

HAFCO METALMASTER

LATHE

OPERATION MANUAL



Models

CL-560 x 1500, CL-560 x 2000

Order Code L610D Order Code L611D

Edition No : LM5601

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OPERATION MANUAL

MACHINE DETAILS

MACHINE

METAL CUTTING LATHE

MODEL NO.

SERIAL NO.

DATE OF MANF.

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NOTE:

This manual is only for your reference. Owing to the continuous improvement of the HAFCO 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 any 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.1-1)

HAFCO
PRODUCT SPECIFICATION

MODEL:

CAPACITY:

SER. NO.:

MFG DATE:

WEIGHT:

VOLTS:

MOTOR Kw:

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Made in China

Fig.1-1



OPERATION MANUAL

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1.1. SPECIFICATIONS

Order Code	L610D	L611D
Model	CL-560	
Swing Over Bed	560mm	560mm
Swing Over Cross Slide	355mm	355mm
Swing In Gap (dia)	785mm	785mm
Distance Between Centers	1500mm	2000mm
Centre Height	280mm	280mm
Bed Width	350mm	350mm
Spindle Bore	105mm	105mm
Spindle Nose Size or Type	D1-8 Camlock	D1-8 Camlock
Spindle Steps / Speed Range	12 (20 - 1600rpm)	12 (20 - 1600rpm)
Headstock Spindle Taper	7MT	7MT
Tailstock Taper	5MT	5MT
Toolholder Size	25mm	25mm
Cross Slide Travel	316mm	316mm
Compound Slide Travel	130mm	130mm
Leadscrew	Metric	Metric
Cross Feed Range (X-Axis)	0.020 - 0.573mm/rev	0.020 - 0.573mm/rev
Longitudinal Feed Range (Z-Axis)	0.59 - 1.646mm/rev	0.59 - 1.646mm/rev
Metric Thread Steps & Pitch Range	47 (0.2 - 14mm)	47 (0.2 - 14mm)
Diametrical Pitches	50 (4-112D.P.)	50 (4-112D.P.)
Module Pitches	39 (0.1-7M.P.0)	39 (0.1-7M.P.0)
Imperial Thread Steps & TPI Range	60 (2 - 112tpi)	60 (2 - 112tpi)
Spindle Motor Power	7.5kW / 10hp	7.5kW / 10hp
Coolant Pump Motor Power	0.1kW(1/8HP)	0.1kW(1/8HP)
Voltage	415Volts	415Volts
Weight	2700kgs	3000kgs
Machine Foot Print LxWxH):cm	290 x 119 x 175	340 x 119 x 175
Taper Turning Attachment	Fitted	Fitted

1.2 IDENTIFICATION

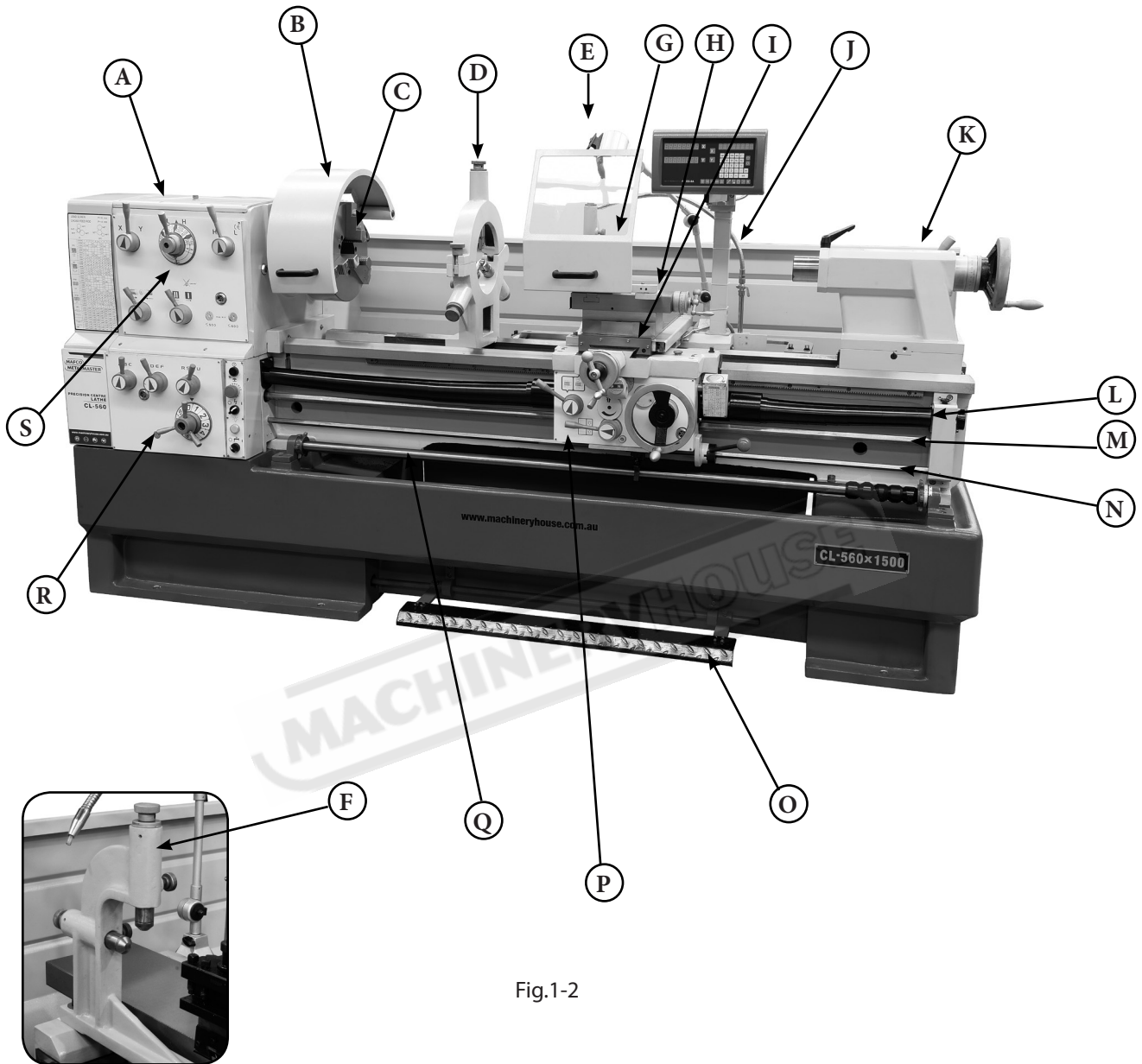


Fig.1-2

- | | |
|------------------|------------------------------|
| A. Headstock | K. Tailstock |
| B. Chuck Guard | L. Longitudinal Leadscrew |
| C. 3-Jaw Chuck | M. Feed Rod |
| D. Steady Rest | N. Control Rod |
| E. LED Work Lamp | O. Foot Brake |
| F. Follow Rest | P. Carriage |
| G. Tool Post | Q. Eccentric Stop Ring Shaft |
| H. Compound Rest | R. Quick-Change Gearbox |
| I. Cross Slide | S. Headstock Controls |
| J. Coolant Hose | |

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1.3 INCLUDED ACCESSORIES

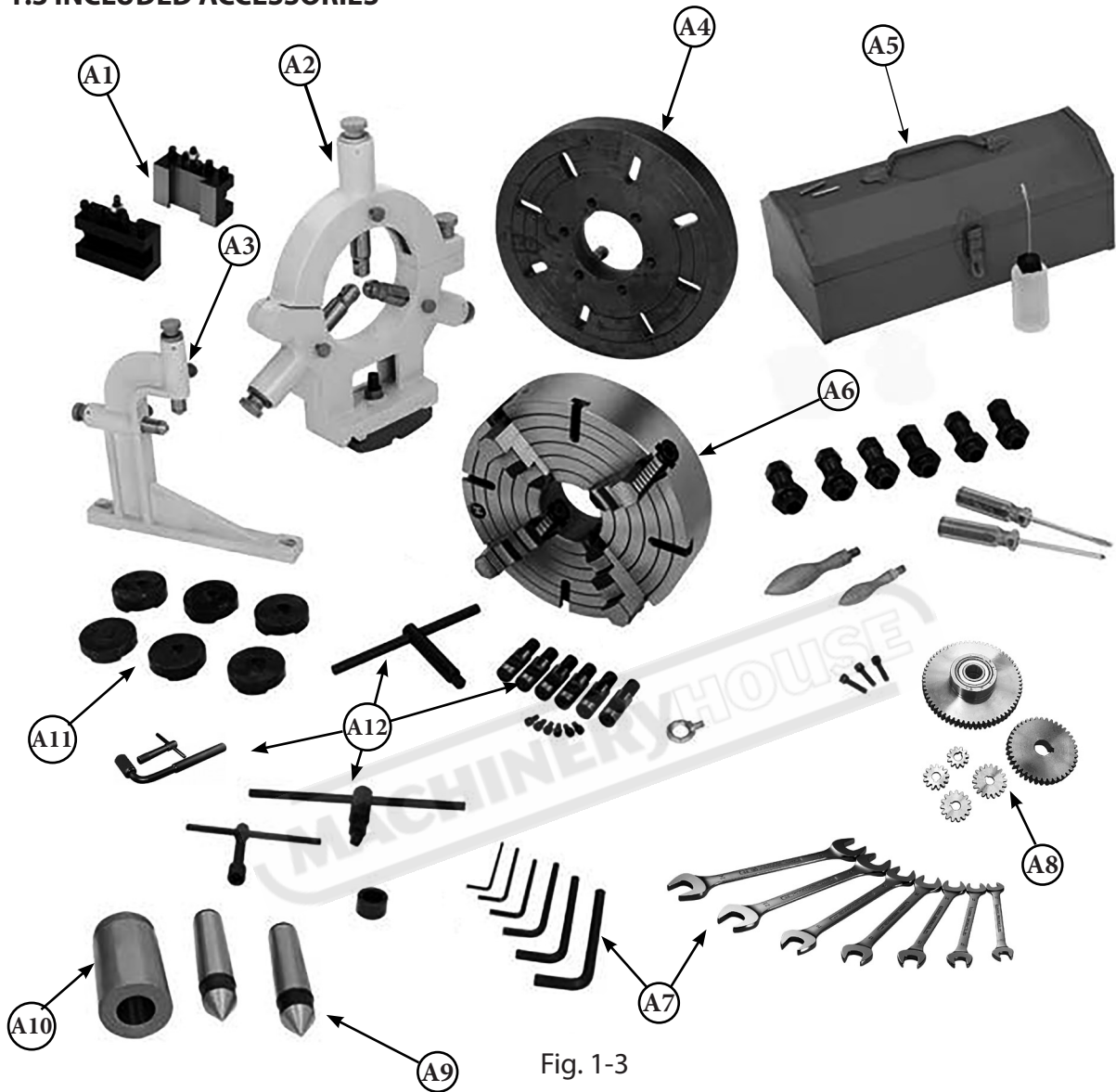


Fig. 1-3

A1	Toolholders	A7	Spanners and Hex Keys
A2	Fixed Steady	A8	Gears 64T and 40T
A3	Follow Steady	A9	2 x 5MT Centers
A4	Faceplate	A10	7 x 5MT Sleeve
A5	Toolbox	A11	Cast Iron Mounting Pads
A6	4 Jaw Independent Chuck	A12	Chuck Keys and Camlocks

OPERATION MANUAL

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, of the application of the 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 jewelery 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 startup or contact with live electrical equipment

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

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.

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.

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 faceplate before starting the lathe.

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. 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.

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

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

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.

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

2.2 CHUCK SAFETY INFORMATION



WARNING

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.

ENTANGLEMENT. Entanglement with a rotating chuck can lead to death, amputation or serious injury. Always roll-up sleeves, tie back long hair and remove jewelry or loose clothing 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.

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.

OPERATION MANUAL

3. SETUP

3.1 CLEAN - UP

The unpainted surfaces of the machine have been coated with a waxy oil to protect them from corrosion during shipment. Remove the protective coating with a solvent cleaner or a citrus based degreaser.

Optimum performance from your machine will be achieved when you clean all moving parts or sliding contact surfaces that are coated with rust prevented products.

Hafco advise to avoid chlorine based solvents, such as acetone or brake parts cleaner, as they will damage painted surfaces and strip metal should they come in contact. Always follow the manufacturer's instructions when using any type of cleaning product.

3.2 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. See dimensions for foundation bolts in Figures 3-3.

OPTIONS FOR MOUNTING

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. 3-1)

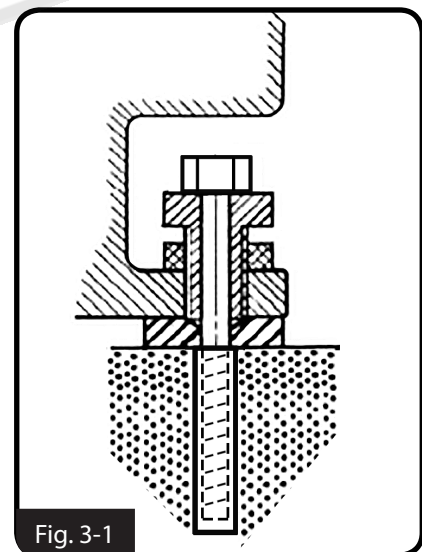


Fig. 3-1

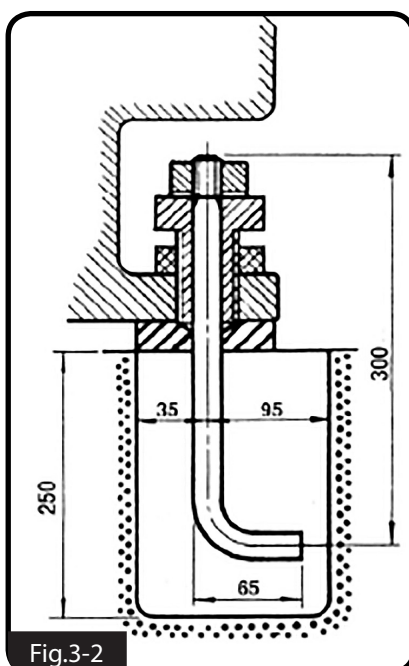


Fig.3-2

In some case a suitable foundation may not be available and a new one may need to be prepared.

The foundation should be concrete approximately 200mm thick with pockets left clear for the hold down bolts.. The hold down bolts can be "L" shape as per the example in Fig. 3-2

OPERATION MANUAL

3.3 FOUNDATION PLAN

	A	B	C	D
CL-560 1500mm Between Centres (mm)	2105	1746	2816	3418
CL-560 2000mm Between Centres (mm)	2605	2246	3316	3918

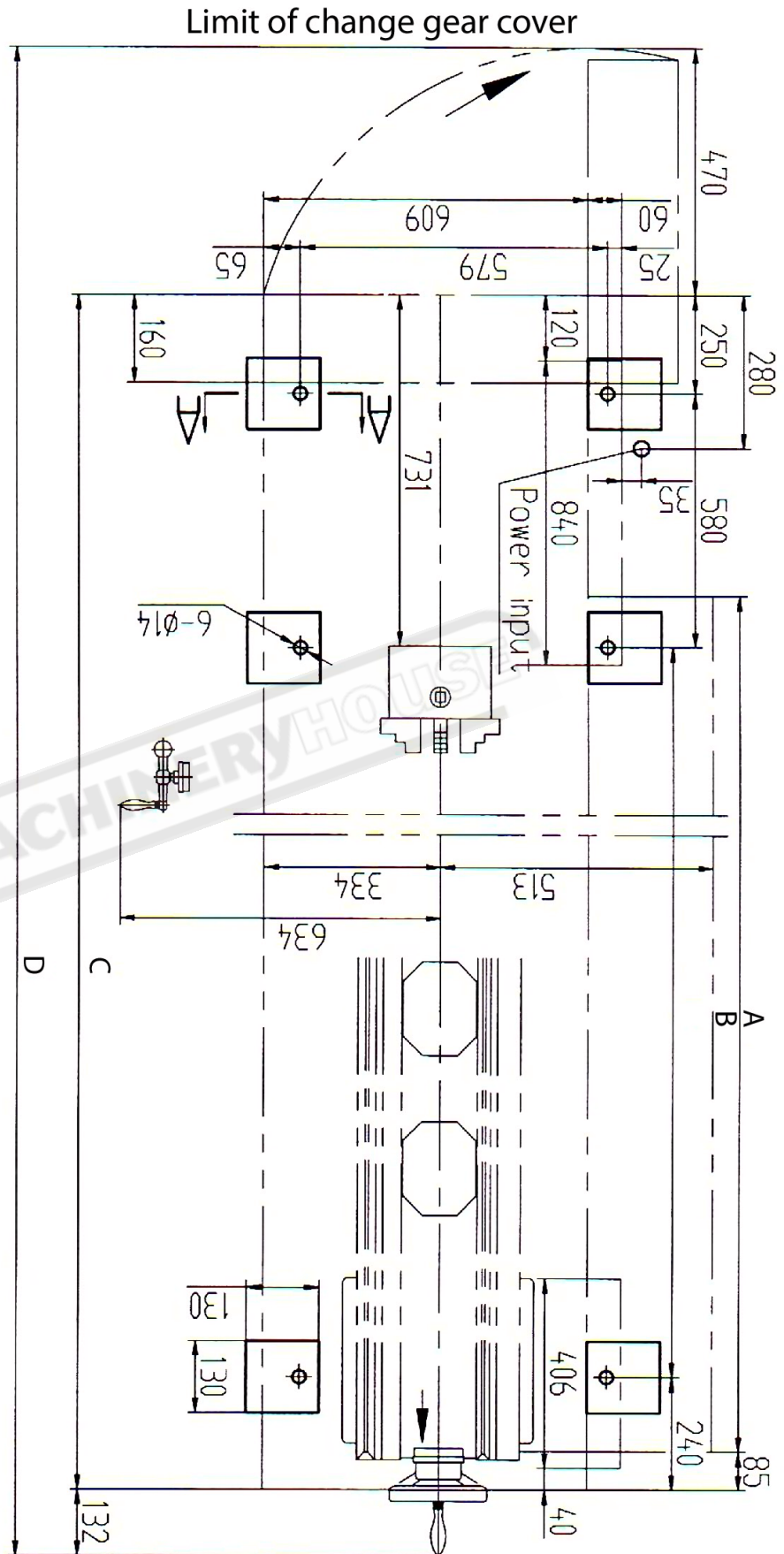


Fig. 3-3

OPERATION MANUAL

3.4 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 17 to identify these controls. Prepare two round metal bars (approx. 830mm long x 40mm dia) and insert them into the preserved holes on the lathe bed. (See Fig. 3-5). Using web slings or chains place them around the bars and adjust the length until the lathe when it is raised is level. (See Fig. 3-6).

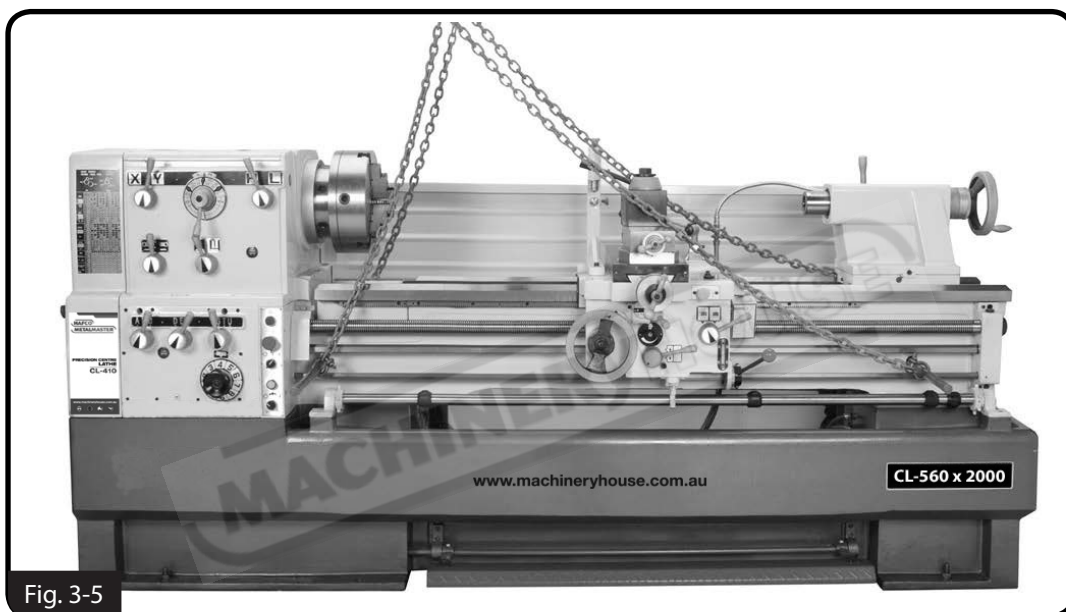


Fig. 3-5

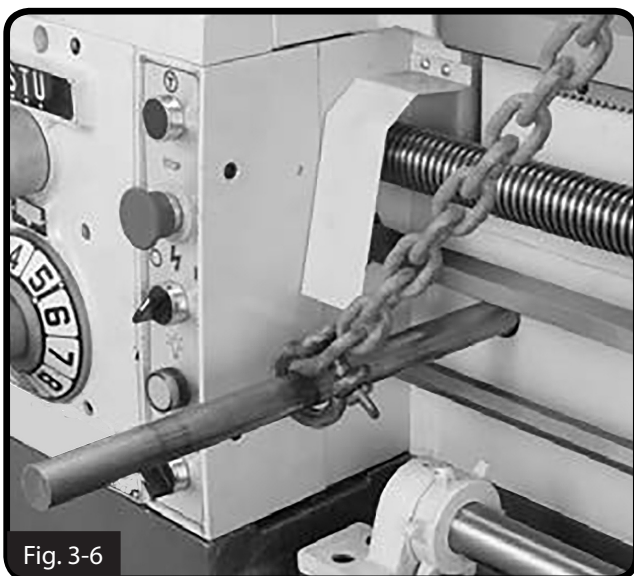


Fig. 3-6

NOTE :

Before lifting check that the slings or chains will not bend either the control shaft, lead screw, feed shaft, coolant hoses or electrical cables. Use rubber sheets or rags to protect the paint work and finished surfaces.

The slings or chains must be certified and suitable to handle the weight of the machine.

The lifting must be managed by an experienced persons with rigging and lifting qualifications.



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3.5 LEVELING

This lathe must be placed on the included leveling screws and cast-iron pads (Figure 3-7). and the lathe should be secured to the floor. The lathe must sit flat on each mounting point, and the ways must be perfectly level. The bed cannot be twisted or bent. If the lathe is found to be misaligned, adjust the leveling screw where it mounts to the floor, until the bed and ways are in alignment. A precision machinist’s level (Q205) should be used.

Place the level on the bedways and on top of the cross slide for the best results (See Fig. 3-8)

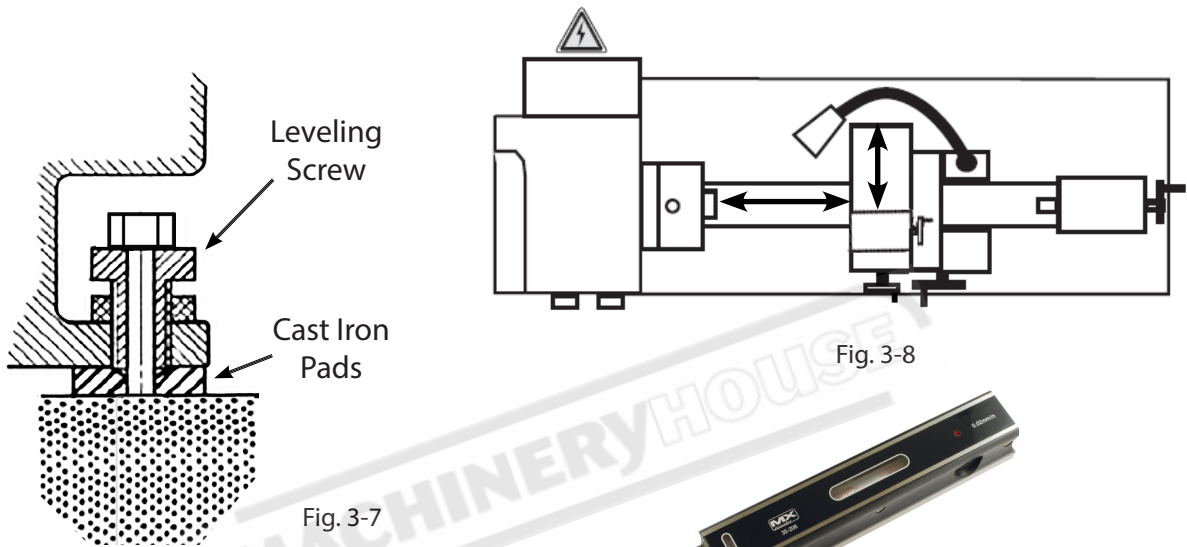


Fig. 3-7

Fig. 3-8



Order Code Q205

3.6 ELECTRICAL INSTALLATION

Place the 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 415V. To minimize the risk of electrocution, fire, or equipment damage, these machines should be hard wired with installation work and electrical wiring done by a qualified electrician.

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.....	415V
Cycle.....	50 Hz
Phase.....	Three Phase
Power Supply Circuit.....	30 Amps
Full Load Current.....	17.5 Amps

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

OPERATION MANUAL
3.7 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 for these machine at 415V is 17.5 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.


4. COMPONENT INFORMATION
4.1 CONTROLS & COMPONENTS
CONTROL PANEL (Fig.4-1)

1. **Jog Button:** Turns the spindle motor ON while being pressed and held and stops when the button is released
2. **Emergency Stop Button:** Stops all machine functions. Twist clockwise to reset.
3. **Lathe Power Switch:** Turns power ON/OFF to the lathe so lathe operations can begin.
4. **Power Light:** Indicates the lathe is energized when illuminated.
5. **Coolant Pump Switch:** Turns coolant pump ON/OFF.

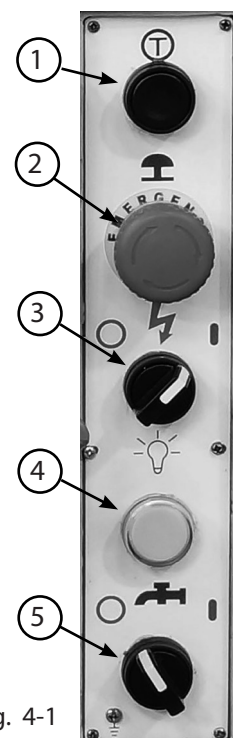


Fig. 4-1

OPERATION MANUAL

4.1 CONTROLS & COMPONENTS Cont.

HEADSTOCK CONTROLS (Fig.4-2)

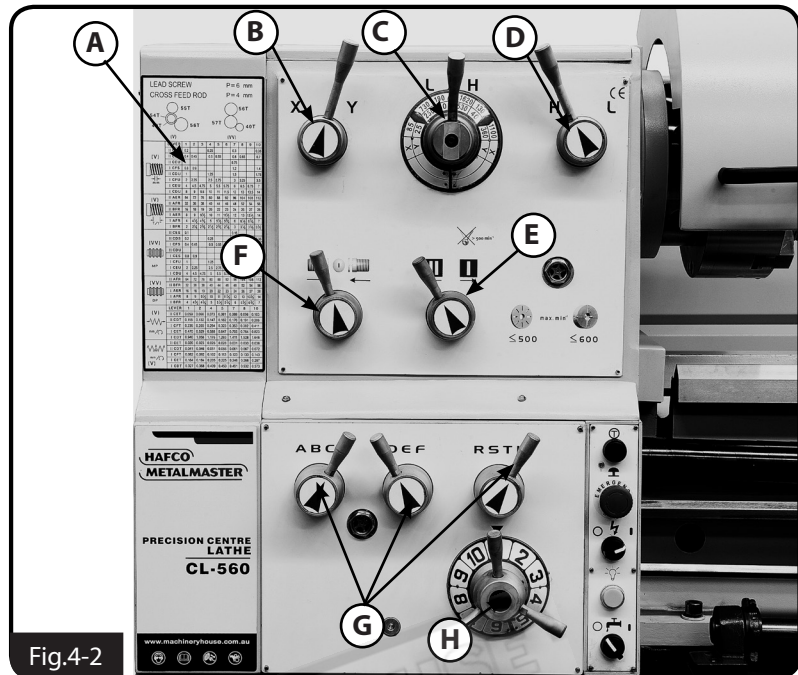
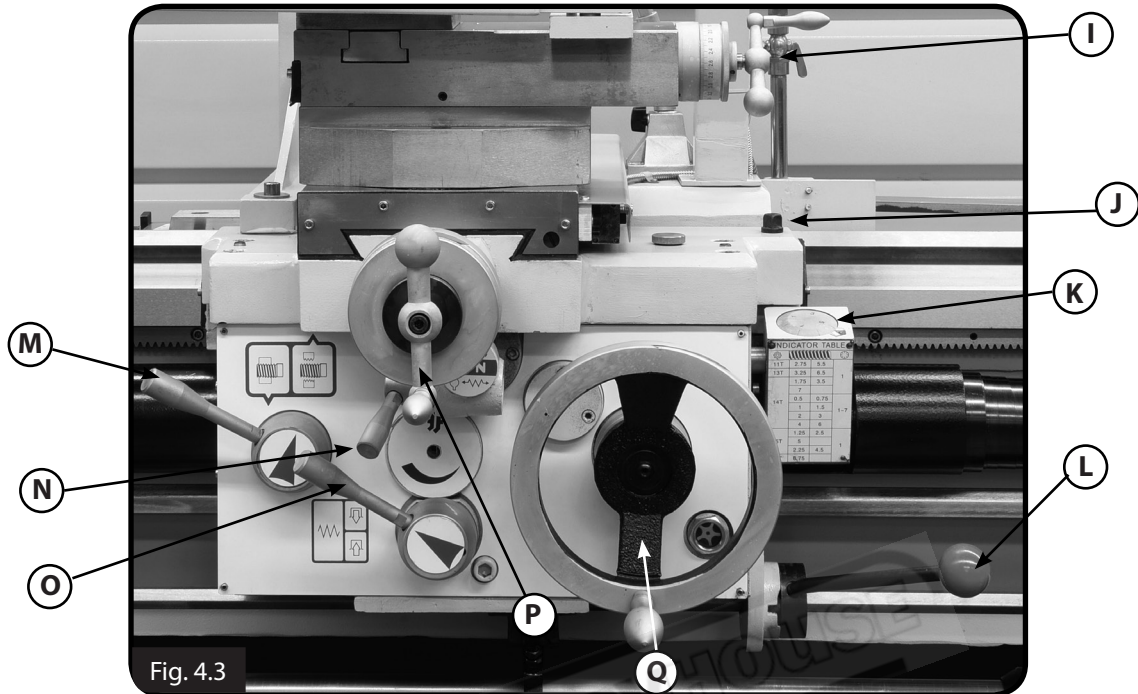


Fig.4-2

- A. Cutting Chart:** Used for selecting the lathe headstock and gearbox levers to give the correct gear combinations for threading and feeding operations.
- B. Range Splitting Lever:** Used to select the spindle speed "X" or "Y" range on the "C" dial.
- C. Spindle Speed Dial:** Positions the headstock gears in one of three speed position on the "C" dial. In each position, there are four spindle speeds with two each in "X" or "Y" range. One in Low range and one in the High range.
- D. Range Lever:** Used to select the high or low range spindle speeds on the "C" dial.
- E. Gearbox Hi/Lo Lever:** This lever puts the gearbox in high or low range and has no effect on spindle RPM. I is Hi range, II is low range.
- F. Leadscrew/Feedrod Direction Lever:** Changes the rotation direction of the leadscrew or feedrod so the apron or cross feed will move in the opposite direction.
- G. Quick Change Gearbox Levers:** Moves the gearbox gears into particular ratios, which then turn the leadscrew and feedrod for threading and power feed operations.
- H. Gearbox Selection Dial:** Changes the gear ratio's in the gearbox according to the thread or feed required from the "A" thread chart.

OPERATION MANUAL

4.1 CONTROLS & COMPONENTS CONT.

APRON (Fig. 4.3)

- I. Compound Slide Handwheel:** Moves the tool toward and away from the workpiece at the preset angle of the compound slide.
- J. Carriage Lock:** Secures the carriage in place for greater rigidity when it should not move.
- K. Thread Dial:** Indicates when to engage the half nut during threading operations.
- L. Spindle Lever:** Starts, stops and reverses direction of the spindle rotation.
- M. Half Nut Lever:** Engages/disengages the half nut for threading operations.
- N. Feed Selection Lever:** Selects the carriage or cross slide for power feed.
- O. Feed Clutch Lever:** Engages the feed mechanical for the item selected.
- P. Cross Slide Handwheel:** Moves the cross slide toward and away from the workpiece.
- Q. Carriage Handwheel:** Moves the carriage along the bed.

OPERATION MANUAL

4.1 CONTROLS & COMPONENTS CONT.

TAILSTOCK (FIG.4.4)

- R. Quill Handwheel:** Moves the quill toward or away from the spindle.
- S. Graduated Scale:** Indicates quill movement in increments of 0.02mm or 0.001" graduations.
- T. Tailstock Lock Lever:** Secures the tailstock in position along the bedway.
- U. Quill Lock Lever:** Secures the quill in position.
- V. Quill:** Moves toward and away from the spindle and holds centers and tooling.
- W. Tailstock Offset Screws:** Adjusts the tailstock offset left or right from the spindle centerline (1 of 2).
- X. Offset Scale:** Indicates the relative distance of tailstock offset from the spindle centerline. (Fig. 4.5)

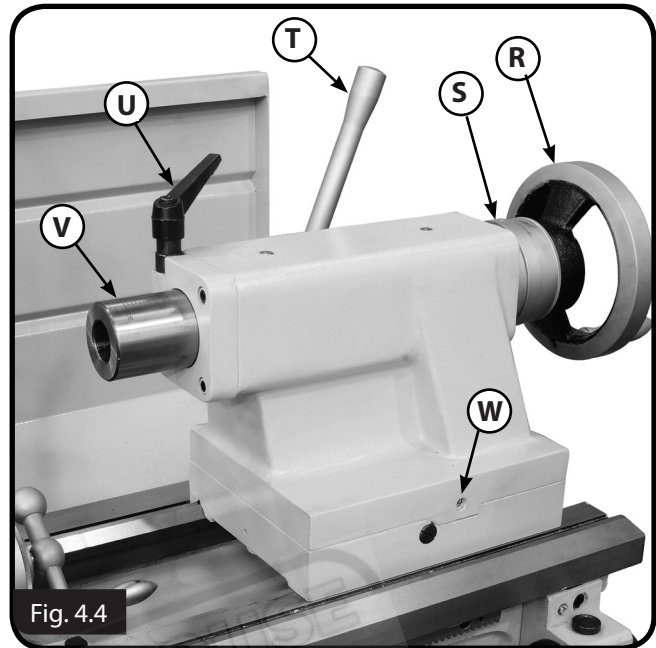


Fig. 4.4

4.2 OFFSETTING THE 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 screws (W in Fig. 4.4)

The tailstock can be offset from the spindle centerline 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 (Fig. 4.5) 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. (W in Fig. 4.4)

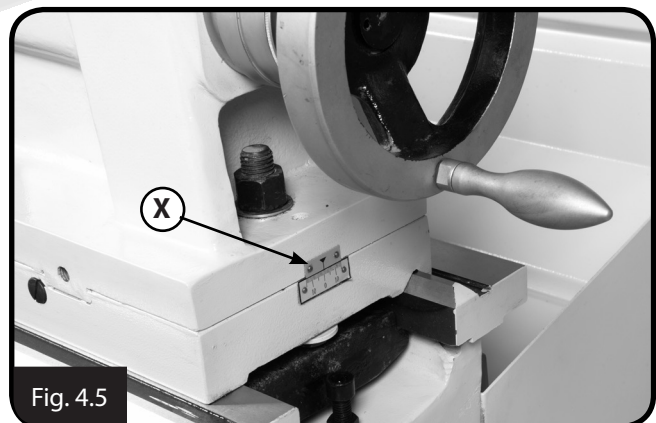


Fig. 4.5

OPERATION MANUAL

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. 4.6

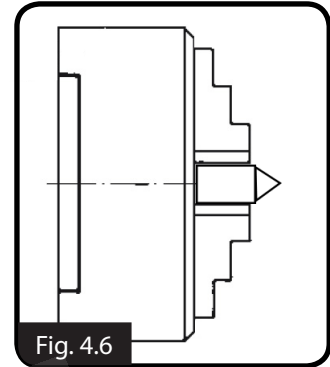


Fig. 4.6

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



Fig. 4.7

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. 4.7
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. 4.8)
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. 4.4 for adjustment screws)
8. Repeat the steps until the round bar is turned parallel.

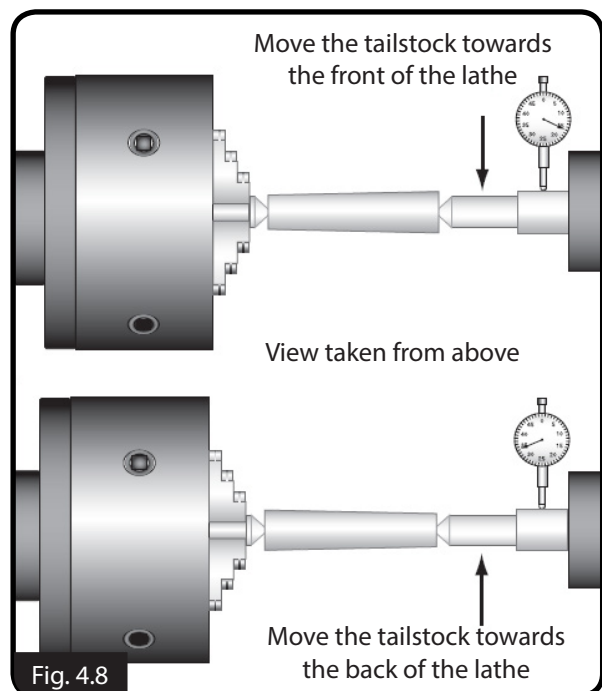


Fig. 4.8

4.4 CARRIAGE & SLIDE LOCKS

The compound rest, and carriage are fitted with locks that can be tightened to increase rigidity when taking heavy turning cuts.

See Fig. 4.9 for the locations of the locks for each device.

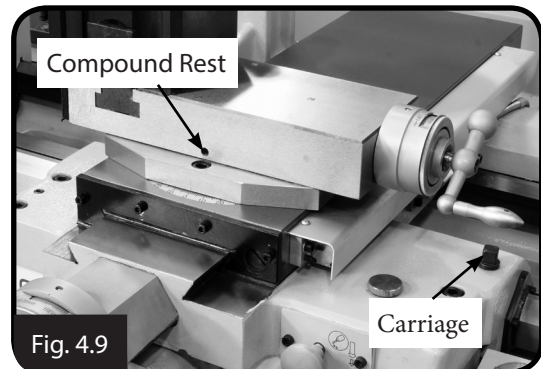


Fig. 4.9

4.5 FIXED AND FOLLOW STEADIES

FIXED STEADY REST

The fixed steady rest supports long, small diameter shafts and can be mounted anywhere along the length of the bedway. Components are shown in Figure 4.10.

To install, thoroughly clean all mating surfaces, then place the fixed steady rest base on the bedways so the triangular notch fits over the bedway prism. Position the fixed 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 rollers against the workpiece. then close the steady rest making sure that the top centre roller does not touch the workpiece.

Close the steady rest, then use the finger adjustment knobs to adjust all three centre rollers to just touch the workpiece without causing any deflection.

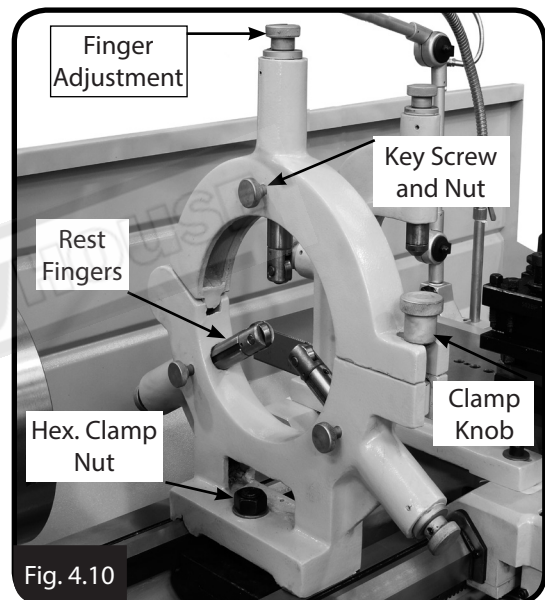


Fig. 4.10

FOLLOW STEADY REST

The follow rest is used when turning long, slender parts to prevent the workpiece from being deflected by the pressure of the cutting tool. It mounts to the saddle with two cap screws (see Fig. 4.11).

Adjustment of the follow rest fingers is done in the same manner as those for the fixed steady rest.

NOTE: To reduce the effects of friction, lubricate the fingers with way oil during operation.

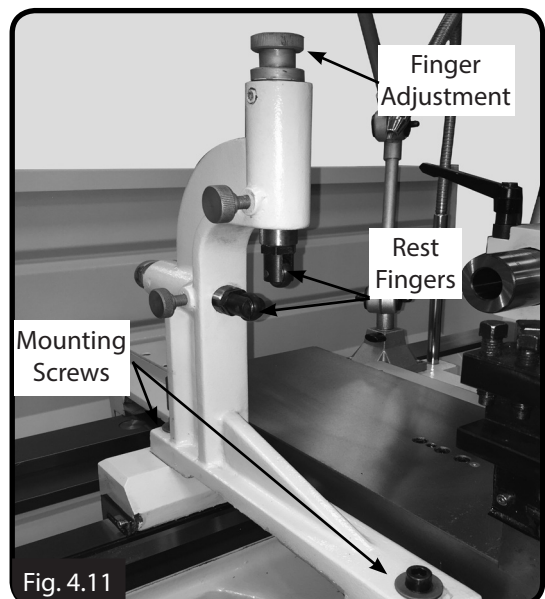


Fig. 4.11

OPERATION MANUAL

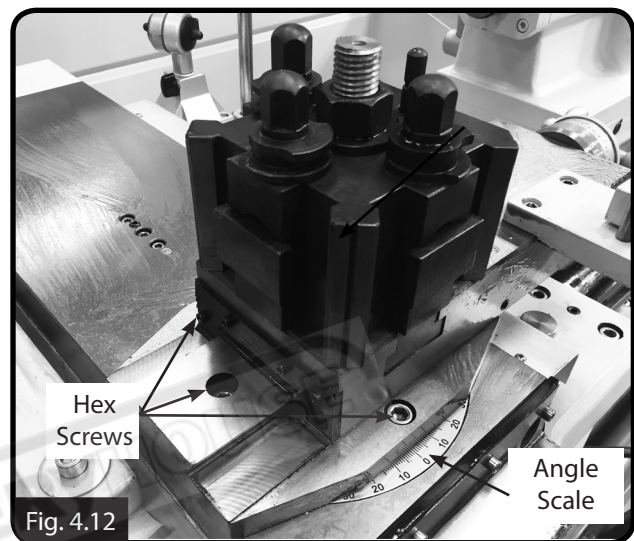
4.6 COMPOUND REST & TOOLPOST

COMPOUND REST

The compound rest provides a smaller amount of movement along its axis via another feed-screw. 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.

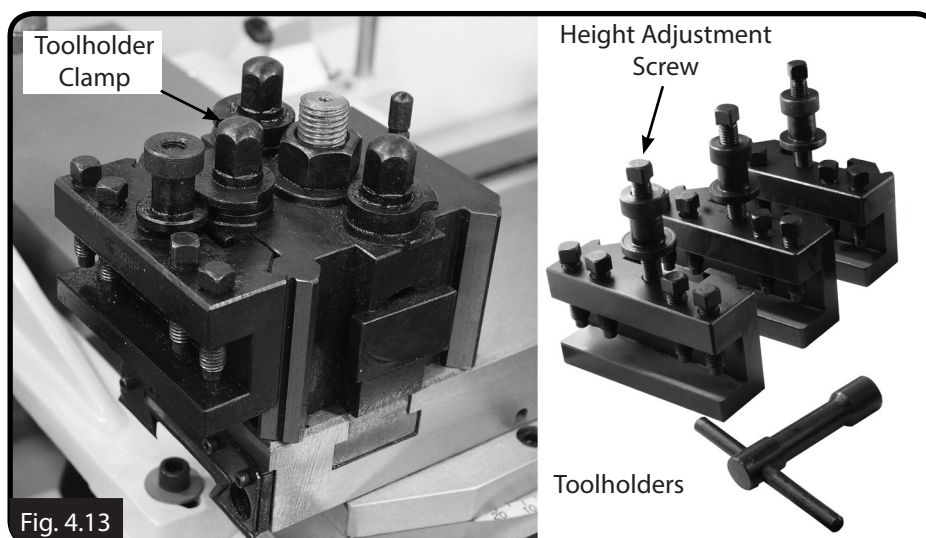
To set the compound rest at a certain angle:

1. Loosen the three hex screws at the base of the compound rest. (One at the front and one either side of the compound slide.) (Fig 4.12).
2. Rotate the compound rest to the desired angle, as indicated by the scale at the base, then retighten the three hex screws.



TOOL POST

The tool bit is mounted in the toolpost which is a quick-change style. 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 the center height which remains constant, even if the holder is removed and replaced on the machine. (Fig. 4.13)



Extra Holders
available
Order Code
L296A

OPERATION MANUAL
4.7 SETTING THE CUTTING TOOL WITH SPINDLE CENTERLINE

The tip of the cutting tool should be set up so that it is inline with the centerline of the spindle, as illustrated in Fig 4.14 . 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.

If fitted with a quick change toolpost height adjustment can be easily set with the height adjusting screw.

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 centre 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.

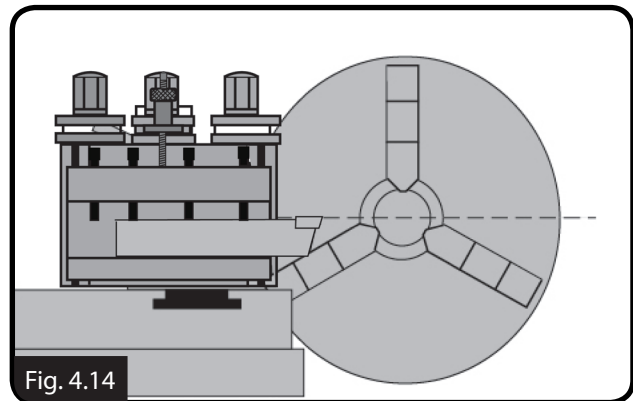


Fig. 4.14

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

1. Mount the cutting tool and secure the toolpost 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.4.15)

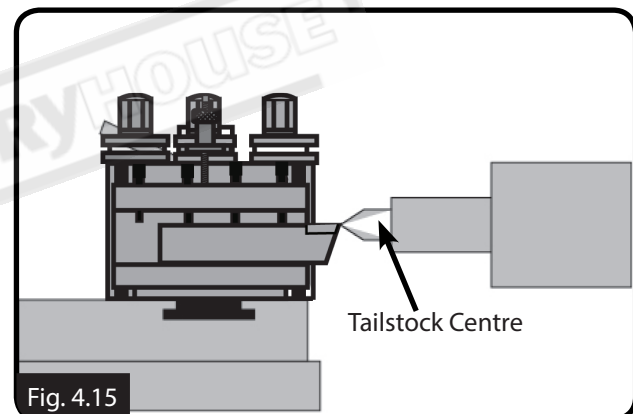


Fig. 4.15

To set the height

Place the tool holder with the cutting tool attached onto the block and rotate "A" until the toolholder can slightly move up and down. Loosen the locking screw "B" in Fig 4.16. Adjust the height stop "C" until the tool tip is in line with the centre line. Tighten "B" lock screw then tighten the toolholder to the block with screw "A". Check the centre height of the tool tip and if not correct repeat the steps until on the centre line. Remove the toolholder by releasing "A" screw and replace. Check again the centre height.

NOTE: The locking screw "B" can be supplied as a set screw or a grub screw.

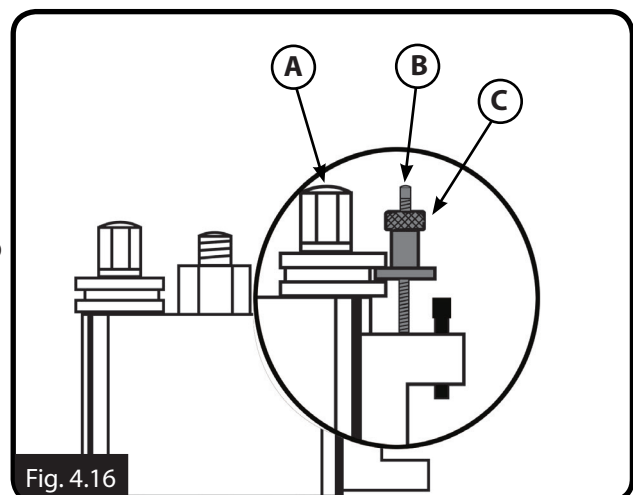


Fig. 4.16

OPERATION MANUAL

4.8 FOUR-POSITION APRON STOP

The four-position apron stop is used for disengaging the apron automatically at a total of four different apron positions. The eccentrics rings ("C" in Fig.4.17) can be tightened in place on the shaft at different positions, and the shaft rotated with each stop corresponding with a number on the dial.

When the shaft is turned to the stop selected the stop is selected. When the apron reaches that point, the top of the stop eccentric will depress the clutch release lever ("D" in Fig. 4.18) and disengage the feed on the apron, thus stopping the apron.

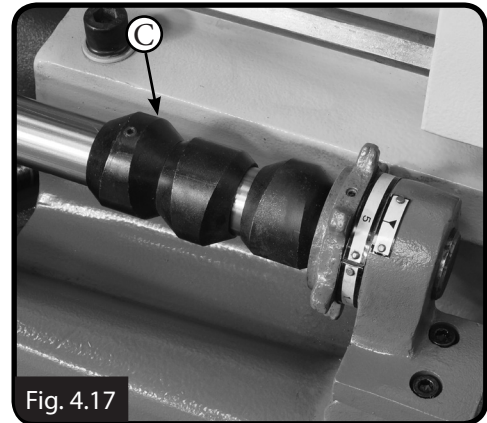


Fig. 4.17

4.9 GAP REMOVAL

This lathe is fitted with a gap section below the spindle that can be removed for machining large diameter parts. The gap is installed, during lathe assembly at the factory and then finished ground for precise fit and alignment. Once the gap has been removed replacing the gap to the original position will be very difficult. Reinstalling the gap to the original factory alignment is nearly impossible. For this reason Hafco do not recommend removing the gap unless absolutely necessary and then recommend to then leave the gap out.

To remove the gap

1. Remove the four cap screws from the bottom of the gap and two from the ends of the ways ("E" in Fig. 4.19).
2. Remove the set screw plug, and assemble an M6 x 30 cap screw, 6mm flat washer, and the gap pin puller hub ("F" in Fig. 4.19)
3. Thread the cap screw into the threaded hole and tighten until the pin is pulled free of the gap and bed.
4. Repeat on the remaining pin.
5. Tap the outside of the gap with a dead blow hammer to loosen, and remove the gap section

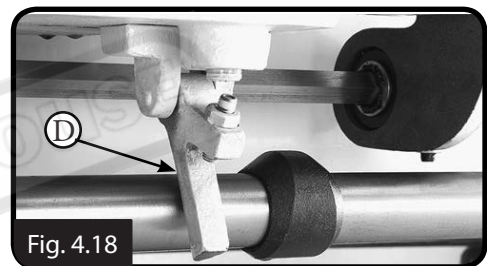


Fig. 4.18

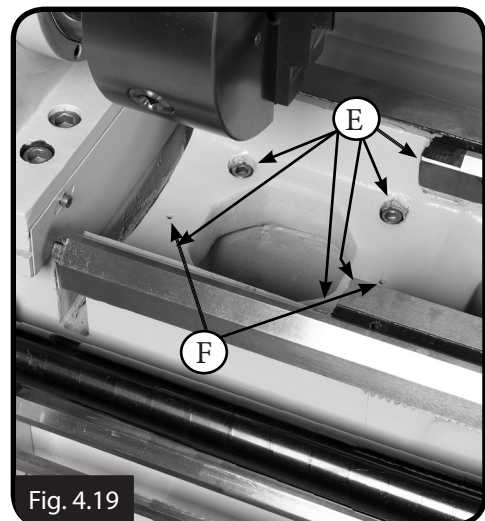


Fig. 4.19



OPERATION MANUAL

4.10 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. 4.24)

Order Code L341

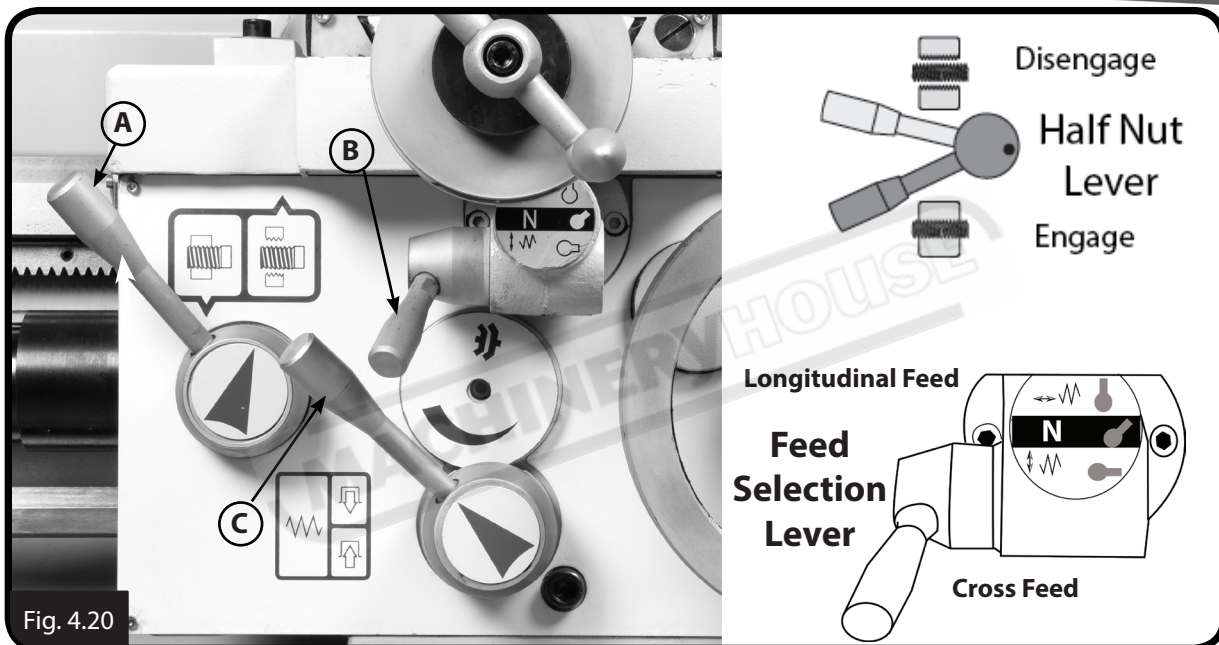
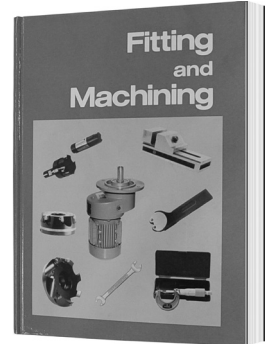


Fig. 4.20

Both the carriage and cross slide are equipped with power feed when the carriage is engaged with the feed rod.

Selecting either cross or longitude can be done by lever B in Fig. 4. 20. 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.

Once the feed selection lever position has been chosen then the feed is engaged by the feed clutch lever "C" in Fig. 4.20. The direction of the feed or threading is controlled by lever "E" on the headstock. (See Fig. 4.21)

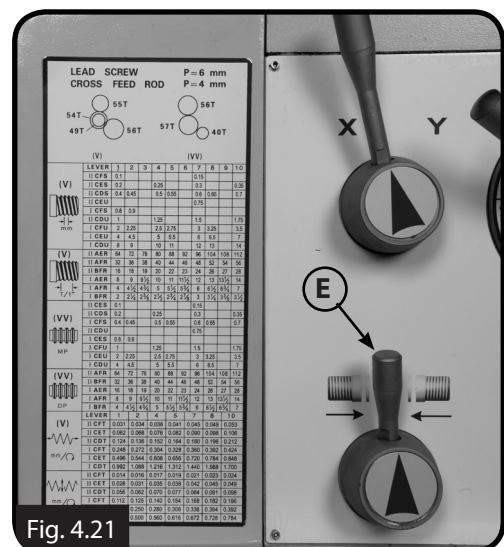


Fig. 4.21

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. 4.22).

NOTE : Make sure the feed selection lever ("B" in Fig.4.20) is in the disengaged (middle) position before attempting to engage the half nut.

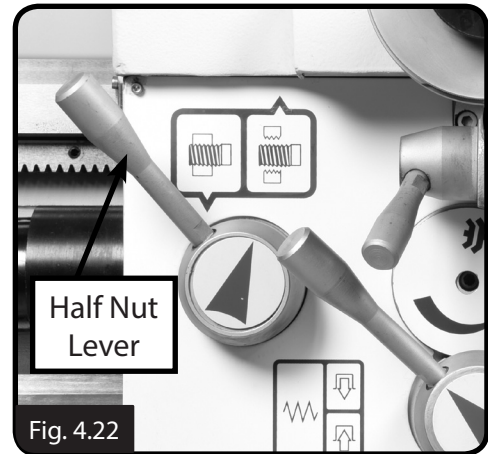


Fig. 4.22

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.4.23)

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. 4.24),
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

INDICATOR TABLE			
⚙	🌀		🕒
11T	2.75	5.5	1
13T	3.25	6.5	
	1.75	3.5	
14T	7		1-7
	0.5	0.75	
	1	1.5	
	2	3	
15T	1.25	2.5	1
	5		
18T	2.25	4.5	
	6.75		

Fig. 4.23

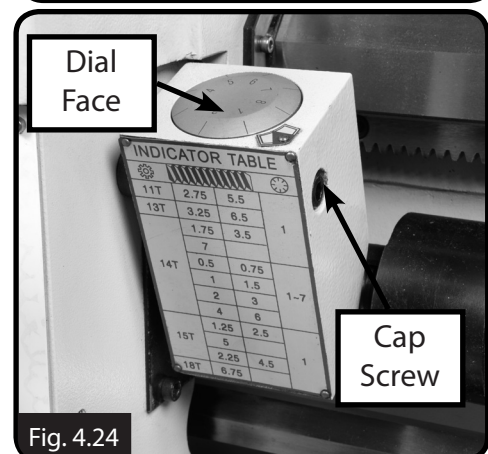


Fig. 4.24

OPERATION MANUAL
4.11 END GEARS

The end gears are used to setup for power feed, and inch, or metric threading operations. See Fig. 4.25 to identify the upper gear, middle 54T/49T change gears, and the lower gear. Details on which gears to use is found in the feed and threading charts on the headstock.

The lathe may need to have the centre gears changed to cut other pitch threads, and may require the centre 54 tooth gear to be replaced with the 57 tooth gear. The following covers this process.

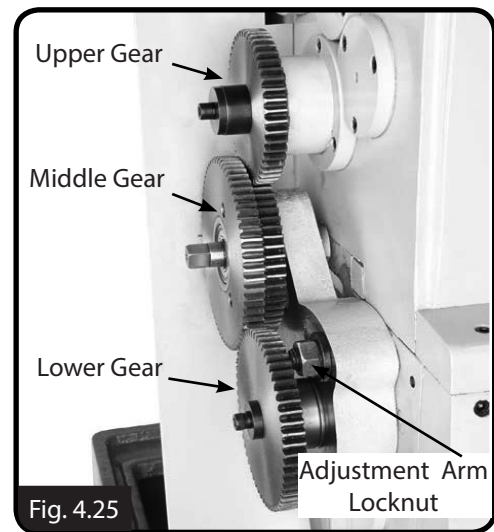


Fig. 4.25

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. Using a 14mm wrench, remove the center spindle and gear assembly (Fig. 4.26).
5. Using retaining ring pliers, remove the circlip from the spindle (Fig. 4.26).
5. With the circlip removed, Use a press to remove the spindle.

Note: A press and a collar that will support the inner bearing race should be used when removing the spindle from the gear so as not to damage the ball bearings.

6. Remove the three M6-1 x 25 cap screws that hold the two gears together.
7. Carefully, using two flat tip screwdrivers inserted between the gears at opposing sides, ease the 54-tooth gear off of the shoulder. Do not use a hammer to separate the gears.
9. Use the 6mm hex wrench and remove the lower and top spindle cap screw, shoulder washer, to change the bottom and top gears. (Fig. 4.27)

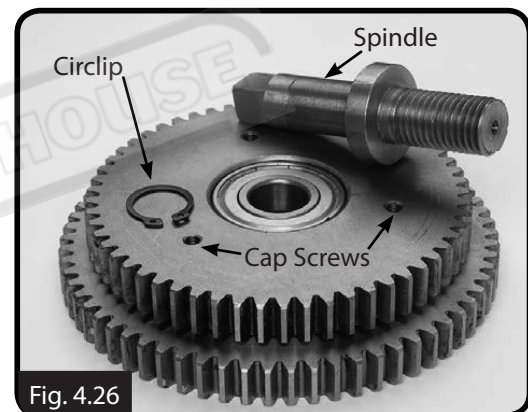


Fig. 4.26



Fig. 4.27

OPERATION MANUAL

END-GEAR CONFIGURATION Cont.

NOTE: In some casers a spacer may need to be used on the bottom shaft to make the bottom gear mesh with the outside gear of the centre gears.

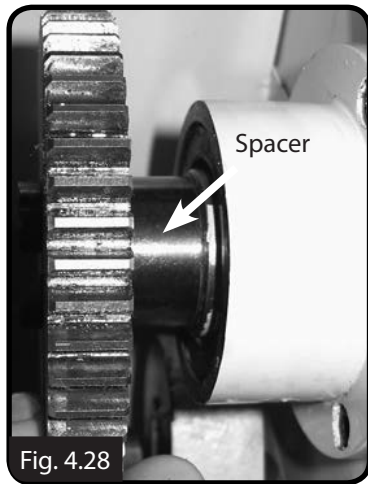


Fig. 4.28

10. If required slide the spacer onto the spindle, (Fig. 4.28) then slide the gear on the shaft. If the spacer is not required then place the gear on the shaft so that the shoulder is then placed against the bearing (Fig. 4.29).
11. Move the center gear and adjustment arm assembly, so they mesh with the top and bottom gear then tighten the spindle and adjustment arm lock nut so all gears mesh and have approximately 0.038 to 0.102mm of backlash.



Fig. 4.29

12. Rotate the gears by hand to make sure that no binding occurs, and then cover the gear teeth with general purpose automotive grease.
13. When the change is finished, make sure the gear arrangement matches the configuration shown on the chart
14. Close the end cover and refer to the Threading Chart for how to shift the lathe to the appropriate feed or thread pitch. (Fig. 4.30)

LEAD SCREW		P=6 mm									
CROSS FEED ROD		P=4 mm									
54T		55T		56T		57T		40T			
49T		56T									
(V)		1	2	3	4	5	6	7	8	9	10
II CES	0.2		0.25						0.3		0.35
II CDS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CEU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
I CDU	8	9	9.5	10	11	11.5	12	13	13.5	14	
II AER	64	72	76	80	88	92	96	104	108	112	
II AFR	32	36	38	40	44	46	48	52	54	56	
II BFR	16	18	19	20	22	23	24	26	27	28	
I AER	8	9	9½	10	11	11½	12	13	13½	14	
I AFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
I BFR	2	2¼	2½	2¾	3	3¼	3½	3¾	4		
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14	
I BFR	4	4½	4¾	5	5½	5¾	6	6½	6¾	7	
II CES	0.1								0.15		0.2
II CDS	0.2		0.25						0.3		0.35
I CFS	0.4	0.45		0.5	0.55				0.6	0.65	0.7
II CDU									0.75		
I CFS	0.8	0.9							1.2		1.4
II CDU	1		1.25						1.5		1.75
I CFU	2	2.25		2.5	2.75				3	3.25	3.5
I CEU	4	4.5	4.75	5	5.5	5.75	6	6.5	6.75	7	
II AFR	64	72	76	80	88	92	96	104	108	112	
II BFR	32	36	38	40	44	46	48	52	54	56	
I AER	16	18	19	20	22	23	24	26	27	28	
I AFR	8	9	9½	10	11	11½	12	13	13½	14</	

OPERATION MANUAL

5. TEST RUN & OPERATION

5.1 TEST RUN

Once the assembly and setup of the machine 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, and in the right direction.
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 33)

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. 5.1).

b. Make sure the spindle lever is in the middle OFF position (Fig. 5.1)

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. Set the spindle speed levers so the speed is at 130 RPM

e. Move the spindle lever (Fig. 5.1) 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 and then restart the lathe by moving the spindle lever down. The test run is now completed

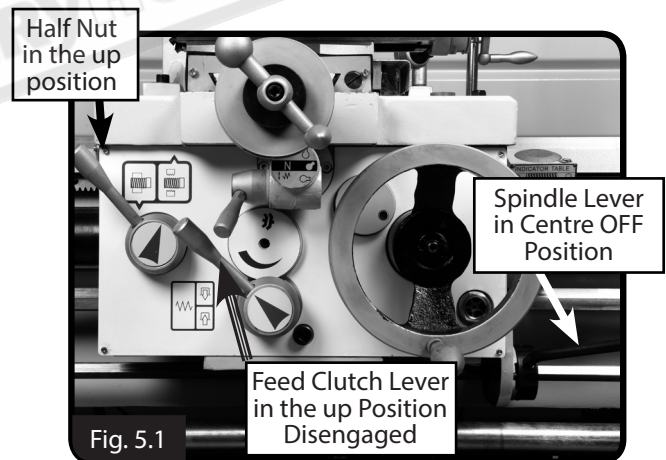


Fig. 5.1

5.2 CHUCK & FACEPLATE MOUNTING

This lathe is equipped with a D1- 8 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. 5.2)

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 5.3)

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 Figure 5.4.

If the cam line is not between the "V" marks when the camlock is tight, the stud may not 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. 5.5). Make sure to re-install the stud locking cap screw after adjustment has been made.

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

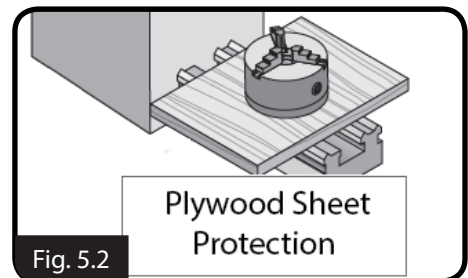


Fig. 5.2

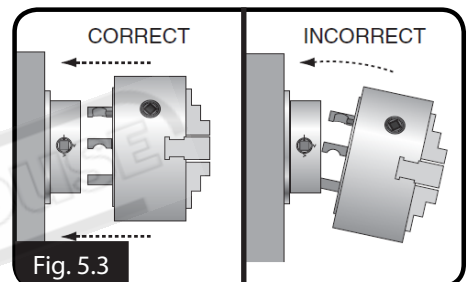


Fig. 5.3

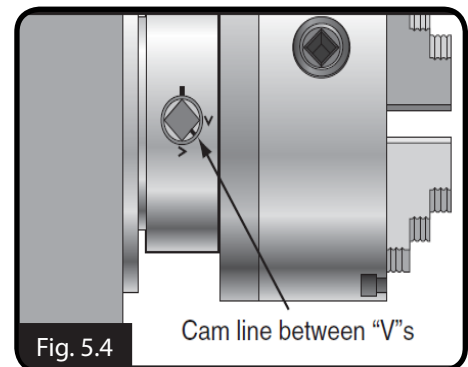


Fig. 5.4

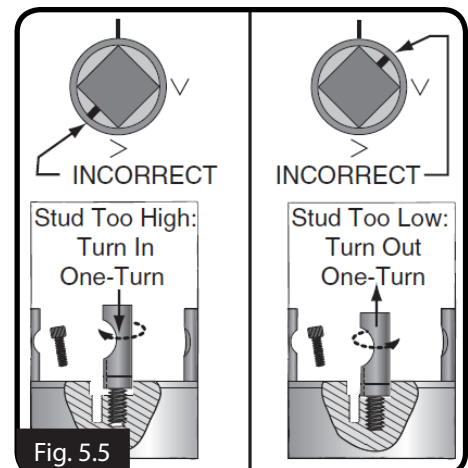


Fig. 5.5

OPERATION MANUAL

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 material.
- 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 items are the recommended cutting speed for the workpiece material and the diameter of the workpiece, as noted in the formula shown below.

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

The Fitting & Machining 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 5.6 shows the levers positioned for a spindle speed of 530 RPM

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. 5.6



WARNING

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

5.4 TAPER TURNING ATTACHMENT

Some models of these lathes may be supplied with a Taper Turning Attachment as a standard option.(Fig. 5.7)

The range of the taper is from 0° - 20° included angle. It works in the following way. The dead man clamp cap screws when they are loose, disengage the taper attachment and the lathe is in normal operation.

When the cap screws (Figure 5.8) are used to clamp the dead-man clamp against the bedway, the taper turning attachment is engaged.

Operation

1. DISCONNECT THE LATHE FROM POWER.
2. Move the carriage, cross slide, and compound rest so your turning tool is at beginning of the taper to be cut.

NOTE: Make sure that there is enough travel on the Taper Turning Attachment slide to cover the length of the taper.

3. Using an hex wrench, tighten both the dead-man clamp cap screws so the dead-man clamps against the lathe bedway (Fig. 5.8).
4. Using a hex wrench, loosen both dovetail lock cap screws (Fig. 5.9, 5.10)
5. Turn the taper angle control knob (Fig. 5.11) until you reach the taper angle that you need as indicated by the taper scale (Fig. 5.9).
6. Re tighten both dovetail lock cap screws and begin the machining operations.

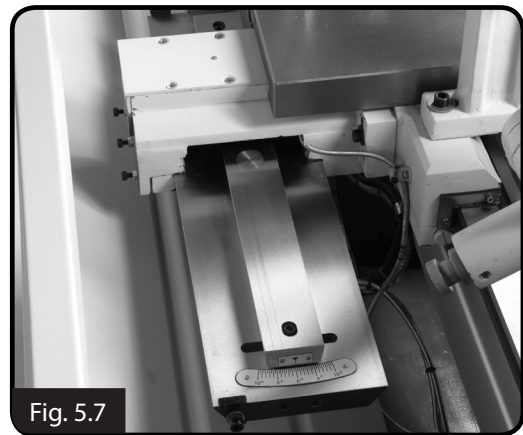


Fig. 5.7

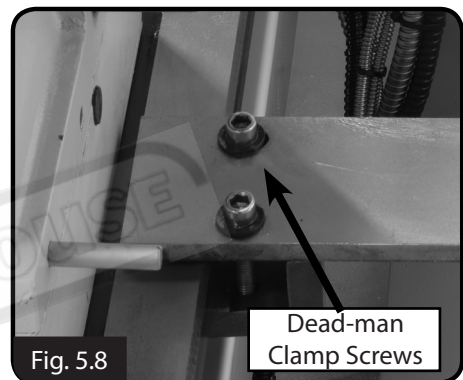


Fig. 5.8

Dead-man
Clamp Screws

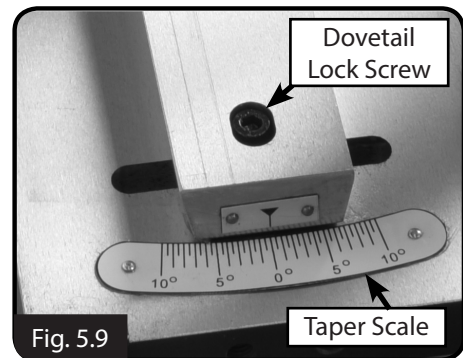


Fig. 5.9

Dovetail
Lock Screw

Taper Scale

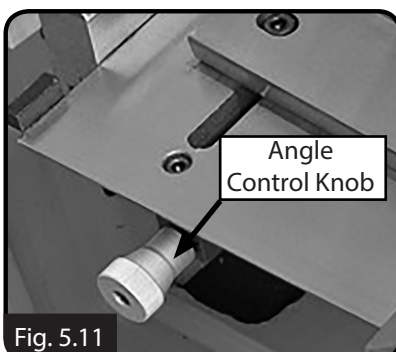


Fig. 5.11

Angle
Control Knob

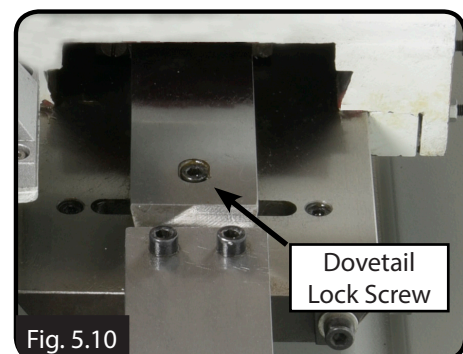


Fig. 5.10

Dovetail
Lock Screw

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	Auto	Machine Oil	Auto Feed
Cross Slide	Slides and Screws	Auto	Machine Oil	Auto Feed
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

Fig. 6.1

6.2 LUBRICATION POINTS

HEADSTOCK

The headstock utilizes an oil-splash feed lubrication system. The reservoir has the proper amount of oil when the oil level in the sight glass is approximately halfway. (Fig. 6.2) The oil sight glass is located below the spindle speed levers. The oil should be changed every six months by firstly draining the oil by removing the drain plug (Fig. 6.3) then filling by the oil filler plug (Fig. 6.4)

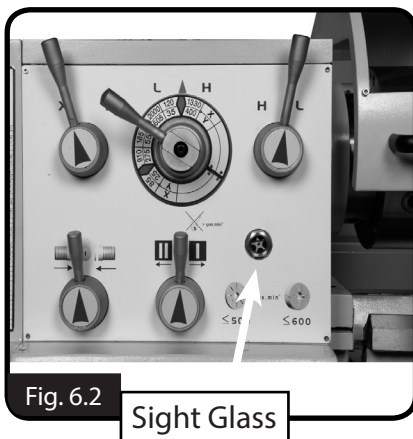


Fig. 6.2

Sight Glass

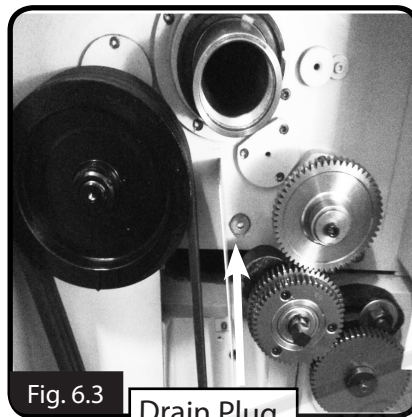


Fig. 6.3

Drain Plug

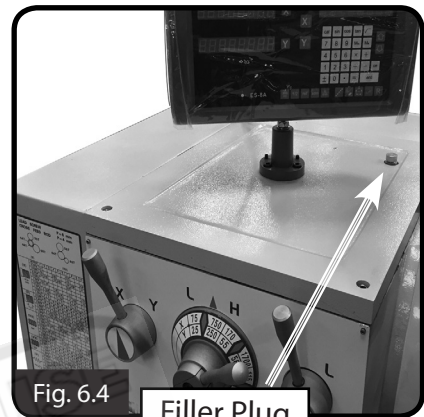


Fig. 6.4

Filler Plug

Quick Change Gearbox

The quick change gearbox is oil-bath lubricated to insure the long life of the gears and bearings. It is recommended the lubricant be changed every twelve months with a 20W non-detergent oil, or an equivalent gearbox machine oil. The oil level can be checked by viewing the sight glass (Figure 6.5) The oil level should be kept so that the oil is level to the middle of the sight glass.

After the first month of daily operation the following procedure should be done.

1. Drain the gear box. See Fig. 6.5 for the drain plug.
2. Flush the gearbox with some fresh oil to remove any contaminants that may be left from the manufacturing process.
3. Replace the drain plug and fill the gearbox with new oil so that the oil level is halfway up the oil sight glass. The filler plug can be found by removing the cover plate above the gearbox. (See Fig. 6.6)

NOTE: The gearbox oil should be changed yearly, or more frequently if heavy machine use requires it.

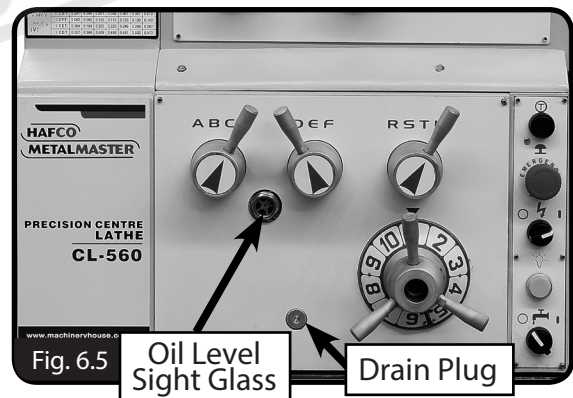


Fig. 6.5

Oil Level Sight Glass

Drain Plug

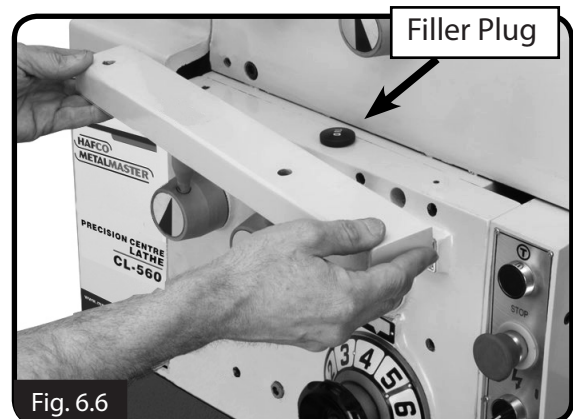


Fig. 6.6

Filler Plug

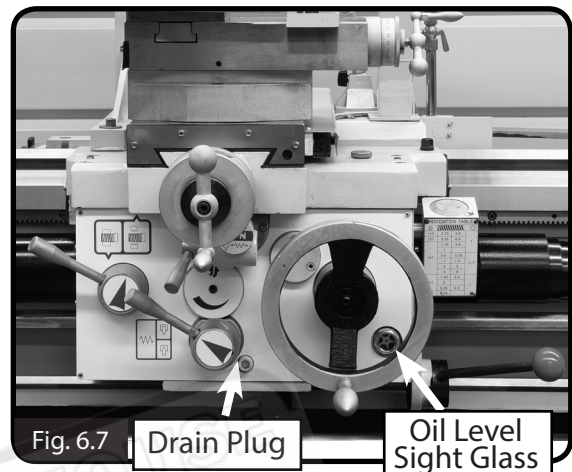
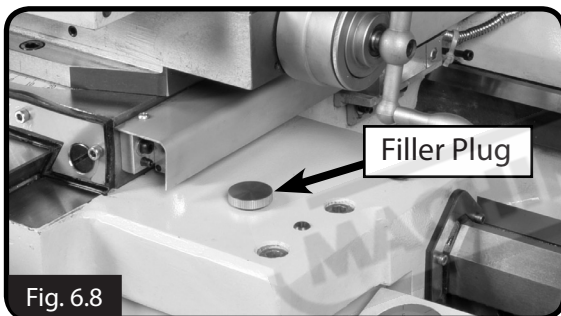
6.2 LUBRICATION POINTS Cont.

APRON

The apron oil sight glass is on the front of the apron, as shown in Fig. 6.7. Maintain the oil volume so that the level is approximately halfway in the sight glass.

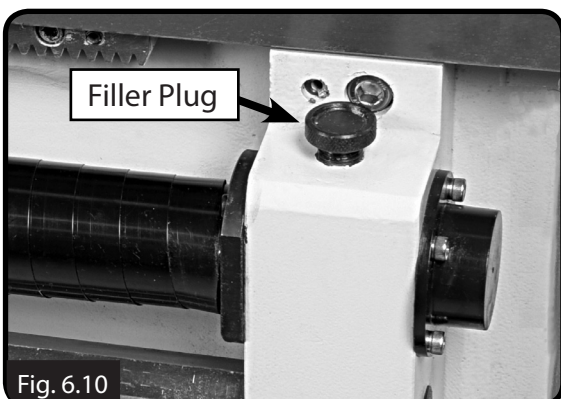
Changing Oil & Flushing Reservoir

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. 6.7), remove the fill plug, (Fig. 6.8) then remove the drain plug and empty the reservoir. Flush the reservoir by pouring a small amount of clean oil into the fill hole and allow it to drain out the bottom. Replace the drain plug, add oil as required, then re-install the fill plug.



BEDWAY LUBRICATION

The bed ways are lubricated by an automatic system (Fig. 6.9) which dispenses oil at preset times from the pump and reservoir mounted on the back of the machine. The oil needs to be way oil or 20W grade. The level should be checked daily



LEADSCREW LUBRICATION

The lead screw is lubricated from a reservoir system (Fig. 6.10) which is filled from the filler plug on the lead screw support on the end of the machine. The oil needs to be 20W grade.

BALL OILERS

Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip, sometimes 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 the 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.

Ball Oiler Locations

- Cross-slide leadscrew & slides
- Compound-rest leadscrew & slides (Fig 6.11)
- Carriage handwheel (Fig.6.13)
- Feed selection lever gearing
- Tailstock ball oilers (Fig. 6.12)

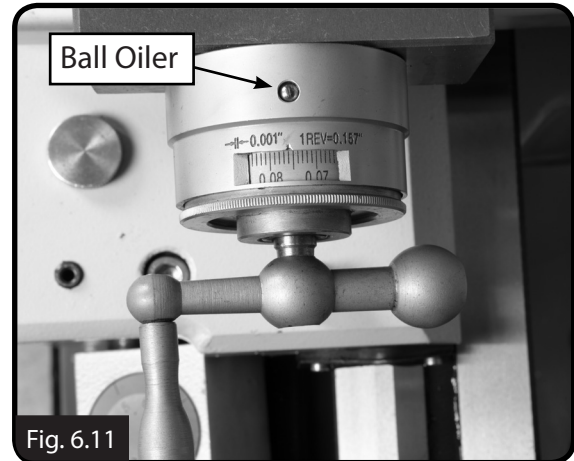


Fig. 6.11

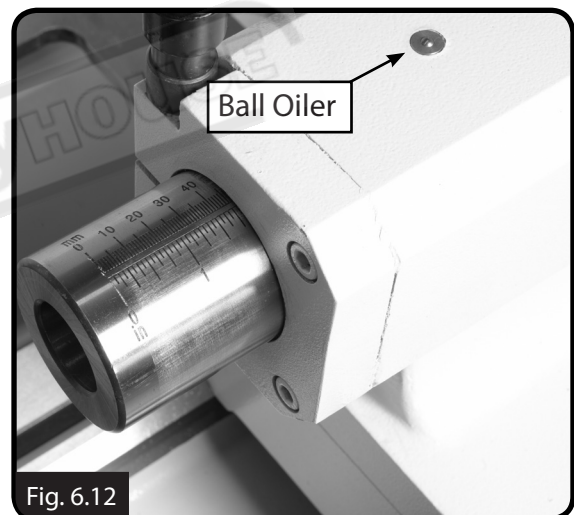


Fig. 6.12

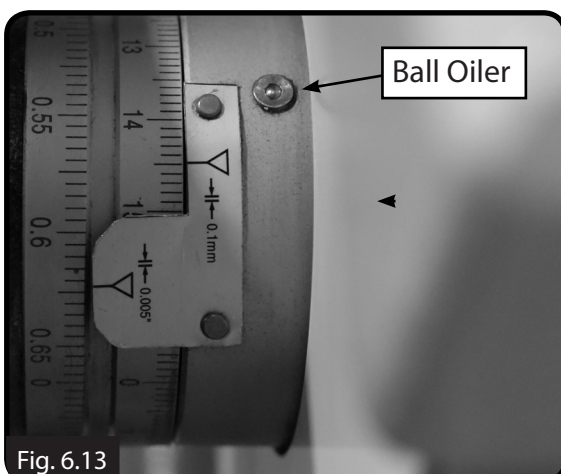


Fig. 6.13

6.3 FEED CLUTCH ADJUSTMENT

This lathe is equipped with a cone type feed clutch. The clutch is designed to protect the apron feed system from overloading. The feed clutch is set by the factory, however, after the lathe has been used, it may require some readjustment.

To adjust the clutch release point:

1. With a hex wrench, turn the center cap screw ("A" in Fig. 6.14) clockwise to increase the clutch holding power, and turn counter clockwise to decrease the amount of clutch holding power.
2. Start the lathe,
3. Engage the power feed ("B" in Fig. 6.14) and hold the longitudinal feed handwheel with one hand. The clutch should release within a few seconds without much pressure of the handwheel rotation. This holding force is approximately 12 kgs.
4. If the amount of pressure is not correct, adjust the clutch screw again as required to achieve the correct setting.

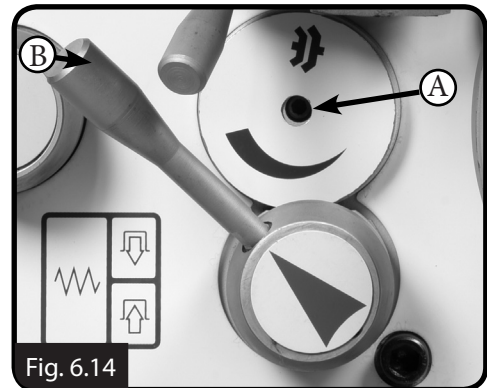


Fig. 6.14

6.4 GIB ADJUSTMENT

The goal when adjusting the cross slide, tailstock, saddle, and compound rest gib screws is to remove sloppiness in the ways without causing the slides to bind. Loose gibs will cause a poor finish on the workpiece and may cause undue wear on the slide. Over-tightening may cause premature wear on the slide, lead screw, and nut. The cross slide, (Fig. 6.15) tailstock, (Fig. 6.16) saddle, and compound rest gibs use a tapered piece of cast iron which is held in position by two gib screws at opposing ends of the gib. When these opposing front and rear gib adjustment screws (Fig. 6.15) are turned in opposite directions from each other, "One screw clockwise and the other counterclockwise, or visa versa" the single gib will be moved in or out to fill the gap between the slide and the dovetail. By doing this the play in the slide is removed. If more play is needed adjust the screws so the gib is moved and held in the opposite direction.



Fig. 6.15

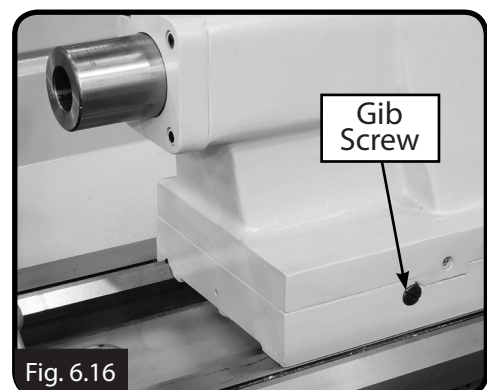


Fig. 6.16

6.5 BRAKE AND MICRO SWITCH ADJUSTMENT

The foot brake is linked to a Micro Switch. This needs to be maintained with a clearance of 3-5mm from the brake cam to the finger of the Micro Switch. Before making any changes always disconnect the power to the machine to ensure the safety of the service personnel and reduce any fading of brake material. After stopping the machine with the foot brake, the spindle control lever needs to be moved to the centre position and then moved to the up or down position again to make the spindle revolve again. (Fig. 6.17)

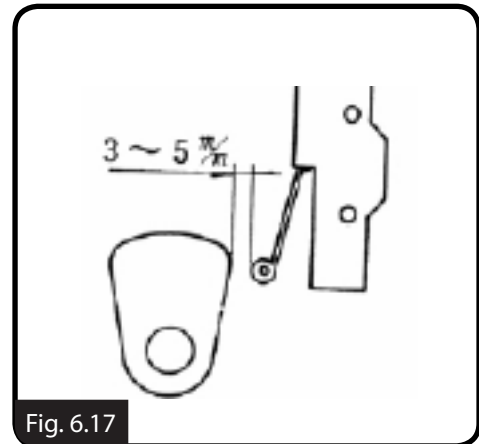


Fig. 6.17

6.6 ADJUSTING THE LEAD SCREW BACKLASH

The machine is supplied from the factory with the correct backlash already adjusted but some times through general use this may need to be adjusted. Incorrect backlash is mainly noticed when during the threading processing, the threads are consistent or cross threading occurs. This is usually caused by incorrect backlash on Lead screw. To fix this problem adjust the packing nut appropriately on rear side of the Lead screw. Open the cover on rear side of Lead screw Bracket, turn nut "A" tightly with the backlash removed. A check of the result can be made by pushing down Half Nut Handle, and turning the apron Hand-wheel. Place your hand on the contact point between Gear Box and Lead screw. There should be no lateral movement. (Fig. 6.18)

Once completed replace the "A" nut side cover.

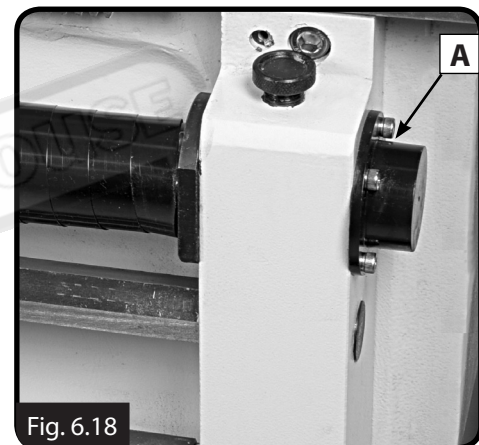


Fig. 6.18

6.7 COOLANT PUMP & TANK

The coolant pump and reservoir are located in the base behind the vented cover on the tailstock end of the lathe and requires regular maintenance.

1. Remove the access cover at the rear of the lathe (Fig.6 .19).
2. Pump the old cutting fluid out of the reservoir and dispose of it according to local laws.
3. Using a magnet, brush, and rags clean out metal chips from the bottom of the reservoir. Flush with hot soapy water if required.
4. Refill the reservoir with water soluble cutting fluid. Follow the manufacturer's instructions for mixing.
5. Open the valve on the coolant nozzle and turn the coolant pump ON to prime the coolant system.
6. Replace the access cover.

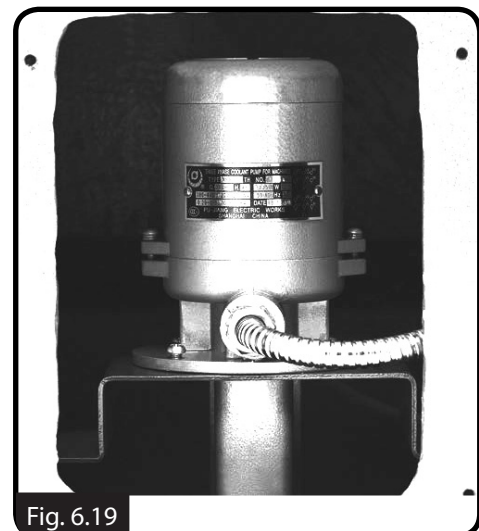


Fig. 6.19

OPERATION MANUAL

6.8 TROUBLE SHOOTING

Symptoms	Possible Cause	Possible Solution
Machine does not start or circuit breaker trips	Foot brake is engaged	Check to see if the foot brake is up.
	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	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
Loud noises coming from near the motor	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

OPERATION MANUAL

6.3 TROUBLE SHOOTING

Symptoms	Possible Cause	Possible Solution
Entire machine vibrates excessively upon startup and while running	Workpiece is unbalanced. Loose or damaged belt(s). V-belt pulleys not properly aligned. Worn or broken gear present. Chuck or faceplate has become unbalanced. Spindle bearings badly worn.	Reinstall workpiece so it is as centered with the spindle bore as possible. Tighten/replace the belt as necessary. Align the V-belt pulleys. Inspect gears and replace if necessary. Re-balance chuck or faceplate; contact a local machine shop for help. Replace spindle bearings.
Bad surface finish.	Wrong RPM or feed rate. Dull tooling or poor tool selection. Too much play in gibs. Tool too high.	Adjust for appropriate RPM and feed rate. Sharpen tooling or select a better tool for the intended operation. Tighten gibs. Lower the tool position.
Can't remove tapered tool from tailstock quill.	Quill had not retracted all the way back into the tailstock. Debris on the taper before inserting	Turn the quill handwheel until it forces taper out of quill. Always make sure that taper surfaces are clean.
Cross slide, compound slide, or carriage feed has sloppy operation	Gibs are out of adjustment. Handwheel is loose. Mechanism worn or needs adjustment.	Tighten gib screw(s). Tighten handwheel fasteners. Tighten any loose fasteners on lead screw mechanism.
Cutting tool or machine components vibrate excessively during cutting	Tool holder not tight enough. Cutting tool sticks too far out of tool holder; lack of support. Gibs are out of adjustment. Dull cutting tool. Incorrect spindle speed or feed rate.	Check for debris, clean, and re-tighten. Reinstall cutting tool so no more than 1/3 of the total length is sticking out of tool holder. Tighten gib screws at affected component. Replace or resharpen cutting tool. Use the recommended spindle speed.
Inaccurate turning results from one end of the workpiece to the other.	Headstock and tailstock are not properly aligned with each other.	Realign the tailstock to the headstock spindle bore centre line.
Chuck jaws won't move or don't move easily.	Chips lodged in the jaws.	Remove jaws, clean and lubricate chuck threads, and replace jaws.

OPERATION MANUAL

6.3 TROUBLE SHOOTING

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

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

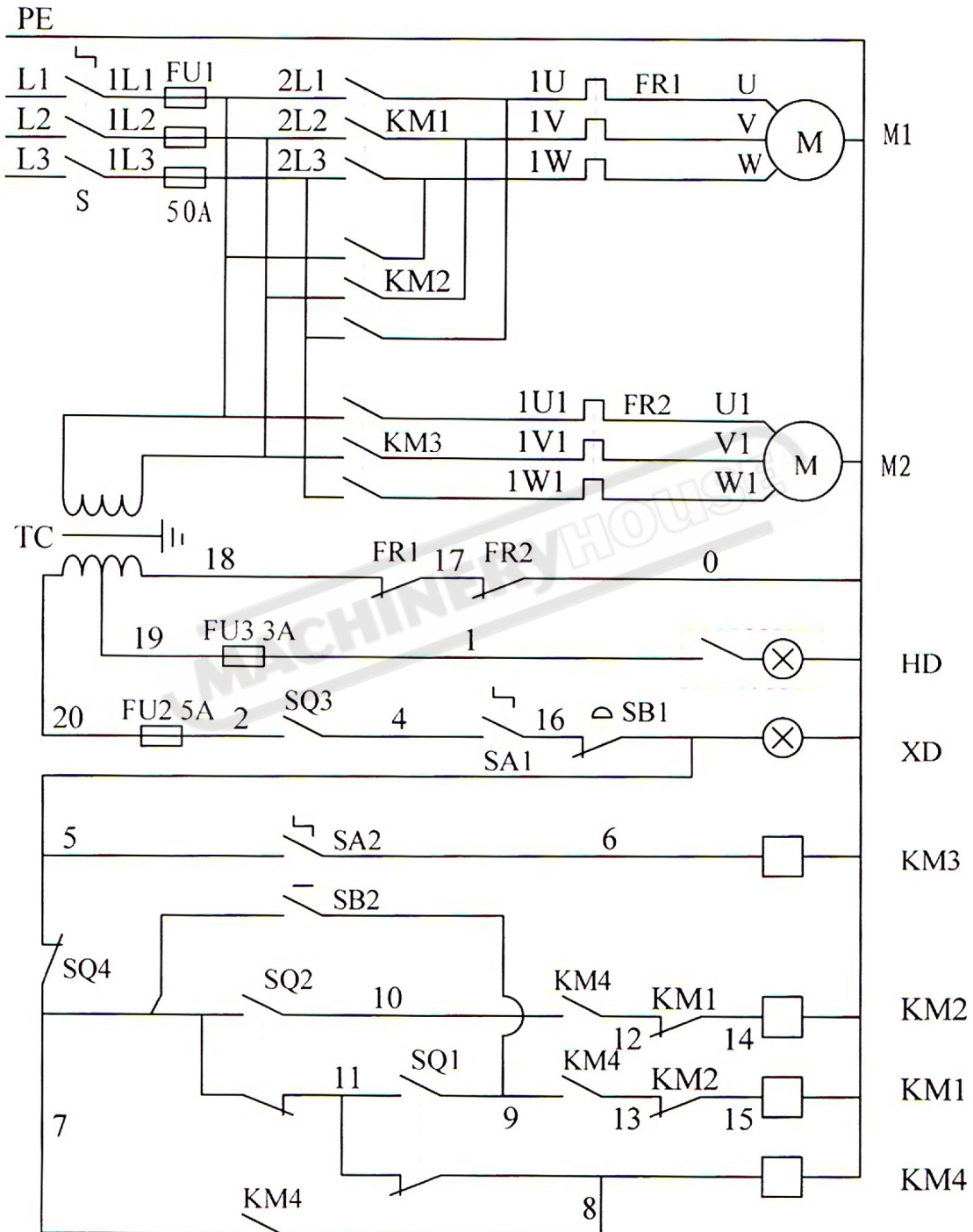
1. Have your machines **Model Number, Serial Number & Date of Manufacture** on hand, these can be found on the specification plate mounted on the machine
2. A scanned copy of your parts list/diagram with required spare part/s identified
3. Go to www.machineryhouse.com.au/contactus and fill out the enquiry form attaching a copy of scanned parts list.

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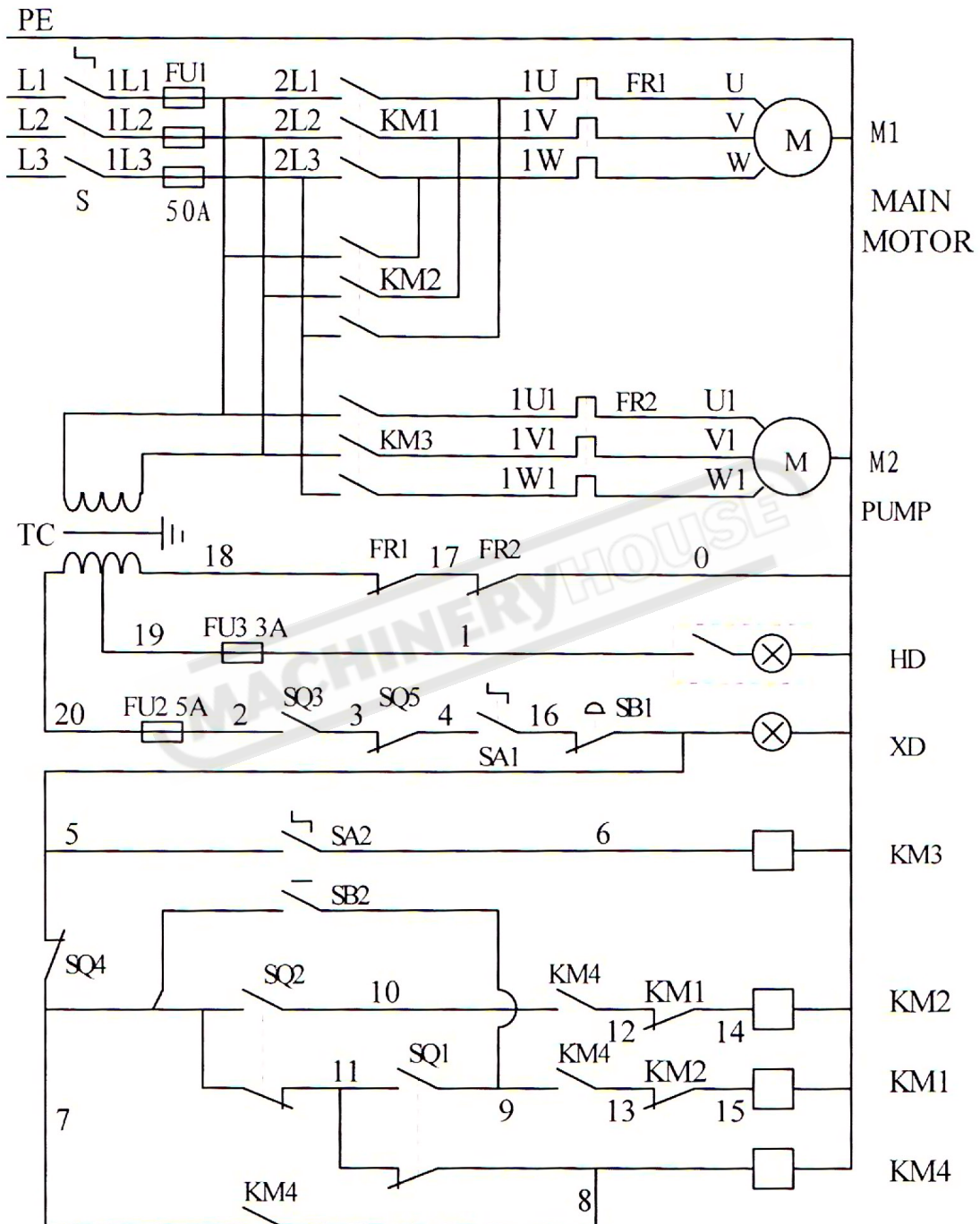
OPERATION MANUAL

A. ELECTRICAL DIAGRAM



OPERATION MANUAL

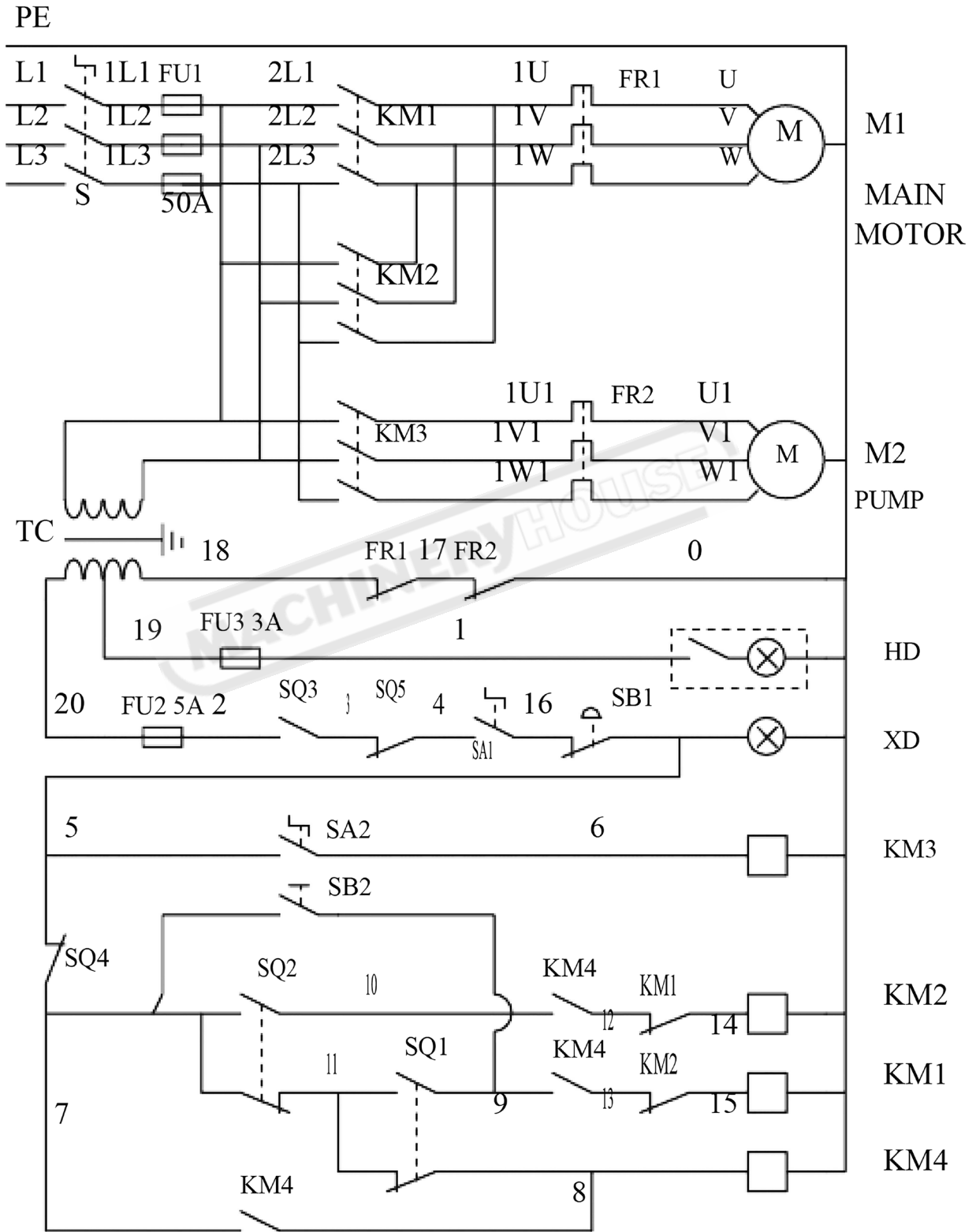
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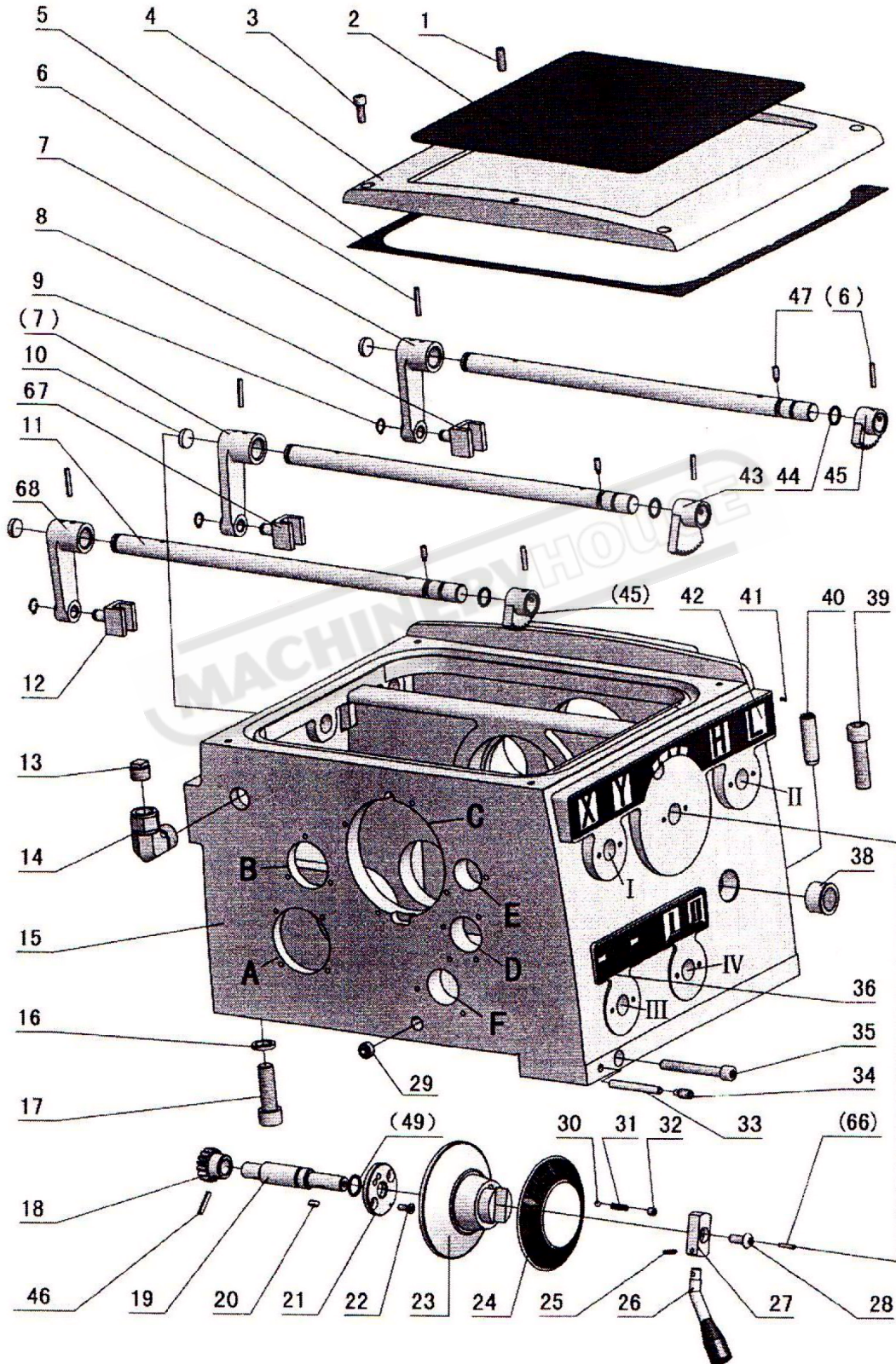
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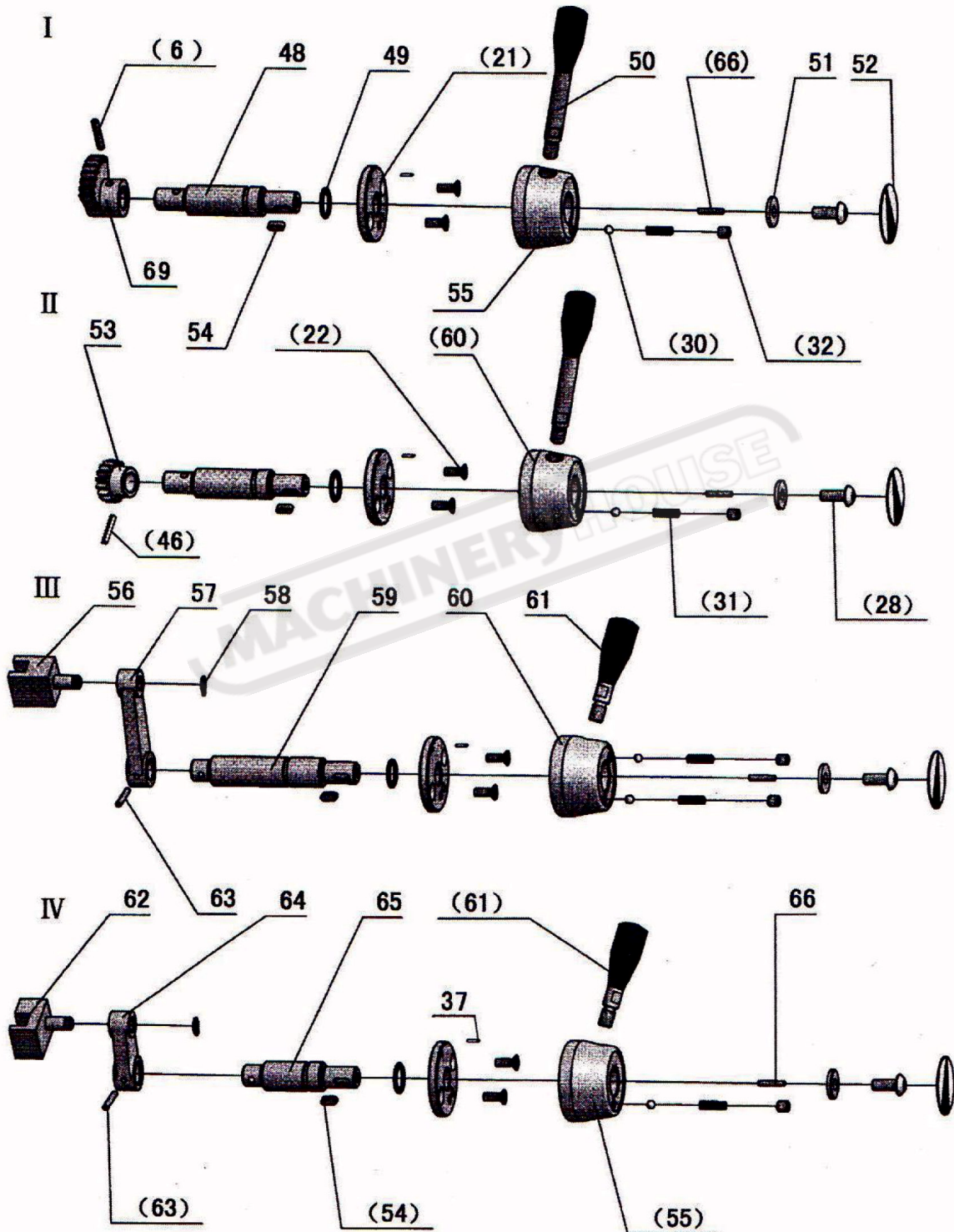
OPERATION MANUAL

CL-560 HEADSTOCK PARTS DIAGRAM



OPERATION MANUAL

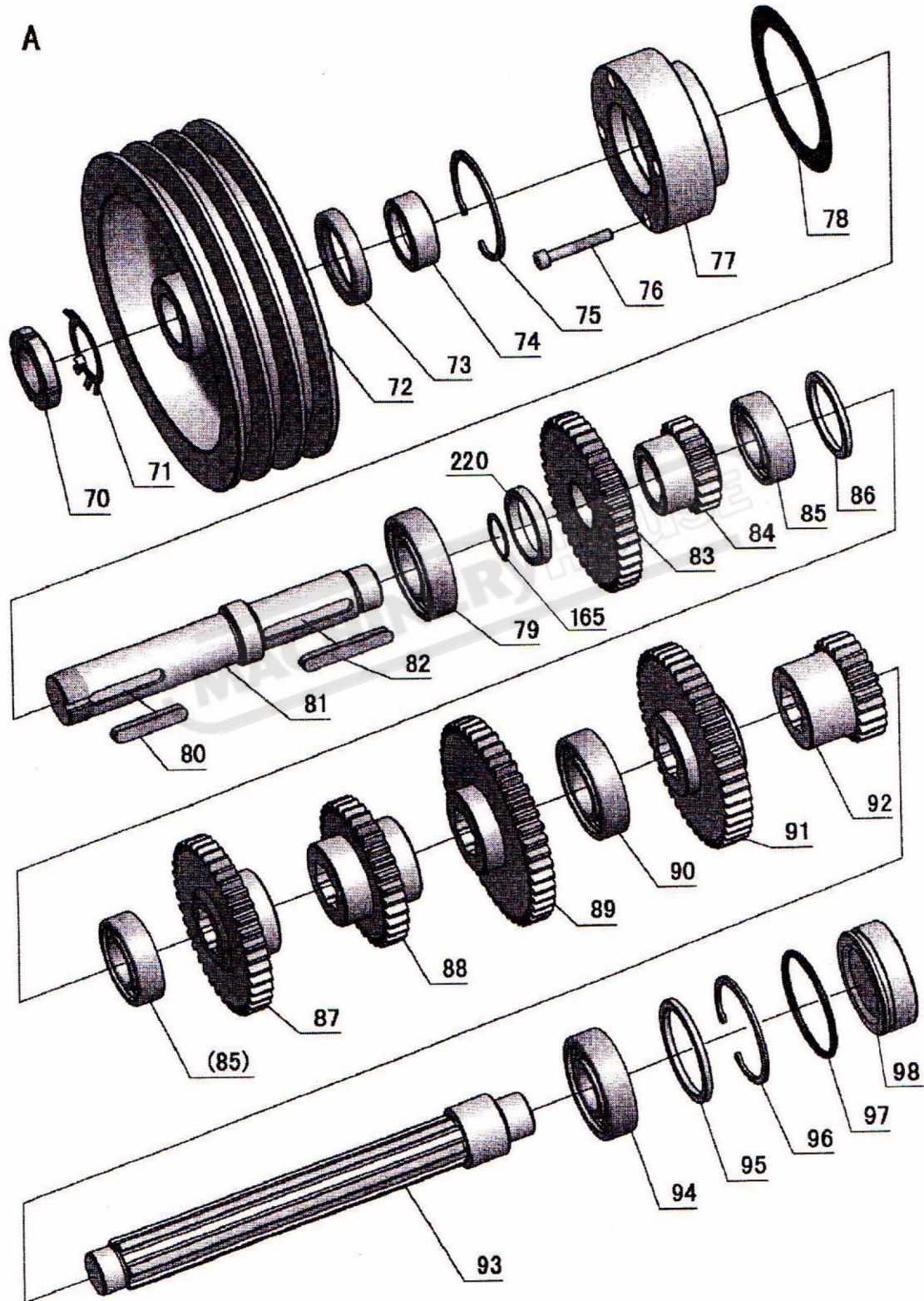
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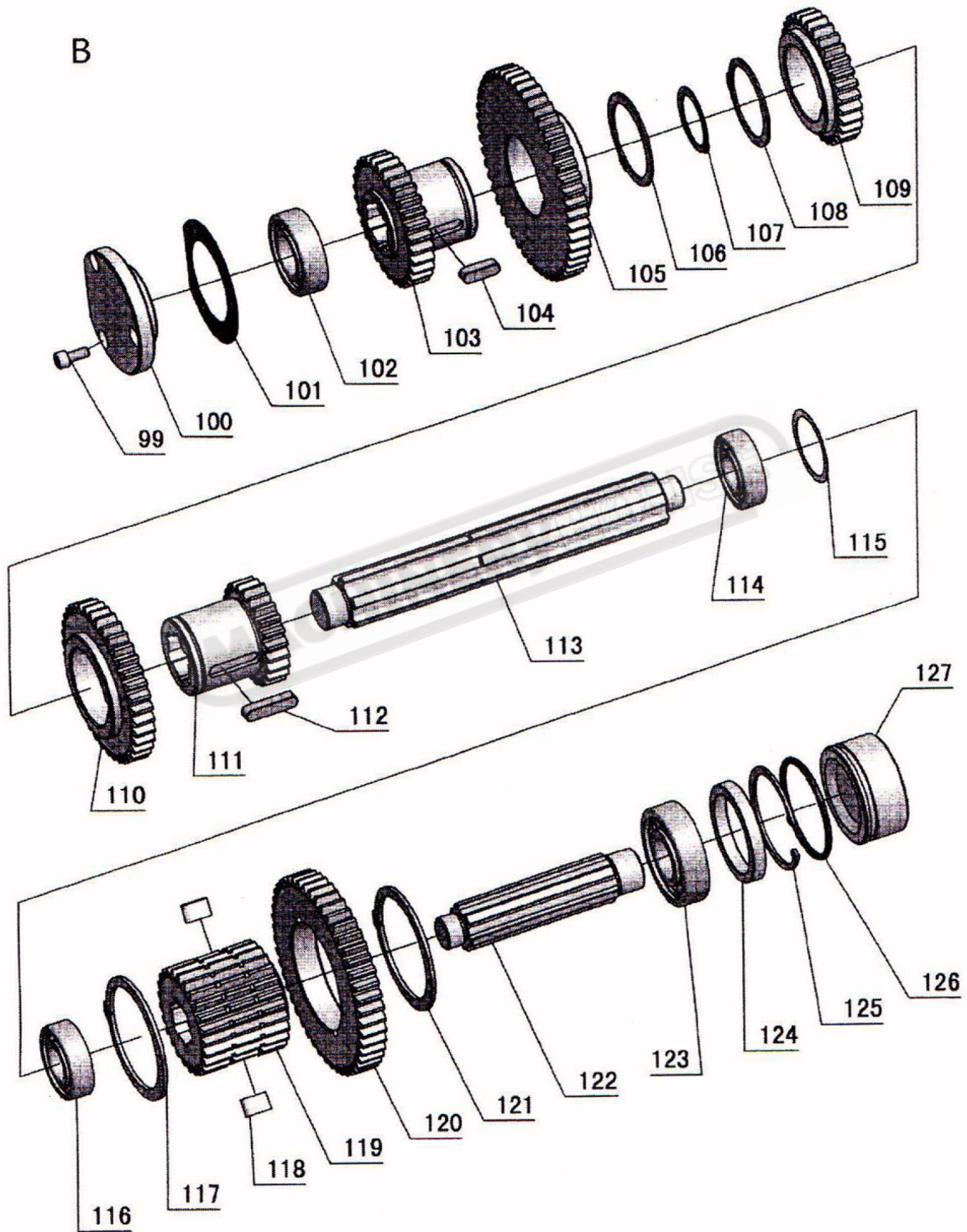
OPERATION MANUAL

CL-560 HEADSTOCK PARTS DIAGRAM Cont.



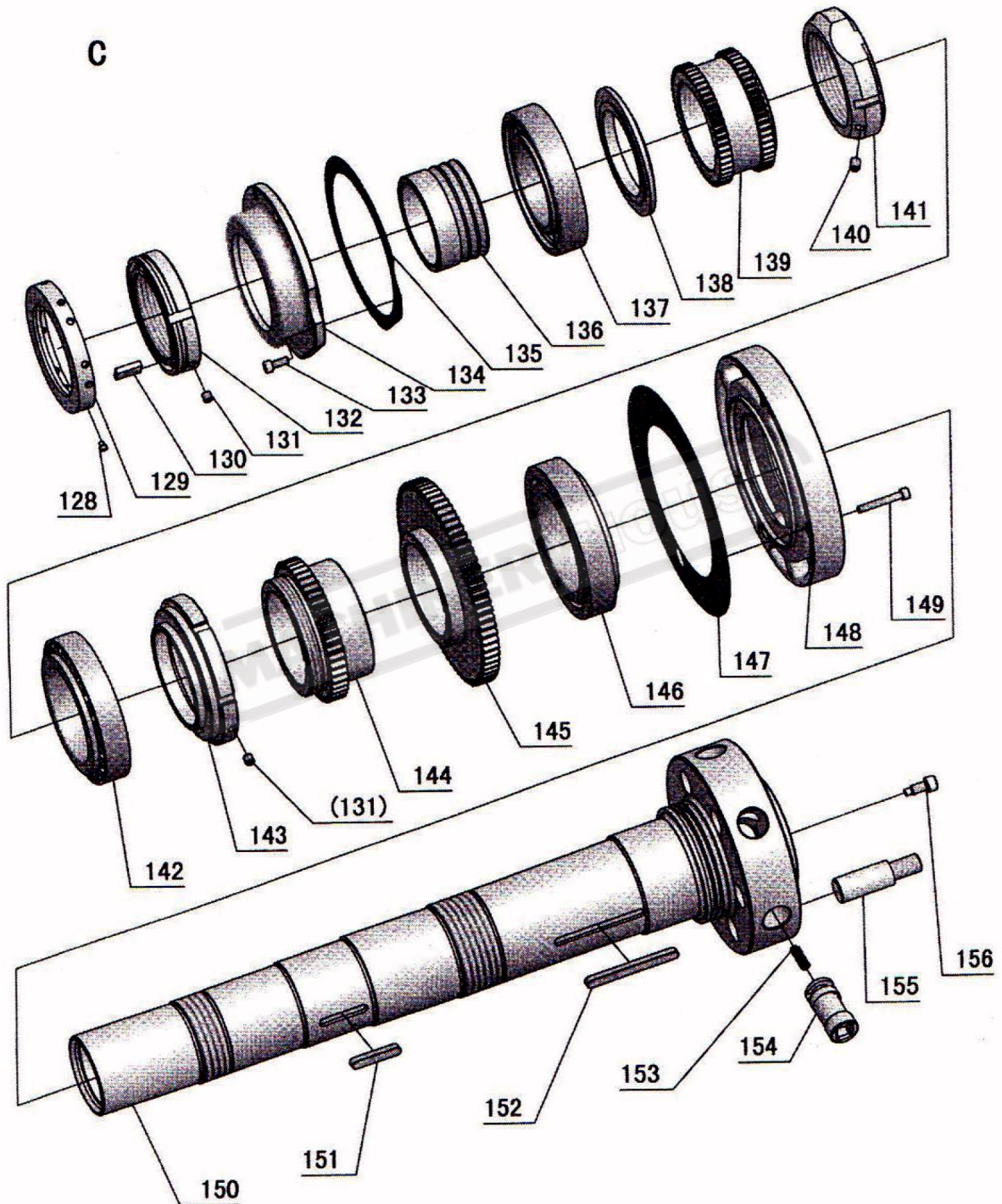
OPERATION MANUAL

CL-560 HEADSTOCK PARTS DIAGRAM Cont.



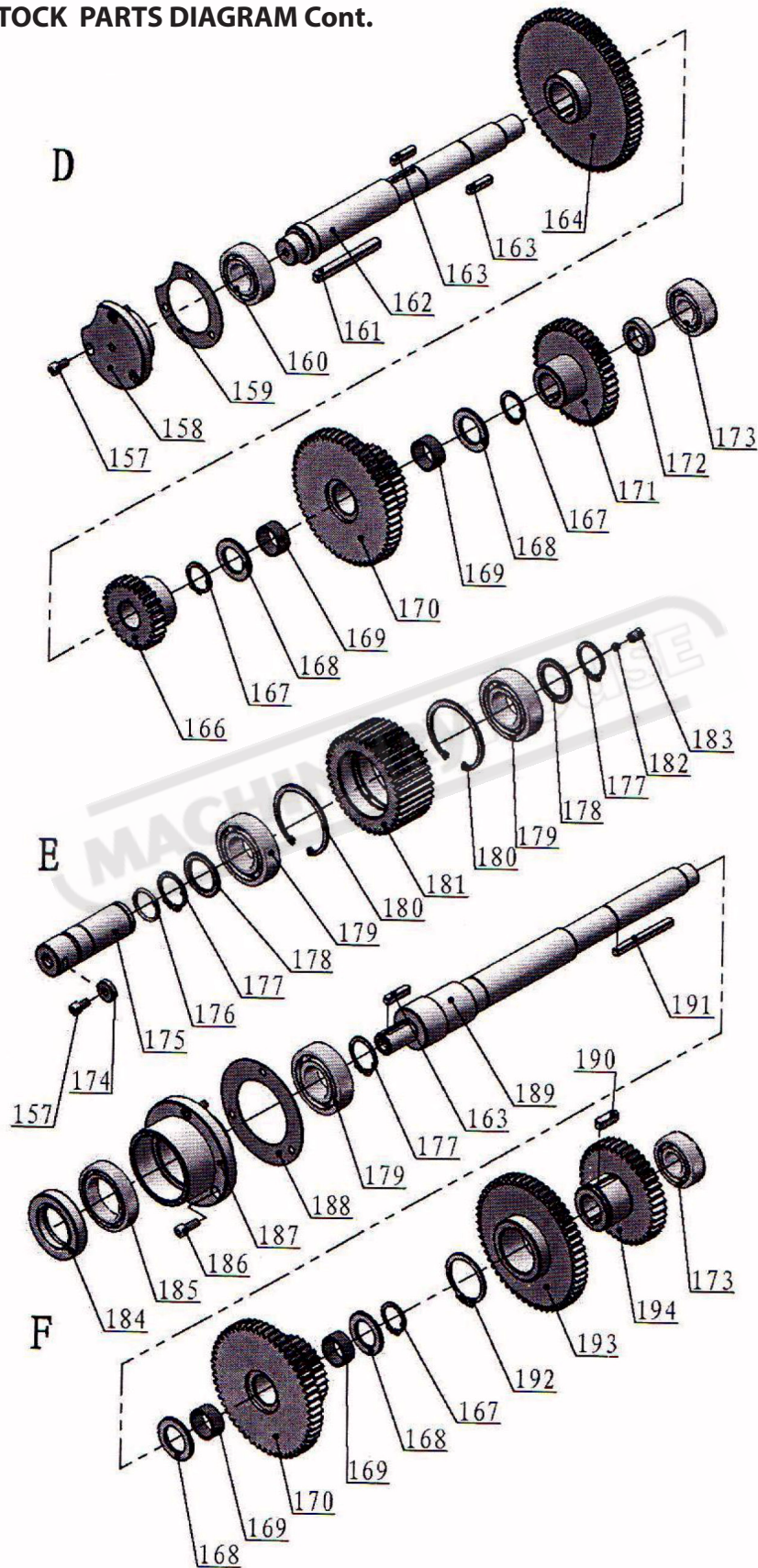
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CL-560 HEADSTOCK PARTS DIAGRAM Cont.



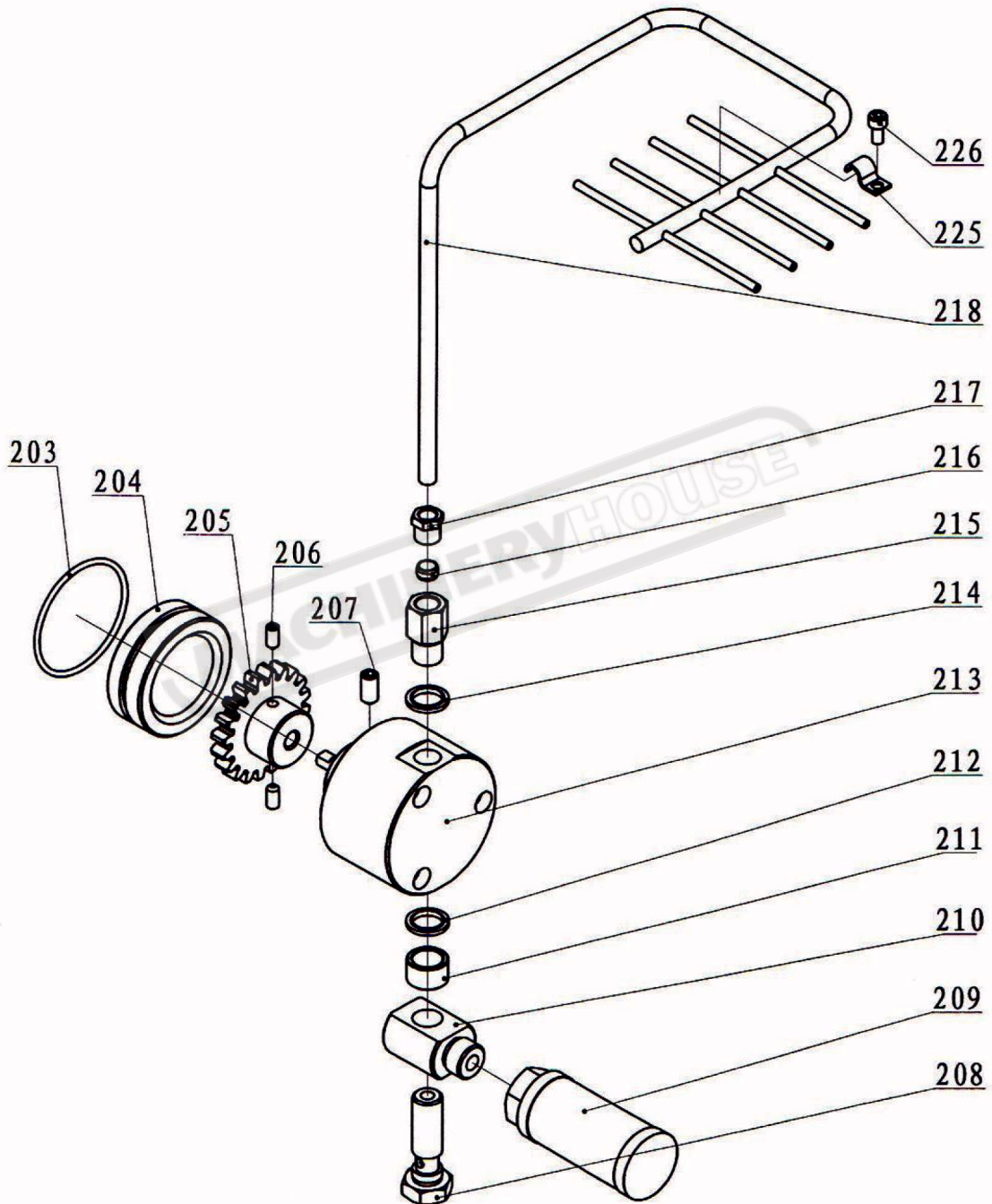
OPERATION MANUAL

CL-560 HEADSTOCK PARTS DIAGRAM Cont.



OPERATION MANUAL

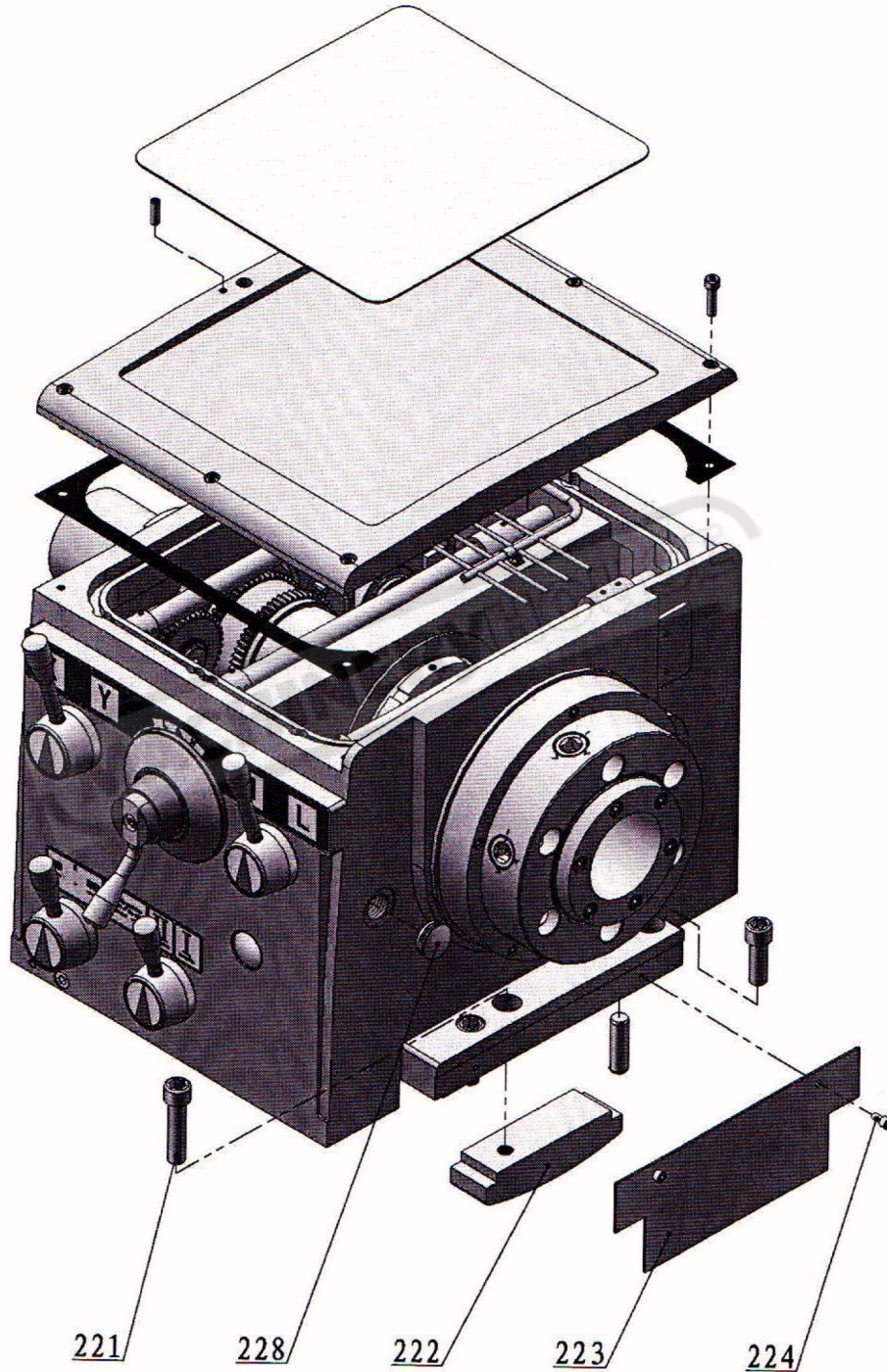
CL-560 HEADSTOCK PARTS DIAGRAM Cont.





OPERATION MANUAL

CL-560 HEADSTOCK PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST

No	Part No.	Item	Specification	Qty.
1	GB77-85	Screw	M8×25	1
2	CR6251-01-11	Cover Dress		1
3	GB70-85	Screw	M8×20	4
4	CR6251-01-02	Headstock Cover		1
5	CR6251-01-10	Sealed Mat		1
6	GB879-86	Spring Pin	5×30	7
7	CR6256B-01-39	Lever		2
8	CR62568-01-40	Fork		1
9	GB894.1-86	Snap Ring	12	3
10	CR6241-01-95	Plug		3
11	CR6251-01-31	Shaft		3
12	CR6256B-01-41	Fork		1
13	SB4032-65	Plug	20	1
14	SB4010-65	Tube Fitting	20	1
15	CR6256B-01-01	Headstock Casting		1
16	GB93-87	Washer	M16	2
17	GB70-85	Screw	M16×45	2
18	CR6241-01-76	Gear		1
19	CR6241-01-81	Shaft		1
20	GB1096-79	Key	5×12	1
21	CR6241-01-83	Fix Black		5
22	GB819-85	Screw	M6×14	10
23	CR6241-01-88	Handel		1
24	CR62568-01-52	Plate		1
25	GB879-86	Spring Pin	4×20	1
26	CR6241-01-90	Lever		1
27	CR6241-01-89	Fix Bracket		1
28	CR6241-01-97	Round Head Screw		5
29	G38-3A	Oil Plug	Z 3/8"	1
30	GB308-84	Steel Ball	1/4"	7
31	CR6241-01-82	Spring		7
32	GB77-85	Screw	M8×8	7
33	GB119-86	Pin	B8×55	1
34	GB79-85	Screw	M10×20	1
35	GB70-85	Screw	M10×80	1
36	CR62568-01-51	Plate		1
37	GB879-86	Spring Pin	3×12	5
38	GB1160.2-89	Oil Sight Glass	A20	1
39	GB70-85	Screw	M16×45	2
40	GB120-86	Pin	16×55	1



OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
41	GB827-86	Rivet	2x4	24
42	CR6256B-01-53	Plate		1
43	CR6241-01-77	Gear		1
44	GB1235-76	O-Ring	20x2.4	6
45	CR6256B-01-43	Gear		2
46	GB879-86	Spring Pin	5x26	2
47	GB79-85	Screw	M6x16	3
48	CR6241-01-80	Shaft		2
49	GB1235-76	O-Ring	22x2.4	5
50	CR6241-01-86	Lever		2
51	CR6241-01-84	Washer		4
52	CR6241-01-100	Plate		4
53	CR6256B-01-44	Gear		1
54	GB1096-79	Key	5x12	4
55	CR6241-01-85	Lever Head		2
56	CR6256B-01-49	Fork		1
57	CR6256B-01-46	Lever		1
58	GB894.1-86	Snap Ring	10	2
59	CR6256B-01-48	Shaft		1
60	CR6241-01-91	Handle		2
61	CR6241-02-62	Lever		2
62	CR6256B-01-50	Fork		1
63	GB879-86	Spring Pin	5x30	2
64	CR6256B-01-47	Lever		1
65	CR6256B-01-45	Shaft		1
66	GB80-85	Screw	M4x20	5
67	CR6256B-01-42	Fork		1
68	CR6256B-01-38	Lever		1
69	CR6251-01-12	Gear		1
70	GB812-88	Nut	TM30x1.5	1
71	GB858-88	Washer	30	1
72	CR6241-01-26	Pulley		1
73	HG4-692-67	Oil Seal	PD40x62x12	4
74	GB278-89	Ball Bearing	1080908	1
75	GB893.1-86	Snap Ring	62	1
76	GB70-85	Socket Head Cap Screw	M6x25	4
77	CR6251-01-32	Bearing Cap		1
78	CR6251-01-33	Bearing Seat Seal		1
79	GB278-89	Ball Bearing	80306	1
80	GB1096-79	Flat Key	8x40	1



OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
81	CR6251-01-90	Input Shaft		1
82	GBI096-79	Flat Key	8x70	1
83	CR6256B-01-09	Gear		1
84	CR6256B-01-08	Gear		1
85	GB278-89	Ball Bearing	80205	2
86	CR6251-01-37	Spacer		2
87	CR6256B-01-07	Gear		1
88	CR6256B-01-06	Gear		1
89	CR6256B-01-05	Gear		1
90	GB278-89	Ball Bearing	80207	1
91	CR6256B-01-04	Gear		1
92	CR6256B-01-03	Gear		1
93	CR6251-01-44	Spline Shaft		1
94	GB278-89	Ball Bearing	80305	1
95	CR6251-01-43	Washer		1
96	GB893.1-86	Snap Ring	62	1
97	GB3452.1-82	O-Ring	56x2.65	1
98	CR6241-01-33	Plug		1
99	GB70-85	Socket Head Cap Screw	M6x12	3
100	CR6251-01-88	Bearing Cover		1
101	CR6251-01-89	Bearing Cover Seal		1
102	GB278-89	Ball Bearing	80205	1
103	CR6256B-01-16	Gear		1
104	GB1096-79	Flat Key	8x32	1
105	CR6256B-01-17	Gear		1
106	GB894.1-86	Snap Ring	58	1
107	GB894.1-86	Snap Ring	38	1
108	GB894.1-86	Snap Ring	52	1
109	CR6256B-01-15	Gear		1
110	CR6256B-01-14	Gear		1
111	CR6256B-01-13	Gear		1
112	GBI096-79	Flat Key	8x32	1
113	CR6251-01-87	Spline Shaft		1
114	GB278-89	Ball Bearing	80205	1
115	CR6251-01-37	Spacer		2
116	GB278-89	Ball Bearing	80205	1
117	GB894.1-86	Snap Ring	82	1
118	CR6251-01-46	Flat Key		2
119	CR6256B-01-11	Gear		1
120	CR6256B-01-12	Gear		1

OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
121	GB894.1-86	Snap Ring	82	1
122	CR6256B -01- 10	Spline Shaft		1
123	GB278-89	Ball Bearing	80305	1
124	CR6251-01-43	Washer		1
125	GB893.1-86	Snap Ring	62	1
126	GB3452.1-82	O-Ring	56×2.65	1
127	CR6241-01-33	Protection Cover		1
128	GB79-85	Socket Head Set Screw	M6×10	4
129	CR6256B-01-56	Balance Block		2
130	CR6251-01-05-1	Brass		1
131	GB77 -85	Socket Head Set Screw	M10×10	2
132	CR6256B-01-55	Lock Nut		1
133	GB70-85	Socket Head Cap Screw	M6×20	4
134	CR6256B-01-27	Rear Bearing Cover		1
135	CR6256B-01-28	Rear Spindle Bearing Cover		1
136	CR6256B-01-26	Oil Ring		1
137	GB276 -89	Ball Bearing	124	1
138	CR6256B-01-25	Shaft Ring		1
139	CR6256B-01-24	Gear		1
140	GB77-85	Socket Head Set Screw	M10×10	3
141	CR6256B-01-54	Lock Nut		1
142	GB297-84	Ball Bearing	32926/P5	1
143	CR6256B-01-23	Lock Nut		1
144	CR6256B-01-22	Gear		1
145	CR6256B-01-21	Gear		1
146	GB297-84	Ball Bearing	32928/P5	1
147	CR6256B-01-20	Front Bearing Cover Seal		1
148	CR6256B-01-19	Front Bearing Cover	D1-8	1
149	GB70-85	Socket Head Cap Screw	M6×35	5
150	CR6256B-01- 02	Spindle		1
151	GB1096-79	Flat Key	8×80	1
152	GB1096-79	Flat Key	10×90	1
153	CR6241-01-94	Spring		6
154	CR6256B-01-57	Cam Lock For D1-8		6
155	CR6251-09-01	Cam Screw For D1-8		6
156	CR6256B-01-58	Screw For D 1- 8		6
157	GB70-85	Socket Head Cap Screw	M6×12	4
158	CR6251-01-74	Bearing Cover		1
159	CR6251-01-75	Bearing Cover Seal		1
160	GB278-89	Ball Bearing	80205	1



OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
161	GB1096-79	Flat Key	8x80	1
162	CR6256B-01-36	Shaft		1
163	GB1096 -79	Flat Key	6x28	3
164	CR6256B-01-33	Gear		1
165	GB894.1- 86	Snap Ring	30	1
166	CR6256B-01-34	Gear		1
167	GB894.1-86	Snap Ring	25	3
168	CR6241-01-16	Spacer		4
169	SF-1	Bearing	2512	4
170	CR6256B-01-29	Gear		2
171	CR6256B-01-35	Gear		1
172	CR6241-01-66	Spacer		1
173	GB278-89	Ball Bearing	80204	2
174	CR6241-01-65	Spacer		1
175	CR6251-01-68	Stationary Pulley Shaft		1
176	GB1235-76	O-Ring	30x2.4	1
177	GB894.1-86	Snap Ring	30	3
178	CR6251-01-66	Spacer		2
179	GB278-89	Ball Bearing	80206	3
180	GB893.1-86	Snap Ring	62	2
181	CR6256B-01-37	Gear		1
182	B1061C	Double Taper Sheath		1
183	15326C	Tie-In		1
184	HG4-692-67	Oil Seal	PD40x62x12	1
185	GB278-89	Ball Bearing	1080908	1
186	GB70-85	Socket Head Cap Screw	M6x16	3
187	CR6251-01-69	Bearing Seat		1
188	CR6251-01-70	Bearing Seat Seal		1
189	CR6256B-01-32	Output Shaft		1
190	GB1096-79	Flat Key	8x25	1
191	GB1096-79	Flat Key	6x70	1
192	GB894.1-86	Snap Ring	42	1
193	CR6256B-01-30	Gear		1
194	CR6256B-01-31	Gear		1
203	GB123 5-76	O-Ring	68x3.1	1
204	CR6251-01-92	Protection		1
205	CR6256B-01-18	Gear		1
206	GB80-85	Screw	M6x12	2
207	GB80-85	Screw	M8x16	1
208	CR6251-01-96	Connection		1

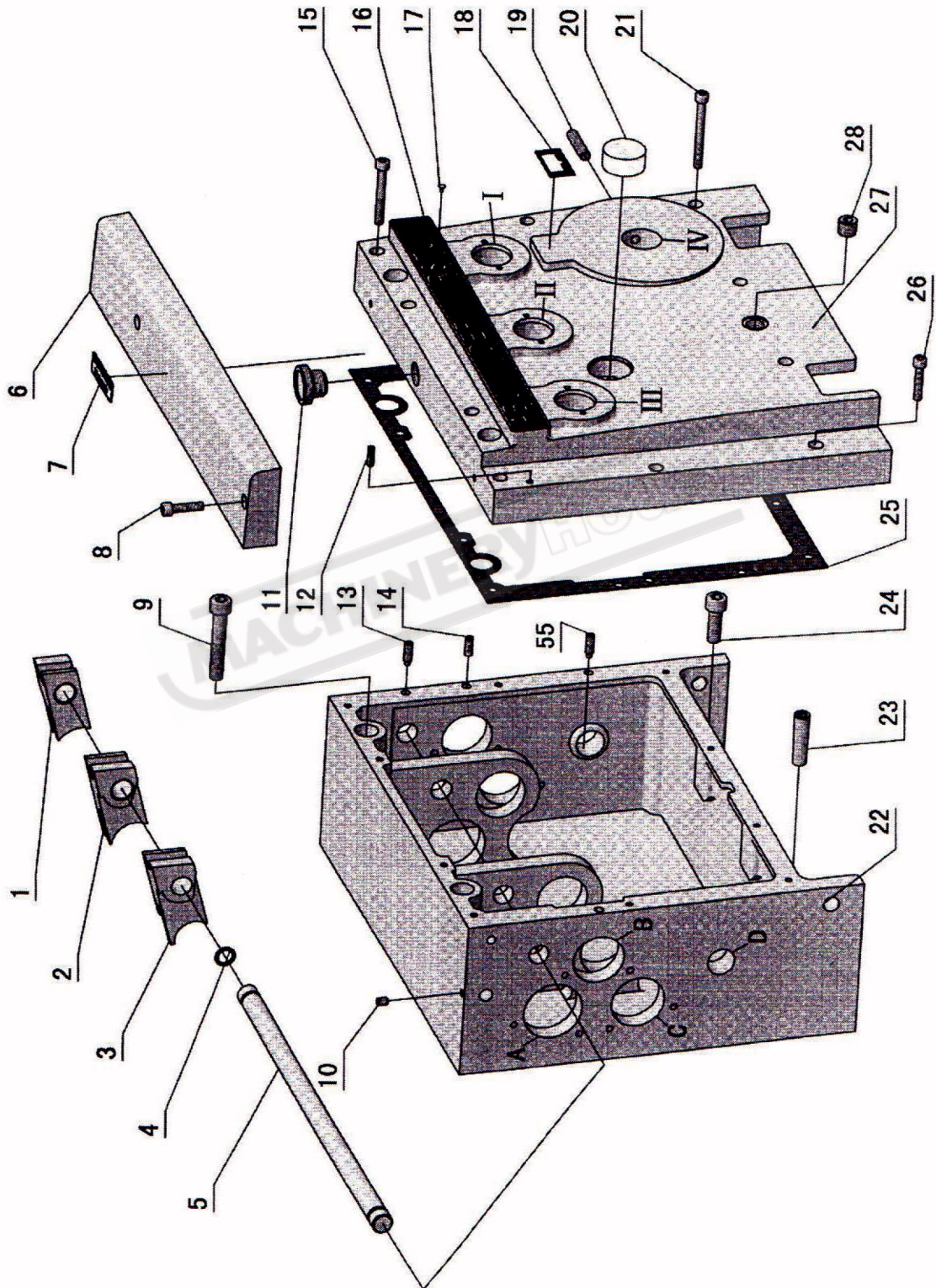
OPERATION MANUAL

CL-560 HEADSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
209	Wu-16x180-J	Filter		1
210	CR6251-01-95	Connection		1
211	CR6251.01-94	Spacer	14	1
212	G52-2	Washer	14	1
213	SNBY2.5/0.5	Oil Pump	M14 x 1.5	1
214	G52-2	Washer	14	1
215	CR6251-01-93	Conjunction Block		1
216	B145C	Double Taper Sheath		1
217	25567	Tie-In		1
218	CR6251-01-08	Oil Pipe		1
220	CR6251-01-34	Spacer Ring		1
221	GB70-85	Socket Head Cap Screw	M16 x 65	1
222	CR6251T-01-07	Clamp		1
223	CR6251T-01-06	Back Plate		1
224	GB70-85	Socket Head Cap Screw	M6 x 10	2
225		Pipe Clip	25594-1	1
226	GB70-85	Socket Head Cap Screw	M5 x 10	1
228		Oil Sight Glass	M27 x 1.5	1

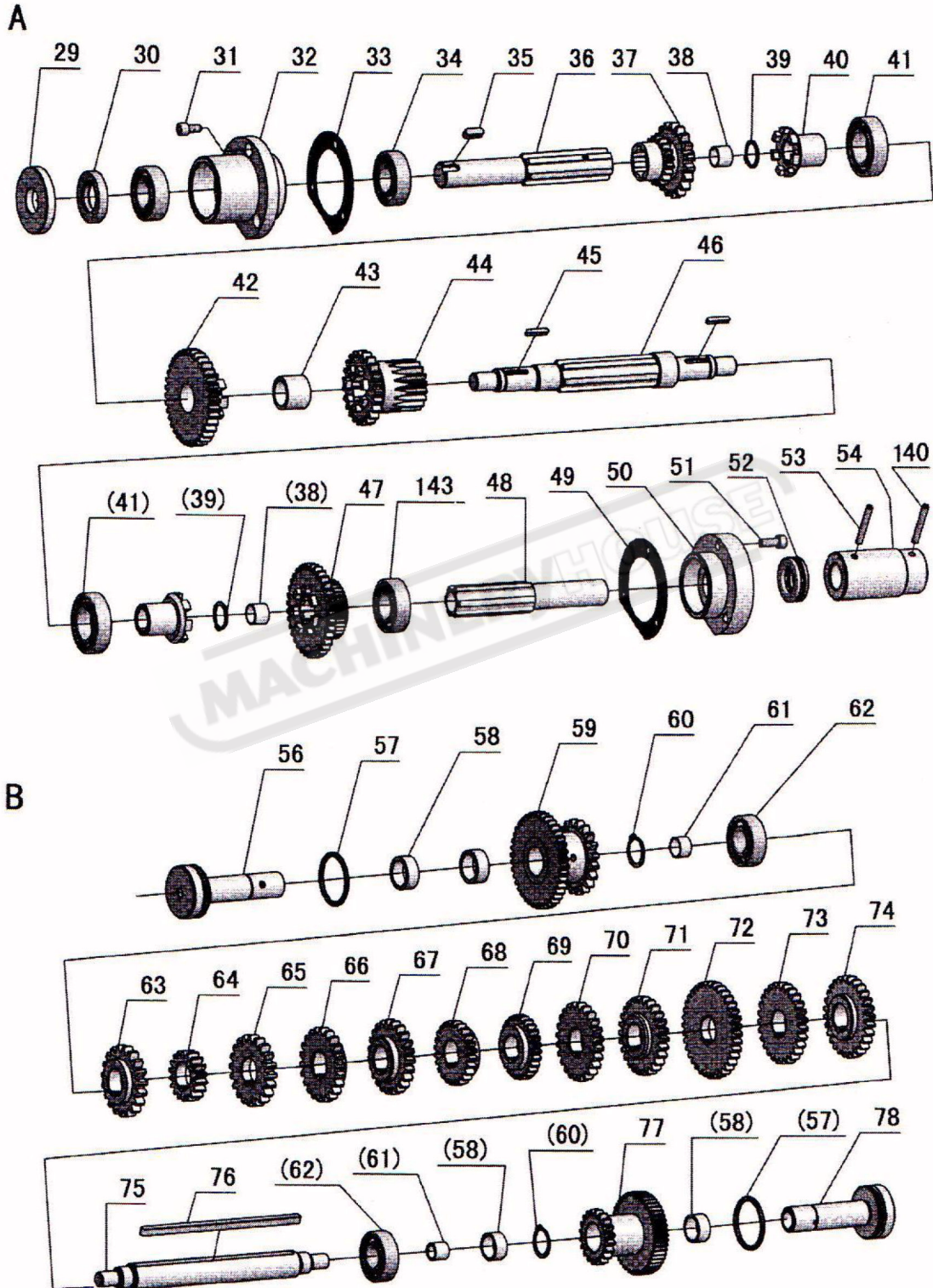
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CL-560 GEARBOX PARTS DIAGRAM



OPERATION MANUAL

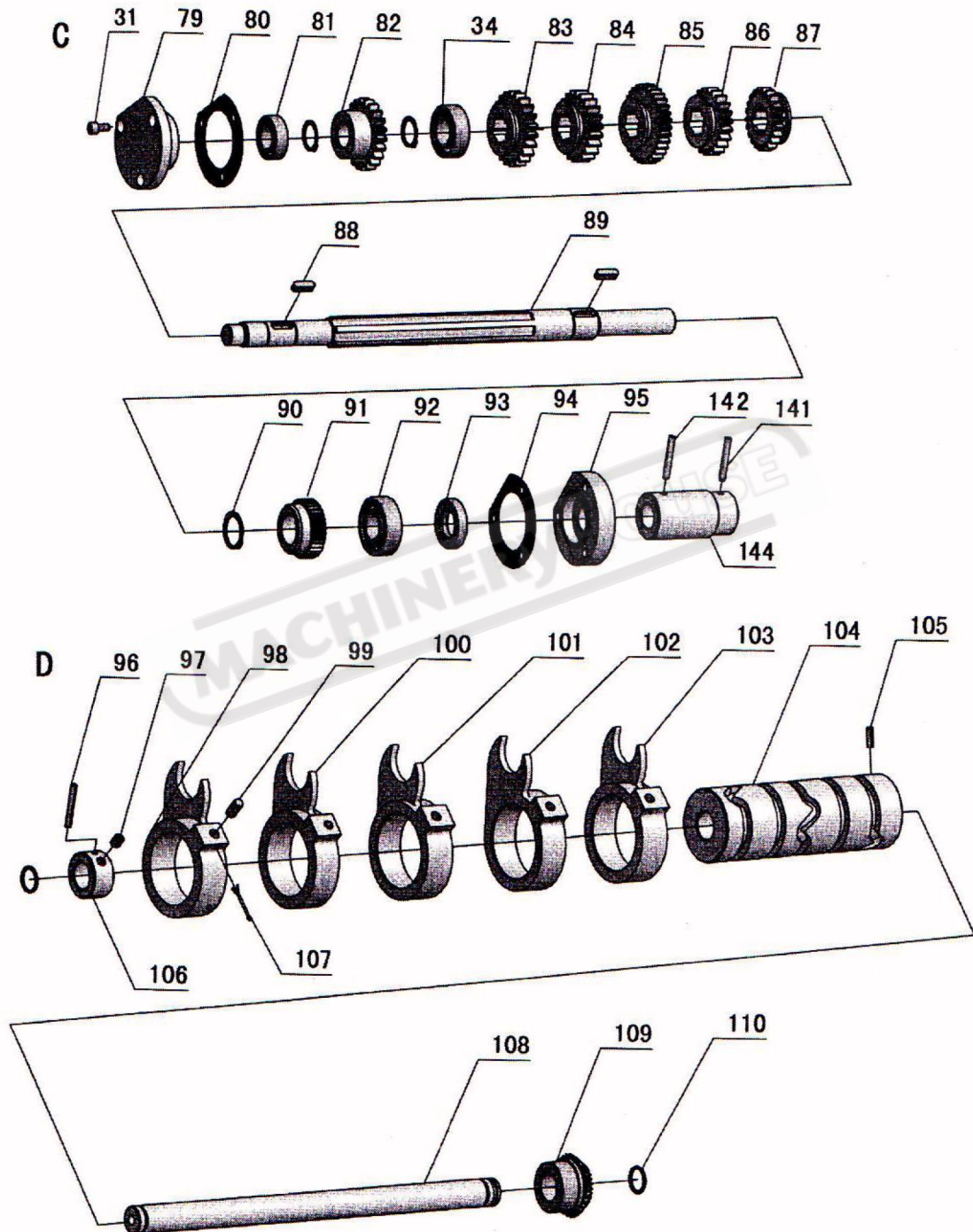
CL-560 GEARBOX PARTS DIAGRAM Cont.





OPERATION MANUAL

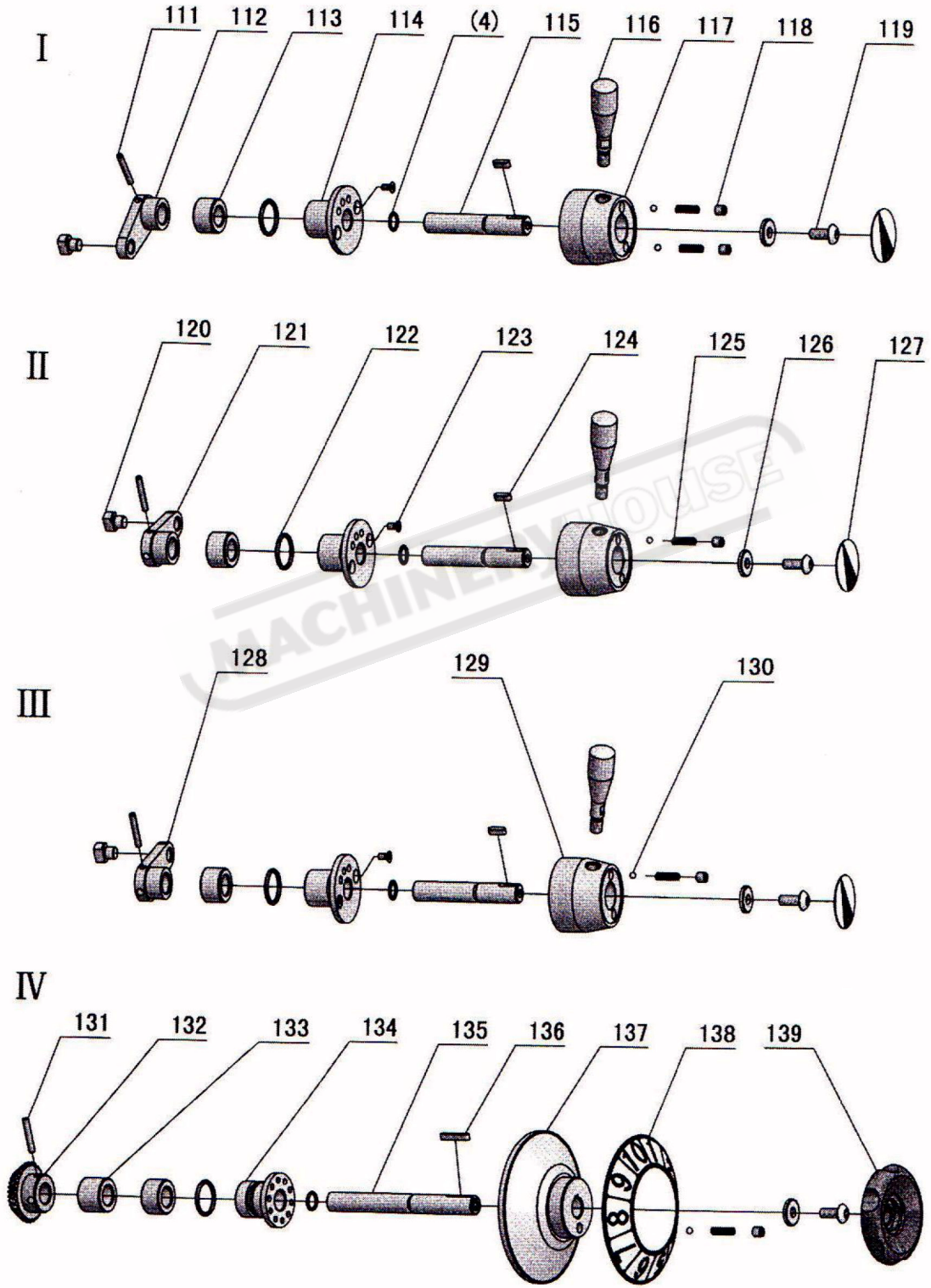
CL-560 GEARBOX PARTS DIAGRAM Cont.





OPERATION MANUAL

CL-560 GEARBOX PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 GEARBOX PARTS LIST

No	Part No.	Item	Specification	Qty.
1	CR6241-02-10	Fork		1
2	CR6241-02-71	Fork		1
3	CR6241-02-72	Fork		1
4	GB1235-76	O-Ring	16x2.4	6
5	CR6241-02-78	Shaft		1
6	CR6251T-02-01	Top Cover		1
7	CR6241-01-102	Plate		1
8	GB70-85	Screw	M6x30	2
9	GB70-85	Screw	M10 x45	2
10	GB78-85	Screw	M6x8	1
11	CR6241-03-42	Oil Cover		1
	CR6241-03-43	Plate		1
12	GB879-86	Spring Pin	5x16	2
13	GB78-85	Socket Set Screw	M6x16	1
14	GB78-85	Screw	M6x16	2
15	GB70-85	Screw	M6x50	4
16	CR6251T-02-06	Plate		1
17	GB827-86	Rivet	2 x5	14
18	CR6241-02-80	Plate		1
19	GB78-85	Screw	M8x35	1
20	GB1160.2-89	Oil Sight Glass	A20	1
21	GB70-85	Screw	M6x60	4
22	CR6251T-02-04	Gear Box		1
23	GB118-86	Taper Pin	8x50	2
24	GB70-85	Screw	M10 x45	2
25	CR6251T-02-05	Sealed Mat		1
26	GB70-85	Screw	M6x50	2
27	CR6251T-02-02	Front Cover		1
28	G38-3A	Oil Plug	Z 3/8"	1
29	CR6251-02-12	Spacer		1
30		Oil-Seal	TC20 x42x8	1
31	GB70-85	Socket Head Cap Screw	M6x12	6
32	CR6241-02-58	Cap		1
33	CR6241-02-59	Sealed Mat		1
34	GB278-89	Ball Bearing	80104	31
35	GB1096-79	Key	6x10	1
36	CR6251-02-11	B-Shaft		1
37	CR6241-02-56	Gear		1
38	SF-1	Ball Bearing	1410	2
39	GB894.1-86	Snap Ring	18	2



OPERATION MANUAL

CL-560 GEARBOX PARTS LIST

No	Part No.	Item	Specification	Qty.
40	CR6241-02-55	Clutch		2
41	GB278-89	Ball Bearing	80105	2
42	CR6241-02-54	Gear		1
43	SF-1	Ball Bearing	2020	1
44	CR6241-02-53	Gear		1
45	GBI096 - 79	Key	4x20	2
46	CR6241-02-52	A-Shaft		1
47	CR6241-02-06	Gear		1
48	CR6241-02-51	C-Shaft		1
49	CR6241-02-50	Sealed Mat		1
50	CR6241-02-49	Cap		1
51	GB70-85	Socket Cap Screw	M6x20	6
52	GB301-84	Thrust Bearing	8104	1
53	GB879-86	Spring Pin	5x35	1
54	CR6251-02-10	Collar-Linkage		1
55	GB79-85	Socket Set Screw	M6x20	1
56	CR6241-02-33	E-Shaft		1
57	GB3452.1-82	O-Ring	35.5x3.55	2
58	SF - 1	Ball Bearing	2012	4
59	CR6241-02-34	Gear		1
60	GB894.1-86	Snap Ring	20	4
61	SF- I	Ball Bearing	1218	2
62	GB278-89	Ball Bearing	80203	2
63	CR6241-02-36	Gear		1
64	CR6241-02-37	Gear		1
65	CR6241 -02-38	Gear		1
66	CR6241-02-39	Gear		1
67	CR6241-02-40	Gear		1
68	CR6241-02-41	Gear		1
69	CR6241-02-42	Gear		1
70	CR6241 -02-43	Gear		1
71	CR6241-02-44	Gear		1
72	CR6241-02-45	Gear		1
73	CR6241-02-46	Gear		1
74	CR6241-02-47	Gear		1
75	CR6241-02-35	D-Shaft		1
76	GB1096-79	Key	6x146	1
77	CR6241-02-05	Gear		1
78	CR6241-02-48	F-Shaft		1
79	CR6241-02-31	Cap		1



OPERATION MANUAL

CL-560 GEARBOX PARTS LIST

No	Part No.	Item	Specification	Qty.
80	CR6241-02-32	Sealed Mat		1
81	GB278-89	Ball Bearing	80103	1
82	CR6241-02-29	Gear		1
83	CR6241-02-28	Gear		1
84	CR6241-02-27	Gear		1
85	CR6241-02-26	Gear		1
86	CR6241-02-25	Gear		1
87	CR6241-02-24	Gear		1
88	GB1096-79	Key	6x20	2
89	CR6241-02-30	G-Shaft		1
90	GB894.1-86	Snap Ring	25	1
91	CR6241-02-04	Gear		1
92	GB279-88	Ball Bearing	180204	1
93		Oil Seal	TC20x40x7	1
94	CR6241-02-23	Sealed Mat		1
95	CR6241-02-22	Cap-Right		1
96	GB879-86	Spring Pin	5x35	1
97	GB78-85	Socket Set Screw	M8x10	1
98	CR6241-02-17	Claw-Shifter		1
99	GB119-86	Pin	B8x16	5
100	CR6241-02-16	Claw -Shifter		1
101	CR6241-02-15	Claw-Shifter		1
102	CR6241-02-14	Claw-Shifter		1
103	CR6241-02-13	Claw-Shifter		1
104	CR6241-02-18	Cam		1
105	GB879-86	Spring Pin	5x16	2
106	CR6241-02-19	Fixed Ring		1
107	GB91-86	Split Pin	2x30	3
108	CR6241-02-20	Cam Shaft		1
109	CR6241-02-12	Bevel Gear		1
110	GB1235-76	O-Ring	22x2.4	2
111	GB879-86	Spring Pin	5x30	3
112	CR6241-02-68	Arm		1
113	CR6241-02-09	Spacer		4
114	CR6241-02-76	Detent Plate		3
115	CR6241-02-11	Shaft		3
116	CR6241-02-62	Lever		3
117	CR6241-02-77	Speed Change Handle		1
118	GB77-85	Screw	M8x8	5
119	CR6241-01-97	Screw		4

OPERATION MANUAL

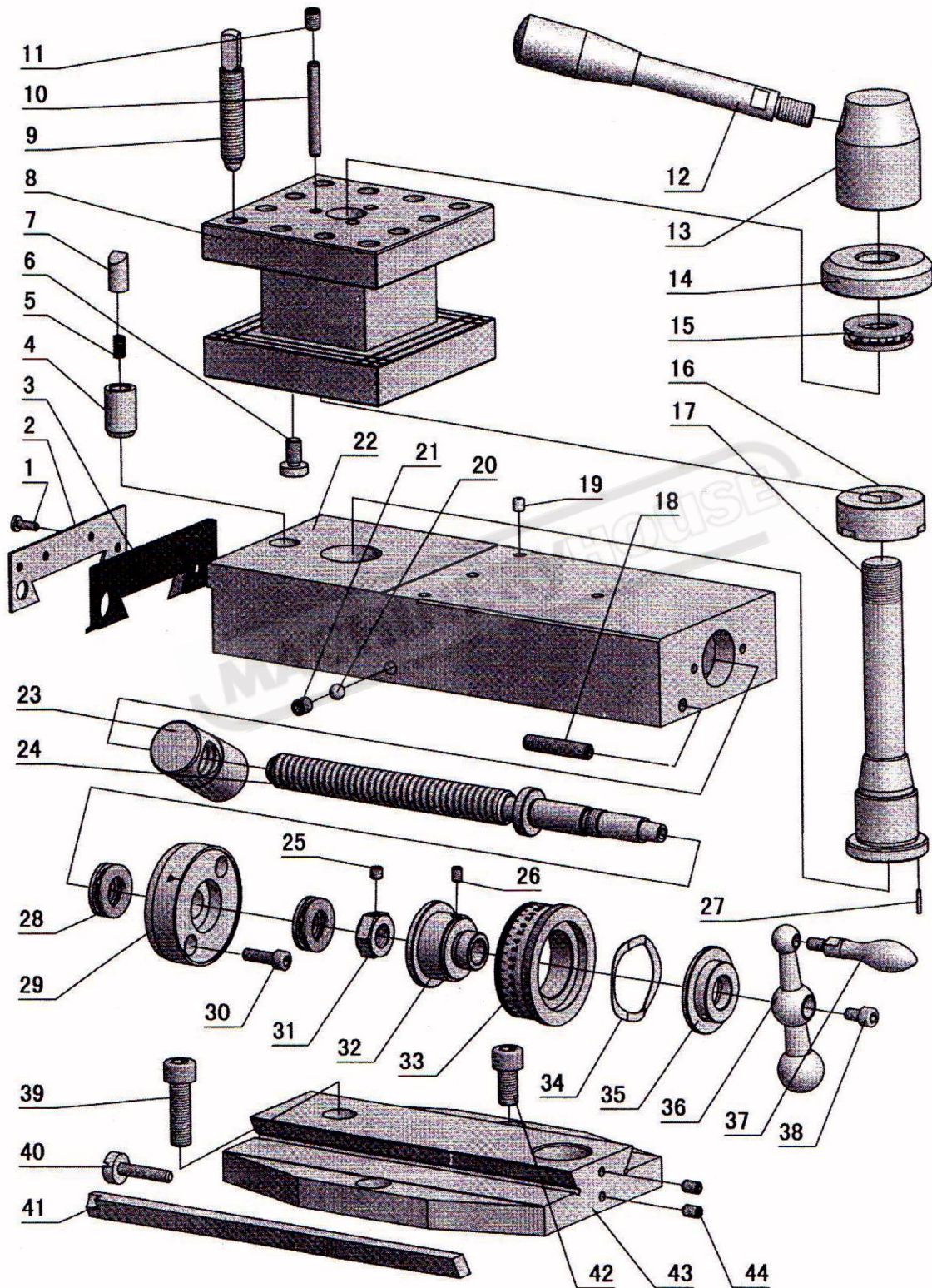
CL-560 GEARBOX PARTS LIST

No	Part No.	Item	Specification	Qty.
120	CR6241-02-74	Fork		3
121	CR6241-02-69	Arm		1
122	GB1235-76	O-Ring	30x3.1	4
123	GB819-85	Screw	M5x10	6
124	GB1096-79	Key	5x14	3
125	CR6241-01-82	Spring		5
126	CR6241-01-84	Washer		4
127	CR6241-01-100	Plate		3
128	CR6241-02-70	Arm		1
129	CR6241-02-67	Speed Change Handle		2
130	GB308-77	Steel Ball	1/4"	5
131	GB879-76	Spring Pin	5x30	1
132	CR6241-02-63	Bevel Gear		1
133	CR6241-02-65	Spacer		1
134	CR6241-02-64	Shaft Sleeve		1
135	CR6241-02-07	Shaft		1
136	GB1096-79	Key	5x28	1
137	CR6241-02-66	Selecting Dial		1
138	CR6241-02-81	Plate		1
139	CR6241-02-61	Wheel		1
140	CR6251-06-23	Pin		1
141	CR6241-06-63	Pin		1
142	GB879-86	Spring Pin	5x35	1
143	GB279-88	Ball Bearing	180104	1
144	CR6241-02-21	Collar- Linkage		1



OPERATION MANUAL

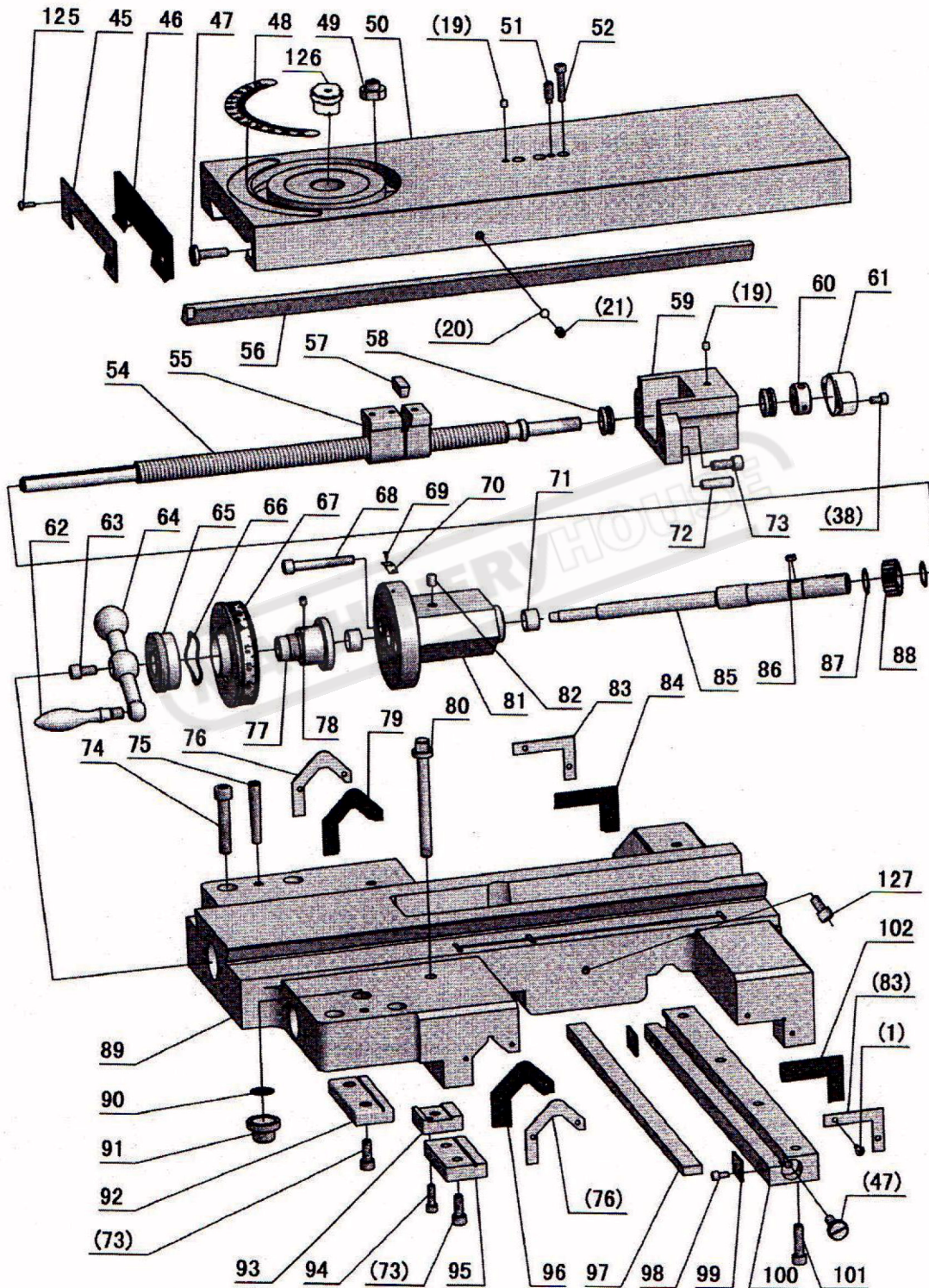
CL-560 SADDLE PARTS DIAGRAM





OPERATION MANUAL

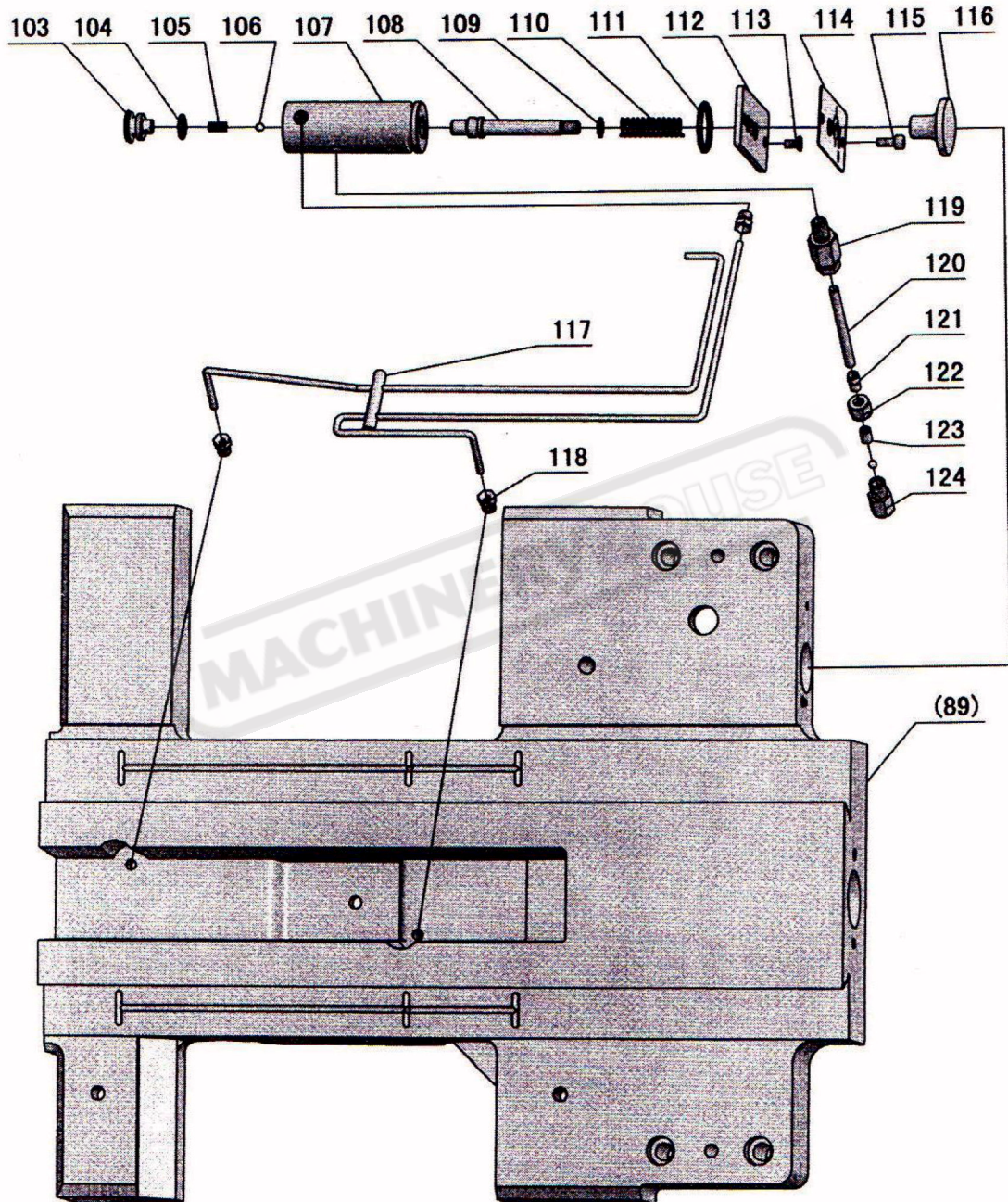
CL-560 SADDLE PARTS DIAGRAM Cont.





OPERATION MANUAL

CL-560 SADDLE PARTS DIAGRAM Cont.





OPERATION MANUAL

CL-560 SADDLE PARTS LIST

No	Part No.	Item	Specification	Qty.
1	GB818-85	Screw	M4x12	12
2	CR6251-03-24	Case-Wiper		1
3	CR6251-03-23	Wiper		1
4	CR6241-03-57	Sleeve		1
5	GB2089-80	Spring	1x5x18	1
6	CR6241-03-60	Adjust Screw (Flat Type)		3
7	CR6241-03-58	Round Pin		1
8	CR6251-03-25	Four Way Tool Post		1
8	CR6251-03-29	Block-Tee (T Type)		1
9	GB83-88	Screw	M12x55	12
10	GB119-86	Pin	D6x60	3
11	GB77-85	Screw	M8x10	3
12	CR6241-03-63	Clamping Handle		1
13	CR6241-03-62	Clamping Handle		1
14	CR6241-03-61	Washer		1
15	GB301-84	Thrust Bearing	8104	1
16	CR6241-03-59	Sleeve (Flat Type)		1
17	CR6251-03-22	Tool Post Shaft (Flat Type)		1
17	CR6251-03-28	Tool Post Shaft (T Type)		1
18	GB77-85	Screw	M8x40	1
19	GB1155-79	Ball Cup	6	6
20	GB308-84	Steel Ball	1/4"	2
21	GB80-85	Screw	M8x10	2
22	CR6251-03-26	Compound Rest (Flat Type)		1
22	CR6251-03-30	Compound Rest (T Type)		1
23	CR6241-03-48	Nut (Metric)		1
23	CR6241-03-48 Y	Nut (Inch)		1
24	CR6241-03-47	Screw-Compound Rest (Metric)		1
24	CR6241-03-47 Y	Screw-Compound Rest (Inch)		1
25	GB80-85	Screw	M6x6	1
26	GB80-85	Screw	M5x8	1
27	GB879-86	Spring Pin	2x12	1
28	GB301-84	Thrust Bearing	8102	2
29	CR6241-03-49	Seat Compound Rest Screw		1
30	GB70-85	Screw	M6 x 20	2
31	CR6241-03-50	Nut		1
32	CR6241-03-51	Collar		1
33	CR6241-03-52	Dial-Compound Rest (Metric)		1
33	CR6241-03-52 Y	Dial-Compound Rest (Inch)		1
34	CR6241-03-54	Wave Type Washer		1

OPERATION MANUAL

CL-560 SADDLE PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
72	GB118-86	Taper Pin	6 x 26	2
73	GB70-85	Screw	M8 x20	6
74	GB70-85	Screw	M10 x 60	4
75	GB118-86	Taper Pin	8 x 60	2
76	CR6251-03-09	Case-Wiper		2
77	CR6241-03-38	Clutch-Dial		1
78	GB80-85	Screw	M6x8	1
79	CR6251-03-07	Wiper		1
80	CR6241-03-74	Bolt		1
81	CR6251-03-17	Bracket		1
82	GB1155-79	Ball Cup	8	1
83	CR6251-03-06	Case-Wiper		2
84	CR6251-03-04	Wiper		1
85	CR6251-03-15	Cross Feed Pinion		1
86	GB1567-79	Key	8 x 12	1
87	GB894.1-86	Snap Ring	24	2
88	CR6251-03-16	Gear		1
89	CR6251-03-01	Saddle		1
90	CR6241-03-43	Plate		1
91	CR6241-03-42	Plug-Oil Inlet		1
92	CR6251-03-13	Gib-Front		1
93	CR6241-03-34	Clamp-Carriage		1
94	GB70-85	Screw	M6 x 20	1
95	CR6251-03-12	Gib-Left-Front		1
96	CR6251-03-08	Wiper		1
97	CR6251-03-10	Gib		1
98	GB70-85	Screw	M5 x 10	4
99	CR6241-03-14	Baffle		2
100	CR6251-03-11	Holder Gib		1
101	GB70-85	Screw	M8 x 30	4
102	CR6251-03-05	Wiper		1
103	CR6241-03-70	Oil Plug		1
104	GB1235-76	O-Ring	16x2.4	1
105	GB2089-80	Spring	0.5x4.5x}6	1
106	GB308-84	Steel Ball	ø 5	2
107	CR6241-03-64	Body Pump		1
108	CR6241-03-65	Piston Rod		1
109	GB3452.1-82	O-Ring	9 x1.8	1
110	CR6241-03-66	Spring		1
111	GB1235-76	O-Ring	32 x 3.1	1

OPERATION MANUAL

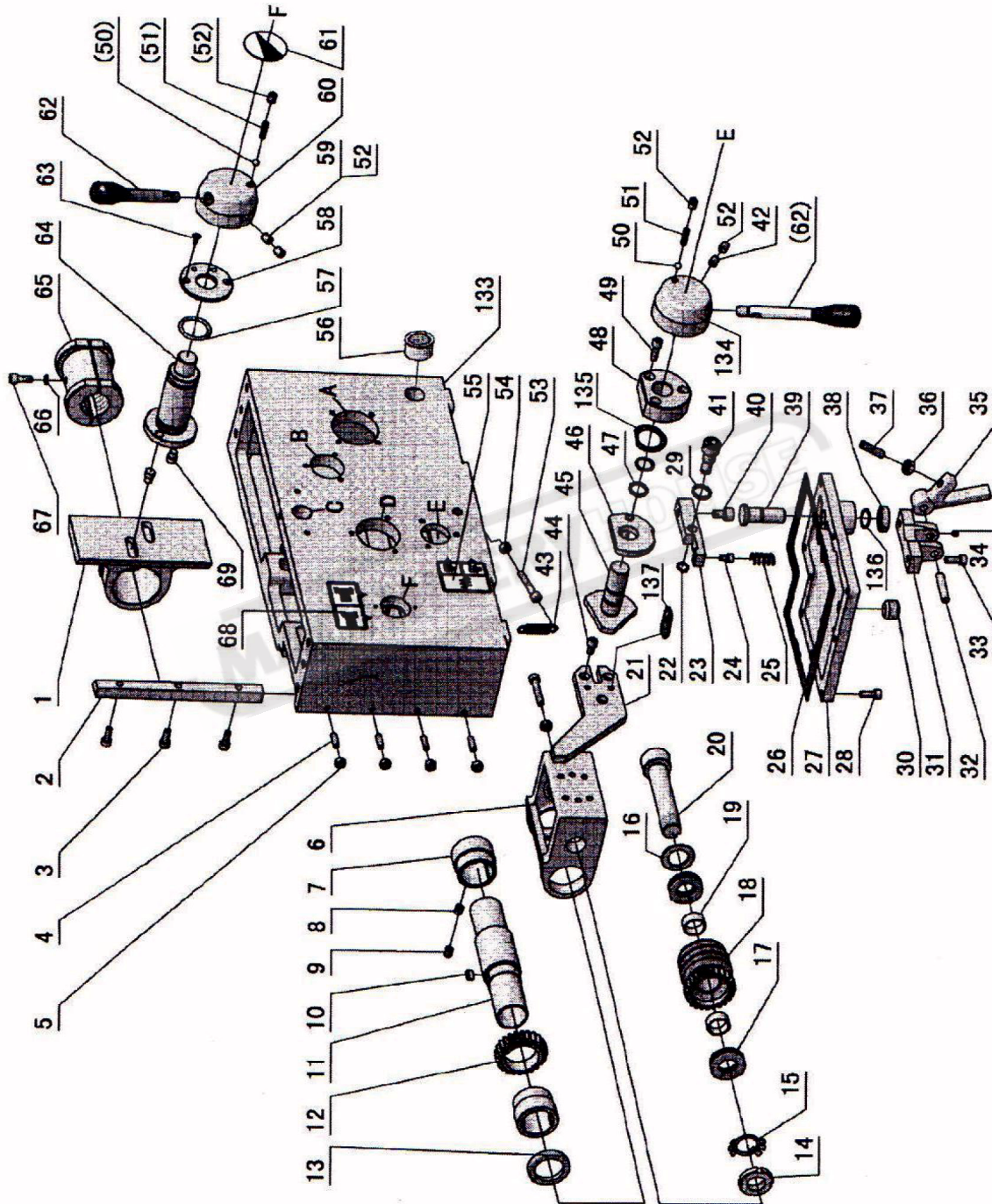
CL-560 SADDLE PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
112	CR6241-03-6 7	Bottom Board		1
113	GB68-85	Screw	MS x 10	3
114	CR6241-03-69	Plate		1
115	GB70-85	Screw	MS x 12	2
116	CR6241-03-68	Plug		1
117	CR6241-03-31	Vitta welding		1
118		Tube Fitting	Z 1/8" x ø4	3
119		Tube Fitting	Z 1/8" x ø6	1
120		Brass Tube	ø6 x 170	1
121	CR6241-03-71	Tube Fitting		1
122	CR6241-03-72	Nut		1
123	CR6241-03-73-2	Sleeve		1
124	CR6241-03-73-1	One Way Valve Assembly		1
125	GB818-85	Screw	MS x 14	4
126	CR6241-03-29	Shaft		1
127	GB70-85	Screw	M8 x 16	1
127	GB97.1-85	Washer	8	1



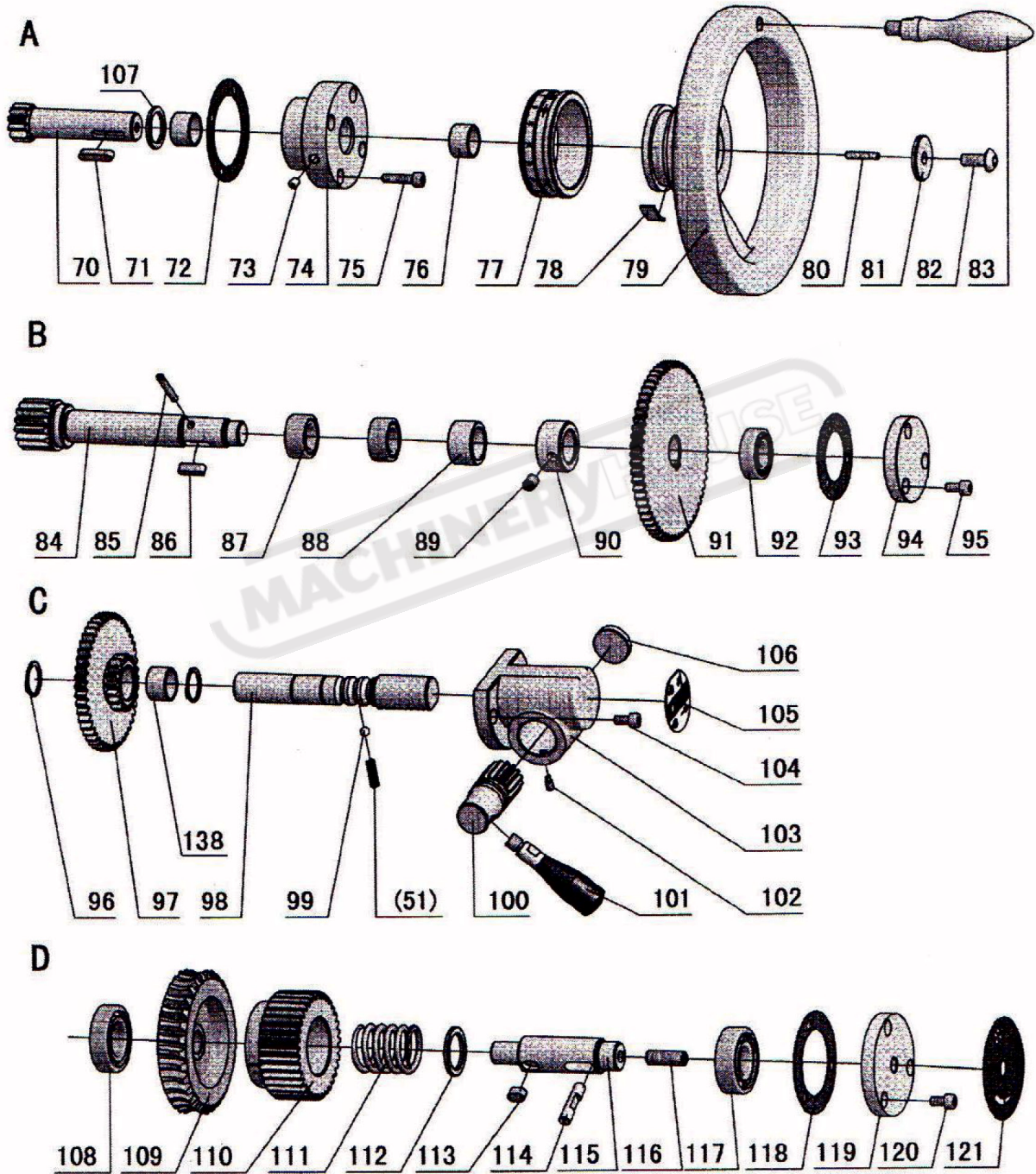
OPERATION MANUAL

CL-560 APRON PARTS DIAGRAM



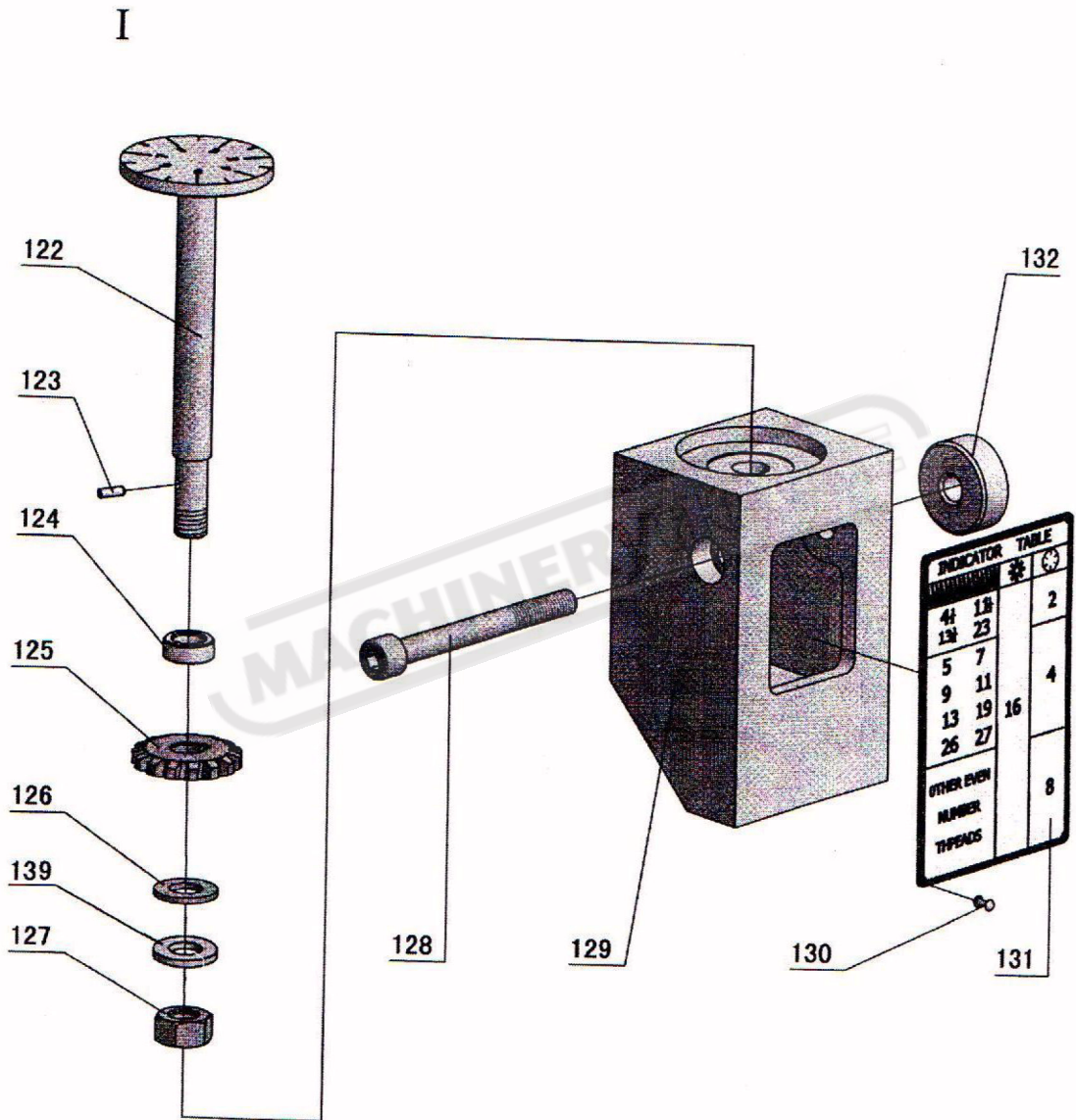
OPERATION MANUAL

CL-560 APRON PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 APRON PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 APRON PARTS LIST

No	Part No.	Item	Specification	Qty.
1	CR6241-04-03R	Lead Nut Assy (Right Hand)		1
1	CR6241-04-03	Lead Nut Assy (Left Hand)		1
2	CR6241-04-02	Gib		1
3	GB70-85	Screw	M6x 16	3
4	GB80-85	Screw	M6 x20	4
5	GB6170-86	Nut	M6	4
6	CR6241-04-18	Seat-Worm		1
7	CR6241-04-15	Bushing		2
8	GB80-85	Screw	M8 x 10	2
9	GB77-85	Screw	M8 x 10	2
10	GB1096-79	Key	6x 12	1
11	CR6241-04-16	Sleeve-Feed Rod		1
12	CR6241-04-17	Gear		1
13		Oil Seal	TC32x42x8	2
14	GB812-88	Nut	M20 x1.5	1
15	GB858-88	Washer	20	1
16	CR6241-04-21	Washer		1
17	GB301-84	Thrust Bearing	8104 2	2
18	CR6241-04-20	Worm Gear		1
19	SF-1	Bearing	2010 2	2
20	CR6241-04-19	Shaft		1
21	CR6241-04-23R	Safe Device Block (Right Hand)		1
21	CR6241-04-23	Safe Device Block (Left Hand)		1
22	GB894.1-86	Snap Ring	10	1
23	CR6241-04-30	Lever		1
24	GB70-85	Screw	M5x 8	1
25	CR6241-04-32	Spring		1
26	CR6241-04-11	Bottom Cover		1
27	CR6241-04-12	Sealed Mat		1
28	GB70-85	Screw	M6x16	9
29	GB982-77	Washer	12	1
30	G38-3A	Oil Plug	Z 3/8"	1
31	CR6241-04-13	Bracket		1
32	GB119-86	Pin	B8x40	1
33	GB70-85	Screw	M6x16	2
34	GB80-85	Screw	M6x6	1
35	CR6241-04-14	Lever		1
36	GB77-85	Screw	M8 x30	1
37	GB6170-86	Nut	M8	1
38		Oil Seal	TC15 x25 x7	1

OPERATION MANUAL

CL-560 APRON PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
39	CR6241-04-10	Pin		1
40	GB70-85	Screw	M8x12	1
41	CR6241-04-31	Screw		1
42	GB80-85	Screw	M8x10	1
43	CR6241-04-22	Spring		1
44	GB70-85	Screw	M6x12	3
45	CR6241-04-25R	Shaft (Right Hand)		1
45	CR6241-04-25	Shaft (Left Hand)		1
46	CR6241-04-26R	Buffer (Right Hand)		1
46	CR6241-04-26	Buffer (Left Hand)		1
47	GB1235 -76	O-Ring	20x2.4	2
48	CR6241-04-27	Sleeve		1
49	GB70-85	Screw	M6x20	3
50	GB308-84	Steel Ball	1/4"	2
51	CR6241-01-82	Spring		3
52	GB77-85	Screw	M8x10	4
53	GB70-85	Screw	M6x35	2
54	GB6170-86	Nut	M6	1
55	CR6241-04-71R	Knob (Right Hand)		1
55	CR6241-04-71	Knob (Left Hand)		1
56	GB1160.2-89	Oil Sight	A20	1
57	GB1235-76	O-Ring	32x3.5	2
58	CR6241-04-08	Washer		1
59	GB80-85	Screw	M8x10	1
60	CR6241-04-07R	Shaft Sleeve (Right Hand)		1
60	CR6241-04-07	Shaft Sleeve (Left Hand)		1
61	CR6241-01-100	Plate		1
62	CR6241-04-09	Lever		2
63	GB819-85	Screw	M4x10	2
64	CR6241-04-06R	Shaft (Right Hand)		1
64	CR6241-04-06	Shaft (Left Hand)		1
65	CR6251-04-01	Haft Nut (Metric)		1
65	CR6251-04-01Y	Haft Nut (Inch)		1
66	GB93-87	Spring Pin	6	2
67	GB70-85	Screw	M6x16	2
68	CR6241-04-70R	Plate (Right Hand)		1
68	CR6241-04-70	Plate (Left Hand)		1
69	CR6241-04-05	Key		2
70	CR6241-04-53	Shaft		1
71	GB1096-79	Key	6x25	1

OPERATION MANUAL

CL-560 APRON PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
72	CR6241-04-55	Sealed Mat		1
73	GB1155-89	Ball Cup	6	1
74	CR6241-04-54	Seat		1
75	GB70-85	Screw	M6x25	4
76	SF-1	Bearing	2010	2
77	CR6241-04-57	Dial- Rack (Metric)		1
77	CR6241-04-57Y	Dial- Rack (Inch)		1
78	Q67-4-33	Spring	80	1
79	CR6241-04-58	Hand Wheel		1
80	GB80-85	Screw	M4x20	1
81	CR6241-04-60	Washer		1
82	CR6241-01-97	Screw		1
83	CR6241-04-59	Handle		1
84	CR6241-04-48	Pinion		1
85	GB879-86	Pin	5x35	1
86	GB1096-79	Key	6x20	1
87	GB5801-86	Needle Bearing	4644903	2
88	CR6241-04-56	Sleeve		1
89	GB80-85	Screw	M8x12	1
90	CR6241-04-49	Spacer		1
91	CR6241-04-50	Gear		1
92	GB278-89	Ball Bearing	80103	1
93	CR6241-04-52	Sealed Mat		1
94	CR6241-04-51	Cover		1
95	GB70-85	Screw	M6x12	1
96	GB894.1-86	Snap Ring	20	2
97	CR6241-04-41	Gear		1
98	CR6241-04-42	Shaft		1
99	GB308-84	Steel Ball	7/32"	1
100	CR6241-04-45	Change Gear		1
101	CR6241-04-46	Handle Lever		1
102	GB79-85	Screw	M5x10	1
103	CR6241-04-43	Change Sleeve		1
104	GB70-85	Screw	M6x12	2
105	CR6241-04-72	Plate		1
106	CR6241-04-44	Plug		1
107	CR6241-04-74	Washer		1
108	GB279-88	Ball Bearing	180105	1
109	CR6241-04-33	Worm Gear		1
110	CR6241-04-34	Gear		1

OPERATION MANUAL

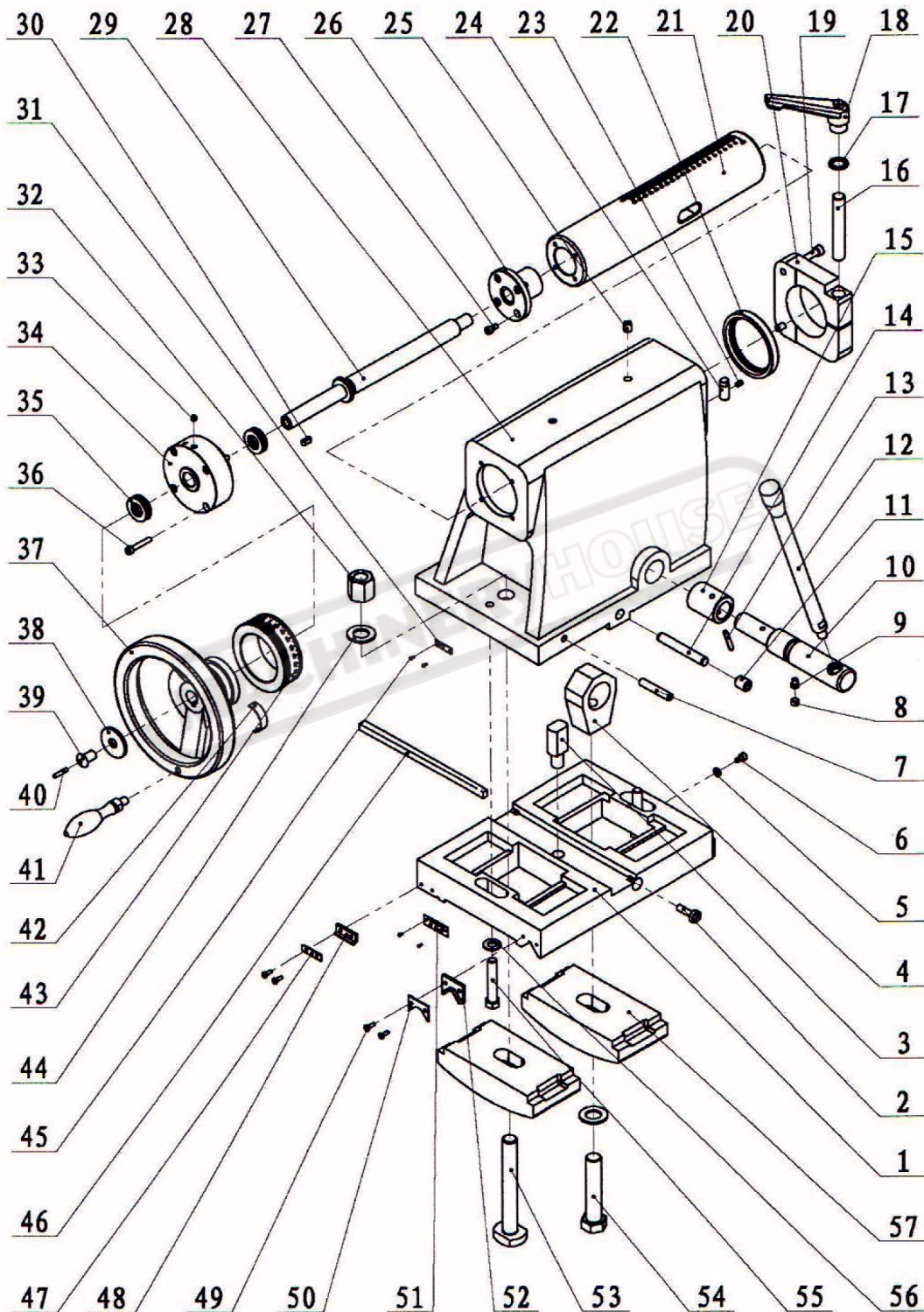
CL-560 APRON PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
111	CR6241-04-37	Spring		1
112	CR6241-04-38	Spacer		1
113	GB1096-79	Key	8x12	1
114	CR6241-04-36	Pin		1
115	CR6241-04-35	Cover		1
116	GB77-85	Screw	M10x30	1
117	GB278-89	Ball Bearing	80204	1
118	CR6241-04-40	Sealed Mat		1
119	CR6241-04-39	Cover		1
120	GB70-85	Screw	M6x12	3
121	CR6241-04-69	Plate		1
122	CR6241-04-62	Dial Indicator Shaft (Metric)		1
122	CR6241-04-62Y	Dial Indicator Shaft (Inch)		1
123	GB879-86	Pin	3x8	1
124	CR6241-04-47	Spacer		1
125	CR6241-04-63	Gear (Metric)		1
125	CR6241-04-64	Gear (Metric)		1
125	CR6241-04-65	Gear (Metric)		1
125	CR6241-04-64Y	Gear (Inch)		1
125	CR6241-04-66	Gear (Metric)		1
125	CR6241-04-67	Gear (Metric)		1
126	GB97.2-85	Washer	10	1
127	GB6170-86	Nut	M10	1
128	GB70-85	Screw	M8x85	1
129	CR6241-04-61	Thread Dial Body		1
130	GB827-86	Rivet	2x5	15
131	CR6241-04-68	Indicator Dial (Metric)		1
131	CR6241-04-68Y	Indicator Dial (Inch)		1
132	CR6241-04-24	Spacer		1
133	CR6241-04-01R	Apron (Right Hand)		1
133	CR6241-04-01	Apron (Left Hand)		1
134	CR6241-04-29R	Hub (Right Hand)		1
134	CR6241-04-29	Hub (Left Hand)		1
135	CR6241-04-28	Sealed Mat		2
136	GB3452.1-82	O-Ring	11.8 x 1.8	1
137	GB879-86	Pin	5x16	2
138	SF-1	Bearing	2020	1
139	GB93-87	Spring Pin	10	1



OPERATION MANUAL

CL-560 TAILSTOCK PARTS DIAGRAM



OPERATION MANUAL

CL-560 TAILSTOCK PARTS LIST

No	Part No.	Item	Specification	Qty.
1	CR6256-05-05	Bottom Tailstock		1
2	CR6241-05-25	Screw		2
3	CR6241-05-23	Block-Adjusting		1
4	CR6241-05-24	Bracket		1
5	GB/T97.1-1985	Washer	6	1
6	GB/T70.1-2000	Screw	M6x10	1
7	CR6241-05-22	Screw-Brake		1
8	GB/T77-2000	Screw	M10x8	1
9	GB/T79-2000	Screw	M10x12	1
10	CR6251-05-07	Shaft		1
11	GB/T80-2000	Screw	M16x20	2
12	CR6241-05-21	Lead Screw		1
13	GB879-86	Spring Pin	6x36	1
14	GB119-86	Pin Shaft	12x85	2
15	CR6241-05-26	Eccentric Block		1
16	CR6251-05A-04	Screw Bolt		1
17	CR6251-05A-03	Washer		1
18	Z52-2	Adjustable Fixed Handle	A-M16x110	1
19	GB/T70.1-2000	Screw	M8x30	2
20	CR6251-05A-02	Locking Block		1
21	CR6251-05A-05	Tailstock Sleeve		1
22	HG4-692-67	Oil-Seal	PD75x95x12	1
23	GB/T80-2000	Screw	M6x10	1
24	CR6251-05-18	Pin Shaft		1
25	GB1155-89	Ball Cup	10	2
26	CR6251-05-14	Feed Nut (Metric)		1
26	CR6251-05-14Y	Feed Nut (Inch)		1
27	GB/T70.1-2000	Screw	M6x12	4
28	CR6251-05A-01	Tailstock Body		1
29	CR6251-05-01	Feed Screw (Metric)		1
29	CR6251-05-01Y	Feed Screw (Inch)		1
30	GB1096-79	Key	6x16	1
31	CR6241-05-28	Plate		1
32	GB/T56-1988	Nut	M20	1
33	GB1155-89	Ball Cup	6	1
34	CR6251-05-02	Cap-Body End		1
35	GB/T301-1995	Thrust Bearing	51104	2
36	GB/T70.1-2000	Screw	M6x35	1
37	CR6251-05-15	Handle Wheel		1
38	CR6251-05-20	Washer		1



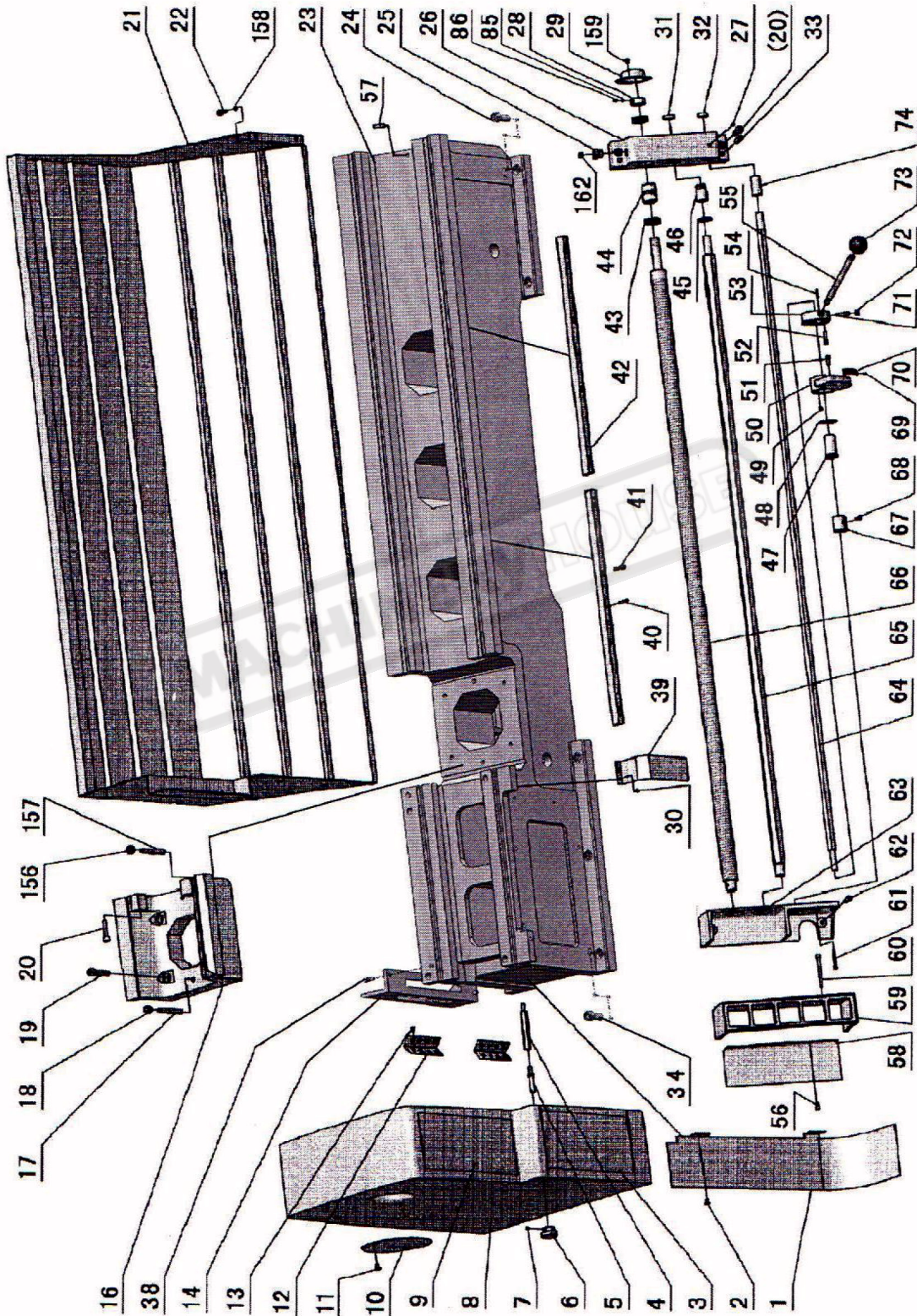
OPERATION MANUAL

CL-560 TAILSTOCK PARTS LIST Cont.

No	Part No.	Item	Specification	Qty.
39	CR6251-05-19	Screw		1
40	GB/T80-2000	Screw	M5x25	1
41	CR6241-04-59	Handle		1
42	Q67-4-33	Spring	100	1
43	CR6251-05-03	Dial-Feed (Metric)		1
43	CR6251-05-03Y	Dial-Feed (Inch)		1
44	GB/T97.1-1985	Washer	20	2
45	GB/T827-1986	Rivet	2x5	4
46	CR6251-05-16	Taper Gib Strip		1
47	CR6251-05-11	Case-Wiper		2
48	CR6251-05-12	Wiper		2
49	GB/T818-2000	Cross Recessed Head Screw	M4x12	8
50	CR6251-05-10	Case-Wiper		2
51	CR6241-05-29	Plate		1
52	CR6251-05-09	Wiper		2
53	GB/T37-1988	Bolt	M20x175	1
54	GB/T5782-2000	Screw	M20x125	1
55	GB/T5782-2000	Screw	M12x90	2
56	GB/T95-1985	Washer	12	2
57	CR6251-05-06	Clamping Handle		2

OPERATION MANUAL

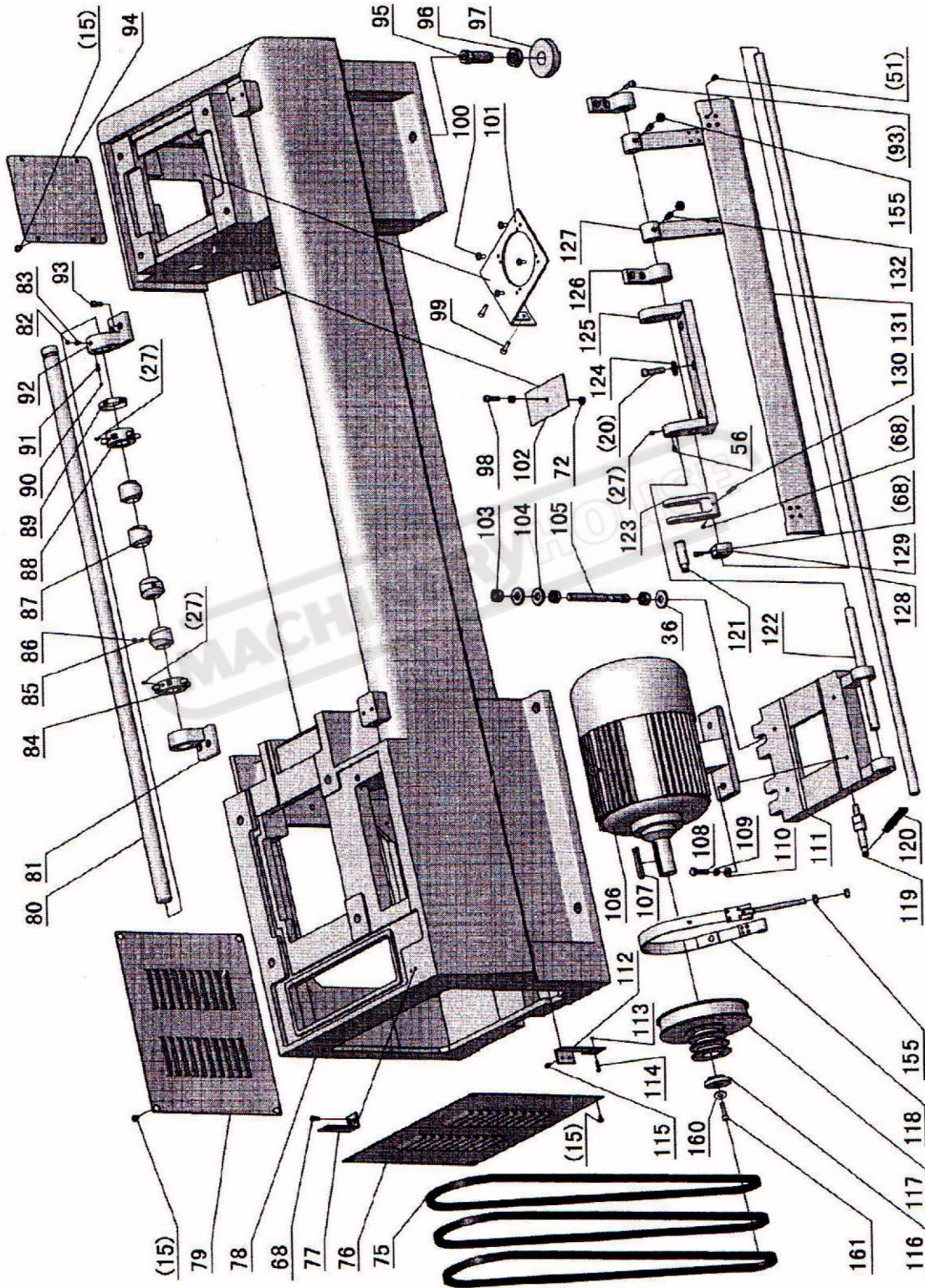
CL-560 BED PARTS DIAGRAM





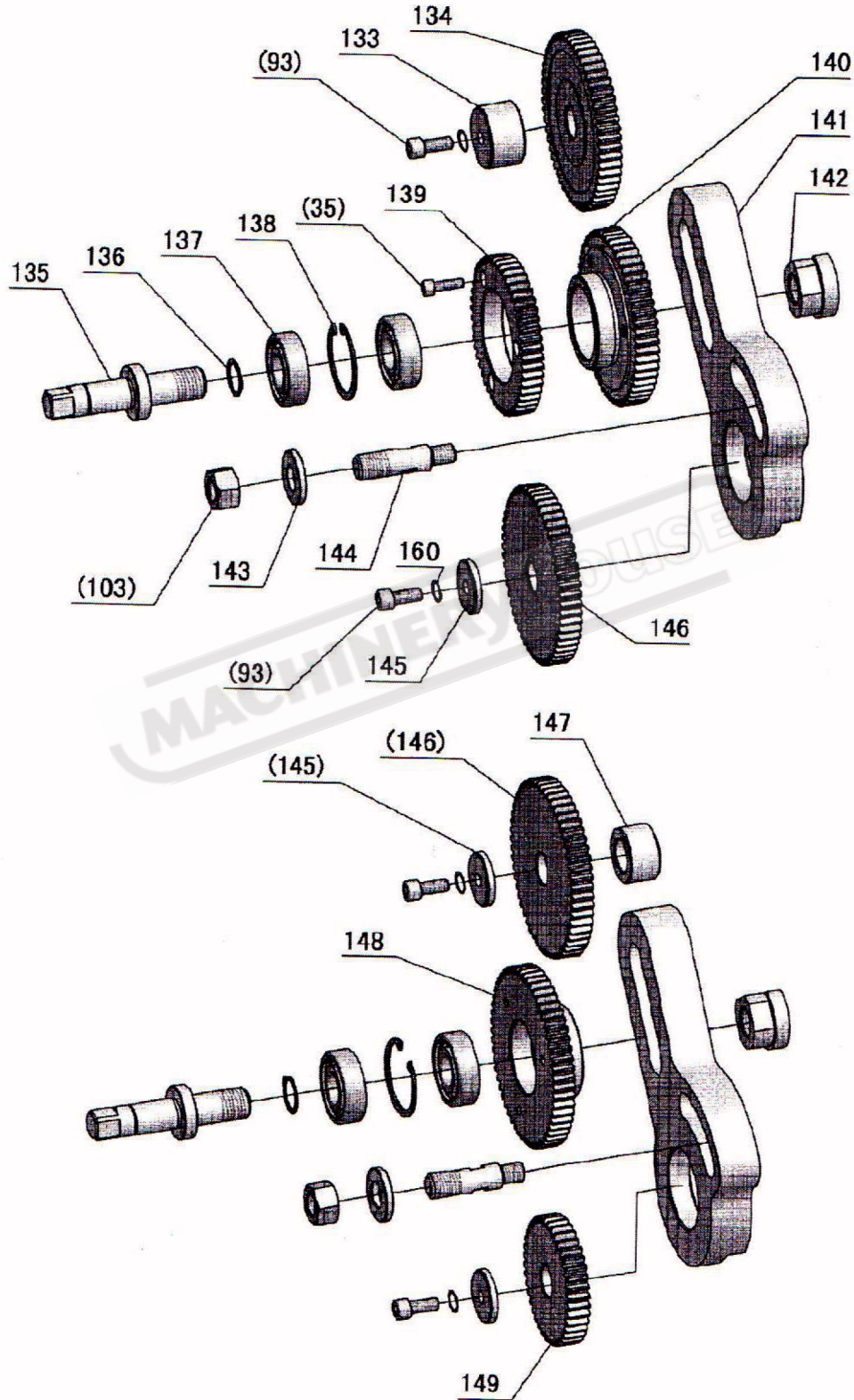
OPERATION MANUAL

CL-560 BED PARTS DIAGRAM Cont.



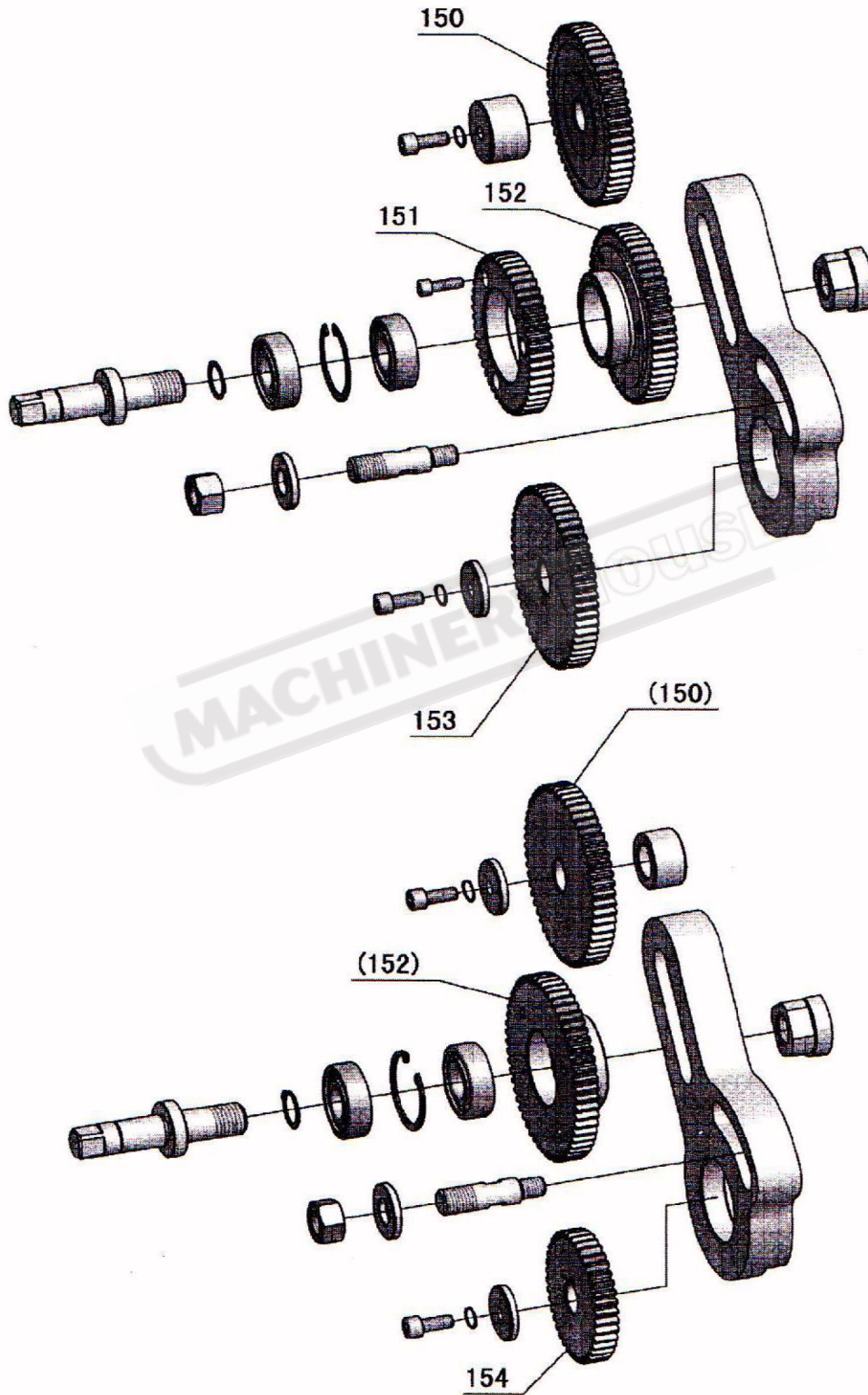
OPERATION MANUAL

CL-560 BED PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 BED PARTS DIAGRAM Cont.



OPERATION MANUAL

CL-560 BED PARTS LIST

No	Part No.	Item	Specification	1Qty.
1	CR6256-06-24	Oil Guard		1
2	GB70-85	Screw	M6x10	2
3	CR6241-08-21	Plate		1
4	CR6251-08-10	Screw		1
5	CR6241-08-18	Screw		1
6	CR6241-08-17	Nut		1
7	GB80-85	Screw	M6x8	1
8	CR6256T-08-01	Cover-End		1
9	CR6251-08-03	Plate (Metric)		1
9	CR6251-08-03Y	Plate (Inch)		2
10	CR6241-08-23	Cover		2
11	GB/T70.2-2000	Screw	M6x10	1
12	GB7277-87	Hinge	100	2
13	GB68-85	Screw	M5x10	12
14	CR6251T-06-09	Stand		1
15	GB818-85	Screw	M6x10	12
16	CR6251T-06-02	Bed Gap		1
17	GB118-86	Pin	10x70	2
18	GB73-85	Screw	M6x10	2
19	GB70-85	Screw	M12x50	4
20	GB70-85	Screw	M10x40	7
21	CR6251T-06-06	Guard Assembly 1000		1
2 1	CR6251T-06-06-1	Guard Assembly 1500		1
21	CR6251T-06-06-2	Guard Assembly 2000		1
21	CR6251T-06-06-3	Guard Assembly 3000		1
22	GB70-85	Screw	M8x16	4
23	CR6251T-06-01	Bed 1000		1
23	CR6251T-06-01-1	Bed 1500		1
23	CR6251T-06-01-2	Bed 2000		1
23	CR6251T-06-01-3	Bed 3000		1
24	GB70-85	Screw	M16x40	4
25	CR6241-06-21	Plug-Oil inlet		1
26	CR6251-06-16	Bracket		1
27	GB80-85	Screw	M6x8	4
28	CR6251-06-13A	Nut		1
29	CR6241-06-70	Cover		1
30	GB818-85	Screw	M5x8	2
31	CR6241-06-19	Plug		1
32	CR6241-06-20	Plug		1
33	GB118-86	Taper Pin	8x50	2

OPERATION MANUAL

CL-560 BED PARTS LIST Cont.

No	Part No.	Item	Specification	1Qty.
34	GB70-85	Screw	M16 x 40	6
35	GB70-85	Screw	M6 x 20	1
36	GB93-87	Washer	16	2
38	GB70-85	Screw	M8 x 20	2
39	CR6241-06-17	Protection Cover		1
40	GB879-86	Spring Pin	5 X 30	6
41	GB70-85	Screw	M6 x 25	8
42	CR6251-06-14	Rack (Left Hand)		1
42	CR6241-06-12A	Rack		1
42	CR6241-06-12B	Rack		1
43	GB301-84	Thrust Bearing	8105	2
44	CR6251-06-17	Bush		1
45	CR6241-06-23	Spacer		1
46	CR6241-06-16	Bush		1
47	CR6241-06-55	Shaft Sleeve		1
48	CR6241-06-57	Washer		1
49	Q81-1	Spring	1x6x20	3
50	CR6241-06-58	Switch Bracket		1
51	GB70-85	Screw	M6x16	12
52	CR6241-06-54	Pin		1
53	CR6241-06-53	Bracket		1
54	GB879-86	Spring Pin	3x20	1
55	CR6241-06-56	Lever		1
56	GB70-85	Screw	M5x10	2
57	GB878-86	Pin	M12 x 50	1
58	CR6241-06-05	Cover		4
59	CR6251T-06-10	Seat -Pilot Light		1
60	GB70-85	Screw	M6x70	2
61	GB70-85	Screw	M4x40	2
62	GB70-85	Screw	M8x25	2
63	CR6251T-06-05	Seat-Switch		1
64	CR6251-06-19	Started Rod 1000		1
64	CR6251-06-19-1	Started Rod 1500		1
64	CR6251-06-19-2	Started Rod 2000		1
64	CR6251-06-19-3	Started Rod 3000		1
65	CR6251-06-18	Feed Rod 1000		1
65	CR6251-06-18-1	Feed Rod 1500		1
65	CR6251-06-18-2	Feed Rod 2000		1
65	CR6251-06-18-3	Feed Rod 3000		1
66	CR6251-06-15	Lead Screw 1000 (Metric)		1

OPERATION MANUAL

CL-560 BED PARTS LIST Cont.

No	Part No.	Item	Specification	1Qty.
66	CR6251-06-15-1	Lead Screw 1500 (Metric)		1
66	CR6251-06-15-2	Lead Screw 2000 (Metric)		1
66	CR6251-06-15-3	Lead Screw 3000 (Metric)		1
66	CR6251-06-15Y	Lead Screw 1000 (Inch)		1
66	CR6251-06-15-1Y	Lead Screw 1500 (Inch)		1
66	CR6251-06-15-2Y	Lead Screw 2000 (Inch)		1
66	CR6251-06-15-3Y	Lead Screw 3000 (Inch)		1
67	CR6241-06-68	Cam		1
68	GB70-85	Screw	M6x12	5
69	GB827-86	Rivet	2x5	12
70	CR6241-06-64	Plate		1
71	GB79-85	Screw	M8x30	2
72	GB6170-86	Nut	M8	4
73	Z16-1	Lever Bush	M12x40	1
74	CR6241-06-26	Bush		1
75	GB1171-74	Belt	B75(60Hz)	3
75	GB1171-74	Belt	B76(50Hz)	3
76	CR6251T-06-04	Cover Motor Seat		1
77	CR6241-08-19	Limited Switch Seat		1
78	CR6251T-06B-03	Stand 1000		1
78	CR6251T-06B-03-1	Stand 1500		1
78	CR6251T-06B-03-2	Stand 2000		1
78	CR6251T-06-03-3	Stand 3000		1
79	CR6241-06-36	Cover Motor Seat		1
80	CR6251-06-20	Auto Stopping Rod 1000		1
80	CR6251-06-20-1	Auto Stopping Rod 1500		1
80	CR6251-06-20-2	Auto Stopping Rod 2000		1
80	CR6251-06-20-3	Auto Stopping Rod 3000		1
81	CR6241-06-06	Bracket		1
82	GB79-85	Screw	M8x12	1
83	GB77-85	Screw	M8x6	1
84	CR6241-06-30	Star Type Ring		1
85	CR6241-06-34	Shoe Clamp		5
86	GB77-85	Screw	M8 x 6	5
87	CR6241-06-33	Cam		4
88	CR6241-06-31	Star Type Ring		1
89	CR6241-06-32	Plate		1
90	GB308-84	Steel Ball	6	1
91	Q81-1	Spring	0.9x5x25	1
92	CR6241-06-07	Bracket		

OPERATION MANUAL

CL-560 BED PARTS LIST Cont.

No	Part No.	Item	Specification	1Qty.
93	GB70-85	Screw	M8x20	10
94	CR6241-06B-38	Pump Hole Cover		1
96	CR6241-06-37	Bolt		6
96	GB6173-86	Nut	M24x2	6
97	CR6241-06-59	Block-Leveling		6
98	GB70-85	Screw	M8x30	1
99	GB70-85	Screw	M6x25	2
100	GB818-85	Screw	M6x10	4
101	CR6241-06-65	Coolant Pump Seat		1
102	CR6251-06-28	Screen		1
103	GB6170-86	Nut	M16	7
104	GB6170-86	Washer		4
105	CR6241-06-49	Screw		2
106	Y132M-4	Motor	7.5kW	1
107	GB1096C-79	Key	10x70	1
108	GB5782-86	Bolt	M10x35	4
109	GB93-87	Spring Washer	10	4
110	GB97.1-86	Washer	10	4
111	CR6241-06-39	Motor Seat		1
112	CR6241-06-66	Limited Switch Seat		1
113	GB6170-86	Nut	M4	2
114	GB818-85	Screw	M4x35	2
115	GB70-85	Screw	M5x8	3
116	CR6241-06-09	Washer		1
117	CR6241-06-08-1	Belt Pulley	60Hz	1
117	CR6241-06-08	Belt Pulley	50Hz	1
118	CR6241-06-50	Belt-Brake		1
119	CR6241-06-51	Shaft		1
120	Q81-3	Spring	2x16x115	1
121	CR6241-06-42	Shaft		1
122	CR6241-06-47	Shaft		1
123	CR6241-06-43	Arm Brake		1
124	CR6241-06-67	Washer		3
125	CR6241-06-45	Bracket-Motor Seat		1
126	CR6241-06-40	Bracket		2
127	CR6241-06-46	Arm		2
128	CR6251-06-22	Shaft 1000		1
128	CR6251-06-22-1	Shaft 1500		1
128	CR6251-06-22-2	Shaft 2000		1
128	CR6251-06-22-3	Shaft 3000		1

OPERATION MANUAL

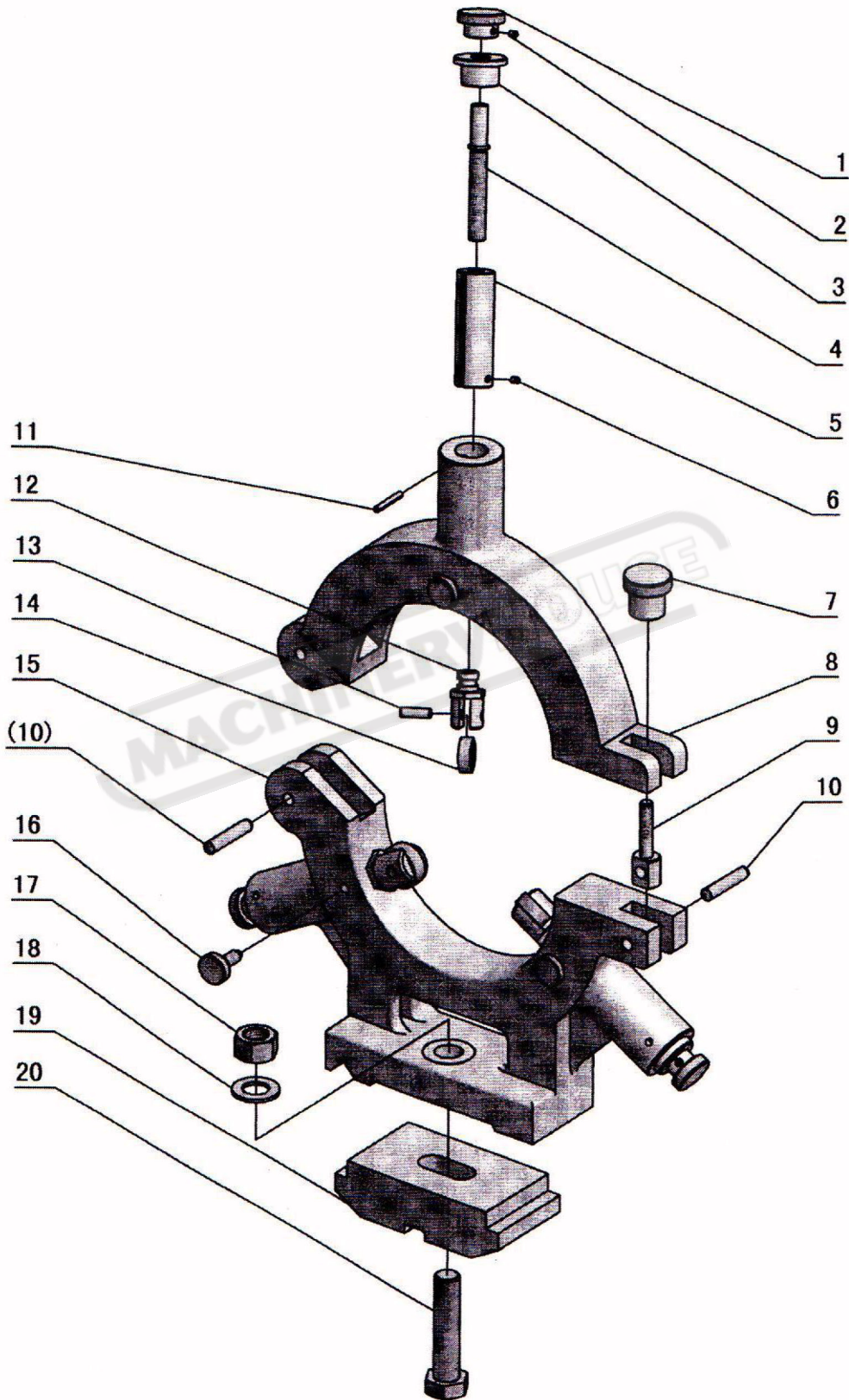
CL-560 BED PARTS LIST Cont.

No	Part No.	Item	Specification	1Qty.
129	CR6241-06-41	Cam		1
130	GB879-86	Spring Pin	5x40	1
131	CR6251-06-21	Pedal-Brake 1000		1
131	CR6251-06-21-1	Pedal-Brake 1500		1
131	CR6251-06-21-2	Pedal-Brake 2000		1
131	CR6251-06-21-3	Pedal-Brake 3000		1
132	GB79-85	Screw	M10x25	2
133	CR6241-08-02	Spacer		1
134	CR6256-08-02	Gear	55TxM2.5	1
135	CR6241-08-04	Bolt		1
136	GB894.1-86	Snap Ring	20	1
137	GB278-89	Ball Bearing	180204	2
138	GB893.1-86	Snap Ring	47	1
139	CR6256-08-08	Gear	49TxM2.5	1
140	CR6256-08-09	Gear	54TxM2.5	1
141	CR6251-08-06	Bracket		1
142	CR6241-08-05	Nut		1
143	CR6241-08-13	Washer		1
144	CR6251-08-04	Bolt		1
145	CR6251-08-07	Spacer		1
146	CR6256-08-05	Gear	56T x M2.5	1
147	CR6241-08-12	Spacer		1
148	CR6256-08-09Y	Gear	57T x M2.5	1
149	CR6256-08-11	Gear	40T x M2.5	1
150	CR6256-08-02Y	Gear	48T x M2.5	1
151	CR6256-08-12Y	Gear	66T x M2.5	1
152	CR6256-08-09Y	Gear	57T x M2.5	1
153	CR6256-08-11Y	Gear	42T x M2.5	1
154	CR6256-08-05Y	Gear	57T x M2.5	1
155	GB6170-86	Nut	M10	4
156	GB73-85	Screw	M5x8	2
157	GB118-86	Pin	8x40	2
158	GB97.1-85	Washer	8	4
159	GB70-85	Screw	M4x8	2
160	GB93-87	Spring Washer	8	3
161	GB70-85	Screw	M8x40	1
162	CR6241-06-24	Plate		1



OPERATION MANUAL

CL-560 FIXED STEADY REST DIAGRAM



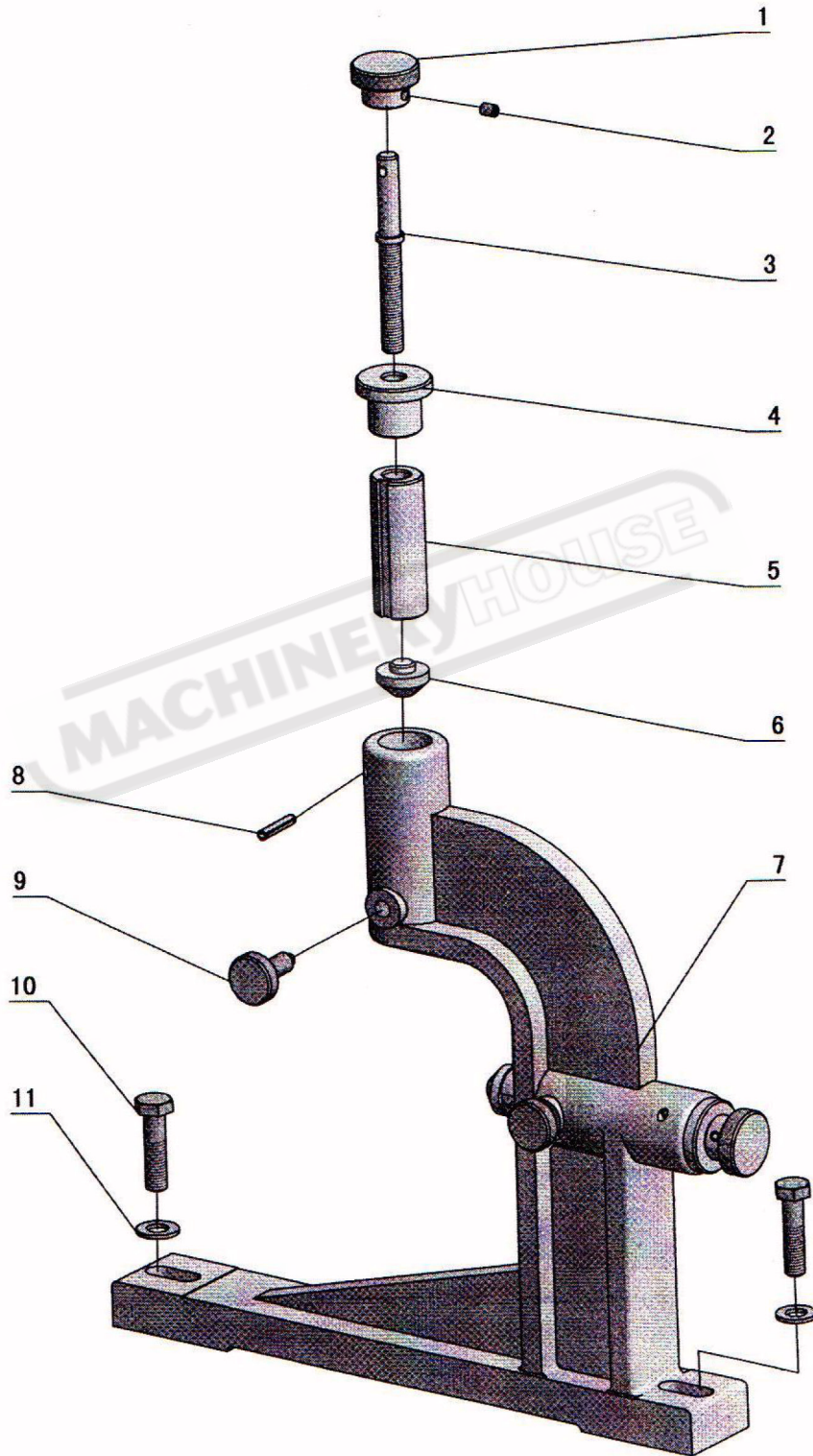
OPERATION MANUAL

CL-560 FIXED STEADY REST PARTS LIST

No	Part No.	Item	Specification	1Qty.
1	CR6251-10-08	Rotate Handle		3
2	GB78-85	Screw	M6x8	3
3	CR6251-10-07	Bush		3
4	CR6251-10-05	Screw Shaft		3
5	CR6251-10-04	Sleeve		3
6	GB77-85	Screw	M6x8	3
7	CR6251-10-09	Handle		1
8	CR6251-10-06	Upside Of Steady Rest		1
9	CR6251-10-10	Clamping Screw		1
10	GB119-86	Pin	12x60	2
11	GB879-86	Spring Pin	5x50	3
12	CR6251-10-02	Support Shaft		3
13	CR6251-10-03	Pin		3
14	GB279-88	Ball Bearing	180300	3
15	CR6256-10-01	Downside Of Steady Rest		1
16	CR6241-10-11	Limited Screw		3
17	GB55-88	Nut	M20	1
18	GB97.2-85	Washer	20	1
19	CR6251-10-12	Clamping Bracket		1
20	GB37-88	Bolt	M20 x 110	1

OPERATION MANUAL

CL-560 FOLLOW REST PARTS DIAGRAM





OPERATION MANUAL

CL-560 FOLLOW REST PARTS LIST

No	Part No.	Item	Specification	1Qty.
1	CR6241-10-12	Rotate Handle		2
2	GB78-85	Screw	M6x8	2
3	CR6241-10-09	Screw Shaft		2
4	CR6241-10-06	Bush		2
5	CR6241-10-10	Sleeve		2
6	CR6241-10-13	Bracket		2
7	CR6256-10-11	Follow Rest		1
8	GB879-86	Spring Pin	5x26	2
9	CR6241-10-11	Limited Screw		2
10	GB5782-86	Bolt	M10x40	2
11	GB97.1-85	Washer	10	3

MACHINERYHOUSE



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.



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 <small>(Recommended for Purchase / Buyer / User)</small>
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. 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. 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. Always wear safety glasses. Do not leave chuck key in chuck. 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. Wear hearing protection as required.
Plant Safety Program to be read in conjunction with manufactures instructions			



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Authorised and signed by:
Safety officer:



Manager:



Revised Date: 12th March 2012