

HAFCO

METALMASTER



Edition : 2.0
Date: (07/25)

Instruction Manual

CENTRE LATHE

AL-1000C & AL-1000D

Order Code: (L240D & L242D)

MACHINE DETAILS

MACHINE.	CENTRE LATHES
MODEL NO.	AL-1000C & AL-1000D
SERIAL NO.	
DATE OF MANF.	

IMPORTED BY

AUSTRALIA



www.machineryhouse.com.au

NEW ZEALAND



www.machineryhouse.co.nz

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

HAFCO METALMASTER	
PRODUCT SPECIFICATIONS	
Model: AL-1000C	Voltage: 240V, 50Hz
Capacity: 360x1000	Motor: 1.5 KW
Nett Weight: MFG	FLC: 14.1 Amps
Date:	
Serial No:	
www.machineryhouse.com.au	www.machineryhouse.co.nz
Made in Taiwan	

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SPARE PARTS

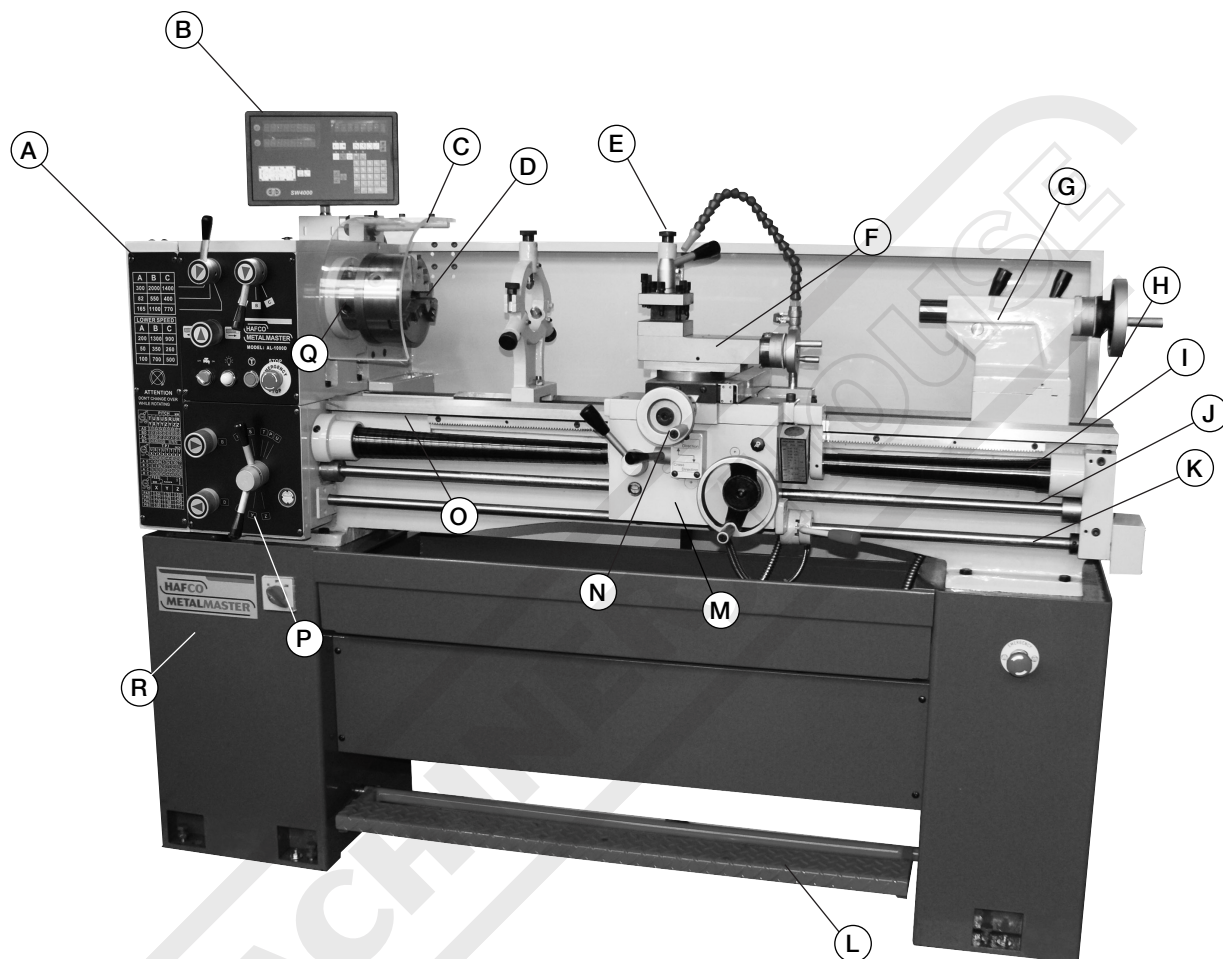
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1.1 SPECIFICATIONS

Order Code	L240D	L242D
MODEL	AL-1000C	AL-1000D
Swing Over Bed (mm)	356	356
Distance Between Centres (mm)	1000	1000
Spindle Bore (mm)	40	40
Swing In Gap (mm)	516	516
Swing Over Cross-slid (mm)	225	225
Digital Readout System Fitted	Yes	Yes
Quick Change Toolpost Fitted	Optional	Optional
Tool Height To Suit (mm)	16	16
Centre Height (mm)	178	178
Spindle Nose Size or Type Camlock	D1-4	D1-4
Bed Width (mm)	190	190
Headstock Spindle Taper (MT)	5	5
Tailstock Taper (MT)	3	3
Cross Slide Travel (mm)	175	175
Compound Slide Travel (mm)	100	100
Leadscrew Type	Imperial	Metric
Cross Feed (X-Axis)	0.0013 / 0.0184 (inch / rev)	0.034 / 0.468 (mm / rev)
Longitudinal Feed (Z-Axis) (inch / rev)	0.0026 / 0.0368 (inch / rev)	0.068 / 0.936 (mm / rev)
Metric Thread Steps & Pitch (steps/pitch)	30 (0.4 - 7.0)	30 (0.4 - 7.0)
Imperial Thread Steps & TPI (No / TPI)	32 (4 - 56)	32 (4 - 56)
3 Jaw Chuck Diameter (mm)	160	160
4 Jaw Chuck Diameter (mm)	200	200
Spindle Steps / Speeds (No / rpm)	9 (82 - 2000)	18 (50 - 2000)
Motor Power (kW / hp)	1.5 / 2	2.25 / 3
Voltage / Amperage (v / amp)	240 / 15	415 / 10
Dimensions (L x W x H) (mm)	1860 x 720 x 1450	1860 x 720 x 1450
Nett Weight (kg)	620	620

1.3 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	J	Feed Shaft
B	Digital Readout Display	K	Start and Stop Shaft
C	Chuck Safety Guard	L	Foot Brake
D	3 Jaw Chuck	M	Saddle
E	Fixed Steady	N	Cross Slide
F	Top Slide	O	Bed Gap
G	Tailstock	P	Feed Gearbox
H	Bed	Q	Spindle
I	Leadscrew Cover	R	Stand

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.



WARNING!

Before operating any machine, take time to read and understand all safety signs and symbols. If not understood seek explanation from your supervisor or an experienced operator.

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 LATHE SAFETY

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 jewelry 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 of the local power authority.

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

ELECTRICAL REQUIREMENTS	AL-1000C	AL-1000D
Nominal Voltage.....	240V	415V
Cycle.....	50 Hz	50Hz
Phase.....	Single Phase	Three Phase
Power Supply Circuit.....	15 Amps	10 Amps
Full Load Current.....	14.2 Amps	4.5 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 operation.

Full-Load Current Rating for these machines are listed 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.

240 VOLT



415 VOLT



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 travelling 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.

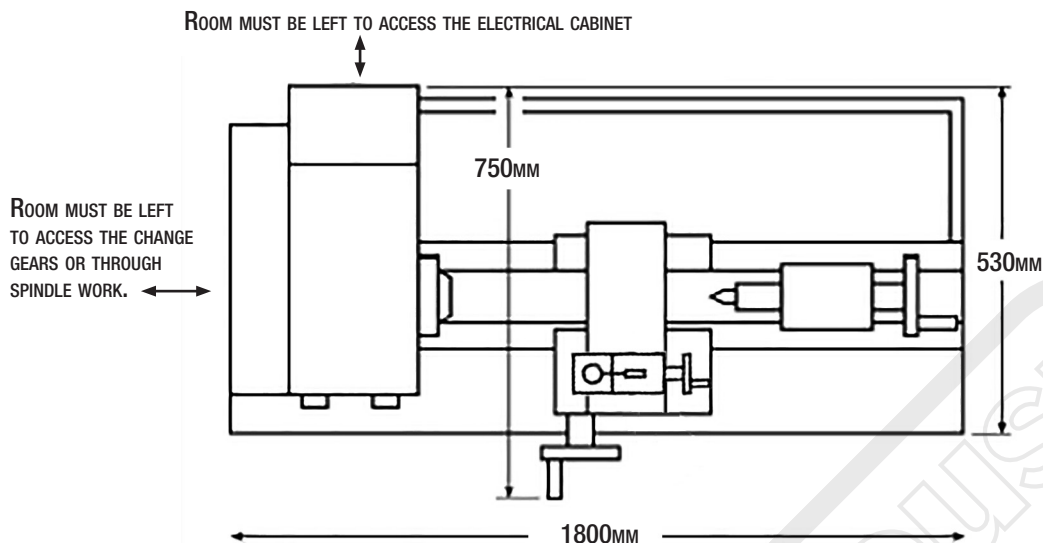
4.4 SITE PREPARATION

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.

LATHE FOOTPRINT (Approximate Dimensions)



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.

When using slings please take note of the sling angle and the loads that apply.

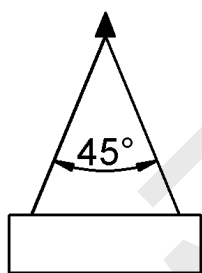


Fig 4.1.

When the slings are at a 45° angle then each sling is carrying the equivalent of 50% of load weight. (Fig.4.1).

When the slings are at a 90° angle then each sling will have a weight equal to 75% of the load on each sling. (Fig 4.2)

NOTE: THE MANUFACTURER RECOMMENDS NOT TO EXCEED 90° ANGLE

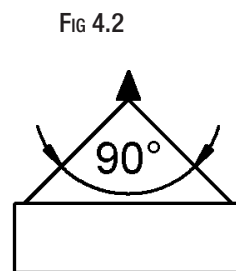


Fig 4.2

Lifting Point

When lifting the machine only certified lifting slings should be used.

Ensure that when lifting, the machine does not tip over.

Check that the lifting slings do not damage any of the machine parts or electrical conduits.

Failure to follow these instructions could cause damage to the machine.

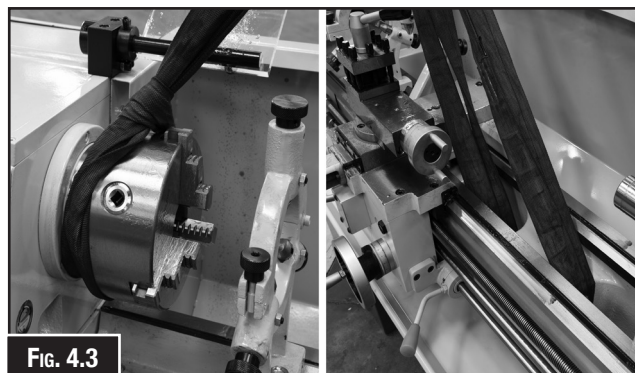


Fig. 4.3

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. 4.4)

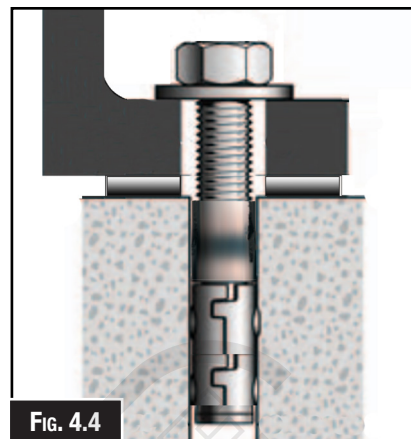


FIG. 4.4

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 levelled. Loosen the hold down bolts and place a level on the surface of the Lathe bed. Metal shims need to be placed under each corner of the base of the machine until level. Once level and the machine is stable then tighten the hold down bolts. (Fig. 4.5).

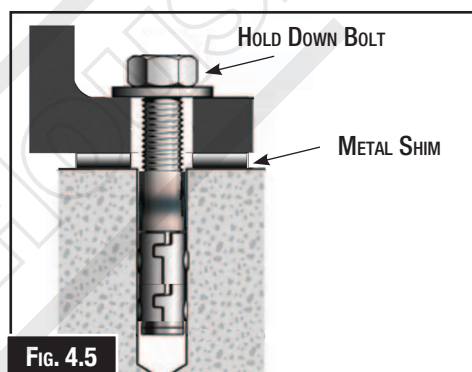


FIG. 4.5

NOTE: The machine must not rest on supports other than those defined in Fig. 4.5

For the best results, use a precision level that is at least 300mm long and accurate enough to show movement when a 0.08mm shim is placed under one end of the level.

If levelling is skipped, it may end up with a taper that affects the precision of your part. From downtime to reworks, a misaligned lathe makes it inefficient, if not virtually impossible, to create high-tolerance parts.

300MM MACHINE LEVEL 35-207
ORDER CODE Q207



NOTE!



For optimum results and to prevent warping or twisting of the cast iron bed and ways, lathe bedways should be leveled from side to side and from front to back on both ends. Re-check the bedways after installation and then annually.

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.

The machine is supplied fully assembled and may only require the fitting of the chuck to the spindle, the chuck guard and on the AL-1000D the Digital Readout display.

Mounting The Digital Readout

The Digital Readout will need to be fitted using the aluminium angle bracket. (Fig. 4.6)



FIG. 4.6

Chuck Safety Guard. (Fig.4.7)

Assembly required will be the bolting on of the safety guard.

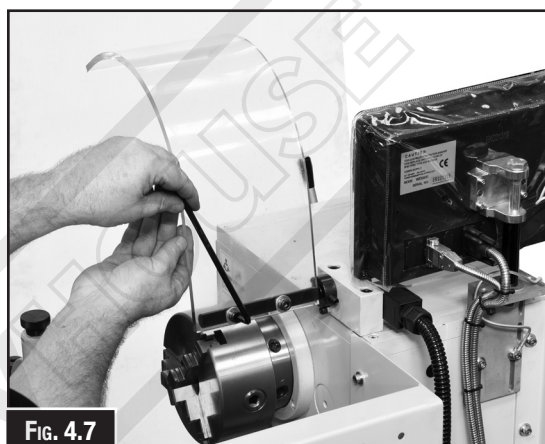


FIG. 4.7



WARNING

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

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. Operating a machine that is not set up may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.

HEADSTOCK ELECTRICAL CONTROLS Fig.5.1

1. **Coolant Switch:** Switches the coolant On or OFF.
2. **Pilot Lamp:** Illuminates when power is connected to the control panel.
3. **Joggle Button:** Allows for the spindle to be moved small amounts.
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 CONTROLS Fig.5.2

- A. **Spindle Speed Levers:** Alpha (right) and numeric (left) are used to select one of the 9 available spindle speeds.

NOTE: AL-1000D has a HI/LOW switch on the stand to select lower speeds.

- B. **Headstock Feed Direction Knob:** Controls the direction that the leadscrew and feed rod rotate.
- C. **Spindle Speed Chart:** Displays the speed lever positions for each speed.
- D. **Thread and Feed Charts:** Display the necessary configuration of the gearbox dials and end gears for different threading or feeding options.
- E. **Feed/Thread Gearbox Levers:** Control the leadscrew and feed rod speed for threading and feeding operations.

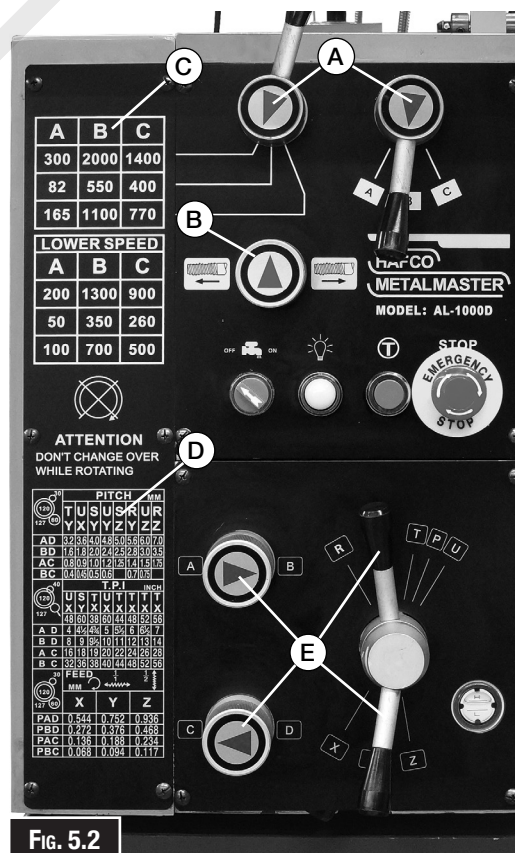
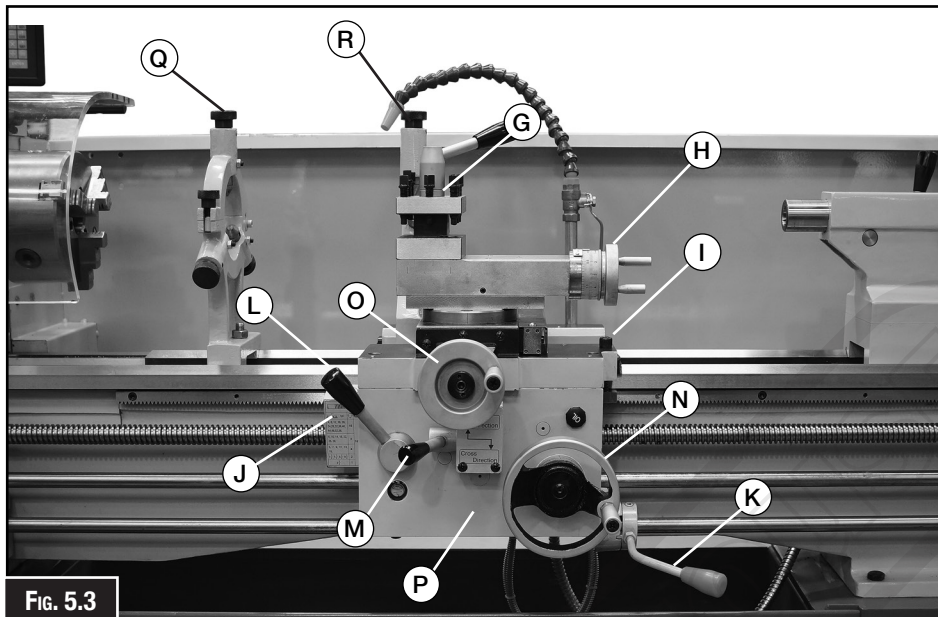


Fig. 5.2

SADDLE Fig.5.3

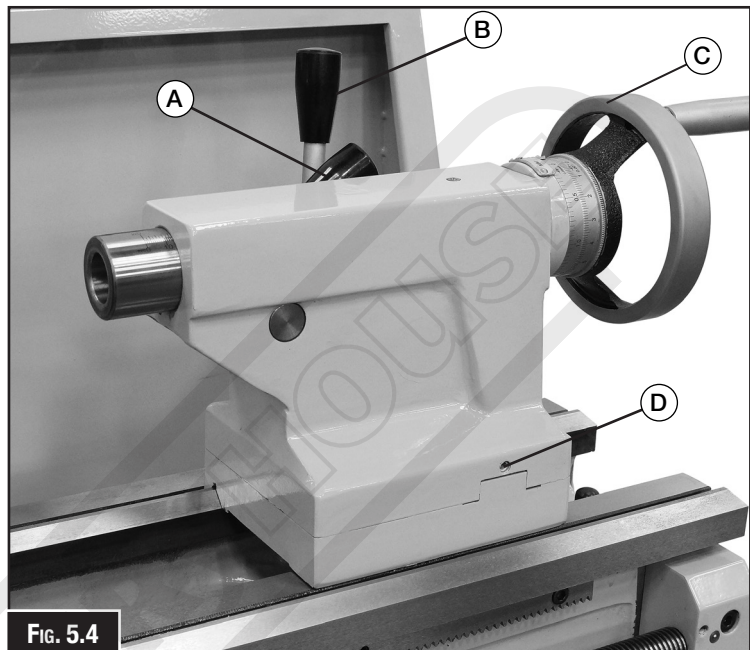


- G. Tool Post:** Allows the operator to load and unload tools.
- H. Compound Rest Hand wheel:** Moves the tool toward and away from the workpiece at the preset angle of the compound rest.
- I. Carriage Lock:** Secures the carriage in place for greater rigidity when it should not move.
- J. Thread Dial:** Indicates when to engage the half nut during threading operations.
- K. Spindle Lever:** Starts, stops and reverses direction of spindle rotation.
- L. Half Nut Lever:** Engages/disengages the half nut for threading operations.
- M. Feed Selection Lever:** Selects the carriage or cross slide for power feed.
- N. Carriage 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. Fixed Steady:** Used to support long work. Can be removed for normal machining or installed when support is required for long work.
- R. Traveling Steady;** Travels with the saddle and is used to support thin materials and sits opposite the tool.

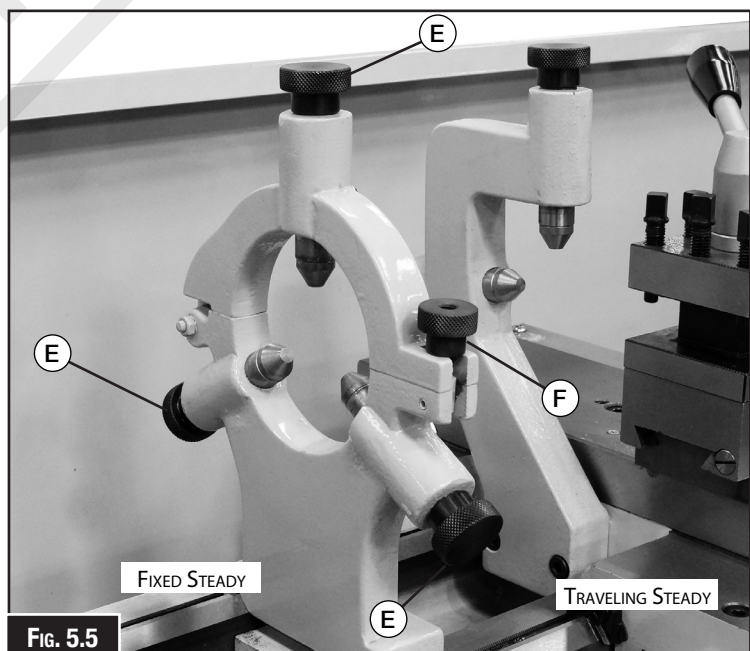
TAILSTOCK Fig. 5.4

The tailstock has many functions. The main usage is for holding drill chucks and centers. The barrel has been etched with graduations in millimeters 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 Handwheel** - Turning the handwheel 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.

**STEADIES Fig.5.5**

- 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.



5.2 CHUCK & FACEPLATE MOUNTING

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

Because chucks are heavy and often awkward to hold, some kind of lifting, support, or protective device should be used during installation or removal. (Fig. 5.6)

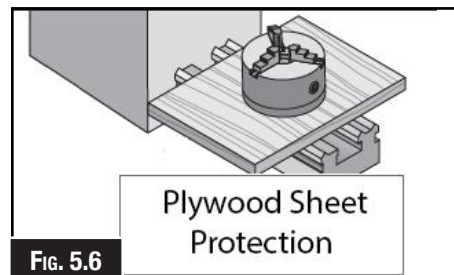


FIG. 5.6

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

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

MOUNTING THE CHUCK

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

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

NOTE: Avoid inserting the studs in from an angle or rotating the spindle. This can damage the studs or the cam holes. (Fig. 5.7)

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. 5.8.

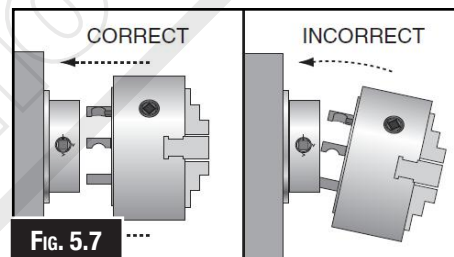


FIG. 5.7

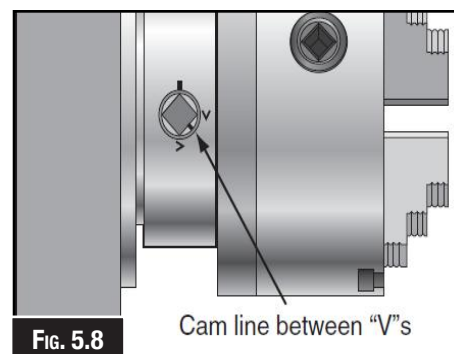


FIG. 5.8



WARNING

Chucks can be heavy and difficult to hold. During installation and removal, protect your hands and precision bed ways by using a chuck cradle or piece of plywood over the bed ways. Use lifting equipment, as necessary, for large chucks.

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. 5.9). 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.

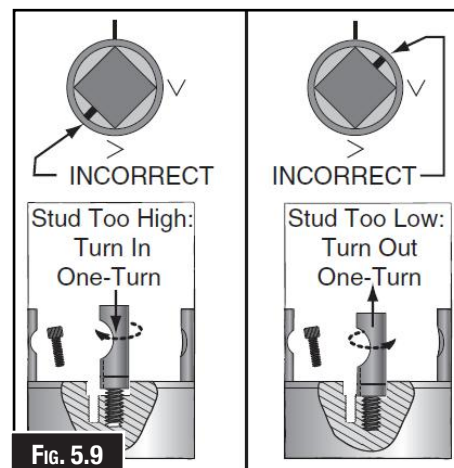


FIG. 5.9

5.3 SETTING CUTTING TOOL TO SPINDLE CENTERLINE

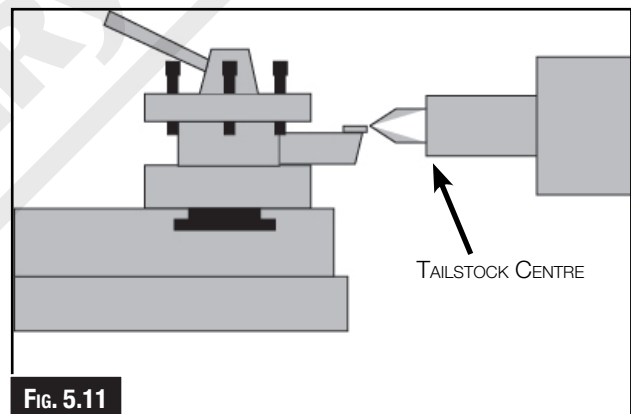
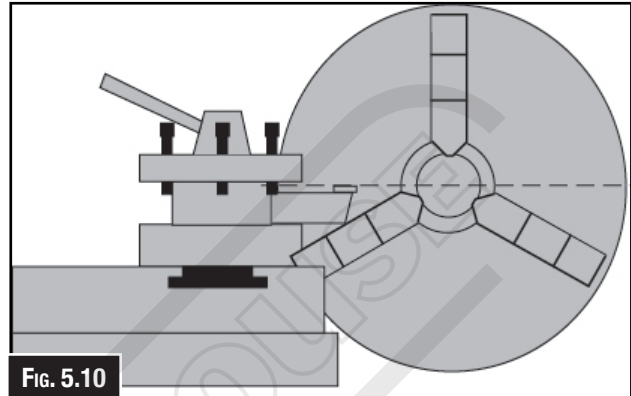
The tip of the cutting tool should be set up so that it is in line with the centerline of the spindle, as illustrated in Fig. 5.10.

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 center over the cross slide and use a fine ruler to measure the distance from the surface of the cross slide to the tip of the center. Adjust the cutting tool height so it is the same distance above the cross slide as the tailstock center.
2. Align the tip of the cutting tool with a tailstock center, as described in the following procedure.
 - 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. 5.11)



WARNING!

Cutting tools are sharp. Take care when handling them. Failure could cause deep cut injury.

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, and 2) configure the lathe controls to produce the required spindle speed.

Determining Spindle Speed

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

$$\frac{\text{RECOMMENDED CUTTING SPEED (MTRS/MIN)} \times 1000}{\text{DIAMETER IN MILLIMETERS} \times 3.14} = \text{RPM}$$

The **Fitting & 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.

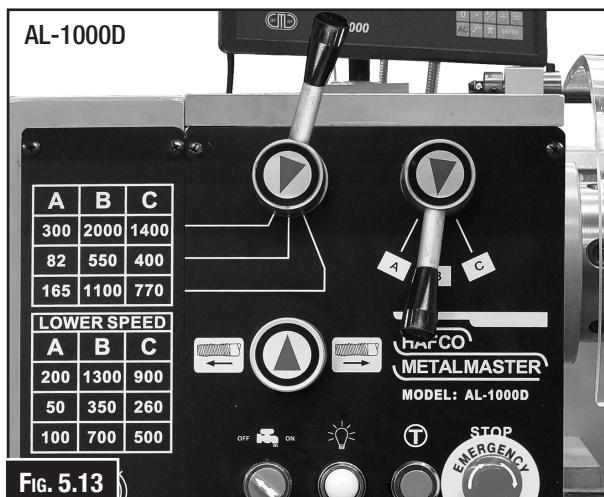
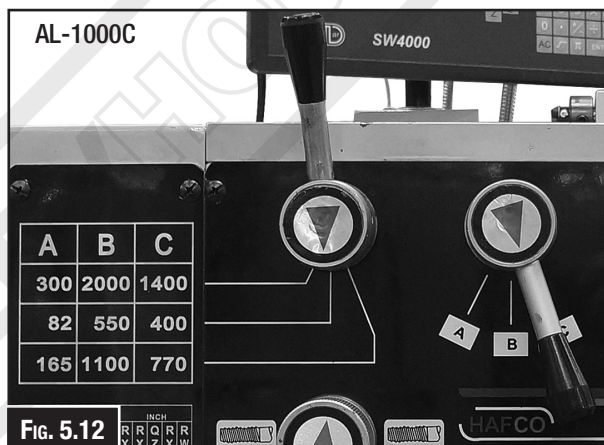
Example AL-1000C

Figure 5.12 shows the levers positioned for a spindle speed of 400 RPM.

Example AL-1000D

Figure 5.13 shows the levers positioned for a spindle speed of 2000 RPM or 1300 RPM depending on the switch configuration.

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



WARNING.

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

HIGH AND LOW RANGE (AL-1000D)

The AL-1000D has a 415 volt electric motor which can be switched between HIGH and LOW, allowing for a High and Low speed range on the lathe.

The switch is found on the front of the machine on the stand just below the headstock. (Fig. 5.14)

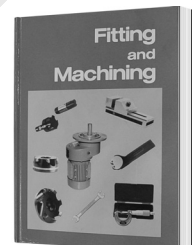


FIG. 5.14

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



Cutting Threads on a AL-1000C

To obtain the desired pitch a combination of a letters, with top dial "A", B", or "C", "D" on the lower dial and top and bottom levers.(Fig.5.15)

Example: To obtain 28tpi thread, the top dial on "A" and the bottom dial on "C" and the top lever is placed in the "R" slot and the bottom lever in the "W" position. (Fig.5.16)

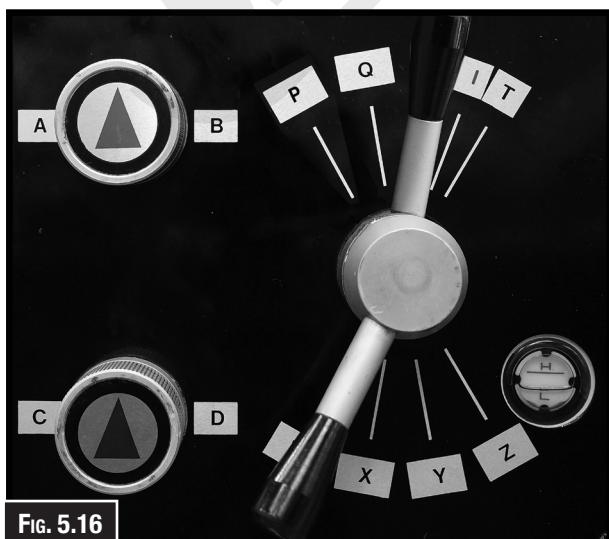


FIG. 5.16

		T.P.I										INCH	
127	30	P	P	Q	T	R	R	Q	R	R			
		X	X	X	Z	X	X	Z	X	W			
		60	65	60	60	57	60	60	69	60			
		A	D	3	3 1/4	4	4 1/2	4 3/4	5	5 1/2	5 3/4	7	
		B	D	6	6 1/2	8	9	9 1/2	10	11	11 1/2	14	
		A	C	12	13	16	18	19	20	22	23	28	
		B	C	24	26	32	36	38	40	44	46	56	

		PITCH										MM	
127	60	28	28	42	35	49	30	49	36				
		R	Q	R	Q	R	Q	Q	Q				
		W	W	W	W	W	X	W	X				
		A	D	3.2	4.0	4.8	5.0	5.6	6.0	7.0	7.2		
		B	D	1.6	2.0	2.4	2.5	2.8	3.0	3.5	3.6		
		A	C	0.8	1.0	1.2	1.25	1.4	1.5	1.75	1.8		
		B	C	0.4	0.5	0.6		0.7	0.75		0.9		
		FEED										1	1 ↑

FIG. 5.15

5.5 THREADING Cont.

Cutting Threads on a AL-1000D

To obtain the desired pitch a combination of letters, with top dial "A", "B", or "C", "D" on the lower dial and top and bottom levers.(Fig. 5.17)

Example: To obtain 36tpi thread, the top dial on "B" and the bottom dial on "C" and the top lever is placed in the "S" slot and the bottom lever in the "Y" position. (Fig. 5.18)

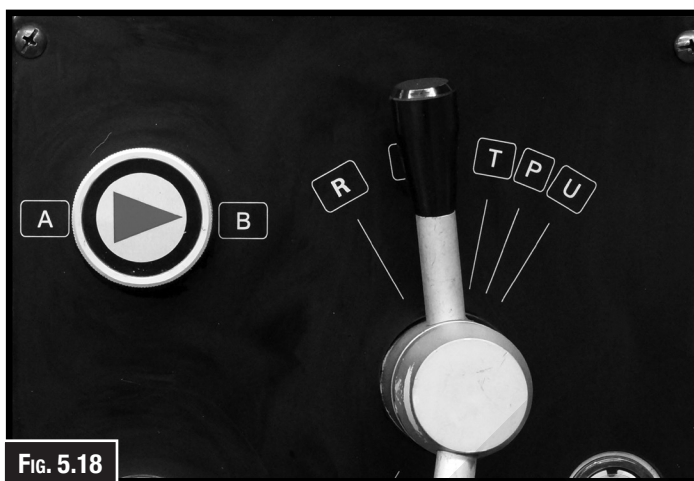


FIG. 5.18

127 30 120 60	PITCH							MM	
	T	U	S	U	S	R	U	R	
	Y	X	Y	Y	Z	Y	Z	Z	
	AD	3.2	3.6	4.0	4.8	5.0	5.6	6.0	7.0
	BD	1.6	1.8	2.0	2.4	2.5	2.8	3.0	3.5
	AC	0.8	0.9	1.0	1.2	1.25	1.4	1.5	1.75
	BC	0.4	0.45	0.5	0.6		0.7	0.75	
127 40 120 60	T.P.I							INCH	
	U	S	T	U	T	T	T	T	
	X	Y	X	X	X	X	X	X	
	48	60	38	60	44	48	52	56	
	AD	4	4½	4¾	5	5½	6	6½	7
	BD	8	9	9½	10	11	12	13	14
	AC	16	18	19	20	22	24	26	28
	BC	32	36	38	40	44	48	52	56
127 30 120 60	FEED			1 1			1 2		
	MM								
	X	Y	Z						
	PAD	0.544	0.752	0.936					
	PBD	0.272	0.376	0.468					
	PAC	0.136	0.188	0.234					

FIG. 5.17

5.6 END GEARS

The end gears are used to setup for power feed, inch, or metric threading operations. See Fig. 5.20 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.

END-GEAR CONFIGURATION

To configure the end gears, first

1. Locate the chart on the headstock that has the thread or feed option that is required.
2. **DISCONNECT THE MACHINE FROM THE 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. 5.21)
5. Loosen the 120T/127T gear hex nut 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. 5.21) and reverse the gears.
6. Remove the cap screw and flat washer from the top gear, then slide the gear off the shafts.
7. 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.
8. Secure the top and bottom gears with the flat washers and cap screws that were removed earlier.
9. Raise the gear support arm and mesh the top gear 120T/127T then tighten the gear support hex nut and replace the end gear cover.

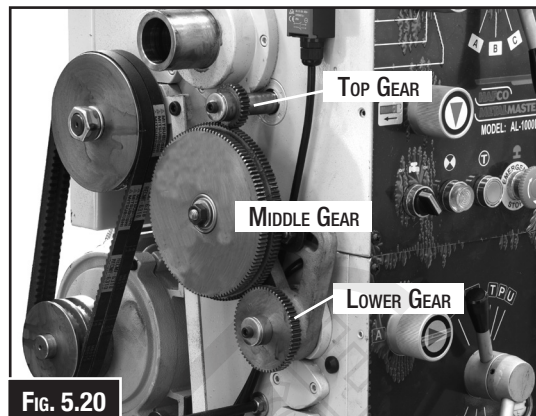


FIG. 5.20

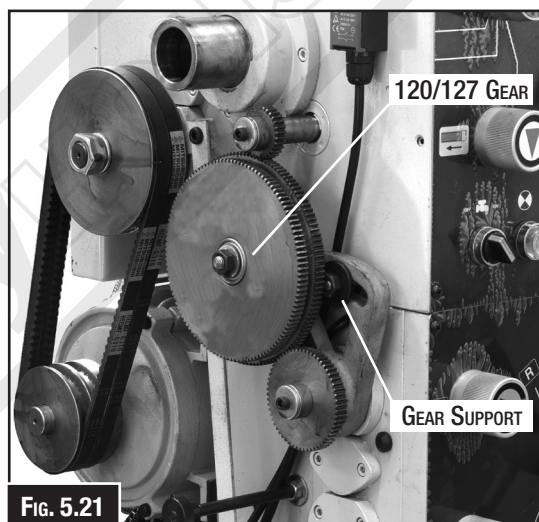


FIG. 5.21

5.7 SELECTING THE FEEDS

The carriage and cross slide both have power feed capability when the carriage is engaged with the feed rod. The rate that these components move per revolution of the feed rod is controlled by the quick-change gearbox lever positions and the end gear configuration. The AL-1000 Metal Lathes 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.5.22)

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

Feed Selection Lever: Changes the power feed to either the cross slide or the carriage.

When the lever is down and the indent pin is pointing up, the cross slide is selected.

Conversely, when the lever is up and the pin is pointing down, the carriage is selected.

In the middle position, the apron gears are disengaged from the feed rod and neither component will move.

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

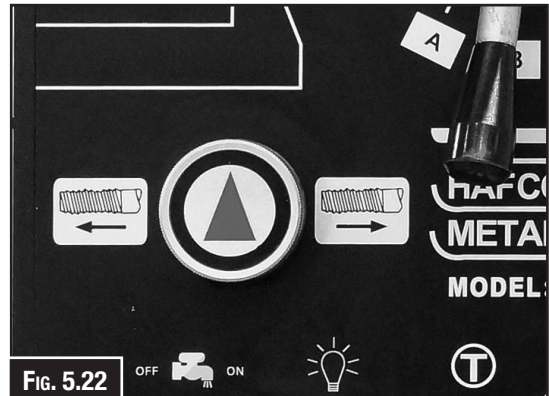
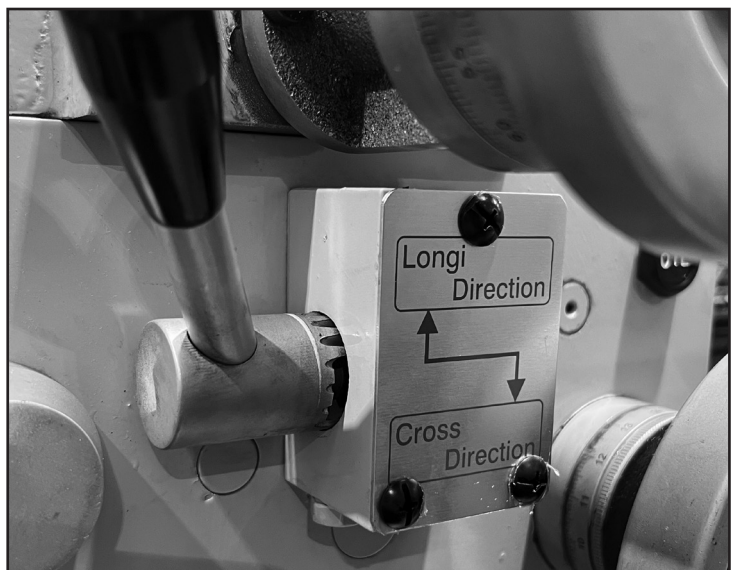


FIG. 5.22



FIG. 5.23



SETTING THE FEED RATE AL-1000C

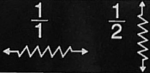
The feed rate chart (Fig. 5.24) displays the settings for the headstock feed controls for feed rates. Feed settings are displayed in "Metric" or "Inch." Below is an explanation of some of the symbols.



The symbol to the left, and found on the Threading and Feed charts, is the configuration of the end gears for the feed rates in the chart.

The symbols to the left, and found on the Threading and Feed charts, explain the ratio of the feed shaft to movement of the slides. For the long travel, one rotation of the shaft means the saddle travels the distance selected on the chart.

For the cross slide one revolution of the feed shaft moves the cross slide half the distance selected on the chart.

		FEED				
		INCH				
		I W	I X	I Y	I Z	
A	D	0.021	0.0295	0.0368	0.0226	
B	D	0.0105	0.0148	0.0184	0.0113	
A	C	0.0053	0.0072	0.0092	0.0056	
B	C	0.0026	0.0036	0.0046	0.0028	

		FEED				
		MM				
		I W	I X	I Y	I Z	
A	D	0.533	0.749	0.935	0.574	
B	D	0.266	0.375	0.467	0.287	
A	C	0.134	0.182	0.233	0.142	
B	C	0.066	0.091	0.116	0.071	

FIG. 5.24

SETTING THE FEED CONTROLS

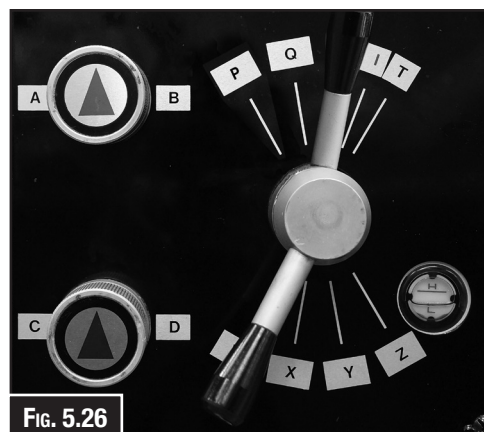
When you examine the chart, you will see a series of boxes. The number in the box is the saddle feed rate.

Example: To select 0.134mm feed,

1. First make sure the end gears are set correctly as displayed in Fig. 5.25.
2. The top dial needs to be set on "A" and the bottom dial set on "C". (Fig. 5.26)
3. The top handle needs to be set on "I" and the bottom handle is set on "W". (Fig. 5.26)

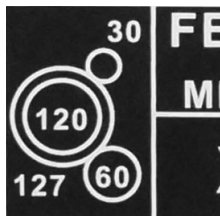
127 30 120 60		FEED				$\frac{1}{1}$ $\frac{1}{2}$
		MM				
		I W	I X	I Y	I Z	
A	D	0.533	0.749	0.935	0.574	
B	D	0.266	0.375	0.467	0.287	
A	C	0.134	0.182	0.233	0.142	
B	C	0.066	0.091	0.116	0.071	

FIG. 5.25



SETTING THE FEED RATE AL-1000D

The feed rate chart (Fig. 5.27) displays the settings for the headstock feed controls for feed rates. Feed settings are displayed in "Metric". Below is an explanation of some of the symbols.



D	Y	Z
4	0.752	0.936
2	0.376	0.468
6	0.188	0.234
8	0.094	0.117

The symbol to the left, and found on the Threading and Feed charts, is the configuration of the end gears for the feed rates in the chart.

The symbols to the left, found on the Threading and Feed charts, explain the ratio of the feed shaft to movement of the slides. For the long travel, one rotation of the shaft means the saddle travels the distance selected on the chart.

For the cross slide one revolution of the feed shaft moves the cross slide half the distance selected on the chart.

AD	3.2	3.6	4.0	4.5	5.0	5.6	6.3	7.0
BD	1.6	1.8	2.0	2.4	2.5	2.8	3.0	3.5
AC	0.8	0.9	1.0	1.2	1.25	1.4	1.5	1.75
BC	0.4	0.45	0.5	0.6		0.7	0.75	
40 120 127 60 T.P.I. INCH								
U	X	Y	X	X	X	X	X	X
48	60	38	60	44	48	52	56	
A D	4	4½	4¾	5	5½	6	6½	7
B D	8	9	9½	10	11	12	13	14
A C	16	18	19	20	22	24	26	28
B C	32	36	38	40	44	48	52	56
30 120 127 60 FEED MM 1/1 1/2								
	X	Y	Z					
PAD	0.544	0.752	0.936					
PBD	0.272	0.376	0.468					
PAC	0.136	0.188	0.234					
PBC	0.068	0.094	0.117					

Fig. 5.27

SETTING THE FEED CONTROLS

When you examine the chart, you will see a series of boxes. The number in the box is the saddle feed rate.

Example: To select 0.376mm feed,

1. First make sure the end gears are set correctly as displayed in Fig. 5.28.
2. The top dial needs to be set on "A" and the bottom dial set on "C". (Fig. 5.29)
3. The top handle needs to be set on "P" and the bottom handle is set on "Y". (Fig. 5.29)

30 120 127 60 FEED MM 1/1 1/2			
	X	Y	Z
PAD	0.544	0.752	0.936
PBD	0.272	0.376	0.468
PAC	0.136	0.188	0.234
PBC	0.068	0.094	0.117

Fig. 5.28



Fig. 5.29

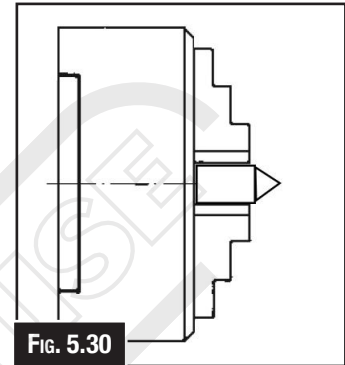
5.8 ALIGNING TAILSTOCK TO SPINDLE CENTERLINE

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

Steps to align the tailstock to the spindle centerline:

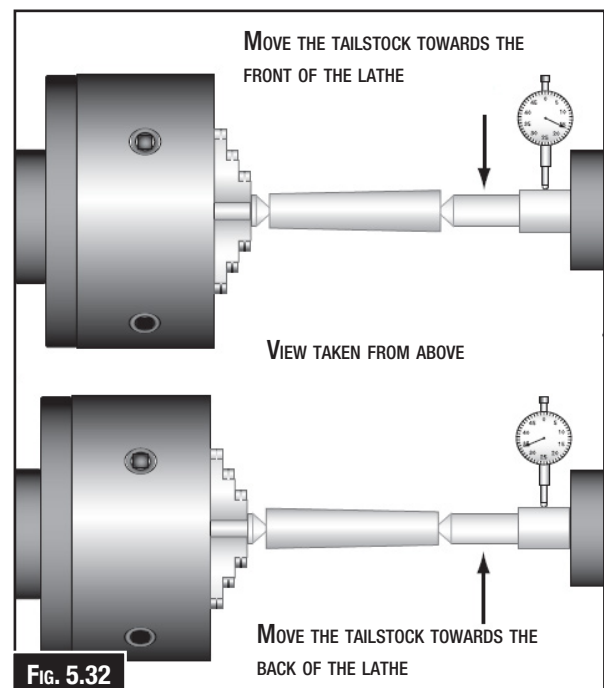
1. Center drill both ends of one piece of round bar, then set it aside for later use in step 4.
2. Use the other piece of round stock to make a dead center, and turn it to a 60° point, as illustrated in the Fig. 5.30.

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



3. Install a center in the tailstock.
4. Attach a lathe dog to the test piece of round stock from Step 1, then mount it between the centers as shown in Fig. 5.31.
5. Turn 1mm off the stock diameter.

6. Mount a test or dial indicator so that the plunger is on the tailstock quill and set the dial to "0". (Fig. 5.32)
7. Use a micrometer to measure both ends of the workpiece. If the test stock is larger at the tailstock end, then adjust the tailstock toward the front of the lathe half the distance of the difference.
8. Repeat the steps until the round bar is turned parallel.



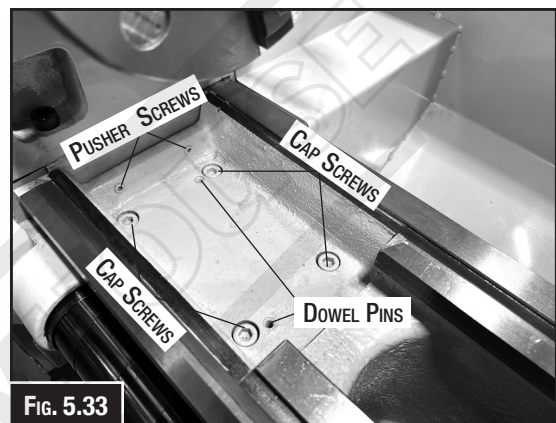
5.9 REMOVING AND REPLACING THE BED GAP

This AL-1000 Lathe bed is equipped with a removable gap that allows for the turning of large diameter workpieces. The gap was seated, pre-loaded, and then ground for precise mating and alignment at the factory.

Removing the gap can cause the lathe insert to slightly spring out of shape. When re-installed, there is no guarantee that original alignment and flush mating will be the same. For this reason, removing the gap is considered a permanent alteration to the lathe, even if it is later re-installed.

To Remove The Gap

1. DISCONNECT MACHINE FROM POWER!
2. Remove the four cap screws that secure gap to bed.
3. Tighten dowel-pin jack nuts (Fig. 5 .33) to remove the pins from gap.
4. Loosen the pusher set screws (Fig. 5.33) a few turns until they are no longer in contact with the headstock.
5. Tap the outside of the gap piece with a soft face hammer to loosen it and remove the gap piece.



To Re-install The Gap

1. Make sure all mating surfaces are clean.
2. Place the gap in position and tap in the dowel pins
3. Install the 4 hold down socket head cap screws snug but not tight.
4. Jack the insert to the right with the pusher screws to close the gap, if any, between the ground surfaces of the bed ways at the join.
5. Tighten the four hold down bolts.

 WARNING	
SAFETY FIRST 	<i>The safety instructions given in this manual cannot be complete. The environment in every shop is different. Always consider your safety first as it applies to your individual working conditions.</i>

5.10 OPTIONAL TAPER TURNING ATTACHMENT

This is a toolroom-quality fixture that can be retrofitted to the AL-1000 series lathes.

It is a self-contained, center-pivoted design that is attached by a single clamp at any point along the lathe bed. It handles tapers up to 300mm long, with half-angle from zero to +/- 10 degrees.

The Taper angle is precisely set by a micrometer-style screw adjustment.

Before installing the attachment, make certain that its two sliding components — Dovetail slide and Follower carriage — move freely without side play. Adjust the gibs and lubricate if necessary

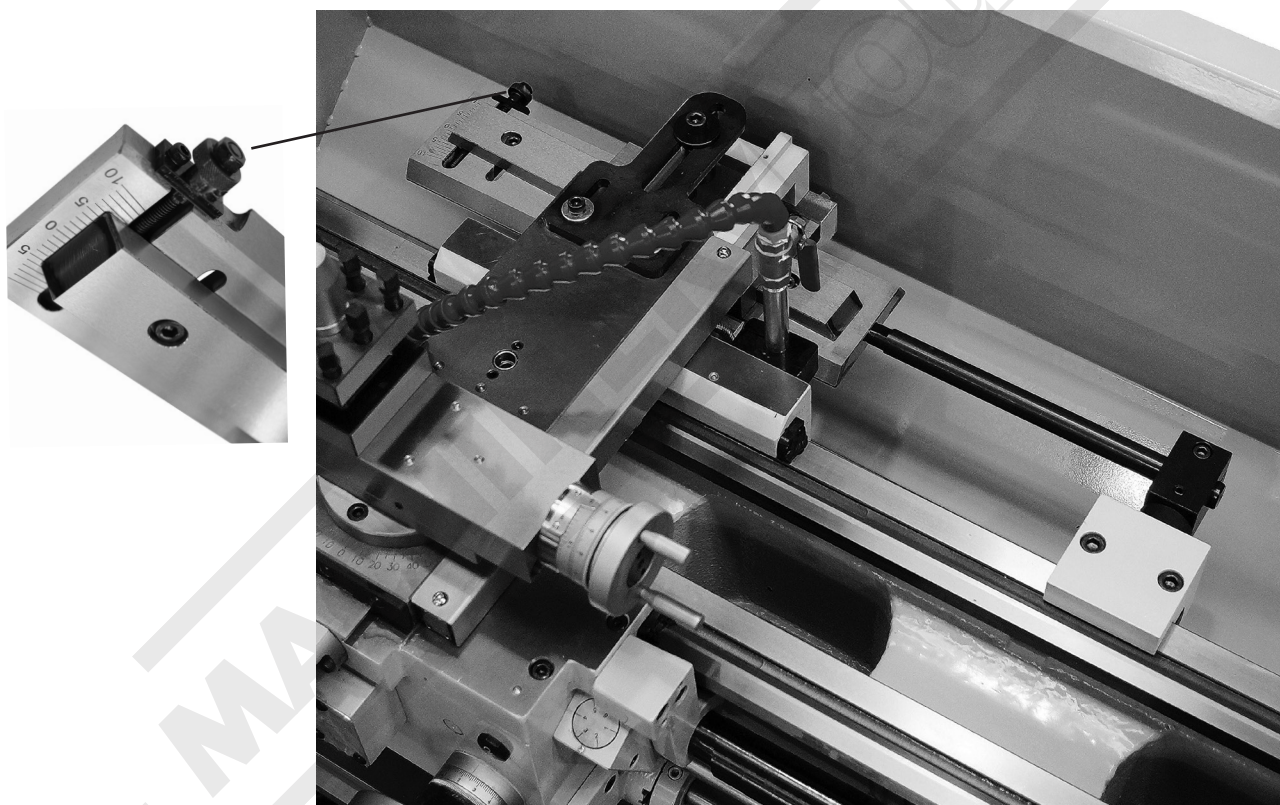
5.10 OPTIONAL TAPER TURNING ATTACHMENT Cont.

NOTE: *Setting up any taper attachment is an iterative, cut and try process.*

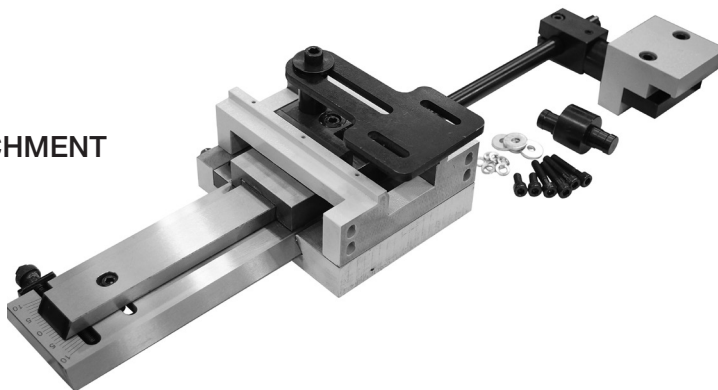
It consists of a bracket or frame which is attached to the rear of the lathe bed and supports a guide bar that pivots at the centre. The guide bar having graduations in degrees may be swivelled on either side of the zero graduation and is set at the desired angle to the lathe axis by a micrometer adjustment. When this taper attachment is used, the cross slide is de-linked from the saddle by removing the binder screw. The rear end of the cross slide is then attached to the guide block by means of a bolt. When the longitudinal feed is engaged, the tool mounted on the cross slide will follow the angular path, as the guide block slides on the guide bar that is set at an angle to the lathe axis.

The required depth of cut is given by the compound slide which is placed at right angles to the lathe axis. The guide bar must be set at half the taper angle.

The maximum angle through which the guide bar may be swivelled is ± 10 degrees on the lathe centre line.



TPA-1000
TAPER TURNING ATTACHMENT
300mm Travel
Suits AL-1000 & AL-960
ORDER CODE L258



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 maintain. 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)



FIG. 6.1

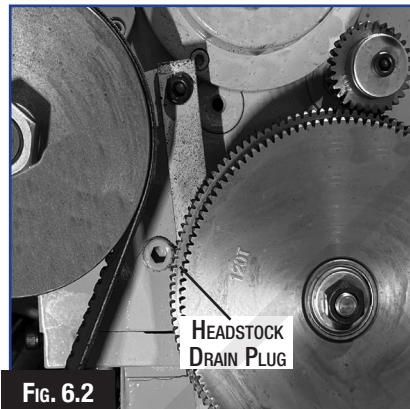


FIG. 6.2



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 6mm hex wrench to remove the drain plug and empty the reservoir.

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

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

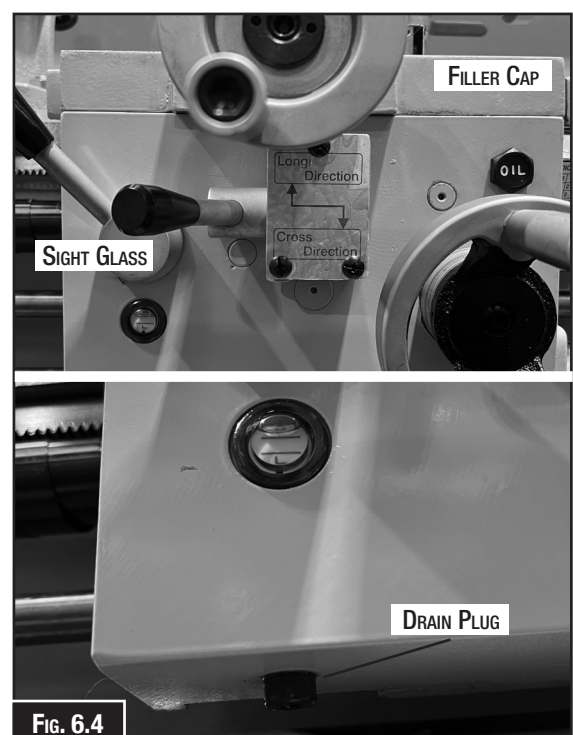


FIG. 6.4

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) it should be cleaned with mineral spirits. The use of a stiff brush will help clean out the threads. Move the carriage out of the way, so you can clean the entire length of the 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.

Lead Screw & Feed Shaft Bearings (Fig.6.6)

The feed and leads screw bearings are lubricated through an oil reservoir at the end of the bed.

Fill 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.

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

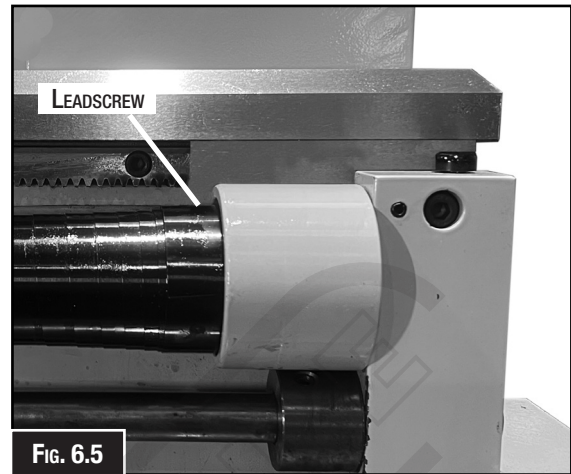


FIG. 6.5

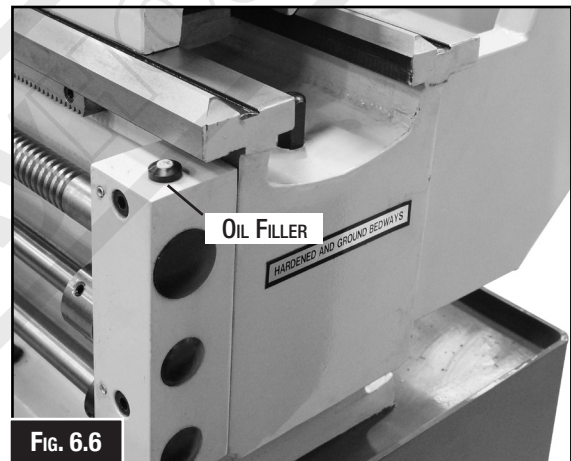


FIG. 6.6

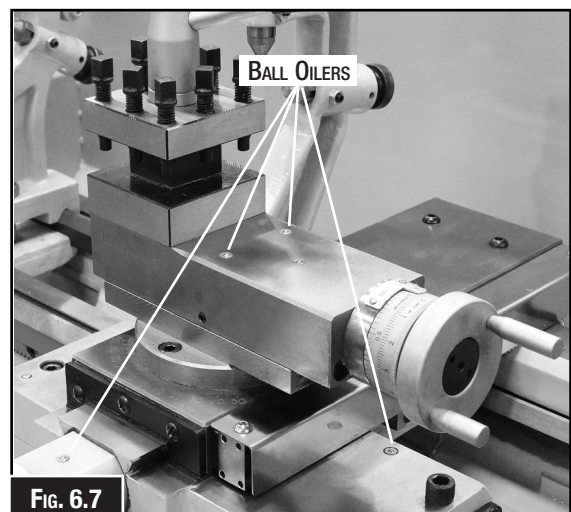


FIG. 6.7

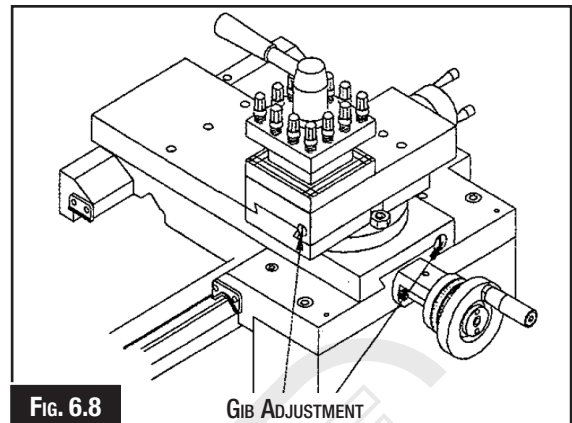
6.3 ADJUSTMENTS

SLIDE WAY GIBS

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.

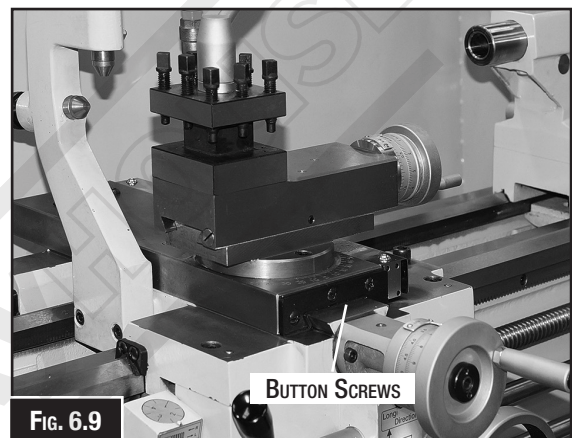
To adjust the top slide gib:

1. DISCONNECT THE MACHINE FROM THE POWER SUPPLY.
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:

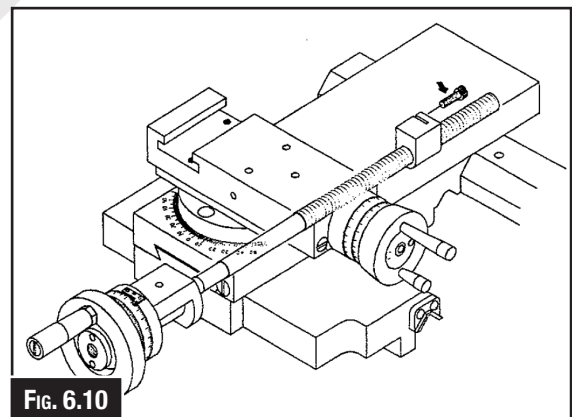
1. DISCONNECT THE MACHINE FROM THE POWER SUPPLY.
2. Undo the three button head screws that hold the slide wiper and remove the rubber wiper. (Fig. 6.9)
3. Release the rear gib screw and tightening the front screw a little at a time. Check constantly for a smooth action throughout the full slide travel.



Cross Slide Nut Adjustment.

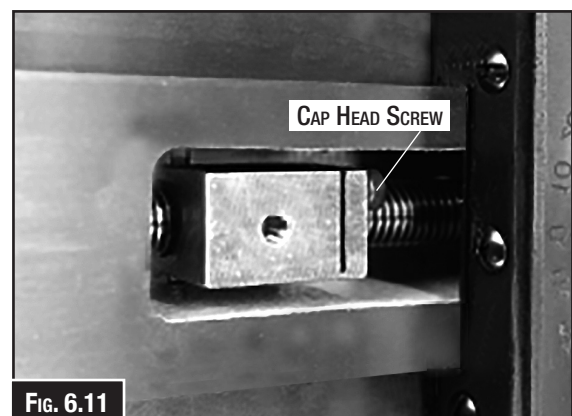
This is an adjustment that can be made to eliminate excessive backlash, which may develop over time.

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 backlash 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. 6.11)

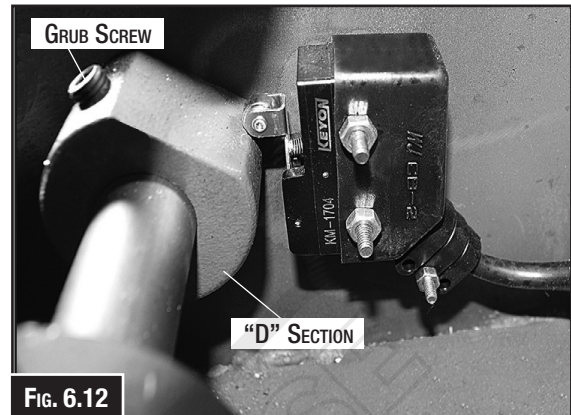


6.4 ADJUSTING FOOTBRAKE INTERLOCK

The AL-1000 is fitted with a footbrake that will brake the machine if pressed and disconnect the power to the motor. The lathe will not run if the footbrake switch fails to close when the foot treadle is released (brake OFF). This switch is located inside the LH stand cabinet. Check that the D-shape cam operates the switch when the treadle is pressed, (Fig. 6.12)

To Adjust The Micro Switch

1. DISCONNECT THE MACHINE FROM POWER.
2. Loosen the Grub screw on the "D" section.
3. Press the foot pedal and rotate the "D" section until the microswitch clicks.
4. Tighten the grub screw.
5. Test the footbrake.



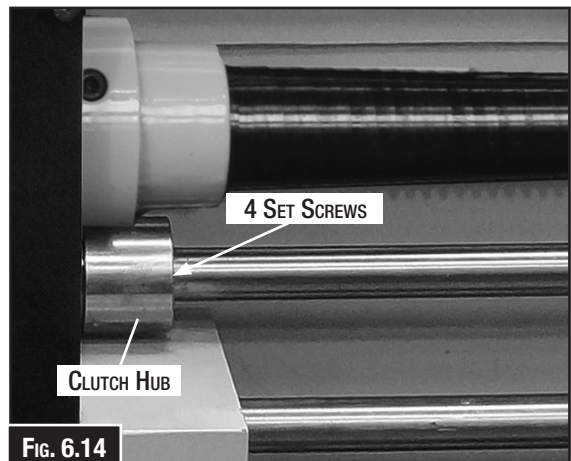
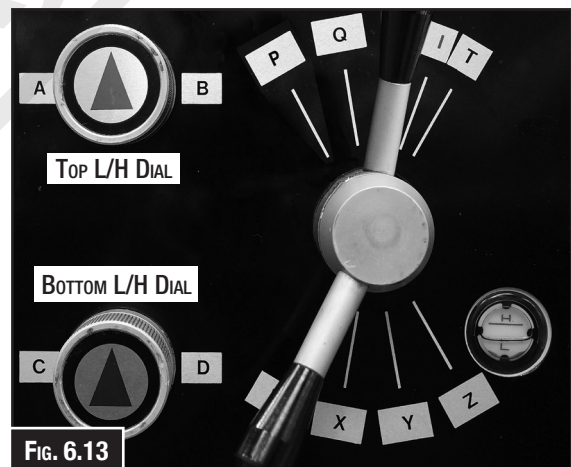
NOTE: When testing the footbrake, the motor must switch OFF before the brake is applied.

6.5 FEED CLUTCH ADJUSTMENT

The AL-1000 is equipped with a feed rod clutch, that connects the feed drive with the feed rod through a set of spring loaded ball bearings. This clutch helps protect the apron feed system from overload. The feed rod clutch comes set from the factory, and unless there is a problem, it needs no adjustment.

The clutch may slip if the path for the carriage or the cross feed is obstructed during turning or facing operations.

1. DISCONNECT MACHINE FROM POWER!
2. Position the top left hand dial pointer between "A" and "B", then position bottom left hand gearbox dial pointer between "C" and "D" (Fig. 6.13). This allows feed rod to move freely so adjustments can be made to the clutch.
3. If the clutch slips during normal work loads, increase the clutch spring pressure by tightening each of the four clutch drive set screws on the face of the clutch hub (Fig. 6.14) one full turn, then recheck for slippage. If the clutch does not slip when it should, reduce the clutch spring pressure by loosening each of the four clutch set screws one full turn, then recheck for slippage.



6.6 TROUBLE SHOOTING

If the machine develops a problem, review the trouble shooting section below to find a fix for the problem. If the problem cannot be solved then contact your dealer for help or to book a service engineer.

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

6.6 TROUBLE SHOOTING Cont.

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

CENTRE LATHES AL-1000C & AL-1000D

Order Code: (L240D & L242D)

Edition : 2.0
Date: (07/25)

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!

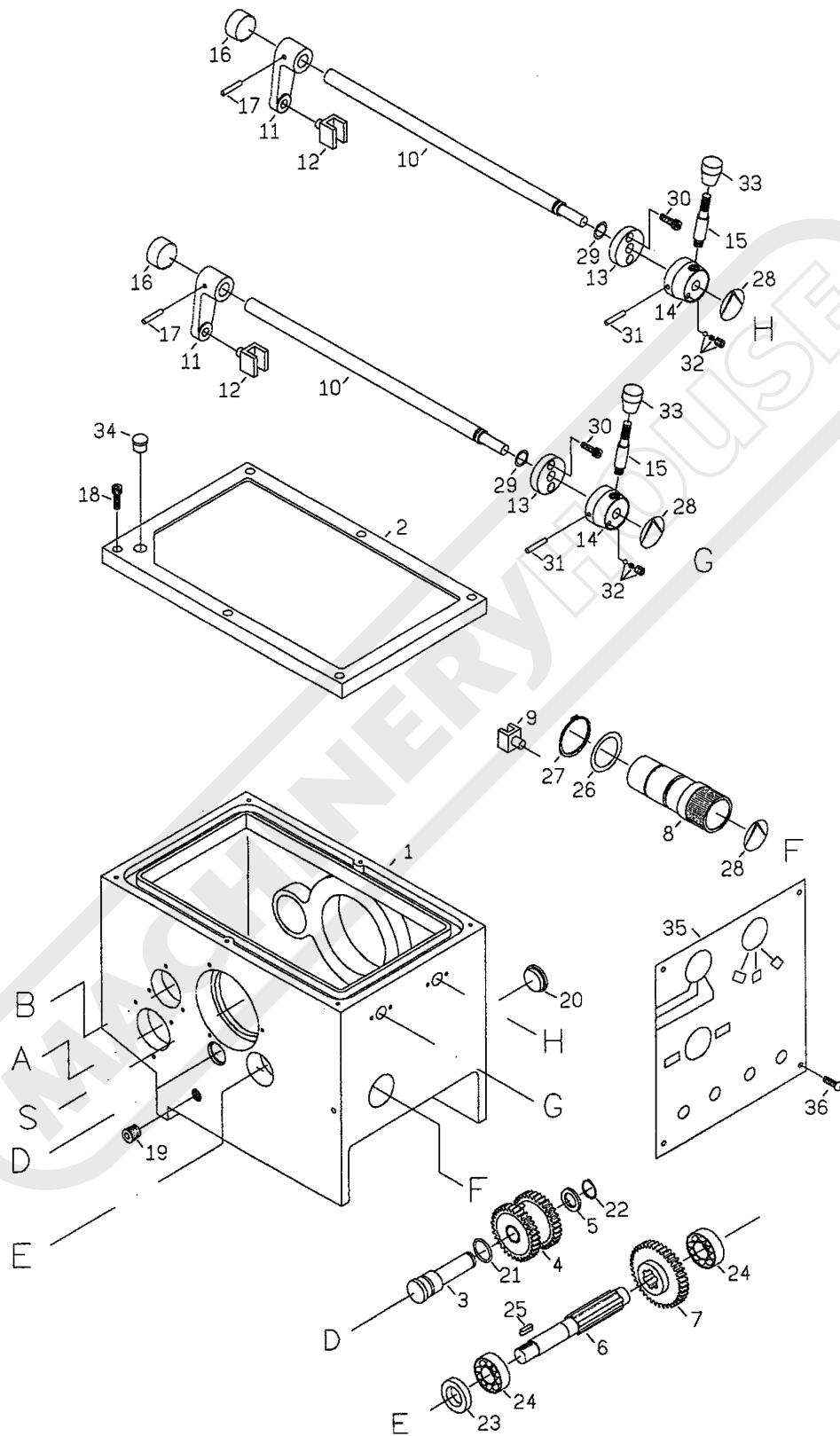
*Electricity is dangerous and could cause death
All electrical work must be carried out by a qualified electrician.*



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.

AL-1000 HEADSTOCK - DIAGRAM

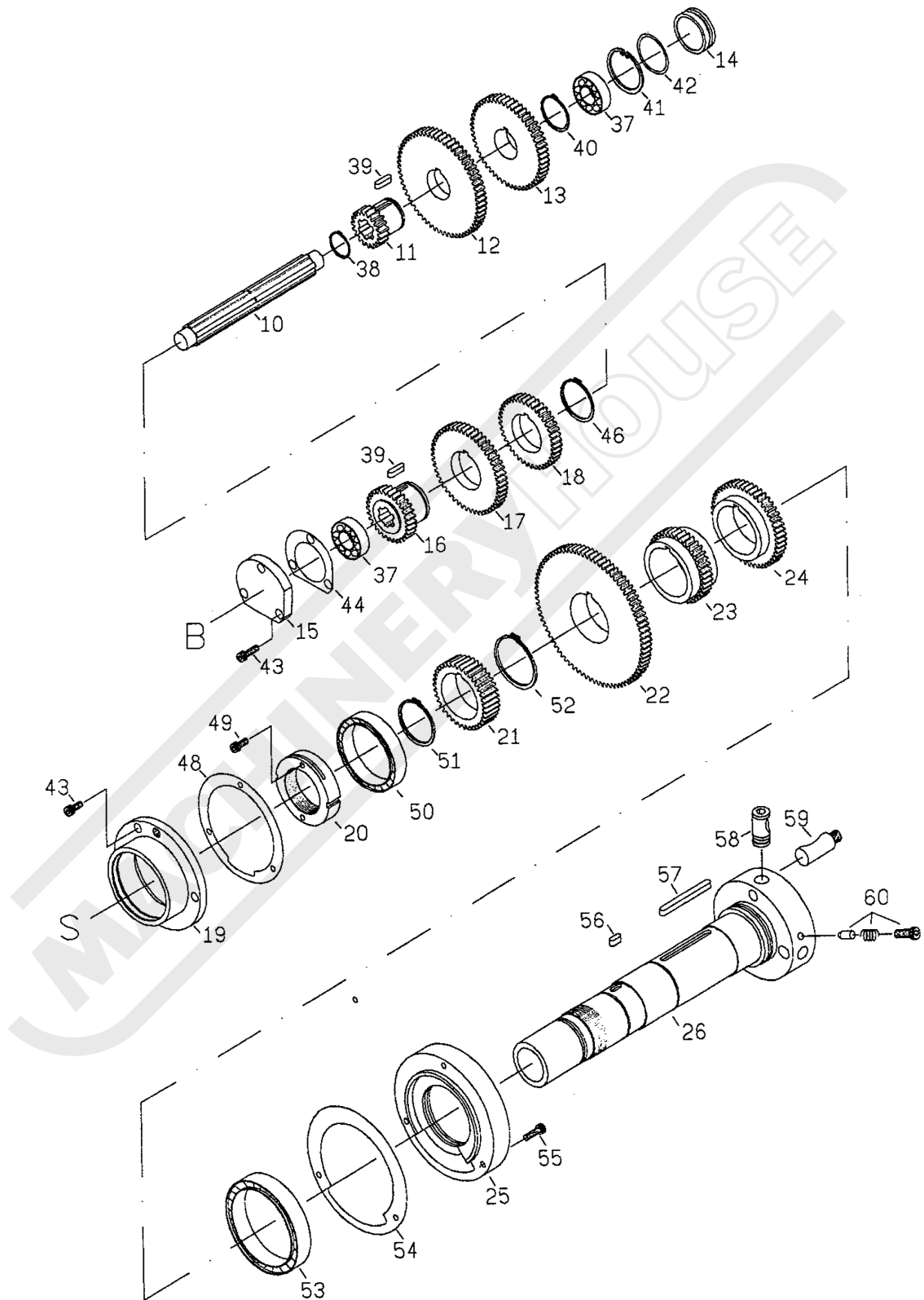


AL-1000 HEADSTOCK - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2101	HEADSTOCK CASTING	1
2	2143	HEADSTOCK COVER	1
3	2121	SHAFT	1
4	2122	GEAR (M2X32T)	1
5	2123	WASHER	1
6	2124	SHAFT	1
7	2125	GEAR (M2X38T)	1
8	2126	HANDLE	1
9	2127	GEAR SHIFT FORK	1
10	2136	SHAFT	2
11	2137	FORK' ARMS	2
12	2138	GEAR SHIFT FORK	2
13	2139	COLLAR	2
14	2141	HANDLE	2
15	2142	CONTROL LEVER	2
16	2194	OIL RING	2
17	2193	PIN (5mmx32mm)	2
18	2184	CAP SCREW (6mmx25mm)	6
19	2195	PLUG (3/8 G.P.)	1
20	2144	OIL SIGHT(29mm)	1
21	2181	OIL RING(P20)	1
22	2148	SNAP RING (S18)	1
23	2178	WASHER	1
24	2180	BEARING (6004)	2
25	2145	KEY(5mmx 18mm)	1
26	2146	OIL RING (P12)	1
27	2188	SNAP RING (S40)	1
28	2185	INDICATOR PLATE	3
29	2191	OIL RING (PI2)	2
30	2189	CAP SCREW (6mmx16mm)	4
31	2192	SPRING PIN (5mmx40mm)	2
32	2186	STEEL BALL SPRING & SET SCREW	2
33	2190	PVC KNOB	2
34	2183	PLUG (5/8")	1
35	2196	DATA PLATE	1
36	2197	SCREW (3/ 16"x3/8")	4

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

AL-1000 HEADSTOCK GEARS - DIAGRAM

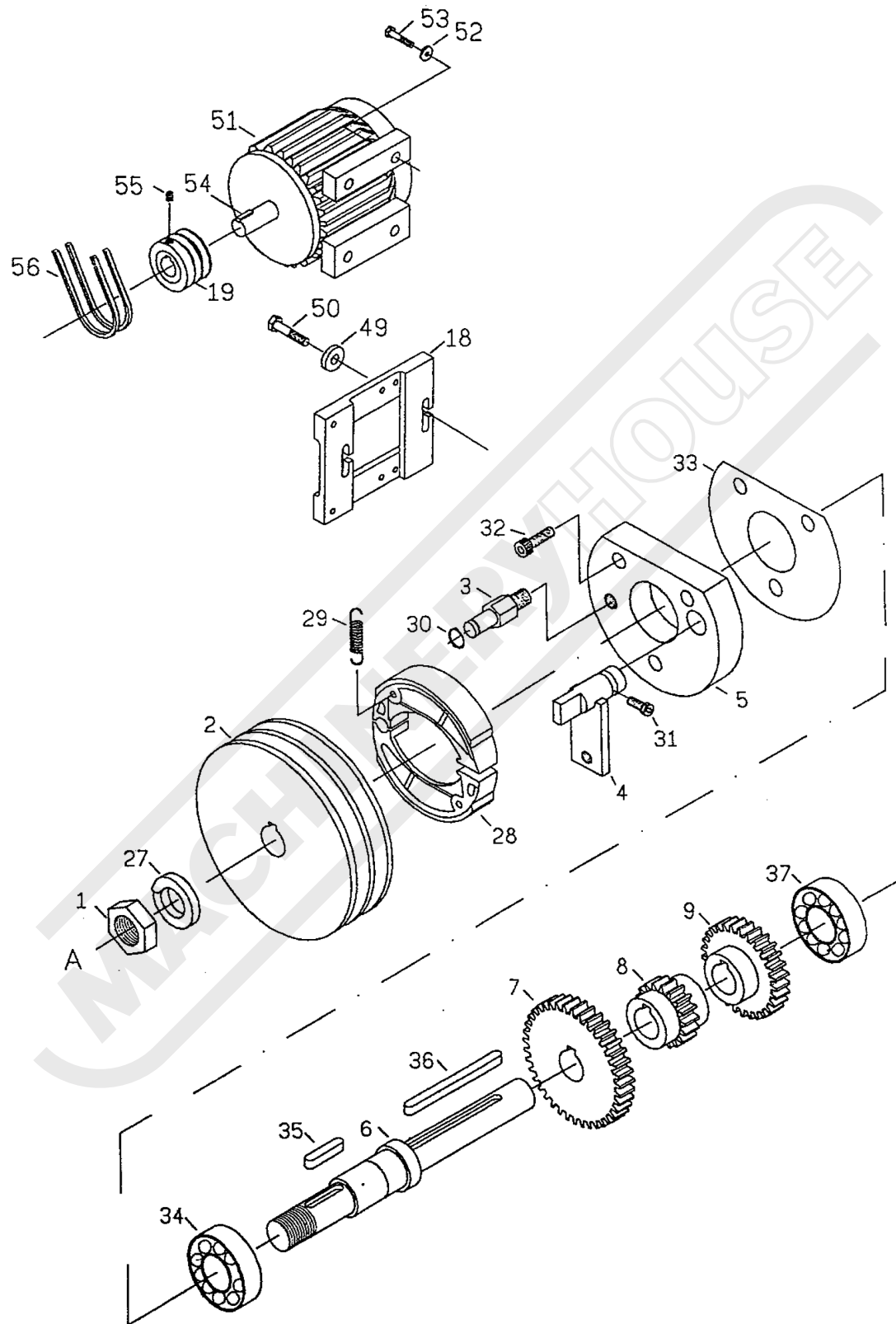


AL-1000 HEADSTOCK GEARS - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
10	2112	SHAFT	1
11	2116	GEAR (M2x 19T)	1
12	2117	GEAR (M2x60T)	1
13	2118	GEAR (M2x52T)	1
14	2119	BORE PLUG	1
15	2120	COVER	1
16	2113	GEAR (M2x30T)	1
17	2114	GEAR (M2x50T)	1
18	2115	GEAR (M2x40T)	1
19	2135	COVER (BACK)	1
20	2134	LOCK NUT	1
21	2133	GEAR (M2x38T)	1
22	2132	GEAR (M2x80T)	1
23	2131	GEAR (M2x39T)	1
24	2130	GEAR (M2x48T)	1
25	2128	COVER (FRONT)	1
26	2129	MAIN SPINDLE	1
38	2162	SNAP RING (S25)	1
39	2163	KEY (6mmx22mm)	2
37	2158	BEARING (#6204)	2
40	2164	SNAP RING (S35)	1
41	2165	SNAP RING (R47)	1
42	2166	OIL RING (P39.4)	1
43	2159	SCREW (CAP 6mmx16mm)	6
44	2180	GASKET	1
46	2161	SNAP RING (S45)	1
48	2167	GASKET	1
49	2147	SCREW (CAP 6mmx25mm)	2
50	2168	BEARING (#30211)	1
51	2169	SNAP RING (S55)	1
52	2170	SNAP RING (S58)	1
53	2171	BEARING (#30212)	1
54	2172	GASKET	1
55	2173	SCREW (CAP 6mmx25mm)	3
56	2174	KEY (6mmx 15mm)	1
57	2175	KEY (7mmx75mm)	1
58	2176	CAM DI-4	3
59	2182	STUD	3
60	2177	DETENT PLUNGER.SPRING AND SCREW	3

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

AL-1000 MOTOR & BRAKE - DIAGRAM

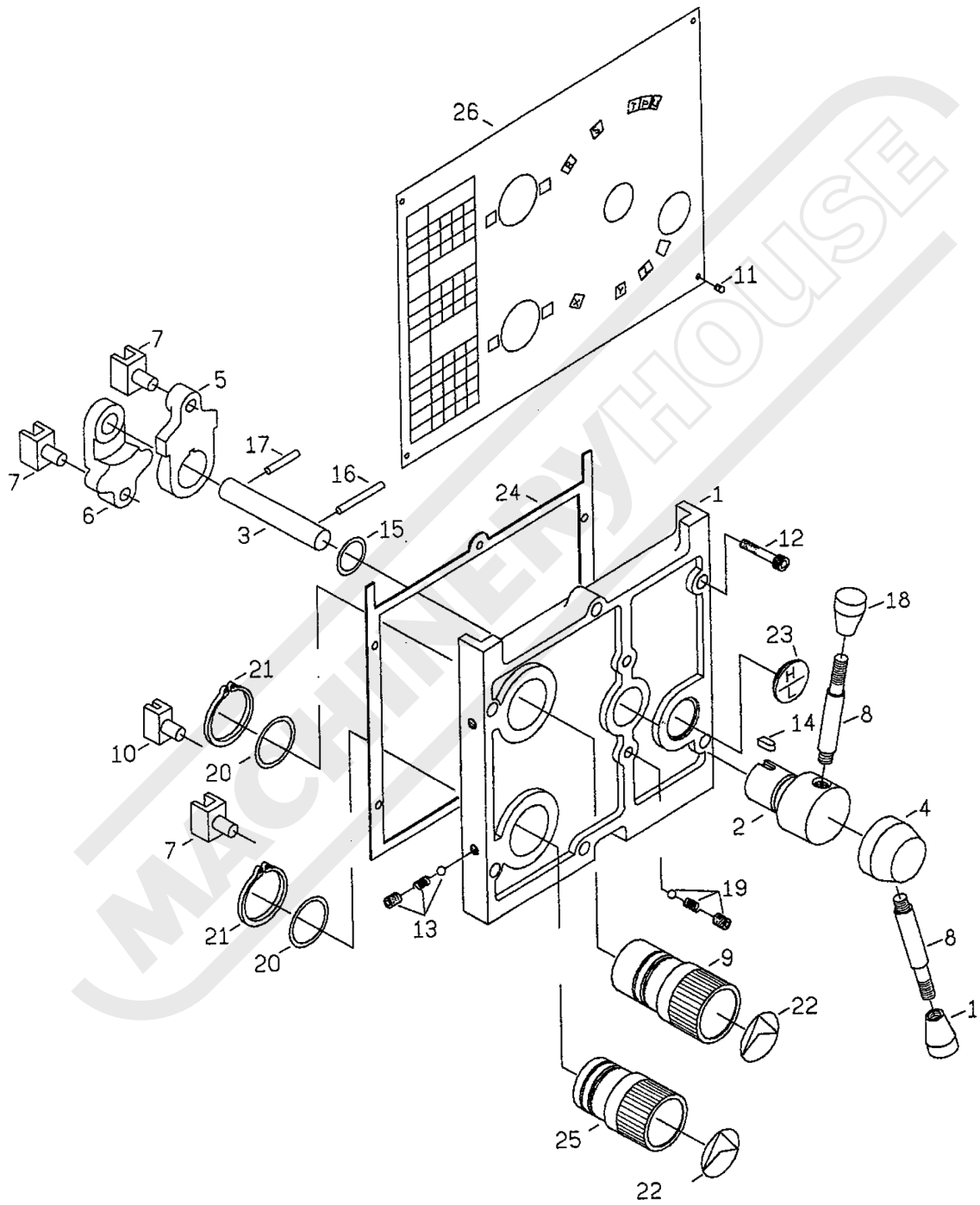


AL-1000 MOTOR & BRAKE - PARTS LIST

No.	FACTORY CODE	DESCRIPTION	Qty.
1	2111	NUT (M2xPl.5mm)	1
2	2110	V-BELT PULLEY	1
3	2107	STUD	1
4	2108	SHAFT LEVER	1
5	2106	COVER	1
6	2102	SHAFT	1
7	2103	GEAR (M2x39T)	1
8	2104	GEAR (M2x18T)	1
9	2105	GEAR (M2x29T)	1
18	2618	MOTOR PLATE	1
19	2653	MOTOR PULLEY	1
27	2149	WASHER	1
28	2109	BRAKE SHOES ASSY	1
29	2140	SPRING	2
30	2151	SNAP RING	1
31	2153	CAP SCREW	1
32	2152	SCREW (CAP 6mmx25mm)	3
33	2179	GASKET	1
34	2155	BEARING (#6205)	1
35	2156	KEY (6mmx30mm)	1
36	2157	KEY (6mmx80mm)	1
37	2158	BEARING (#6204)	1
49	2619	WASHER	2
50	2631	SCREW (CAP 10mmx35mm)	2
51	2652	MAIN MOTOR	1
52	2656	WASHER	4
53	2657	SCREW (CAP 8mmx30mmj)	4
54	2659	KEY (8mmx45mm)	1
55	2655	SCREW (SET 10mmx20mm)	1
56	2654	V-BELT	2

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

AL-1000 GEARBOX CASTING - DIAGRAM

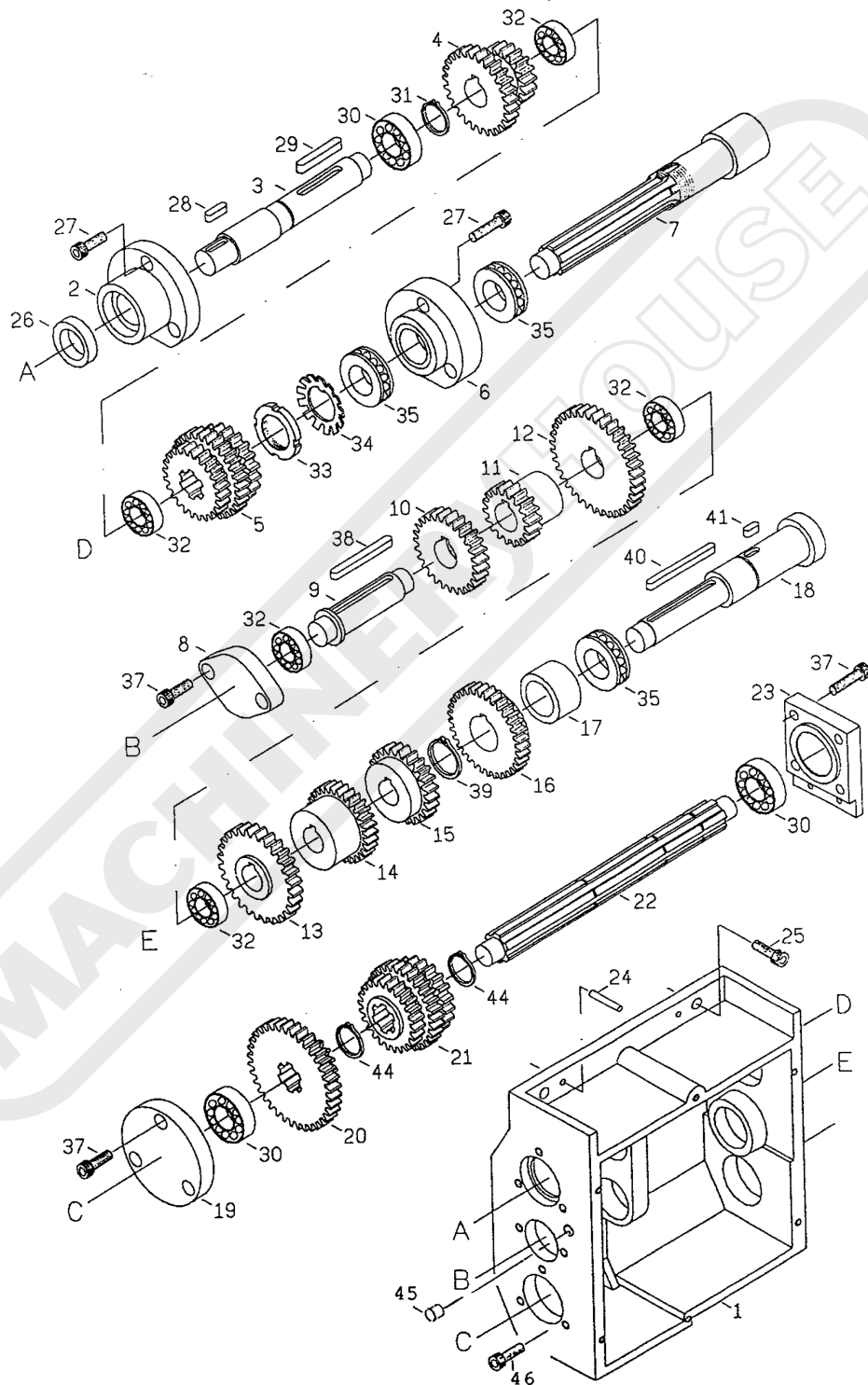


AL-1000 GEARBOX CASTING - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2224	COVER	1
2	2225	HANDLE	1
3	2226	SHAFT	1
4	2227	HANDLE	1
5	2228	SHIFT LEVER	1
6	2229	SHIFT LEVER	1
7	2230	SHIFT FORK	3
8	2231	LEVER	2
9	2233	HANDLE	1
10	2234	SHIFT FORK	1
11	2241	SCREW (3/16x3/8 IN)	6
12	2248	SCREW (CAP 6mmx30mm)	6
13	2247	SET SCREW SPRING AND STEEL BALL	2
14	2251	KEY (5mmx10mm)	1
15	2244	OIL RING (P24)	1
16	2243	SPRING PIN (5mmx40mm)	1
17	2242	SPRING PIN (5mmx30mm)	1
18	2250	PVC KNOB	2
19	2253	SET SCREW SPRING AND STEEL BALL	2
20	2246	OIL RING (P34)	2
21	2245	SNAP RING (S40)	2
22	2249	INDEXING PLATE	2
23	2252	OIL SIGHT (29mm)	1
24	2254	GASKET	1
25	2232	HANDLE	1
26	2240	DATA PLATE	1

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

AL-1000 IMPERIAL GEARBOX - DIAGRAM

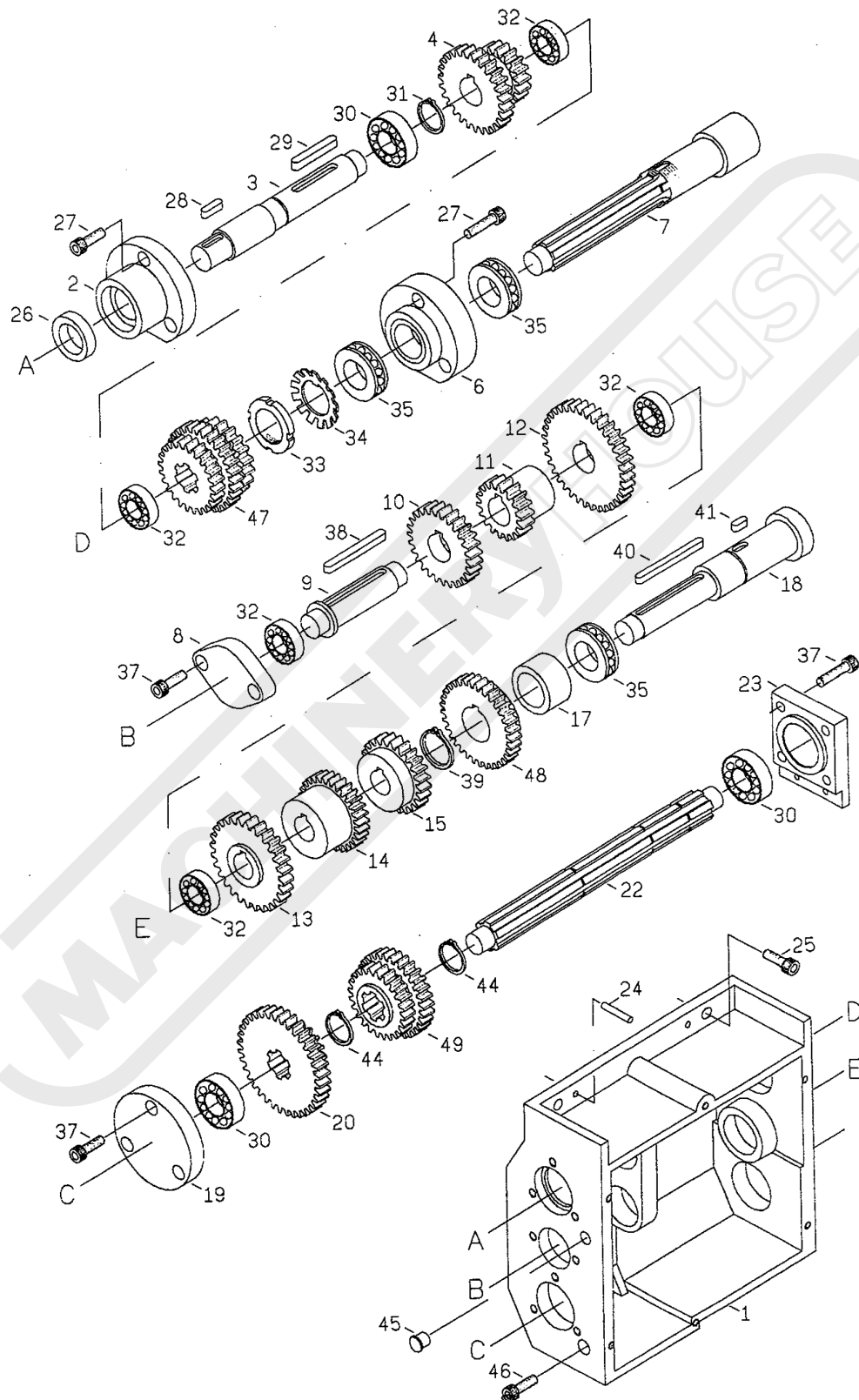


AL-1000 IMPERIAL GEARBOX - PARTS LIST

No.	FACTORY CODE	DESCRIPTION	Qty.
1	2201	GEAR BOX CASTING	1
2	2204	COVER	1
3	2202	SHAFT	1
4	2203	GEAR (M2x27TX18T)	1
5	2236	GEAR (14Px27Tx30T)(M2.25x21T)	1
6	2205	COVER	1
7	2206	SHAFT	1
8	2218	COVER	1
9	2208	SHAFT	1
10	2209	GEAR (M2x27T)	1
11	2210	GEAR (M2x18T)	1
12	2211	GEAR (M2x36T)	1
13	2217	GEAR (M2.25x28T)	1
14	2216	GEAR (14Px30T)	1
15	2215	GEAR (14Px24T)	1
16	2237	GEAR (14Px33T)	1
17	2212	SPACER	1
18	2213	SHAFT	1
19	2222	COVER	1
20	2220	GEAR (M2x36Tx18T)	1
21	2235	GEAR (14Px24Tx30T)(M2.25x20T)	1
22	2219	SHAFT	1
23	2223	COVER	1
24	2272	PIN (5mmx28mm)	2
25	2273	CAP SCREW (8mmx30mm)	3
26	2256	OIL SEAL (22x35x7)	1
27	2255	CAP SCREW (6mmx20mm)	6
28	2267	KEY (5mmx18mm)	1
29	2258	KEY (6mmx40mm)	1
30	2259	BEARING (6004)	3
31	2260	SNAP RING (S20)	1
32	2261	BEARING (6003)	5
33	2262	NUT	1
34	2269	WASHER	1
35	2263	THRUST (51105)	3
37	2275	CAP SCREW (6mmx20mm)	9
38	2268	KEY (6mmx55mm)	1
39	2266	SNAP RING (S25)	1
40	2264	KEY (5mmx60mm)	1
41	2265	KEY (5mmx12mm)	1
44	2274	SNAP RING (S22)	2
45	2276	OILER (5/16 IN)	1
46	2277	SCREW (CAP 8mmx10mm)	1

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

AL-1000 METRIC GEARBOX - DIAGRAM

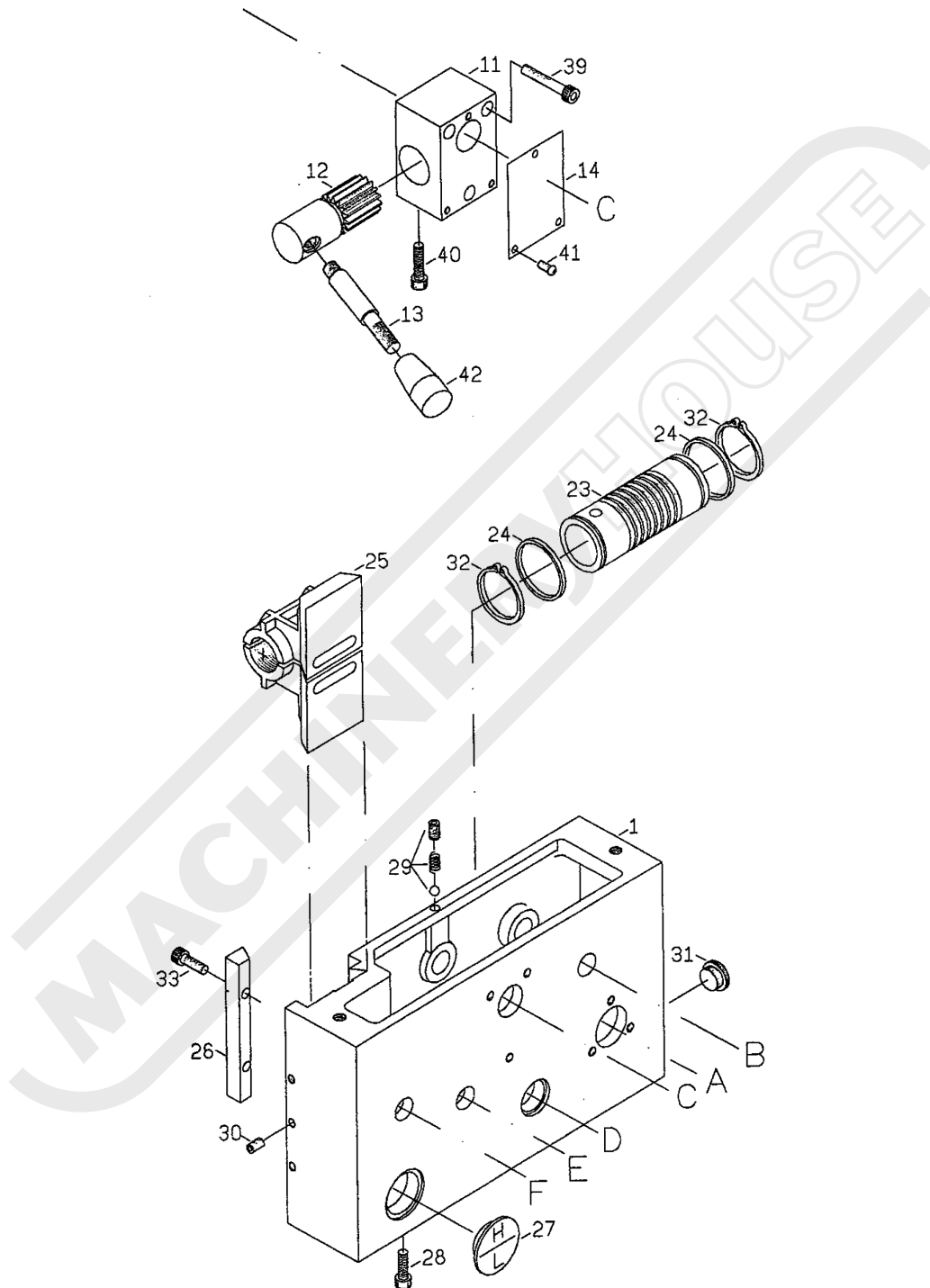


AL-1000 METRIC GEARBOX - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2201	GEAR BOX CASTING	1
2	2204	COVER	1
3	2202	SHAFT	1
4	2203	GEAR (M2x27TX18T)	1
47	2207	GEAR (M2.25x20T)(14Px30T)(M2x25T)	1
6	2205	COVER	1
7	2206	SHAFT	1
8	2218	COVER	1
9	2208	SHAFT	1
10	2209	GEAR (M2x27T)	1
11	2210	GEAR (M2x18T)	1
12	2211	GEAR (M2x36T)	1
13	2217	GEAR (M2.25x28T)	1
14	2216	GEAR (14Px30T)	1
15	2215	GEAR (14Px24T)	1
48	2214	GEAR (M2x30T)	1
17	2212	SPACER	1
18	2213	SHAFT	1
19	2222	COVER	1
20	2220	GEAR (M2x36Tx18T)	1
49	2221	GEAR (M2.25x21T)(14Px30T)	1
22	2219	SHAFT	1
23	2223	COVER	1
24	2272	PIN (5mmx28mm)	2
25	2273	CAP SCREW (8mmx30mm)	3
26	2256	OIL SEAL (22x35x7)	1
27	2255	CAP SCREW (6mmx20mm)	6
28	2267	KEY (5mmx18mm)	1
29	2258	KEY (6mmx40mm)	1
30	2259	BEARING (6004)	3
31	2260	SNAP RING (S20)	1
32	2261	BEARING (6003)	5
33	2262	NUT	1
34	2269	WASHER	1
35	2263	THRUST (51105)	3
37	2275	CAP SCREW (6mmx20mm)	9
38	2268	KEY (6mmx55mm)	1
39	2266	SNAP RING (S25)	1
40	2264	KEY (5mmx60mm)	1
41	2265	KEY (5mmx12mm)	1
44	2274	SNAP RING (S22)	2
45	2276	OILER (5/16 IN)	1
46	2277	SCREW (CAP 8mmx10mm)	1

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

AL-1000 APRON CASTING - DIAGRAM

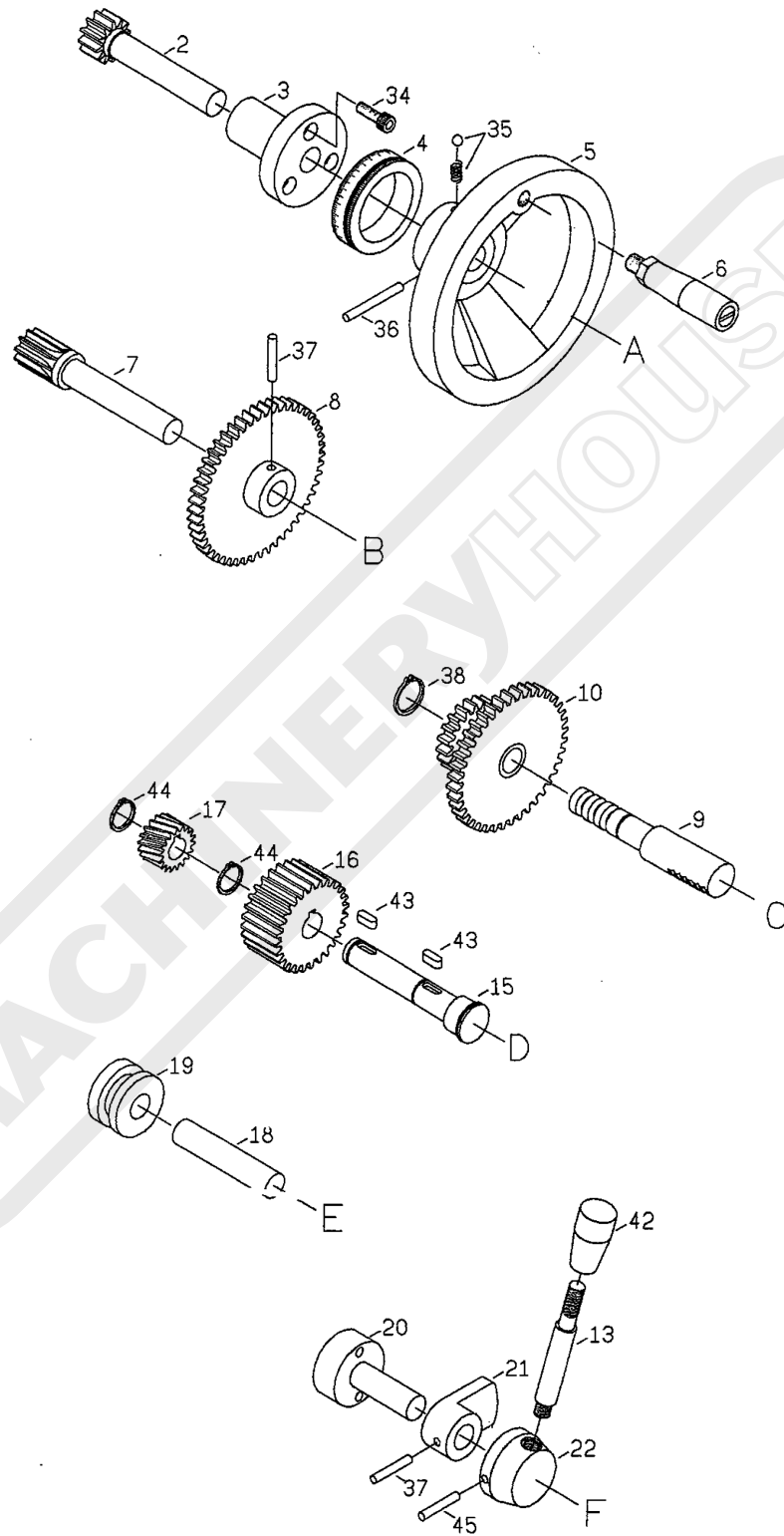


AL-1000 APRON CASTING - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
10	2301	APRON CASTING	1
11	2316	BRACKET	1
12	2317	GEAR SHAFT (M1.5x16T)	1
13	2318	LEVER	2
14	2362	INDEXING PLATE	1
23	2309	WORM	1
24	2310	COLLAR	2
25	2325	HALF NUT CLUTCH	1
26	2326	GIB	1
27	2358	OIL SIGHT (29mm)	1
28	2357	CAP SCREW (8mmx 10mm)	1
29	2355	STEEL BALL SET SCREW AND SPRING	1
30	2354	SET SCREW (6mmx10mm)	3
31	2356	PLUG (5/8 IN)	1
32	2352	SNAP RING (S 30)	2
33	2353	CAP SCREW (6mmx20mm)	2
39	2363	CAP SCREW (6mmx40mm)	4
40	2360	CAP SCREW (8mmx25mm)	1
41	2361	SCREW (3/16x3/8 IN)	3
42	2359	PVC KNOB	2

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

AL-1000 APRON GEAR AND SHAFT - DIAGRAM



AL-1000 APRON GEAR AND SHAFT - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
2	2302	CEAR SHAFT(M2x12T)	1
3	2303	KEEP ASSY	1
4	2304	INDEX RING	1
5	2305	HANDWHEEL	1
6	2306	HANDLE	1
7	2307	GEAR SHAFT (M1.5x13T)	1
8	2308	GEAR (M2x50T)	1
9	2314	SHAFT	1
10	2315	GEAR(M2x22T)(M2x44T)	1
15	2311	SHAFT	1
16	2312	GEAR(M2x22T)	1
17	2313	GEAR(M1.5x 18T)	1
18	2319	SHAFT	1
19	2320	COLLAR	1
20	2321	SHAFT	1
21	2322	LEVER	1
22	2323	HANDLE	1
34	2340	CAP SCREW(6mmx16mm)	3
35	2341	STEEL BALL AND SPRING	1
36	2342	PIN (5mmx50mm)	1
37	2343	PIN (5mmx30mm)	2
38	2344	CIRCLIP (E12)	1
43	2348	KEY (5mmx14mm)	2
44	2346	SNAP RING (S14)	2
45	2351	PIN (5mmx40mm)	1

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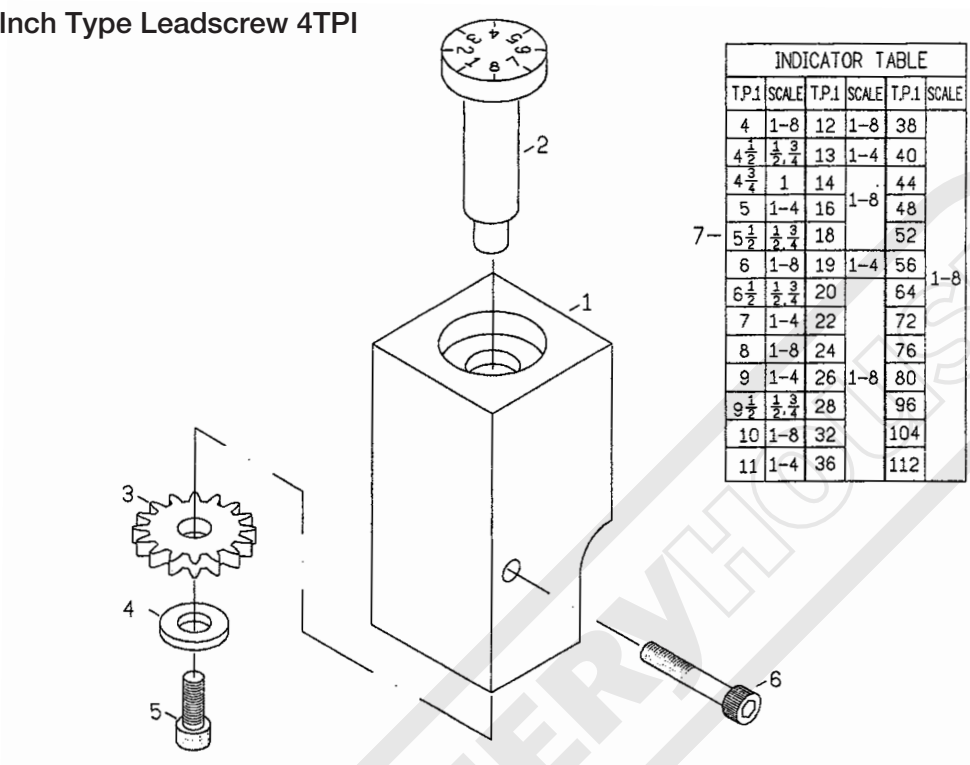


CAUTION

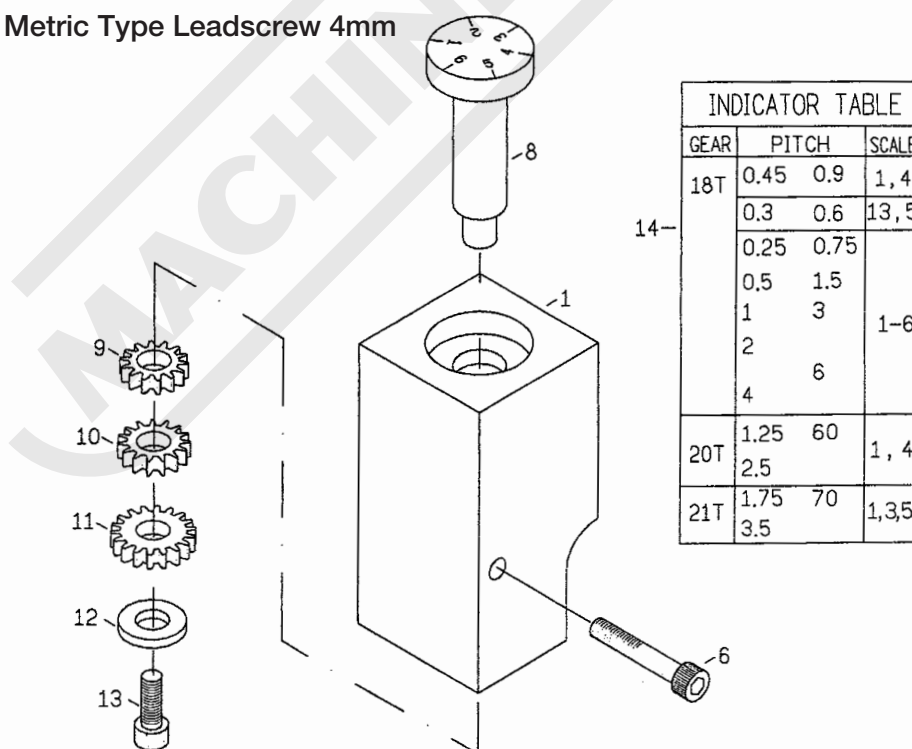
Some service processes should only be carried out by professional maintenance personnel. If you are unsure of your ability to complete a task, please contact your local Metalmaster service engineer.

AL-1000 THREADING INDICATOR - DIAGRAMS

Inch Type Leadscrew 4TPI



Metric Type Leadscrew 4mm



AL-1000 THREADING INDICATOR - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2327	THREAD BODY INDICATOR	1
2	2328	THREAD DIAL BODY (INCH TYPE)	1
3	2329	GEAR (M2x16T)	1
4	2366	FLAT WASHER	1
5	2365	CAP SCREW (6mmx12mm)	1
6	2364	CAP SCREW (6mmx45mm)	1
7	2336	THREAD CHART PLATE (IN TYPE)	1
8	2328-1	THREAD DIAL BODY (METRIC TYPE)	1
9	2330	GEAR (M1.25x18T)	1
10	2331	GEAR (M1.25x20T)	1
11	2332	GEAR (M1.25x21T)	1
12	2366	FLAT WASHER	1
13	2365	CAP SCREW (6mmx12mm)	1
14	2337	THREAD CHART PLATE (METRIC TYPE)	1

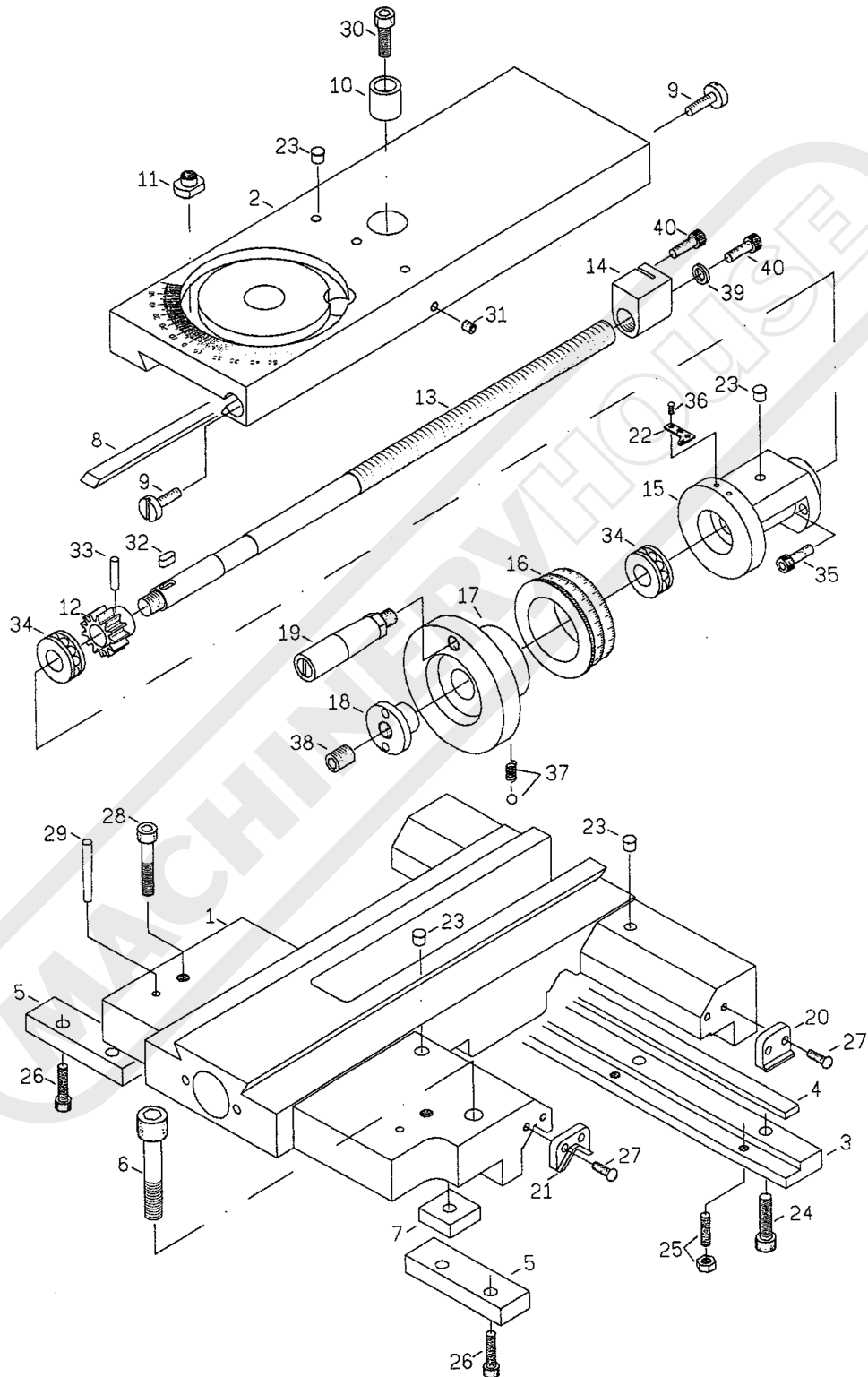
NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY



WARNING

Disconnect all power from the machine before servicing. There may be multiple power sources present. Remove the plug from the power point or remove the fuse if hardwired. Failure to do may cause death or injury.

AL-1000 SADDLE AND CROSS SLIDE - DIAGRAM

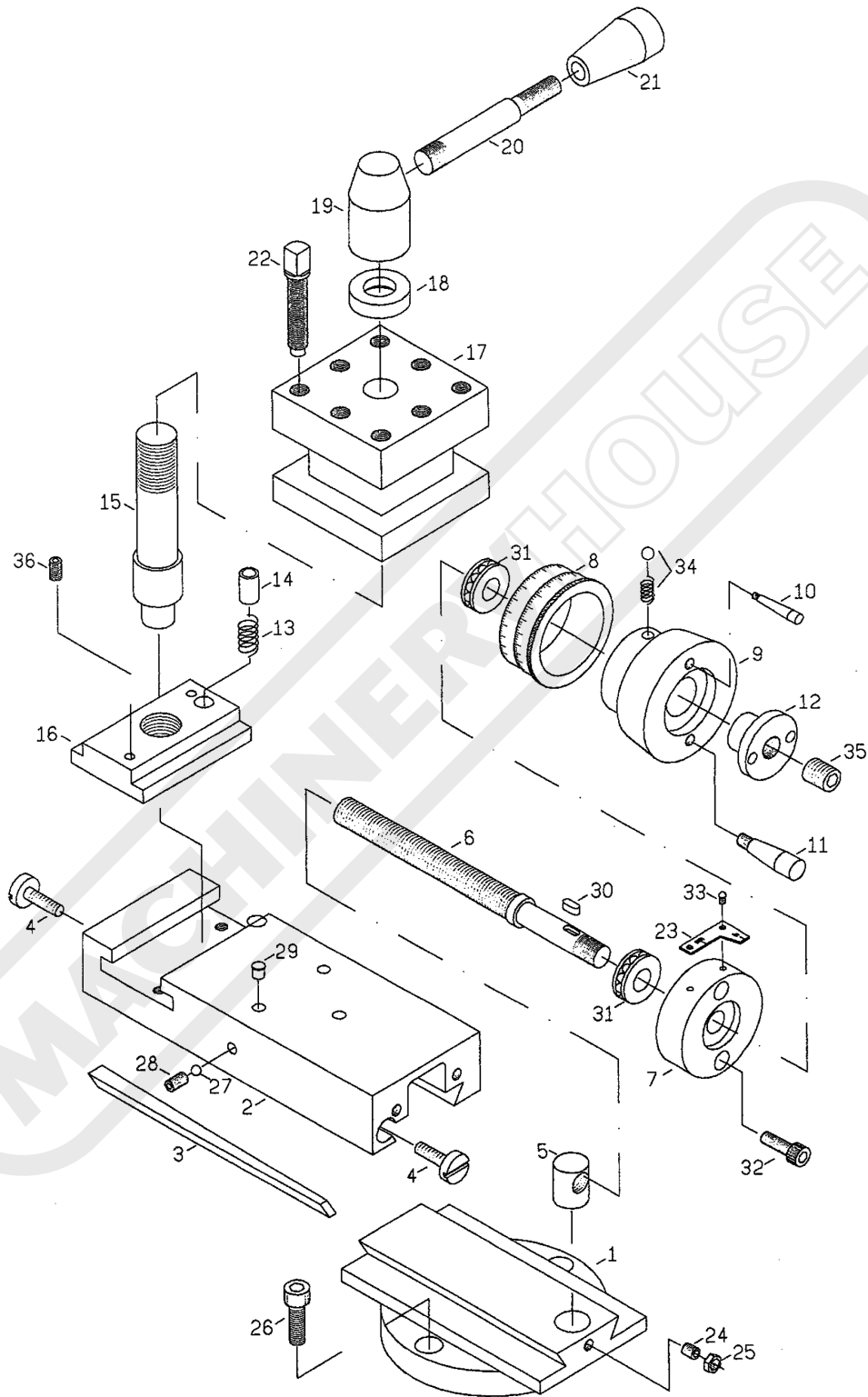


AL-1000 SADDLE AND CROSS SLIDE - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2401	SADDLE CASTING	1
2	2402	CROSS-SLIDE	1
3	2403	CLAMP REAR	1
4	2404	GIB	1
5	2405	CLAMP FRONT	2
6	2406	CAP SCREW (7/16x2-1/2 IN)	1
7	2407	WASHER	1
8	2408	GIB	1
9	2409	GIB SCREW	2
10	2410	COLLAR	1
11	2419	NUT	2
12	2411	GEAR (M2x13T)	1
13	2412	SCREW	1
14	2413	NUT	1
15	2414	KEEP ASSY	1
16	2415	INDEX RING	1
17	2417	HANDWHEEL	1
18	2416	PLUG	1
19	2418	HANDLE	1
20	2439	WIPER	2
21	2440	WIPER	2
22	2465	DIAL	1
23	2450	OILER (1/4 IN)	5
24	2454	CAP SCREW (8mmx20mm)	3
25	2453	SCREW AND NUT	1
26	2451	CAP SCREW (8mmx16mm)	2
27	2452	SCREW (3/16x1/2 IN)	8
28	2466	CAP SCREW	2
29	2467	PIN	2
30	2462	CAP SCREW (8mmx20mm)	1
31	2461	CAP SCREW (8mmx20mm)	1
32	2460	KEY (5mmx12mm)	1
33	2459	PIN (5mmx22mm)	1
34	2457	THRUST (2902)	2
35	2458	CAP SCREW (6mmx25mm)	2
36	2468	NAIL (2mm)	2
37	2456	STEEL BALL AND SPRING	1
38	2455	SCREW (12mmx12mm)	1
39	2464	WASHER	1
40	2463	CAP SCREW (6mmx12mm)	2

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AL-1000 TOP SLIDE - DIAGRAM

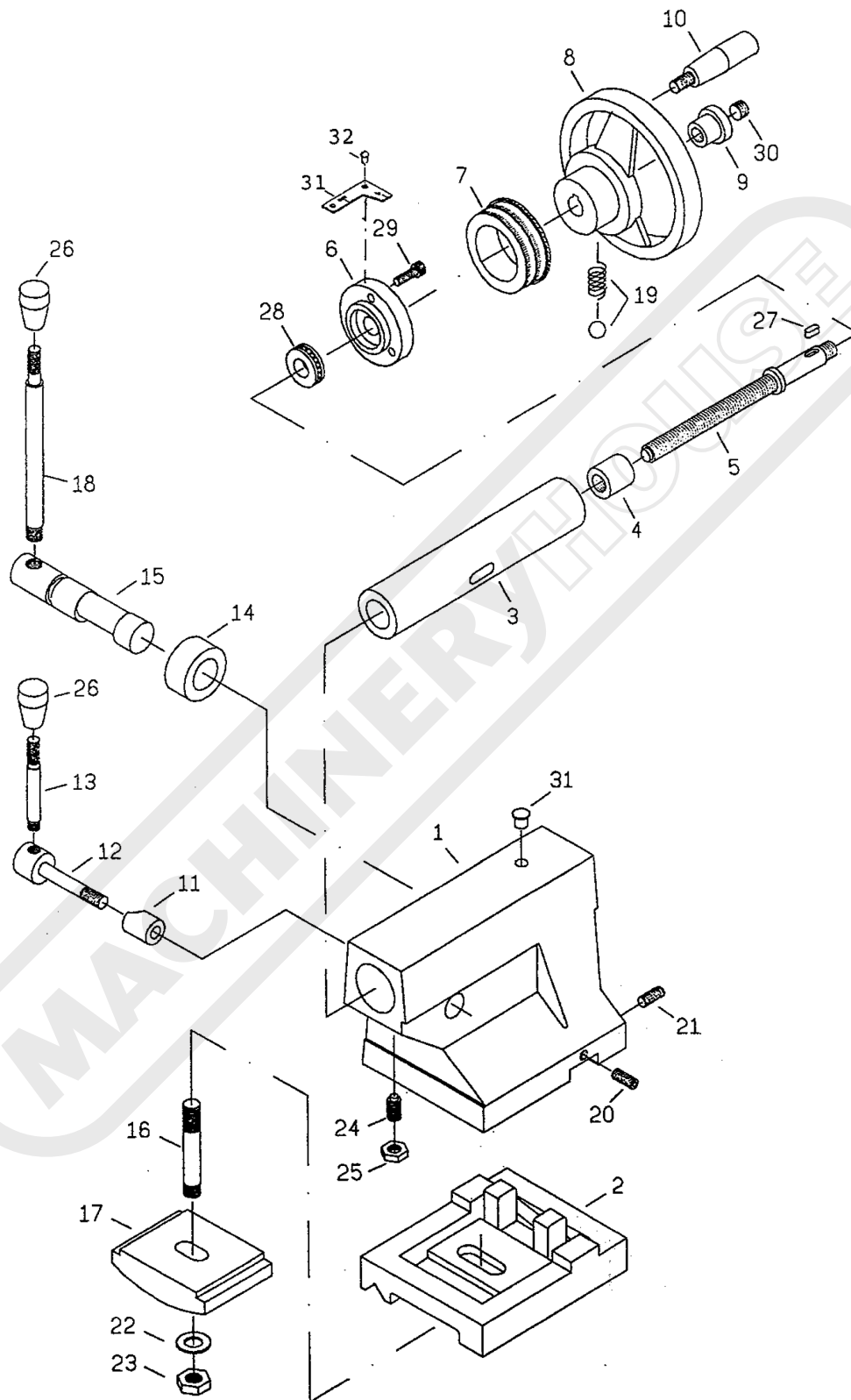


AL-1000 TOP SLIDE - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2420	SWIVEL SLIDE	1
2	2421	TOP-SLIDE (T-SLOT)	1
3	2422	GIB	1
4	2423	SCREW	2
5	2424	NUT	1
6	2425	LEAD SCREW	1
7	2426	BRACKET	1
8	2427	INDEXING RING	1
9	2428	HANDWHEEL	1
10	2429	GRIP (LONG)	1
11	2430	GRIP (SHORT)	1
12	2416	NUT	1
13	2442	SPRING	1
14	2431	PIN	1
15	2432	BOLT	1
16	2441	T-SLOT NUT	1
17	2433	4-WAY TOOL POST	1
18	2434	WASHER	1
19	2435	HUB	1
20	2436	LEVER	1
21	2437	PVC KNOB	1
22	2438	SCREW (3/8 IN)	8
23	2443	DIAL	1
24	2463	SET SCREW (6mmx12mm)	1
25	2444	NUT	1
26	2462	CAP SCREW (8mmx16mm)	2
27	2445	STEEL BALL	1
28	2469	SCREW	1
29	2450	OIL CAP (1/4 IN)	3
30	2464	KEY (4mmx10mm)	1
31	2465	THRUST BEARING (51101)	2
32	2466	CAP SCREW (6mmx25mm)	2
33	2446	NAIL (2mm)	2
34	2467	STEEL BALL & SPRING	1
35	2455	SCREW (12mmx12mm)	1
36	2468	SET SCREW	2

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

AL-1000 TAILSTOCK - DIAGRAM

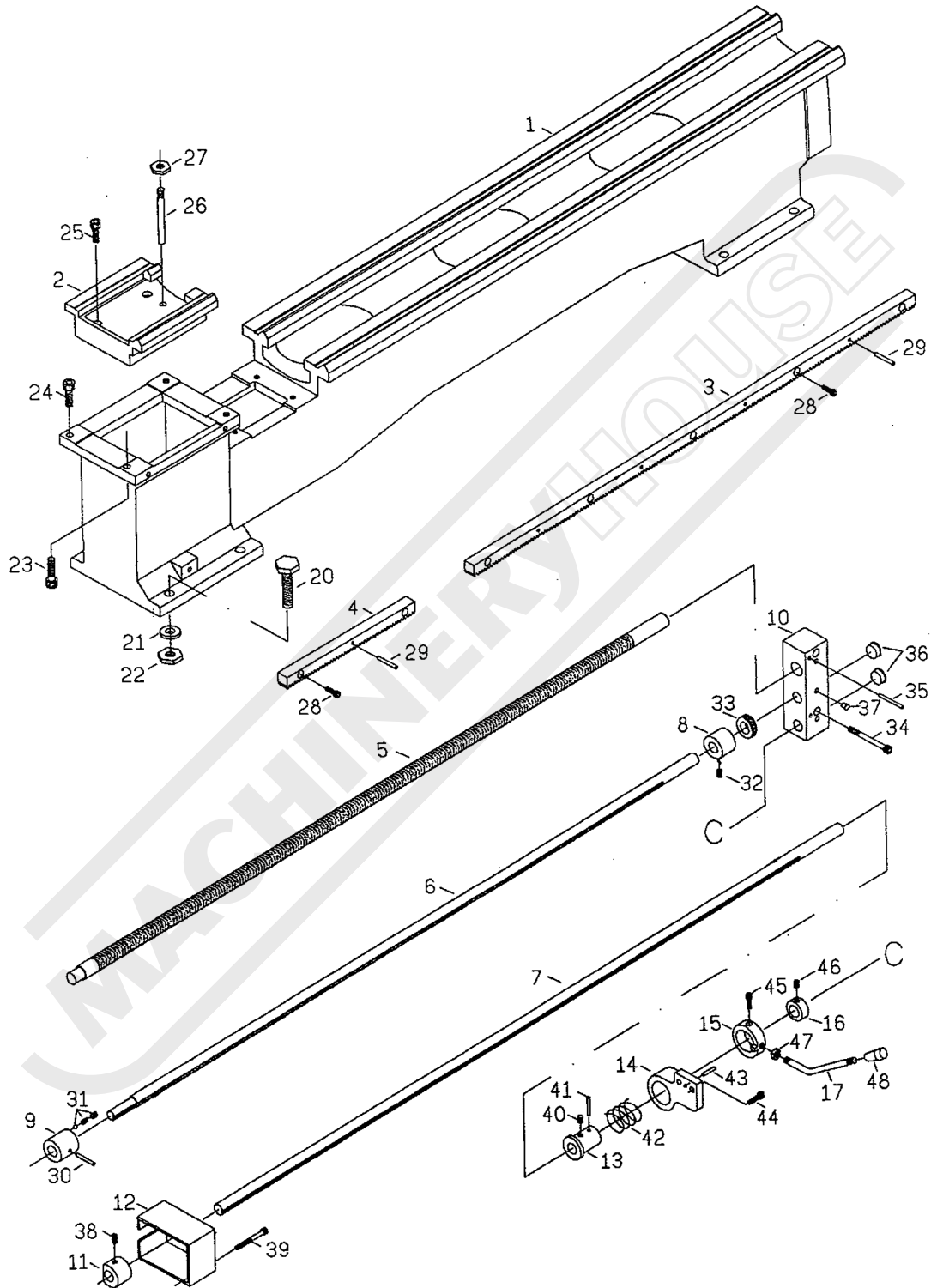


AL-1000 TAILSTOCK - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2501	TAILSTOCK CASTING	1
2	2502	TAILSTOCK BASE	1
3	2503	TAILSTOCK BARREL	1
4	2504	NUT	1
5	2505	FEED SCREW	1
6	2506	BRACKET	1
7	2507	DIAL	1
8	2508	HANDWHEEL	1
9	2509	NUT	1
10	2510	HANDLE	1
11	2511	NUT	1
12	2512	SHAFT	1
13	2513	LEVER	1
14	2514	COLLAR	1
15	2515	CAM SHAFT	1
16	2516	CLAMP STUD	1
17	2517	CLAMP	1
18	2518	CLAMP HANDLE LEVER	1
19	2519	STEEL BALL & SPRING	1
20	2520	SET SCREW (8mmx30mm)	2
21	2521	SET SCREW (8mmx30mm)	2
22	2522	WASHER	1
23	2523	NUT	1
24	2524	CAP SCREW (8mmx20mm)	1
25	2525	NUT	1
26	2526	PVC KNOB	2
27	2528	KEY (5mmx 12mm)	1
28	2529	THRUST BEARING(2902)	1
29	2530	CAP SCREW (6mmx20mm)	3
30	2531	SCREW (12mmx 12mm)	1
31	2527	DIAL	1
32	2532	SCREW(3/ 16"x3/8")	2
33	2533	OIL CAP(1/4")	1

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AL-1000 BED - DIAGRAM



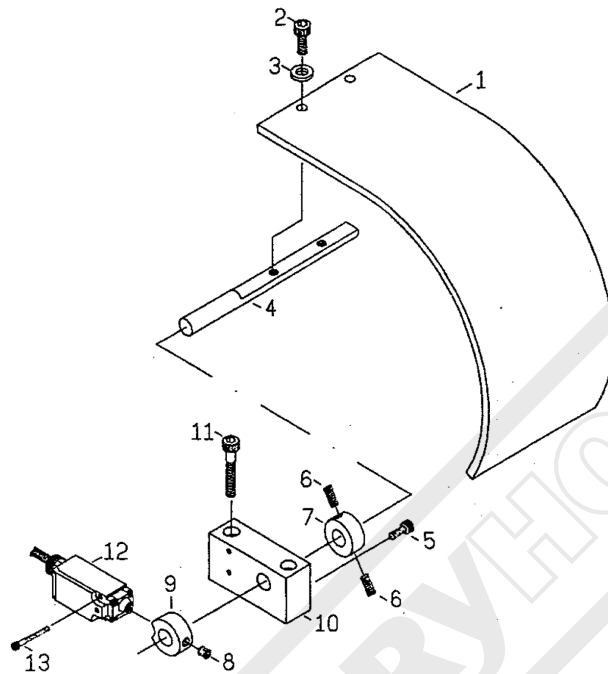
AL-1000 BED - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2601	BED	1
2	2602	GAP	1
3	2603	RACK	1
4	2604	RACK	1
5	2605	LEAD SCREW (4 TPI)(4 MM)	1
6	2606	SHAFT	1
7	2607	FOR/REV CONTROL.THIRD-ROD SHAFT	1
8	2609	COLLAR	1
9	2608	COLLAR	1
10	2617	END BRACKET	1
11	2611	BUSH	1
12	2610	BOX	1
13	2612	BUSHING	1
14	2613	BRACKET	1
15	2614	BUSH	1
16	2615	BUSH	1
17	2616	LEVER	1
18	2630	PVC KNOB	1
20	2634	SCREW (CAP 1/2"x2")	6
21	2621	WASHER	6
22	2622	NUT	6
23	2623	SCREW (CAP 10mmx40mm)	2
24	2624	SCREW (CAP 10mmx35mm)	2
25	2632	SCREW (CAP 10mmx35mm)	4
26	2633	SCREW TAPER PIN	2
27	2627	NUT	2
28	2636	SCREW (CAP 6mmx20mm)	6
29	2635	PIN (5mmx28mm)	4
30	2637	SCREW (SET 8mmx 12mm)	1
31	2638	STEEL BALL AND SPRING	2
32	2639	SCREW (SET 8mmx10mm)	1
33	2640	THRUST (#51104)	1
34	2651	SCREW (8mmx60mm)	2
35	2650	PIN (5mmx50mm)	2
36	2658	PLUG	2
37	2649	OIL CUP (1/4")	3
38	2642	SCREW (SET 8mmx10mm)	1
39	2641	SCREW (CAP 6mmx16mm)	2
40	2628	SCREW (SET 6mmx16mm)	1
41	2629	PIN (5mmx28mm)	1
42	2643	SPRING	1
43	2646	PIN (5mmx28mm)	1
44	2644	SCREW (CAP 6mmx20mm)	2
45	2645	SCREW (CAP 6mmx10mm)	1
46	2648	SCREW (SET 8mmx8mm)	1
47	2647	NUT	1

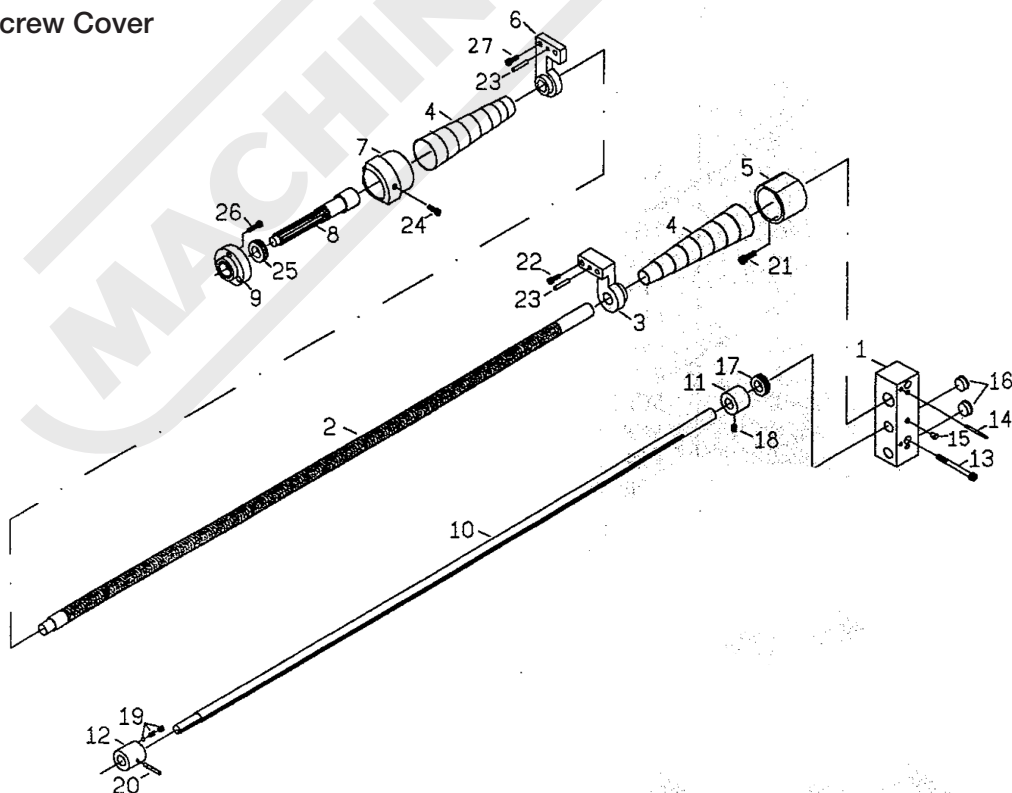
NOTE: SOME INDIVIDUAL PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

AL-1000 CHUCK GUARD & COVER - DIAGRAM

Chuck Guard



Leadscrew Cover

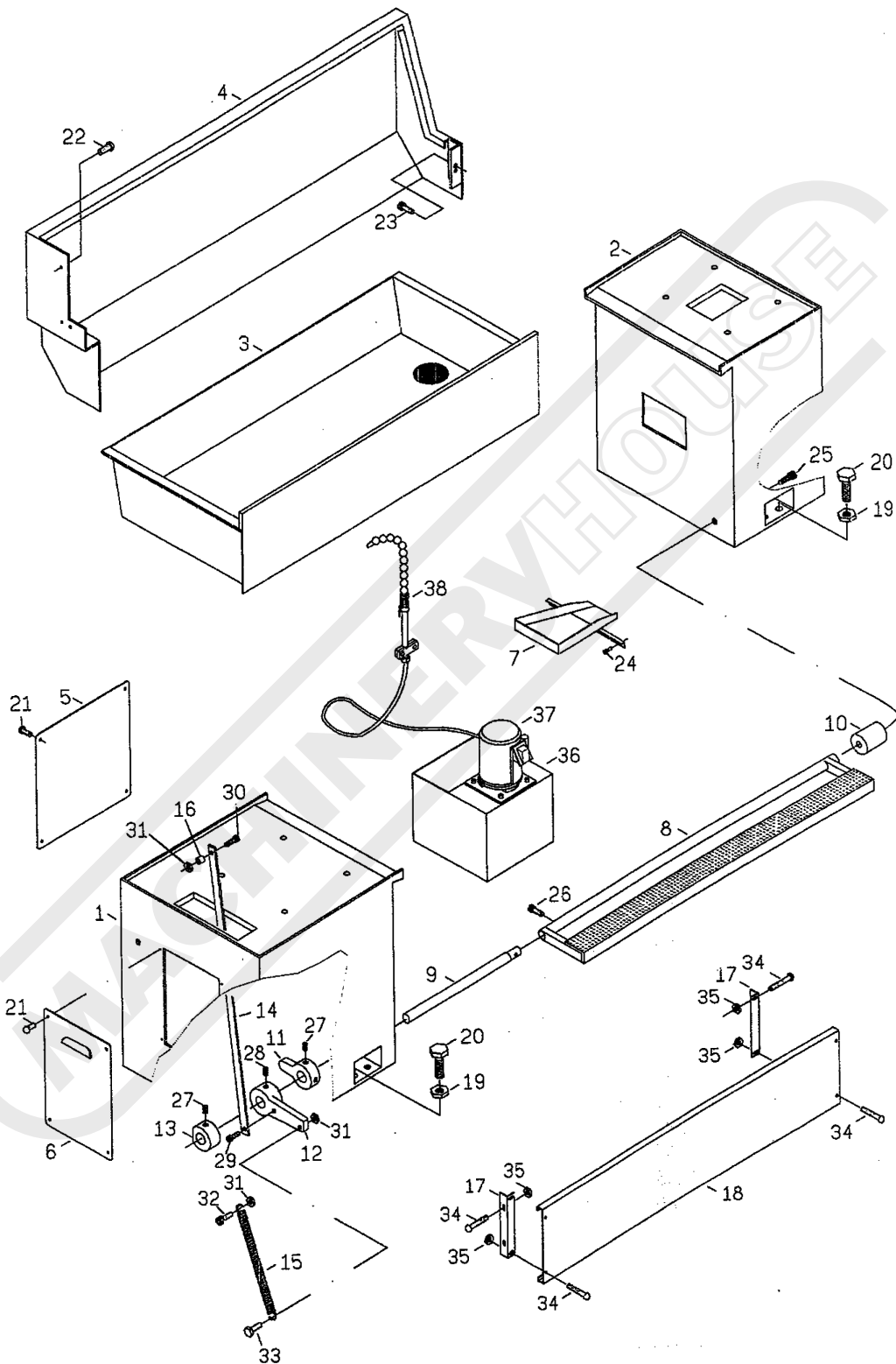


AL-1000 CHUCK GUARD & COVER - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
		CHUCK GUARD	
1	2901	COVER	1
2	2912	CAP SCREW (8mmx20mm)	2
3	2913	WASHER	2
4	2914	ROD	1
5	2911	SCREW (CAP 6mmx16mm)	1
6	2906	SCREW (SET 8mmx20mm)	2
7	2907	COLLAR	1
8	2908	SCREW (SET 8mmx10mm)	1
9	2909	COLLAR	1
10	2910	FRAME	1
11	2903	SCREW (CAP 8mmx55mm)	2
12	2902	SWITCH AND COVER	1
13	2904	SCREW (CAP 4mmx30mm)	2
		LEADSCREW COVER	
1	2617	END BRACKET	1
2	2605	LEAD SCREW	1
3	2625	ARM	1
4	2668	PROTECTION HOOD	2
5	2626	BUSH	1
6	2620	ARM	1
7	2618	COVER	1
8	2206	SHAFT	1
9	2205	COVER	1
10	2606	SHAFT	1
11	2609	COLLAR	1
12	2608	COLLAR	1
13	2651	SCREW (CAP 8mmx60mm)	2
14	2650	PIN (5mmx50mm)	2
15	2649	OIL CUP (1/4")	3
16	2658	PLUG	2
17	2667	THRUST (51104)	1
18	2666	SCREW (SET 8mmx10mm)	1
19	2665	STEEL BALL SPRING & SCREW	2
20	2664	SCREW (SET 8mmx12mm)	1
21	2661	SCREW (CAP 6mmx20mm)	2
22	2663	SCREW (CAP 8mmx50mm)	2
23	2653	PIN (5mmx50mm)	2
24	2662	SCREW (CAP 8mmx16mm)	1
25	2263	THRUST (51105)	1
26	2255	SCREW (CAP 6mmx20mm)	3
27	2660	SCREW (CAP 8mmx30mm)	2

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

AL-1000 PUMP AND CABINET - DIAGRAM

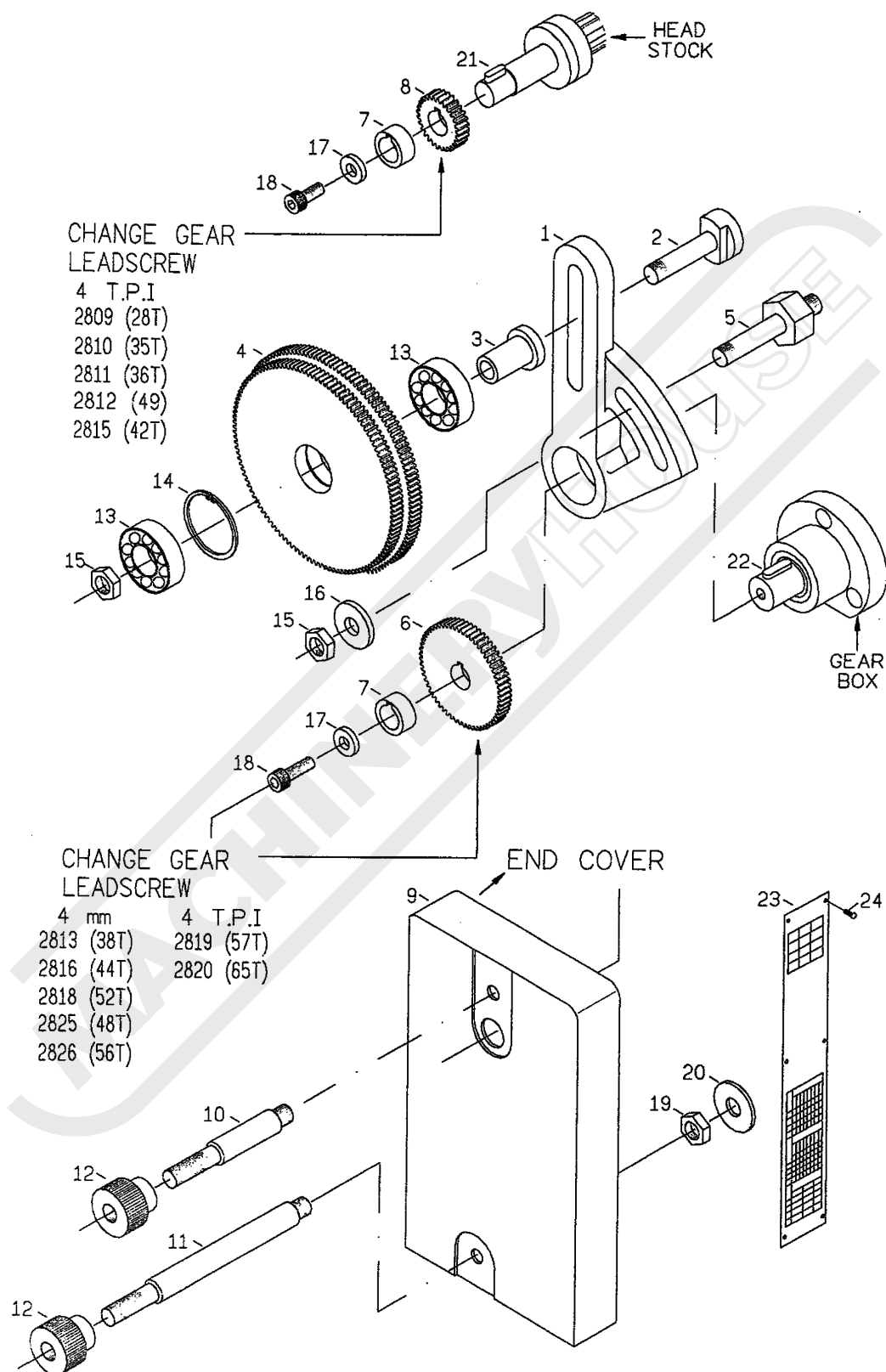


AL-1000 PUMP AND CABINET - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2701	LEFT PEDESTAL HEAD-END	1
2	2702	RIGHT PEDESTAL TAIL-END	1
3	2704	CHIP PAN	1
4	2705	SPLASH GUARD	1
5	2709	COVER	1
6	2708	COVER	1
7	2707	CHUTE	1
8	2703	FOOT BRAKE PEDAL	1
9	2715	CONNECTOR SHAFT	1
10	2716	COLLAR	1
11	2714	LEVER	1
12	2713	LEVER	1
13	2712	COLLAR	1
14	2711	BAR	1
15	2745	SPRING	1
16	2730	WASHER	1
17	2719	BAR	2
18	2718	CONNECT PLATE	1
19	2710	NUT	2
20	2732	SCREW (1/2"x2")	4
21	2741	SCREW (6mmx12mm)	8
22	2737	SCREW (CAP 6mmx12mm)	3
23	2736	SCREW (CAP 8mmx20mm)	1
24	2735	SCREW (CAP 6mmx16mm)	2
25	2734	SCREW (CAP 8mmx20mm)	1
26	2733	SCREW (CAP 8mmx20mm)	2
27	2742	SCREW (SET 10mmx20mm)	2
28	2743	SCREW (SET 10mmx40mm)	2
29	2731	SCREW (CAP 8mmx10mm)	1
30	2740	SCREW (8mmx10mm)	1
31	2746	NUT	3
32	2738	SCREW (CAP 8mmx25mm)	1
33	2739	SCREW (8mmx30mm)	1
34	2747	SCREW (6mmx16mm)	8
35	2748	NUT	8
36	2706	TANK	1
37	2717	PUMP (1/8 HP)	1
38	2720	HOSE	1

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

AL-1000 END GEARS AND COVER - DIAGRAM

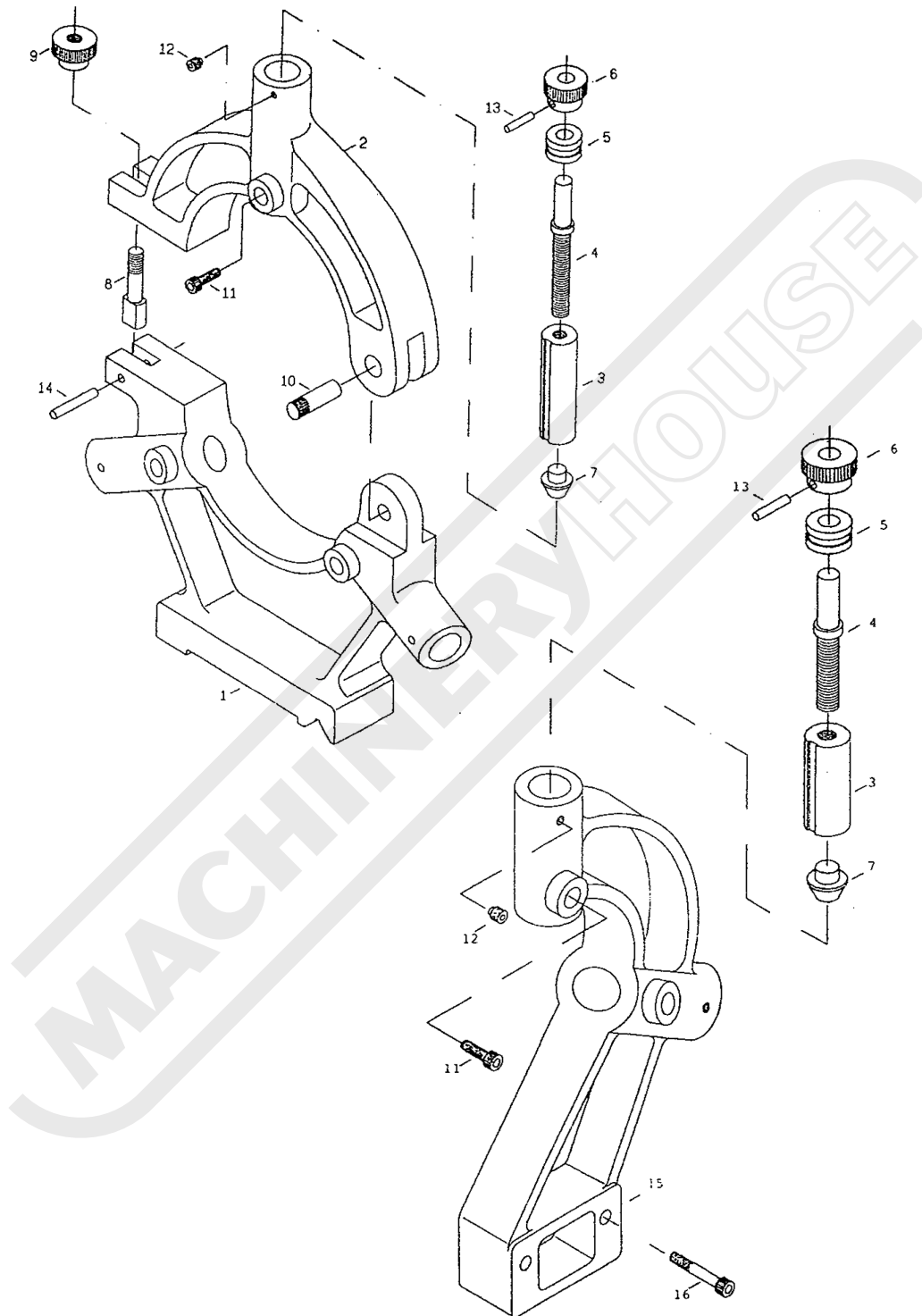


AL-1000 END GEARS AND COVER - PARTS LIST

No	FACTORY CODE	DESCRIPTION	Qty.
1	2801	SWING FRAME	1
2	2802	BOLT	1
3	2803	COLLAR	1
4	2804	GEAR(MI.25x 120T,127T)	1
5	2805	SCREW	1
6	2808	GEAR(1.25x60T)	1
7	2806	COLLAR	1
8	2807	GEAR(1.25x30T)	1
9	2821	END COVER	1
10	2822	STUD	1
11	2824	STUD	1
12	2823	NUT	2
13	2833	BEARING(6202Z)	2
14	2836	CIRCLIP(R 35)	1
15	2835	NUT	2
16	2837	WASHER	1
17	2839	WASHER	2
18	2840	SCREW(CAP 6mmx16mm)	2
19	2838	NUT	1
20	2831	WASHER	1
21	2830	KEY (5mmx 18mm)	1
22	2841	KEY (5mmx 18mm)	1
23	2827	DATA PLATE	1
24	2817	SCREW (3/16"x3/8")	6
25	2809	CHANGE GEAR (MI.25x28T)	1
26	2810	CHANGE GEAR (MI.25x35T)	1
27	2811	CHANGE GEAR (MI.25x36T)	1
28	2812	CHANGE GEAR (MI.25x49T)	1
29	2815	CHANGE GEAR (MI.25x42T)	1
30	2813	CHANGE GEAR (MI.25x38T)	1
31	2816	CHANGE GEAR (MI.25x44T)	1
32	2818	CHANGE GEAR (MI.25x52T)	1
33	2825	CHANGE GEAR (MI.25x48T)	1
34	2826	CHANGE GEAR (MI.25x56T)	1
35	2819	CHANGE GEAR (MI.25x57T)	1
36	2820	CHANGE GEAR (MI.25x65T)	1
37	2814	CHANGE GEAR (MI.25x40T)	1

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

AL-1000 FIXED & TRAVELING STEADIES - DIAGRAM



AL-1000 FIXED & TRAVELING STEADIES - PARTS LIST

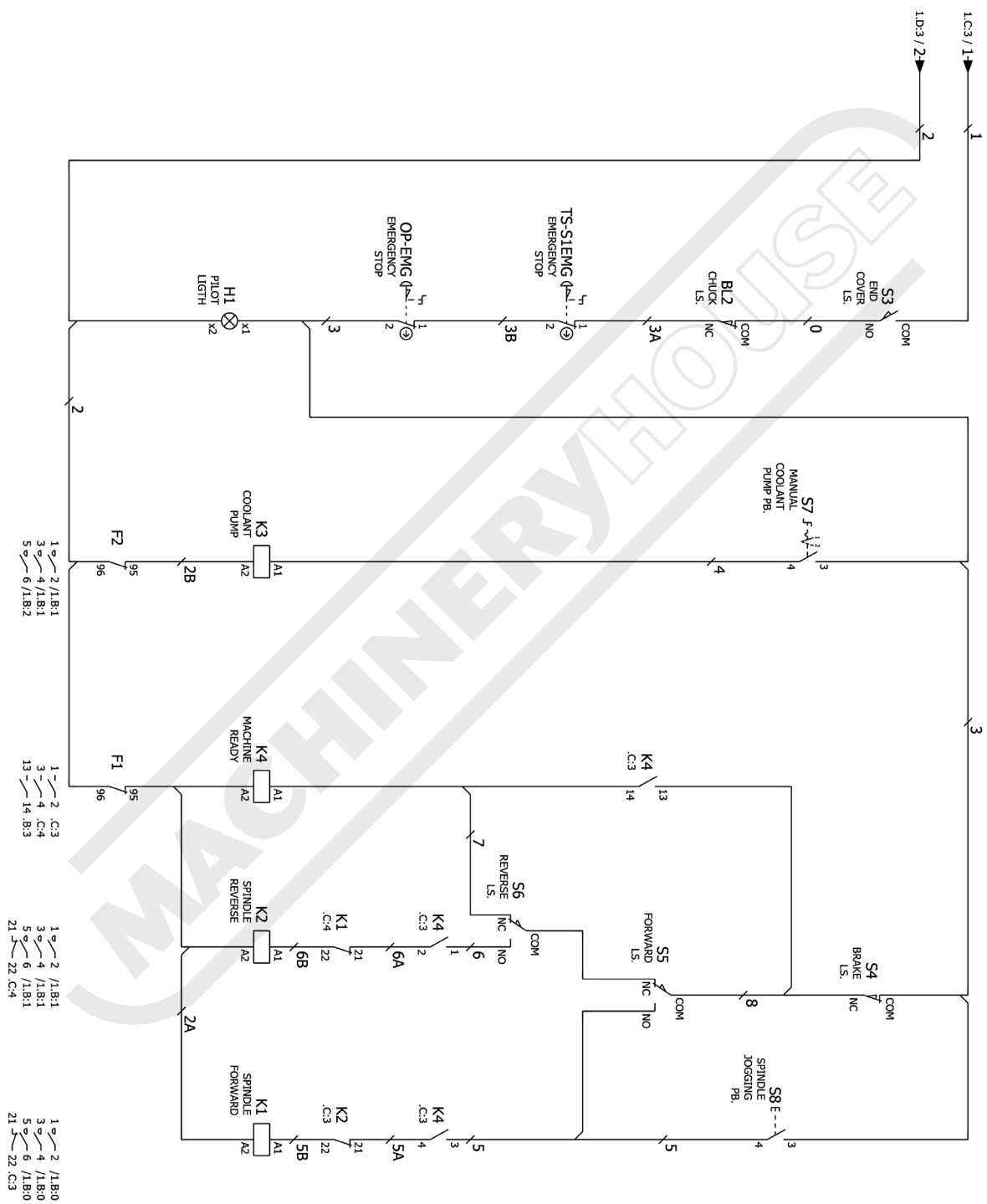
No.	FACTORY CODE	DESCRIPTION	Qty.
1	2917	CASTING	1
2	2918	CASTING	1
3	2919	SHAFT	5
4	2920	SCREW	5
5	2905	COLLAR	5
6	2921	HANDLE	5
7	2922	SHAFT	5
8	2923	SCREW	1
9	2924	HANDLE	1
10	2925	SHAFT	1
11	2926	SCREW	5
12	2927	SCREW	5
13	2928	SPRING PIN	5
14	2929	SPRING PIN	1
15	2915	CASTING	1
16	2916	SCREW	2

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

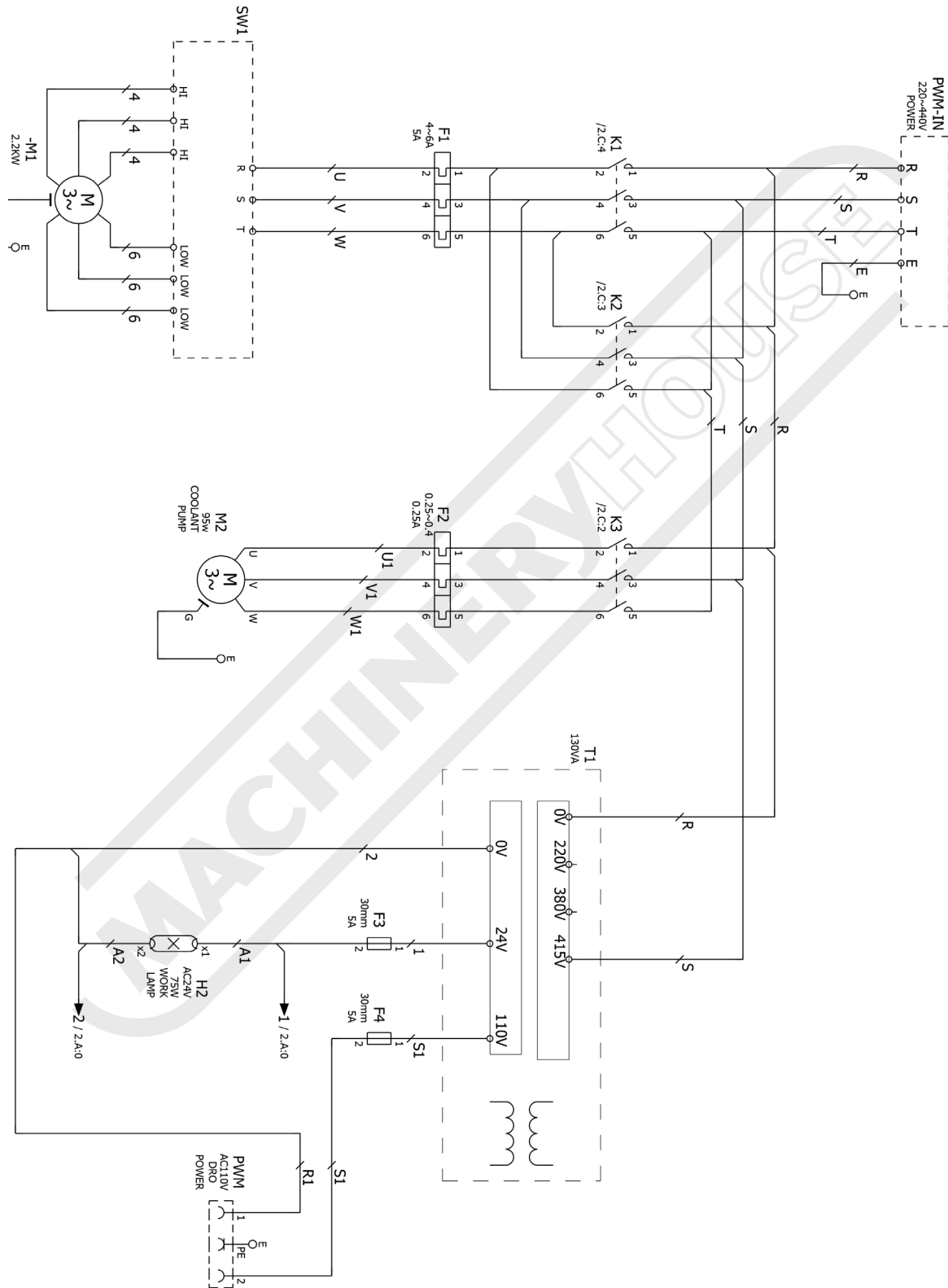
**WARNING**

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.

AL-1000C WIRING - DIAGRAM



AL-1000D ELECTRICAL - 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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