



# Craftsman Geared Head Lathe Manual

**Chester UK Ltd**  
**Clwyd Close**  
**Hawarden Industrial Park Hawarden**  
**Chester CH5 3PZ**  
**Tel: 01244 531631**  
**[sales@chestermachinetools.com](mailto:sales@chestermachinetools.com)**  
**[www.chestermachinetools.com](http://www.chestermachinetools.com)**



## Contents

1 Specification	3
2 Electric system	4
3 Installation	8
4 Levelling	10
5 Lubrication	11
6 Operation instructions	12
7 Problem Solving	21
8 Maintenance	22
9 Parts List	23

## Technical Specifications

Swing over bed	305mm
Swing over gap	440mm
Swing over cross slide	173mm
Distance between centres	940mm
Length of bed	1473mm
Width of bed	182mm
Spindle bore	38mm
Toolpost tool size	12mm
Speed range	64-1500rpm
Longitudinal travel	940mm
Cross slide travel	150mm
Top slide travel	90mm
Chuck diameter	160mm
Spindle taper	MT5
Tailstock taper	MT3
Tailstock quill travel	100mm
Leadscrew diameter	22mm
Feed rod diameter	19mm
Leadscrew thread	3mm
Thread can be cut	
For opened gearbox	Inch 40 kinds 4-112 tpi
	Metric 15 kinds 0.25-7.5mm
For closed gearbox	Inch 14 kinds 7-1/25-48 tpi
	Metric 11 kinds 0.5-3mm
Motor power	1.1kw (1.5hp)
Net weight	440kg
Dimensions	1780 x 750 x 760mm

## Electrical system

This lathe is wired for 220v, single phase 50 cycle.

The electric system in the lathe has been installed and adjusted in the factory. Please don't open the electrical box.

Before operating, wire the proper power source to the lathe and connect the ground wire. Turn the power on and check the running direction of the spindle, if this is wrong, turn off the motor and cut off the power source, then change the wires as per the wiring chart.

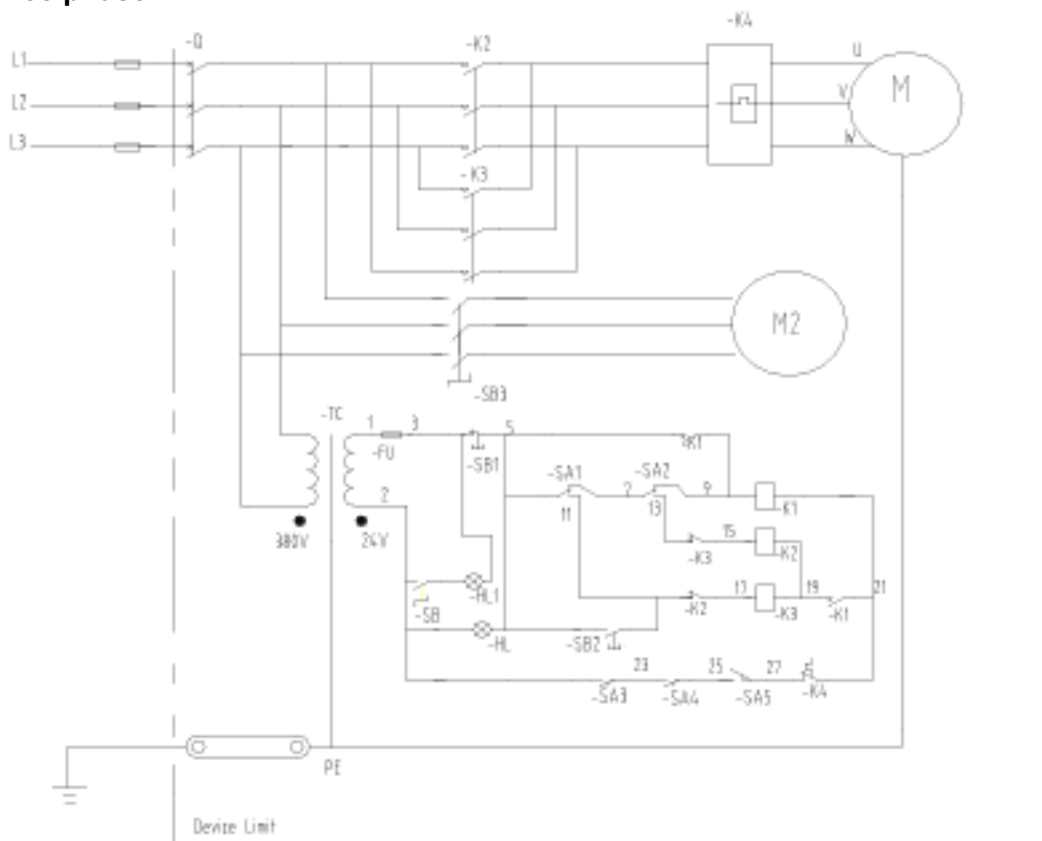
### Caution:

If you need to change the connection in the electrical box please ask a local electrician to assist. They will need to follow the wiring chart, the wire diameter must not be less than 1.5mm<sup>2</sup>

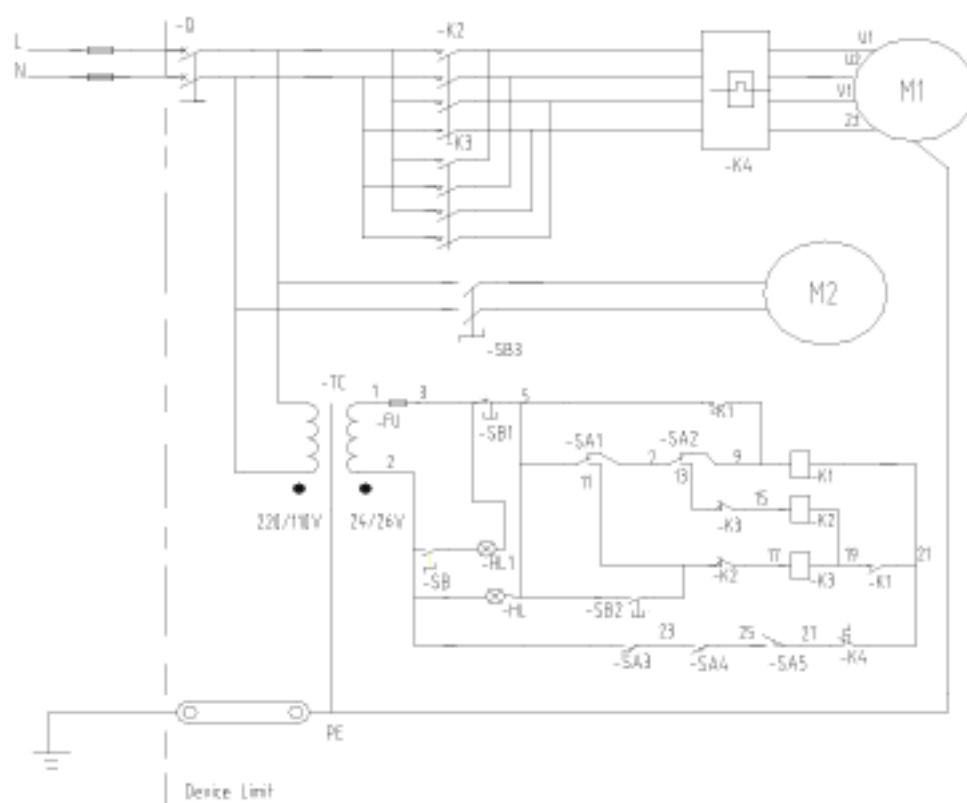
<b>Phase</b> <b>Voltage</b>	<b>Single phase</b>	<b>Three phase</b>
110V	30A	
220V	15A	7.5A
380V		5A

## Electrical principle chart

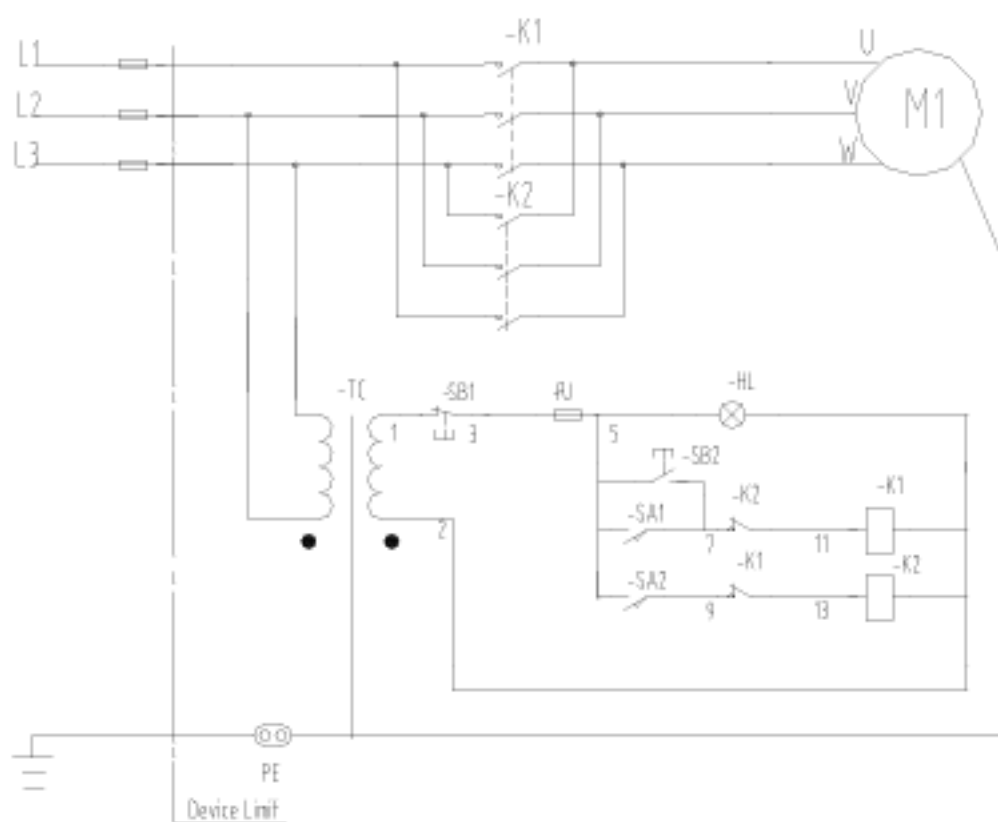
### Three phase



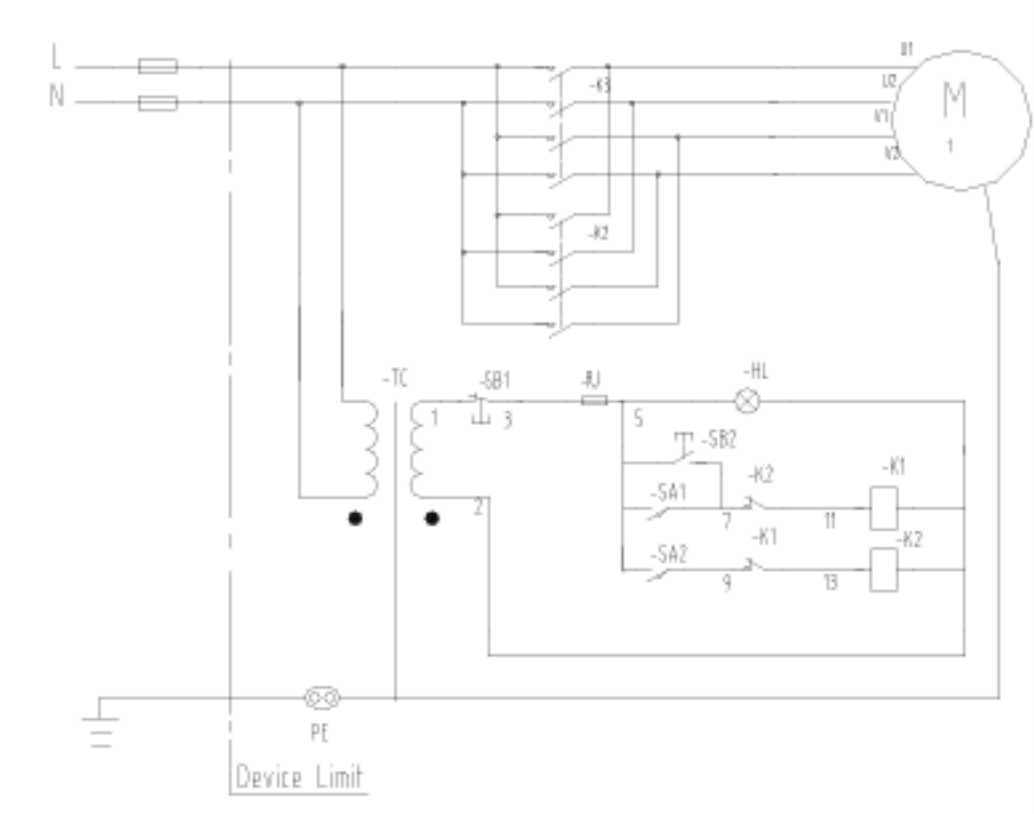
## Single phase



## Three phases



Single phases



## Description

<b>SIGN</b>	<b>NAME</b>	<b>SIGE</b>	<b>NAME</b>
M	Motor	SB2	Jog switch
TC	Transformer	SA3	Pulley cover limiting switch
HL	Indicator light	SA4	Chuck cover limiting switch
HL1	Work light	SA5	Brake switch
SB1	Stop switch	K4	Heat relay

## Installation

### Caution:

The machine must be fitted securely. Don't turn down or make any movement without exception due to shaking, wind, power, lashing, or other expected power or force.

### Foundation

The base for the machine's foundation must be solid and heavy enough to support the weight and without noticeable deflection. The floor must be fairly level.

Concrete floor is the best foundation. This provides a rigid base and minimizes vibration from adjacent machines. The floor strength must be tested. The testing method: place a level on the floor and put the machine on installation position, if the bubble shows appreciable deflection, the floor must be reinforced.

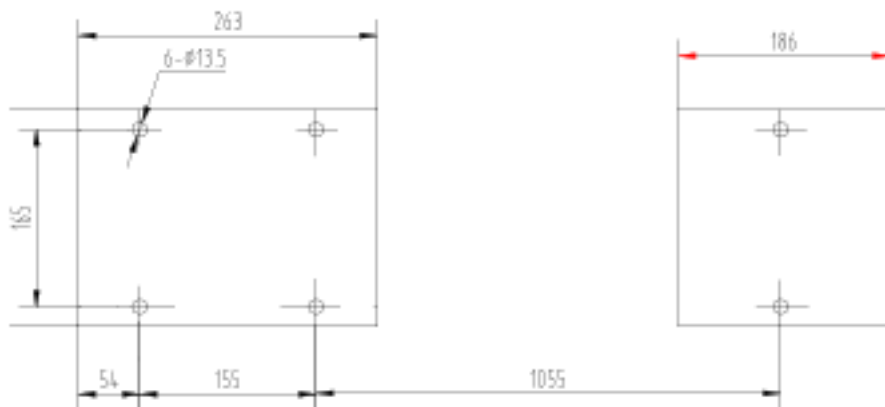
When determining the position of installation, leave a certain place in left, right, front and back of the machine in accordance with its overall dimension and installation dimension of the machine, to allow for operation and repairs.

If using the stand, firstly, mark and drill eight holes in the eight fitting hole position of the base according to fitting dimension of the stand. Secondly, cover eight foundation bolts in the base (note position precision when determining the fitting hole position).

Put the stand on the base, connecting to the eight foundation bolts, then place two adjustable iron spacers in each, down face of front, back of two stand (in order to increase the touched space, please stagger the position of front and back adjustable iron spacer).

Fix the connecting block of left, right of stand, fit the stand on the base. Lastly, lift the lathe on the stand and connect and fix the lathe to the stand using nuts and bolts.

If fitting the lathe directly on the base, firstly, in accordance with fitting dimension, mark and drill holes in the base of six fitting hole position of lathe, cover six foundation bolts in the base, place two adjustable iron spacers on the base in front and back of spindle box position and place one adjustable iron spacer on the base in cross direction of tailstock position, then lift the lathe on the adjustable iron spacers.



*Fitting dimensions without stand*



### *Lifting*

- Place the mats in which the lifting tools connect before lifting the lathe, to avoid damaging the machine's surface.
- The lathes net weight is 330kg, and the stand weight is 60kg, keep the machine in balance and avoid tilting.
- The carriage, tailstock and other sliding parts of the lathe are locked before leaving the factory. Don't loosen these when lifting and inspect these parts to confirm whether they are locked or not in order to prevent the parts sliding.
- Carefully put the machine on the base or stand which has been fixed in place, and fix the machine using bolts and nuts.

### *Cleaning*

- Prior to shipment all machine and finished surfaces are coated to prevent rusting.
- Before moving the carriage or tailstock, use cleaning solvent to remove this coating. Use a brush and solvent to clean the machine, and clean the ways for any residue of rust preventive coating. This will ensure the removal of any particles and prevent the way scoring.
- Lubricate the ways when clean finished.

## Levelling

The lathe should be kept level at all times.

### Levelling procedure:

#### *Longitudinal levelling*

Once the bedways are dry after cleaning, back off the base screw, place a 6" spirit level over the working table along the longitudinal direction (bed length direction). Move the working table at the headstock end along the bed length direction, and make level by adjusting the adjustable iron spacer, and obtain a reading. Then move the working table to the tailstock, adjust the screw of the adjustable iron spacer until the spirit level obtains the same reading as on the headstock end.

#### *Cross levelling*

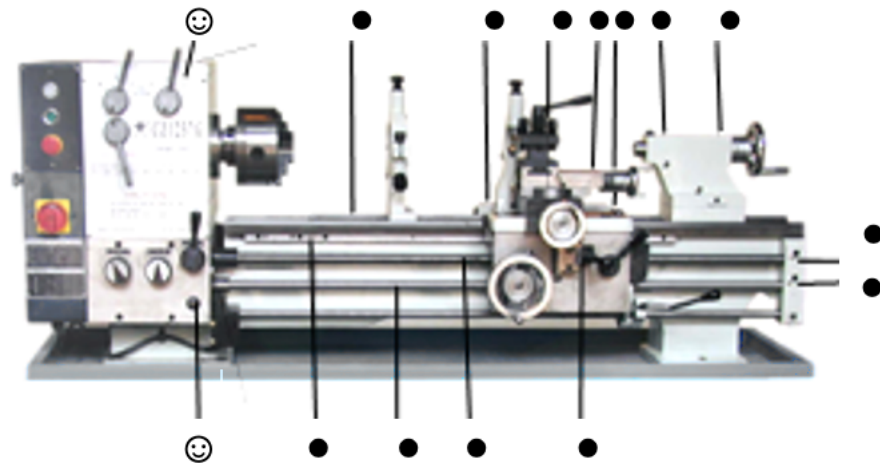
Place the spirit level on the working table along the cross direction (bed width direction), move the working table to the headstock end along the bed length direction, take a reading, then move the working table to the tailstock end, the reading at this end must be exactly the same as the other end. If the reading is not same, adjust the screw of the adjustable iron spacer to get the same reading.

The adjustments at one end will affect the reading of the other, so the leveling procedure should be repeated several times, make any necessary adjustments using a staff ruler and iron spacer. After the adjustments are finished, turn the screw foundation bolt down slightly until they rest under slight tension. The tension should be such that it does not change the level reading. Recheck level after fixing the bolt; if necessary, make any minor adjustments.

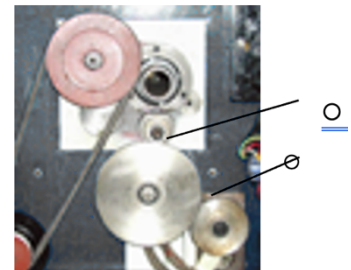
After the machine has been used for a period of time, check the levels to observe if the original conditions still exist. Make any adjustments required as per the above mentioned way if necessary. (make an erasable marker at one end of the spirit level to keep the same direction for every reading.)

**Caution: The low precision spirit level must not be used, schedule regular checks as part of your machine maintenance.**

## Lubrication

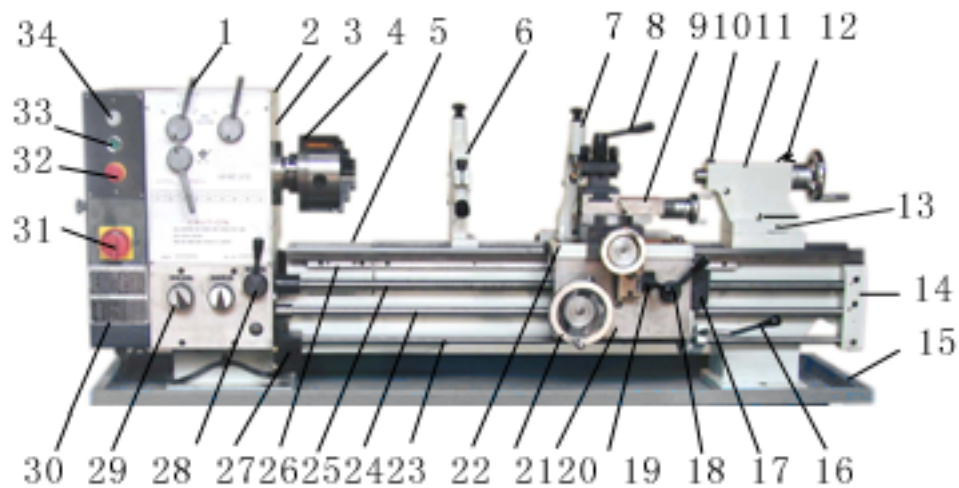


- ☺---- Lubricate with oil as oiler indication
- Often lubricate as every working time
- Lubrication as every working time



Caution: Lubrication is essential for machine maintenance. Use lubrication moderately, if this is insufficient it will affect the performance of the machine. If there is too much lubrication this can make the work area unclear, this could overflow or come off.

## Operation Instructions



1. Lever
2. Headstock cover
3. Headstock
4. Jaw chuck
5. Gap
6. Travelling Steady
7. Fixed Steady
8. Tool post handle
9. Tool post slide
10. Sleeve clamping lever
11. Tailstock
12. Tailstock clamp lever
13. Adjusting screw
14. Three road support seat
15. Chip pan
16. Control lever
17. Threading dial
18. Half nut lever
19. Cross/longitudinal feed lever
20. Apron
21. Longitudinal feed handwheel
22. Carriage
23. Control rod
24. Feed rod
25. Lead screw

26. Rack
27. Limiting switch box
28. Feed rod and leadscrew exchange lever
29. Change gear handle
30. Pulley cover
31. Power switch
32. Emergency switch
33. Start switch
34. Indication light

**Caution:**

Do not operate the lathe before you fully understand all the controls and functions.

Before cutting work pieces, it is advised to make a trial run in order to familiarize yourself with the functions.

Before operating, check oil levels and lubrication of all sliding and rotating parts. If there is not enough lubrication, refer to the lubrication chart.

The lathe has no lighting equipment, the user should provide enough suitable lighting equipment to remove shadow disruption and avoid any danger due to poor lighting during the cutting process.

Keep workpieces clamped firmly to prevent them flying off. The workpiece should not be too long in order to ensure cutting precision, the rate and diameter should be no more than 4.

When any unexpected matter occurs during turning, you should press the emergency stop switch to ensure the machine comes to a complete stop. Then make any necessary adjustments.

Cutting Amount Selection: When choosing the cut amount, assume that the lathe, tool or workpiece is rigid. Don't overload to prevent breakage. Follow the below chart for a guide on cutting measurements:

Work piece diameter	Cut speed (r.p.m.)	Cut depth (mm)	Feed amount (mm/turn)
≥ø150	<160	<0.5	<0.1
≥ø100-150	<200	<0.5	<0.1
≥ø50-100	<400	<1	<0.15
≥ø30-50	<1000	<1.5	<0.15
< Ø30	<1300	<1	<0.1

Note: When the rate of the outstanding workpiece diameter is over 4, the cut depth and feed amount should be less.

When you've finished working, turn the power off and clean the lathe. Cut the machine from the power before cleaning.

## Headstock

The main spindle is driven by gears, it has three sliding gears, the position of these can be changed with the operating lever.

The machine is equipped with a belt from the motor to spindle pulley, the belt tension has been adjusted in the factory, it is advised to check the tension before starting the machine. The belt should depress about 1/2 inch using normal finger pressure; a tight belt will damage the bearings; a loose belt will be easy to wear and slide. When necessary to adjust the belt tension, you may adjust the bolt under the motor bracket and move the motor to proper position and the belt to proper tension.

The oil in headstock should be changed regularly. First, change the oil after 15 days, then, change it after 45 days and then change it every six months, or one year. There is a hole under the headstock with a screw cover over it, back out the screw, the oil in the headstock will then flow out, after this is done clean the headstock inside using gas oil or kerosene, then pour the clean lubricating oil to the headstock until the level to the red line of the oil gauge.

*Caution: The oil reservoirs should be maintained, if this is low add oil according to the oil gauge.*

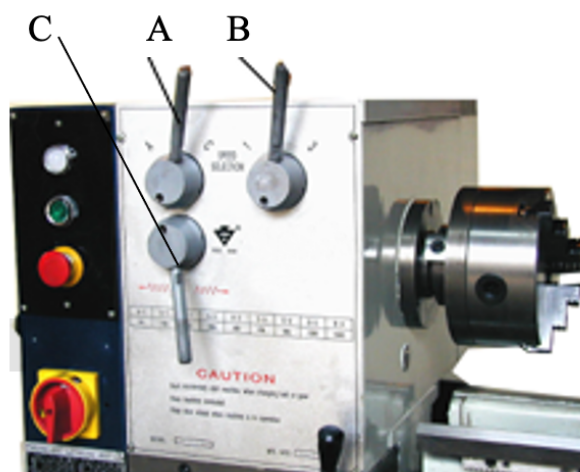
## Spindle Speed

The main spindle can obtain 9 kinds of speeds by changing the lever according to brand showing. Proceed as follows:

- Move the control lever to the middle position and turn on the power
- Using the speed chart, move the two levers (A,B), ensure the arrowhead is in the direction of the line for A,B,C on the name plate. If this is difficult, you can move the chuck by hand to engage the gear.

	1	2	3
A	64	460	380
B	210	1500	1300
C	130	940	790

**Caution: Don't change speed whilst the spindle is running**



## Main Spindle Rotation

Starting, stopping, forward and reverse of spindle can be made using the control lever. Using the control rod, firstly, pull the lever to headstock direction, then pull it up and down.

Moving the control lever down the spindle for forward rotation, and move the control lever up the spindle for reverse rotation. Moving the control lever to the middle will stop the spindle.

When you need to change the direction of the spindle on a single phase motor. Firstly, move the control lever from one side to the middle a little, then stop till the motor stops, then move up or down. If you move the control lever from one side directly to another side, the direction of the spindle won't change.

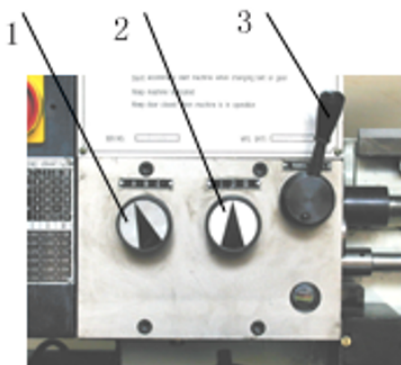
## Gear Box

This has a quick-change gear system design, used to control the rate of the spindle to leadscrew and feed rod when used to cut thread; external turning and facing.

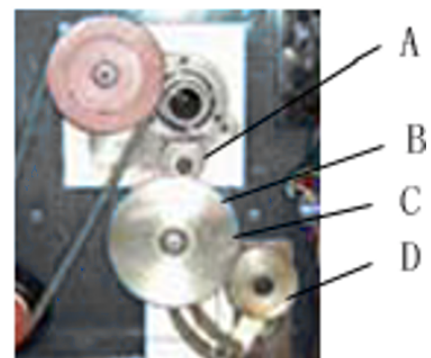
The quick –change gear box is controlled using two handles. Handle (1) has three position; A,B,C. Handle (2) has three positions; 1, 2, 3.

Handle (3) has left, middle and right positions; move the handle to the right, for leadscrew running, and the machine can be used to cut thread. Move the handle to the left, for feed rod running and the machine can be used for external turning, internal turning and facing. Move the Handle to the middle, for parking.

This machine can be used to cut metric and inch threads when putting the handle (1), & handle (2) to the proper position. Please change the gear A, B, C, D. whenever necessary.



- 1) Gear changing handle 2) Gear changing handle  
3) Feed rod and leadscrew changing handle



- A) Gear B) Gear  
C) Gear D) Gear

The half nut must be engaged to the leadscrew all times when the thread is being cut. When cutting is finished, move the tool back and reverse the motor, then move the tool to the original start-cutting position and begin the next process, and work many times at the same rate until the thread is finished.

**Caution: Do not change the Handle (1, 2, 3) when the machine is running.**

Table for Imperial thread screw

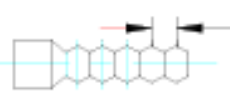
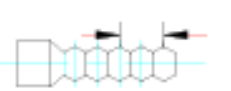
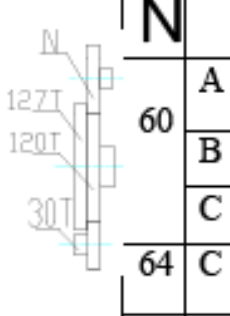
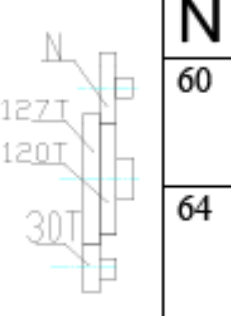
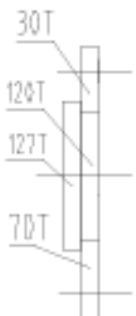
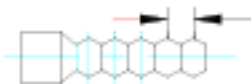
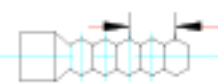

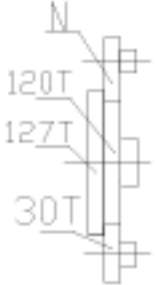



									
MM					/INCH				
									
N					N				
60	A	---	2.5	1.25	60	B	48	12	24
	B	0.5	2	1		C	32	8	16
	C	0.75	3	1.5	64	A	36	9	18
64	C	0.8	---	---		B	45	---	22-1/2
70	C	---	3.5	1.75		C	30	7-1/2	15
FEEDING									
									



Table for Inch thread screw

											
MM						/INCH					
	N		I	II	III		N		I	II	III
	60	A	---	2.5	1.25		60	B	48	12	24
		B	0.5	2	1			C	32	8	16
		C	0.75	3	1.5			64	A	36	9
	64	C	0.8	---	---		B		45	---	22-1/2
	70	C	---	3.5	1.75		C		30	7-1/2	15
FEEDING							I	II	III		
						A	0.063	0.253	0.126		
						B	0.051	0.202	0.101		
						C	0.076	0.303	0.152		
						A	0.0025	0.010	0.005		
						B	0.002	0.008	0.004		
						C	0.003	0.012	0.006		

## Carriage

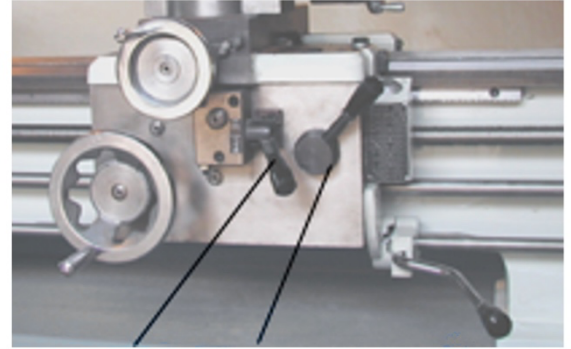
The function of the carriage firmly supports the tool post and carries it moving in longitudinal and cross directions.

## Power Feed

When external turning and facing, please turn the lever (28) on the gear box to left and make the feed rod rotation.

To use the power feed in longitudinal direction, move up & engage the cross/longitudinal feed lever (A). To use the power feed in cross direction, move down & engage the cross/longitudinal feed lever (A).

While the cross/longitudinal feed lever is in the feed position, the half nut lever (B) can be engaged, the safety interlock mechanism will prevent simultaneous engagement of (A) and (B).



A B

For threading, put the lever (28) on the gear box to the right and lead screw rotating, then move the cross/longitudinal feed lever (A) to the middle and engage the half nut, the result is the lead screw rotating, making the carriage move to the right and left.

*Caution: Do not force the half nut lever while engaging with the lead screw.*

When using the power feed, the direction of spindle rotating, carriage moving and cross slide moving have been designed by mechanism; for example, when the spindle rotates clockwise, the carriage moves to left, and conversely to the right.

## Threading Dial

When the pitch proportion of the leadscrew and the workpiece thread is not integer times and the half nut needs opening while cutting, it is necessary to use the threading dial to control tools and prevent mixed screw.

The threading dial is located on the right or left side of the apron. It performs the important function of indicating the proper time to engage the half nut lever so that the tool will enter the same groove of the thread on each successive cut. The dial is marked with lines numbered 1.2.3.4. and in between are lines with no numbers.

These are half lines and are called unnumbered lines. When the dial is engaged with the leadscrew, this rotates the dial, and a single line is marked on the housing of the threading dial (fixed line).

The instruction plate riveted on the threading dial shows the selection and sequence of matching the revolving lines with the fixed line.

For thread cutting, engage the half nut at appropriate numbers shown on the scale column of the threading dial plate. 1-4 on the scale means the half nut can be engaged on any of the numbered lines 1-2-3-4, for each successive cut only numbered lines must be used. 1-3/2-4 on the scale means the half nut can be engaged on 1 and 3 or 2 and 4 for successive cuts. For example, when you engage the half nut on the numbered line "1" or "3", you engage the half nut on the numbered line "2" for the first cutting. After that for successive cutting, the half nut should be engaged on the numbered line "2" or "4". 1-8 means the half nut will be engaged on any line, numbered or unnumbered.

If half nut engages with the leadscrew all the time while cutting the thread, you don't need to use the threading dial, in this instance, after finishing each successive cutting, firstly, back the tool and reverse the motor, then move the tool to the last cutting start position and make the next successive cutting.

#### **4 way tool post**

The main function of the tool post is to hold tools, if required, the tool post can hold more than one tool (at most 4), the tool thickness must be less than the tool groove.

When installing tools, you should line the workpiece up with the revolving center line, using the shims to adjust, after adjusting correctly, please fix the tool. If turning the tool post, turn the tool post locking handle counter clockwise to loosen the locking handle and turn the tool post to the position required and then turn the tool post lock handle clockwise to lock the tool post.

#### **Compound Slide**

Use the compound slide to cut tapers, when cutting, loosen the screw on the saddle, move the compound slide, and move the graduated line towards the graduation number on the saddle. Then fix the screw, turn the driving handwheel, and use the tool post to move the tool, you should now have an angle between the traveling line and turning line of spindle, and you can turn tapers.

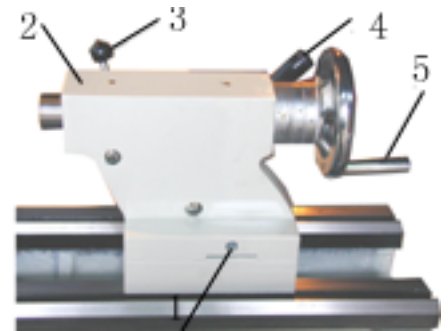
#### **Tailstock**

The tailstock slides along the bed ways freely and can be locked in position using the clamp lever (4). Use the end pin to stop the tailstock sliding down. Rotate the tailstock handwheel (5) to slide the quill. The quill can be locked in place using the quill lock lever (3). Before leaving the factory, the lathe will have the same line between the tailstock center and spindle center.

For cutting small tapers, loosen the clamp lever (4) before starting and adjust the set over screw(1), this will ensure the deviation between spindle center and tailstock center and then lock the clamp lever. You can proceed with any work.

After finishing, you should move the tailstock set back, using the same mention as mentioned above to adjust the two set over screw (1) and move the tailstock back to eliminate the taper. Use the same for external turning, using the tailstock centre for workpieces.

When correcting work, use a precision cylinder to connect the two centers of the spindle and tailstock, then place a meter on the workable and ensure the center head contacts with the cylinder side center line, then move the worktable to end of headstock, take a reading from meter, and move the meter to the tailstock end; otherwise use the same way as mentioned above to make any adjustments to get the same reading at both ends.



### **Instrument protection**

The lathe is equipped with safety protection on any dangerous areas to make it safe to use. This includes a chuck guard, tool post cover, and pulley cover. Always ensure that these are in use before switching the machine on.

## Problem solving and repairs

Before checking, disconnect the machine from the mains.

Problem	Diagnosis	Solution
The spindle does not rotate when switched on	<p>Incorrect voltage used, mains is switched off.</p> <p>The fuse in the electrical box has blown.</p> <p>Electric connection is loose.</p>	<p>Adjust the input voltage and turn power on.</p> <p>Check fuse.</p> <p>Check connection and fix.</p>
Motor is too hot and there is no power.	<p>Overloading or working time is too long.</p> <p>Voltage is too low.</p> <p>Poor motor quality.</p> <p>The fuse or wire connection is poor, making the motor short circuit.</p> <p>The belt is too tight.</p>	<p>Reduce the working time.</p> <p>Adjust to correct voltage.</p> <p>Change the motor.</p> <p>Switch the electric off and change the fuse.</p> <p>Loosen and adjust to correct.</p>
The spindle bearing is hot.	<p>Not enough lubrication.</p> <p>Bearing assembly is too tight.</p> <p>Turning at a high speed for a long time.</p>	<p>Fill the oil according to the gauge.</p> <p>Rotate the spindle by hand, adjust the spindle back nut.</p> <p>Reduce the cutting amount.</p>
Lack of power when spindle is rotating.	<p>Belt is too loose or worn.</p> <p>Motor brushes worn.</p> <p>Fuse has blown.</p>	<p>Adjust belt tension.</p> <p>Change brushes.</p> <p>Change fuse.</p>
Machine is cutting small taper when turning.	<p>The spindle centre and tailstock centre are not aligned.</p> <p>The carriage moving line is not parallel with the spindle centre.</p>	<p>Adjust tailstock.</p> <p>Loosen headstock lock screw and adjust spindle centre to required position.</p>
Workpiece surface is rough.	<p>Spindle bearing spacing is too large.</p> <p>Space between saddle and gib is too large.</p> <p>Tool is blunt.</p> <p>Workpiece does not lock.</p>	<p>Adjust to correct.</p> <p>Adjust to correct.</p> <p>Sharpen tool.</p> <p>Lock workpiece tightly.</p>

## Maintenance

### *Daily maintenance*

- Before using, oil and lubricate all moving parts.
- Do not overload the machine.
- When any work is finished, clean the work area and switch the power off. Clean any metal chips and shavings.
- If there are any problems with the machine, repair it or contact the local supplier, or a handyman for assistance.

### *Weekly maintenance*

- Clean the leadscrew and feed rod.
- Check sliding and turning surfaces, if there is not enough lubrication apply this to the machine.

### *Monthly maintenance*

- Adjust the gib space of the saddle
- Lubricate the worm gear, half nut, and bearings to prevent wear.

### *Yearly maintenance*

- Check the machine thoroughly to ensure it is accurate.
- Check cables, terminals, switches, and any other electrical components, if loose, change if required.
- Check the accuracy of the machine using the checking chart and adjust if required.

## Parts List

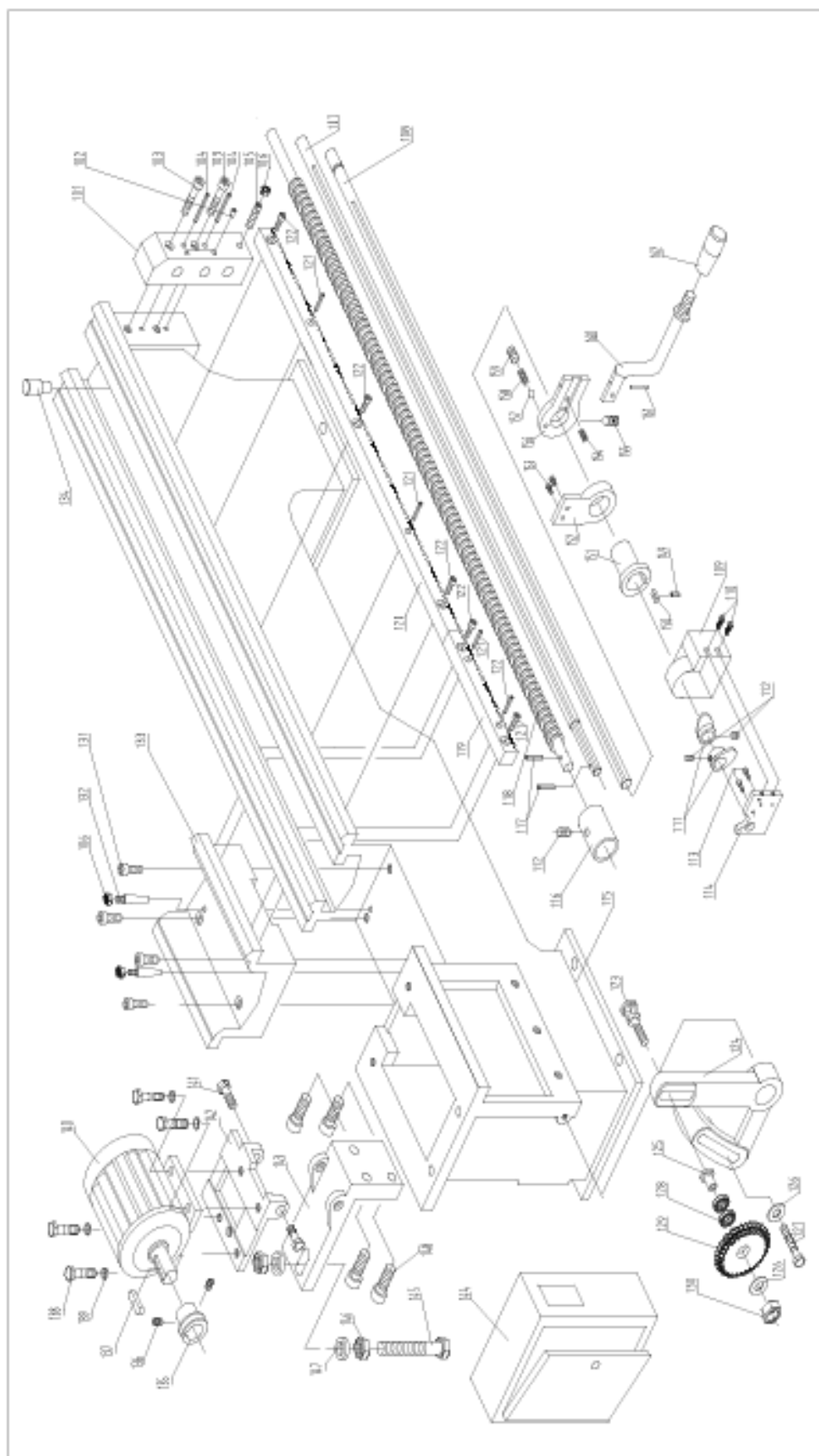
### Bed Assembly

Pos.	Name	Qty	Pos.	Name	Qty
101	Fixing Block	1	132	Taper Pin with Thread 8 x 75	2
102	Oil Cup 6	2	133	Gap	1
103	Screw M8 x 25	2	134	Stop Pin	1
104	Spring Pin 5 x 25	1	135	Motor Pulley	1
105	Screw M8 x 20	1	136	Screw M6 x 8	2
106	Nut M8	1	137	Key 8 x 25	1
107	Feeding Rod	1	138	Bolt M8 x 25	4
108	Switch Lever	1	139	Washer 8	4
109	Switch Cover	1	140	Motor (1.5kw)	1
110	Screw M6 x 12	2	141	Bolt	2
111	Eccentric Block	2	142	Motor Seat	1
112	Screw M6 x 6	3	143	Motor Rest	1
113	Screw M6 x 12	2	144	Puller Cover	1
114	Switch Board	1	145	Bolt M12 x 90	2
115	Bed	1	146	Nut M12	2
116	Sleeve	1	147	Washer 12	2
117	Spring Pin 5 x 30	2	148	Screw M8 x 30	4
118	Longitudinal Thread Screw	1	149	Spring Pin 3 x 5	1
119	Rack (Left)	1	150	Key B5 x 12	1
120	Rack (Right)	1	151	Sleeve	1
121	Screw M6 x 20	5	152	Arm	1
122	Spring Pin 5 x 30	4	153	Screw M6 x 12	1

123	Change Gear Shaft	1	154	Spring 1 x 6 x22	1
124	Change Gear Bracket	1	155	Screw M8 x 12	1
125	Bearing Sleeve	1	156	Cover	1
126	Washer 10	2	157	Steel Ball 6	1
127	Bolt M10 x 40	1	158	Spring 1 x 6 x 9	1
128	Bearing 6003-Z	2	159	Screw M8 x 10	1
129	Change Gear	1	160	Lever	1
130	Nut M10	1	161	Pin B5 x 35	1
131	Screw M10 x 34	4	162	Grip	1



## Bed Assembly



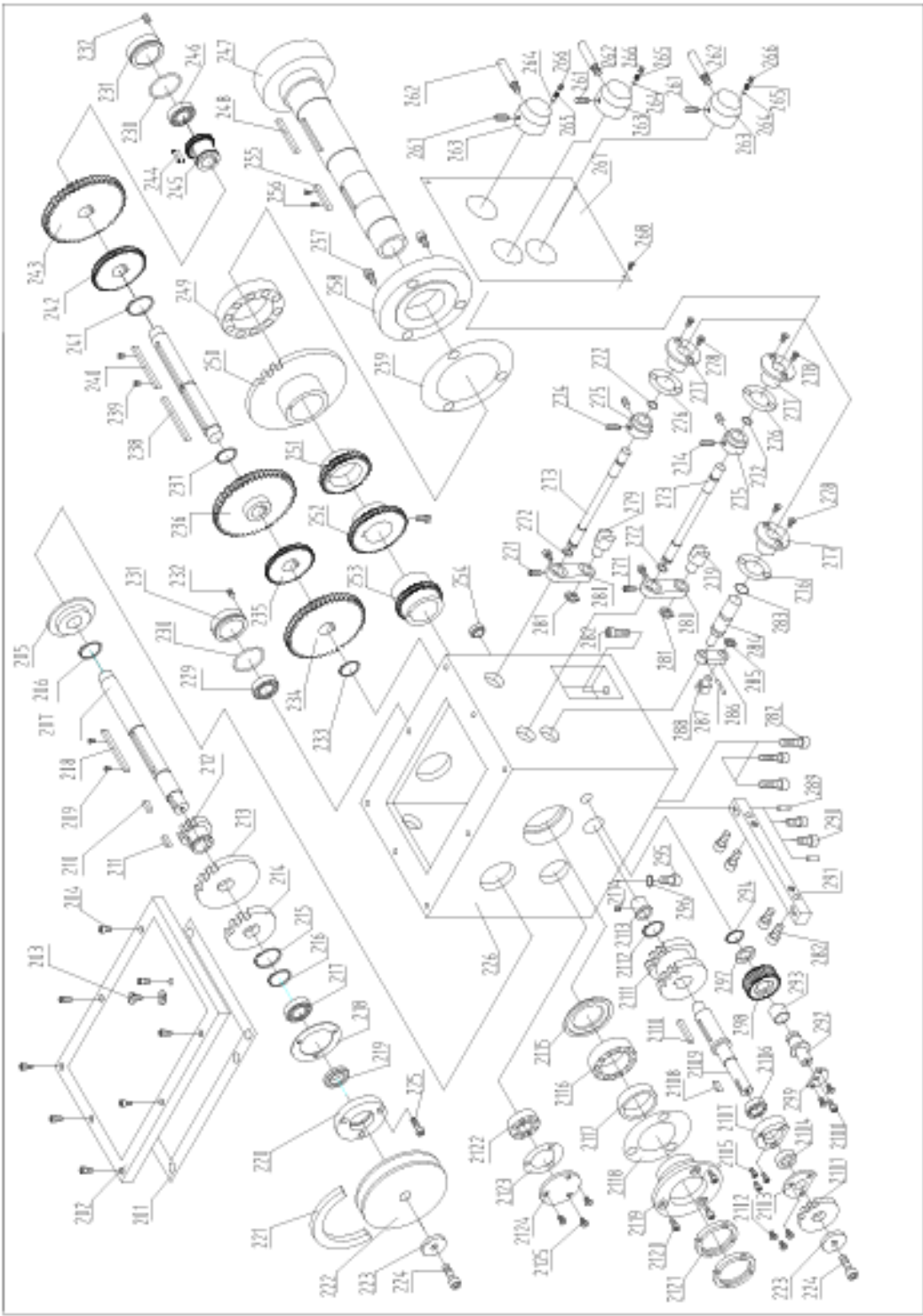
## Headstock Assembly

Pos.	Name	Qty	Pos.	Name	Qty
201	Gasket	1	265	Spring 1 x 5 x20	3
202	Cover	1	266	Screw M8 x 5	3
203	Oil Fill Plug	1	267	Name Plate	1
204	Screw M6 x 25	8	268	Screw M4 x 8	4
205	Round Fork	1	271	Screw M6 x 10	4
206	Retaining Ring (External) 25	1	272	O-ring Gasket	4
207	Input Shaft	1	273	Shaft	2
208	Key 8 x 80	1	274	Screw M6 x 10	4
209	Screw M3 x 8	2	275	Collar	2
210	Key 5 x 14	1	276	Gasket	3
211	Key 8 x 20	1	277	Fixing Seat	3
212	Gear	1	278	Screw M5 x 10	6
213	Gear	1	279	Fork	2
214	Gear	1	280	Arm	2
215	Retaining Ring (External) 38	1	281	Retaining Ring (External) 15	2
216	Retaining Ring (External) 25	1	282	Screw M10 x 35	6
217	Bearing 6205P6	1	283	O-ring Gasket	1
218	Gasket	1	284	Shaft	1
219	Oil Seal B25 x 40 x 7	1	285	Retaining Ring (External) 10	1
220	Cover	1	286	Arm	1
221	B-Belt B914	1	287	Spring Pin 4 x 20	1
222	Pulley	1	288	Fork	1
223	Washer	2	289	Pin 8 x 26	2
224	Screw M6 x 14	2	290	Screw M10 x 30	4

225	Screw M6 x 20	3	291	Adjusting Bar	1
226	Headstock	1	292	Shaft	1
229	Bearing 6204P6	1	293	Collar	1
230	O-Ring Gasket 43.7 x 1.8	2	294	Retaining Ring (External) 20	1
231	Plug	2	295	Screw M10 x 16	1
232	Screw M6 x 10	2	296	O-ring Gasket 10 x 1.8	1
233	Retaining Ring (External) 25	1	297	Washer	1
234	Gear	1	298	Gear	1
235	Gear	1	299	Cover	1
236	Gear	1	2100	Screw M5 x 10	3
237	Retaining Ring (External) 25	1	2101	Gear	1
238	Key 8 x 80	1	2102	Screw M3 x 10	3
239	Screw M3 x 8	2	2103	Cover	1
240	Key 8 x 80	1	2104	Oil Seal FB20 x 35 x 7	1
241	Retaining Ring (External) 38	1	2105	Screw M5 x 16	3
242	Gear	1	2106	Bearing 61804P6	1
243	Gear	1	2107	Cover	1
244	Key 8 x 20	1	2108	Key 5 x 14	2
245	Gear	1	2109	Shaft	1
246	Bearing 6204P6	1	2110	Key 8 x 40	1
247	Spindle	1	2111	Gear	1
248	Key 8 x 80	1	2112	Retaining Ring (External) 26	1
249	Bearing 30211P5	1	2113	Sleeve	1
250	Gear	1	2114	Screw M6 x 10	1
251	Gear	1	2115	Flashing Ring	1
252	Gear	1	2116	Bearing 321010P6	1

253	Gear	1	2117	Spacer	1
254	Oil Level Indicator	1	2118	Gasket	1
255	Key 8 x 70	1	2119	Cover	1
256	Screw M6 x 8	1	2120	Screw M6 x 14	3
257	Screw M8 x 30	3	2121	Round Nut M50 x 1.5	2
258	Cover	1	2122	Bearing 6205P6	1
259	Gasket	1	2123	Gasket	1
261	Screw M8 x 14	3	2124	Cover	1
262	Handle	3	2125	Screw M5 x 10	3
263	Handle Seat	3			
264	Steel Ball	3			

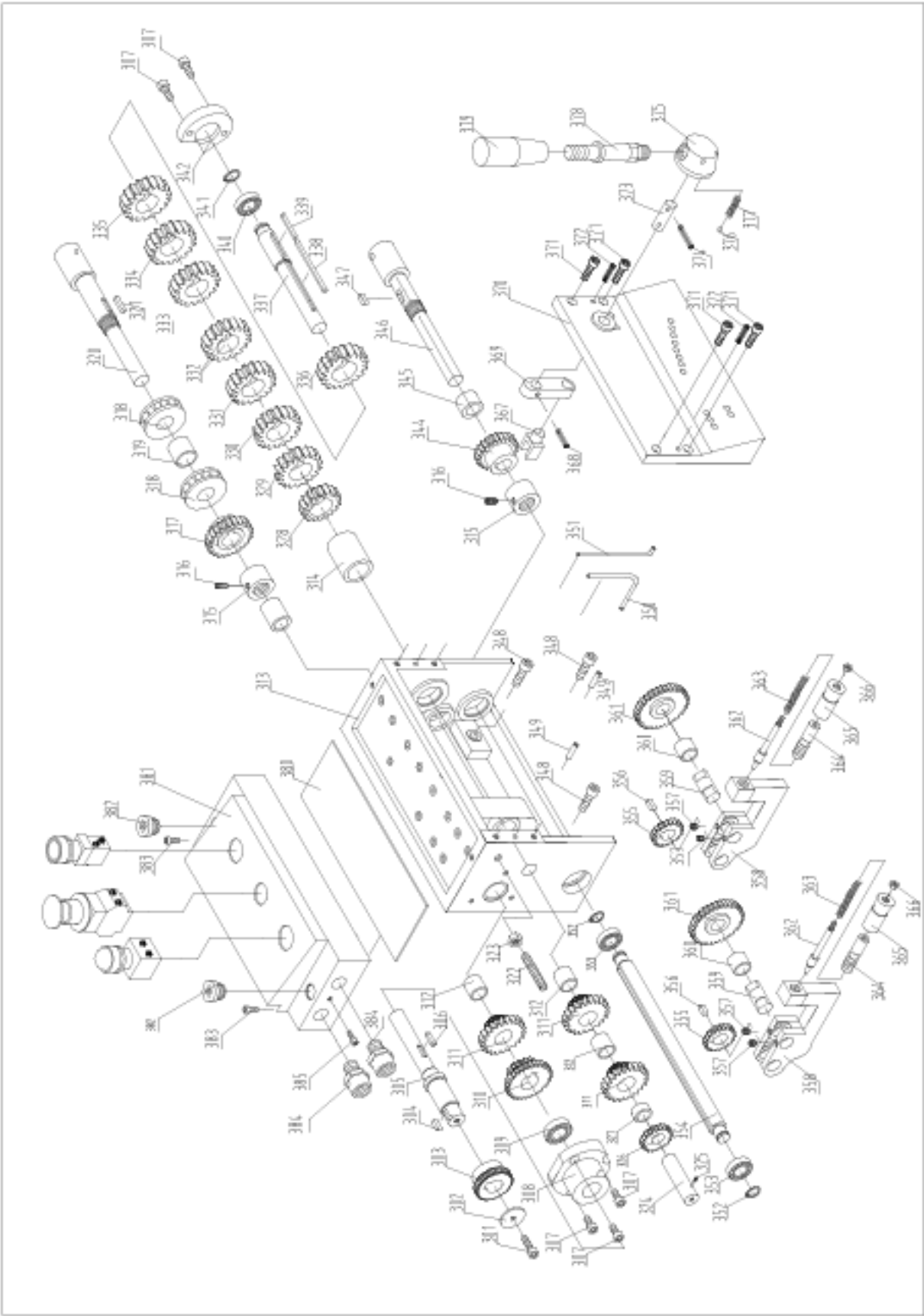
Headstock Assembly



## Gear Box Assembly

Pos.	Name	Qty	Pos.	Name	Qty.
301	Screw M6 x 12	1	344	Gear	1
302	Washer	1	345	Sleeve	1
303	Gear	1	346	Shaft	3
304	Key 5 x 14	1	348	Screw M8 x 25	4
305	Shaft	1	349	Pin 5 x 20	1
306	5 x 3 x 6	1	350	Oil Pipe	1
307	Screw M6 x 10	5	351	Oil Pipe	2
308	Bearing Cover	1	352	Retainer Ring	2
309	Bearing 6003	1	353	Bearing 6201-z	1
310	Duplex Gear	1	354	Shaft	2
311	Duplex Gear	3	355	Gear	2
312	Gear Sleeve	3	356	Key 5 x 14	4
313	Gear Box	1	357	Screw M6 x 6	2
314	Sleeve	2	358	Handle Seat	2
315	Nut	2	359	Shaft	2
316	Screw M6 x 6	2	360	Gear Sleeve	2
317	Gear	1	361	Gear	2
318	Bearing 51104	2	362	Axle of Gripper	2
319	Sleeve	1	363	Spring	2
320	Shaft	1	364	Sleeve of Gripper	2
321	Key 6 x16	2	365	Lever	2
322	Screw M8 x 35	1	366	Nut M6	1
323	Nut M8	1	367	Fork	1
324	Shaft	1	368	Pin 5 x 24	1
325	Screw M6 x 6	1	369	Arm	1
326	Gear	1	370	Front Cover of Gear Box	4
327	Gear Sleeve	1	371	Screw M6 x 16	1
328	Gear	1	372	Pin 5 x 20	2
329	Gear	1	373	Shaft	1
330	Gear	1	374	Pin 5 x 40	1
331	Gear	1	375	Knob	1
332	Gear	1	376	Steel Ball 6	1
333	Gear	1	377	Spring 1 x 4.5 x 16	1
334	Gear	1	378	Lever	1
335	Gear	1	379	Lever Grip BM10 x 50	1
336	Gear	1	380	Gasket	1
337	Shaft	1	381	Knob Seat	2
338	Key 5 x 74	1	382	Plug	2
339	Key 6 x 32	1	383	Screw M6 x 8	2
340	Bearing 6002-z	1	384	Pipe Connector 8	2
341	Retainer Ring (External) 15	1			
342	Cover	1			

Gear Box Assembly



## Apron Assembly

Pos.	Name	Qty	Pos.	Name	Qty.
401	Handle BM8 x 63	1	434	Nut M8	1
402	Handwheel	1	435	Screw M8 x 35	1
403	Spring	2	436	Spring	2
404	Steel Ball 6	3	437	Change Lever Seat	1
405	Dial Ring	1	438	Feed Plate	1
406	Screw M6 x 16	3	439	Lever Grip BM10 x 50	1
407	Handwheel Seat	1	440	Change Lever	1
408	Oiler 6	2	441	Rod	1
409	Apron	1	442	Safety Stopper	1
410	Spring Pin 5 x 60	1	443	Clutch Gear	1
411	Gear	1	444	Pin A6 x 30	3
412	Gear	1	445	Clutch	1
413	Spring Pin 5 x 60	1	446	Container Ring	1
414	Gear Shaft	1	447	Clutch Gear	1
415	Washer	2	448	Handle	1
416	Key 5 x 32	1	449	Knob	1
417	Worm	1	450	Spring Pin 5 x 40	1
418	Screw M6 x 25	4	451	Rod	1
419	Nut Seat	1	452	Screw M8 x 8	2
420	Screw M6 x 6	1	453	Pin	2
421	Safety Piece	1	454	Half Nut Seat	1
422	Screw M4 x 14	2	455	Screw M6 x 8	2
423	Spring	1	456	Half Nut	1
424	Arm	1	457	Screw M5 x 16	2
425	Axle	1	458	Guide Plate	1
426	Key 4 x 20	1	459	Screw M6 x 12	2
427	Gear	1	460	Axle	1
428	Spring Pin 5 x 24	2	461	Pin 3 x 12	1
429	Worm	1	462	Gear	1
430	Washer	2	463	Rivet 2.5 x 5	1
431	Screw M6 x 12	4	464	Screw M6 x 45	1
432	Shaft	1	465	Threading Dial	1
433	Key 4 x 8	1			





## Saddle Assembly

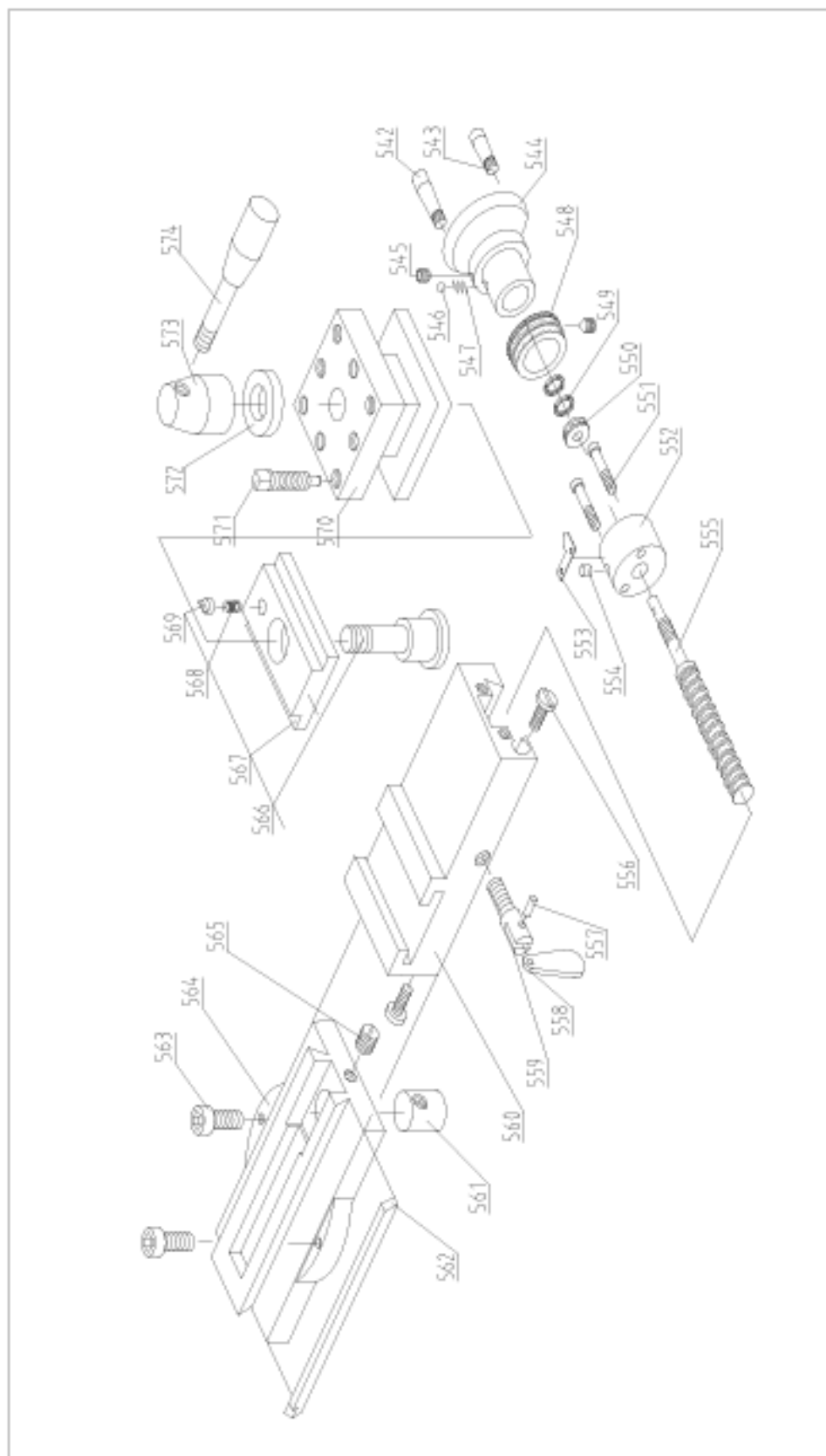
Pos.	Name	Qty	Pos.	Name	Qty
501	Saddle	1	522	Screw M6 x 16	1
502	Wiper	2	523	Handwheel	1
503	Screw M5 x 12	8	524	Handle	1
504	Screw M8 x 25	3	525	Lead Screw of Saddle	1
505	Nut M8	3	526	Adjusting Screw	2
506	Screw M8 x 22	3	527	Gib	1
507	Wiper	1	528	Plug	1
508	Screw M6 x 16	4	529	Screw M8 x 30	2
509	Block Slide	2	530	Pin 5 x 35	2
510	Locking Block	1	531	Wiper	1
511	Washer 10	1	532	Fixing Block	2
512	Bolt M10 x 60	1	533	Oil Cup 6	6
513	Pin 5 x 20	1	534	Lead Screw Nut	1
514	Gear	1	535	Screw M4 x 20	2
515	Bearing 51101	2	536	Locking Screw	2
516	Lead Screw Seat	1	537	Pin 2 x 8	2
517	Screw M6 x 45	2	538	Locking Lever	2
518	Nut M12 x 1.25	2	539	Fixing Seat	1
519	Graduation Collar	1	540	Screw M6 x 20	1
520	Compressing Spring	2	541	Cross Slide	1
521	Steel Ball 6	1			



## Tool Post Assembly

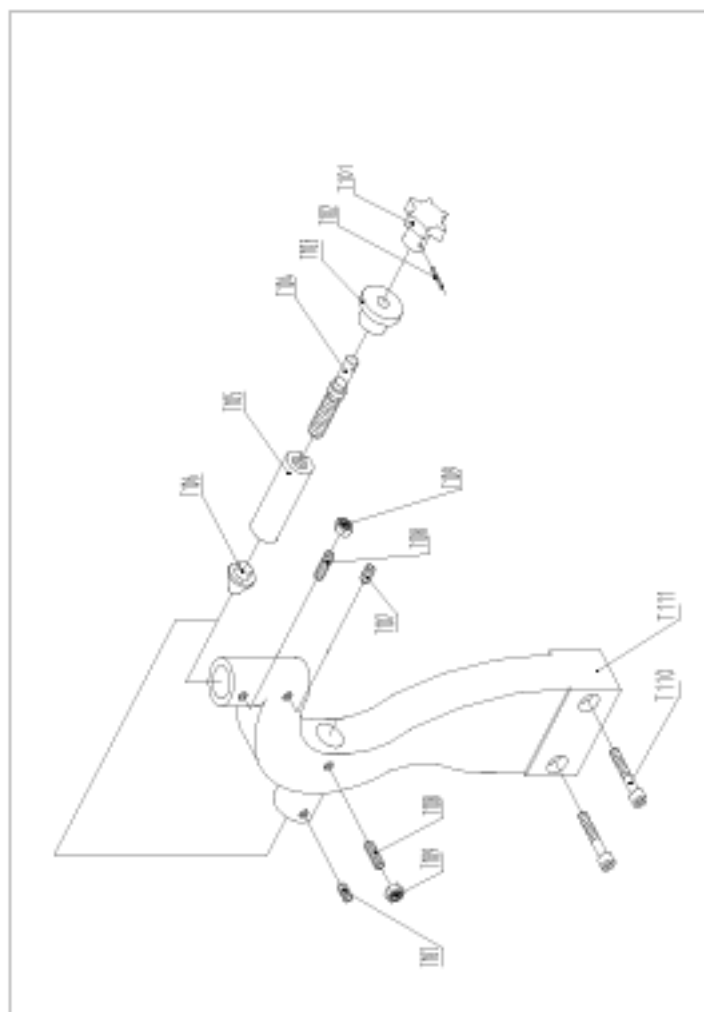
Pos.	Name	Qty	Pos.	Name	Qty
542	Handle	1	559	Clamping Screw	1
543	Handle	1	560	Base of Tool Post	1
544	Handwheel	1	561	Leadscrew Nut	1
545	Screw M6 x 16	2	562	Gib	1
546	Steel Ball 6	1	563	Screw M8 x 24	2
547	Pressure Spring	1	564	Swivel Base	1
548	Graduation Collar	1	565	Screw M6 x 12	1
549	Nut M10 x 1	2	566	Locking Screw	1
550	Bearing 51100	1	567	T-Block	1
551	Screw M4 x 30	2	568	Compressing Spring	1
552	Leadscrew Seat	1	569	Locating Block	1
553	Indicator Plate	1	570	Tool Post	1
554	Oil Cup 6	1	571	Screw	8
555	Leadscrew	1	572	Washer	1
556	Adjusting Screw	2	573	Lever	1
557	Pin 2 x 8	2	574	Handle	1
558	Clamping Knob	1			

## Tool Post Assembly



## Follow Rest Assembly

Pos.	Name	Qty	Pos.	Name	Qty
T101	Star Handle M8 x 30	2	T107	Screw M6 x 8	2
T102	Pin 3 x 16	2	T108	Screw M6 x 16	2
T103	Collar	2	T109	Nut M6	2
T104	Adjusting Screw	2	T110	Screw M8 x 35	2
T105	Sleeve	2	T111	Follow Rest	1
T106	Clamping Block	2			



## Steady Rest Assembly

Pos.	Name	Qty	Pos.	Name	Qty
T201	Star Handle M8 x 30	3	T211	Cover of Steady Rest	1
T202	Pin 3 x 16	3	T212	Knob	1
T203	Collar	3	T213	Lever	1
T204	Adjusting Screw	3	T214	Pin 5 x 30	1
T205	Sleeve	3	T215	Base of Steady Rest	1
T206	Clamping Block	3	T216	Nut M12	1
T207	Screw M6 x 16	3	T217	Washer 12	1
T208	Nut M6	4	T218	Fixing Plate	1
T209	Screw M6 x 8	3	T219	Bolt M12 x 70	1
T210	Bolt M6 x 25	3			

