HAFCO METALMASTER

Edition : 1.0
Date: (03/26)

Instruction Manual

CENTRE LATHE

AL-346

Order Code: (L543D)

MACHINE DETAILS

MACHINE.	**CENTRE LATHE**
MODEL NO.	**AL-346**
SERIAL NO.	
DATE OF MANF.	

IMPORTED BY

AUSTRALIA

HARE&FORBES MACHINERYHOUSE

www.machineryhouse.com.au

NEW ZEALAND

MACHINERYHOUSE

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NOTE:
This manual is only for your reference. At the time of the compiling of this manual every effort to be exact with the instructions, specifications, drawings, and photographs of the machine was taken. Owing to the continuous improvement of the HAFCO METALMASTER 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.

SAFETY SYMBOLS:
The purpose of safety symbols is to attract your attention to possible hazardous conditions

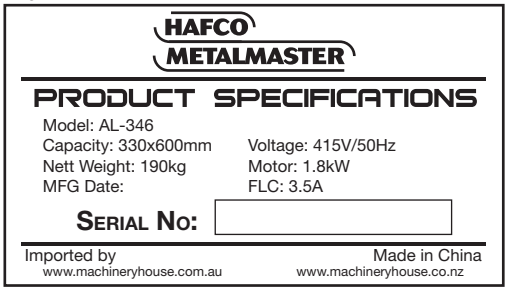
⚠WARNING **Indicates a potentially hazardous situation causing injury or death**

⚠CAUTION **Indicates an alert against unsafe practices.**

Note: **Used to alert the user to useful information**

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)

FIG.1



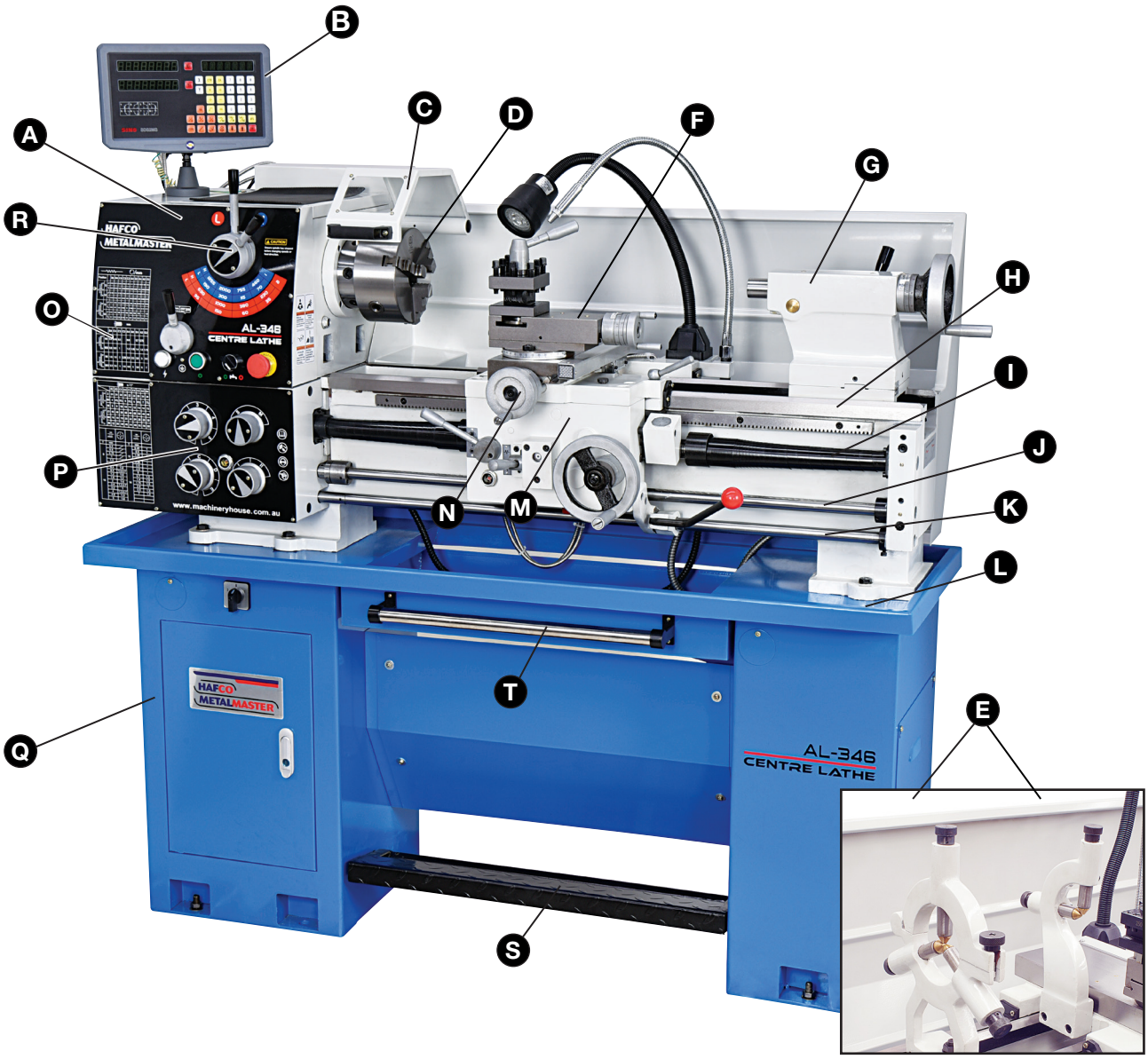
CONTENTS:

1.1 SPECIFICATIONS

Order Code	L543D
MODEL	**AL-346**
Swing Over Bed (mm)	330
Distance Between Centres (mm)	600
Spindle Bore (mm)	40
Swing In Gap (mm)	Nil
Swing Over Cross-slide (mm)	
Digital Readout System Fitted	Yes
Quick Change Toolpost Fitted	No
Tool Height To Suit (mm)	14
Centre Height (mm)	165
Spindle Nose Size or Type Camlock	D1-4
Bed Width (mm)	181
Headstock Spindle Taper (MT)	5
Tailstock Taper (MT)	3
Cross Slide Travel (mm)	160
Compound Slide Travel (mm)	85
Leadscrew Type	Metric
Metric Cross Feed (X-Axis) (mm/rev)	(0.013-0.31)
Metric Longitudinal Feed (Z-Axis) (mm / rev)	(0.013-0.31)
Metric Thread Steps & Pitch (No / mm)	32 (0.4 -7)
Imperial Thread Steps & TPI (No / TPI)	36 (4 - 60)
3 Jaw Chuck Diameter (mm)	160
4 Jaw Chuck Diameter (mm)	200
Spindle Steps / Speeds (No / rpm)	16 (70 - 2000)
Motor Power (kW / hp)	1.8 / 2.4
Voltage / Amperage (v / amp)	415 / 10
Dimensions (L x W x H) (mm)	1450 x 670 154
Nett Weight (kg)	560

1.2 IDENTIFICATION

Become familiar with the names and locations of the controls and features shown below to better understand the instructions when mentioned later in this manual.



A	Headstock	**K**	Start and Stop Shaft
B	Digital Readout Display	**L**	Swarf Tray
C	Chuck Safety Guard	**M**	Saddle
D	3 Jaw Chuck	**N**	Cross Slide
E	Fixed & Traveling Steadies	**O**	Feed and Thread Charts
F	Top Slide	**P**	Feed Gearbox
G	Tailstock	**Q**	Stand
H	Bed	**R**	Spindle Speed Controls
I	Leadscrew	**S**	Foot Brake
J	Feed Shaft	**T**	Slideout Swarf Tray

2. SAFETY

2.1 GENERAL METALWORKING MACHINE SAFETY

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.

- ✓ Always wear safety glasses or goggles.
- ✓ Wear appropriate safety footwear.
- ✓ Wear respiratory protection where required.
- ✓ Gloves should never be worn while operating the machine, and only worn when handling the work piece.
- ✓ Wear hearing protection in areas > 85 dBA. If you have trouble hearing someone speak from one metre (three feet) away, the noise level from the machine may be hazardous.
- ✓ DISCONNECT THE MACHINE FROM POWER when making adjustments or servicing.
- ✓ Check and adjust all safety devices before each job.
- ✓ Ensure that guards are in position and in good working condition before operating.
- ✓ Ensure that all stationary equipment is anchored securely to the floor.
- ✓ Ensure all machines have a start/stop button within easy reach of the operator.
- ✓ Each machine should have only one operator at a time. However, everyone should know how to stop the machine in an emergency.

2.1 GENERAL SAFETY REQUIREMENTS CONT.

- ✓ Ensure that keys and adjusting wrenches have been removed from the machine before turning on the power. Appropriate storage for tooling should be provided.
- ✓ Ensure that all cutting tools and blades are clean and sharp. They should be able to cut freely without being forced.
- ✓ Stop the machine before measuring, cleaning or making any adjustments.
- ✓ Wait until the machine has stopped running to clear cuttings with a vacuum, brush or rake.
- ✓ Keep hands away from the cutting head and all moving parts.
- ✓ Avoid awkward operations and hand positions. A sudden slip could cause the hand to move into the cutting tool or blade.
- ✓ Return all portable tooling to their proper storage place after use.
- ✓ Clean all tools after use.
- ✓ Keep work area clean. Floors should be level and have a non-slip surface.
- ✓ Use good lighting so that the work piece, cutting blades, and machine controls can be seen clearly. Position any shade lighting sources so that they do not cause any glare or reflections.
- ✓ Ensure there is enough room around the machine to do the job safely.
- ✓ Obtain first aid immediately for all injuries.
- ✓ Understand that the health and fire hazards can vary from material to material. Make sure all appropriate precautions are taken.
- ✓ Clean machines and the surrounding area when the operation is finished.
- ✓ Use proper lock out procedures when servicing or cleaning the machines or power tools.

DO NOT

- × Do not distract an operator. Horseplay can lead to injuries and should be strictly prohibited.
- × Do not wear loose clothing, gloves, neckties, rings, bracelets or other jewellery that can become entangled in moving parts. Confine long hair.
- × Do not handle cuttings by hand because they are very sharp. Do not free a stalled cutter without turning the power off first. Do not clean hands with cutting fluids.
- × Do not use rags or wear gloves near moving parts of machines.
- × Do not use compressed air to blow debris from machines or to clean dirt from clothes.
- × Do not force the machine. It will do the job safer and better at the rate for which it was designed.

CAUTION!

It is impossible to cover all possible hazards Every workshop environment is different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

2.1 GENERAL SAFETY REQUIREMENTS Cont.

HAZARDS ASSOCIATED WITH MACHINES include, but are not limited to:

- Being struck by ejected parts of the machinery.
- Being struck by material ejected from the machinery.
- Contact or entanglement with the machinery.
- Contact or entanglement with any material in motion.

Health Hazards (other than physical injury caused by moving parts)

- Chemicals hazards that can irritate, burn, or pass through the skin.
- Airborne items that can be inhaled, such as oil mist, metal fumes, solvents, and dust.
- Heat, noise, and vibration.
- Ionizing or non-ionizing radiation. (X-ray, lasers, etc.)
- Biological contamination and waste.
- Soft tissue injuries (for example, to the hands, arms, shoulders, back or neck) resulting from repetitive motion, awkward posture, extended lifting, and pressure grip.

Other Hazards

- Slips and falls from and around machinery during maintenance.
- Unstable equipment that is not secured against falling over.
- Safe access to/from machines. (access, egress)
- Fire or explosion.
- Pressure injection injuries from the release of fluids and gases under high pressure.
- Electrical Hazards, such as electrocution from faulty or ungrounded electrical components.
- Environment in which the machine is used. (in a machine shop, or on a work site)

WARNING!

The machine is the sole responsibility of the owner for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training, proper inspection and maintenance, manual availability and comprehension. The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

WARNING!

Machines are safeguarded to protect the operator from injury or death with the placement of guards. Machines must not be operated with the guards removed or damaged.

2.2 SPECIFIC SAFETY FOR LATHES

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


Safety glasses must be worn at all times in work areas


Long and loose hair must be contained


Gloves must not be worn when using this machine


Sturdy footwear must be worn at all times in work areas


Close fitting/protective clothing must be worn


Rings and jewellery must not be worn.

PRE-OPERATIONAL SAFETY CHECKS

- ✓ Locate and ensure you are familiar with all machine operations and controls.
- ✓ Ensure all guards are fitted, secure and functional. Do not operate if guards are missing or faulty.
- ✓ Check workspaces and walkways to ensure no slip/trip hazards are present.
- ✓ Check the job is clamped tight in the chuck.
- ✓ Remove all tools from the bed and slides of the machine.
- ✓ Ensure the correct speed for machining process is selected.
- ✓ Remove the chuck key before starting the lathe.

OPERATIONAL SAFETY CHECKS

- ✓ Before making adjustments or measurements, switch off and bring the machine to a complete standstill.
- ✓ Always remove the chuck key from the chuck.

ENDING OPERATIONS AND CLEANING UP

- ✓ Switch off the machine when work completed.
- ✓ Reset all guards to a fully closed position.
- ✓ Avoid letting swarf build up on the tool or job. Stop the machine and remove it.
- ✓ Leave the machine in a safe, clean and tidy state.

DON'T

- × **Do not** use faulty equipment. Immediately report suspect machinery.
- × **Do not** try to lift chucks or face plates that are too heavy for you.
- × **Do not** leave the machine running unattended.
- × **Do not** attempt to slow or stop the chuck or revolving work by hand.
- × **Do not** leave equipment on top of the machine.

POTENTIAL HAZARDS AND INJURIES

- ❒ Flying objects such as the chuck key left in chuck.
- ❒ Cutting tool injury when cleaning, filing or polishing.
- ❒ Hair/clothing getting caught in moving machine parts.
- ❒ Metal splinters and swarf.
- ❒ Eye Injuries.

3. POWER SUPPLY

3.1 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.

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..... 10 Amps
Full Load Current..... 3.8 Amps

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

3.2 FULL-LOAD CURRENT RATING

The full-load current rating is the amperage a machine draws 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 can be found on the motor plate.

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 SETUP

4.1 UNPACKING

This machine was carefully packaged for safe transport. When unpacking, separate all enclosed items from packaging materials and inspect them for shipping damage. If items are damaged, please contact your distributor.

NOTE: Save all the packaging materials until you are completely satisfied with the machine and have resolved any issues with the distributor, or the shipping agent.

When unpacking, check the packing list to make sure that all parts shown are included. If any parts are missing or broken, please contact your distributor.

4.2 INCLUDED ACCESSORIES

160mm 3-jaw chuck with reverse jaws
200mm 4-jaw chuck
Face plate
Fixed and traveling steadies
Change gears
Dead centre
Cabinet stand
Splash tray
Toolbox and instruction booklet
Swarf tray
Thread-chasing dial
Chuck guard
2 Axis Digital Readout
Leadscrew Covers

4.3 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.

It is advised 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.

4.4 SITE PREPARATION

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

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

It is recommended that the machine is anchored to the floor to prevent tipping or shifting. It also reduces vibration that may occur during operation.

4.5 LIFTING INSTRUCTIONS

On the day that the machine arrives, make sure that a crane or forklift with sufficient capacity is available to unload the machine from the vehicle. Ensure access to the chosen site is clear and that doors and ceilings are sufficiently high and wide enough to receive the machine.

To handle the machine, the slings should be positioned so the machine is level when lifted.

LIFTING POINT (Fig. 4.1-2)

To obtain a balanced condition before lifting, it is necessary to move the tailstock to the right hand end of the bed way and clamp it there. Make sure to clean the bed ways before moving the carriage or tailstock. Use approved webbed slings to lift the lathe. Position the saddle and tailstock along the bed to obtain the balance. Raising and lowering the machine should be done carefully, especially when you are lowering the machine. Be sure not to bump the machine against the floor.

Important: Do not use slings around the bed as the lead screw and feed shaft may be bent.

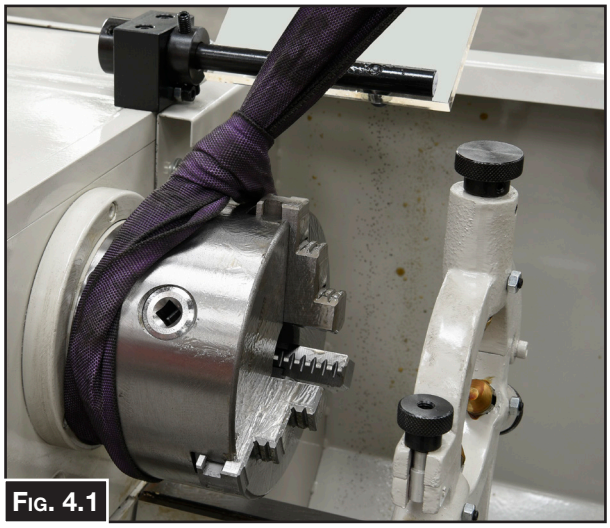


FIG. 4.1

⚠ WARNING

SAFETY FIRST 	**The safety instructions given in this manual can not be complete. The environment in every shop is different. Always consider your safety first as it applies to your individual working conditions.**

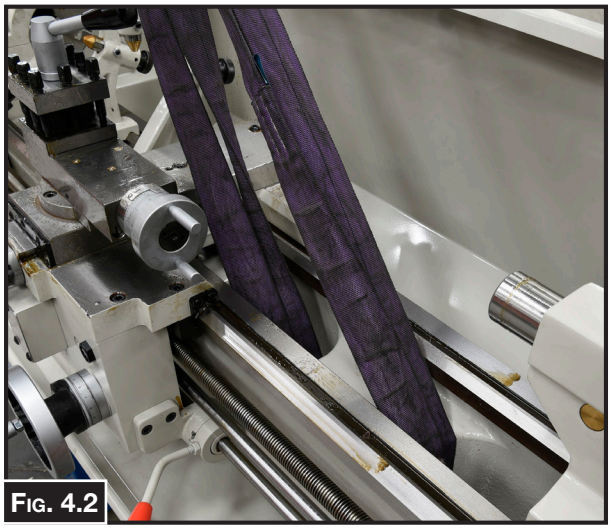


FIG. 4.2

WARNING!

Make sure everyone is away from the load before hoisting. The load must be under control when lowering loads or when the load is suspended. Rigging and crane operation must be carried out by persons with approved qualifications.

4.6 ANCHORING TO THE FLOOR

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. 4.3)

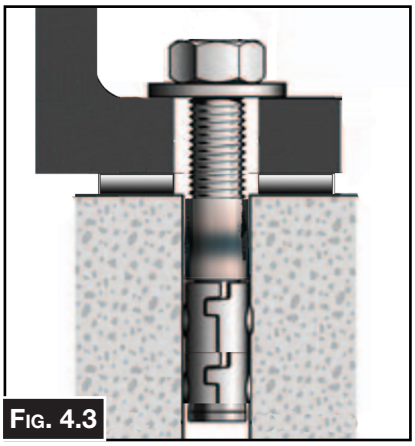


FIG. 4.3

4.7 MACHINE LEVELING

To set your machine up so that it operates to optimum performance, apply the following procedure.

After your machine has been anchored to a concrete slab floor, it then needs to be leveled. Loosen the hold down bolts and place a level on the surface of the Lathe bed. Metal shims need to be placed under the corner of the base of the machine until level. Once level and the machine is stable then tighten the hold down bolts. (Fig. 4.4)

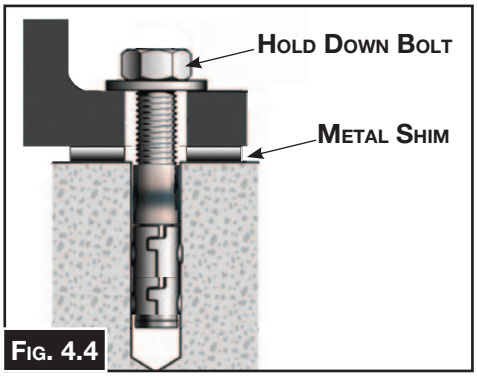
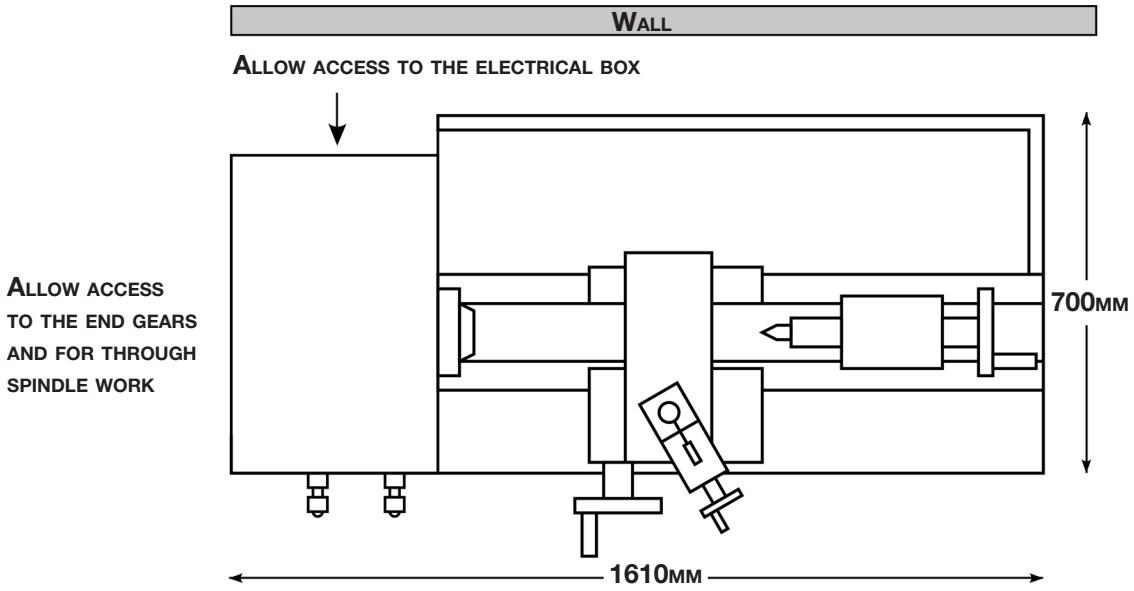


FIG. 4.4

Floor Plan



4.8 ASSEMBLY

The machine must be fully assembled before it can be operated. First clean any parts that are coated in rust preventative to ensure the assembly process can proceed smoothly.

Mounting The Digital Readout

Disconnect the machine from the power before installing the DRO.

The Digital Readout will need to be fitted using the bracket on the top of the head. (Fig. 4.5)

NOTE: In some cases the machine may be supplied fully assembled and may only require the fitting of the chuck to the spindle.

FIG. 4.5

Assemble Handles. (Fig.4.6)

Assembly required will be the bolting on of the handles. Using a screwdriver assemble each handle on the hand wheels of the machine.

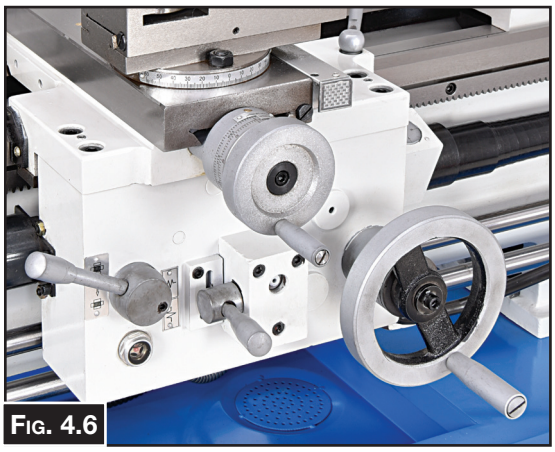


FIG. 4.6

5. OPERATION

This machine may perform many types of operations that are beyond the scope of this manual. Many of these operations may be dangerous or deadly if performed incorrectly.

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

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

5.1 CONTROLS

The purpose of this control overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, and the machine controls and what they do. It also helps the operator to understand if they are discussed later in this manual.

NOTE: DO NOT start the machine until all of the setup instructions have been performed.

Headstock Electrical Controls Fig.5.1

1. **Pilot Lamp:** Illuminates when power is connected to the control panel.
2. **Jog Button:** Allows for the spindle to be rotated in small amounts.
3. **Coolant Switch:** Switches the coolant ON or OFF.
4. **Emergency Stop Button:** When pressed disconnects power to the control panel and stops the machine. To reset the stop button the top of the stop button must be twisted to allow the button to pop up.

FIG. 5.1

Headstock Speed Controls Fig.5.2

5. **High / Low Lever:** Switches between high and low speed in the gearbox.
6. **Speed Control Lever:** Sets the speed to the scale below.
7. **Leadscrew Direction Lever:** Changes the direction of the leadscrew and feed shaft.
8. **High/Low Speed Control:** Switches the motor between High and Low speed. (Fig. 5.3)

FIG. 5.2

⚠ WARNING!

SAFETY FIRST 	**The safety instructions given in this manual can not be complete. The environment in every shop is different. Always consider your safety first as it applies to your individual working conditions.**

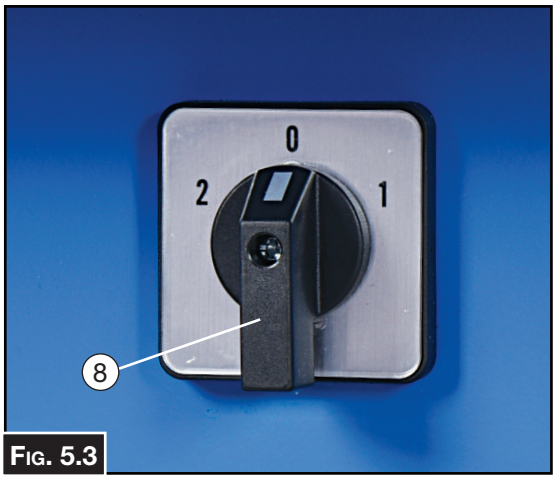


FIG. 5.3

SADDLE Fig.5.4

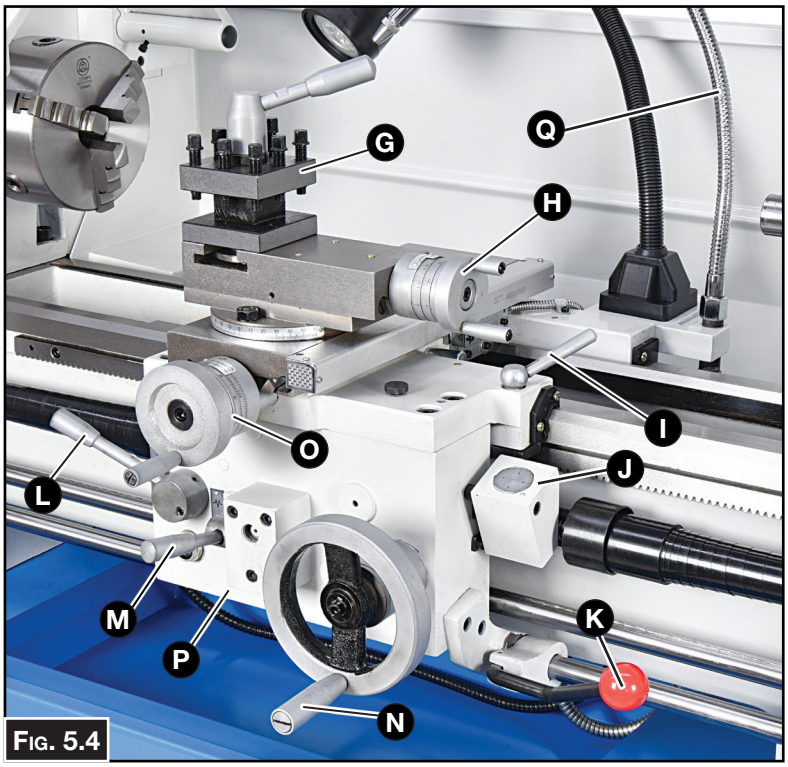


FIG. 5.4

G. 4-Way Tool Post: Allows the operator to load and unload tools.

H. Compound Rest Hand wheel: Moves the tool toward and away from the workpiece at the pre-set angle of the compound rest.

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

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

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

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

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

N. Carriage Hand wheel: Moves the carriage along the bed.

O. Cross Slide Hand wheel: Moves the cross slide toward and away from the workpiece.

P. Apron: Houses the carriage gearing.

Q. Coolant Hose: Flexible coolant hose, that travels with the saddle.

WARNING!

DO NOT operate any machine before it is fully assembled and all the safety guards have been fitted and secured. Failure to do so may cause death or severe injury.

Spindle ON/OFF Lever (Fig. 5.5)

Starts and stops the spindle in forward and reverse.

- Moving the lever upward from the central OFF position spins the chuck forward (the top of the chuck moves toward the machinist).
- Moving the lever downward from the central position spins the chuck in reverse (the top of the chuck moves away from the machinist).

Fig. 5.5

Foot Brake (Fig. 5.6)

This lathe is equipped with a foot brake to quickly stop the spindle. Pushing the foot brake while the spindle is ON cuts power to the motor and stops the spindle. Once stopped, the spindle ON/OFF lever MUST be returned to the neutral position before the spindle can be restarted.

WARNING!

Using the foot brake to stop the lathe reduces risk of an entanglement injury from allowing the lathe to coast to a stop. Use the foot brake to stop the lathe whenever possible.

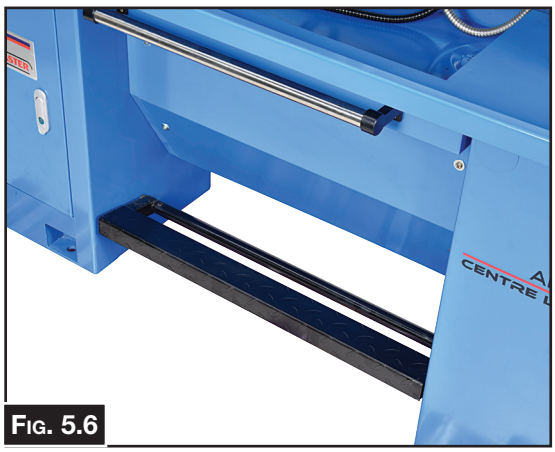
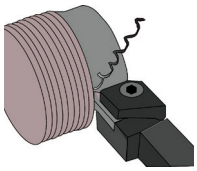


Fig. 5.6

Slide Out Swarf Tray (Fig. 5.7)

The machine is fitted with a Slide out front swarf tray designed for easy cleaning.

⚠ WARNING!



Always use leather gloves when handling swarf. Cuttings are sharp and can cause deep cuts and other injures.

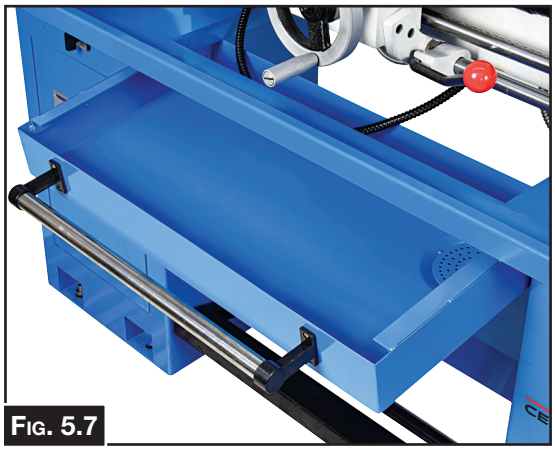


Fig. 5.7

TAILSTOCK Fig. 5.8

The tailstock has many functions. The main use is for holding drill chucks and centres.

The barrel has been etched` with graduations in millimetres and inches and has a Morse taper #3 bore. The tailstock also can be offset to cut tapers.

A. Top Lock Lever - This lever locks the tailstock barrel in place.

B. Side Lock Lever - This lever locks the tailstock in place on the lathe bed.

C. Tailstock Hand-wheel - Turning the hand-wheel advances or retracts the barrel in the tailstock.

The graduated dial on the hand wheel is adjustable.

D. Tailstock Adjustment - Two grub screws, (one either side) control the adjustment of the tailstock when taper turning is required.

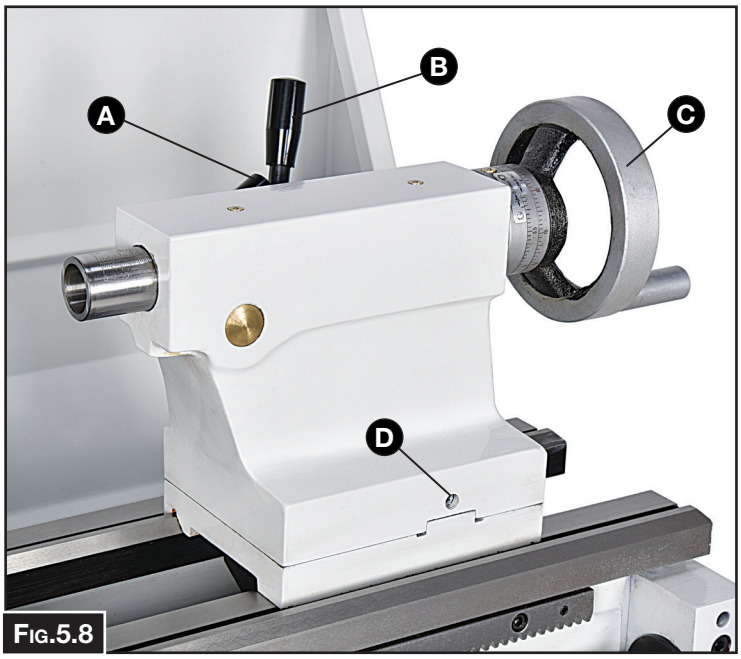


FIG.5.8

STEADIES Fig. 5.9

E. Knurled Screws - Moves the fingers in or out to allow for adjustment.

F. Lock Nut - When unlocked allows the fixed steady to be split to allow the steady to be placed around the work.

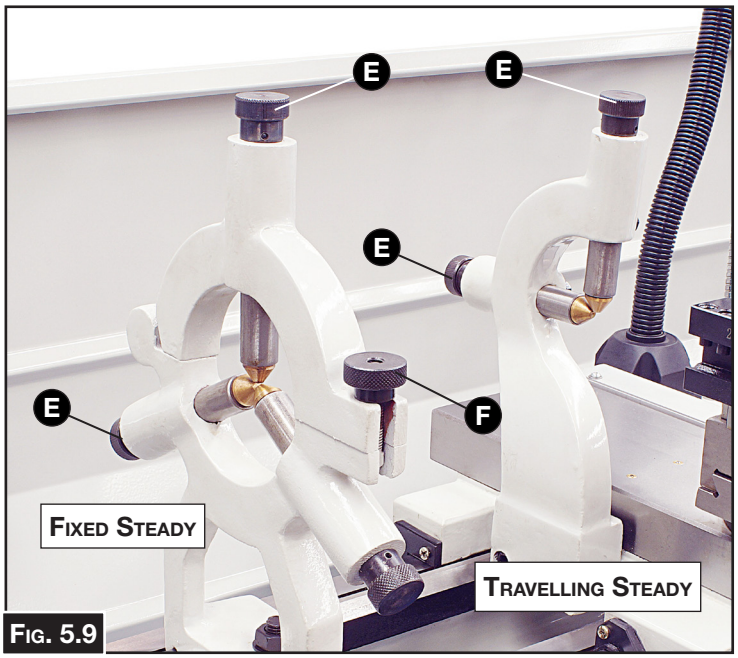


FIG. 5.9

WARNING!

Serious injury could occur if you connect machine to power before completing the setup process. DO NOT connect to power until all assembly and adjusting processes are complete.

5.2 CHUCK & FACEPLATE MOUNTING

This lathe is equipped with a D1- 5 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. 5.10)

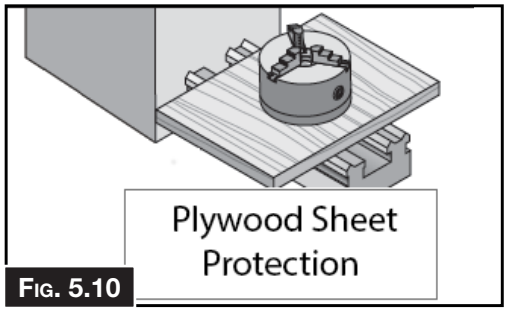


FIG. 5.10

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 and 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. 5.11)

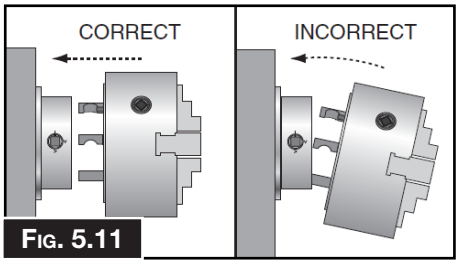


FIG. 5.11

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 Fig. 5.12.

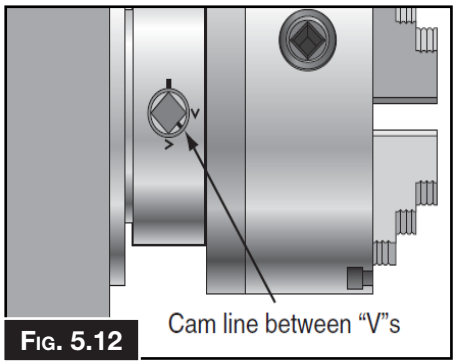


FIG. 5.12

If the cam line is not between the “V” marks when the camlock is tight, the stud may be installed at the incorrect height.

First check that the line on the cam is flush with the surface of the chuck. If it is not then adjust the stud height as shown (Fig. 5.13).

Make sure to re-install the stud cap screw afterward.

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

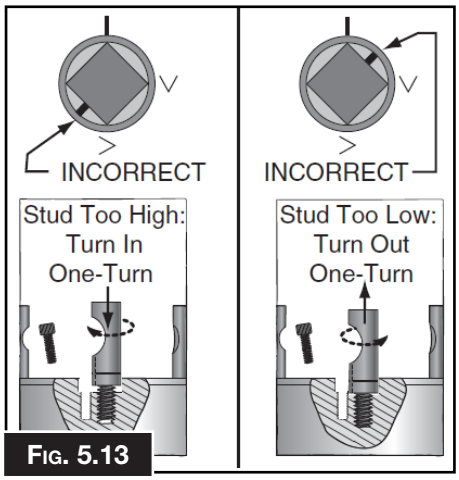


FIG. 5.13

WARNING!

Lathe chuck keys or tools left in the chuck can cause serious injury or death. Remove these items from the chuck before switching on the power.

Changing Jaws on 3 Jaw Chuck (Fig. 5.14)

Changing jaws on a lathe chuck is a task that requires some care and attention to ensure it is done safely and correctly. Here are general steps that can guide you through the process:

1. Before you start, make sure the lathe is turned off and unplugged. Wear appropriate personal protective equipment such as gloves and safety glasses.
2. Ensure you have the correct replacement jaws that are compatible with your lathe chuck.
3. Make sure that the chuck and the replacement jaws have been thoroughly cleaned.
4. Insert the chuck key into a scroll keyway and rotate it until the jaws are released from the chuck body.
5. Examine the side of the jaws-each is stamped with a number 1 through to 3.
6. Examine the jaw guides of the chuck. Each is stamped with a corresponding number.
7. Slide the #1 jaw into the #1 jaw guide and hold it firmly against the scroll gear threads, then rotate the chuck key clockwise approximately one turn until the lead thread engages with the jaw. (Fig. 5.14) **Note: Tug on the jaw to make sure it is engaged with the scroll gear thread.**
8. Repeat Steps 3-4 for jaws #2 and #3 in sequence.
9. Rotate the chuck key clockwise to bring the jaws together in the centre of the chuck. If installed correctly, the jaws will converge evenly at the centre of the chuck. If the jaws do not come together evenly, remove them, make sure the numbers of the jaws and the jaw guides match, then properly re-install them.

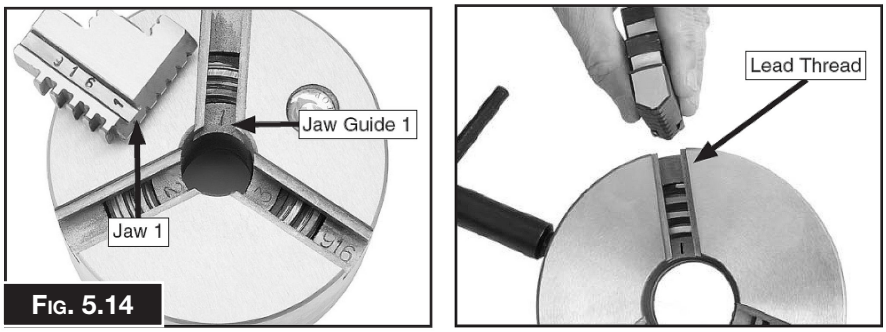


FIG. 5.14

Faceplate Or 4 Jaw Chuck (Fig.5.15)

This section outlines basic operation safety related to using the faceplate included with your lathe. Use knowledge of safety and common sense when applying the steps on how to use this faceplate.

The faceplate is cast-iron and has multiple slots for T-bolts that hold clamping hardware. If you suspect that any of the chuck or jaw combinations may not hold a work piece safely, remove the chuck and install the faceplate as outlined for special clamping options.

However, just as with the 4-Jaw chuck, not all work pieces can be safely held. Holding a work piece off center or holding an irregular shaped work piece will cause the entire assembly to rotate out of balance.

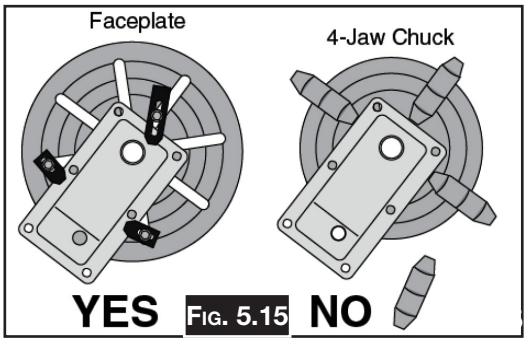


FIG. 5.15

If spun any speed too high, the work piece can eject hitting the lathe operator or bystanders causing a severe or fatal injury. Fig. 5.15 shows an example of a work piece being improperly held with the 4-jaw chuck. One jaw of the chuck interfered with the work piece edge, and removing the jaw creates an extreme work piece ejection hazard. The workpiece holding solution shown in Fig. 5.15 is to use the faceplate with a minimum of three clamps that are spaced as equally apart as possible for full support.

5.3 SETTING THE CUTTING TOOL ON THE CENTERLINE

The tip of the cutting tool should be set up so that it is in line with the centerline of the spindle, as illustrated in Fig. 5.16.

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

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

Below are two common methods:

1. 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 centre.

2. Align the tip of the cutting tool with a tail stock center, as described in the following procedure.(Fig. 5.17)

a. Mount the cutting tool and secure the post so the tool faces the tailstock.

b. Install a center in the tailstock, and position the tip near the cutting tool.

c. Lock the tailstock and quill in place.

d. Adjust the height of the cutting tool tip to meet the center tip, as shown. (Fig. 5.16)

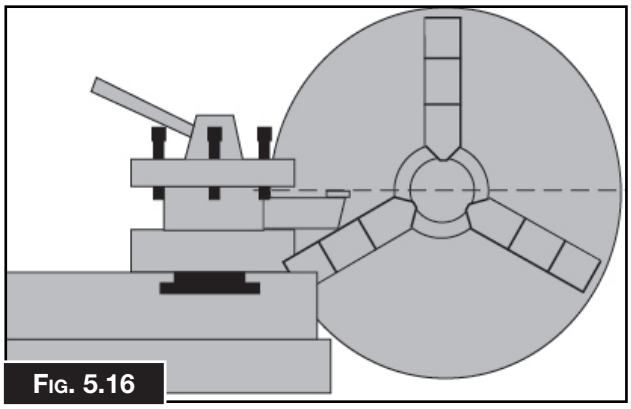


FIG. 5.16

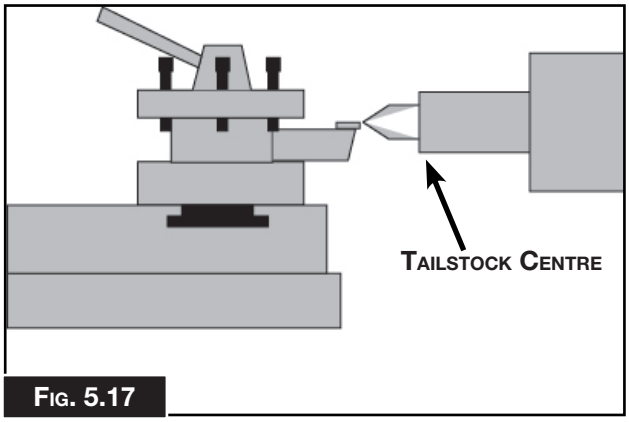


FIG. 5.17

WARNING!

The machine is the sole responsibility of the owner for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training, proper inspection and maintenance, manual availability and comprehension. The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

5.4 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,

2) Configure the lathe controls to produce the required spindle speed.

Determining Spindle Speed

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

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

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:

1. Sets the High/Low lever. (A in Fig. 5.18)

   Low Range 35 - 150 rpm. range (B in Fig.5.18)

   Hi-Range 230 - 1000 rpm. range (B in Fig.5.18)

   Low Range 70 - 300 rpm. range (C in Fig.5.18)

   Hi-Range 450 - 2000 rpm. range (C in Fig.5.18)

2. Speed dial lever selects the speed in the scale displayed. (D in Fig. 5.18)

Note: If the spindle High or Low 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 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.

Two Speed Motor:

The motor has two speeds. To select the high or low range, the switch needs to be moved to the desired motor speed.

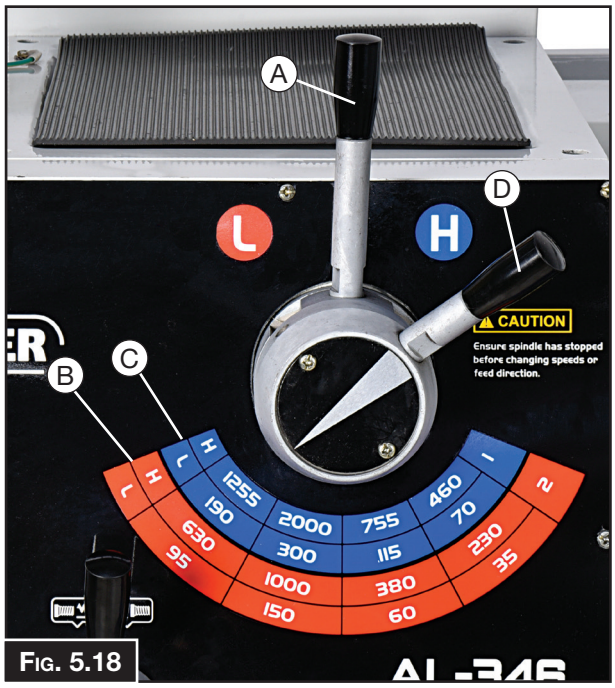


Fig. 5.18

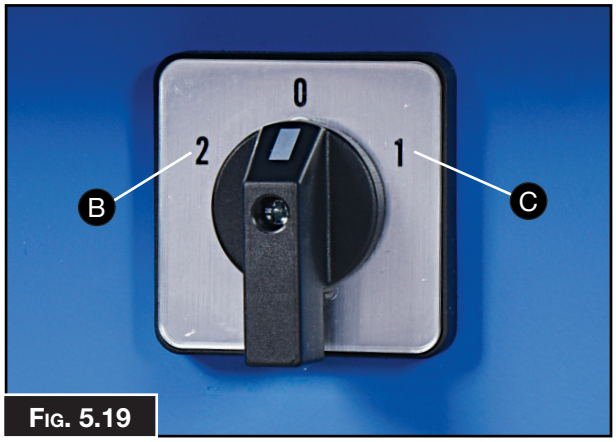
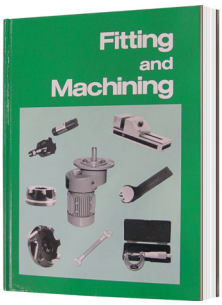


Fig. 5.19

5.5 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.

Order Code L341



n / 1"

		A2	A3	C3	A4	C3	C3	C3	A5	B4
48T 127T 120T Z	Z	24	24	38	24	22	24	26	24	24
	MII	4	4½	9½	5	5½	6	6½	7	7½
	MI	8	9	19	10	11	12	13	14	15
24T 127T 120T Z1	Z1	48	48	38	48	44	48	52	48	48
	MII	16	18	19	20	22	24	26	28	30
	MI	32	36	38	40	44	48	52	56	60

mm

		B4	C4	C3	C2	A4	D2	E4	A2	E2
24T 127T 120T 48T	MI	0.4	0.45	0.5		0.6		0.7	0.75	
	MII	0.8	0.9	1		1.2	1.25	1.4	1.5	1.75
48T 127T 120T 24T	MI	1.6	1.8	2	2.25	2.4	2.5	2.8	3	3.5
	MII	3.2	3.6	4	4.5	4.8	5	5.6	6	7

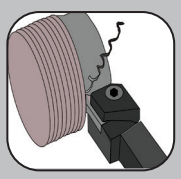
Fig.5.20

Feed & Threading Gearbox

The setup procedure on this lathe is the same for metric & inch threads. These thread selections are indicated by a series of letters and numbers shown on the headstock threading charts. First, the change gear positions are checked and rearranged if indicated by the chart. Next, the quick change gearbox knobs and levers are moved to specific positions also indicated by the chart.

To set up for threading:

1. DISCONNECT LATHE FROM POWER!
2. Open the change gear door on the left hand side of the headstock to expose the change gears.
3. Review the threading chart for the required thread to be cut (Fig. 5.20). The chart indicates that to cut a 0.50 metric thread, the change gears and feed dials must be in the following positions.
4. Turn the first knob of the quick change gearbox to “3” position, turn the second knob to “M” position, turn the third knob to “C ” position and turn the fourth knob to “I” position. (Fig. 5.21). Leaving 0.08mm–0.15mm backlash between gear teeth, arranges the 24 teeth change gear to 120 teeth and 120 teeth to 48 tooth change gear.
5. Rotate the spindle by hand to verify no binding exists, and close the gear door.



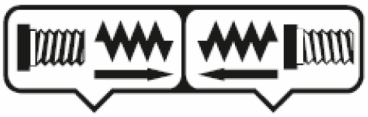
WARNING!

STOP the machine before any attempt to remove the swarf. Use leather gloves when handling swarf. Cuttings are sharp and can cause injury.

Fig. 5.21

Leadscrew Direction

Selects the direction for the leadscrew and the power feed.(Fig. 5.22). When the lever is positioned to the right side, the carriage will move to the left along the bed, or the cross feed will travel toward the front of the lathe.



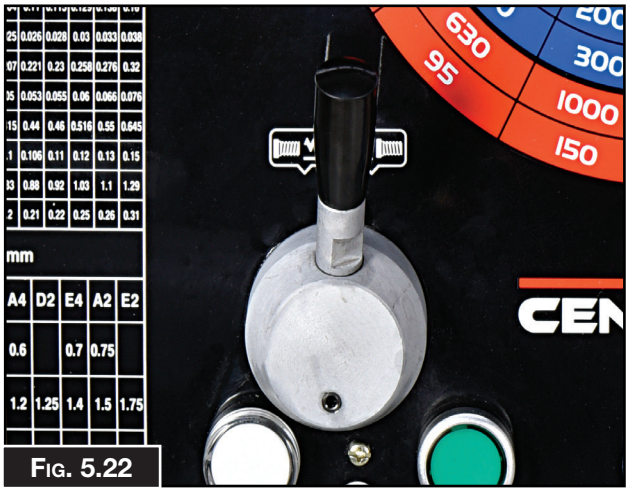


Fig. 5.22

Thread Chasing Dial

The numbers on the thread dial are used with the thread dial chart (Fig. 5.23) to show when to engage the half nut during metric threading. (Fig. 5.23)

When cutting metric threads and the pass has been completed, the thread dial (Fig. 5.23) allows the operator to disengage the carriage from the leadscrew, and quickly return the carriage for the next pass. Based on the thread pitch being cut, and what is indicated on the Indicator Table, the dial indicates where the operator must re-clamp the half nut in order to resume the same thread to avoid cross-cutting threads.

When cutting some inch or other types of threads, the half nut may have to be clamped to the leadscrew until the threads are complete, otherwise the path of the same thread will be lost. In this case carriage returns are made by backing the tool point out of the thread, and reversing spindle rotation with the spindle ON/OFF lever.

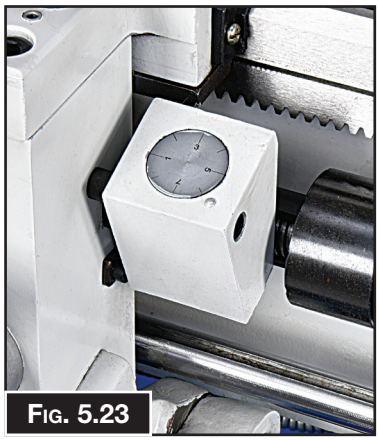
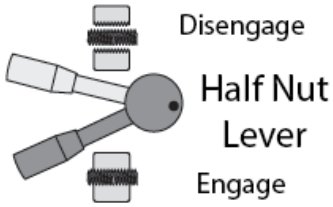


Fig. 5.23

	mm			mm	
T	mm		T	mm	
0	0.5	/	15	0.45	1
	0.6	/		0.9	1
	0.75	/		1.25	1
	1	/		1.8	1
	1.5	/		2.25	1
	3	/		2.5	1
16	0.4	1-8	14	4.5	1
	0.8	1,3,5,7		5	1
	1.2	1-8		0.7	1,5
	1.6	1,5		1.4	1,5
	2	1-8		1.75	1,5
	2.4	1,3,5,7		2.8	1
	3.2	1		3.5	1,5
	4	1,3,5,7		7	1,5
	4.8	1,5			
	6	1-8			

Half Nut Lever (Fig. 5.24)

When the feed selection lever and carriage lock are disengaged, the half-nut lever can be moved downward from the disengaged upper position to clamp the half nut around the leadscrew for threading operations.



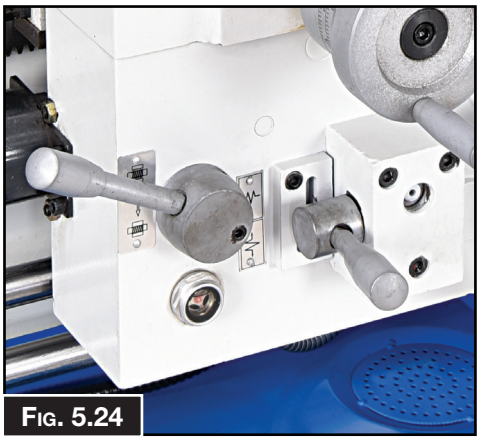


FIG. 5.24

Procedure for threading:

1. Set the speed to about one quarter of the speed used for turning.
2. Set the quick change gearbox for the required pitch in threads.
3. Set the compound rest at 29 degrees to the right for right hand threads.
4. Install a 60 degree threading tool bit for metric threads or a 55 degree tool for imperial threads and set the height to the lathe centre point.

Align your threading tool against a freshly faced end or against the side of the chuck.

- Align your threading tool against a freshly faced end or against the side of the chuck. The little arrow-shaped alignment tools you see are a pain and are only good for gauging hand-ground tool bits.
- If you do a lot of threading on a manual lathe, invest in a tool that accepts inserts. The inserts are precisely ground and easily changed. One insert cuts dozens of thread pitches.
- I learned how to thread on the lathe using the compound in-feed method. Contrary to popular belief, the compound set doesn't have to be at half the thread angle. By using what's called "modified-flank in-feed" and changing this angle, you help alleviate threading problems in difficult-to-cut materials.

CAUTION!

Check the oil levels and lubrication points before running the machine for the first time. Lack of lubrication can cause damage to the machine and may void the warranty.

CAUTION!

It is impossible to cover all possible hazards. All workshop environments are different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

5.6 CHANGE GEARS

The end gears are used to setup for power feed, inch, or metric threading operations. See Fig. 5.25 to identify the upper gear, middle 120T/127T change gears, and the lower gear. Details on which gear to use are found on the headstock feed and threading charts.

Change Gear Configuration:

To configure the change gears:

1. Locate the chart on the headstock that has the thread or feed option that is required.
2. DISCONNECT THE MACHINE FROM POWER!
3. Remove the headstock end gear cover.
4. While holding the 120T/127T gears, loosen the arm by undoing the gear support hex nut and slowly let the gears pivot down and away from the upper top gear, as illustrated. (Fig. 5.26)
5. Loosen the 120T/127T gear socket head screw and slide the middle gear away from the bottom gear. The 120T/127T gears many need to be reversed. Undo the 120T/127T gear hex nut (Fig. 5.26) and reverse the gears.
6. Remove the cap screw and flat washer from the top gear, then slide the gear off the shaft. Slide the desired gear onto the top gear shaft and desired gear onto the bottom gear shaft making sure to align the keys and keyways. Position the flat, non-stepped face of the gears away from the headstock so they will mesh with either the 120T or 127T gear depending on which one is required.
7. Secure the top and bottom gears with the flat washers and cap screws that were removed earlier.
8. Raise the gear support arm and mesh the top gear with the 120T/127T, then tighten the arm support hex locking nut and replace the change gear cover. (Fig. 5.27)

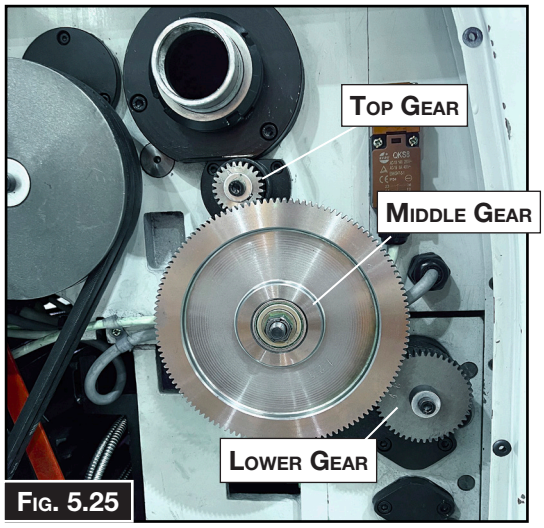


Fig. 5.25

Fig. 5.26

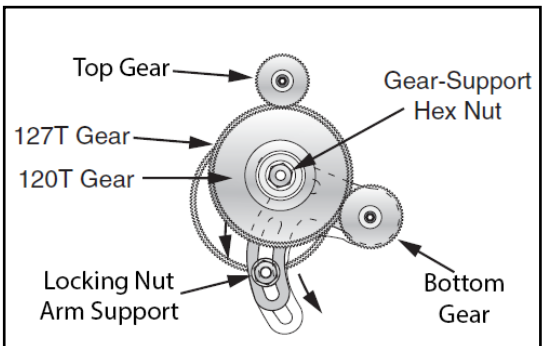


Fig. 5.27

CAUTION!

Before attempting this feature, disconnect the machine from the power supply to avoid injury to the operator from accidental startup or damage to the machine.

5.7 SELECTING THE FEEDS

The AL-346 Metal Lathe can cut left or right while feeding or threading, and both ways for facing operations. This feed direction is controlled by the selection knob on the headstock (Fig.5.28)

NOTE: The feed direction knob should not be changed while the spindle is rotating.

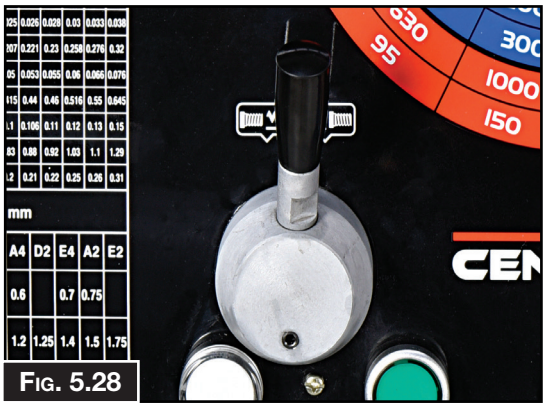


FIG. 5.28

Selecting the Feed Rod

The feed rod can be selected by rotating the top right hand dial to the “S” position. (Fig. 5.28). Use this position for all feeding operations. When the knob is in the other positions, threading selections can be made.

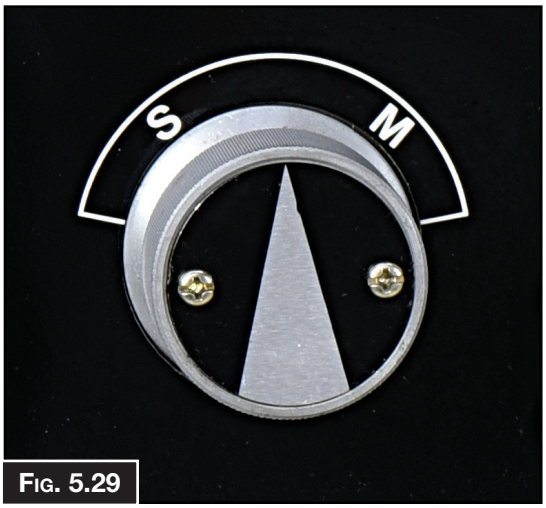
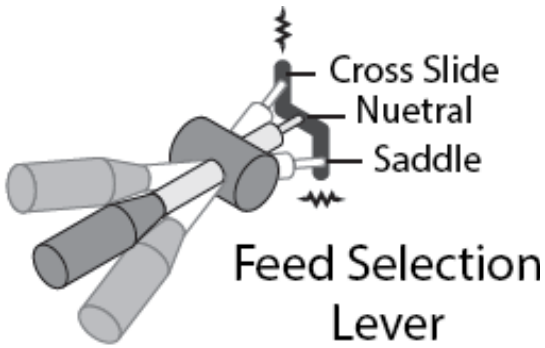


FIG. 5.29

Feed Lever - Longitudinal and cross slide powered feeds are controlled by the feed lever. The lever pivots through two stops which require moving the lever left and right as well as up and down.

Moving this lever upward activates the automatic longitudinal feed. Moving the lever down activates the cross slide for facing operations. (Fig. 5.29)



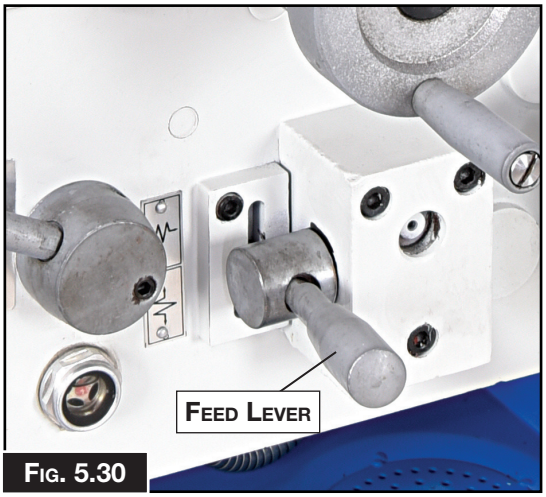
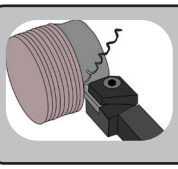


FIG. 5.30



WARNING!

STOP the machine before attempting to remove the swarf. Use leather gloves when handling swarf. Cuttings are sharp and can cause injury.

5.8 ALIGNING TAILSTOCK TO SPINDLE CENTERLINE

By offsetting the tailstock, the dead centre can hold a work piece off centre from the spindle centerline so tapers and pipe threads can be cut. An offset scale (Fig. 5.31) with increments is located at the rear of the tailstock. However, to achieve exact taper angles, or to adjust the tailstock back into the spindle centerline, angle gauges and a test indicator must be used.

To offset the tailstock:

1. Loosen the tailstock lock lever.
2. Using a hex wrench loosen one of the front or rear adjustment screws shown in Fig. 5.31

   — To move the tailstock toward the rear of the lathe, loosen the rear adjustment screw and tighten the front screw.

   —To move the tailstock toward the front of the lathe, loosen the front adjustment screw and tighten the rear screw.
3. Apply the tailstock lock lever, and check the amount of the tailstock offset. Unlock and readjust as required for fine tuning.

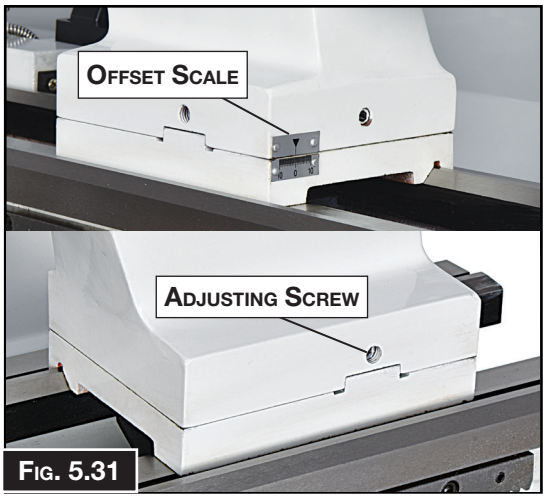


Fig. 5.31

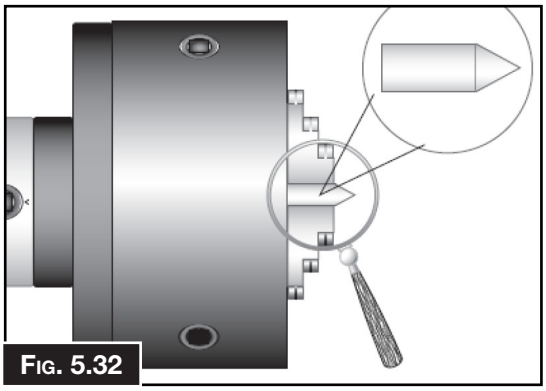


Fig. 5.32

Aligning Tailstock

1. Centre drill a 150mm long piece of bar stock on both ends. Set it aside for use in Step 4.
2. Make a dead centre by turning a shoulder to make a shank. Flip the piece over in the chuck and turn a 60°point (Fig. 5.32). As long as it remains in the chuck, the point of your center will be accurate to the spindle axis.
3. Place the live centre in your tailstock.
4. Attach a lathe dog to the chuck bar stock from step 1, and mount between the centers (Fig. 5.33).
5. Turn approximately 0.25mm off the diameter.
6. Mount a dial indicator so that the plunger is on the tailstock quill (Fig. 5.33).
7. Measure the stock with a micrometer. If the stock is wider at the tailstock end, the tailstock needs to be moved toward the front of the lathe half the amount of the taper. If the stock is thinner, at the tailstock end, the tailstock needs to be moved toward the rear of the lathe by half the amount of the taper (Fig. 5.33)

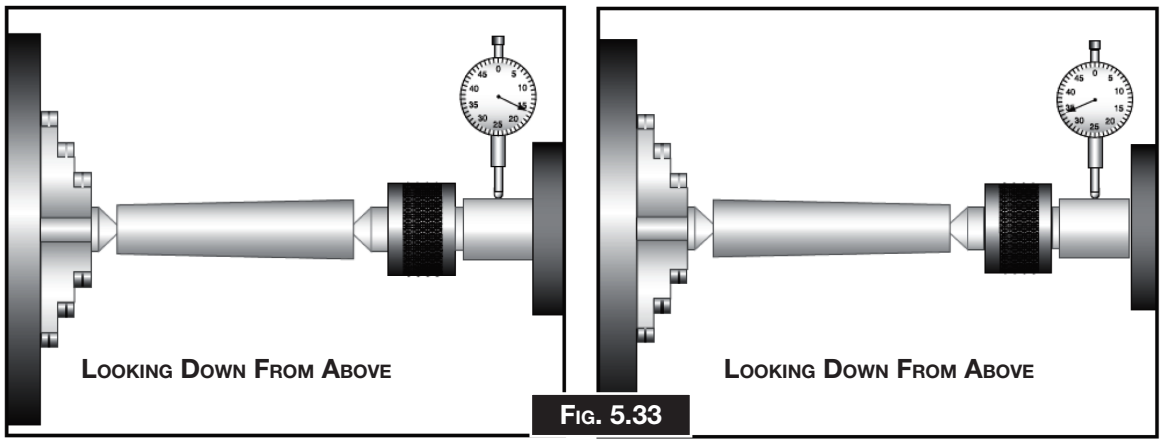


Fig. 5.33

5.9 COOLANT SYSTEM

The cutting fluid system delivers cutting fluid via a flexible distribution hose and nozzle. The cutting fluid pump turns ON and OFF with a switch located on the control panel. Fluid flow is controlled by a manual flow control valve. (Fig. 5.34)

NOTE! Running the pump without adequate cutting fluid in the reservoir may permanently damage it. This type of damage is not covered by the warranty. Always use high quality cutting fluid and follow the manufacturer's instructions for diluting. Frequently check the cutting fluid condition and change it promptly when it becomes overly dirty or rancid.

FIG. 5.34

WARNING! Biological and poison hazard! Use the correct personal protection equipment when handling cutting fluid and by fluid manufacturer requirements to properly dispose of cutting fluid.

Checking cutting fluid system

When checking the cutting fluid system, the goal is to make sure there is enough cutting fluid, the chip level in the first chamber is not too high, and the cutting fluid has not become rancid or contaminated.

To Check The Cutting Fluid System:

1. Disconnect lathe from power!
2. At the tailstock end of the lathe, remove the pump access cover.
3. Inspect the level of cutting fluid inside the tank. The cutting fluid should be approximately 25mm below the top of the tank.
4. Using a wooden stick, check the level of the metal chips in the first chamber (Fig. 5.35). If the chips are 3⁄4 the height of the baffle, then remove the chips.

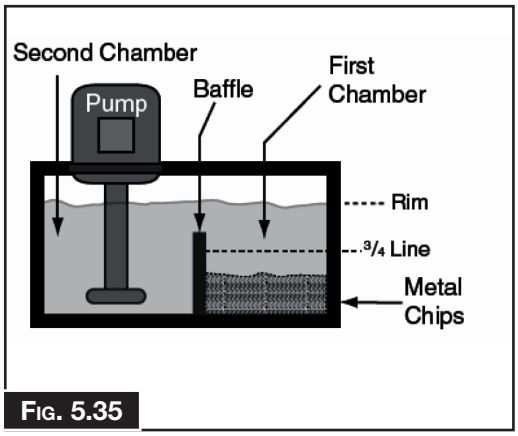


FIG. 5.35

5. Inspect the cutting fluid quality as outlined by the fluid manufacturer and replace as recommended.

Cleaning Cutting Fluid System

1. Place the drain hose on the end of the coolant nozzle, and pump the used cutting fluid into the drain bucket. As soon as pumping is complete turn the pump OFF immediately.
2. Disconnect lathe from power!
3. Lift the tank assembly from the lathe stand.
4. Remove all metal shavings, any remaining cutting fluid, and clean out the tank.
5. Clean the intake screen on the pump.
6. Reinstall the cutting fluid tank into the lathe stand.
7. Mix the cutting fluid to the manufacturer's required specification , and fill the cutting fluid tank
8. Reinstall the pump access cover.

6. MAINTENANCE

6.1 LUBRICATION

⚠ WARNING **Before maintaining or cleaning the machine, turn off the circuit breaker, or disconnect the machine from the power supply. Post a sign to inform other workers that the machine is under maintenance.**

For optimum performance from the machine, it is important that the machine is well lubricated and maintained. Follow the maintenance schedule listed in the following section and refer to any specific instructions given.

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

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

6.2 LUBRICATION POINTS

Headstock

The headstock reservoir has the proper amount of oil when the oil level in the sight glass is approximately halfway. (Fig. 6.1) The oil sight glass is located below the chuck, The oil should be changed every six months by firstly draining the oil by removing the drain plug (Fig. 6.2) then filling by the oil filler plug (Fig. 6.3) The drain plug can be found under the gear train.

Fig. 6.1

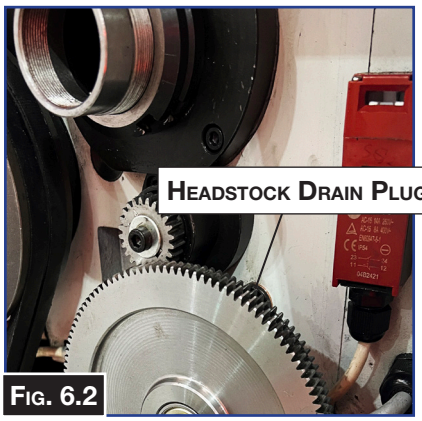


Fig. 6.2

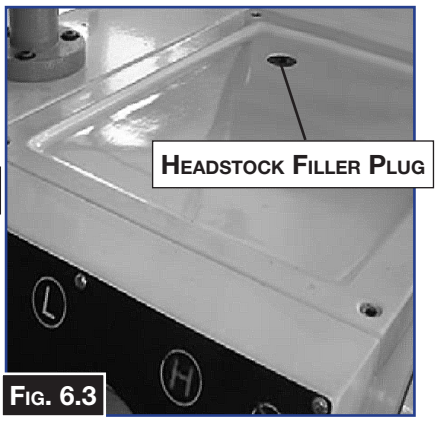


Fig. 6.3

APRON

The apron oil sight glass is on the front of the apron, as shown in Fig. 6.4. 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. 6.4), remove the fill plug, then use a hex wrench to remove the drain plug and empty the reservoir.

Note: The drain plug can be found on the bottom of the saddle

Flush the reservoir by pouring a small amount of clean oil into the fill hole and allowing it to drain out the bottom.

Replace the drain plug, add oil as required, then re-install the fill plug.

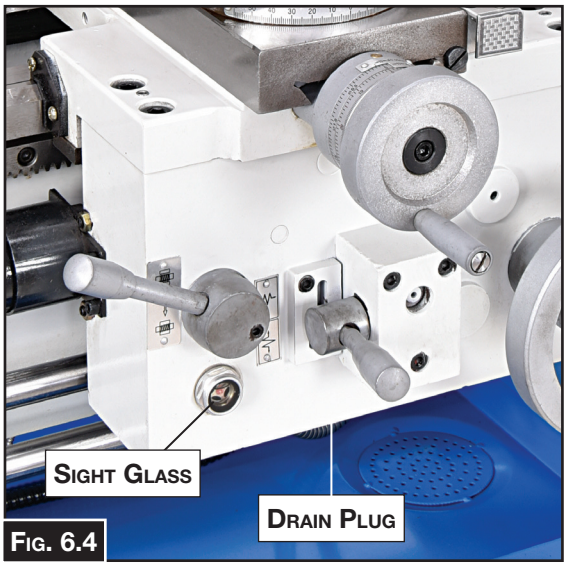


Fig. 6.4

CAUTION!

Check the oil levels and lubrication points before running the machine for the first time. Lack of lubrication can cause damage to the machine and may void the warranty.

Gearbox

The quick change gearbox has an oil reservoir that is equipped with a sight glass for the quick checking of the oil level. Before and after every use, make sure that the oil level is correct. Figures 6.5 and 6.6 show the gearbox locations of the sight glasses and the fill/drain plugs.

Fig. 6.5

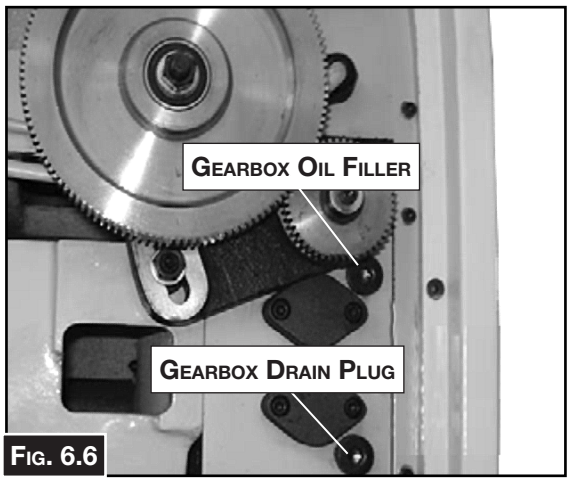


Fig. 6.6

To add oil to the reservoir:

1. Clean the area around the fill plug to prevent debris from falling in the reservoir when adding oil.
2. Remove the fill plug.
3. Slowly add oil until the oil level is centered in the sight glass.
4. Replace fill plug.

Changing oil

The oil in the reservoirs must be changed after the first three months of operation, then twice a year after that. If the lathe is under heavy use, more frequent oil changes will be required to keep the gearboxes clean and ensure long machine life. Some lathe owners believe that by using full synthetic oils in the gearboxes is a way to extend oil change intervals. We do not recommend this practice. While synthetic oils are superior this lathe does not use a filter to remove contaminants that are generated during normal use, such as when shifting gears. Changing the oils on a frequent basis to flush out moisture and contaminants is still the best option to ensure long gearbox life.

CAUTION!

Before attempting this feature, disconnect the machine from the power supply to avoid injury to the operator from accidental startup or damage to the machine

Longitudinal Leadscrew

Undo the end of the lead screw cover and slide it to the end of the shaft. Before lubricating the lead screw (Fig. 6.5) is should be cleaned with mineral spirits. The use of a stiff brush will help clean out the threads. Move the carriage out of the way, so you can clean the entire length of the lead screw. Apply a thin coat of oil along the length of the lead screw. Use a stiff brush to make sure the oil is applied evenly and down into the threads. Replace the lead screw cover.

FIG. 6.5

Lead Screw & Feed Shaft Bearings (Fig.6.6).

The feed and leads screw bearings are lubricated through ball oilers at the end of the bed. Lubricate with machine oil and check each shift.

Ball Oilers (Fig. 6.7)

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

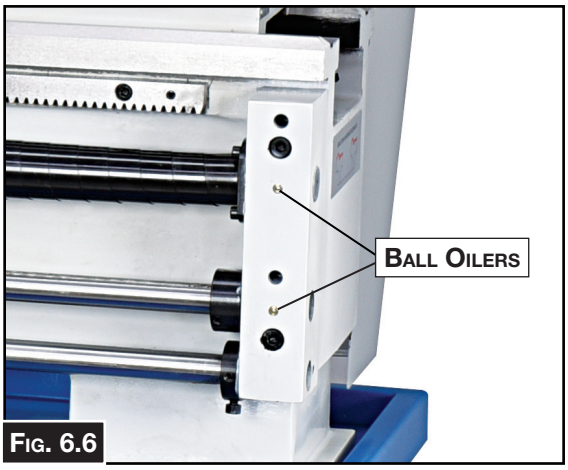


FIG. 6.6

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

Oilers can be found below

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

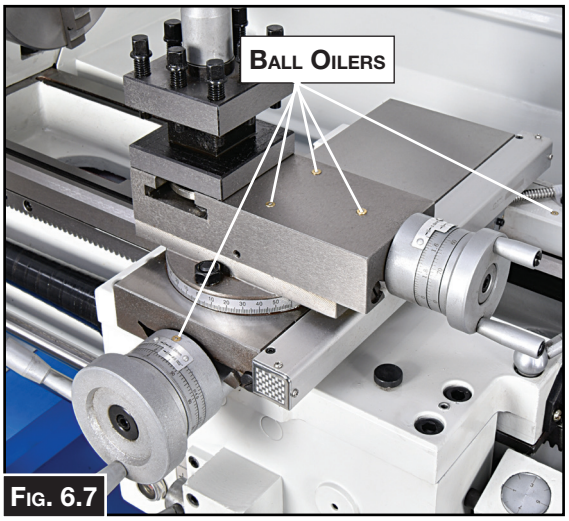


FIG. 6.7

6.3 TROUBLESHOOTING

Review the troubleshooting and procedures in this section if a problem develops with your machine. If you need replacement parts then follow the procedure in the beginning of the spare parts section or if additional help with a procedure is required, then contact your distributor.

Note: Make sure you have the model of the machine, serial number,and manufacture date before calling.

Symptoms	Possible Cause	Possible Solution
Motor will not start	1. Stop button not reset. 2. Main power panel switch is OFF 3. Circuit breaker or fuse has tripped. 4. No voltage or open connection 5. Faulty capacitor. 6. Spindle ON/OFF switch is at fault 7. Power switch or contactor faulty 8. Faulty Motor	1. Reset the stop button. 2. Turn the main power panel switch ON 3. Seek an electrician to trouble shoot and repair. 4. Test circuit and connections as required. 5. Replace capacitor. 6. Replace switch. 7. Replace power switch or magnetic contactor. 8. Replace motor.
Fuses or circuit breakers trip open	1. Short circuit in power lead or plug 2. Short circuit in motor or loose connections 3. Incorrect fuse or circuit breakers in power supply	1. Inspect cord or plug for damage, repair or replace. 2. Inspect all connections on motor. Repair as required. 3. Install correct fuses or circuit breakers.
Machine is loud, belt slips when cutting. Overheats or bogs down in the cut.	1. Excessive depth of cut. 2. RPM or feed rate wrong for operation 3. Dull cutting bit 4. Belt is slipping 5. Belt is at fault.	1. Decrease depth of cut. 2. Refer to RPM feed rate chart for appropriate Speed or feed. 3. Sharpen or replace cutting bit. 4. Remove grease or oil from belt. Adjust belts. 5. Replace belts.
Gear change lever will not shift	1. Gears not aligned in the headstock.	1. Rotate the spindle by hand until the gear falls into place.
Loud noise at the rear near motor	1. Pulley set screw or keys are missing or loose.	1. Inspect keys and set screws. Replace or tighten if required.
Entire machine vibrates excessively upon start-up or while running	1. Workpiece is unbalanced. 2. Worn or broken gear present. 3. Chuck or faceplate has become unbalanced. 4. Spindle bearings at fault.	1. Reinstall work piece so it is centered with spindle centreline. 2. Inspect gears and replace if required. 3. Balance chuck or faceplate. Contact a machine shop for help. 4. Adjust or replace spindle bearings
Cutting tool or machine components vibrate excessively during machining.	1. Tool holder not tight enough 2. Cutting tool stick out too far out of the tool holder. Lack of support. 3. Gibbs out of adjustment. 4. Dull cutting tool. 5. Incorrect spindle speed or feed rate.	1. Check for debris, clean and re tighten. 2. Install cutting tool so that no more than 1/3 of the total length is sticking out of the toolpost. 3. Tighten gib screws on effected slide. 4. Replace or sharpen the cutting tool. 5. Use the recommended speed and feeds.
Can't remove the tapered tool from the tailstock quill.	1. Quill has not retracted all the way back into the tailstock. 2. Debris is binding arbor in the quill. 3. Incorrect arbor or tooling inserted into the quill.	1. Turn the quill handwheel until it forces the taper out of the quill. 2. Extend quill to exposed drift slot and use drift key to remove arbor. 3. Remove quill and drive out tooling or arbor with punch
Cross slide, compound rest or carriage feed have sloppy operation.	1. Gibbs out of adjustment. 2. Handwheel is loose or has excessive backlash 3. Leadscrew mechanism worn out or out of adjustment.	1. Tighten gibs 2. Tighten screws and adjust backlash. 3. Tighten any loose fasteners or leadscrew mechanism.
Bad surface finish	1. Wrong RPM or feed rate 2. Dull tooling or poor tool selection 3. Too much play in the gibs 4. Tool too high.	1. Adjust to the appropriate RPM or feed rate. 2. Sharpen tooling or select a better tool. 3. Tighten gibs. 4. Lower the tool position.

6.3 TROUBLESHOOTING Cont.

Symptoms	Possible Cause	Possible Solution
Inaccurate turning results from one end to the other	1. Head stock and tailstock are not properly aligned. 2. Head stock not aligned to the bed.	1. Realign the tailstock to the headstock spindle bore and centre line. 2. Contact your Hafco Metalmaster service centre.
Chuck jaws won't move or do not move easily.	1. Chips lodged in the jaws 2. Chuck Scroll binding.	1. Remove jaws and clean and lubricate chuck threads and replace jaws. 2. Remove the chuck and dismantle. Clean with kerosene lubricate and re assemble
Carriage won't auto feed or over-loads the spindle motor.	1. Carriage or gib lock is applied. 2. Gears are not all engaged or broken. 3. Gibbs are too tight. 4. Leadscrew shear pin has sheared.	1. Release locks 2. Adjust gear positions or replace. 3. Loosen gib screws lightly. 4. Correct the cause of the shear pin breakage and replace shear pin.
Tail stock quill will not feed out	1. Quill lock lever is tightened down	1. Turn lever counter clockwise.

6.4 ADJUSTMENTS

Tapered Gib Adjustment

Tapered gibs are fitted to the slide ways of the saddle, cross-slide and top (compound) slides so that if any slackness, that may develop can be reduced. Make sure that slide ways are thoroughly cleaned and lubricated before attempting adjustment.

To Adjust The Top Slide Gib:

1. DISCONNECT MACHINE FROM POWER.
2. Release the rear gib screw and tightening the front screw a little at a time. Check constantly for a smooth action throughout the full slide travel. (Fig. 6.8)

To Adjust The Cross Slide Gib:

1. DISCONNECT MACHINE FROM POWER.
2. Undo the three button head screws that hold the slide wiper and remove the rubber wiper.
3. Release the rear gib screw and tightening the front screw a little at a time. Check constantly for a smooth action throughout the full slide travel.

To Adjust The Saddle Slide Gib:

1. Loosen the jam nuts on the four set screws (Fig. 6.9), and adjust the set screws.
2. Repeat adjustments as necessary until the carriage adjustment is acceptable.
6. Hold the set screws in place and tighten the jam nuts.

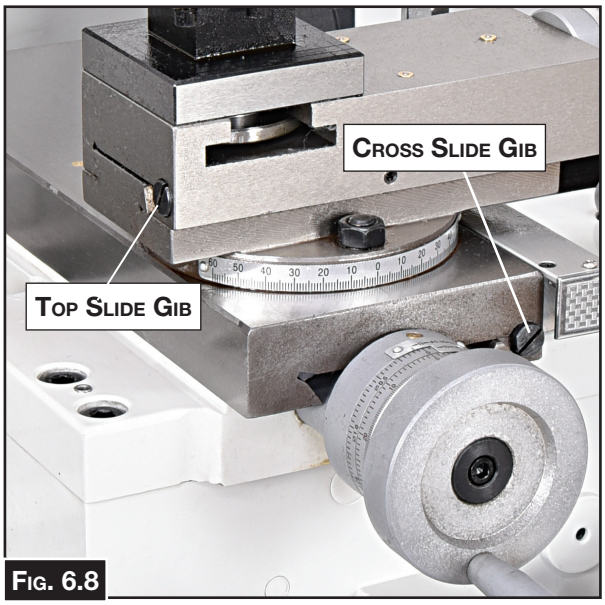


Fig. 6.8

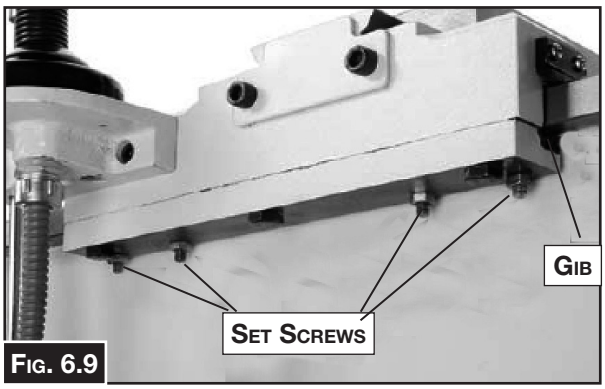


Fig. 6.9

NOTE: Avoid over adjustment, which can result in an increased wear rate and stiff or jerky action of the movement.

Cross Slide Nut Adjustment.

This is an adjustment that can be made to eliminate excessive backlash, which may develop over time.

Backlash is reduced through the cap head screw located at the rear of the nut.

To adjust the backlash:

1. DISCONNECT THE MACHINE FROM THE POWER SUPPLY.
2. Remove the back splash guard.
3. With a long hex key in the cap head screw, make only small adjustment. Operating the cross slide several times by hand to be sure of smooth operation throughout the travel.(Fig. 6.10)

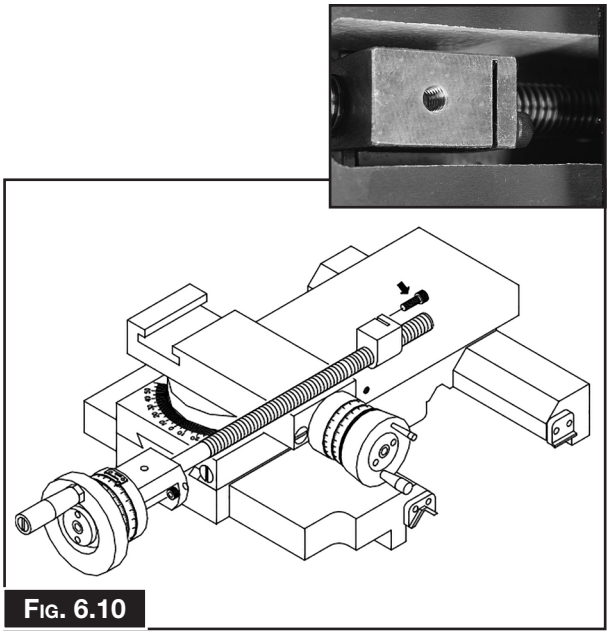


FIG. 6.10

Feed Clutch Adjustment

This lathe is equipped with a feed rod clutch, shown in Fig. 6.11, that connects the feed drive hub with the feed rod through a set of spring-loaded internal balls. This clutch helps protect the apron feed system from overload. The feed rod clutch comes set from the factory, and should need no adjustment.

The clutch may slip if the path for the carriage or the cross feed is obstructed during turning or facing operations, the tool bit crashes into a workpiece shoulder, or if the carriage lock is left applied. It is important to recognize, the clutch is not a foolproof way to protecting the lathe from damage if an operational mistake is made. Never completely tighten the feed clutch set screw past its normal setting outlined in this procedure in an attempt to completely eliminate clutch slip. Doing so will void the warranty, and can lead to catastrophic gearbox damage.

To Adjust The Feed Rod Clutch:

DISCONNECT LATHE FROM POWER!

— if the clutch slips during normal work loads and no problem exists with the feed system, the clutch spring pressure must be increased. Tighten the two set screws 1⁄8-turn and recheck for slippage.

— if for any reason the clutch is bound up or locked, and does not slip when it should, the clutch spring pressure must be reduced. Loosen the two set screws 1⁄8-turn, and recheck for slippage.

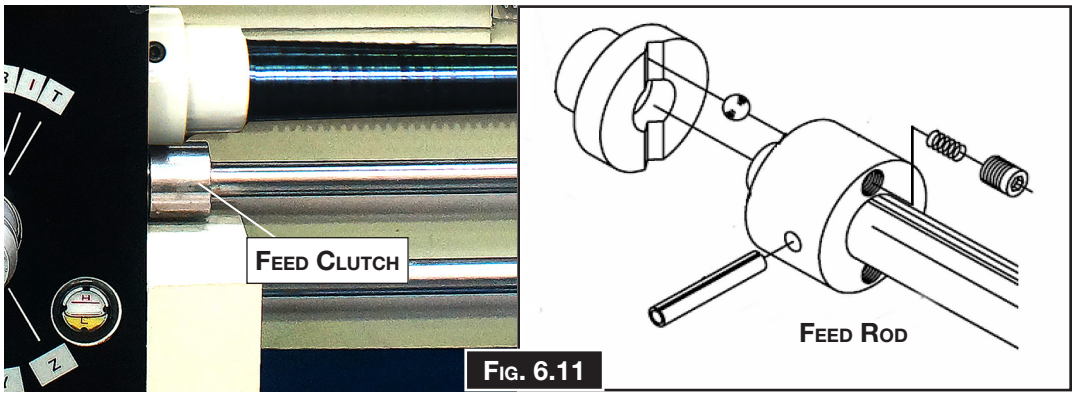


FIG. 6.11

V-Belt Tension

After initial break in, the v-belts slightly stretch and seat into the pulley. It is important to check and adjust them to compensate for this initial wear. Check the tension thereafter on a monthly basis.

To Check The V-Belt Tension:

1. Disconnect lathe from power!
2. Open the headstock gear door.
3. Push the center of the v-belts with moderate pressure. The V-belt deflection should be approximately 10mm.
   — If the belt deflection is greater than 10mm, use the wrench to loosen the motor mount bolts (Fig. 6.12) and slide the motor downward until the deflection is correct.
4. Tighten the bolts and recheck the belts.

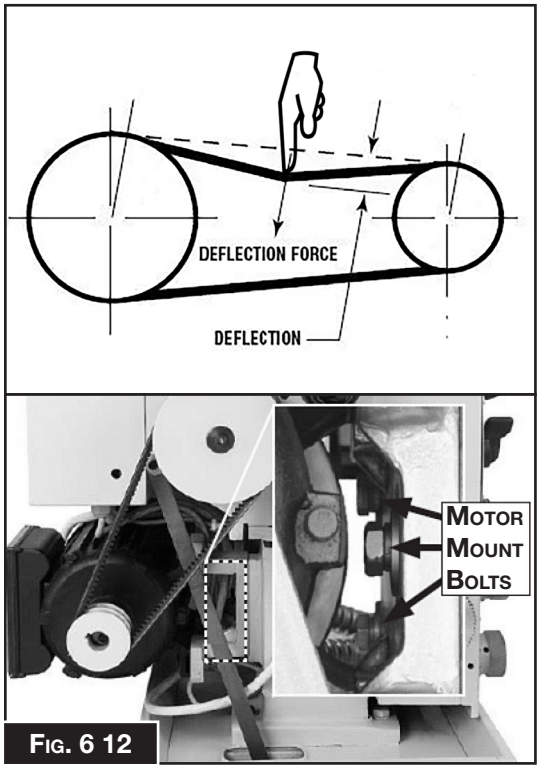


FIG. 6 12

Half Nut Adjustment

If the half-nut mechanism wears it may have to be adjusted if it becomes loose. The half nut is mounted in ways with a gib exerting pressure between components to reduce sloppy movement. The half-nut gib is a flat bar-type gib, similar to the saddle gib, and is tensioned with three set screws.

To Adjust The Half Nut:

1. DISCONNECT LATHE FROM POWER!
2. Open the half nut and remove the thread dial.
3. Loosen the hex nuts on the set screws shown in Fig. 6.13
4. Tighten each set screw approximately 1⁄8 of a turn, then re tighten the hex nuts without moving the set screws.
5. Move the carriage handwheel until the half nut can fully close, then open/close the half nut several times and notice how it feels. The half nut is correctly adjusted when you feel a slight drag while opening and closing. It should not feel stiff or loose.

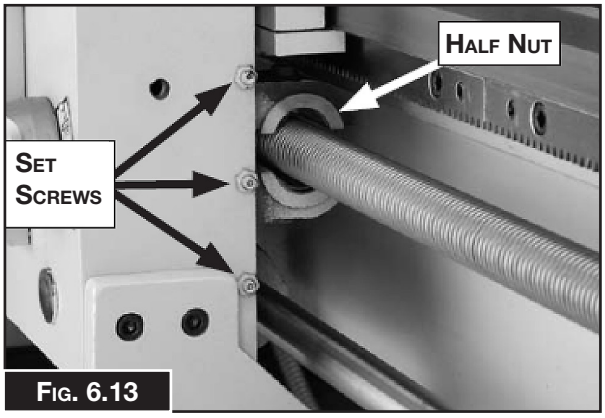


FIG. 6.13

CENTRE LATHE

AL-346

Order Code: (L543D)

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 anytime 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.

NOTE: SOME PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

3. Go to **www.machineryhouse.com.au/contactus** and fill out the inquiry form attaching a copy of scanned parts list.

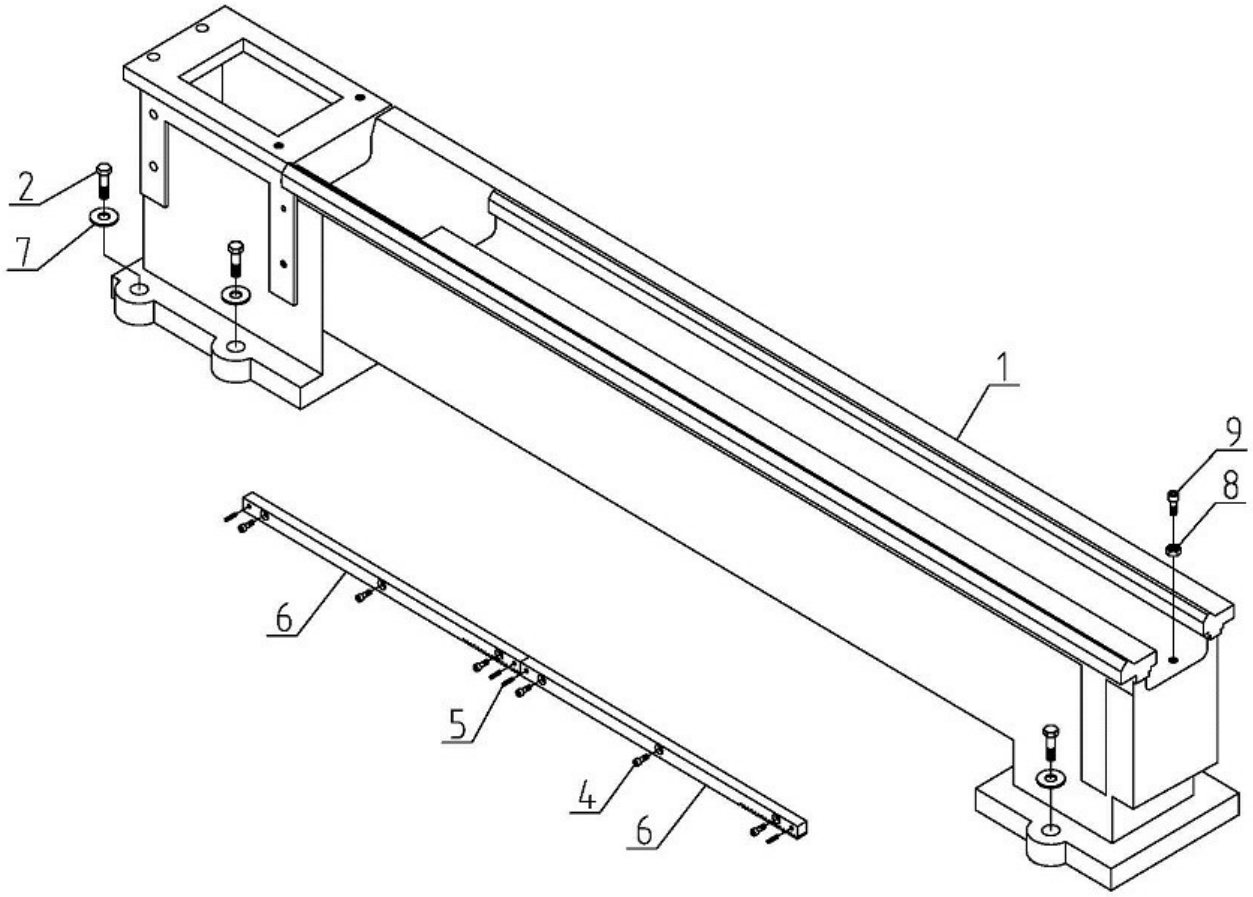
WARNING!

Electricity is dangerous and could cause death
All electrical work must be carried out by a qualified electrician.

CAUTION!

It is impossible to cover all possible hazards Every workshop environment is different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

BED ASSEMBLY - DIAGRAM

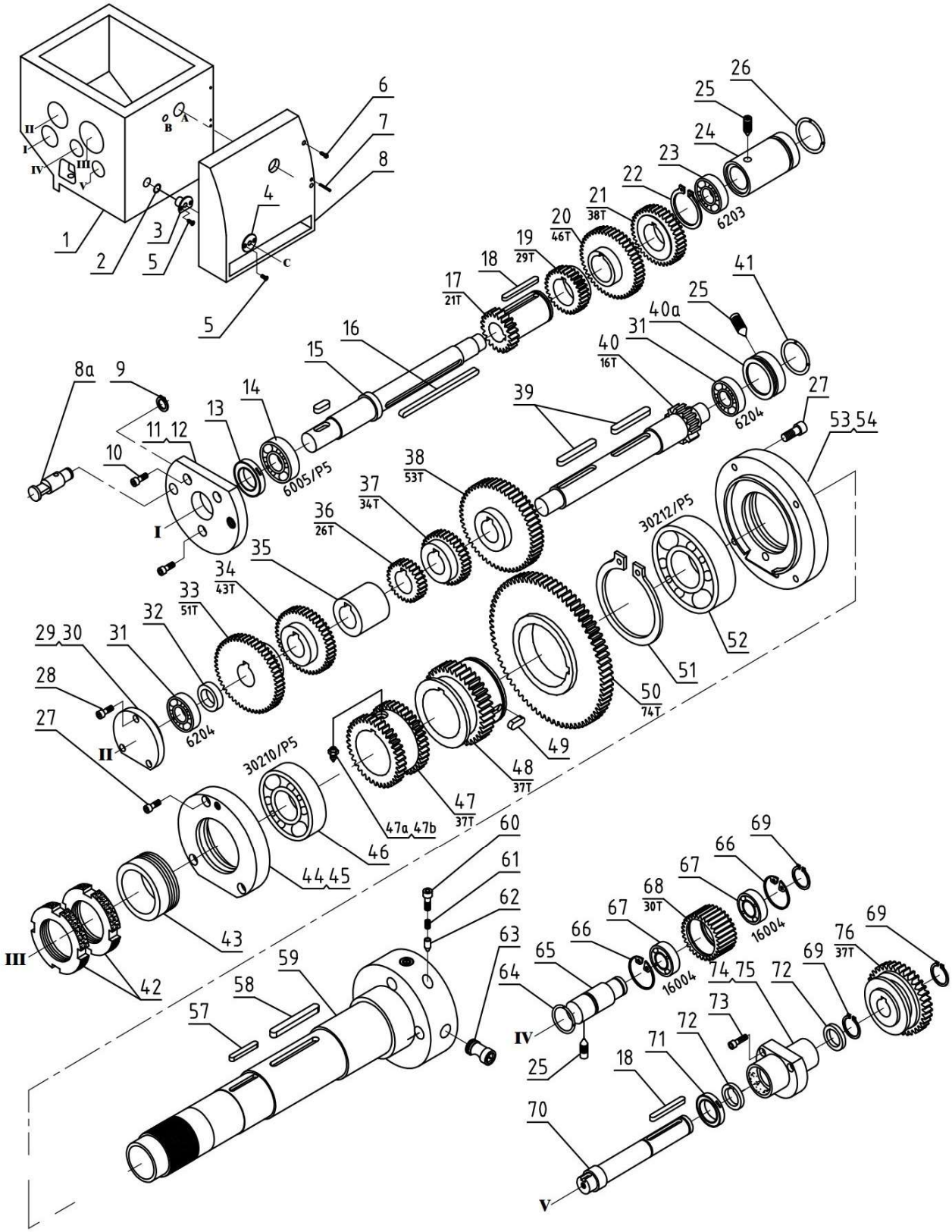


BED ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-11101-1	LATHE BED		1
2	GB/T5782	SCREW	M12X40	6
4	GB/T70	HEX SOCKET CAP SCREW	M6X15	6
5	GB/T879	PIN	6X25	4
6	D330A-11204	RACK GEAR		2
7	GB/T97.1	WASHER	12	6
8	GB/T6170	NUT	M10	1
9	GB/T70	HEX SOCKET CAP SCREW	M10X35	1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

HEADSTOCK ASSEMBLY - DIAGRAM



HEADSTOCK ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-21107	HEADSTOCK		1
2	GB1235-76	OIL SEAL	20x2.4	1
3	D330A-21246	SLEEVE		1
4	D330A-21235	SLEEVE		1
5	GB/T819	CAP SCREW	M4X8	4
6	GB/T70	HEX SOCKET CAP SCREW	M6X40	4
7	GB/T879	ROLL PIN	5X40	2
8	D330A-21113-1	CASE FRAME		1
8a	D330A-11230	ROCKER SHAFT		1
9	GB894.1	EXT RETAINING RING	12	1
10	GB/T70	HEX SOCKET CAP SCREW	M6X20	3
11	D330A-21124	PULLEY SHAFT COVER		1
12	D330A-21601	GASKET		1
13	GB/T9877.1	OIL SEAL	25X40X7	1
14	GB/T276	BEARING		1
15	D330A-21215	SHAFT		1
16	GB/T1096	KEY	A6X120	1
17	D330A-21217	GEAR	21T	1
18	GB/T1096	KEY	A6X50	2
19	D330A-21218	GEAR	29T	1
20	D330A-21219	GEAR	46T	1
21	D330A-21220	GEAR	38T	1
22	GB/T894.1	EXT RETAINING RING	35	1
23	GB/T276	BEARING	6203	1
24	D330A-21106	FRONT PLUG		1
25	GB/T78	SET SCREW	M8X16	3
26	GB1235-76	OIL SEAL	40X3.1	1
27	GB/T70	HEX SOCKET CAP SCREW	M6X25	7
28	GB/T70	HEX SOCKET CAP SCREW	M4X12	3
29	D330A-21104	COVER		1
30	D330A-21602	GASKET		1
31	GBT276	BEARING		2
32	D330A-21211	WASHER		1
33	D330A-21222	GEAR	51T	1
34	D330A-21209	GEAR	43T	1
35	D330D-21221	SPACER		1
36	D330A-21210	GEAR	26T	1
37	D330A-21223	GEAR	34T	1
38	D330A-21224	GEAR	53T	1
39	GB/T1096	KEY	A8X55	2
40	D330A-21212	SHAFT	16T	1
40a	D330A-21225	FRONT PLUG		1

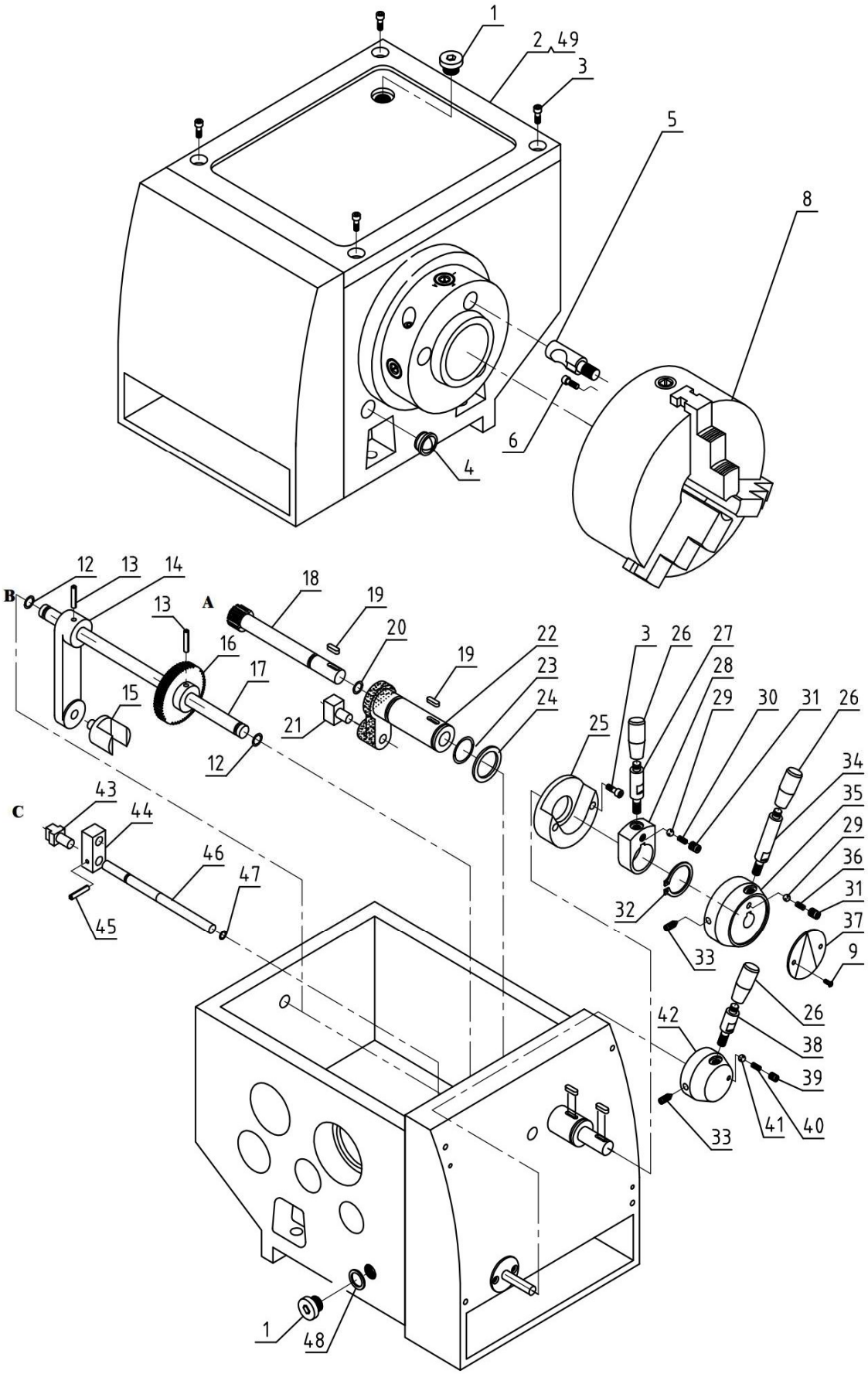
NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

HEADSTOCK ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
41	GB1235-76	OIL SEAL	47X3.1	1
42	D330A-21208	NUT		2
43	D330A-21102	COLLAR		1
44	D330A-21103	END COVER		1
45	D330A-21603	GASKET		1
46	GBT297	BEARING	30210	1
47	D330A-21207A	GEAR	37T/37T	1
47a	GB/T78	SET SCREW	M4X10	1
47b	GBT6170	HEX NUT	M4	1
48	D330A-21227	GEAR	37T	1
49	GB/T1096	KEY	A8X18	1
50	D330A-21226	GEAR	74T	1
51	GB/T894.1	EXT RETAINING RING	72	1
52	GB/T297	BEARING	30212	1
53	D330A-21108	FRONT COVER		1
54	D330A-21605	GASKET		1
57	GB/T1096	KEY	A6X40	1
58	GB/T1096	KEY	A8X85	1
59	D330A-21228A	SPINDLE		1
60	GB/T70	HEX SOCKET CAP SCREW	M8X16	3
61	GB2089	SPRING	4.5X16X0.8	3
62	D330A-21230	CAM PIN		3
63	D330A-21231	CAM		3
64	GB3452.1	OIL SEAL	25×2.4	1
65	D330A-21238	SHAFT		1
66	GB893.1	INT RETAINING RING	42	2
67	GB276	BEARING	16004	2
68	D330A-21237	GEAR	30T	1
69	GB894.1	EXT RETAINING RING	20	3
70	D330B-21239G	SHAFT		1
71	GB9877.1	OIL SEAL	24X32X5	2
72	D330A-21202	WASHER		2
73	GB70	HEX SOCKET CAP SCREW	M5X16	3
74	D330A-21101	COVER		1
75	D330A-21604	GASKET		1
76	D330A-21201	GEAR	37T	1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

HEADSTOCK CONTROLS - DIAGRAM

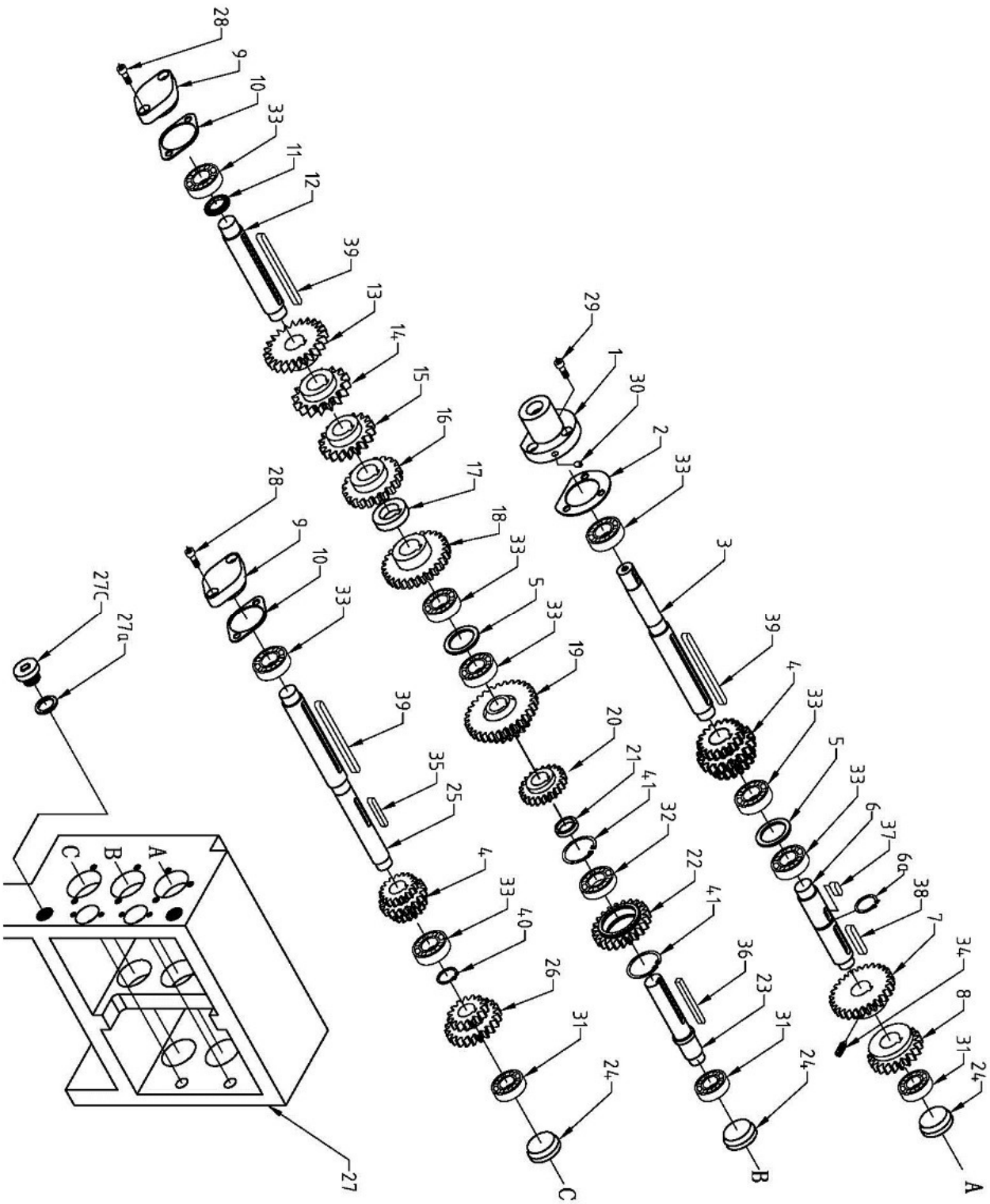


HEADSTOCK CONTROLS ASSEMBLY - PARTS LIST

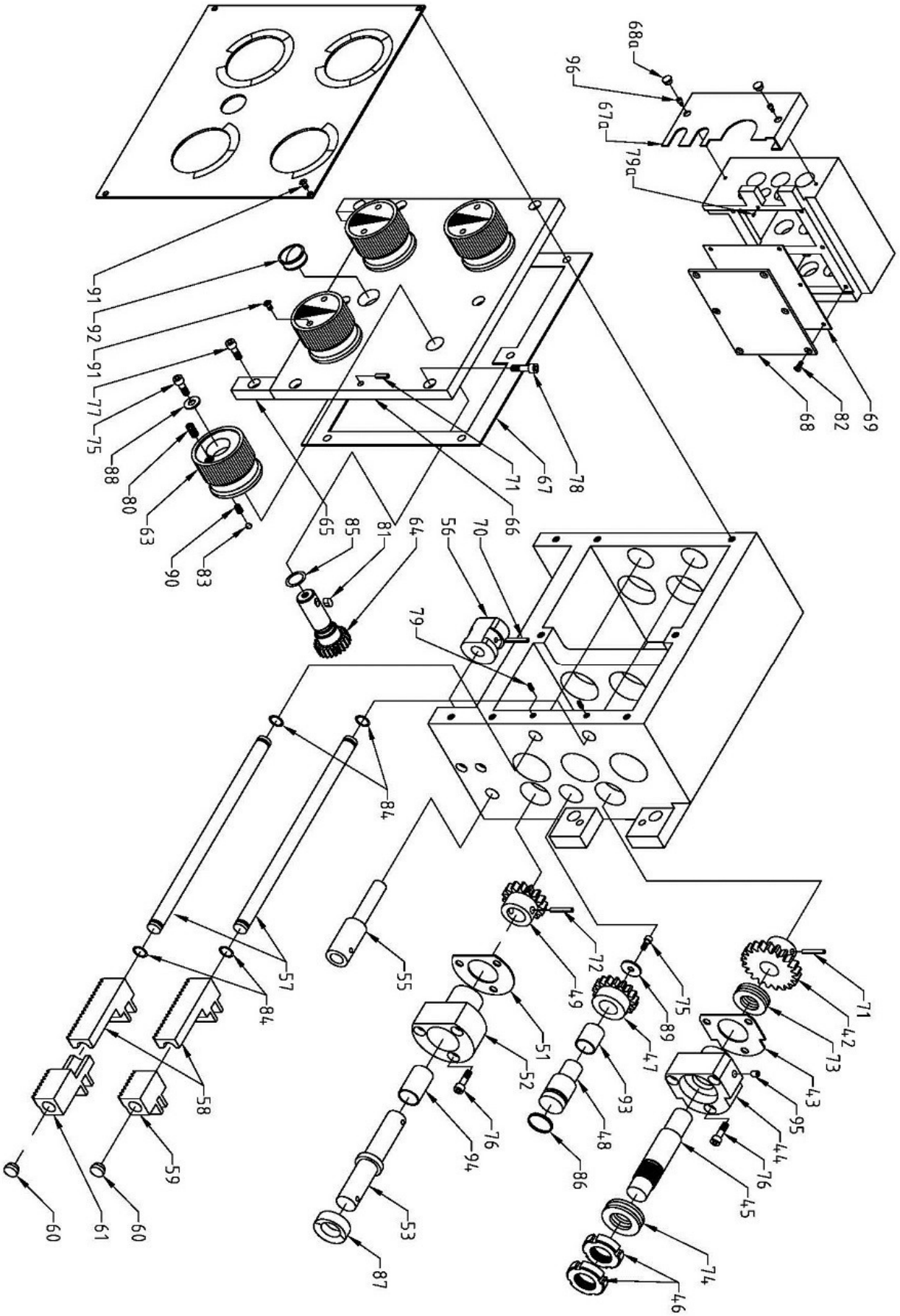
Index No.	Part No.	Description	SPECIFICATION	Qty
1		HEXAGONAL SOCKET HEAD PLUG	M16×1.5	2
2	D330A-21112-1	COVER BOARD		1
3	GB/T70	HEX SOCKET CAP SCREW	M6X25	6
4	JB/T7941.2	OIL SIGHT	M16X1.5	1
5	D330A-81201	CAMLOCK STUD		3
6	GB/T70	HEX SOCKET CAP SCREW	M6X12	3
8		3-JAW CHUCK	160MM/ D1-4	1
9	GB818	CAP SCREW	M4X6	2
12	GB3452.1	OIL SEAL	14×2.4	2
13	GBT879	ROLL PIN	5×30	2
14	D330A-21109	ROCKER		1
15	D330A-21233	SHIFT FORK		1
16	D330A-21234	GEAR	51T	1
17	D330A-21232	SHAFT		1
18	D330A-21241-1	GEARED SHAFT	17T	1
19	GB/T1096	KEY	5×14	2
20	GB1235-76	OIL SEAL	16×2.4	1
21	D330A-21403	SHIFT FORK		1
22	D330A-21121-1	SHIFT COLLAR		1
23	GB1235-76	OIL SEAL	30×3.1	1
24	D330A-21240	WASHER		1
25	D330A-21118	BASE		1
26	GB7271.3	HANDLE	M8×40	3
27	D330A-21248-1	LEVER		1
28	D330A-21119	LEVER BASE		1
29	GB308	STEEL BALL	6	2
30	D330A-21257	SPRING	6×1×13	1
31	GB77	SET SCREW	M8×8	2
32	GB894.1	EXT RETAINING RING	30	1
33	GB78	SET SCREW	M6×16	2
34	D330A-21249	LEVER		1
35	D330A-21117	LEVER BASE		1
36	D330A-21256	SPRING	6×1×26	1
37		POSITION SIGN PLATE		1
38	D330A-21248	LEVER		1
39	GB77	SET SCREW	M6×8	1
40	D330A-21258	SPRING	5X0.8X25	1
41	GB308	STEEL BALL	5	1
42	D330A-21120	LEVER BASE		1
43	D330A-21402	SHIFT FORK		1
44	D330A-21111	ROCKER		1
45	GB/T879	ROLL PIN	4×18	1
46	D330C-21236C	SHAFT		1
47	GB1235-76	OIL SEAL	10×1.9	1
48		COPPER WASHER	16	1
49	D330A-21606	GASKET		1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

GEARBOX ASSEMBLY 1 - DIAGRAM



GEARBOX ASSEMBLY 2 - DIAGRAM



GEARBOX ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-3034	COVER		1
2	D330A-3035	OIL SEAL		1
3	D330A-3041	SHAFT		1
4	D330A-3005	GEAR	18T/18T/18T	2
5	D330A-3066	WASHER		2
6	D330A-3067	SHAFT		1
6a	GB894.1-20	CIRCLIP	20	1
7	D330A-3027	GEAR	27T	1
8	D330A-3025	GEAR	21T	1
9	D330A-3044	COVER		2
10	D330A-3046	OIL SEAL		2
11	D330A-3045	WASHER		1
12	D330A-3033	SHAFT		1
13	D330A-3029	GEAR	24T	1
14	D330A-3031	GEAR	16T	1
15	D330A-3032	GEAR	18T	1
16	D330A-3003	GEAR	20T	1
17	D330A-3030	WASHER		1
18	D330A-3002	GEAR	28T	1
19	D330A-3026	GEAR	30T/18T	1
20	D330A-3007	GEAR	22T	1
21	D330A-3008	WASHER		1
22	D330A-3009	GEAR	23T	1
23	D330A-3019	SHAFT		1
24	CQ6230-3017B	COVER		3
25	D330A-3004	SHAFT		1
26	D330A-3006	GEAR	15T/22T	1
27	CQ6230-3001E	GEAR BOX		1
27a		COPPER WASHER	16	1
27c		SCREW	M16X1.5	2
28	GB/T70-M6X12	HEX SOCKET CAP SCREW	M6X12	4
29	GB/T70-M6X16	HEX SOCKET CAP SCREW	M6X16	3
30	JB/T7940.4-6	OIL PORT	6	1
31	GB/T276-6002	BEARING	6002	3
32	GB/T276-16003	BEARING	16003	1
33	GB/T276-6003	BEARING	6003	8
34	GB/T78-M6X8	SCREW	M6X8	1
35	GB/T1096	KEY	A5X35	1
36	GB/T1096	KEY	C5X40	1
37	GB/T1096	KEY	A6X15	1
38	GB/T1096	KEY	A6X35	1
39	GB/T1096	KEY	A6X90	3
40	GB/T894.1	CIRCLIP	17	1
41	GB/T893.1	CIRCLIP	35	2
42	.D330A-3018	GEAR	21T	1
43	CQ6230-3068D	OIL SEAL		1
44	CQ6230-3084D	COVER		1
45	D330 A-3021	SHAFT		1
46	D330A-GB812	NUT		2
47	D330A-3016	GEAR	17T	1

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GEARBOX ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
48	D330A-3015	SHAFT		1
49	D330A-3014	GEAR	15T	1
51	CQ6230-3086D	OIL SEAL		1
52	CQ6230-3022F	COVER		1
53	CQ6230-3013E	SHAFT		1
55	CQ6230-3011D	SHAFT		1
56	D330A-3012	POSITION PIECE		1
57	CQ6230-3089A	SHAFT		2
58	CQ6230-3049C	GEAR RACK		2
59	CQ6230-3062C	GEAR RACK		1
60	CQ6230-3091B	COVER		2
61	CQ6230-3050C	GEAR RACK		1
63	CQ6230-3054F	BOSS		4
64	CQ6230-3088	GEAR	23T	4
65	CQ6230-3061B	WASHER		2
66	CQ6230-3059E	COVER		1
67	CQ6230-3087D	OIL SEAL		1
67a	D330A-3001A	COVER		1
68	D330A-3042	COVER		1
68a		COVER	Φ13	2
69	D330A-3070	OIL SEAL		1
70	GB/T879	PIN	4X28	1
71	GB/T879	PIN	5X26	2
72	GB/T879	PIN	5X28	2
73	GB/T301-51103	BEARING	51103	1
74	GB/T301-51104	BEARING	51104	1
75	GB/T70	HEX SOCKET CAP SCREW	M6X12	5
76	GB/T70	HEX SOCKET CAP SCREW	M6X25	6
77	GB/T70	HEX SOCKET CAP SCREW	M8X16	2
78	GB/T70	HEX SOCKET CAP SCREW	M8X20	6
79	GB/T78	SCREW	M4X8	2
79a	GB/T78	SCREW	M5X8	1
80	GB/T77	SCREW	M8X6	4
81	GB/T1096	KEY	A5X8	4
82	GB/T819	SCREW	M6X10	6
83	GB308-89	BALL	6	4
84	GB/T3452.1	OIL SEAL	12X1.8	4
85	GB/T3452.1	OIL SEAL	16X2.4	4
86	GB/T3452.1	OIL SEAL	22X2.4	1
87	GB/T9877.1	OIL SEAL	18X30X10	1
88	GB/T97.1-6	WASHER	6	4
89	GB/T96-6	WASHER	6	1
90	GB2089	SPRING	6X18X0.8	4
91	GB/T818	SCREW	M4X6	12
92		OIL SEAL	M22X1.5	1
93		COPPER WASHER	16X18X20	1
94		COPPER WASHER	17X19X30	1
95	JB/T7940.4	OIL PORT	6	1
96	GB/T70	HEX SOCKET CAP SCREW	M5X8	2

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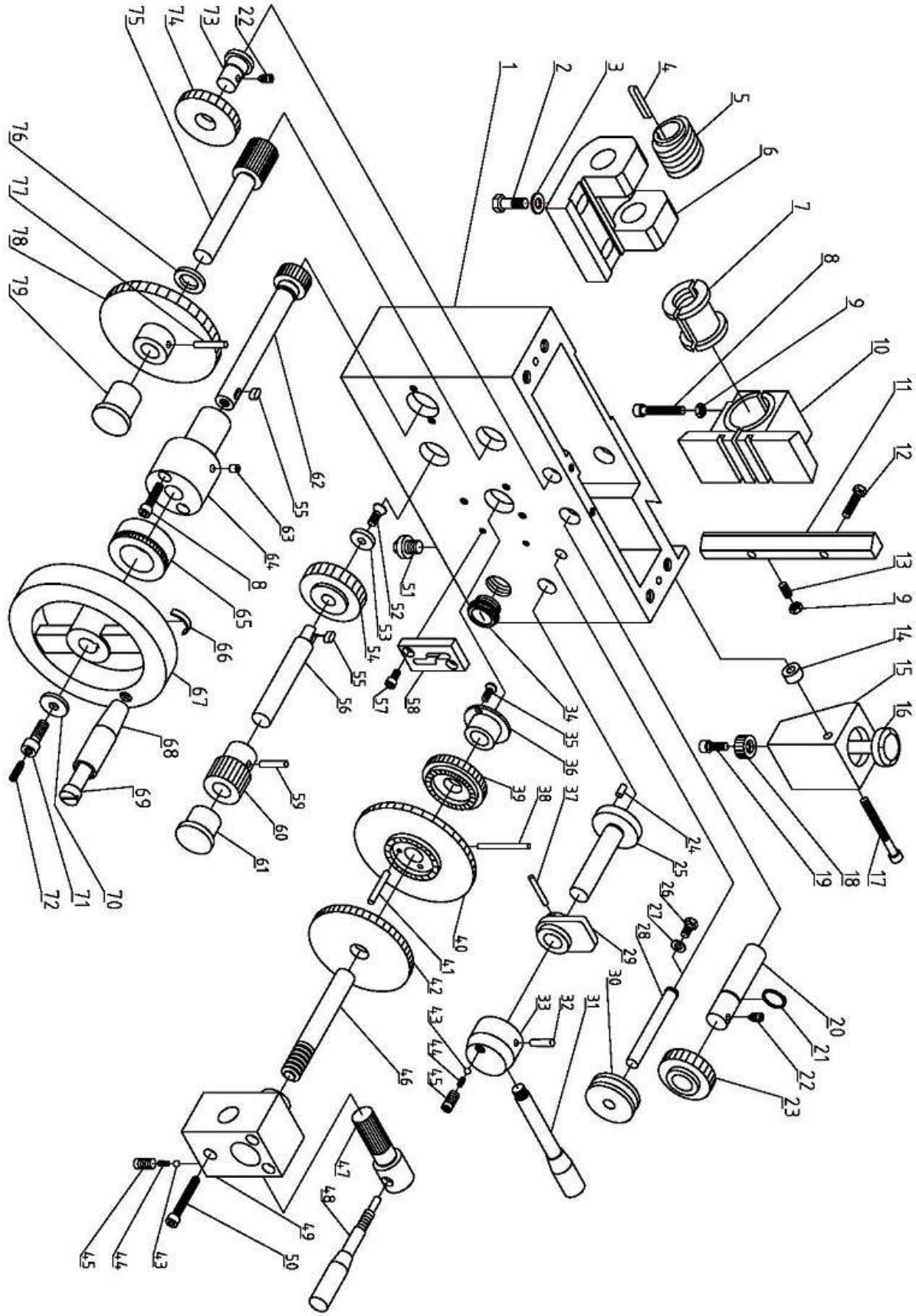
APRON ASSEMBLY - DIAGRAM



APRON ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	CQ6230-4001	APRON CASTING		1
2	GB/T5782	CAP SCREW	M8X30	2
3	GB/T97.1	WASHER	8	2
4	GB/T1096	KEY	A5X36	1
5	CQ6230-4008	WORM		1
6	CQ6230-4009	BRACKET		1
7	CQ6230-4003	HALF NUT HALF NUT		1
8	GB/T70	CAP SCREW	M6X40	3
9	GB/T6175	NUT	M6	3
10	CQ6230-4002	BRACKET		1
11	CQ6230-4022	GIB		1
12	GB/T5782	CAP SCREW	M6X25	2
13	GB/T77	SCREW	M6X15	2
14	CQ6230-4007	WASHER		1
15	CQ6230-4005	BRACKET		1
16	CQ6230-4006	SHAFT		1
17	GB/T70	CAP SCREW	M6X60	1
18	CQ6230-4004	GEAR		1
19	GB/T70	CAP SCREW	M6X15	1
20	CQ6230-4046	SHAFT		1
21	GB/T894.1	CIRCLIP	18	1
22	GB/T78	SCREW	M6X6	2
23	CQ6230-4035	GEAR	21T	1
24	GB/T119	PIN	5X10	2
25	CQ6230-4023	SHAFT		1
26	GB/T5782	CAP SCREW	M6X10	1
27	GB/T97.1	WASHER	6	1
28	CQ6230-4024	SHAFT		1
29	CQ6230-4021	LOCATING BLOCK		1
30	CQ6230-4025	FORK		1
31	CQ6230-4044	LEVER		1
32	GB/T117	TAPER PIN	5X40	1
33	CQ6230-4045	LEVER HAND		1
34	JB/T7941.2	OIL SEAL	M22X1.5	1
35	GB/T65	SCREW	M5X12	2
36	CQ6230-4016	WASHER		1
37	GB/T879	PIN	4X30	1
38	GB/T879	PIN	4X50	1
39	CQ6230-4014	GEAR	25T	1
40	CQ6230-4013	GEAR	51T	1
41	GB/T119	PIN	5X33	3
42	CQ6230-4013	GEAR	43T	1
43	GB308	STEEL BALL	6	2
44	CQ6123-14-01	SPRING		2
45	GB/T77	SCREW	M8X8	2
46	CQ6230-4015	SHAFT		1

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APRON ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
47	CQ6230-4042	GEAR	10T	1
48	CQ6230-4041	LEVER		1
49	CQ6230-4039	BRACKET		1
50	GB/T70	CAP SCREW	M6X45	3
51		BOLT	M10X1	1
52	GB/T819	SCREW	M6X12	1
53	CQ6230-4048	WASHER		1
54	CQ6230-4017	GEAR		1
55	GB/T1096	KEY	5X10	2
56	CQ6230-4018	SHAFT		1
57	GB/T70	CAP SCREW	M5X10	2
58	CQ6230-4043	LOCATING BLOCK SHAFT		1
59	GB/T879	PIN	5X25	1
60	CQ6230-4019	GEAR	14T	1
61	CQ6230-4020	WASHER		1
62	CQ6230-4030	SHAFT		1
63	GB/T7940.4	OIL PORT	6	1
64	CQ6230-4031	BRACKET		1
65	CQ6230-4036	GRADUATED DIAL		1
66	CQ6230-4037	CURSOR		1
67	CQ6230-4034	HAND WHEEL		1
68	CQ6230-4032	HANDLE		1
69	CQ6230-4033	HANDLE SCREW		1
70	CQ6230-4038A	WASHER		1
71	CQ6230-4047	SCREW		1
72	GB/T79	SCREW	M5X30	1
73	CQ6230-4011	SHAFT		1
74	CQ6230-4010	GEAR	25T	1
75	CQ6230-4028	SHAFT		1
76	CQ6230-4027	WASHER		1
77	GB/T879	PIN	5X30	1
78	CQ6230-4029	GEAR	50T	1
79	CQ6230-4026	WASHER		1

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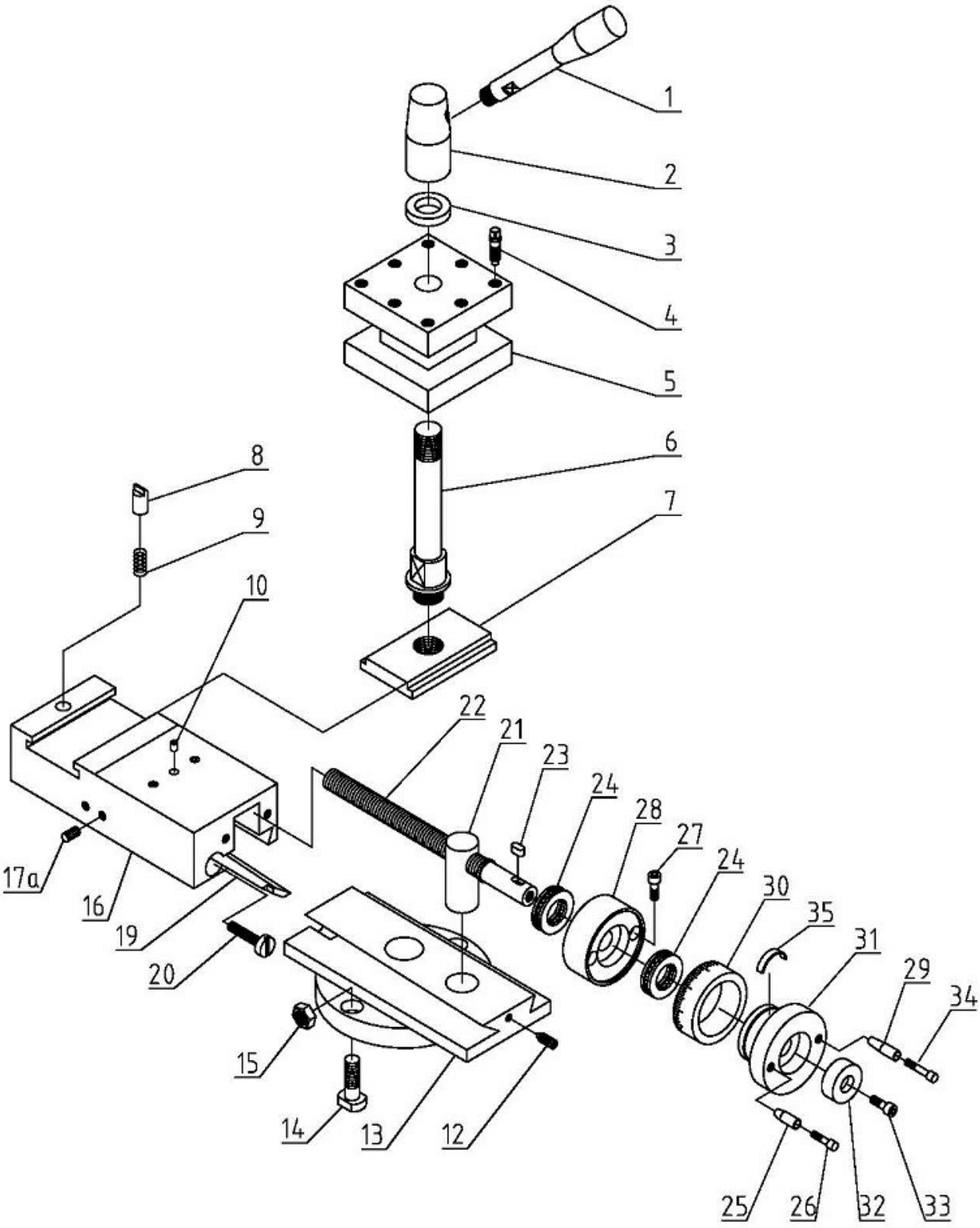
COMPOUND REST - DIAGRAM



COMPOUND REST - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	CQ6230-5010	HANDLE		1
2	CQ6230-5009	BOSS		1
3	CQ6230-5008	COLLAR		1
4	GB/T83	SCREW	M10×45	8
5	CQ6230-5005	TOOL POST		1
6	CQ6230-5006	SHAFT		1
7	CQ6230-5003	NUT		1
8	CQ6230-5004	PIN		1
9	GB2089	SPRING	1.2×6×8	1
10	JB/T7940.4	OIL CUP	6	3
12	GB/T78	SCREW	M6×16	1
13	CQ6230-5001	COMPOUND		1
14	D330A-51203	”T” SCREW		2
15	GB/T6175	NUT	M10	2
17a	GB/T78	SET SCREW	M6X12	1
21	CQ6230-5012	NUT		1
22	CQ6230-5011	GUIDE SCREW		1
23	GB/T1096	KEY	A4×8	1
24	GB/T301-51101	BEARING		2
25		COLLAR		1
26		BOLT		1
27	GB/T70	HEX SOCKET CAP SCREW	M6×25	2
28	CQ6230-5013	BRACKET		1
29		COLLAR		1
30	CQ6230-5014	INDEX RING		1
31		HAND WHEEL		1
32		WASHER		1
33	GB/T70	HEX SOCKET CAP SCREW	M6×12	1
34		BOLT		1
35	CQ6230-4037	LEAF SPRING		1

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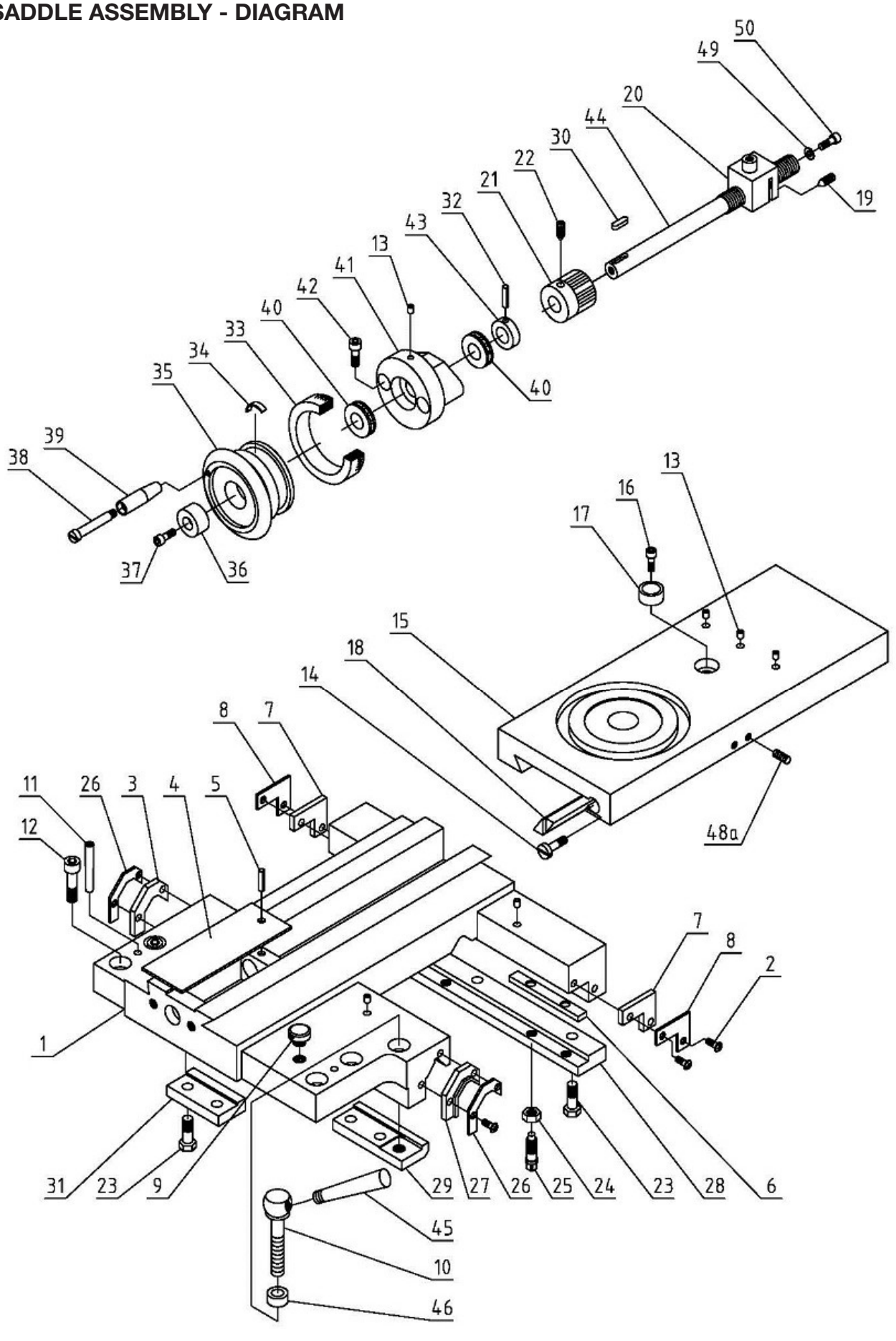
SADDLE ASSEMBLY - DIAGRAM



COMPOUND REST - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-51101	SADDLE		1
2	GB818	SCREW	M5X12	8
3	D330A-51301	WIPER		1
4	D330A-51211	COVER		1
5	GB/T879	PIN	3X10	1
6	D330A-51216	PRESS PLATE		2
7	D330A-51303	PRESS PLATE		2
8	D330A-51204	WIPER		2
9	D330A-51215	SCREW		1
10	D330A-S1001	SCREW (OPTIONAL)		1
11	GB/T118	TAPER PIN	6X45	2
12	GB/T70	HEX SOCKET CAP SCREW	M10×30	4
13	JB/T7940.4	OIL CUP	6	6
14	D330A-51214	SCREW		2
15	D330A-51102	TOOL POST		1
16	GB/T70	HEX SOCKET CAP SCREW	M6×12	1
17	D330A-51201	BUSHING		1
18	D330A-51212	GIB		1
19	GB/T78	SCREW	M4×12	2
20	D330A-51401	NUT		1
21	D330A-51202	GEAR		1
22	GB/T78	SCREW	M6×8	1
23	GB/T5782	SCREW	M8×25	7
24	GB/T6175	NUT	M8	4
25	GB/T83	SCREW	M8×25	4
26	D330A-51205	PRESS PLATE		2
27	D330A-51302	WIPER		1
28	D330A-51104	PRESS PLATE		1
29	D330A-51105	PRESS PLATE		1
30	GB/T1096	KEY	5×20	1
31	D330A-51103	PRESS PLATE		1
32	GB/T879	PIN	4X25	1
33	D330A-51208	INDEX RING		1
34	CQ6230-4037	LEAF SPRING		1
35	D330A-51207	HAND WHEEL		1
36	D330A-51207-1	WASHER		1
37	GB/T70	HEX SOCKET CAP SCREW	M6×16	1
38	JD10-06027A	HANDLE SCREW		1
39	JD10-06027	HANDLE		1
40	GB/T301-51102	BEARING	51102	2
41	D330A-51106	BRACKET		1
42	GB/T70	HEX SOCKET CAP SCREW	M8×30	2
43	D330A-51210	WASHER		1
44	D330A-51206	GUIDE SCREW		1
45	D330A-S1002	HANDLE (OPTIONAL)		1
46	D330A-S1003	LOCK HANDLE		1
48a	GB/T78	SET SCREW	M6X12	1
49	GB/T97.1	WASHER	5	1
50	GB/T70	HEX SOCKET CAP SCREW	M5×12	1

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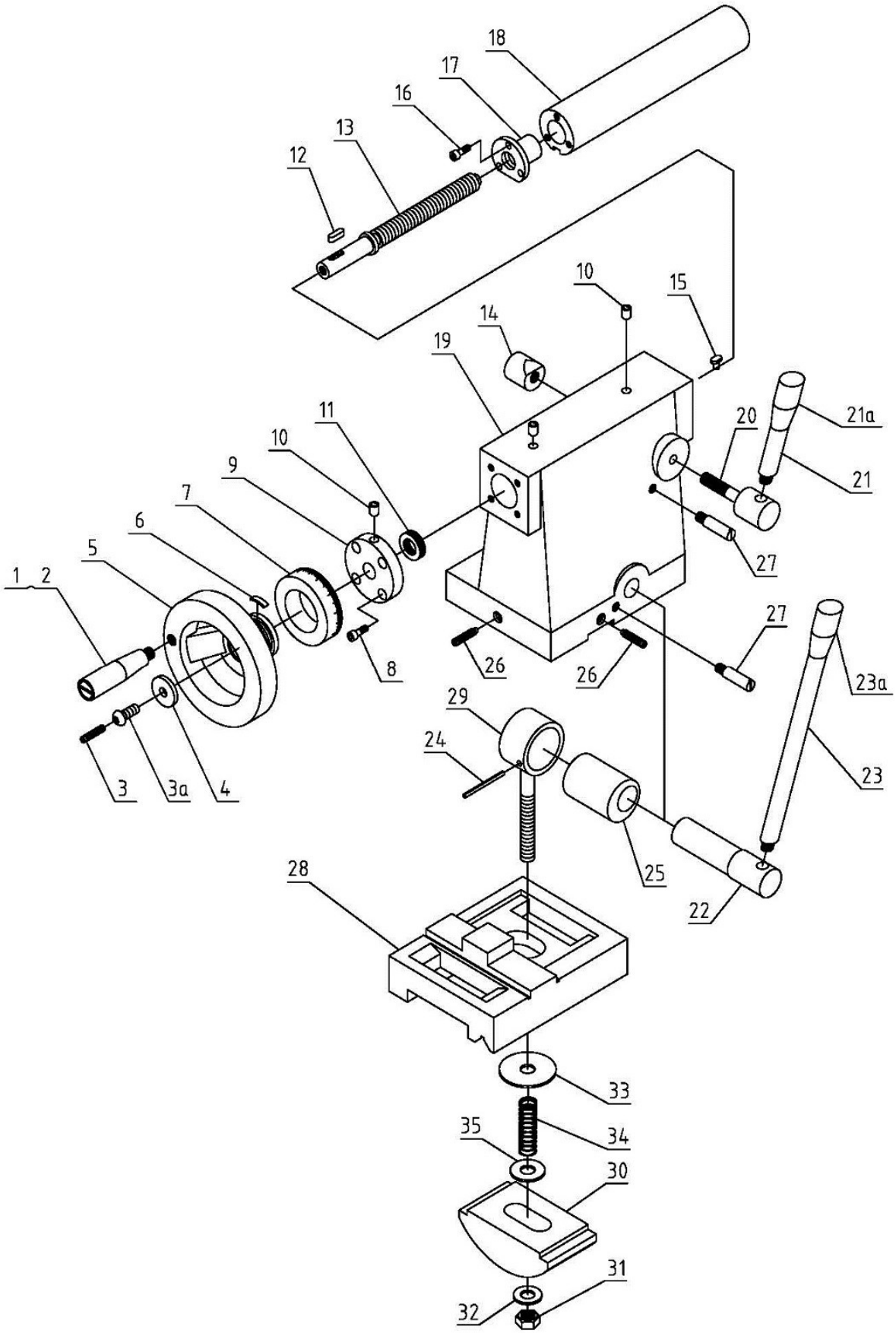
TAILSTOCK ASSEMBLY - DIAGRAM

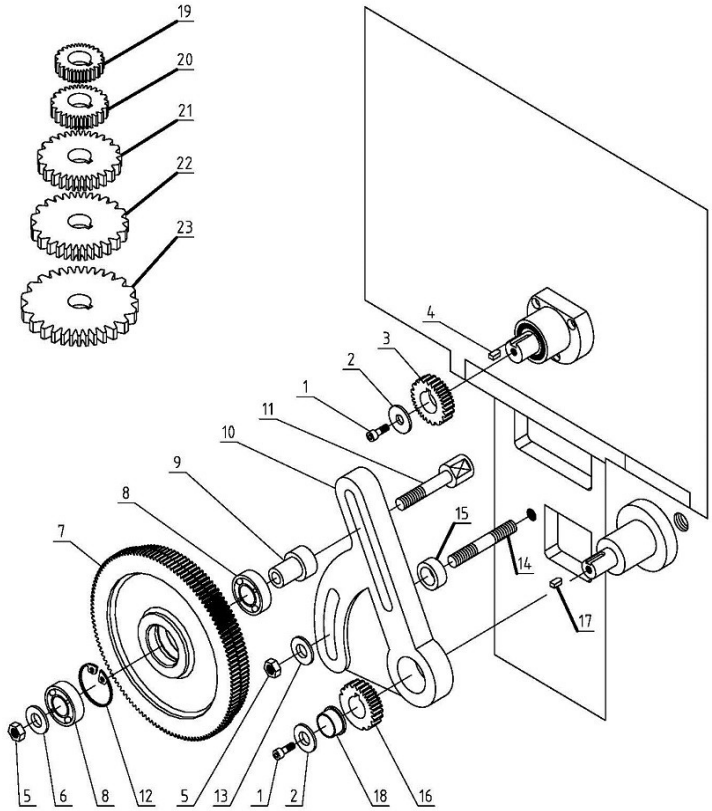


TAILSTOCK ASSEMBLY -PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	CQ6230-4033	HANDLE		1
2	CQ6230-4032	LEVER		1
3	GB/T77	SCREW	M5X25	1
3a	D330A-6044	ADJUSTING SCREW		1
4	D330A-6045	WASHER		1
5	D330A-6005	HAND WHEEL		1
6	CQ6230-4037	LEAF SPRING		1
7	D330A-6010	INDEX RING		1
8	GB/T70	HEX SOCKET CAP SCREW	M6X16	4
9	D330A-6011	BRACKET		1
10	JB/T7940.4-8	OIL CUP	8	3
11	GB/T301-51102	BEARING		1
12	GB/T1096	KEY	A4X15	1
13	D330A-6006	GUIDE SCREW		1
14	D330A-6023	LOCK NUT		1
15	D330A-6015	KEY		1
16	GB/T70	HEX SOCKET CAP SCREW	M4×12	3
17	D330A-6012	NUT		1
18	D330A-6013	QUILL		1
19	D330A-6001	TAIL STOCK		1
20	D330A-6022	LOCK SCREW		1
21	D330A-6021	LEVER		1
21a	GB7271.3	LEVER HANDLE	M8X40	1
22	D330A-6017	SHAFT		1
23	D330A-6004	LEVER		1
23a	GB7271.3	LEVER HANDLE	M10X50	1
24	GB/T119	PIN	5×30	1
25	D330A-6018	COLLAR		1
26	GB/T79	SCREW	M10×50	3
27	D330A-6003	SCREW		2
28	D330A-6002	BASE		1
29	D330A-6019	SHAFT		1
30	D330A-6020	BASE SHOE BLACK		1
31	GB/T6175	NUT	M12	1
32	GB/T97.1	WASHER		1
33	D330A-6042	WASHER		1
34	D330A-6041	SPRING		1
35	D330A-6043	WASHER		1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

CHANGE GEAR ASSEMBLY - DIAGRAM

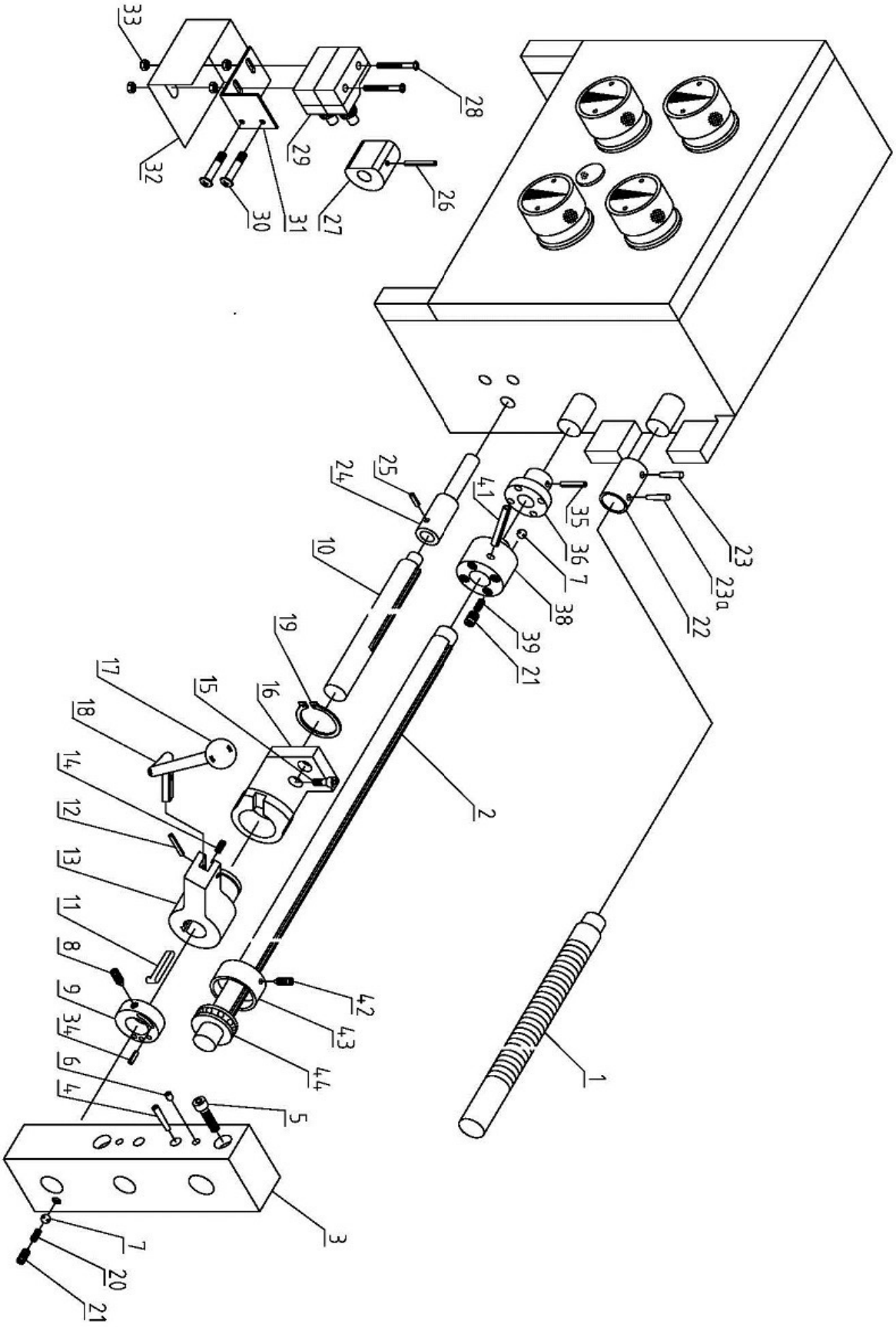


CHANGE GEAR ASSEMBLY PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	GB/T70	HEX SOCKET CAP SCREW	M6X12	2
2	GB/T96	WASHER	6	2
3	D330A-91202	GEAR	24T	1
4	GB/T1096	KEY	A5X8	1
5	GB/T6175	NUT	M10	2
6	GB/T97.1	WASHER	10	1
7	D330A-91208	GEAR	120/127T	1
8	GB/T276-6003	BEARING	6003	2
9	D330A-91209	COLLAR		1
10	D330A-91101	QUADRANT		1
11	D330A-91210	SCREW		1
12	GB/T893.1-35	CIRCLIP	35	1
13	GB/T97.1-10	WASHER	10	1
14	GB/T901	SCREW	M10X60	1
15	D330A-91212	WASHER		1
16	D330A-91206	GEAR	48T	1
17	GB/T1096	KEY	A5X8	1
18	D330A-91213-1	WASHER		1
19	D330A-91201	CHANGE GEAR	22T	1
20	D330A-91203	CHANGE GEAR	26T	1
21	D330A-91204	CHANGE GEAR	38T	1
22	D330A-91205	CHANGE GEAR	44T	1
23	D330A-91207	CHANGE GEAR	52T	1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

FEED ROD ASSEMBLY - DIAGRAM

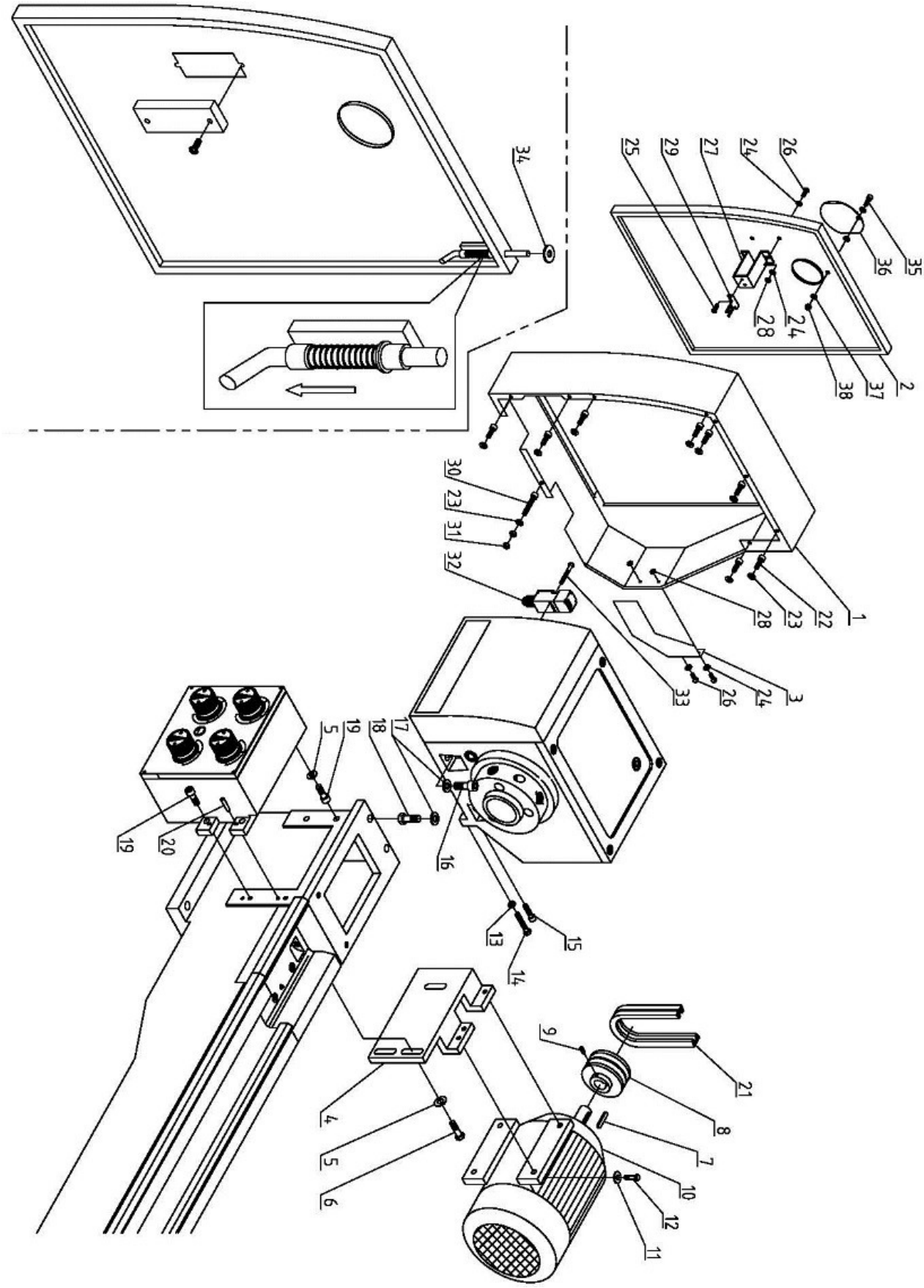


FEED ROD ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-11201-1	GUIDE SCREW		1
2	D330A-11202-1	ROD		1
3	D330A-11102	BRACKET		1
4	GB/T118	TAPER PIN	6X45	2
5	GB/T70	HEX SOCKET CAP SCREW	M8X60	2
6	JB/T7940.4	OIL CUP	6	2
7	GB308	BALL	6	1
8	GB/T78	SCREW	M6×10	1
9	D330A-11209-1	BUSHING		1
10	D330A-11203-1	FEED ROD		1
11	D330A-11104-1	KEY		1
12	GB/T879	PIN	4X25	1
13	D330A-11104	BRACKET		1
14	GB2089	SPRING	10X1X12	1
15	GB/T70	HEX SOCKET CAP SCREW	M6X12	2
16	D330A-11105	BRACKET		1
17	JB/T7271.1	HANDLE BALL	M10X32	1
18	D330A-11206	HANDLE		1
19	GB/T894.1	CIRCLIP	32	1
20	GB2089	SPRING	1×5×30	1
21	GB/T77	SCREW	M8X8	1
22	D330A-11207	SLEEVE		1
23	GB/T879	ROLL PIN	4X24	1
23a	GB/T879	ROLL PIN	4X24	1
24	CQ6230-3011D	SHAFT		1
25	GB/T879	PIN	4X20	1
26	GB/T879	PIN	4X30	1
27	D330A-3012	POSITION PIEC		1
28	GB818	SCREW	M4X50	2
29		SWITCH	LXW5-11M	2
30	GB818	SCREW	M4X20	2
31	D330A-71207	BRACKET		1
32	D330A-71207-1	COVER		1
33	GB/T6175	NUT	M4	4
34	GB/T879	PIN	4X12	1
35	GB/T879	PIN	5X25	1
36	D330A-3013S/01A	CLUTCH		1
38	D330A-3020D-1	CLUTCH		1
39	GB/T1358	SPRING	6X1X25	4
41	GB/T879	ROLL PIN	4X42	1
42	GB/T78	SCREW	M6X10	1
43	D330A-CS004-1	COVER		1
44	GB/T301	BEARING		1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

MOTOR & CHANGE GEAR COVER - DIAGRAM

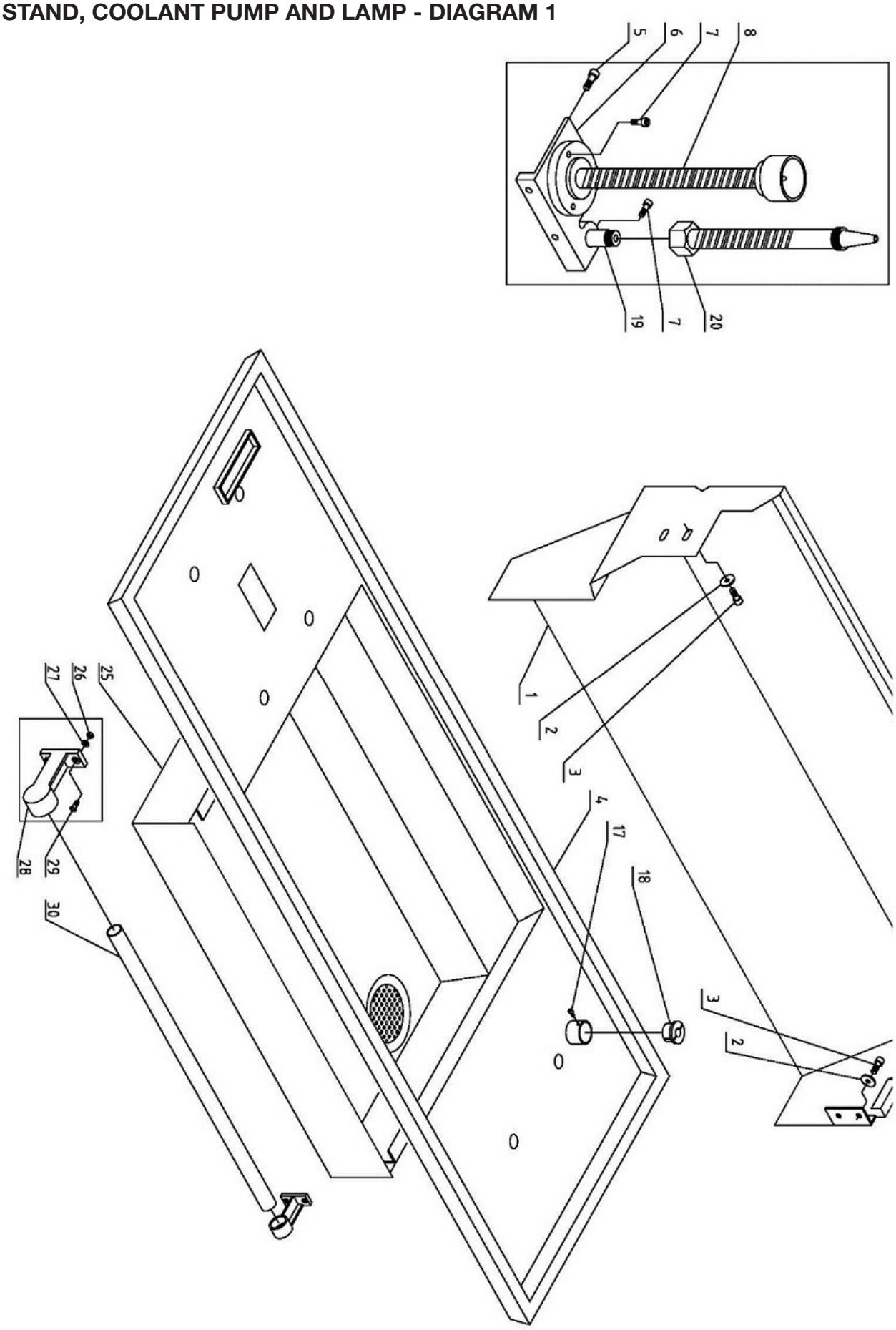


MOTOR & CHANGE GEAR COVER - PARTS LIST

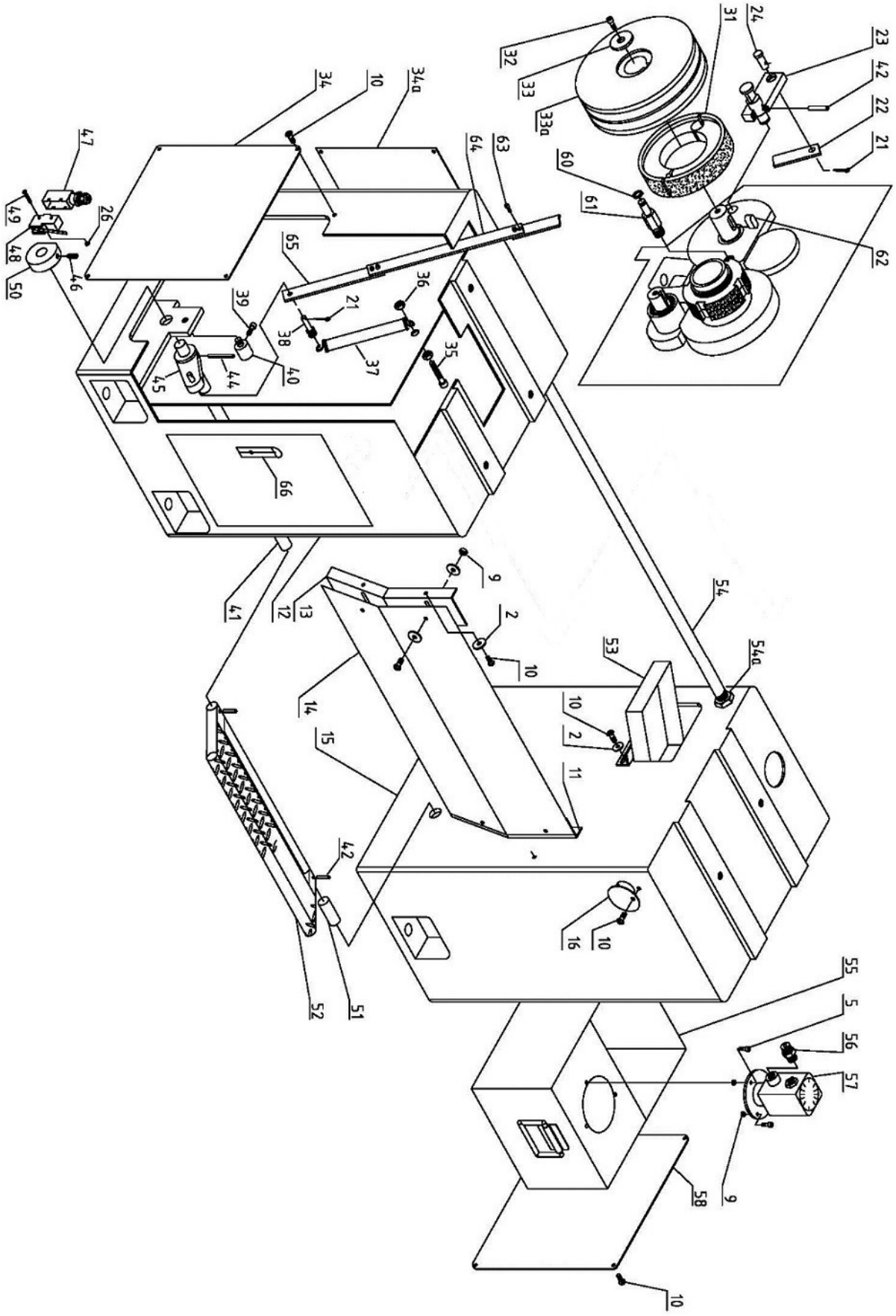
Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-13401A-1	GEAR ENCLOSURE		1
2	D330A-13402A-1	GEAR ENCLOSURE COVER		1
3	D330A-14220	PLATE		1
4	D330A-11107	MOTOR MOUNTING PLATE		1
5	GB/T97.1-10	WASHER	10	5
6	GB/T5782-M10X30	SCREW	M10X30	3
7	GB/T1096-8X35	KEY	8X35	1
8	D330A-11106	PULLEY		1
9	GB/T78-M6X8	SCREW	M6X8	1
10		MOTOR		1
11	GB/T97.1-8	WASHER	8	4
12	GB/T5782-M8X25	SCREW	M8X25	4
13	GB/T6175-M8	NUT	M8	2
14	GB/T5782-M8X45	SCREW	M8X45	2
15	GB/T70-M8X30	HEX SOCKET CAP SCREW	M8X30	2
16	GB/T70-M12X35	HEX SOCKET CAP SCREW	M12X35	2
17	GB/T97.1-12	WASHER	12	4
18	GB/T5782-M12X30	SCREW	M12X30	2
19	GB/T70-M10X30	HEX SOCKET CAP SCREW	M10X30	4
20	GB/T117-6X30	TAPER PIN	6X30	2
21		V-BELT	A864	2
22	GB/T70-M5X8	HEX SOCKET CAP SCREW	M5X8	8
23	GB/T97.1-5	WASHER	5	9
24	GB/T97.1-4	WASHER	4	6
25	GB818-M4X6	SCREW	M4X6	2
26	GB818-M4X10	SCREW	M4X10	4
27	D330A-71209	BRACKET (OPTIONAL)		1
28	GB/T6175-M4	NUT	M4	4
29		SWITCH KEY	QKS8	1
30	GB/T70-M5X30	HEX SOCKET CAP SCREW	M5X30	1
31	GB/T6175-M5	NUT	M5	2
32		SWITCH	QKS8	1
33	GB818-M4X30	SCREW	M4X30	2
34		WASHER		2
35	GB/T70	HEX SOCKET CAP SCREW	M6X12	1
36	D330D-14208-1	SAFETY GUARD		1
37	GB/T97.1	WASHER	6	3
38		LOCK NUT	M6	1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

STAND, COOLANT PUMP AND LAMP - DIAGRAM 1



STAND, COOLANT PUMP AND LAMP - DIAGRAM 2



STAND, COOLANT PUMP AND LAMP - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-14205A-2	CHIP GUARD		1
2	GB/T97.1	WASHER	6	16
3	GB/T70	HEX SOCKET CAP SCREW	M6X10	4
4	D330A-14203A-2	OIL PAN		1
5	GB/T70	HEX SOCKET CAP SCREW	M6X20	5
6	D330A-71206-4	BRACKET		1
7	GB/T70	HEX SOCKET CAP SCREW	M5X15	4
8		WORKING LAMP		1
9	GB/T6175	NUT	M6	6
10	GB/T818	SCREW	M6X10	26
11	D330B-14206-1	RIGHT BRACKET		1
12	D330A-14201A-2	LEFT CABINET		1
13	D330B-14206	LEFT BRACKET		1
14	D330A-14207-2	BACK PLATE		1
15	D330A-14202A-2	RIGHT CABINET		1
16	D330D-14208B	COVER		4
17	GB/T70	HEX SOCKET CAP SCREW	M4X6	1
18	D330A-92206	BRACKET		1
19	D330A-92202	COLLAR		1
20		LIQUID NOZZLE		1
21	GB/T91	PIN	3X16	2
22	D330A-14214-1	BRAKE LINKAGE/UPPER		1
23	D330B-14218	ROCKER		1
24	D330A-11239	SHAFT		1
25	D330A-14204A-2	OIL PAN		1
26	GB/T6175-M4	NUT	M4	6
27	GB/T97.1-4	WASHER	4	4
28		BRACKET		2
29	GB/T818-M4X10	SCREW	M4X10	4
30	D330A-14204A-2	HANDLE		1
31		BRAKE BLOCK		1
32	GB/T70-M8X16	HEX SOCKET CAP SCREW	M8X16	1
33	GB/T96-8	WASHER	8	1
33a	D330A-21105	PULLEY		1
34	D330A-14209A	LEFT CABINET COVER/SIDE		1
34a	D330A-14210A	LEFT CABINET COVER/REAR		1
35	GB/T70-M10X30	HEX SOCKET CAP SCREW	M10X30	1
36	GB/T6175-M10	NUT	M10	2
37	D330A-11237	EXTENSION SPRING		1
38	D330A-11236	PIN		1
39	GB/T70	HEX SOCKET CAP SCREW	M6X40	1
40	D330A-11242	SHAFT		1
41	D330B-14215	SHAFT		1
42	GB/T879-5X28	PIN	5X28	3
44	GB/T879-5X40	PIN	5X40	1

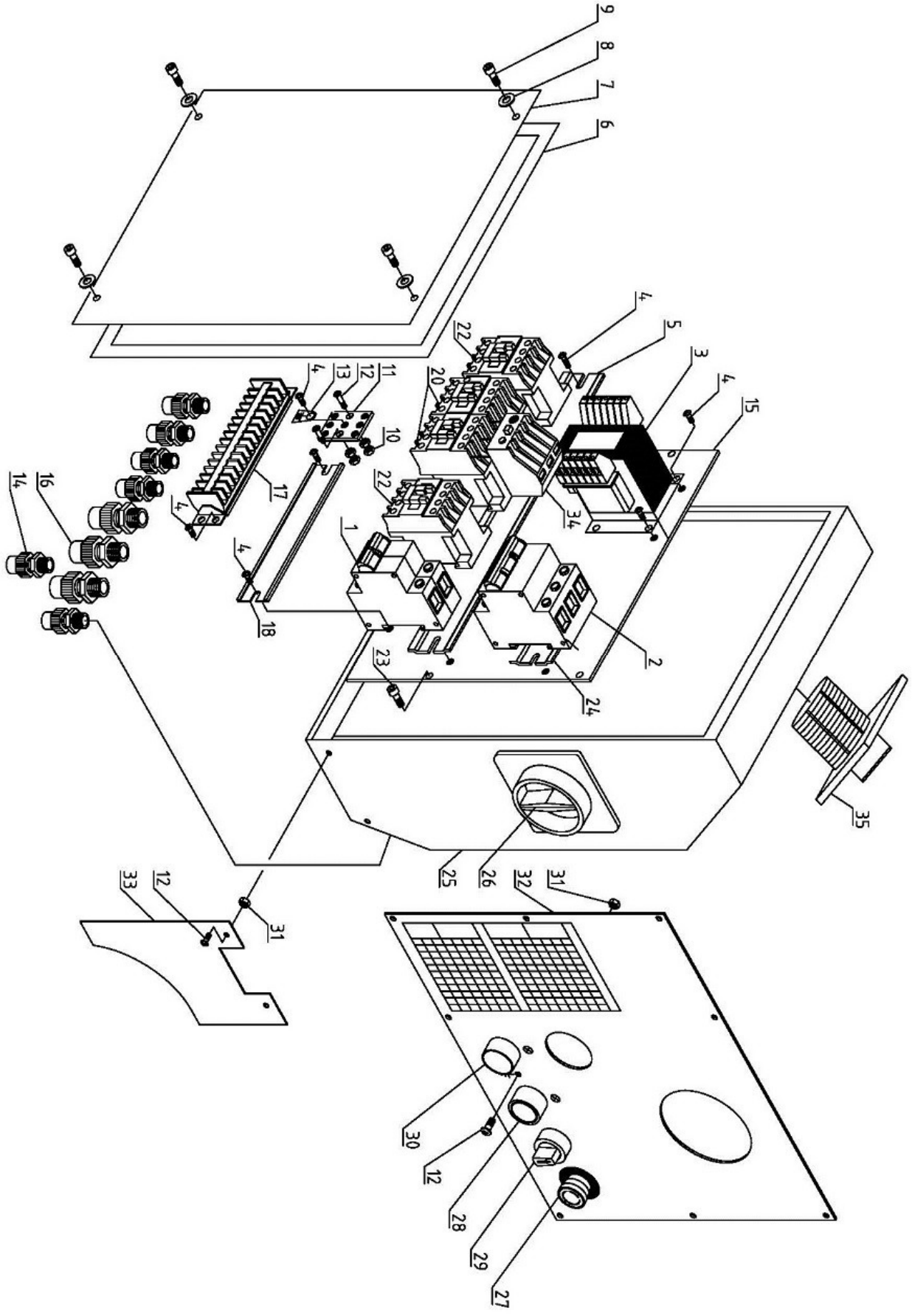
NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

STAND, COOLANT PUMP AND LAMP - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
45	D330A-11235	ROCKER		1
46	GB/T78	SCREW	M6X12	1
47		LIMIT SWITCH COVER		1
48		LIMIT SWITCH	YBLXW-5/11N1	1
49	GB/T818	SCREW	M4X40	2
50	D330DV-11210	BRAKE RETAINING COLLAR		1
51	D330B-14216	SHAFT		1
52	D330A-14212-2	BRAKE PEDAL		1
53	D330D-14213B	FUNNEL		1
54	D330A-14222	STEEL TUBE		1
54a	GBT6172	NUT	M16X1.5	1
55	D330B-14401	WATER TANK		1
56	D330A-92203	CONNECTING		1
57		PUMP		1
58	D330B-14211A	RIGHT CABINET COVER/SIDE		1
60	GB/T894.1-8	CIRCLIP	8	1
61	D330A-11232	SHAFT		1
62	GB/T1096	KEY	8X20	1
63	GB/T70	HEX SOCKET CAP SCREW	M6X10	4
64	D330A-14214-2	BRAKE LINKAGE/MIDDLE		1
65	D330A-14214-3	BRAKE LINKAGE/LOWER		1
66		DOOR LATCH ASSEMBLY		1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

ELECTRICAL ASSEMBLY - DIAGRAM



ELECTRICAL ASSEMBLY - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1		CIRCUIT BREAKER	DZ47-63 -1PC3	2
2		CIRCUIT BREAKER		1
3		TRANSFORMER	JBK5-100VA-TH	1
4	GB818	PAN HEAD SCREW	M4X6	15
5		DIN RAIL LOWER		1
6		RUBBER CUSHING		4
7	D330B-14102	COVER		1
8	GB97.1	FLAT WASHER	4	4
9	GB70	HEX SOCKET CAP SCREW	M4×10	4
10	GB6170	HEX NUT	M5	4
11	D330A-71401	GROUNDING BLOCK		1
12	GB818	PAN HEAD SCREW	M4X12	5
13		EARTH GROUNDING LABEL		1
14		STRAIN RELIEF	M16X1.5	6
15	D330B-14103	MOUNTING PLATE		1
16		STRAIN RELIEF	M20X1.5	3
17		TERMINAL BAR	TD1516	1
18		DIN RAIL GROUND		1
20		AC CONTACTOR	3TB4022-0XBO 9A24V	3
22		3TH80-24V	3TH80-24V	1
23	GB70	HEX SOCKET CAP SCREW	M5X12	4
24		DIN RAIL UPPER		1
25	D330B-14101A	ELECTRIC BOX		1
26		POWER SWITCH	LW26-20	1
27		E-STOP BUTTON	XB2-BS545	1
28		SELF-RETURN SWITCH BUTTON	YJ139-LA38	1
29		SELECTOR SWITCH	LAY3-11/2	1
30		POWER LIGHT	LA38-11DN/AC24V	1
31	GB6170	HEX NUT	M4	3
32		NAME PLATE		1
33	B330B-14220A	MOTOR UPPER COVER		1
34		OL RELAY	JRS2-63/25D 3.2-5	1
35		POWER SWITCH	LW26-20 4S5/5	1

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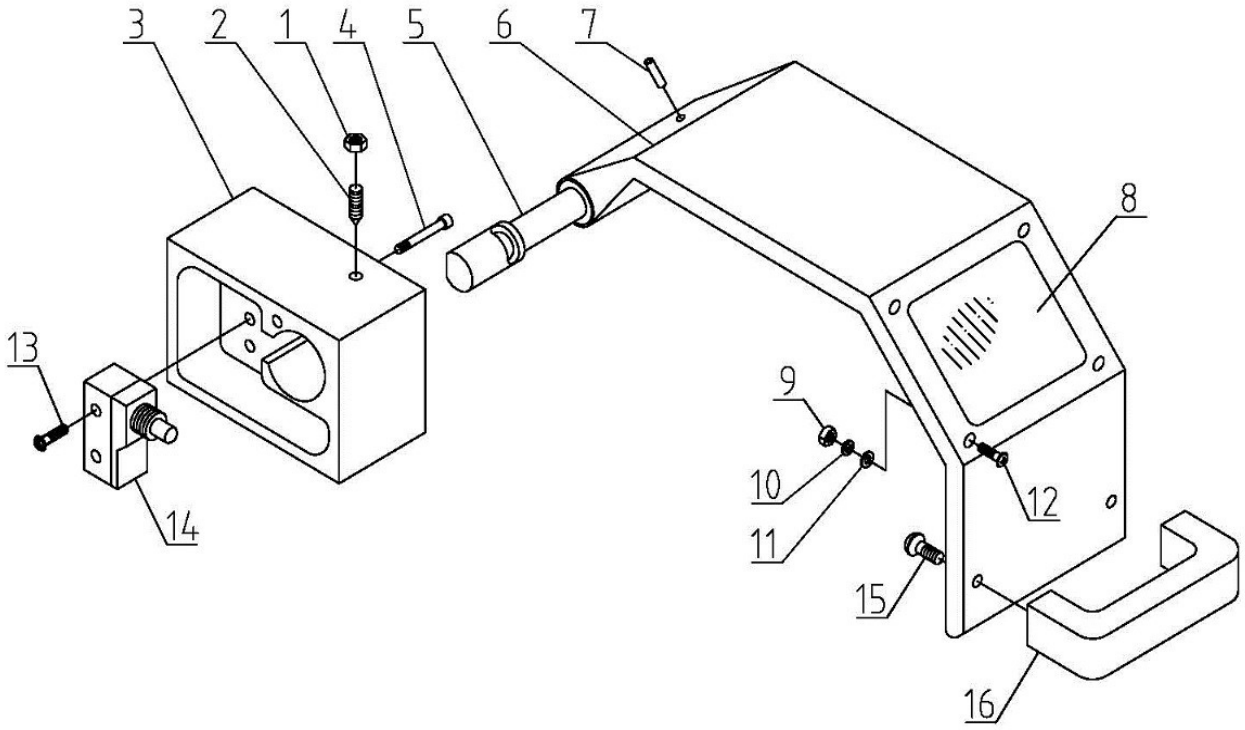
CHUCK SAFETY GUARD - DIAGRAM



CHUCK SAFETY GUARD - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	GB/T6170-M6	NUT	M6	1
2	GB/T79-M6 ×16	SCREW	M6 ×16	1
3	D330A-71101	SWITCH BOX		1
4	GB/T70-M6× 45	HEX SOCKET CAP SCREW	M6× 45	2
5	D330A-71203	SHAFT		1
6	D330A-71204A	PROTECTING COVER		1
7	GB/T879-4X25	PIN	4X25	1
8	D330A-71402	COVER		1
9	GB/T6175-M3	NUT	M3	4
10	GB/T93-3	WASHER		4
11	GB/T97.1-3	WASHER	3	4
12	GB/T818-M3X12	SCREW	M3X12	4
13	GB/T818-M4X25	SCREW	M4X25	2
14		SWITCH	LXW5-11M	1
15	GB/T818-M6X8	SCREW	M6X8	2
16		HANDLE		1

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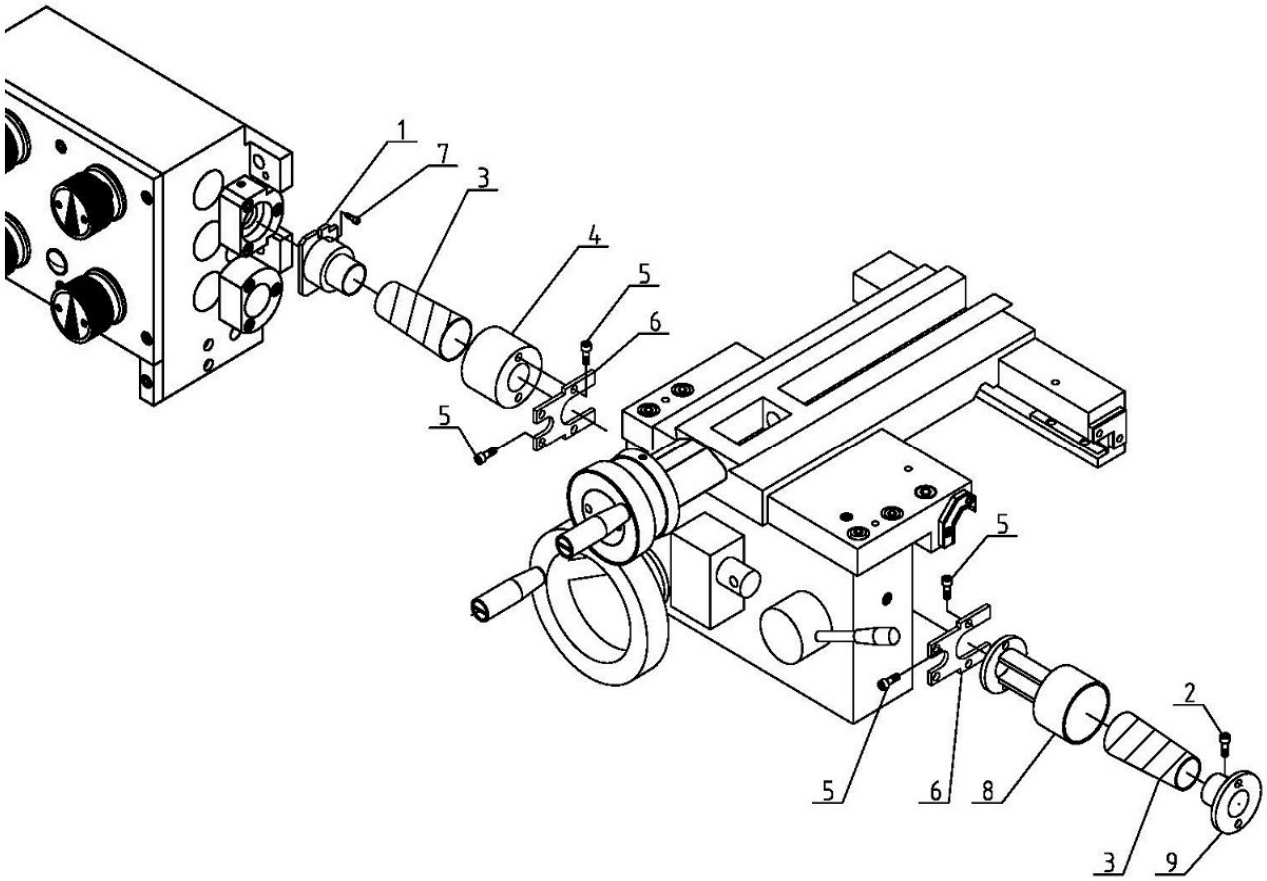
LEADSCREW SAFETY GUARD - DIAGRAM



LEADSCREW SAFETY GUARD - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-1030	BRACKET		1
2	GB/T70-M5×10	HEX SOCKET CAP SCREW	M5×10	2
3	D330A-F7001	SPRING COVER		2
4	D330A-1034	LEFT BRACKET		1
5	GB/T70-M6×12	HEX SOCKET CAP SCREW	M6×12	8
6	D330A-1033	BRACKET		2
7	GB/T70-M4×10	HEX SOCKET CAP SCREW	M4×10	2
8	D330B-1029G	BRACKET		1
9	D330A-1031	BRACKET		1

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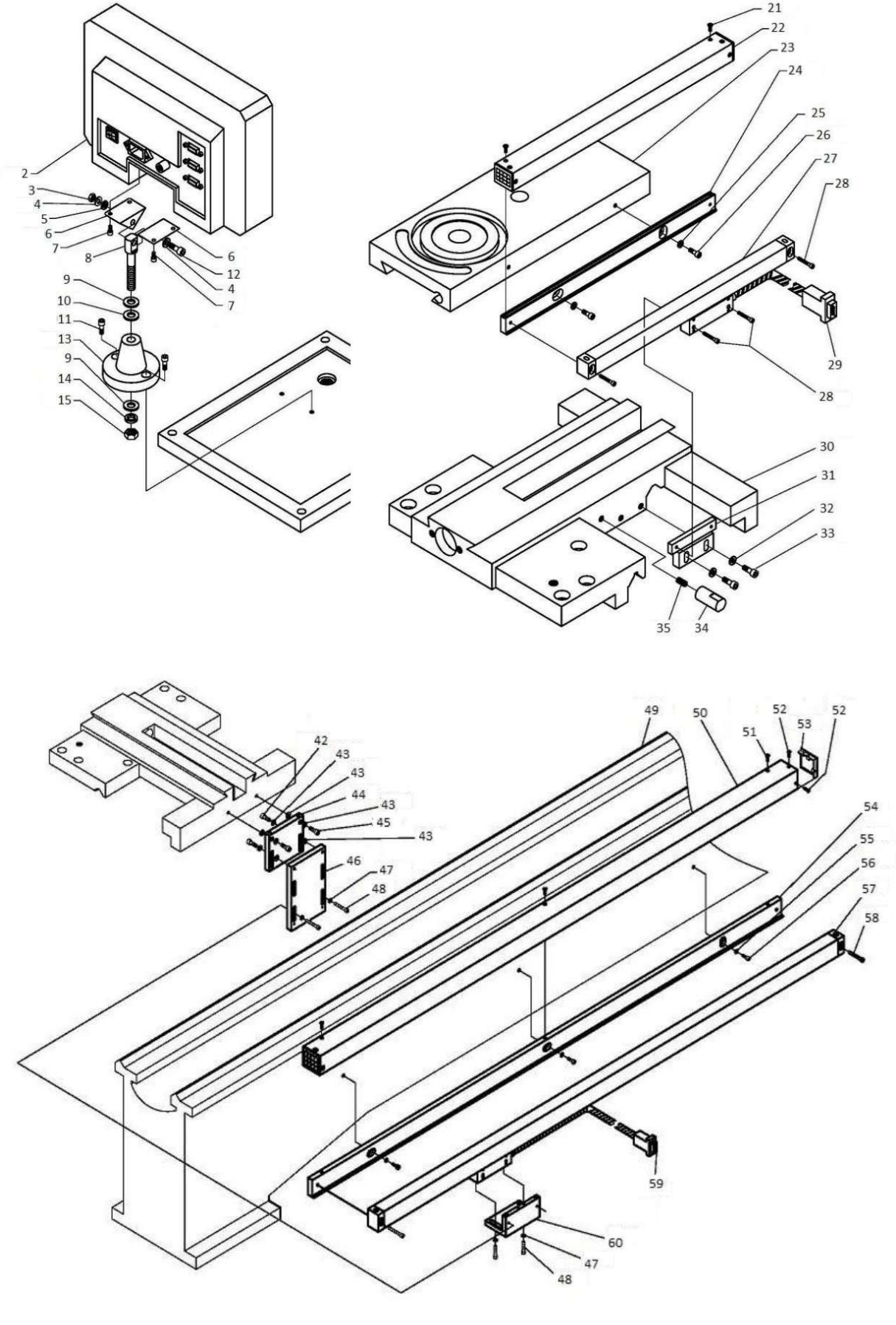
DIGITAL READOUT - DIAGRAM



DIGITAL READOUT - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
2		DRO DISPLAY		1
3	GB/T6170	HEX NUT	M6	1
4	GB/T97.1	FLAT WASHER	6	2
5	GB/T93	LOCK WASHER	6	1
6		DISPLAY MOUNT PLATE		2
7	GB/T70	HEX SOCKET CAP SCREW	M4X10	4
8		DISPLAY MOUNT POST		1
9	GB/T97.1	FLAT WASHER	10	2
10		PLASTIC WASHER	10	1
11	GB/T70	HEX SOCKET CAP SCREW	M5X14	2
12	GB/T70	HEX SOCKET CAP SCREW	M6X30	1
13		DISPLAY MOUNT BASE		1
14	GB/T93	LOCK WASHER	10	1
15	GB/T6170	NUT	M10	1
21	GB/T819	SCREW	M3X6	2
22		DRO CROSS SLIDE SENSOR COVER		1
24		DRO CROSS SLIDE ADAPTER PLATE		1
25	GB/T97.1	FLAT WASHER	4	2
26	GB/T70	HEX SOCKET CAP SCREW	M4X12	2
27		DRO POSITION SENSOR	220MM	1
28	GB/T70	HEX SOCKET CAP SCREW	M3X20	4
29		BNC CONNECTOR-KA500		1
31		SADDLE ADAPTER PLATE		1
32	GB/T97.1	FLAT WASHER	5	2
33	GB/T70	HEX SOCKET CAP SCREW	M5X20	2
34		HARD STOP		1
35	GB/T73	SET SCREW	M6X15	1
42	GB/T70	HEX SOCKET CAP SCREW	M5X25	2
43	GB/T97.1	FLAT WASHER	5	8
44		DRO ADAPTER PLATE		1
45	GB/T70	HEX SOCKET CAP SCREW	M5X20	2
46		DRO SENSOR PLATE		1
47		THICK FLAT WASHER	4	4
48	GB/T70	HEX SOCKET CAP SCREW	M4X20	4
50		DRO POSITION SENSOR		1
51	GB/T2673	SCREW	M4X6	3
52	GB/T15856.1	SCREW	M6X30	2
53		END CAP		2
54		MOUNTING PLATE		1
55		THICK FLAT WASHER	4	3
56	GB/T70	HEX SOCKET CAP SCREW	M4X15	3
57		DRO POSITION SENSOR	620MM	1
58	GB/T70	HEX SOCKET CAP SCREW	M4X30	2
59		BNC CONNECTOR-KA300		1
60		ANGLE PLATE		1

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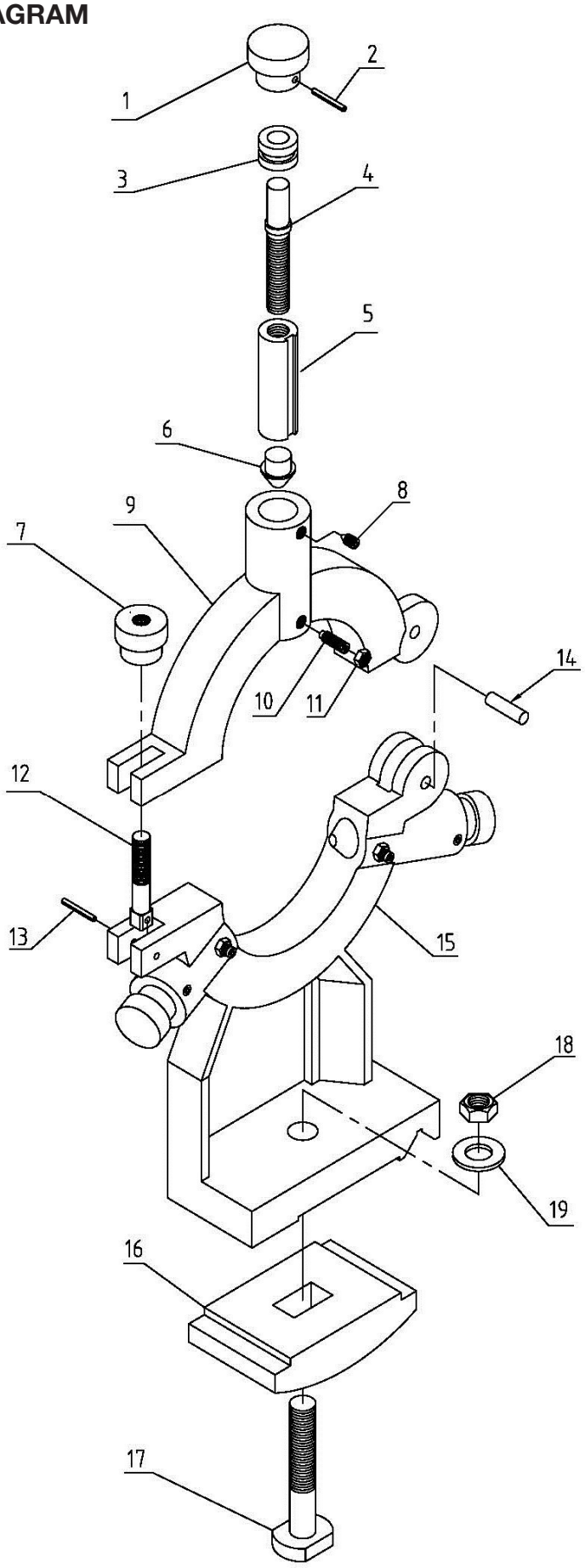
STEADY REST - DIAGRAM



STEADY REST - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-8205	KNOB		3
2	GB/T879-3X20	PIN	M6X8	3
3	D330A-8207	COLLAR		3
4	D330A-8206	PRESSING LEVER		3
5	D330A-8208	PRESSING COLLAR		3
6	D330A-8209	PRESSING BASE		3
7	D330A-8204	LOCKING SCREW NUT		1
8	GB/T78-M6X10	SCREW	M6X10	3
9	D330A-8202	UPPER BODY		1
10	GB/T79-M6×16	SCREW	M6×16	3
11	GB/T6170-M6	NUT	M6	3
12	D330A-8203	LOCKING LEVER		1
13	GB/T879-4×20	PIN	4×20	1
14	GB/T119-6X20	PIN	6X20	
15	D330A-8201	BASE BODY		1
16	D330A-8210	PRESSING PLATE		1
17	D330A-8211	“T”SCREW		1
18	GB/T6170-M12	NUT	M12	1
19	GB/T97.1-12	WASHER	12	1

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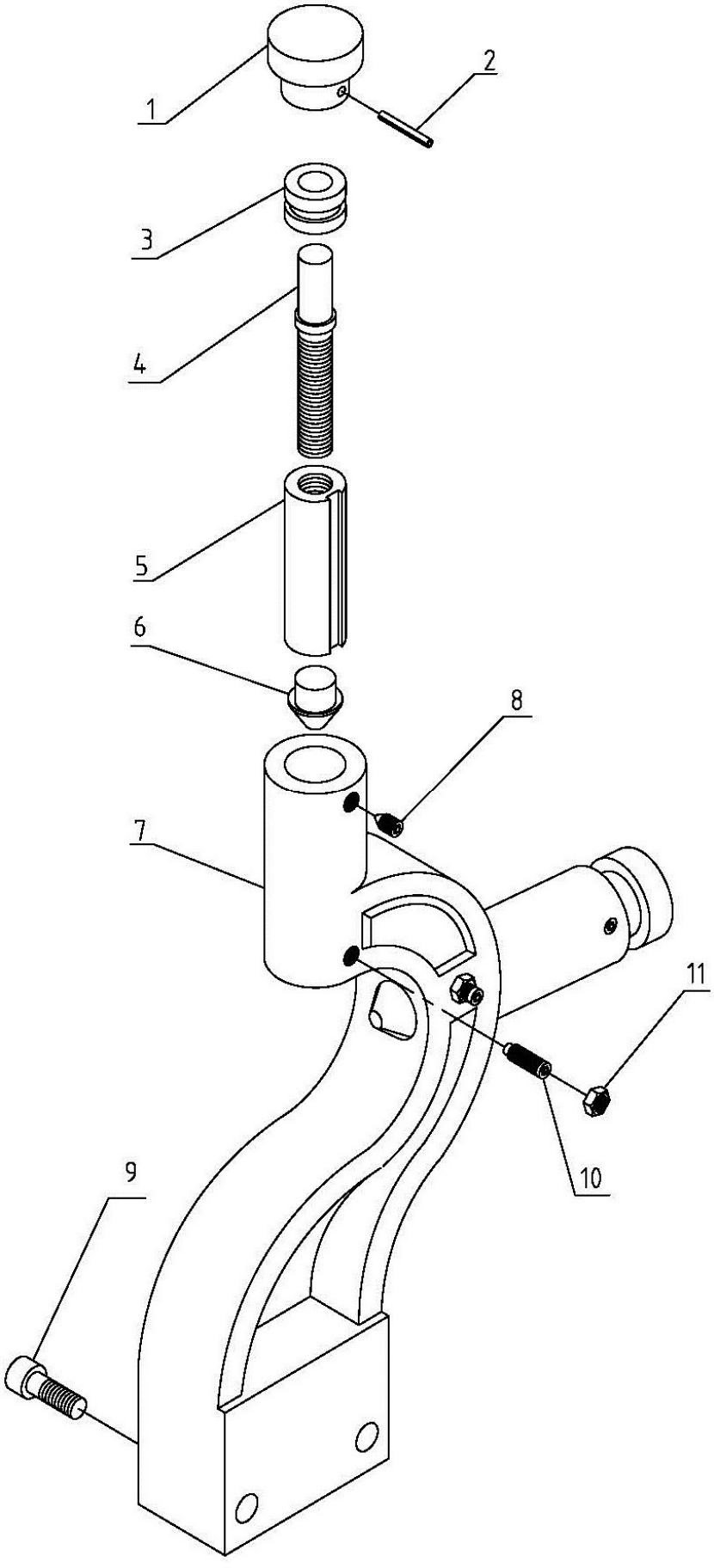
FOLLOW REST - DIAGRAM

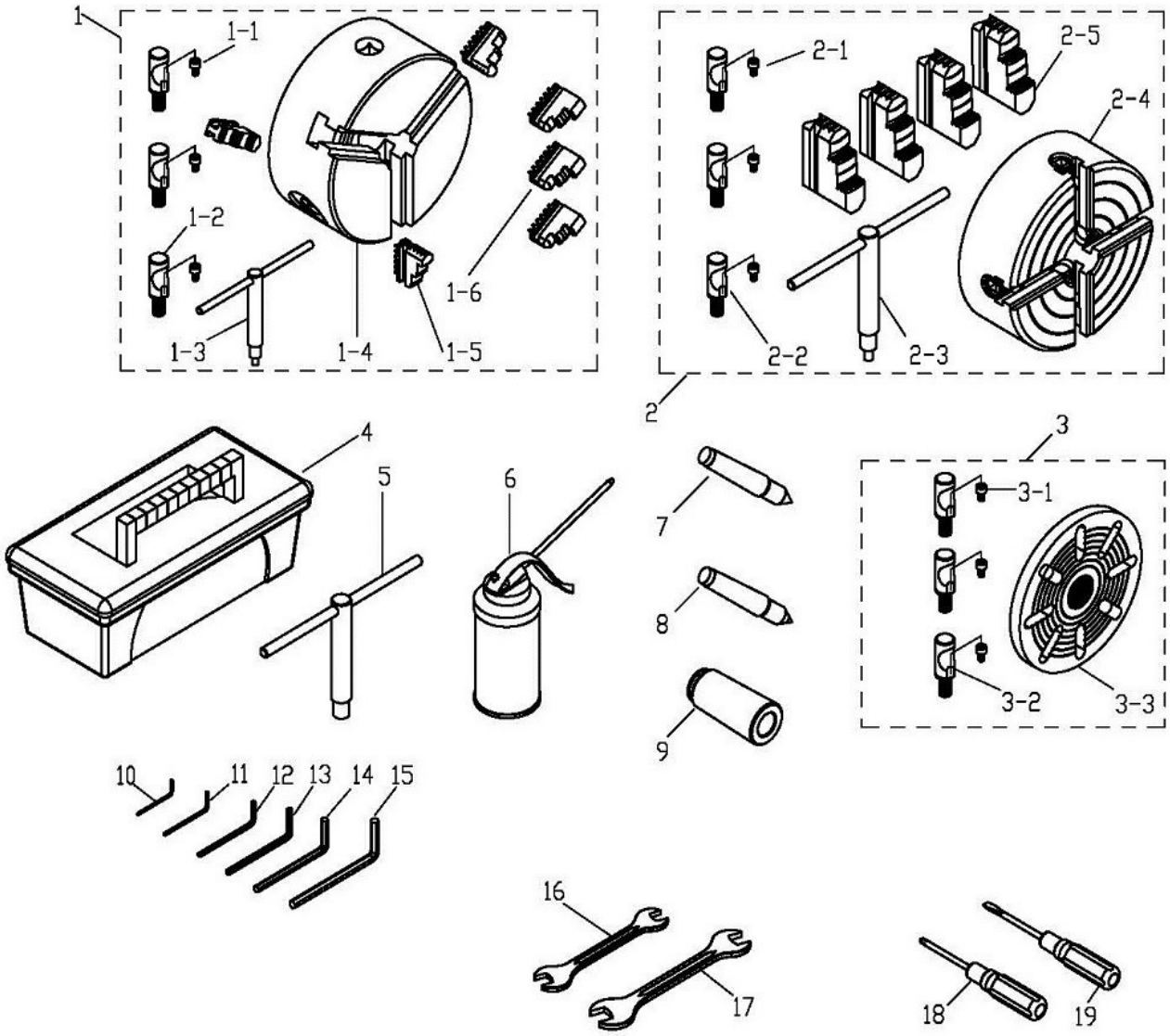


FOLLOW REST - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1	D330A-8205	KNOB		2
2	GB/T879-3X20	PIN	3X20	2
3	D330A-8207	COLLAR		2
4	D330A-8304	PRESSING LEVER		2
5	D330A-8303	PRESSING COLLAR		2
6	D330A-8209	PRESSING BASE		2
7	D330A-8301	BODY		1
8	GB/T78-M6X10	SCREW	M6X10	2
9	GB/T70-M8×40	HEX SOCKET CAP SCREW	M8×40	2
10	GB/T79-M6×16	SCREW	M6×16	2
11	GB/T6170-M6	NUT	M6	2

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

ACCESSORIES - DIAGRAM

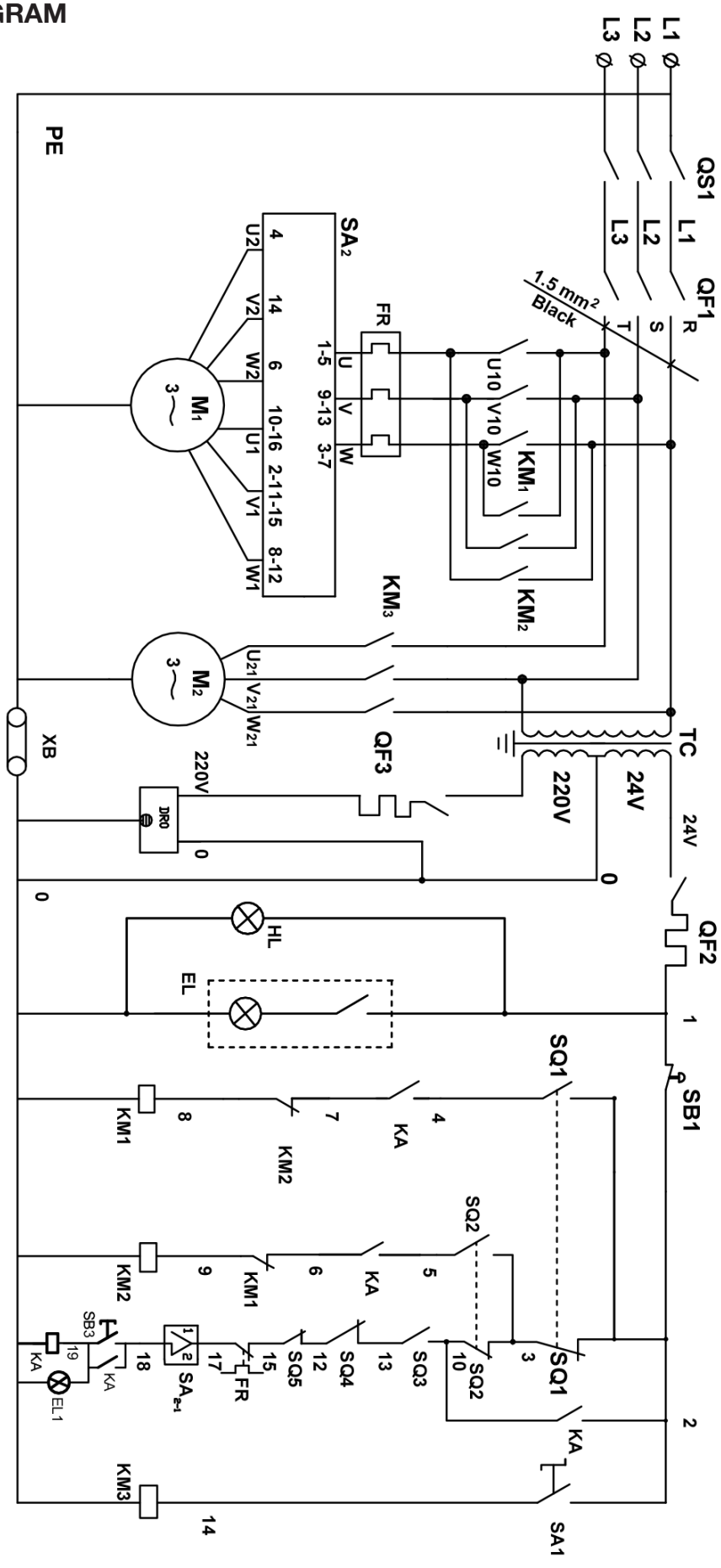


ACCESSORIES - PARTS LIST

Index No.	Part No.	Description	SPECIFICATION	Qty
1		3-JAW CHUCK ASSEMBLY	160MM-D4	1
1-1	GB/T70-M6X12	HEX SOCKET CAP SCREW	M6X12	3
1-2	330A-81201	CAMLOCK STUD		3
1-3		3-JAW CHUCK KEY		1
1-4		3-JAW CHUCK BODY		1
1-5		INTERNAL JAWS 3PCS SET		1
1-6		REVERSE JAWS 3PCS SET		1
2		JAW CHUCK ASSEMBLY	200MM-D4	1
2-1	GB/T70-M6X12	HEX SOCKET CAP SCREW	M6X12	3
2-2	330A-81201	CAMLOCK STUD		3
2-3		4-JAW CHUCK KEY		1
2-4		4-JAW CHUCK BODY		1
2-5		JAWS 4PCS SET		1
3	30A-81103	FACE PLAT ASSEMBLY	250MM	1
3-1	GB/T70-M6X12	HEX SOCKET CAP SCREW	M6X12	3
3-2	330A-81201	CAMLOCK STUD		3
3-3		FACE PLAT BODY		1
4		TOOL BOX		1
5	CQ6230-F3003	KEY FOR CAM LOCKS		1
6		OIL GUN		1
7		DEAD CENTERS MT3	MT3	1
8		DEAD CENTERS MT3	MT3	1
9		TAPERED REDUCING SLEEVE	MT5-MT3	1
10		HEX WRENCH 3MM		1
11		HEX WRENCH 4MM		1
12		HEX WRENCH 5MM		1
13		HEX WRENCH 6MM		1
14		HEX WRENCH 8MM		1
15		HEX WRENCH 10MM		1
16		OPEN END WRENCHES	16-18MM	1
17		OPEN END WRENCHES	17-19MM	1
18		CROSS POINT SCREWDRIVER	3"	1
19		FLAT BLADE SCREWDRIVER	3"	1

NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

WIRING - DIAGRAM



ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.

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