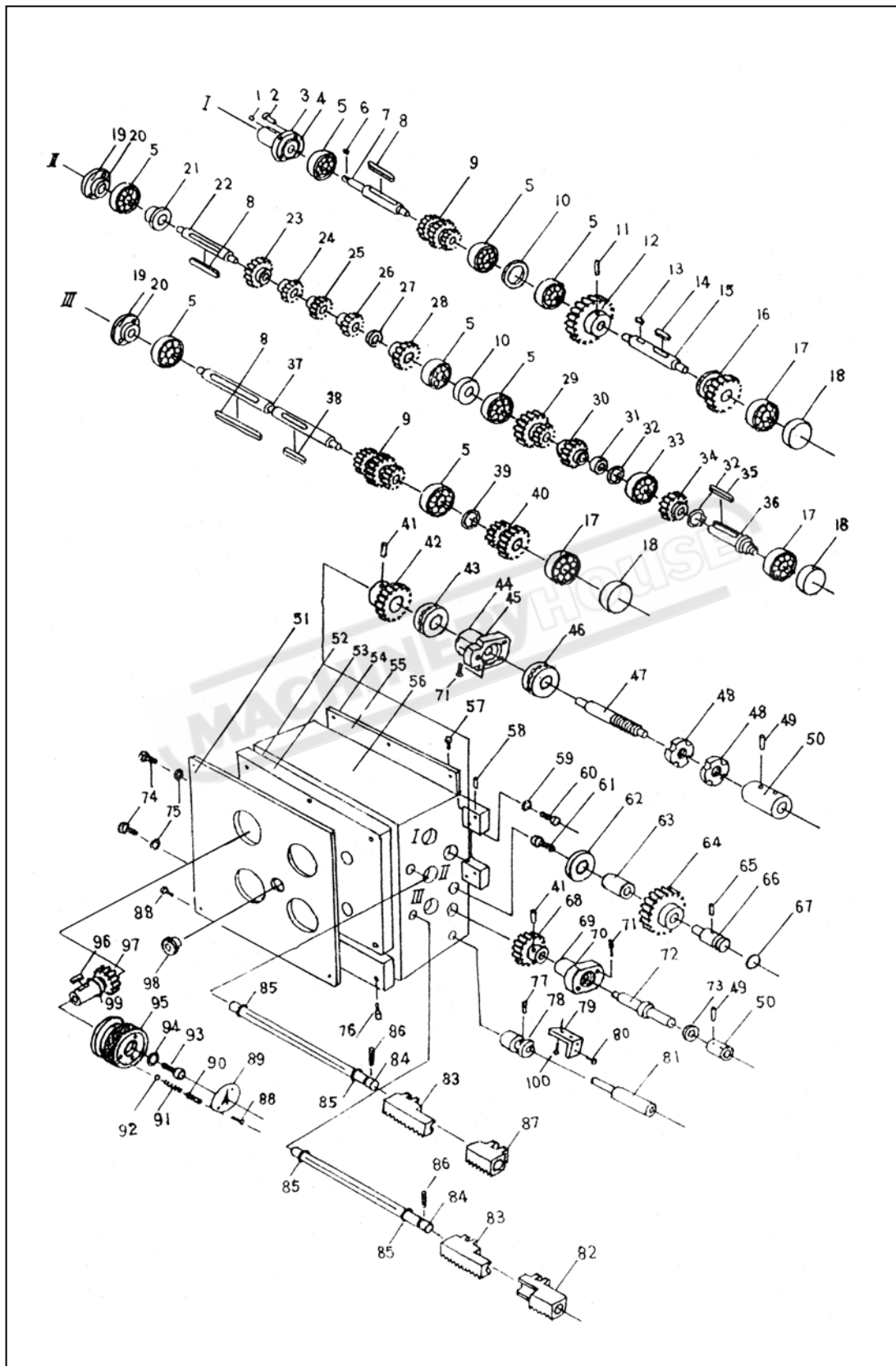
## OWNER'S MANUAL

| <b>GEAR BOX- II</b> |          |     |       |     |               |     |         |
|---------------------|----------|-----|-------|-----|---------------|-----|---------|
| No.                 | NAME     | QTY | NOTE  | No. | NAME          | QTY | NOTE    |
| 1                   | Oil Cup  | 1   |       | 33  | Bearing       | 1   |         |
| 2                   | Screw    | 7   | M6×12 | 34  | Gear          | 1   | 3009B   |
| 3                   | Cover    | 1   | 3034B | 35  | Key           | 1   | C5×40   |
| 4                   | Oil seal | 1   | 3035C | 36  | Shaft         | 1   | 3019C   |
| 5                   | Bearing  | 8   |       | 37  | Shaft         | 1   | 3004B   |
| 6                   | Key      | 1   | 5×13  | 38  | Key           | 1   | 5×35    |
| 7                   | Shaft    | 1   | 3041B | 39  | Circlip       | 1   |         |
| 8                   | Key      | 3   | 6×90  | 40  | Gear          | 1   | 3006C   |
| 9                   | Gear     | 2   | 3005B | 41  | Pin           | 2   | 5×25    |
| 10                  | Washer   | 2   | 3066B | 42  | Gear          | 1   | 3018C   |
| 11                  | Screw    | 1   | M6×8  | 43  | Bearing       | 1   | 8103    |
| 12                  | Gear     | 1   | 3027C | 44  | Cover         | 1   | 3084D   |
| 13                  | Key      | 1   | 6×15  | 45  | Oil seal      | 1   | 3068D   |
| 14                  | Key      | 1   | 6×35  | 46  | Bearing       | 1   | 8104    |
| 15                  | Shaft    | 1   | 3067B | 47  | Shaft         | 1   | 3021C   |
| 16                  | Gear     | 1   | 3025C | 48  | Nut           | 2   | M20×1.5 |
| 17                  | Bearing  | 3   |       | 49  | Pin           | 1   | 5×25    |
| 18                  | Cover    | 3   | 3017B | 50  | Bushing       | 1   | 3020E   |
| 19                  | Cover    | 2   | 3044B | 51  | Fascia        | 1   | 3060B   |
| 20                  | Oil seal | 2   | 3046B | 52  | Oil seal      | 1   | 3071D   |
| 21                  | Washer   | 1   | 3045B | 53  | Cover         | 1   | 3059D   |
| 22                  | Shaft    | 1   | 3033B | 54  | Cover         | 1   | 3042C   |
| 23                  | Gear     | 1   | 3029B | 55  | Oil seal      | 1   | 3070C   |
| 24                  | Gear     | 1   | 3031B | 56  | Gear box      | 1   | 3001D   |
| 25                  | Gear     | 1   | 3032B | 57  | Screw         | 6   | M6×12   |
| 26                  | Gear     | 1   | 3003B | 58  | Pin           | 2   | 5×25    |
| 27                  | Washer   | 1   | 3030B | 59  | Spring washer | 2   |         |
| 28                  | Gear     | 1   | 3002B | 60  | Screw         | 2   | M10×30  |
| 29                  | Gear     | 1   | 3026C | 61  | Screw         | 1   | M6×10   |
| 30                  | Gear     | 1   | 3007C | 62  | Washer        | 1   | 6×32×5  |
| 31                  | Washer   | 1   | 3008C | 63  | Bushing       | 1   | 3024C   |
| 32                  | Circlip  | 2   |       | 64  | Gear          | 1   | 3016C   |

## OWNER'S MANUAL

| NO. | NAME              | QTY | NOTE     | NO. | NAME            | QTY | NOTE    |
|-----|-------------------|-----|----------|-----|-----------------|-----|---------|
| 65  | Screw             | 1   | M6×16    | 97  | Pad             | 2   | 3048D   |
| 66  | Shaft             | 1   | 3015C    | 98  | Bulb            | 2   | 3052D   |
| 67  | Oil seal          | 1   | 22×2.65  | 99  | Oil seal        | 2   | 8.5×1.8 |
| 68  | Gear              | 1   | 3014C    | 100 | Shaft           | 2   | 3056D   |
| 69  | Cover             | 1   | 3022F    | 101 | Pin             | 2   | 3079D   |
| 70  | Oil seal          | 1   | 3086D    | 102 | Spring          | 2   |         |
| 71  | Screw             | 5   | M6×25    | 103 | Ball            | 4   |         |
| 72  | Shaft             | 1   | 3013D    | 104 | Spring          | 4   | 1×5×14  |
| 73  | Oil seal          | 1   |          | 105 | Screw           | 4   | M8×5    |
| 74  | Screw             | 2   | M16×1.5  | 106 | Pin             | 2   | M5×25   |
| 75  | Washer            | 1   |          | 107 | Pin             | 2   | 5×25    |
| 76  | Oil seal          | 1   | 16×2.4   | 108 | Hand lever      | 2   | 3055D   |
| 77  | Screw             | 1   | 3012C    | 109 | Pin             | 4   | A6×20   |
| 78  | Oil window        | 1   |          | 110 | Pin             | 2   | A5×15   |
| 79  | Bracket           | 1   | 3011D    | 111 | Screw           | 4   | M4×6    |
| 80  | Screw             | 1   |          | 112 | Shifter         | 3   | 3062B   |
| 81  | Screw             | 4   | M22×24   | 113 | Spring          | 2   | 1×5×14  |
| 82  | Screw             | 2   | M4×10    | 114 | Shifter arm     | 1   | 3058D   |
| 83  | Circlip           | 8   |          | 115 | Shifter arm     | 1   | 3053D   |
| 84  | Shifter arm       | 1   | 3063D    | 116 | Tag             | 1   | 3064D   |
| 85  | Shifter           | 1   | 3049B    | 117 | Tag             | 1   | 3069D   |
| 86  | Cover             | 1   | 3061B    | 118 | Handle          | 2   | 2058    |
| 87  | Shifter arm       | 1   | 3065D    | 119 | Knob            | 2   | M8×40   |
| 88  | Jacket            | 2   | 3050D    | 120 | Switch rod      | 1   | 3011D   |
| 89  | Transparent scale | 4   | 3080D    | 121 | Screw           | 1   | M6×10   |
| 90  | Screw             | 6   | M4×10    | 122 | Position block  | 1   | 3012E   |
| 91  | Key               | 4   | 5×6      | 123 | Bearing         | 1   | 8103    |
| 92  | Oil seal          | 2   | 21.5×1.8 | 124 | Pin             | 1   | 5×40    |
| 93  | Turn plate        | 2   | 3057D    | 125 | Connection part | 1   | 3020D   |
| 94  | Tag               | 1   | 3071D    | 126 | Ball            | 2   | Ø6      |
| 95  | Channel plate     | 2   | 3054D    | 127 | Spring          | 2   | 1×5×20  |
| 96  | Tag               | 1   | 3074D    | 128 | Screw           | 2   | M8×8    |

## GEAR BOX-III

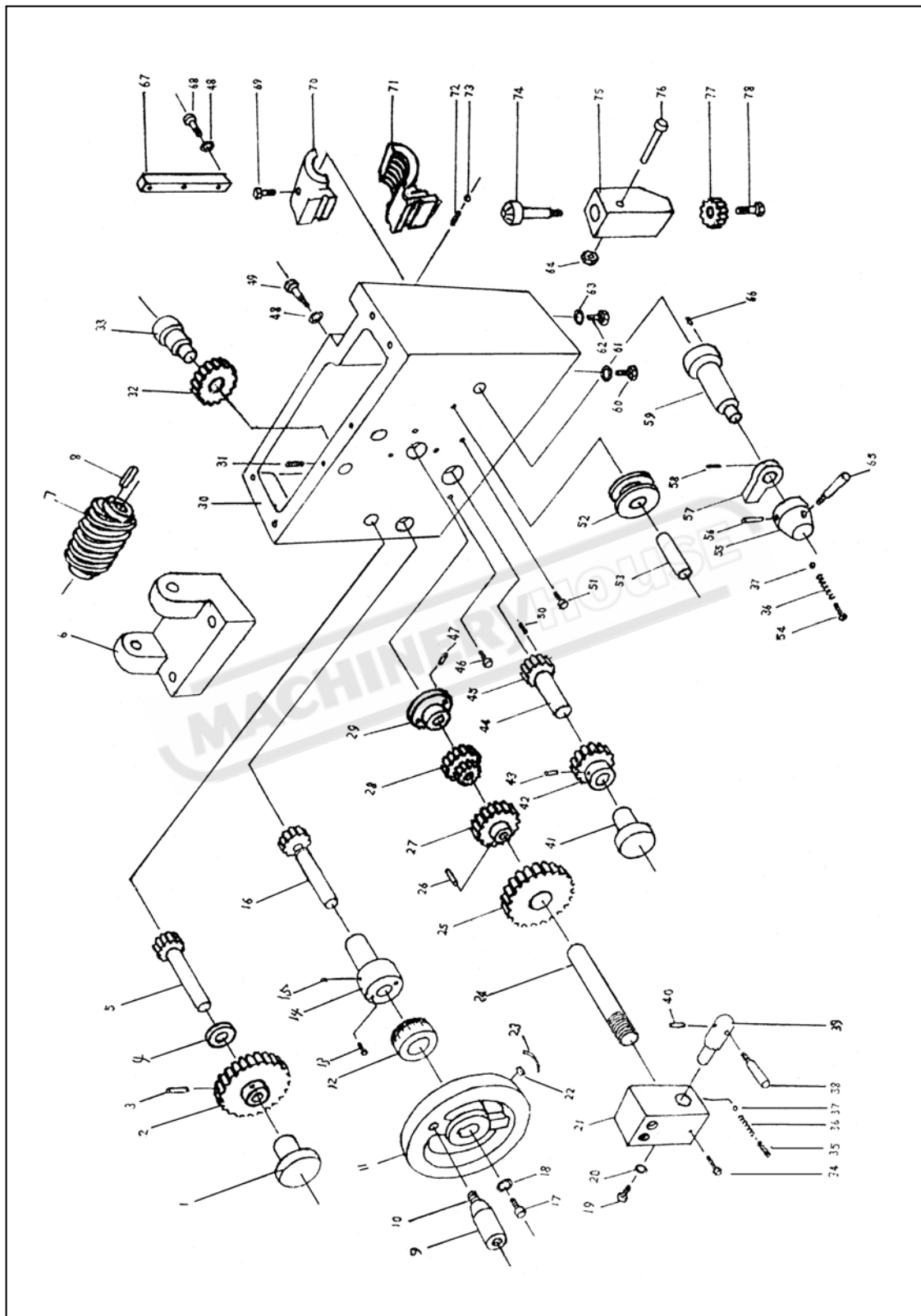


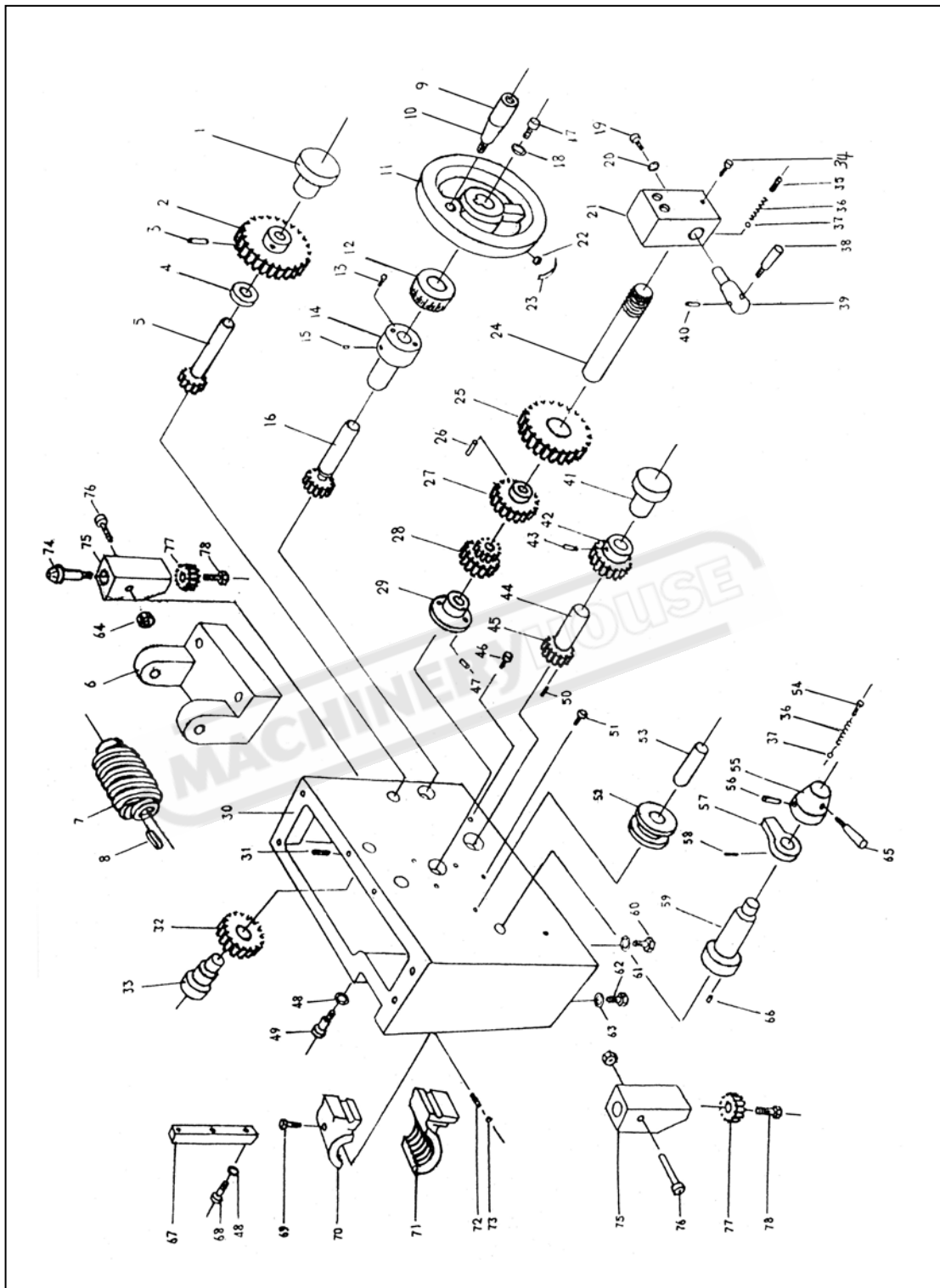
## OWNER'S MANUAL

| <b>GEAR BOX- III</b> |          |     |       |     |          |     |         |
|----------------------|----------|-----|-------|-----|----------|-----|---------|
| NO.                  | NAME     | QTY | NOTE  | NO. | NAME     | QTY | NOTE    |
| 1                    | Oil cup  | 1   |       | 26  | Gear     | 1   | 3003B   |
| 2                    | Screw    | 7   | M6×12 | 27  | Washer   | 1   | 3030B   |
| 3                    | Cover    | 1   | 3034B | 28  | Gear     | 1   | 3002B   |
| 4                    | Oil seal | 1   | 3035C | 29  | Gear     | 1   | 3026C   |
| 5                    | Bearing  | 8   | 89103 | 30  | Gear     | 1   | 3007C   |
| 6                    | Key      | 1   | 5×13  | 31  | Washer   | 1   | 3008C   |
| 7                    | Shaft    | 1   | 3041B | 32  | Circlip  | 2   |         |
| 8                    | Key      | 3   | 6×90  | 33  | Bearing  | 1   | 89103   |
| 9                    | Gear     | 2   | 3005B | 34  | Gear     | 1   | 3009B   |
| 10                   | Washer   | 2   | 3066B | 35  | Key      | 1   | C5×40   |
| 11                   | Screw    | 1   | M6×8  | 36  | Shaft    | 1   | 3019C   |
| 12                   | Gear     | 1   | 3027C | 37  | Shaft    | 1   | 3004B   |
| 13                   | Key      | 1   | 6×15  | 38  | Key      | 1   | 5×35    |
| 14                   | Key      | 1   | 6×35  | 39  | Circlip  | 1   |         |
| 15                   | Shaft    | 1   | 3067B | 40  | Gear     | 1   | 3006C   |
| 16                   | Gear     | 1   | 3025C | 41  | Pin      | 2   | 5×6     |
| 17                   | Bearing  | 3   | 89102 | 42  | Gear     | 1   | 3018C   |
| 18                   | Cover    | 3   | 3017B | 43  | Bearing  | 1   | 8103    |
| 19                   | Cover    | 2   | 3044B | 44  | Cover    | 1   | 3084D   |
| 20                   | Oil seal | 2   | 3046B | 45  | Oil seal | 1   | 3068D   |
| 21                   | Washer   | 1   | 3045B | 46  | Bearing  | 1   | 8104    |
| 22                   | Shaft    | 1   | 3033B | 47  | Shaft    | 1   | 3021C   |
| 23                   | Gear     | 1   | 3029B | 48  | Nut      | 2   | M20×1.5 |
| 24                   | Gear     | 1   | 3031B | 49  | Pin      | 1   | 5×6     |
| 25                   | Gear     | 1   | 3032B | 50  | Bushing  | 1   | 3020E   |

## OWNER'S MANUAL

| NO. | NAME          | QTY | NOTE     | NO. | NAME           | QTY | NOTE   |
|-----|---------------|-----|----------|-----|----------------|-----|--------|
| 51  | Fascia        | 1   | 3060E    | 76  | Screw          | 8   | M8×15  |
| 52  | Oil seal      | 1   | 3071D    | 77  | Screw          | 1   | M6×10  |
| 53  | Cover         | 1   | 3059D    | 78  | Position piece | 1   | 3012D  |
| 54  | Cover         | 1   | 3042C    | 79  | Support        | 1   | 7003B  |
| 55  | Oil seal      | 1   | 3070C    | 80  | Screw          | 2   | M4×20  |
| 56  | Gear box      | 1   | 3001C    | 81  | Shaft          | 1   | 3011D  |
| 57  | Screw         | 6   | M6×12    | 82  | Gear rack      | 1   | 3050C  |
| 58  | Pin           | 2   | 5×25     | 83  | Gear rack      | 2   | 3049C  |
| 59  | Spring washer | 2   |          | 84  | Shaft          | 2   | 3089A  |
| 60  | Screw         | 2   | M10×30   | 85  | Oil seal       | 4   | 12×1.8 |
| 61  | Screw         | 1   | M6×12    | 86  | Screw          | 2   | M4×6   |
| 62  | Washer        | 1   | 6×32×5   | 87  | Gear rack      | 1   | 3062C  |
| 63  | Bushing       | 1   | B1260    | 88  | Screw          | 12  | M3×6   |
| 64  | Gear          | 1   | 3016C    | 89  | Sign board     | 4   | 2060   |
| 65  | Screw         | 1   | M6×16    | 90  | Screw          | 4   | M8×6   |
| 66  | Shaft         | 1   | 3015C    | 91  | Spring         | 4   | 1×5×25 |
| 67  | Oil seal      | 1   | 22×2.65  | 92  | Steel ball     | 4   | Ø5     |
| 68  | Gear          | 1   | 3014C    | 93  | Screw          | 4   | M6×10  |
| 69  | Cover         | 1   | 3022F    | 94  | Washer         | 4   |        |
| 70  | Oil seal      | 1   | 3086D    | 95  | Hand wheel     | 4   | 3054F  |
| 71  | Screw         | 5   | M6×25    | 96  | Key            | 4   | 5×8    |
| 72  | Shaft         | 1   | 3013E    | 97  | Gear           | 4   | 3088   |
| 73  | Oil seal      | 1   | 18×30×10 | 98  | Oil window     | 1   | A12    |
| 74  | Screw         | 2   | M16×1.5  | 99  | Oil seal       | 4   | 16×2.4 |
| 75  | Washer        | 2   |          |     |                |     |        |

**APRON-LEFT**

**APRON-RIGHT**

## OWNER'S MANUAL

| APRON-LEFT OR APRON-RIGHT |            |     |       |     |             |     |        |
|---------------------------|------------|-----|-------|-----|-------------|-----|--------|
| NO.                       | NAME       | QTY | NOTE  | NO. | NAME        | QTY | NOTE   |
| 1                         | Bushing    | 1   | 4026  | 23  | Leaf spring | 1   | 4037   |
| 2                         | Gear       | 1   | 4029  | 24  | Shaft       | 1   | 4015   |
| 3                         | Pin        | 1   | 5×30  | 25  | Gear        | 1   | 4012   |
| 4                         | Space      | 1   | 4027  | 26  | Pin         | 1   | 5×33   |
| 5                         | Gear shaft | 1   | 4028  | 27  | Gear        | 1   | 4013   |
| 6                         | Worm am    | 1   | 4008  | 28  | Gear        | 1   | 4014   |
| 7                         | Worm       | 1   | 4009  | 29  | Bushing     | 1   | 4016   |
| 8                         | Flat key   | 1   | B5×36 | 30  | Apron case  | 1   | 4001   |
| 9                         | Handle     | 1   | 4032  | 31  | Screw       | 1   | M6×6   |
| 10                        | Lever      | 1   | 4033  | 32  | Gear        | 1   | 4010   |
| 11                        | Hand wheel | 1   | 4034  | 33  | Shaft       | 1   | 4011   |
| 12                        | Index ring | 1   | 4036  | 34  | Screw       | 3   | M6×45  |
| 13                        | Screw      | 1   | M6×20 | 35  | Screw       | 1   | M8×8   |
| 14                        | Bracket    | 2   | 4031  | 36  | Spring      | 2   | 1×45×6 |
| 15                        | Oil cup    | 1   |       | 37  | Ball        | 2   |        |
| 16                        | Gear shaft | 4   | 4030  | 38  | Lever       | 1   | 4041   |
| 17                        | Screw      | 1   | M6×12 | 39  | Gear shaft  | 1   | 4042   |
| 18                        | Washer     | 1   | 4035  | 40  | Pin         | 1   | 5×25   |
| 19                        | Screw      | 4   | M6×10 | 41  | Bushing     | 1   | 4020   |
| 20                        | Washer     | 1   | 4038  | 42  | Gear        | 1   | 4019   |
| 21                        | Boss       | 1   | 4039  | 43  | Pin         | 1   | 5×25   |
| 22                        | Key        | 1   | 5×16  | 44  | Shaft       | 1   | 4018   |

## OWNER'S MANUAL

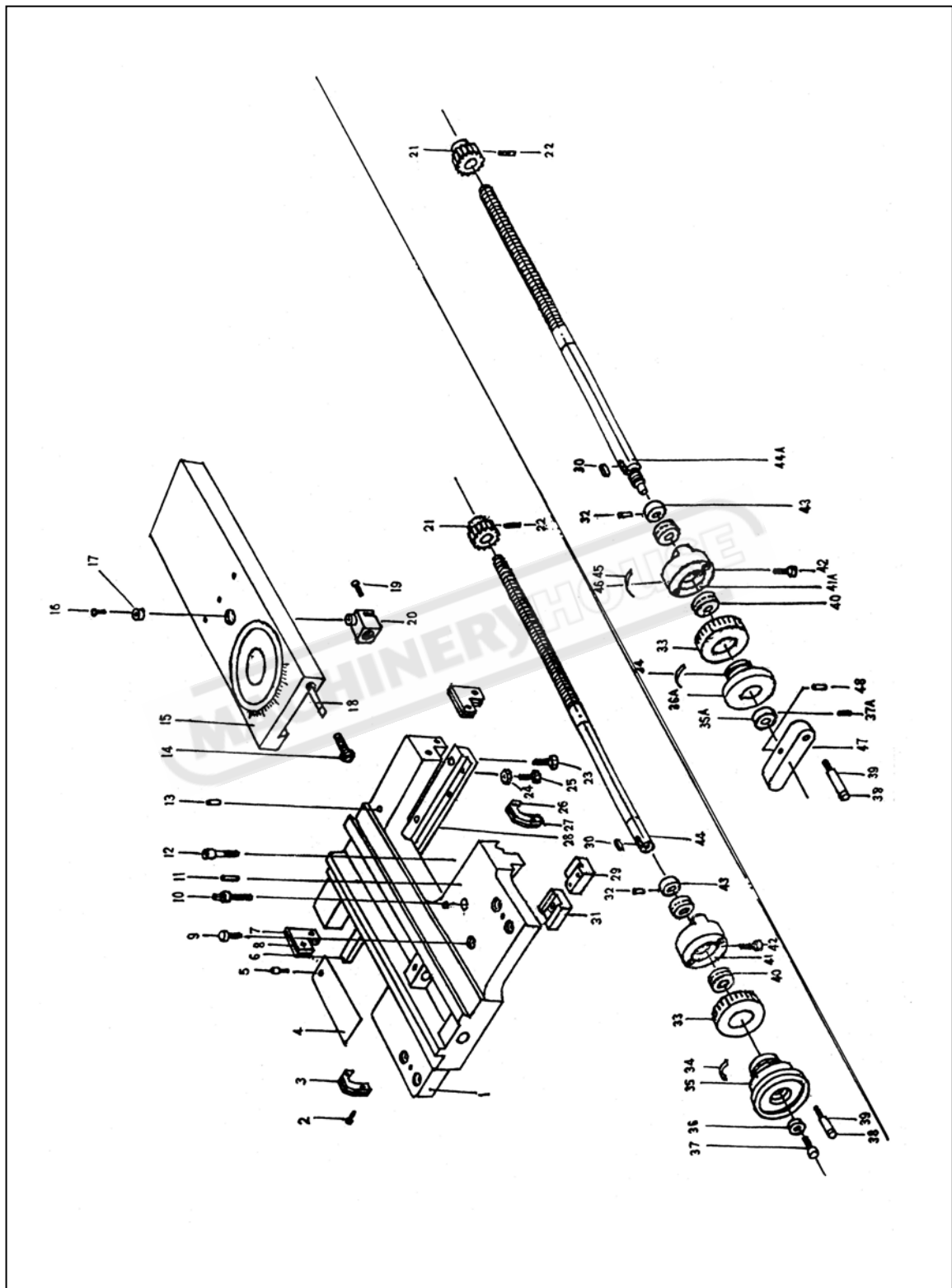
| NO. | NAME           | QTY | NOTE     | NO. | NAME           | QTY | NOTE   |
|-----|----------------|-----|----------|-----|----------------|-----|--------|
| 45  | Worm gear      | 1   | 4017     | 67  | Gib            | 1   | 3022   |
| 46  | Oil window     | 1   | A12      | 68  | Half nut house | 2   | M6×25  |
| 47  | Screw          | 2   | M5×33    | 69  | Screw          | 2   | M5×35  |
| 48  | Washer         | 3   | Ø6       | 70  | half nut       | 1   | 4002   |
| 49  | Screw          | 1   | M6×10    | 71  | Screw          | 1   | 4003A1 |
| 50  | Screw          | 1   | M6×6     | 72  | Screw          | 2   | M6×15  |
| 51  | Limit block    | 1   | 4043     | 73  | Nut            | 2   | M6     |
| 52  | Safety shifter | 2   | 4025     | 74  | Thread dial    | 1   | 4006   |
| 53  | Shaft          | 1   | 4024     | 75  | Housing        | 1   | 4005   |
| 54  | Screw          | 1   | M8×8     | 76  | Screw          | 1   | M6×65  |
| 55  | Boss           | 1   | 4045     | 77  | Gear           | 1   | 4044   |
| 56  | Pin            | 1   | 5×40     | 78  | Screw          | 1   | M6×15  |
| 57  | Cam            | 1   | 4021     |     |                |     |        |
| 58  | Screw          | 1   | M5×12    |     |                |     |        |
| 59  | Shaft          | 1   | 4023     |     |                |     |        |
| 60  | Screw          | 1   | M8×30    |     |                |     |        |
| 61  | Washer         | 2   | Ø8       |     |                |     |        |
| 62  | Screw          | 2   | M10×1×20 |     |                |     |        |
| 63  | Washer         | 1   | Ø10      |     |                |     |        |
| 64  | Lever          | 1   | 4007     |     |                |     |        |
| 65  | Lever          | 1   | 4044     |     |                |     |        |
| 66  | Pin            | 2   | 5×10     |     |                |     |        |



## OWNER'S MANUAL

| COMPOUND REST |             |     |           |     |             |     |        |
|---------------|-------------|-----|-----------|-----|-------------|-----|--------|
| NO.           | NAME        | QTY | NOTE      | NO. | NAME        | QTY | NOTE   |
| 1             | Handle      | 1   | 5010      | 23  | Key         | 1   | 4×8    |
| 2             | Boss        | 1   | 5009      | 24  | Bearing     | 1   | 8101   |
| 3             | Collar      | 1   | 5008      | 25  | Scale       | 1   | 5026A2 |
| 4             | Screw       | 8   | M10×45    | 26  | Rivet       | 2   | 2×4    |
| 5             | Tool post   | 1   | 5005      | 27  | Screw       | 2   | M6×25  |
| 6             | Shaft       | 1   | 5006      | 28  | Bracket     | 1   | 5013   |
| 7             | Nut         | 1   | 5003      | 29  | Bearing     | 1   | 8101   |
| 8             | Pin         | 1   | 5004      | 30  | Index ring  | 1   | 5014A3 |
| 9             | Spring      | 1   | 1.2×4.8×8 | 31  | Hand wheel  | 1   | 5016A  |
| 10            | Oil cup     | 1   |           | 32  | Washer      | 1   | 5028   |
| 11            | Nut         | 1   | M6        | 33  | Screw       | 1   | M6×12  |
| 12            | Screw       | 1   | M6×16     | 34  | Lever       | 2   | 5031   |
| 13            | Compound    | 1   | 5001      | 35  | Leaf spring | 1   | 4037   |
| 14            | Screw       | 2   | 5107      | 21A | Nut         | 1   | 5012   |
| 15            | Nut         | 2   | M10       | 22A | Guide screw | 1   | 5011   |
| 16            | Compound    | 1   | 5002      | 30A | Index ring  | 1   | 5014   |
| 17            | Pin         | 1   | 5024      | 31A | Washer      | 1   | 5016   |
| 18            | Screw       | 1   | M6×8      | 32A | Nut         | 1   | 5025   |
| 19            | Gib         | 1   | 5023      | 33A | Screw       | 1   | M6×8   |
| 20            | Screw       | 2   | 5021      | 34A | Lever       | 1   | M8×63  |
| 21            | Nut         | 1   | 5012A1    | 36  | Bracket     | 1   | 5120   |
| 22            | Guide screw | 1   | 5011A3    | 37  | Pin         | 1   | 3×16   |

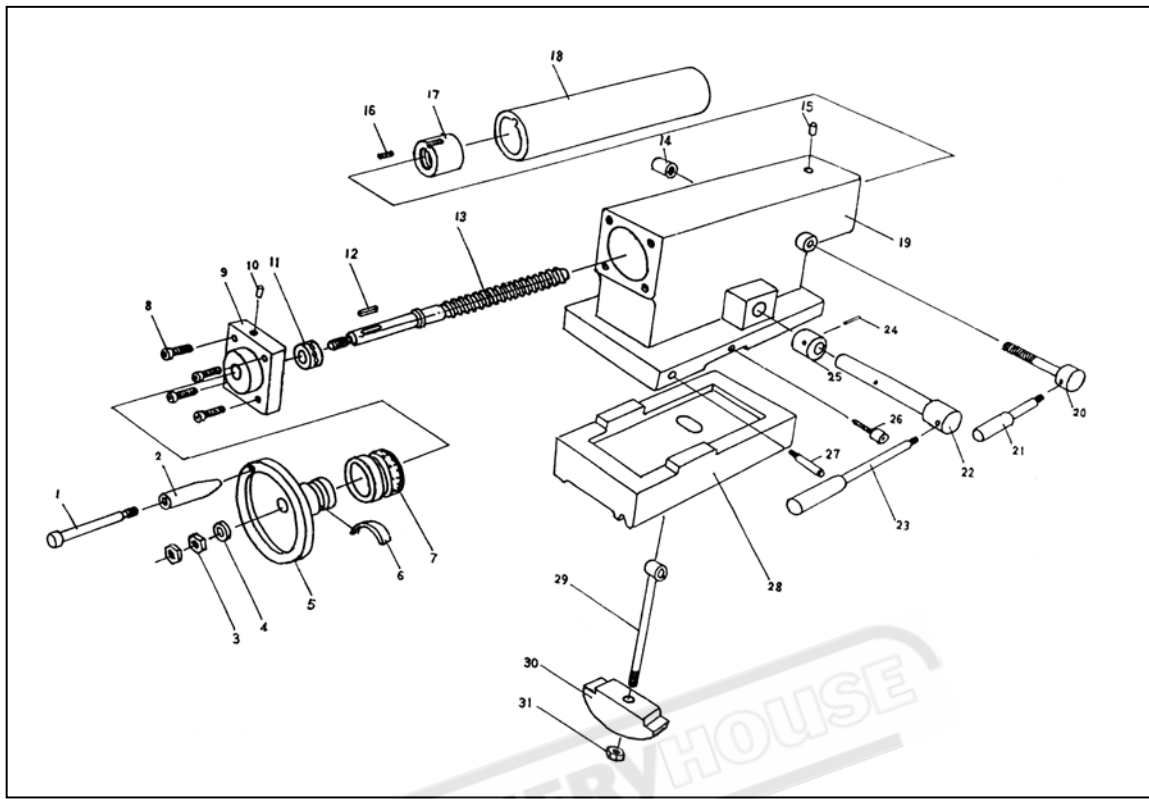
## SADDLE



## OWNER'S MANUAL

| <b>SADDLE</b> |             |     |        |     |             |     |        |
|---------------|-------------|-----|--------|-----|-------------|-----|--------|
| NO.           | NAME        | QTY | NOTE   | NO. | NAME        | QTY | NOTE   |
| 1             | Saddle      | 1   | 5101   | 28  | Press plate | 1   | 5131   |
| 2             | Screw       | 8   | M5×132 | 29  | Press plate | 2   | 5116   |
| 3             | Wipper      | 1   | 5108   | 30  | Key         | 1   | 5×20   |
| 4             | Cover       | 1   | 5106   | 31  | Press plate | 1   | 5129   |
| 5             | Screw       | 1   | M3×8   | 32  | Pin         | 1   | 3×20   |
| 6             | Press plate | 2   | 5130   | 33  | Index ring  | 1   | 5124A3 |
| 7             | Press plate | 2   | 5110   | 34  | Leaf spring | 1   | 4037   |
| 8             | Wipper      | 2   | 5109   | 35  | Hand wheel  | 1   | 5122A  |
| 9             | Screw       | 1   | 5113   | 36  | Washer      | 1   | 5028   |
| 10            | Screw       | 1   | 5128   | 37  | Screw       | 1   | M6×16  |
| 11            | Pin         | 2   | 6×45   | 38  | Hand        | 1   | 4033   |
| 12            | Screw       | 4   | M10×30 | 39  | Lever       | 1   | 4032   |
| 13            | Oil cup     | 5   |        | 40  | Bearing     | 1   | 8102   |
| 14            | Screw       | 2   | 5115   | 41  | Bracket     | 1   | 5125A  |
| 15            | Tool post   | 1   | 5102   | 42  | Screw       | 2   | M8×30  |
| 16            | Screw       | 1   | M6×12  | 43  | Washer      | 1   | 5126   |
| 17            | Bushing     | 1   | 5105   | 44  | Guide screw | 1   | 5103A3 |
| 18            | Gib         | 1   | 5114   | 35A | Collar      | 1   | 5122   |
| 19            | Screw       | 2   | M4×12  | 36A | Nut         | 1   | 5121   |
| 20            | Nut         | 1   | 5104A2 | 37A | Screw       | 1   | M6×6   |
| 21            | Gear        | 1   | 5127   | 41A | Bracket     | 1   | 5125A  |
| 22            | Screw       | 1   | M6×8   | 44A | Guide screw | 1   | 5103A2 |
| 23            | Screw       | 7   | M8×25  | 45  | Rivet       | 2   | 2×4    |
| 24            | Nut         | 4   | M8     | 46  | Scale       | 1   | 5133A2 |
| 25            | Screw       | 4   | M8×25  | 47  | Bracket     | 1   | 5120   |
| 26            | Press plate | 2   | 5112   | 48  | Pin         | 1   | 4×20   |
| 27            | Wipper      | 1   | 5111   |     |             |     |        |

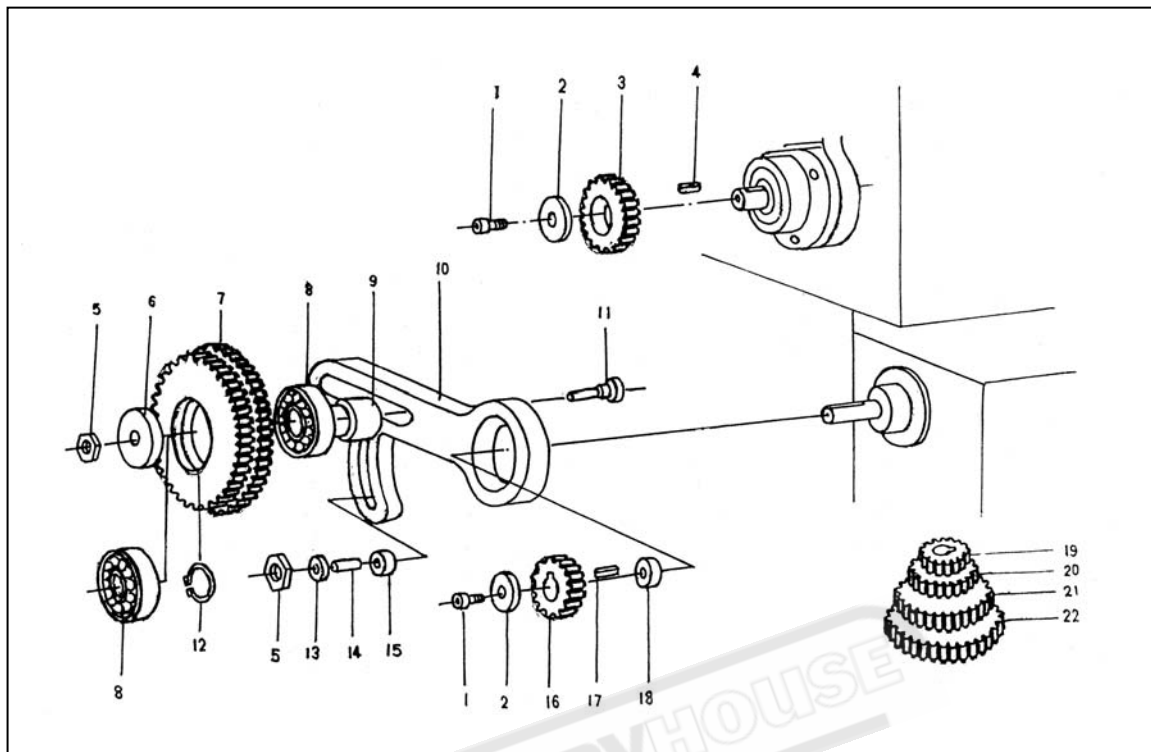
## TAIL STOCK



### TAILSTOCK

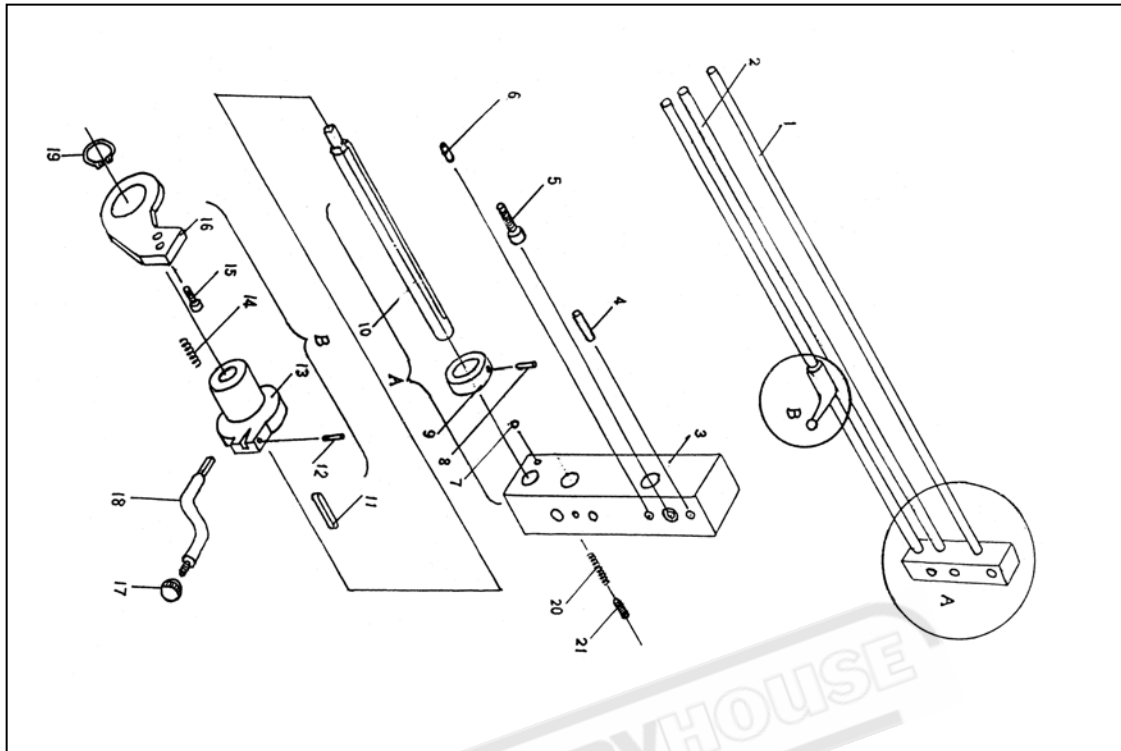
| NO. | NAME        | QTY | NOTE  | NO. | NAME            | QTY | NOTE   |
|-----|-------------|-----|-------|-----|-----------------|-----|--------|
| 1   | Handle      | 1   | 4033  | 17  | Nut             | 1   | 6012   |
| 2   | Lever       | 1   | 4032  | 18  | Quill           | 1   | 6013   |
| 3   | Nut         | 2   | M10   | 19  | Tail stock      | 1   | 6001   |
| 4   | Washer      | 1   | A10   | 20  | Lock screw      | 1   | 6022   |
| 5   | Hand wheel  | 1   | 6005  | 21  | Handle          | 1   | 6021   |
| 6   | Leaf spring | 1   | 4037  | 22  | Shaft           | 1   | 6017   |
| 7   | Index ring  | 2   | 6010  | 23  | Handle          | 1   | 6004   |
| 8   | Screw       | 4   | M6×16 | 24  | Pin             | 1   | 5×30   |
| 9   | Bracket     | 1   | 6011  | 25  | Collar          | 1   | 6018   |
| 10  | Oil cup     | 1   |       | 26  | Screw           | 1   | M10×50 |
| 11  | Bearing     | 1   |       | 27  | Screw           | 1   | 6003   |
| 12  | Key         | 1   | 4×15  | 28  | Base            | 1   | 6002   |
| 13  | Guide screw | 1   | 6006  | 29  | Shaft           | 1   | 6019   |
| 14  | Lock nut    | 1   | 6023  | 30  | Base shoe black | 1   | 6020   |
| 15  | Oil cup     | 1   |       | 31  | Nut             | 1   | M12    |
| 16  | Screw       | 2   | M6×8  |     |                 |     |        |

## CHANGE GEAR



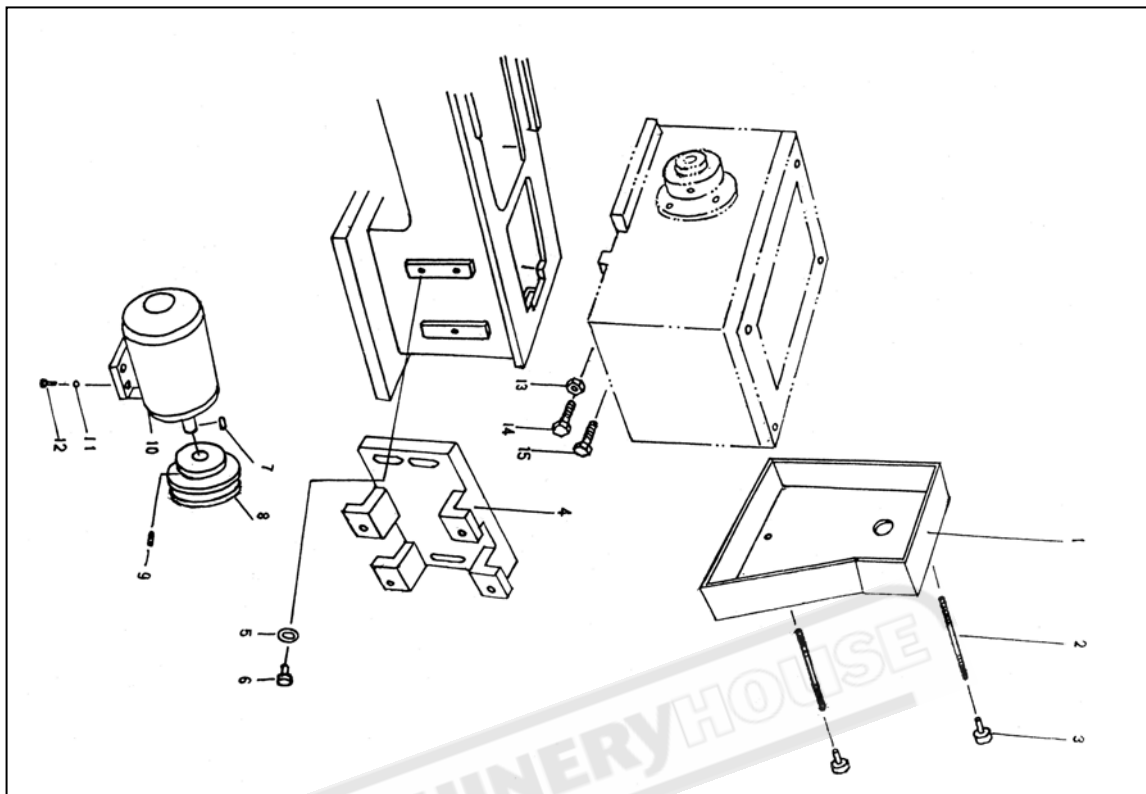
| CHANGE GEAR |          |     |       |     |             |     |        |
|-------------|----------|-----|-------|-----|-------------|-----|--------|
| NO.         | NAME     | QTY | NOTE  | NO. | NAME        | QTY | NOTE   |
| 1           | Screw    | 2   | M6×12 | 12  | Circlip     | 1   |        |
| 2           | Washer   | 2   | 2003  | 13  | Washer      | 1   |        |
| 3           | Gear     | 1   | 2002C | 14  | Screw       | 1   | M10×45 |
| 4           | Key      | 1   | C5×8  | 15  | Washer      | 1   | 3037A  |
| 5           | Nut      | 2   | M10   | 16  | Gear        | 1   | 3039C  |
| 6           | Washer   | 1   | 3035  | 17  | Key         | 1   | 5×18   |
| 7           | Gear     | 1   | 3038C | 18  | Washer      | 1   | 3034B  |
| 8           | Bearing  | 1   |       | 19  | Change gear | 1   | 3076C  |
| 9           | Collar   | 1   | 3033  | 20  | Change gear | 1   | 3075C  |
| 10          | Quadrant | 1   | 3043B | 21  | Change gear | 1   | 3077C  |
| 11          | Screw    | 1   | 3034  | 22  | Change gear | 1   | 3078C  |

## CONTROL SWITCH ASSEMBLY



| CONTROL SWITCH ASSEMBLY |             |     |       |     |             |     |          |
|-------------------------|-------------|-----|-------|-----|-------------|-----|----------|
| NO.                     | NAME        | QTY | NOTE  | NO. | NAME        | QTY | NOTE     |
| 1                       | Guide screw | 1   | 1005B | 12  | Pin         | 1   | 4×20     |
| 2                       | Rod         | 1   | 1006B | 13  | Bracket     | 1   | 1014B    |
| 3                       | Bracket     | 1   | 1012  | 14  | Spring      | 1   | 1.2×8.10 |
| 4                       | Pin         | 2   | 6×65  | 15  | Screw       | 2   | M6×15    |
| 5                       | Screw       | 2   | M8×60 | 16  | Bracket     | 1   | 1015B    |
| 6                       | Oil cup     | 2   |       | 17  | Handle ball | 1   | M10×32   |
| 7                       | Ball        | 1   |       | 18  | Handle      | 1   | 1016     |
| 8                       | Pin         | 1   | 4×20  | 19  | Circlip     | 1   |          |
| 9                       | Bushing     | 1   | 1035B | 20  | Spring      | 1   | 1×5×30   |
| 10                      | Feed rod    | 1   | 1010  | 21  | Screw       | 1   | M8×10    |
| 11                      | Key         | 1   |       |     |             |     |          |

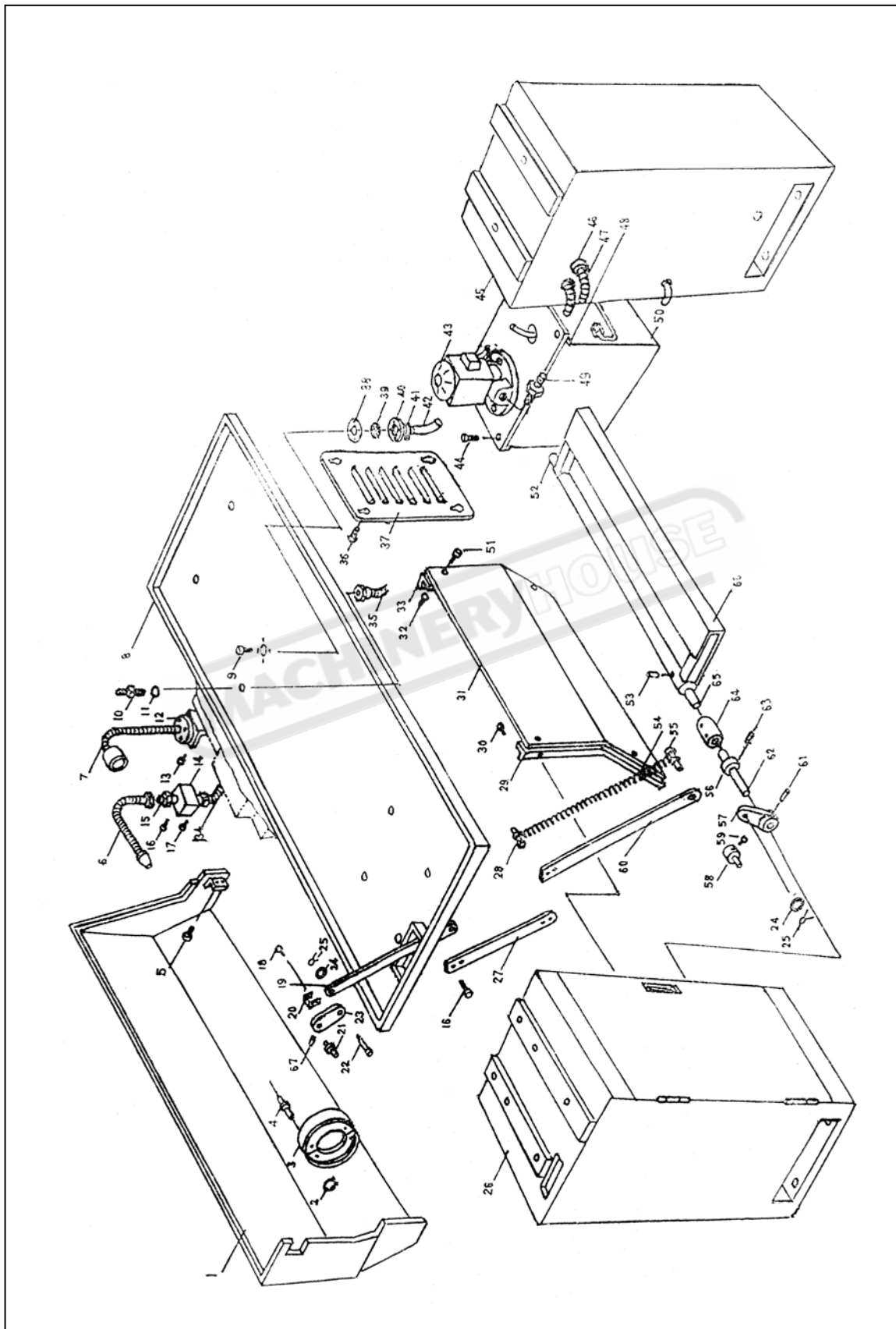
## BED AND DRIVE ASSEMBLY



### BED AND DRIVE ASSEMBLY

| NO. | NAME    | QTY | NOTE   | NO. | NAME   | QTY | NOTE  |
|-----|---------|-----|--------|-----|--------|-----|-------|
| 1   | Cover   | 1   | 1021   | 9   | Screw  | 1   | M6×8  |
| 2   | Screw   | 2   | 1002   | 10  | Motor  | 1   |       |
| 3   | Nut     | 2   | 1001   | 11  | Spacer | 4   | Ø8    |
| 4   | Trestle | 1   | 1024   | 12  | Screw  | 4   |       |
| 5   | Washer  | 3   | 1013   | 13  | Nut    | 2   | M6    |
| 6   | Screw   | 3   |        | 14  | Screw  | 2   | M8×45 |
| 7   | Key     | 1   | 8×40   | 15  | Screw  | 2   | M8×30 |
| 8   | Pulley  | 1   | 1003A5 |     |        |     |       |

## SPECIAL ACCESSORIES



## OWNER'S MANUAL

| SPECIAL ACCESSORIES--BASE PART |              |     |       |     |               |     |       |
|--------------------------------|--------------|-----|-------|-----|---------------|-----|-------|
| NO.                            | NAME         | QTY | NOTE  | NO. | NAME          | QTY | NOTE  |
| 1                              | Chip guard   | 1   | 1023  | 31  | Back plate    | 1   | 8601  |
| 5                              | Screw        | 4   | M6×16 | 32  | Nut           | 4   | M6    |
| 8                              | Oil pan      | 1   | 1022  | 33  | Right bracket | 1   | 8603  |
| 26                             | Left cabinet | 1   | 8400  | 45  | Right cabinet | 1   | 8500  |
| 29                             | Left bracket | 1   | 8602  | 51  | Screw         | 4   | M6×16 |
| 30                             | Screw        | 4   | M6×16 |     |               |     |       |

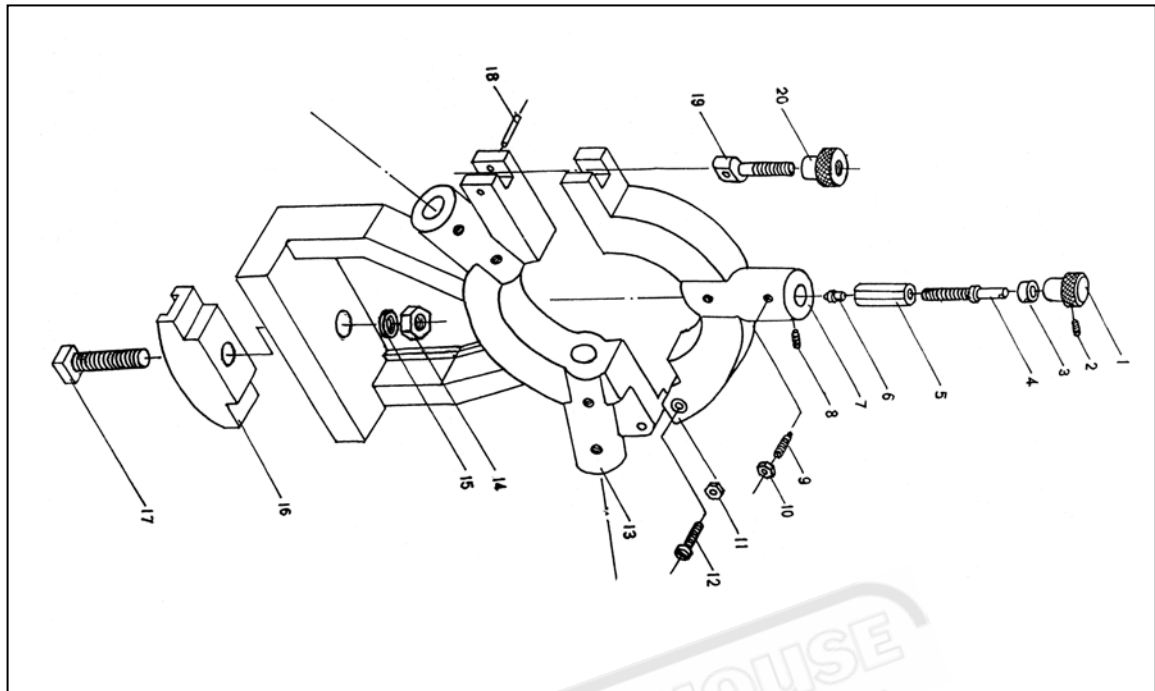
| SPECIAL ACCESSORIES--BRAKE PART |              |     |        |     |                   |     |        |
|---------------------------------|--------------|-----|--------|-----|-------------------|-----|--------|
| NO.                             | NAME         | QTY | NOTE   | NO. | NAME              | QTY | NOTE   |
| 2                               | Open circlip | 1   |        | 53  | Spring pin        | 1   | 5×25   |
| 3                               | Brake block  | 1   |        | 54  | Spring            | 1   | 1048   |
| 4                               | Shaft        | 1   | 1040   | 55  | Shaft             | 1   | 1047   |
| 16                              | Screw        | 2   | M6×12  | 56  | Circlip           | 1   | 20     |
| 18                              | Screw        | 1   | M4×10  | 57  | Shifter           | 1   | 1045   |
| 19                              | Draw rod     | 1   | 1043   | 58  | Shaft             | 1   | 1052   |
| 20                              | Bracket      | 1   | 1053   | 59  | Screw             | 1   | M6×30  |
| 21                              | Pivot        | 1   | 1042   | 60  | Draw rod          | 1   | 1054   |
| 22                              | Pin          | 1   | 8×20   | 61  | Spring pin        | 1   | 5×40   |
| 23                              | Shifter      | 1   | 1041   | 62  | Shaft             | 1   | 1049-1 |
| 24                              | Washer       | 2   |        | 63  | Screw             | 1   | M6×12  |
| 25                              | Open clip    | 2   | 2.5×16 | 64  | Connecting sleeve | 1   | 1049-3 |
| 27                              | Draw rod     | 1   | 1044   | 65  | Shaft             | 1   | 1049-2 |
| 28                              | Screw        | 1   | M10×30 | 66  | Paddle            | 1   | 1050   |
| 52                              | Shaft        | 1   | 1051   | 67  | Spring pin        | 1   | 4×25   |

## OWNER'S MANUAL

| <b>SPECIAL ACCESSORIES--COOLING PART</b> |                 |     |                  |     |             |     |         |
|------------------------------------------|-----------------|-----|------------------|-----|-------------|-----|---------|
| NO.                                      | NAME            | QTY | NOTE             | NO. | NAME        | QTY | NOTE    |
| 6                                        | Coolant pipe    | 1   |                  | 39  | Filter      | 1   | 9203    |
| 9                                        | Screw           | 4   | M5×12            | 40  | Pipe        | 1   | 9204    |
| 10                                       | Pipe connecting | 1   | 9206             | 41  | Hooping     | 1   |         |
| 11                                       | Washer          | 1   | 9207             | 42  | Pine        | 1   | 16×1000 |
| 14                                       | Bracket         | 1   | 9208             | 43  | Coolant     | 1   |         |
| 15                                       | Shaft           | 1   | X6121-06011<br>A | 44  | Screw       | 4   | M5×10   |
| 17                                       | Screw           | 2   | M8×35            | 46  | Pipe        | 1   | M16×15  |
| 34                                       | Coolant pipe    | 1   |                  | 47  | Metal pipe  | 1   | 8×1800  |
| 35                                       | Coolant pipe    | 1   |                  | 48  | Cover       | 1   | 9210    |
| 36                                       | Screw           | 4   | M6×12            | 49  | Pipe        | 1   | 9206    |
| 37                                       | Cover           | 1   | 9201A            | 50  | Coolant box | 1   | 9209    |
| 38                                       | Papet lining    | 1   | 9205             |     |             |     |         |

| <b>SPECIAL ACCESSORIES--LIGHTING PART</b> |              |     |      |     |       |     |       |
|-------------------------------------------|--------------|-----|------|-----|-------|-----|-------|
| NO.                                       | NAME         | QTY | NOTE | NO. | NAME  | QTY | NOTE  |
| 7                                         | Working lamp | 1   |      | 13  | Screw | 2   | M5×12 |
| 12                                        | Bracket      | 1   | 7015 |     |       |     |       |

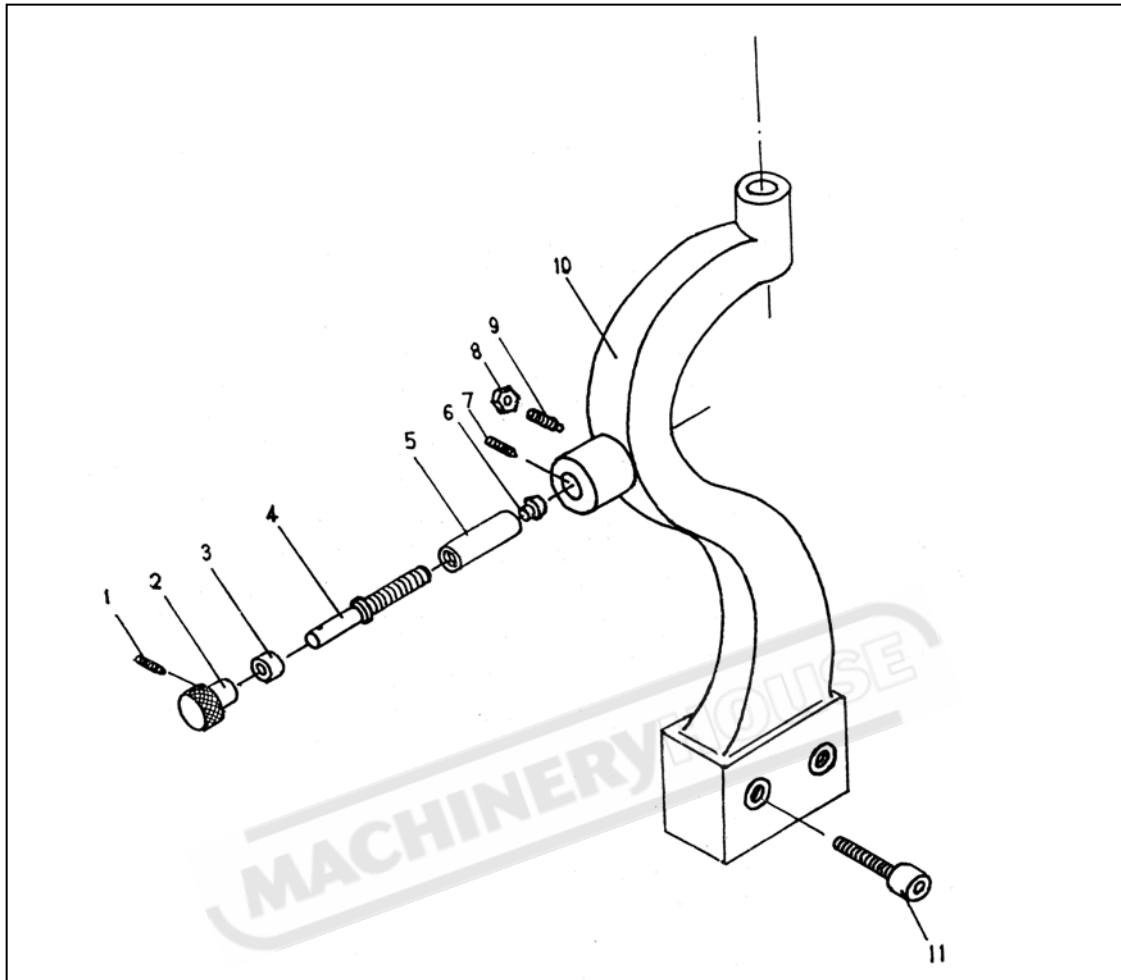
## STEADY REST



### STEADY REST

| NO. | NAME            | QTY | NOTE  | NO. | NAME              | QTY | NOTE   |
|-----|-----------------|-----|-------|-----|-------------------|-----|--------|
| 1   | Knob            | 3   | 8205  | 11  | Hex screw nut     | 1   | M6     |
| 2   | Screw           | 3   | M6×8  | 12  | Screw             | 1   | M6×25  |
| 3   | Collar          | 3   | 8207  | 13  | Base body         | 1   | 8201   |
| 4   | Pressing lever  | 3   | 8206  | 14  | Hex screw nut     | 1   | M12    |
| 5   | Pressing collar | 3   | 8208  | 15  | Washer            | 1   | 12     |
| 6   | Pressing base   | 3   | 8209  | 16  | Pressing plate    | 1   | 6020   |
| 7   | Upper body      | 1   | 8202  | 17  | Square ad bolt    | 1   | M12×60 |
| 8   | Screw           | 3   | M6×10 | 18  | Spring pin        | 1   | 4×25   |
| 9   | Screw           | 3   | M6×16 | 19  | Locking lever     | 1   | 8203   |
| 10  | Hex screw nut   | 3   | M6    | 20  | Locking screw nut | 1   | 8204   |

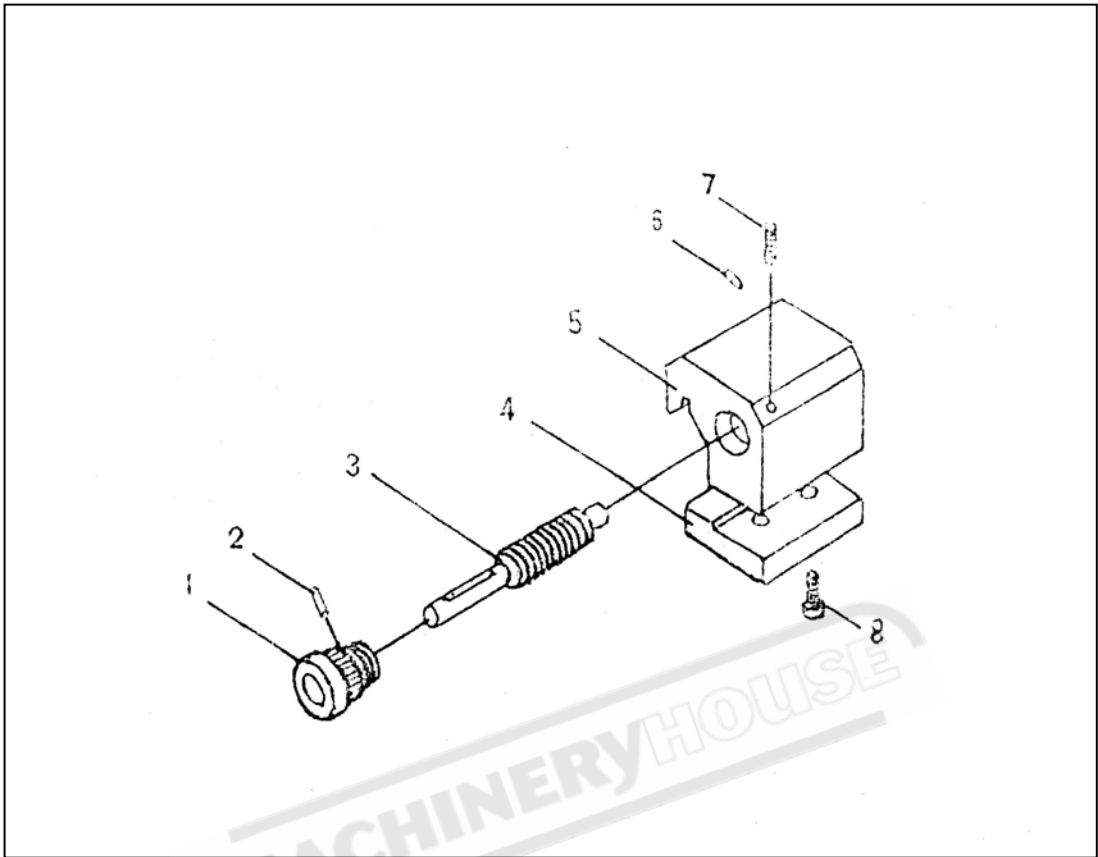
## FOLLOW REST



### FOLLOW REST

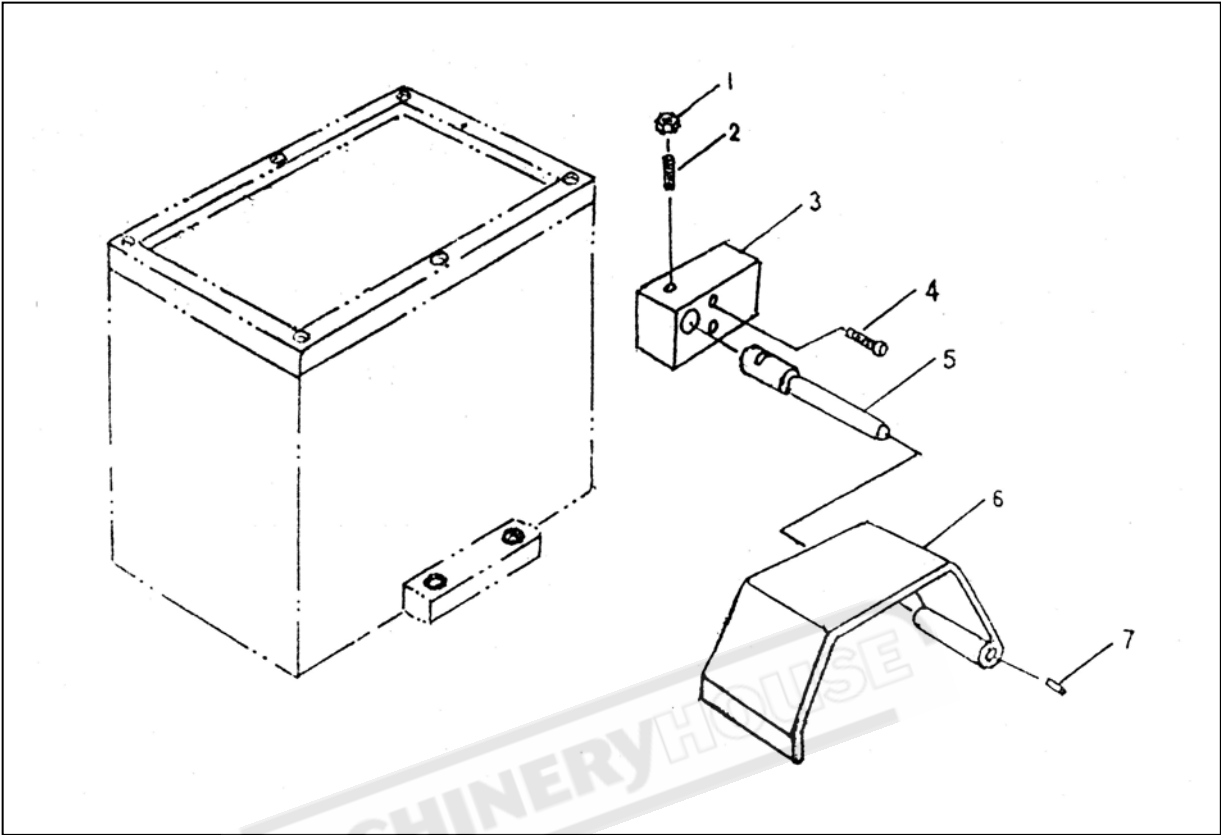
| NO. | NAME            | QTY | NOTE | NO. | NAME          | QTY | NOTE  |
|-----|-----------------|-----|------|-----|---------------|-----|-------|
| 1   | Screw           | 2   | M6×6 | 7   | Screw         | 2   | M6×10 |
| 2   | Knob            | 2   | 8205 | 8   | Hex screw nut | 2   | M6    |
| 3   | Collar          | 2   | 8207 | 9   | Screw         | 2   | M6×16 |
| 4   | Pressing lever  | 2   | 8206 | 10  | Body          | 1   | 8201  |
| 5   | Pressing collar | 2   | 8208 | 11  | Bolt          | 2   | M8×40 |
| 6   | Pressing base   | 2   | 8209 |     |               |     |       |

POSITION DEVICE



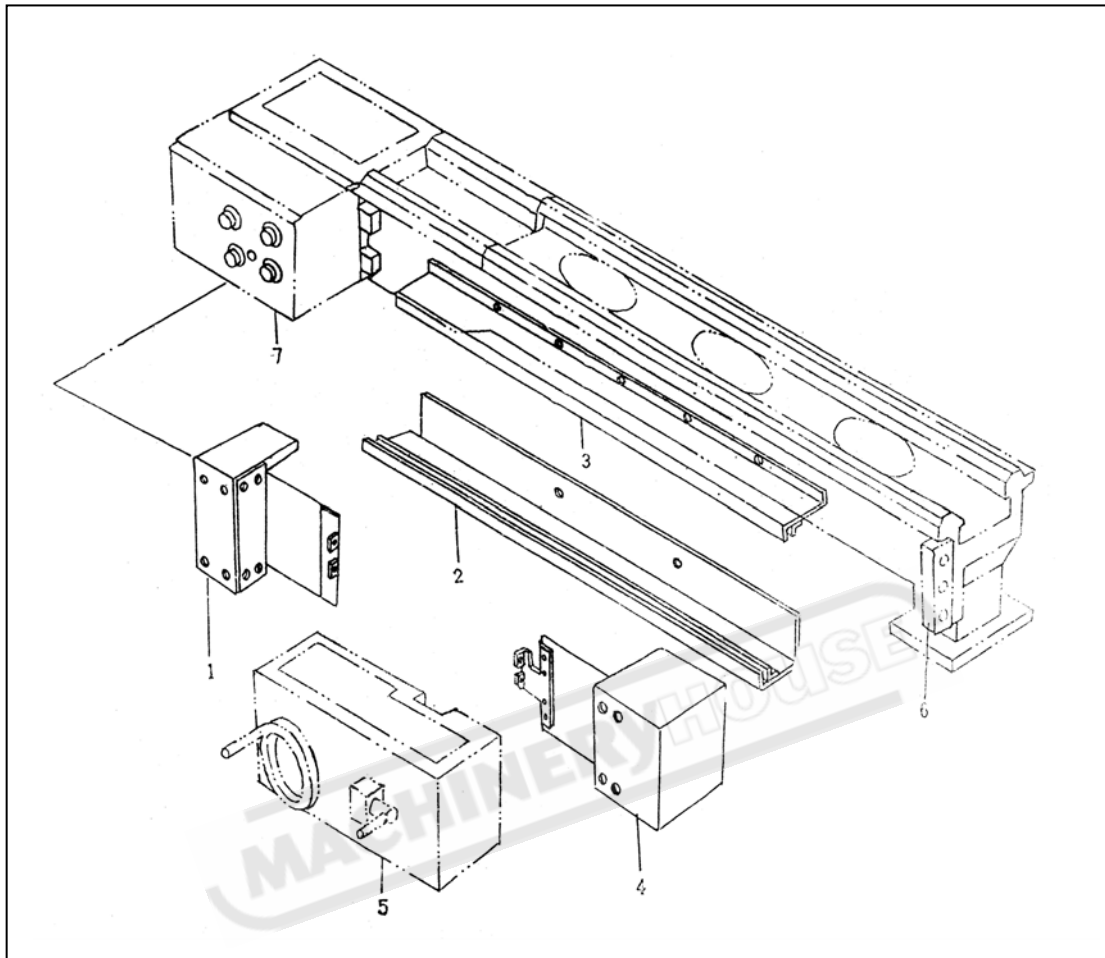
| POSITIONING DEVICE |                |     |      |     |          |     |       |
|--------------------|----------------|-----|------|-----|----------|-----|-------|
| NO.                | NAME           | QTY | NOTE | NO. | NAME     | QTY | NOTE  |
| 1                  | Knob           | 1   | 8705 | 5   | Body     | 1   | 8703  |
| 2                  | Pin            | 1   | M3×6 | 6   | Indictor | 1   | 8707  |
| 3                  | Guide screw    | 1   | 8706 | 7   | Screw    | 1   | M6×10 |
| 4                  | Pressing plate | 1   | 8704 | 8   | Screw    | 2   | M6×12 |

PROTECTING COVER



| PROTECTING COVER |            |     |        |     |                  |     |        |
|------------------|------------|-----|--------|-----|------------------|-----|--------|
| NO.              | NAME       | QTY | NOTE   | NO. | NAME             | QTY | NOTE   |
| 1                | Nut        | 1   | M6     | 5   | Shaft            | 1   | 8902   |
| 2                | Screw      | 1   | M6 ×16 | 6   | Protecting cover | 1   | 8903   |
| 3                | Switch box | 1   | 8901   | 7   | Pin              | 1   | M4 ×12 |
| 4                | Screw      | 2   | M6× 45 |     |                  |     |        |

## GUARD



| GUARD |            |     |      |     |          |     |      |
|-------|------------|-----|------|-----|----------|-----|------|
| NO.   | NAME       | QTY | NOTE | NO. | NAME     | QTY | NOTE |
| 1     | Left box   | 1   | 1120 | 5   | Apron    | 1   | 4000 |
| 2     | Down board | 1   | 1118 | 6   | Bracket  | 1   | 1012 |
| 3     | Up board   | 1   | 1117 | 7   | Gear Box | 1   | 3000 |
| 4     | Right box  | 1   | 1110 |     |          |     |      |