Craftsman Lathe Operation Manual

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Introduction

Chester UK Limited is a specialist company that has been supplying the machine tool industry for over 30 years. The Chester UK Head Office comprises of a 30,500 sq.ft factory complete with offices and a showroom. Specialising in conventional machine tools, Chester has built a reputation for quality and reliability, which is highly regarded in the machine tool industry and the model engineering market.

There are several divisions within the company; Export, Education, Model Engineering & UK Sales, all with dedicated sales personnel who are trained to answer your questions.

When buying from Chester you can be assured of a complete back-up service with mechanical and electrical engineers that are available to give advice if required.

Stock is a large part of any business and Chester have always invested substantially in building a large quantity of machines and spares, ready to satisfy customer requirements. Chester UK has one of the largest stocks of conventional new machines and accessories within Great Britain.

Please take time to visit our website: www.chestermachinetools.com

HEALTH AND SAFETY

As with all machinery there are certain hazards involved with the operation and use of the lathe. Using the machine with respect and caution will considerably lessen the possibility of person injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.
This machine was designed for certain applications only. We strongly recommend that the machine is not modified, and / or used for any application other than which it was designed. **If you have any questions relative to its application do not use the machine, until you have first been in contact with Chester UK.**
The lathe may not arrive with a power socket or plug. In the event of this happening, please inform Chester UK on Tel: (01244) 531 631.

Safety rules for all tools

User

1. **Wear correct apparel**
   No loose clothing, gloves, rings, bracelets, or other jewellery to get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.
2. **Always wear eye protection**
   Refer to ANSLZ87.1 standard for appropriate recommendations. Also use face and / or a dust mask if the cutting operation is dusty.
3. **Don't overreach**
   Always keep a proper footing and balance.
4. **Never stand on a tool**
   Serious injury could occur if the tool is tipped or if the cutting tool is accidentally contacted.
5. **Never leave the tool running unattended**
   Turn power off. Leave tool until it comes to a complete stop.
6. **Drugs, alcohol and medication**
   Do not operate the tool while under the influence of drugs, alcohol, or any medication.
7. **Make sure the tool is disconnected from the power supply**
   While motor is being mounted, connected, or reconnected.
8. **Always**
   Keep hands and fingers away from any moving parts.
9. **Stop**
   The machine before moving chips.
10. **Shut-off**
    Power and clean the lathe and work area before leaving the machine.

Use of the machine

1. **Remove adjusting keys and wrenches**
   Form a habit of checking to see that keys and adjusting wrenches are removed from the tool before turning it 'on'.
2. **Don't force the tool**
   It will do the job better and be safer at the rate for which it was designed.
3. **Use the right tool**
   Don't force the tool or attachment to do a job for which it was not designed.
4. **Secure work**
   Use clamps or a vice to hold work when practical. It's safer than using your hands and frees both to operate the machine.
5. **Maintain tools in top condition**
   Keep tools sharp and clean for the best and safest performance. Follow instructions for lubricating and changing accessories.
6. **Use recommended accessories**
   Consult Chester UK for recommended accessories. The use of improper accessories may cause hazards.

7. **Avoid accidental starting**
Make sure the switch is in the '**OFF'** position before plugging in power cord.

8. **Stop**
The machine before putting material in the vice.

9. **Always**
Have stock firmly clamped in the vice before starting the cut.

10. **Ground all tools**
If the tool is equipped with a three-prong plug, it should be plugged into a three-hole electrical receptacle. If an adapter is used to accommodate a two-prong receptacle, the adapter plug must be attached to a known ground. Never remove the third prong.

Adjustment

Make all adjustments with the power off. When assembling follow the manuals instructions, this will ensure correct instruction and a safe structure.

Working environment

1. **Keep the work area clean**
Cluttered areas and benches invite accidents.

2. **Don't use in a dangerous environment**
Don't use power tools in damp or wet locations or expose to rain. Keep the work area well lit.

3. **Keep children etc at a safe distance.**
All children etc should be kept at a safe distance from the work area.

4. **Don't**
Install & use this machine in an explosive dangerous environment.

Maintenance

1. **Disconnect**
Machine from the power source when making repairs.

2. **Check damaged parts**
Before further use of the tool, a guard or other part that is damaged should be carefully checked to ensure that it would operate properly and perform its intended function check for alignment of moving parts, binding of moving parts, breakage of parts, mounting and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.

3. **Disconnect tools**
Before servicing and when changing accessories such as blades bits, cutters, etc.

4. **To prevent**
The corrosion of machined surfaces when a soluble is used as coolant, pay particular attention to wiping dry the surfaces where fluid accumulates and does not evaporate quickly, such as between the machine bed and vice.

Safety Device

1. Interlock switch on pulley cover. As soon as the pulley cover is open, the machine will come to a stop with the function of this switch. Do not remove this switch from the machine for any reason and check its function frequently.

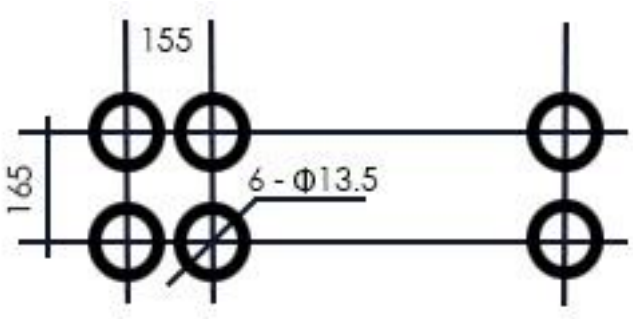
2. Interlock switch on cutting area. As soon as the pulley cover is open, the machine will come to a stop with the function of this switch. Do not remove this switch from the machine for any reason and check its function frequently.

Machine Specification

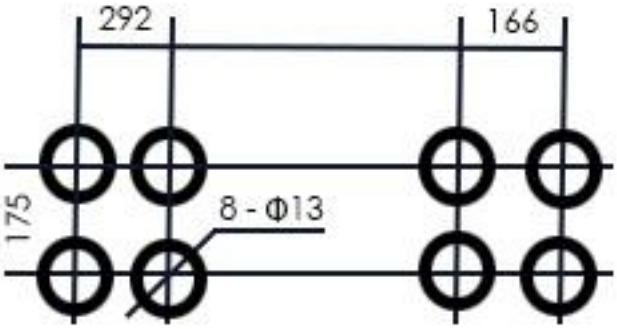
Center Height	151mm
Swing Over Bed	305mm
Swing Over Cross-slide	173mm
Between Centres	940mm
Width of Bed	182mm
Toolpost Tool Size	12mm
Speed Range	50-1200rpm
Longitudinal Travel	810mm
Cross-slide Travel	150mm
Top-slide Travel	85mm
Chuck Diameter	160mm
Spindle Bore	36mm
Spindle Taper	MT5
Tailstock Quill Travel	120mm
Tailstock Taper	MT3
Motor Power	1.1kW (1.5hp)
Net Weight	390kg
Dimensions	1370 x 740 x 680mm

Installation Plans

Machine to stand



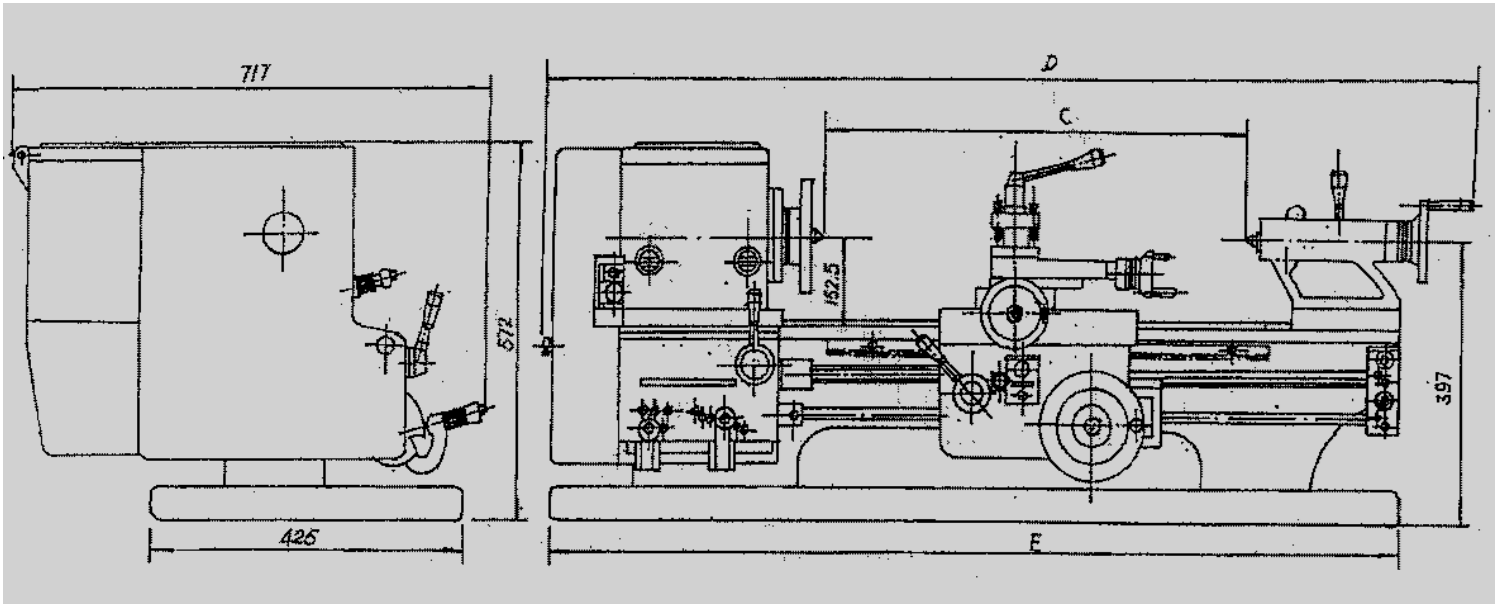
Machine to floor



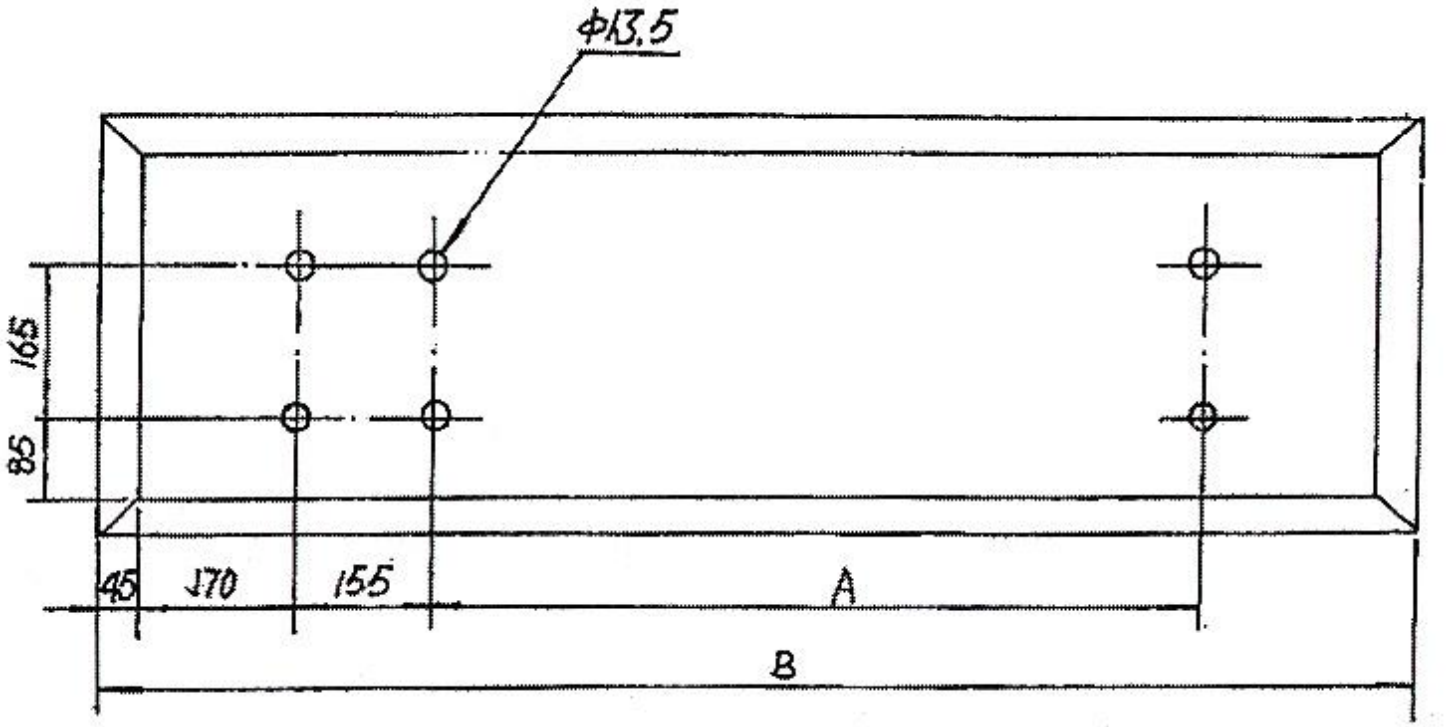
1. Craftsman Lathe
2. Tray
3. Stand
4. Adjustable iron spacer
5. Foundation bolt

General Dimension

Front view



Top view



A	717mm
B	1310mm
C	610mm
D	1400mm
E	1310mm

Metal Cutting Process - Turning

Introduction

This training guide is designed to give you 'hands-on' experience through which you can gain a good appreciation of this well-known type of machine tool. In particular, your attention should be directed towards its operational uses and parameters, the general layout of controls, accessories, associated tooling, and the maintenance factors related to lathes.

So that you can make the most use of your lathe, it is essential that you use every opportunity to consolidate what you observe. This type of work is largely self-motivated and the drive and desire to find out must come from you.

It takes a considerable time to become a skilled lathe operator and to possess all the skill of hand that goes with it. Therefore, it is not expected that you will be manually skilled on completion of the module, but you will have gained intellectually and without doubt, by practical involvement, some skill of hand will be achieved.

Figure 1. Example of a Typical Centre Lathe

Centre Lathe

The term Centre Lathe is derived from the fact that in its operation the lathe holds a piece of material between two rigid supports called centres, or by some other device such as a chuck or faceplate which revolves about the centre line of the lathe.

The lathe shown above is a typical example. This machine is usually used in a jobbing (one off) situation or for small batch work where it would be too expensive to specially 'tool up' for just a few items.

The lathe on which you will work is a machine used to cut metal. The spindle carrying the work is rotated whilst a cutting tool, which is supported in a tool post, is made to travel in a certain direction depending on the form of surface required. If the tool moves parallel to the axis of the rotation of the work a cylindrical surface is produced as in Fig 2 (a), whilst if it moves at right angles to this axis, it produces a flat surface as in Fig 2 (b).

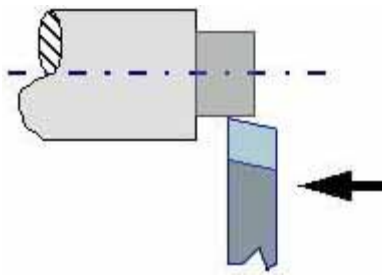


Figure 2a. Producing a Cylindrical Surface

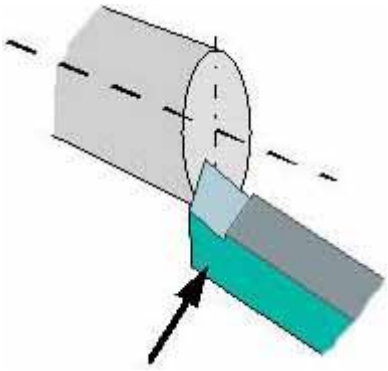


Figure 2b. Producing a Flat Surface

The lathe can also be used for the purposes shown in Fig 2c, 2d, 2e and 2f.

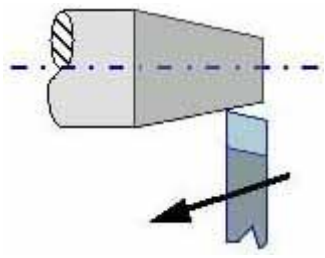


Figure 2c. Taper Turning

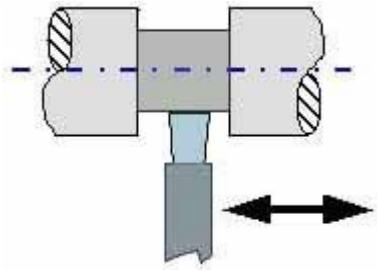


Figure 2d. Parting Off / Under Cutting

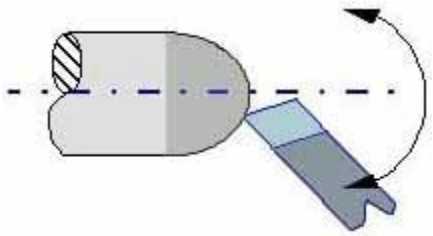


Figure 2e. Radius Turning Attachment

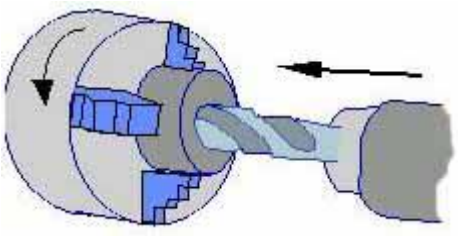


Figure 2f. Drilling on a Lathe

Cutting Tools

The tool used in a lathe is known as a single point cutting tool. It has one cutting edge or point whereas a drill has two cutting edges, and a file has numerous points or teeth.

The lathe tool shears the metal rather than cuts as will be seen later and it can only do so if there is relative motion between the tool and the work piece. For example, the work is rotating, and the tool is moved into its path such that it forms an obstruction and shearing takes place. Of course, the amount of movement is of paramount importance - too much at once could for instance result in breakage of the tool.

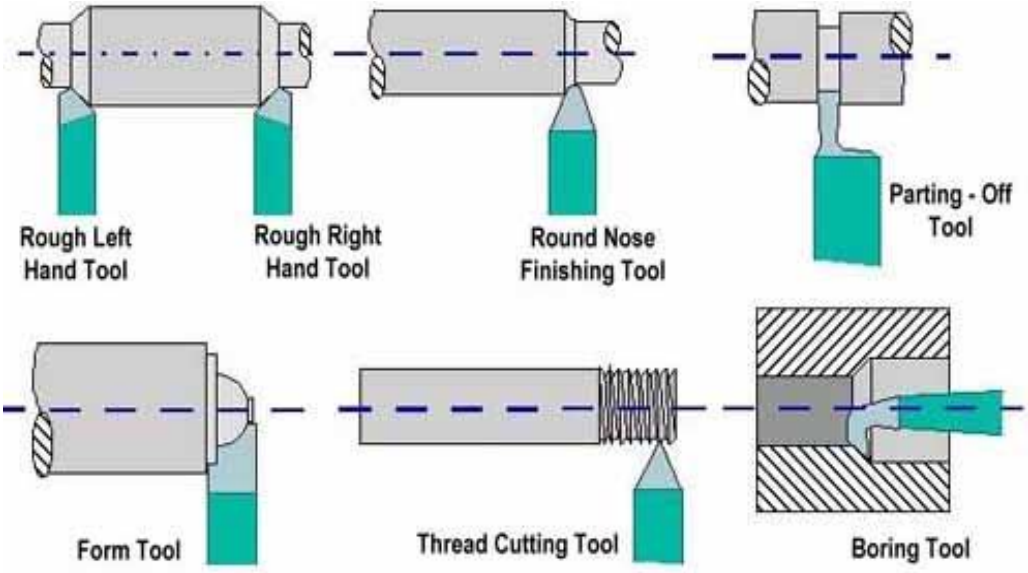


Figure 3. Types of Cutting Tool

The type and design of the tools selected will depend on the job in hand, the machining operation selected and the material to be cut. The correct tool especially the various face angles are essential if the operation is to be done in a cost-effective (i.e. productive) way. The tools used in a lathe are various, some of which are shown in figure 3.

The range of cutting tool types is extensive and a few examples only are shown in this handout. Nonetheless you should take every opportunity to look deeper into the types of tools available.

Basic Theory

The usual conception of cutting suggests clearing the substance apart with a thin knife or wedge. When metal is cut the action is rather different and although the tool will always be wedge shaped in the cutting area and the cutting edge should always be sharp the wedge angle will be far too great for it to be considered knife shaped. Consequently, a shearing action takes place when the work moves against the tool.

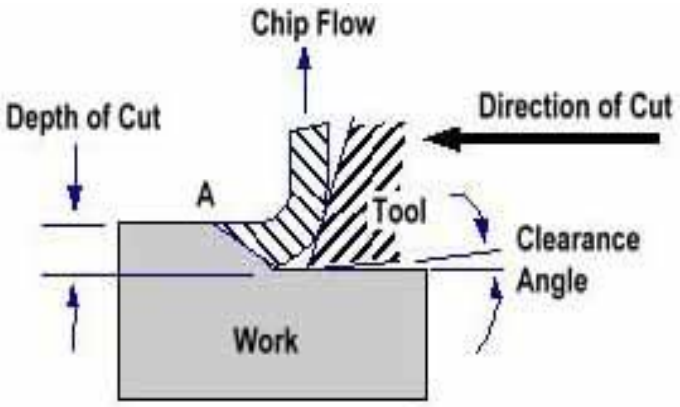


Figure 4. Basic Metal Cutting Theory

Figure 4 shows a tool being moved against a fixed work piece. When the cut is in progress the chip presses heavily on the top face of the tool and continuous shearing takes place across the shear plane AB. Although the Figure shows a tool working in the horizontal plane with the work piece stationary, the same action takes place with the work piece revolving and the tool stationary.

Tool Angles

There are three important angles in the construction of a cutting tool rake angle, clearance angle and plan approach angle.

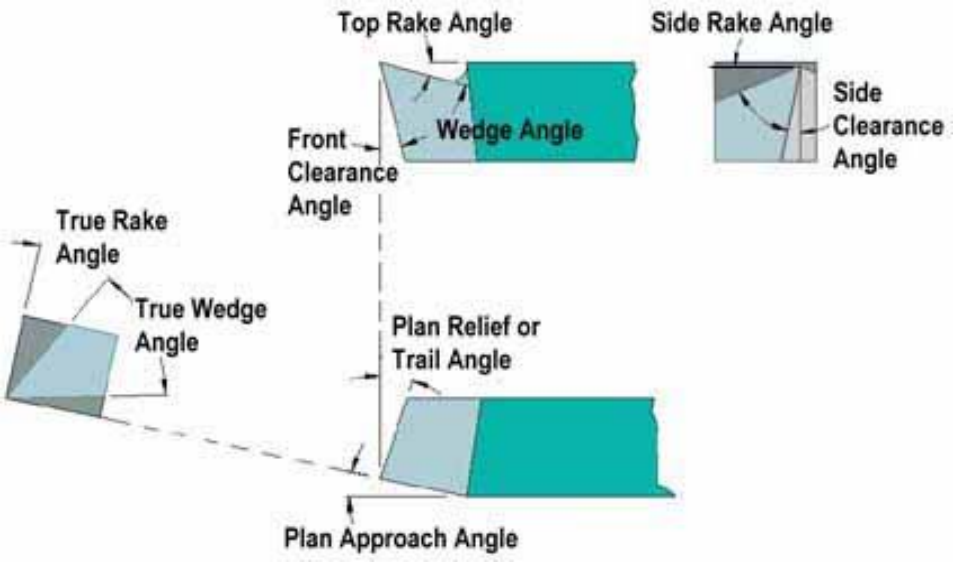


Figure 5. Main Features of a Single Point Cutting Tool

Rake Angle

Rake angle is the angle between the top face of the tool and the normal to the work surface at the cutting edge. In general, the larger the rake angle, the smaller the cutting force on the tool, since for a given depth of cut the shear plane AB, shown in Figure 4 decreases as rake angle increases. A large rake angle will improve cutting action, but would lead to early tool failure, since the tool wedge angle is relatively weak. A compromise must therefore be made between adequate strength and good cutting action.

Metal Being Cut	Cast Iron	Hard Steel / Brass	Medium Carbon Steel	Mild Steel	Aluminium
Top Rake Angle	0°	8°	14°	20°	40°

Table 1. Typical value for top rake angle

Clearance Angle

Clearance angle is the angle between the flank or front face of the tool and a tangent to the work surface originating at the cutting edge. All cutting tools must have clearance to allow cutting to take place. Clearance should be kept to a minimum, as excessive clearance angle will not improve cutting efficiency and will merely weaken the tool. Typical value for front clearance angle is 6° in external turning.

Plan Profile of Tool

The plan shape of the tool is often dictated by the shape of the work, but it also influences the tool life and the cutting process. Figure 6 shows two tools, one where a square edge is desired and the other where the steps in the work end with a chamfer or angle. The diagram shows that, for the same depth of cut, the angled tool has a much greater length of cutting edge in contact with the work and thus the load per unit length of the edge is reduced. The angle at which the edge approaches the work should in theory be as large as possible, but if too large, chatter may occur. This angle, known as the Plan Approach Angle, should therefore be as large as possible without causing chatter.

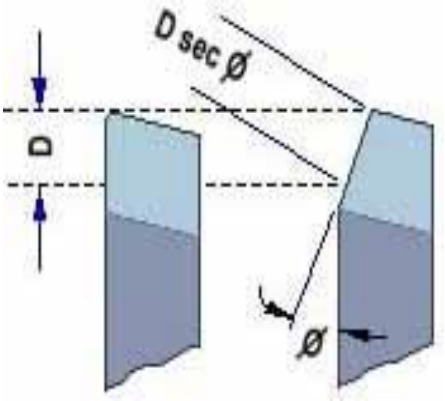


Figure 6. Plan Approach Angle

The trailing edge of the tool is ground backwards to give clearance and prevent rubbing and a good general guide is to grind the trailing edge at 90° to the cutting edge. Thus, the Trail Angle or Relief Angle will depend upon the approach angle.

A small nose radius on the tool improves the cutting and reduces tool wear. If a sharp point is used it gives poor finish and wears rapidly.

Characteristics of Tool Material

For efficient cutting a tool must have the following properties:

Hot Hardness

This means the ability to retain its hardness at high temperatures. All cutting operations generate heat, which will affect the tools hardness and eventually its ability to cut.

Strength and Resistance to Shock

At the start of a cut the first bite of the tool into the work results in considerable shock loading on the tool. It must obviously be strong enough to withstand it.

Low Coefficient of Friction

The tool rubbing against the work piece and the chip rubbing on the top face of the tool produce heat, which must be kept to a minimum.

Tool Materials in Common Use

High Carbon Steel

Contains 1 - 1.4% carbon with some addition of chromium and tungsten to improve wear resistance. The steel begins to lose its hardness at about 250° C and is not favoured for modern machining operations where high speeds and heavy cuts are usually employed.

High Speed Steel (H.S.S.)

Steel, which has a hot hardness value of about 600° C, possesses good strength and shock resistant properties. It is commonly used for single point lathe cutting tools and multi point cutting tools such as drills, reamers, and milling cutters.

Cemented Carbides

An extremely hard material made from tungsten powder. Carbide tools are usually used in the form of brazed or clamped tips. High cutting speeds may be used and materials difficult to cut with HSS may be readily machined using carbide tipped tool.

Tool Life

As a rule, the relationship between the tool life and cutting speed is

$$VT^n = C$$

where;
V = cutting speed in m/min
T = tool life in min
C = a constant

For high-speed steel tools the value of C ranges from 0.14 to 0.1 and for carbide tools the value would be 0.2.

Chip Formation & Chip Breaker

The type of chip produced depends on the material being machined and the cutting conditions at the time. These conditions include the type of tool used tool, rate of cutting condition of the machine and the use or absence of a cutting fluid.

Continuous Chip

This leaves the tool as a long ribbon and is common when cutting most ductile materials such as mild steel, copper, and aluminium. It is associated with good tool angles, correct speeds and feeds, and the use of cutting fluid.

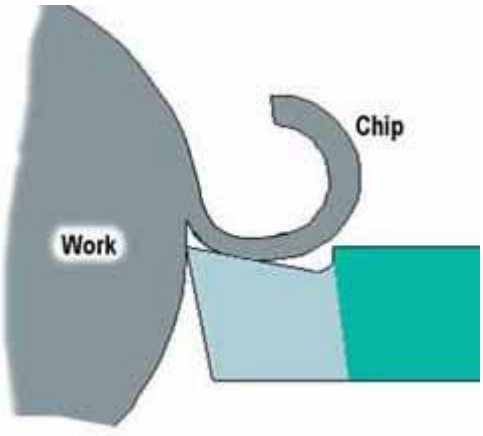


Figure 7. Continuous Chip

Discontinuous Chip

The chip leaves the tool as small segments of metal resulted from cutting brittle metals such as cast iron and cast brass with tools having small rake angles. There is nothing wrong with this type of chip in these circumstances.

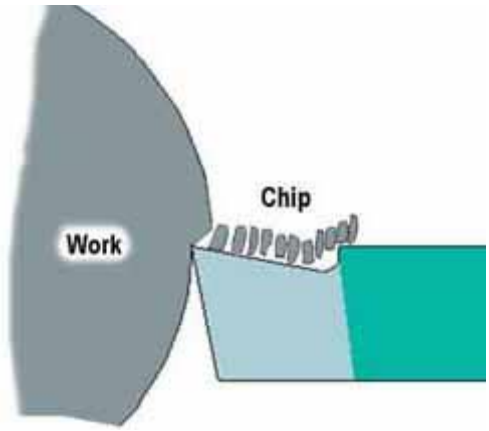


Figure 8. Discontinuous Chip

Continuous Chip with Built-up Edge

This is a chip to be avoided and is caused by small particles from the work piece becoming welded to the tool face under high pressure and heat. The phenomenon results in a poor finish and damage to the tool. It can be minimised or prevented by using light cuts at higher speeds with an appropriate cutting lubricant.

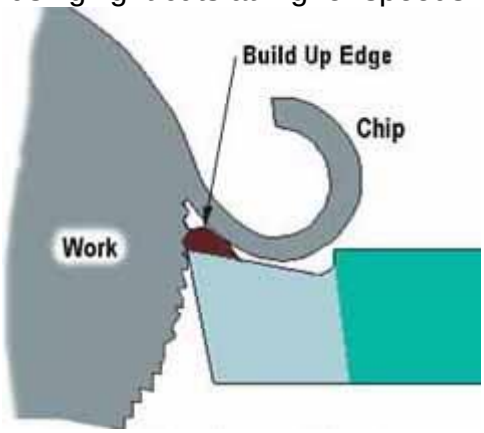


Figure 9. Continuous Chip with Build-up Edge

Chip Breaker

A chip breaker is used to break the continuous chip into sections so that the chips cannot tangle around the cutting tool. Grinding a groove on the tool face a few millimeters behind the cutting edge makes the simplest form of chip breaker.

Cutting Speed & Feed

As you proceed to the process of metal cutting, the relative `speed' of work piece rotation and `feed' rates of the cutting tool coupled to the material to be cut must be given your serious attention. This relationship is of paramount importance if items are to be manufactured in a cost-effective way in the minimum time, in accordance with the laid down specifications for quality of surface finish and accuracy. You, as a potential supervisory / management level engineer, must take note of these important parameters and ensure that you gain a fundamental understanding of factors involved.

Cutting Speed

All materials have an optimum Cutting Speed, and it is defined as the speed at which a point on the surface of the work passes the cutting edge or point of the tool and is normally given in meters/min. To calculate the spindle Speed required,

$$N = \frac{CS \times 1000}{\pi d}$$

Where:
N = Spindle Speed (RPM)
CS = Cutting Speed of Metal (m/min)
d = Diameter of Work piece

Table 2 shows the cutting speed recommended for some common metals. It may be possible to exceed these speeds for light finishing cuts. For heavy cuts they should be reduced.

Metal	meters /min
Cast Iron	20-28
Mild Steel	18-25
High Speed Steel	12-18
Brass	45-90
Bronze	15-21
Aluminium	up to 300

Table 2. Cutting Speed

Feed

The term `feed' is used to describe the distance the tool moves per revolution of the work piece and depends largely on the surface finish required. For roughing out a soft material a feed of up to 0.25 mm per revolution may be used. With tougher materials this should be reduced to a maximum of 0.10 mm/rev. Finishing requires a finer feed then what is recommended.

Cutting Fluid & Lubricant

The aims in metal cutting are to retain accuracy, to get a good surface finish on the work piece and at the same time to have a longer tool life.

However, during the metal cutting process heat is generated due to:

- the deformation of the material ahead of the tool
- friction at the tool point

Using a lubricant can readily reduce heat generated due to friction. Heat caused by deformation cannot be reduced and yet a fluid can carry it away. Thus the use of a cutting fluid will serve to reduce the tool wear, give better surface finish and a tighter dimensional control.

The proper selection, mixing and application of cutting fluids is however often misunderstood and frequently neglected in machining practice. In order that the cutting fluid performs its functions properly it is necessary to ensure that the cutting fluid be applied directly to the cutting zone so that it can form a film at the sliding surfaces of the tool.

Cutting fluids in common use

Water

It has a high specific heat but is poor in lubrication and also encourages rusting. It is used as a cooling agent during tool grinding.

Soluble Oils

Oil will not dissolve in water but can be made to form an intimate mixture or emulsion by adding emulsifying agents. The oil is then suspended in the water in the form of tiny droplets. These fluids have average lubricating abilities and good cooling properties.

Soluble oils are suitable for light cutting operations on general-purpose machines where high rates of metal removal are often not of prime importance. There are many forms of soluble oil in the market and the supplier's instruction should be followed regarding the proportions of the `mix'.

Mineral Oils

They are used for heavier cutting operations because of their good lubricating properties and are commonly found in production machines where high rates of metal removal are employed. Mineral oils are very suitable for steels but should not be used on copper or its alloys since it has a corrosive effect.

Vegetable Oils

They are good lubricants but are of little used since they are liable to decompose and smell badly.

Screw Cutting

During this module you are required to explore the use of the lathe to cut, amongst other things, a metric screw thread on a bar. It is a slightly more difficult task than plain turning because it involves accurate setting up of the tool and exact setting of feed in relation to the work rotation. Once this is done however, and this you will be shown, the process of screw cutting becomes relatively simple. Fig 10 shows the arrangement in simplified form.

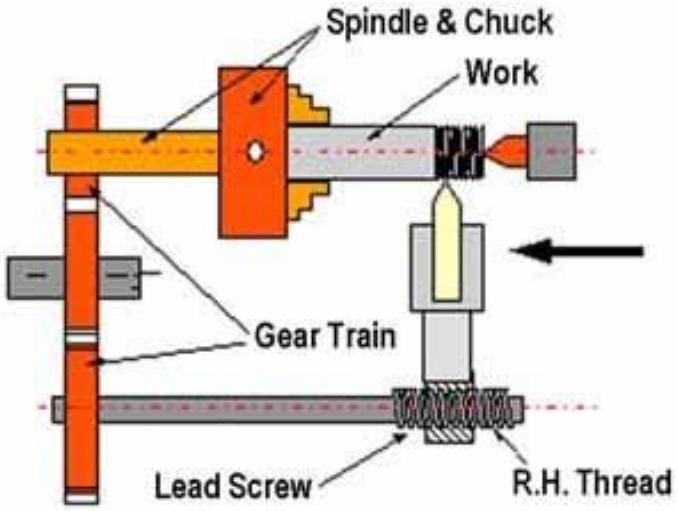


Figure 10. Screw Cutting Set-up

There are many different forms of screw thread; Fig 11 shows the 'sections' of three most common types.

More types and specifications of screw threads can be found in any Workshop Technology Hand Books and you must get used to finding such information and knowing how to apply it.

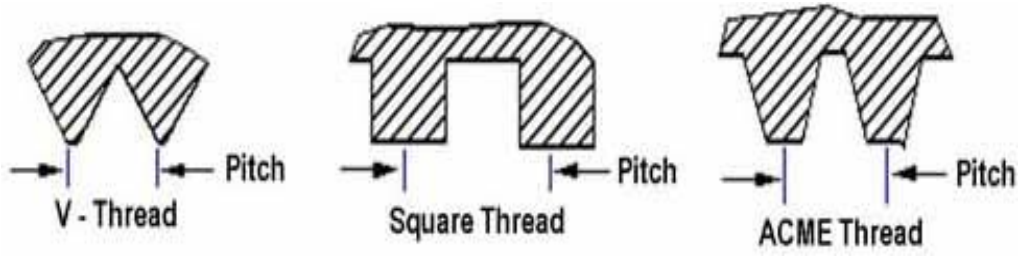


Figure 11. Types of Screw Thread

CONCLUSION

Lathes are normally robust in construction, and they will, with good care, last for many years. It is not unusual for instance to see good lathes still in use that are 50 years old.

To ensure good, accurate, trouble-free use it is necessary that the correct maintenance routines are regularly carried out and that important surfaces such as slide-ways are kept well protected so as to reduce wear and thus maintain good accuracy. This aspect of 'good husbandry' should be of interest to you and you will be expected to demonstrate an understanding of this. In this respect the types of maintenance routine carried out, the design and accessibility of the maintenance system, and the lubricants used, are all factors that require your attention.

Standard Accessories

1) Motor pulley	2) Tool post wrench	3) Allen wrench	4) Double end wrench
5) Change gear	6) 3 – Jaw chuck	7) Centre sleeve	8) Screw driver
9) Back plate	10) Centre	11) Oil gun	12) Tool box
13) Motor	14) Follow rest	15) Steady rest	16) Face plate

Electric system

Standard lathe is wired for 200V, 1 phase 50 cycles; other connection can be made at customers' request.

The electrical 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 lathe and connect the ground wire. Turn on the power and check turning direction of spindle, if wrong, firstly, turn off the motor and cut off the power source, then change the wires as the wiring chart shows.

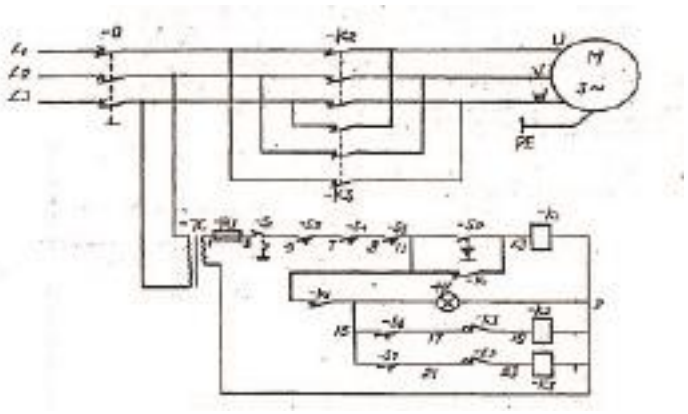
Caution

If you need to change the connection in the electrical box, please ask a local electrician or technologist to assist. The diameter of wire must not be less than 1.5mm.

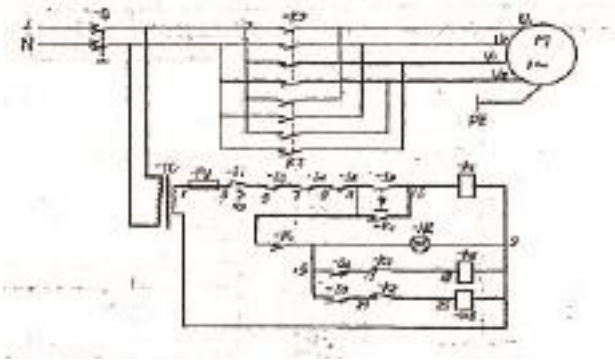
The electrical and wiring charts are designed in accordance with the condition that all kinds of protection installations have been fitted.

Electrical chart

Three Phase: 220V/380V/440V

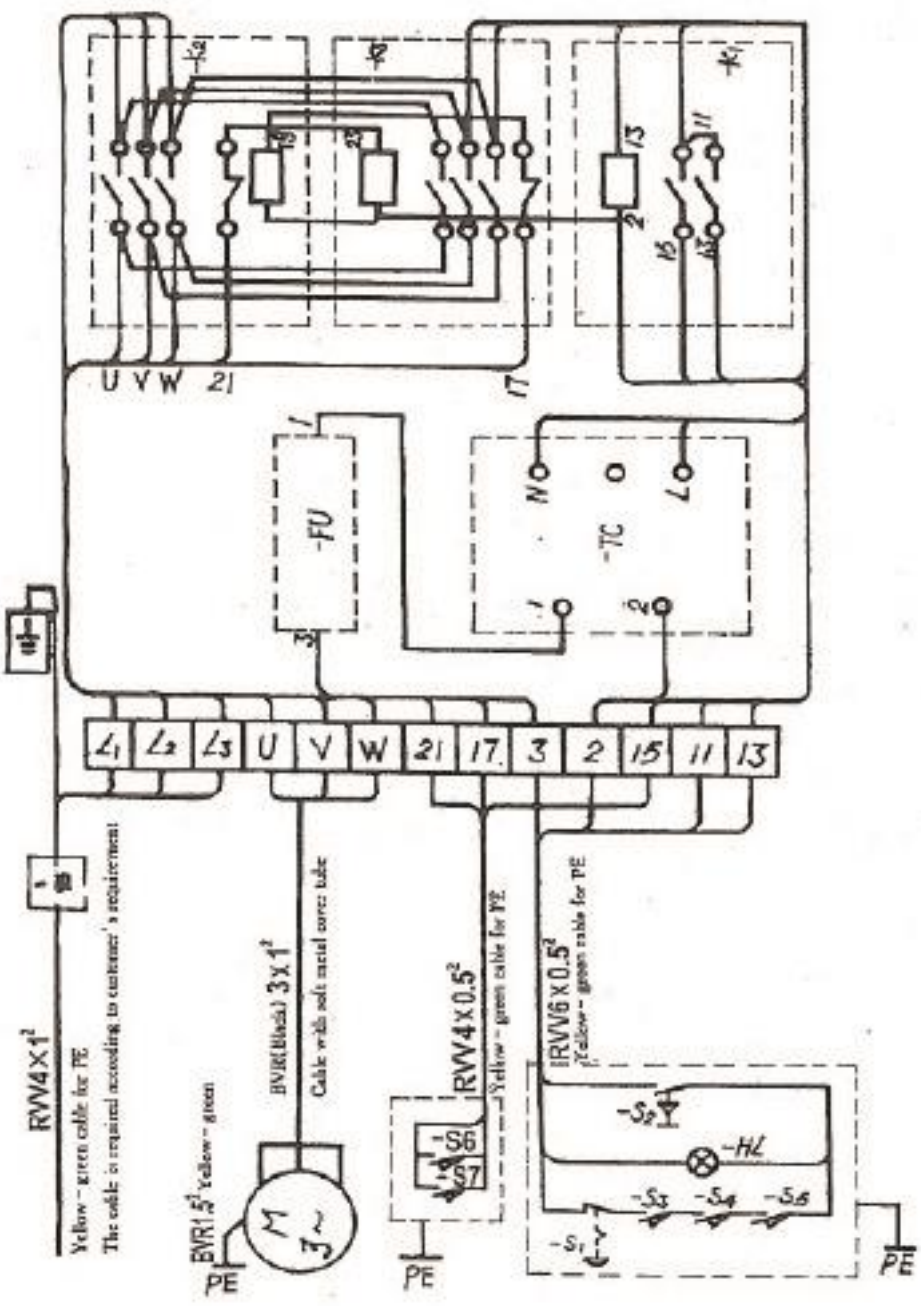


Single Phase: 110V/220V

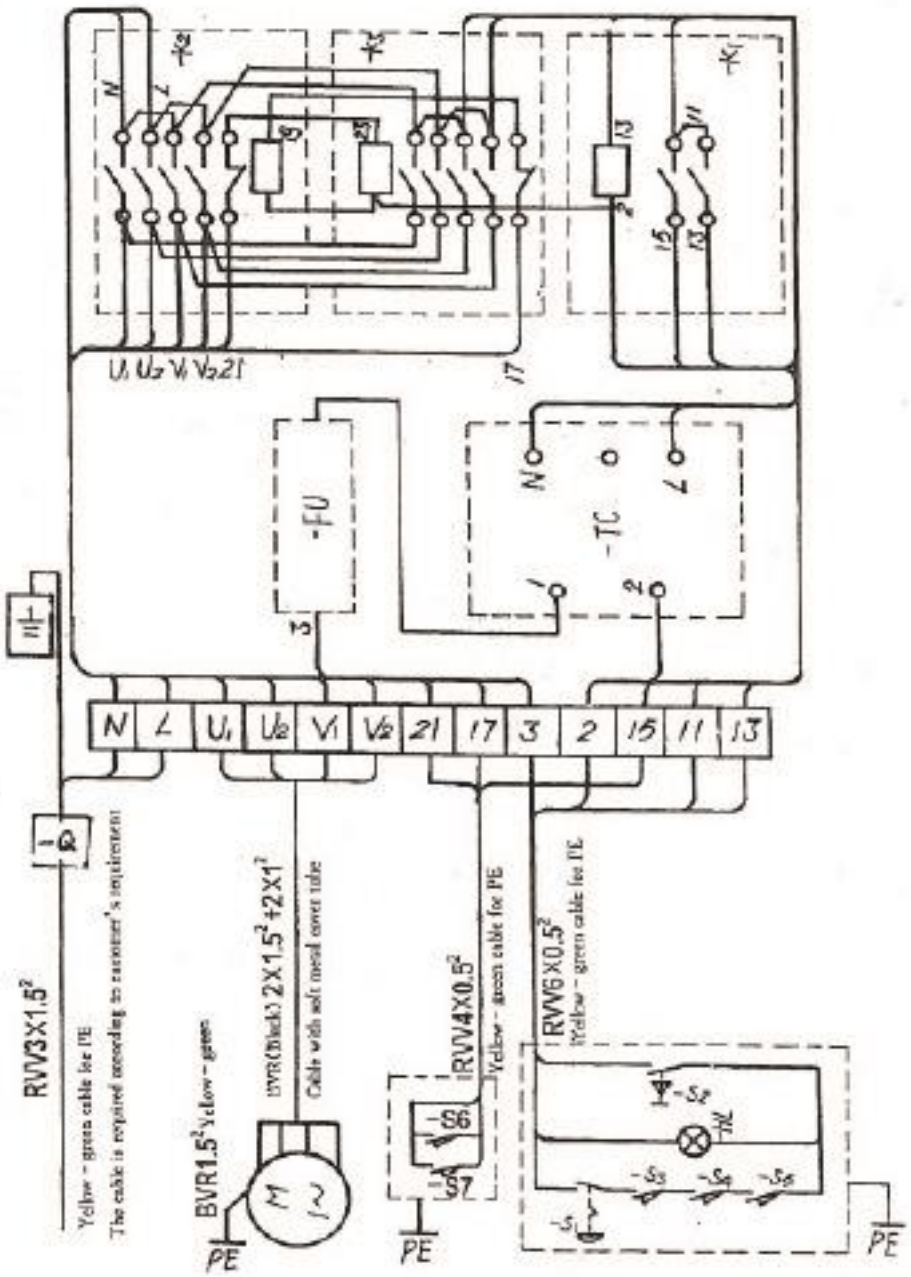


Wire chart

Three Phase: 220V/380V/440V



Single Phase: 110V/220V



Opening the package

The machine is packed in a hard wooden case. When opening this case, you should be careful not to damage the surface of the lathe. Look up the operating manual and check if accessories are full, if not ask local seller for them.

Installation

Caution: The machine must be fitted firmly and stable. Don't turn down, or make any movements without inspection due to shaking, wind power, lashing or any other unexpected external power or internal movement force (such as inertia, motor power etc..).

Foundation

The base for the machine's foundation must be solid and heavy enough to withstand the weight of the machine without noticeable deflection.

Please ensure that the floor is level. Concrete flooring is the ideal foundation. This provides a rigid base and minimizes vibration from adjacent machines.

Test the floor strength prior to installation. To test this; place a level on the floor and put the machine in position, if the bubble shows appreciable deflection the floor must be reinforced.

When determining the position for installation, leave a certain amount of space in left, right, front and back of the machine in accordance with its overall dimension and installation dimension of the machine so that the operating and repairing is convenient.

If you use our stand (available as an optional accessory), please firstly, make a mark and drill eight holes in the eight fitting hole position of base according to fitting dimensions of the stand. Secondly, cover the eight foundation bolts in the base (note position precision when determining the fitting hole position).

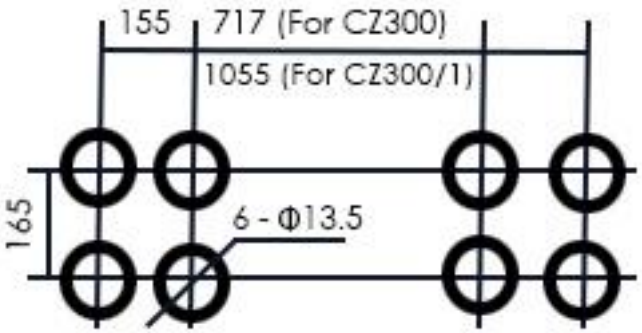
Put the stand on the base, connecting to the eight-foundation bolt. Then place two adjustable iron spacers in each hole face down in the front, back of two stands (to increase the space, please stagger the position of front and back adjustable iron spacers).

Fix the connecting block to left and right of stand. Fit the stand on the base.

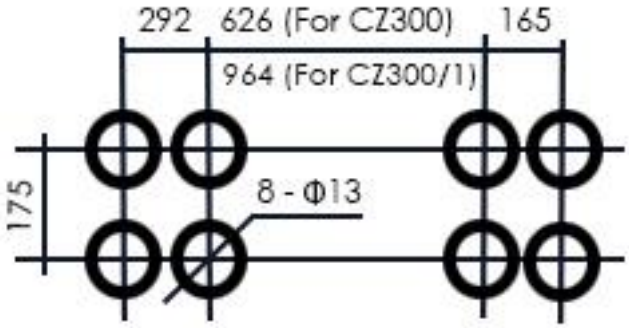
Lastly, lift the lathe on to the small stand and connect, then fix the lathe to the stand using nut and bolts.

If you fit the lathe directly to the base, firstly in accordance with fitting dimension, mark and drill hole in the base of six fitting hole position of lathe, cover six foundation bolts in the base, place two adjustable iron spacers on the front base on 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 to the adjustable iron spacers.

1) Fitting without stand



2) Fitting with stand



Lifting

Place down the mats in which the lifting tools connect before lifting the lathe, to avoid damaging the machine's surface.
The lathe net weight is 330kg, the stands weight is 60kg. When lifting, you must keep the machine in balance and avoid tilting.

The carriage, tailstock and other slide parts of the lathe are locked before leaving the factory. Don't loosen these when lifting, you should inspect these first to confirm whether they are locked or not in order to prevent the parts sliding to make danger.

Carefully put the machine on the base or stand and fix it on by using nuts and bolts.

Cleaning

Prior to shipping, all machines and finished surfaces are coated to prevent rusting. Before moving the carriage or tailstock, use a cleaning solvent to remove the rust preventive coating. Using a brush and solvent to clean the lead screw, rack, feed rod, etc.

Move the saddle, carriage and tailstock to cleaned direction about 300mm, clean the remaining area to remove any residue of rust preventive coating. Move the other way in the same direction and repeat this process. Such care in cleaning will ensure the removal of any foreign particles and prevent the way scoring. Lubricate the ways when finished cleaning.

Levelling

The lathe should always be kept perfectly level.

Levelling Proceedure

A – Longitudinal Levelling

After the bed ways are dry after cleaning, back off the base screws, place a 6’ precision machinist spirit level over the working table along longitudinal direction (bed length direction), move the working table at the headstock end along bed length direction. Make level by adjusting the iron spacers, obtain a reading. Then move the working table to the tailstock, adjust the screw of the adjustable iron spacer until the spirit level obtain the same reading as on the headstock end.

B – Cross Levelling

Put the spirit level on the working table along cross direction (bed width direction), move the working table on the headstock end along 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. No twist is permissible. If the reading is not the same adjust the screw of the iron spacer to get the same reading.

The adjustments at one end will affect the reading of the other, so the levelling procedure should repeat many times, making necessary adjustments using a ruler and iron spacer. After the adjustments are finished, turn down slightly the screw foundation bolt 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 minor adjustments.

After the machine has been put into use for a period of time, check level to observe the condition. Make any adjustments needed as directed above if required.

Caution: Do not use a low precision spirit level. Regularly check the level as part of your routine machine maintenance.

Lubrication

Regular lubrication is important to maintain your machine. The quantity of oil must be moderate, if it is insufficient this will affect the precision of your machine, if it is too much, this will also make the work area unclear. The ideal application of oil will not overflow or come off your machine.

Caution:

- Do not operate the lathe before you thoroughly understand all the controls and functions. Before cutting any work pieces, make a trial running to familiarize yourself with the machine and it's functions.
- Before operating, check oil levels and lubricate all sliding and rotating parts.
- If the lathe has no working light, prepare enough lighting equipment to avoid leading dangers due to poor lighting during cutting.
- Keep clamping the work piece firmly to prevent it from flying off. The outstanding of the work piece should not be too long in order to keep the cutting precision, the rate of the outstanding diameter should be no more than 4.
- When unexpected turning takes place, you should push the emergency stop button or turn off the power at once to stop running.
- When you need to adjust the lathe, work piece, or machine tool, push the stop button to make the machine stop and then adjust.
- When choosing the cut amount you must consider the lathe, tool, or work piece rigid. Don't overload the cut.

When you have finished working, turn the power off and clean the machine. Remove the machine from the power store prior to cleaning.

Spindle Speed

There is a gear and pulley system in the headstock. The main spindle can obtain up to 12 speeds by changing the position of belts or gears. Generally, light load and small diameter work pieces are suitable for high speed. Heavy load and large diameter work pieces are suitable for low speed.

Caution: Do not change speed whilst the spindle is running.

When changing spindle speed please proceed as follows:

- Move the control lever to the middle position, turn off the motor, stop the spindle running.
- Raise the headstock cover and pull the belt tension lever to the loose position.
- Move the belt to the desired position.
- Push the belt tension lever back to the tightened position.

Headstock

Lift the cover to observe the headstock structure.

The headstock is equipped with 2 belts.

Belt tension: It is advisable to check the tension before starting the machine. The belts should depress about ½ inch by normal finger pressure. If the belt is too tight it will damage the bearings, if it is too loose it will cause the belts to slide and speed the belts wear and tear.

If necessary, adjust the tension of the belt. The link mechanism is provided for adjusting the tension of belts. If the belt is loose, loosen bolt and turn out the screw rod until the desired tension is set, then tighten the hexagon bolt in position.

The spindle and bearing are lubricated by the oil from the oil reservoirs which are located at either side of the headstocks.

Pull out the lock pin from the gear and make a half turn to set it in the ‘out’ position.

Pull the lever and turn back to engage the gears. If you are having difficulty, slightly run the spindle by hand to make the gears easy to engage.

Main Spindle Rotation

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

Moving the control lever down the spindle will be forward rotation, moving the control lever up the spindle will be reverse rotation. Control lever in the middle of the spindle will stop.

If the motor is on one phase and you need to change the direction of the spindle, firstly move the control lever from one side to the middle, stop a little till the motor stops then move up or down.
If you move the control lever from one side directly to the other the direction of the spindle won’t change.

Gear Box

The quick-change gear system designs the rate of the spindle to lead screw and the feed rod when it is used for cutting thread, external turning and facing.

The quick-change gear box is controlled by three handles.
Handle 1 has 5 positions (A-E). Handle 2 has 8 positions (1-8).

The additional Handle 3 has 3 positions (Left Hand & Right Hand - Neutral), three positions.

Move the handle to the right for lead screw running to cut thread. Adjust the handle to left, for feed rod running for external turning, internal turning and facing. Move to the middle is for parking.

This machine can be used to cut metric and inch threads when putting the handle to the proper position. Please change the gears A.B.C & D when necessary.

Half nuts must be always kept engaged to lead screw when the thread is being cut. When your finish cutting each time, firstly, make sure the tools are placed back and reverse the motor, then return the tool to the original start – cutting position and begin the next process. Continue until the thread is finished.

Please note that you cannot change the handle whilst the machine is running.

Carriage

The function of the carriage is to firmly support the tool post and carry it whilst moving in longitudinal and cross direction.

Power Feed

When external turning and facing please turn the lever on the gear box to the left and make the feed rod rotate.

If you need the power feed in longitudinal direction engage the cross/longitudinal lever.
If you need the power feed in cross direction, again, engage the cross/longitudinal lever.

While the cross/longitudinal feed lever is in the feed position, the half nut lever cannot be engaged, the built-in safety interlock mechanism will prevent simultaneous engagement.

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

Caution – Do not force the half nut lever whilst engaging with the lead screw.

When using the power feed, the direction of the spindle rotating, carriage moving and cross – slide moving have been designed by mechanism. For example, when the spindle is rotating in a clockwise direction, the carriage moves to the left, conversely to the right.

3 – star gear system can change the carriage travel direction also. When the spindle is rotating in the clockwise direction and the lever is in the up position it makes the carriage move left. When the lever is on down position the carriage moves right. If the lever is in the middle the carriage will stop moving.

Threading Dial

When the pitch proportion of the lead screw and work piece thread is not integer times you need to open the half nut while cutting, it is necessary to use the thread dial to control tools and prevent the mixed screw. The threading dial is located on the right or left side of the apron.

It performs the important of indicating the proper time to engage the half – cut lever so that the tool will enter the same groove as the thread on each successive cut. The dials are 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. The dial when engaged with the lead screw will cause the rotation of the dial. A single line is marked on the housing of the threading dial (fixed line).

The instruction plate riveted on the threading dials shows the selection and sequence of matching and revolving line.

For thread cutting, engage the half – nuts at the appropriate numbers shown on the scale column of the threading dial. 1 – 4 on the scale mean the half – nuts 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’ for the first cut, after that for successive cuts, the half – nut must be engaged on the numbered line ‘1’ or ‘3’. If you engage the half – nut on the numbered line ‘2’ for the first cut, after those successive cuts, the half – nut must be engaged on the numbered line ‘2’ or ‘4’. 1 – 8 means the half – nut can be engaged on any line, numbered or unnumbered.

If the half – nut is engaged with the lead screw all the time while cutting the thread there is no need to use the threading dial. In this case after you have finished each successive cut, firstly, back the tool and reverse the motor, then move the tool to the last start – cutting position and then make the next successive cut.

Four position tool post

The main function of the tool post is to fix the tool. If necessary, the tool post may fix more than one tool (at most 4). Tool thickness must be less than the tool groove.

When installing the tool again you should confirm the tool head direction to the work piece revolving centre line, permitting you to use iron spacers to adjust. After adjusting correctly, please fix the tool.

If you need to turn the tool post, then turn the locking handle anti-clockwise to loosen the locking handle and turn the tool post to the position you need, then turn the tool post lock handle clockwise to make the tool post lock.

Compound slide

Using the compound slide can cut the taper. When cutting the taper please loosen the screw on the saddle, round the compound slide, let the line graduate towards the number on the saddle. Then fix the screw around the driving hand wheel, and then move the tool. Now there is an angle between the travelling line and the turning line of the spindle, thus you can turn the taper.

Tailstock

The tailstock slides along the bed ways freely and can be locked in any position by clamping the lever. There is an end pin to stop the tailstock sliding down. Rotating the tailstock hand wheel can slide the quill. The quill can be locked by the quill lock lever.

Before leaving the factory, we ensure that it is the same line between the tailstock centre and spindle centre.

For cutting small tapers, you must loosen the clamp lever in advance and adjust the set over the screw. Make the deviation between the spindle centre and tailstock centre and then lock the clamp lever. You are now ready to start work.

After finishing proceedings, you should set the tailstock back. In the same way, when doing the external turning using the tailstock centre and getting a taper work piece, please use the same way as mentioned above to adjust the two set over the screw and back to correctly eliminate the taper.

When correcting, use a precise cylinder to connect the two centres of the spindle and the tailstock. Place a meter on the work table, and make its centre head connect to the side centre line, then move the work table to the end of the headstock and take a reading from the metre. Then move the metre to the end of the tailstock and take another reading. These readings must match exactly at each end, if they don’t then use the method mentioned above to make adjustments to get the ends reading the same.

Protection instruments

The lathe can be equipped with several safety precautions as according to the customer’s requirements. These can locate dangerous areas, protect your body and ensure you can use your machine safely.

These instruments include chuck cover, tool post cover and headstock cover, all fitted with micro switch system.

For example, if the chuck cover is being turned over the machine will stop running immediately. The machine can only be run when every cover Is down and every micro switch is turned on.

Caution: Use the safety protection instructions to ensure careful use. If the machine is not working properly, please repair immediately.

Checking problems and repairing

Always turn the machine off at the power socket before checking for any problems.

- **If you turn the machine on but the spindle doesn't rotate**
  The voltage is not right and the machine had turned off - Please adjust the input voltage and turn on the main switch

- **The motor is too hot or not powerful**
  Overloading or working time is too long – reduce it
  The voltage is too low – adjust it
  Poor quality of motor – purchase a new one
  The fuse or wiring contact is not good- please turn off at mains and change the fuse
  The belt is too tight – adjust tension as per instructions

- **The temperature of spindle bearing is to high**
  Not having enough lubrication oil – Refill according to oil gauge
  The bearing assembly is too tight – normally rotate the spindle by hand easily, otherwise adjust the spindle back nut.
  High speed turning for a long time – slightly reduce the cutting amount

- **Shortage of force when the spindle is rotating**
  The belt is too loose or worn – please adjust the belt tension to correct position or change
  The motor is burnt – change to a new one
  The fuse may have blown – change it

- **Making small taper when external turning**

  It is not the same line between the spindle centre and the tailstock centre – adjust the tailstock according to the operation manual.
  The moving line of the carriage is not parallel to the spindle centre – please loosen the lock screw of the head stock and adjust the spindle centre to required position and lock.

- **During proceeding, the surface of the work piece is very rough**
  The space of the spindle bearing is too big – adjust it to the correct size or change to a new one.
  The space between the saddle and the gib is too big – adjust them to correct size.
  The tool is not sharp – sharpen it
  The work piece does not lock tightly – lock it tightly
  The precision of the spindle bearing is incorrect – please change to new one

- **Electrical faults**
  The cable is damaged or worn – change to a new cable
  Link to earth wire not finished – fix the link
  The cable terminal may be loosing and will need to be fixed

Maintenance

Always keep the machine in good condition and precision. Remember that maintenance is better than repair.

Daily maintenance

Before using daily, oil and lubricate all moving parts.
If the spindle temperature is too high or the machine is too noisy, stop the machine and check it in order to keep in running properly.
When your lathe is having difficulty operating, stop it and repair it to prevent further damage. *If you need to please ask for help from your local supplier or repairman.*
Do not over work the lathe.
Before leaving the work space, ensure that you clean the work area. Loosen the belt handle, unload the working piece and turn off the power. Be careful to clean any chippings, shavings and dust. Pour in lubricating and anti-rusting oil.

Weekly maintenance

Clean and protect the lead screw and feed rod.
Look at all the sliding and turning surfaces to see if they are lacking lubrication, then pour lubricating oil onto desired parts.

Monthly maintenance

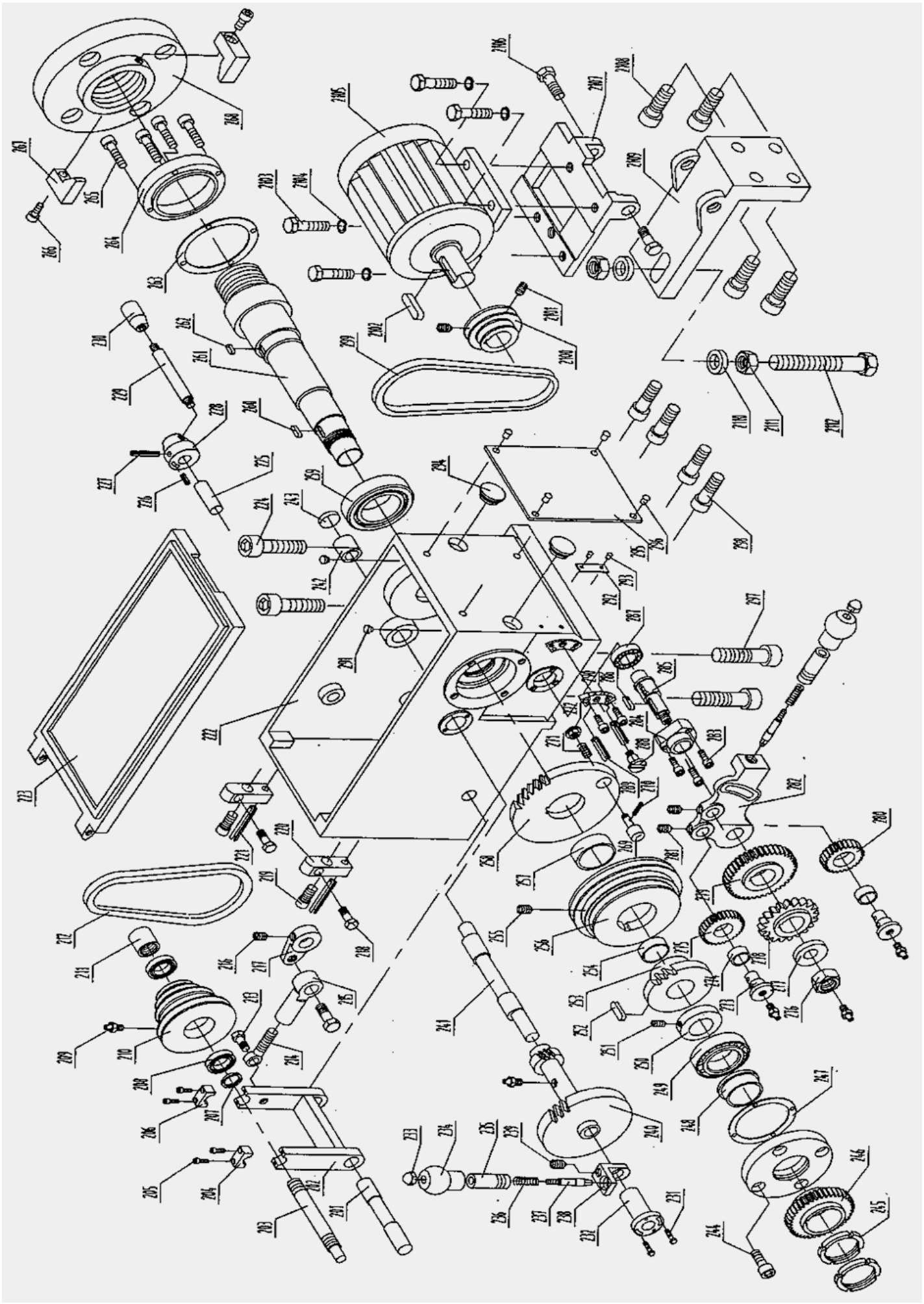
Adjust all the gib space by the saddle.
Lubricate the worm gear, half – nut and bearing in order to prevent wear.

Yearly maintenance

Level the machine in order to ensure accuracy.
Check the cable, terminal switch and other electrical components (no less than once a year) in order to prevent loosening, please exchange if necessary.
Check the accuracy of machine as per the checking chart, please adjust if necessary.

Parts List

Index No.	Part No.	Description	QTY.
101	CM1224C-01-011	Bracket	1
102	GB/T7940.4	Oiler 6	2
103	GB/T70	Key 8×25	1
104	GB/T879	Spring Pin M8×25	4
105	GB/T77	Screw M8×20	1
106	GB/T41	Nut M8	1
107	CM1237CHG-01-009	Rod	1
108	CM1237CHG-01-013	Control rod	1
109	CM1224C-01-015	Cover	1
110	GB/T65	Screw M6×12	2
111	CM1224C-01-014	Block	2
112	GB/T77	Screw M6×6	3
113	GB/T70	Screw M6×12	2
114	CM1224C-01-016	Switch plate	1
115	CM1237CHG-01-010	Bed	1
116	CM1224C-01-005	Sleeve	1
117	GB/T879	Spring pin 5×30	2
118	CM1237CHG-01-006	Longitudinal lead screw	2
119	CM1237CHG-01-007(2)	Rack	2
120	CM1237CHG-01-007(1)	Rack	2
121	GB/T70	Screw M6×20	5
122	GB/T879	Spring pin 5×30	4
123	CM1224C-01-002	Shaft	1
124	CM1224C-01-001	Change gear bracket	1
125	CM1224C-01-003	Spacer	1
126	GB/T95	Washer 10	2
127	GB/T5780	Bolt M10×40	1
128	GB/T276	Bearing 6003-z	2
129	CM1224C-01-004	Change gear	1
130	GB/T41	Nut M10	1
131	GB/T70	Screw M10×34	4
132	GB/T881	Tap pin 8 ×75	2
133	CM1237CHG-01-010(1)	Concave block	1
134	CM1224C-01-017	Stop pin	1

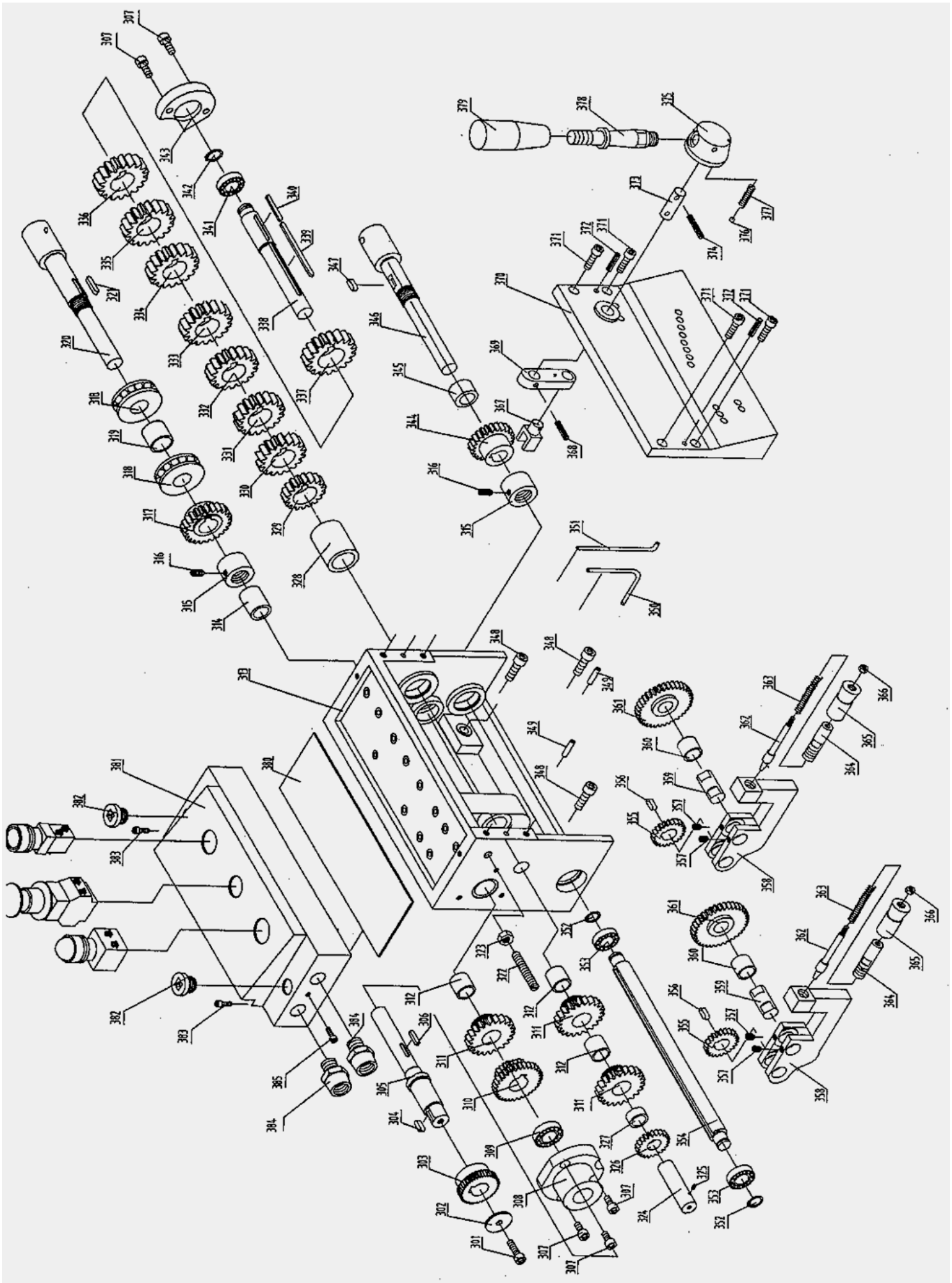


Index No.	Part No.	Description	QTY.
201	CM1224C-02-002	Supporting shaft	1
202	CM1224C-02-001	Bracket	1
203	CM1224C-02-015	Shaft	1
204	CM1224C-02-013	Small cover of bracket	1
205	GB/T70	Screw M5×12	2
206	CM1224C-02-013	Big cover of bracket	1
207	GB/T812	Nut M25×1. 5	1
208	GB/T276	Bearing 6005-z	2
209	JB/T7940.1	Oiler	5
210	CM1224C-02-014	V-Pulley	1
211	CM1224C-02-012	Locking nut	1
212	GB/T1171	V-Belt B838	1
213	CM1224C-02-009	Bolt	1
214	CM1224C-02-011	Bolt	1
215	CM1224C-02-010	Adjustable nut	1
216	GB/T78	Screw M×12	1
217	CM1224C-02-008	Transmission bracket	1
218	GB/T27	Bolt M8×35	2
219	GB/T70	Screw M8×20	2
220	CM1224C-02-049	Hinge	2
221	GB/T879	Spring pin 5×25	2
222	CM1224C-02-003	Headstock	1
223	CM1224C-02-046	Cover	1
224	GB/T70	Screw M10×35	2
225	CM1224C-02-007	Tension Axle	1
226	GB/T879	Spring pin 5×14	1
227	GB/T879	Spring pin 5×40	1
228	CM1224C-02-050	Lever seat	1
229	CM1224C-06-015	Lever	1
230	GB/T4141.14	Knob BM10×50	1
231	GB/T70	Screw M6×10	2
232	CM1224C-02-047	Back gear cover	1
233	GB/T923	Nut	2
234	CM1224C-02-051(3)	Positioning lever	2
235	CM1224C-02-051(1)	Positioning lever grip	2
236	CM1224C-02-051(4)	Compressing spring	2
237	CM1224C-02-051(2)	Positioning shaft	2

Index No.	Part No.	Description	QTY.
238	CM1224C-02-018	Back gear change seat	
239	GB/T78	Screw M8×12	1
240	CM1224C-02-017	Back gear	1
241	CM1224C-02-019	Prejudicial shaft	1
242	CM1224C-02-016	Back gear sleeve	1
243	CM1224C-02-025	Cover	1
244	GB/T70	Screw M8×16	3
245	GB/T812	Nut M45×1.5	2
246	CM1224C-02-021	Gear	1
247	CM1224C-02-053	Gasket	1
248	CM1224C-02-054	Collar	1
249	GB/T296	Bearing D30210	1
250	CM1224C-02-055	Spacer	1
251	GB/T77	Screw M8×20	1
252	GB/T1096	Key 8×20	1
253	CM1224C-02-034	Helical gear	1
254	CM1224C-02-033	Collar	1
255	GB/T78	Screw M6×10	1
256	CM1224C-02-036	V-Pulley	1
257	CM1224C-02-035	Collar	1
258	CM1224C-02-039	Helical gear	1
259	GB/T296	Bearing D30211	1
260	GB/T1096	Key 6×16	1
261	CM1224C-02-41	Main spindle	1
262	GB/T1096	Key 8×14	1
263	CM1224C-02-053	Gasket	1
264	CM1224C-02-040	Main spindle front cover	1
265	GB/T70	Screw M8×20	4
266	GB/T70	Screw M8×16	2
267	CM1224C-02-056	Locking block	2
268	CM1224C-02-057	Face plate	1
269	CM1224C-02-037	Pin	1
270	GB/T879	Spring pin 3×16	1
271	CM1224C-02-038	Spring	1
272	GB/T807	Thin nut M8	1
273	CM1224C-02-022	Axle	2
274	CM1224C-02-023	Spacer	2
275	CM1224C-02-024	Gear	1

Index No.	Part No.	Description	QTY.
276	GB/T6170	Nut M12	1
277	CM1224C-02-027	Washer	1
278	CM1224C-03-009	Gear	1
279	CM1224C-02-029	Gear	1
280	CM1224C-02-043	Gear	1
281	GB/T78	Screw M6×12	1
282	CM1224C-02-030	Tumbler	1
283	GB/T70	Screw M6×16	3
284	CM1224C-02-028	Cover	1
285	CM1224C-02-026	Output shaft	1
286	GB/T1096	Key 5×25	1
287	GB/T276	Bearing 6202	1
288	CM1224C-02-031	Screw	1
289	GB/T879	Spring pin 5×20	2
290	CM1224C-02-032	Position seat	1
291	CM1224C-02-052	Oil seal	2
292	CM1224C-00-002	Plate	1
293	GB/T863.1	Rivet 2.5×5	2
294	JB/T7941.1	Oil ruler	2
295	CM1224C-00-004	Name plate	1
296	GB/T863.1	Rivet 3×6	4
297	GB/T70	Screw M10×30	2
298	GB/T70	Screw M8×30	4
299	GB/T1171	V-Belt B813	1
2100	CM1224C-02-004	Motor pulley	1
2101	GB/T77	Screw M8×16	2
2102	GB/T1096	Key 6×32	1
2103	GB/T5780	Bolt M8×25	4
2104	GB/T93	Spring washer8	4
2105		Motor	1
2106	CM1224C-02-042	Screw	2
2107	CM1224C-02-005	Motor seat	1
2108	GB/T70	Screw M8×30	4
2109	CM1224C-02-006	Motor support seat	1
2110	GB/T96	Washer 12	2
2111	GB/T6172	Nut M12	2
2112	GB/T5780	Bolt M12×75	1

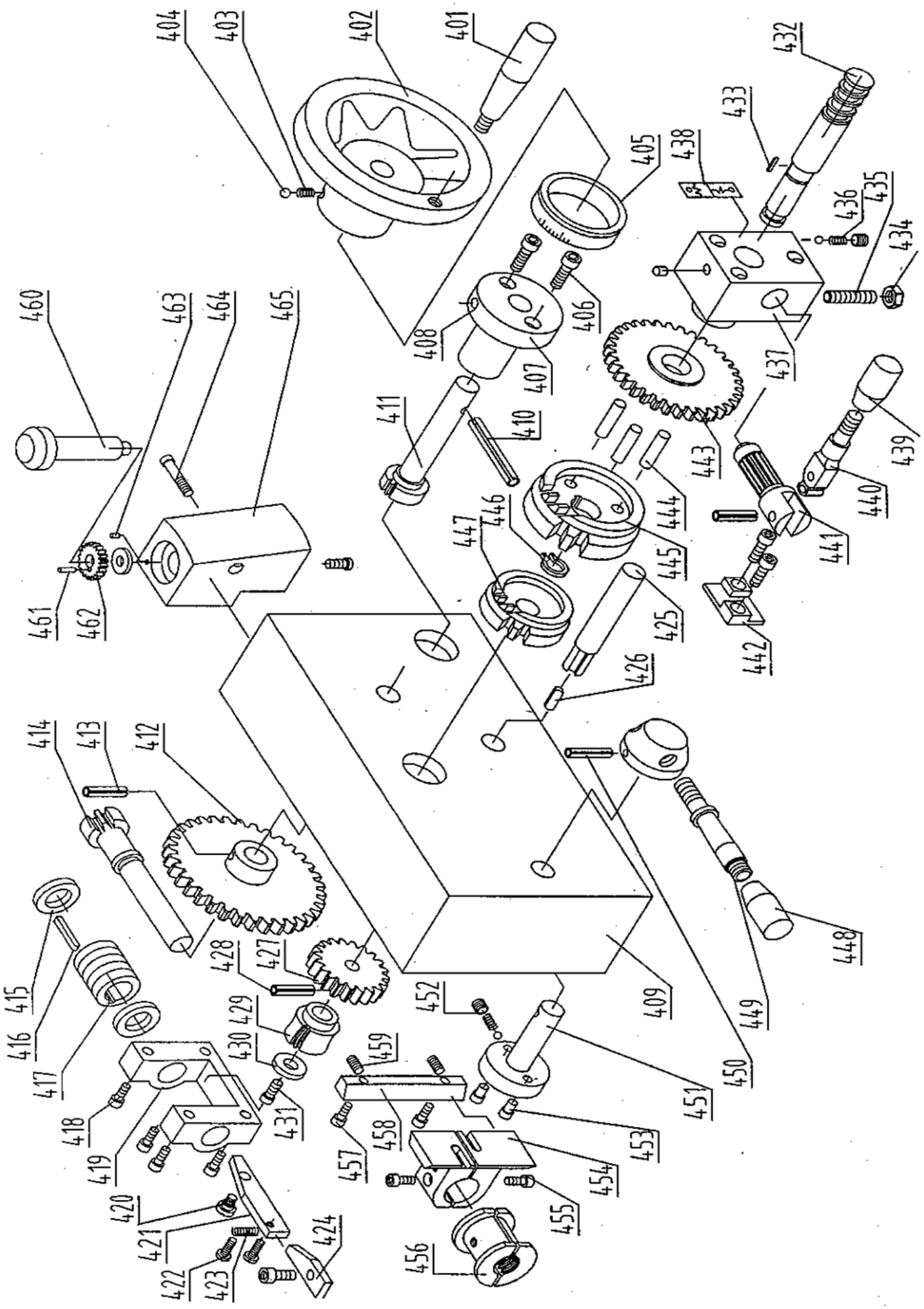
Gearbox Assembly



Index No.	Part No.	Description	Qty.
301	GB/T70-85	Screw M6×12	6
302	CM1224C-03-008	Washer	1
303	CZ300A-03-001	Gear M=1.25,Z=30,60,64,70	4
304	GB/T1096	Key 5×14	1
305	CZ300A-03-017	Inputting shaft	1
306	CM1224C-03-010	Bearing cover	1
307	GB/T276-94	Bearing6003	1
308	CZ300A-03-018	Gear M=2,Z=18	1
309	CZ300A-03-026	Sleeve	2
310	GB/T894.1-85	Retain ring (external) 32	1
311	CZ300A-03-020	Duplex gear M=2,Z=36/27	1
312	Gb/t1096	Key 6×16	1
313	CZ300A-03-021	Duplex gear M=2,z=22/25	1
314	CZ300A-03-042	Sleeve	1
315	CZ300A-03-004	Cover	1
316	GB/T894.1-85	Retain ring (external) 15	1
317	CZ300A-03-041	Adjusting washer	1
318	CZ300A-03-036	Sleeve	1
319	CZ300A-03-039	Gear	1
320	GB/T879	Pin 5×28	1
321	CZ300A-03-038	Shaft	1
322	GB/T1096	Key 5×28	1
323	CZ300A-03-037	Gear M=2,Z=19	1
324	CZ300A-03-036	Sleeve	1
325	CZ300A-03-035	Gasket	1
326	CZ300A-03-034	Cover	1
327	GB/T819	Screw M5×10	3
328	CZ300A-03-046	Cover	1
329	CZ300A-03-047	Gasket	1
330	GB/T894.1-85	Retain ring (external) 15	1
331	GB/T276-94	Bearing 6002	1
332	CZ300A-03-019	Sleeve	1
333	CZ300A-03-044	Sleeve	1
334	CZ300A-03-043	Duplex gear M=2, Z=18/36	1
335	CZ300A-03-022	Gears M=2,Z=27/33/30	1
336	CZ300A-03-042	Sleeve	1
337	CZ300A-03-033	Shaft	1
338	GB/T70-85	Screw M10×10	1
339	GB/T3452.1	Gasket ring 10×1.8	1
340	GB/T70-85	Screw M8×60	5
341	GB/T879	Pin 5×20	2

342	CZ300A-03-040	Box	1
343	CZ300A-03-034	Oil cover	1
344	CZ300A-03-024	Gear	1
345	GB/T879	Pin 5×12	3
346	CZ300A-03-025	Duplex M=2,Z=18/36	1
347	GB/T896-86	Retain ring (external) 12	1
348	CZ300A-03-030	Gear M=2,z=27	1
349	GB/T879	Pin 5×30	1
350	GB/T301	Bearing 8103	2
351	CZ300A-03-031	Sleeve	1
352	GB/T810	Nut M20×1.5	2
353	CZ300A-03-008	Shaft	1
354	CZ300A-03-052	Fork	1
355	CZ300A-03-053	Fork	1
356	CZ300A-03-012	Fork	1
357	GB/T879	Pin 5×25	3
358	CZ300A-03-050	Arm	2
359	CZ300A-03-013	Arm	1
360	GB/T3452.1	Gasket ring 8.75×1.8	2
361	GB/T3452.1	Gasket ring 8.75×1.9	1
362	GB/T894	Retain ring (external) 12	2
363	CZ300A-03-049	Shaft	1
364	CZ300A-03-014	Shaft	2
365	GB/T894	Retain ring (external) 10	1
366	CZ300A-03-027	Gears M=2,Z=27/36/18	1
367	CZ300A-03-028	Gear M=2,Z=32	1
368	GB/T879	Pin 5×20	1
369	CZ300A-03-029	Sleeve	1
370	CZ300A-03-032	Sleeve	1
371	CZ300A-03-009	Shaft	1
372	CZ300A-03-010	Gasket	1
373	CZ300A-03-051	Cover	1
374	GB/T70	Screw M8×16	4
375	JB/T7941.1	Oil level indicator 16	1
376	CZ300A-02-044	Fixing seat	3
377	GB/T879	Pin 5×45	2
378	GB/T879	Pin 5×45	1
379	CZ300A-02-047	Handle	2
380	CZ300A-03-016	Seat of lever	1
381	CM1224C-04-013	Lever	1
382	JB/T7271.5	Grip of lever	1
383	GB/T308	Steel ball 6.5	3
384	GB/T2089	Compression spring 1×5×20	3
385	GB/T73	Screw M8×5	3
386	CZ300A-02-048	Indicator	2

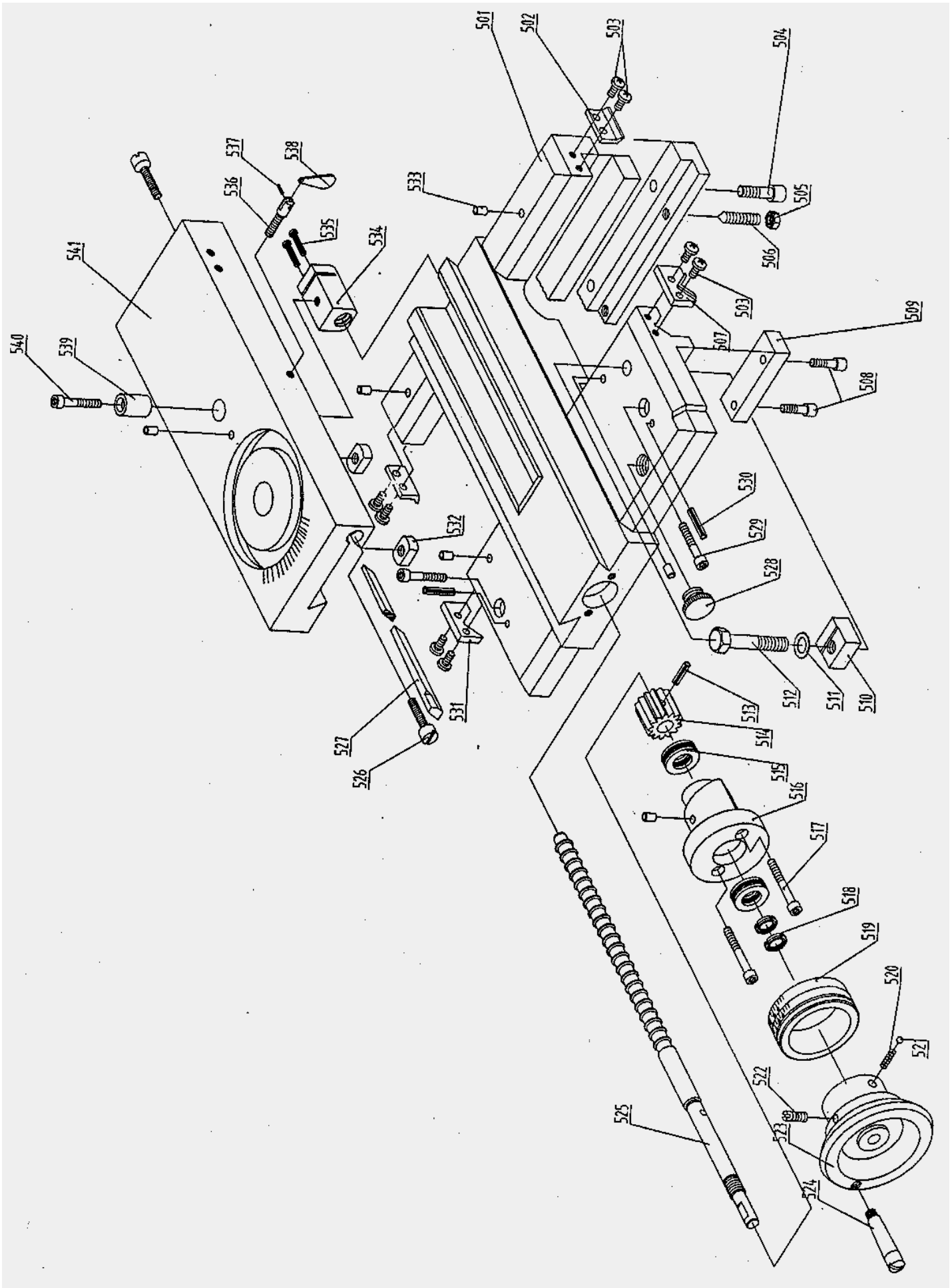
Apron Assembly



NO.	PART NO.	DESCRIPTION	QTY.
401	GB/T4141.1	Handle BM8×63	1
402	CM1224C-04-011	Handwheel	1
403	CM1224C-06-007	Spring	2
404	GB/T308	Steel ball 6	3
405	CM1224C-04-013	Dial ring	1
406	GB/T70	Screw M6×16	3
407	CM1224C-04-014	Handwheel seat	1
408	GB/T7940.4	Oiler 6	2
409	CM1224C-04-015	Apron	1
410	GB/T879	Spring Pin 5×60	1
411	CM1224C-04-012	Gear	1
412	CM1224C-04-016	Gear	1
413	GB/879	Spring pin 5×30	1
414	CM1224C-04-010	Gear shaft	1
415	CM1224C-04-037	Washer	2
416	GB/T1096	Key 5×32	1
417	CM1224C-04-022	Worm	1
418	GB/T70	Screw M6×25	4
419	CM1224C-04-021	Nut seat	1
420	GB/T830	Screw M6×6	1
421	CM1224C-04-035	Safety piece	1
422	GB/T65	Screw M4×14	2
423	CM1224C-04-034	Spring	1
424	CM1224C-04-032	Arm	1
425	CM1224C-04-007	Axle	1
426	GB/T1096	Key 4×20	1
427	CM1224C-04-006	Gear	1
428	GB/T879	Spring pin 5×24	2
429	CM1224C-04-023	Worm	1
430	CM1224C-04-031	Washer	2
431	GB/T70	Screw M6×12	4
432	CM1224C-04-020	Shaft	1
433	GB/T1096	Key 4×8	1
434	GB/T6170	Nut M8	1
435	GB/T75	Screw M8×35	1
436	CM1224C-04-038	Spring	2
437	CM1224C-04-017	Change lever seat	1

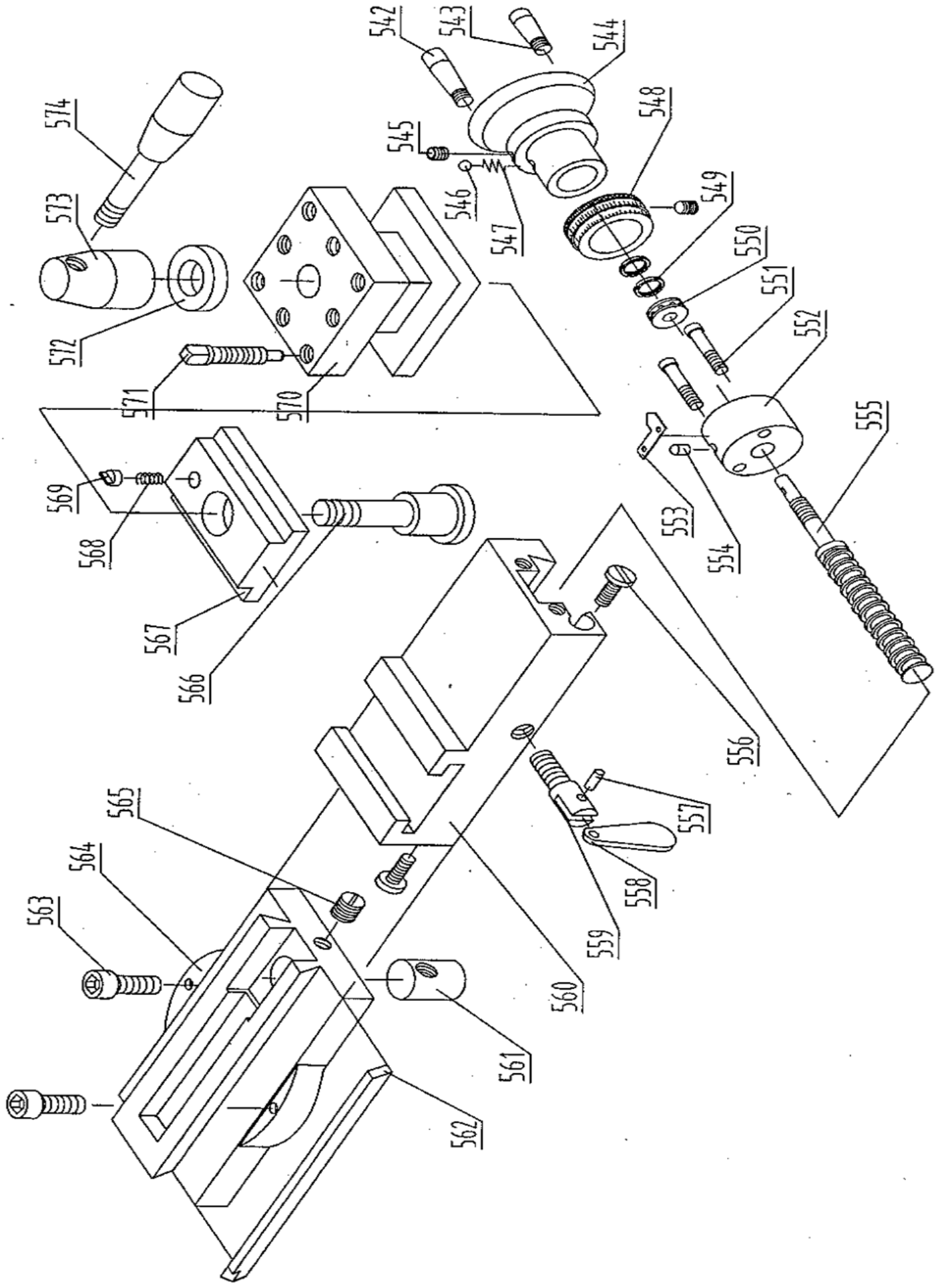
NO.	PART NO.	DESCRIPTION	QTY.
438	CM1224C-00-011	Feed plate	1
439	Gb/t4141.14	Lever grip BM10×50	1
440	CM1224C-04-001	Change lever	1
441	CM1224C-04-018	Rod	1
442	CM1224C-04-002	Safety stopper	1
443	CM1224C-04-008	Clutch gear	1
444	GB/T119	Pin A6×30	3
445	CM1224C-04-009	Clutch	1
446	GB/T894.1	Contain ring	1
447	CM1224C-04-019	Clutch gear	1
448	CM1224C-04-003	Handle	1
449	CM1224C-04-036	Knob	1
450	GB/T879	Spring pin 5×40	1
451	CM1224C-04-004	Rod	1
452	GB/T77	Screw M8×8	2
453	CM1224C-04-024	Pin	2
454	CM1224C-04-026	Half nut seat	1
455	GB/70	Screw M6×8	2
456	CM1224C-04-025	Half nut	1
457	GB/T70	Screw M5×16	2
458	CM1224C-04-029	Guide plate	1
459	GB/T78	Screw M6×12	2
460	CM1224C-04-028	Axle	1
461	GB/T119	Pin 3×12	1
462	CM1224C-04-030	Gear	1
463	GB/T827	Rivet 2.5×5	1
464	GB/T70	Screw M6×45	1
465	CM1224C-04-027	Threading dial	1

Saddle Assembly



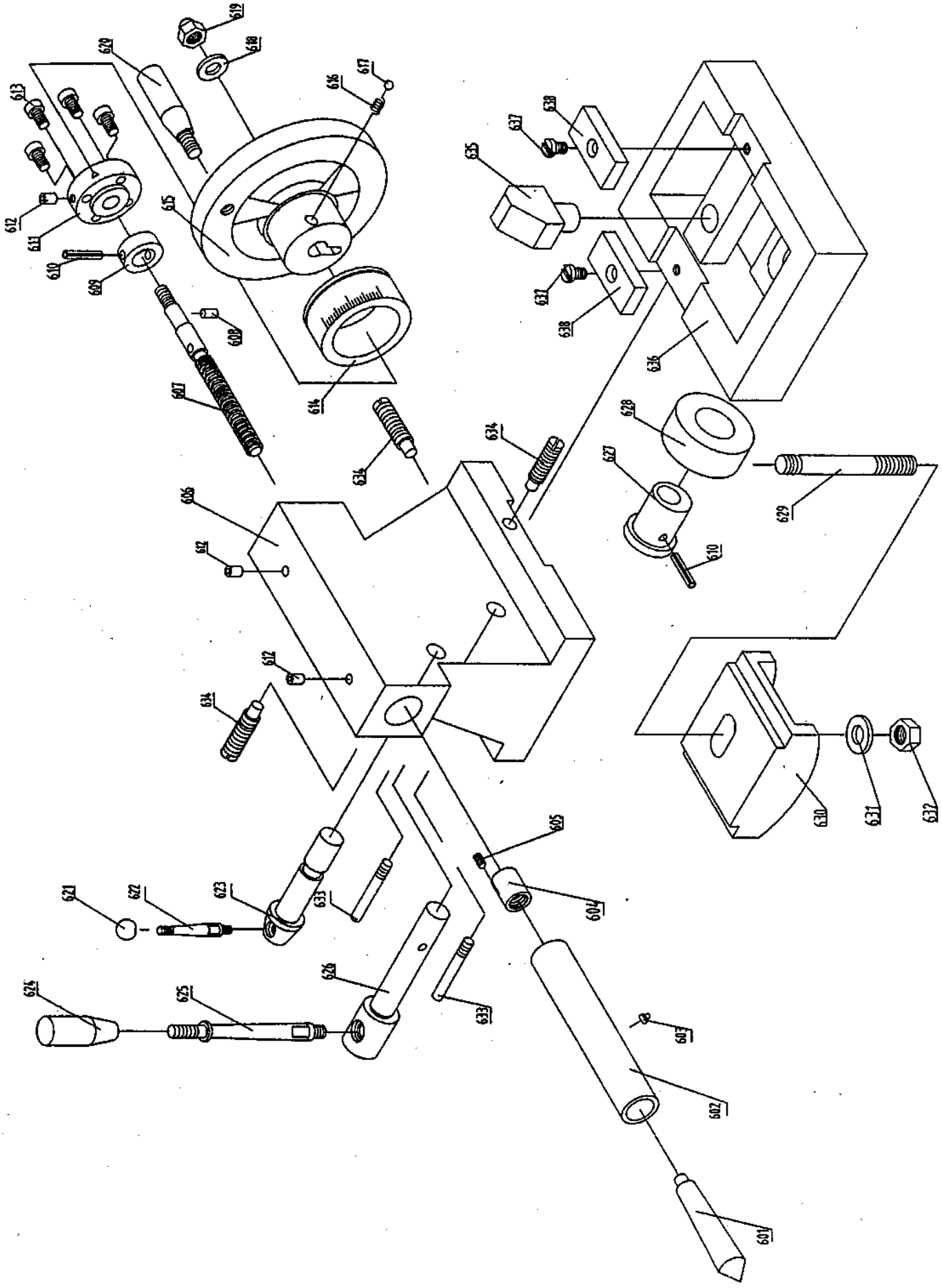
Index No.	Part No.	Description	QTY.
501	CM1224C-05-003	Saddle	1
502	CM1224C-05-044	Wiper	2
503	GB/T818	Screw M5×12	8
504	GB/T70	Screw M8×25	3
505	GB/T41	Nut M8	3
506	GB/T78	Screw M8×22	3
507	CM1224C-05-041	Wiper	1
508	GB/T70	Screw M6×16	4
509	CM12224C-05-040	Block slide	2
510	CM1224C-05-032	Locking block	1
511	GB/T95	Washer 10	1
512	GB/T5780	Bolt M10×60	1
513	GB/T879	Pin 5×20	1
514	CM1224C-05-039	Gear	1
515	GB/T301	Bearing 51101	2
516	CM1224C-05-038	Lead screw seat	1
517	GB/T70	Screw M6×45	2
518	GB/T810	Nut M12×1.25	2
519	CM1224C-05-037	Graduation collar	1
520	CM1224C-06-007	Compressing spring	2
521	GB/T308	Steel ball 6	1
522	GB/T77	Screw M6×16	1
523	CM1224C-05-023	Handwheel	1
524	CM1224C-05-024	Handle	1
525	CM1224C-05-004	Lead screw of saddle	1
526	CM1224C-05-034	Adjusting screw	2
527	CM1224C-05-035	Gib	1
528	CM1224C-03-034	Plug	1
529	GB/T70	Screw M8×30	2
530	GB/T879	Pin 5×35	2
531	CM1224C-05-042	Wiper	1
532	CM1224C-05-008	Fixing block	2
533	JB/T7940.1	Oil cup 6	6
534	CM1224C-05-006	Lead screw nut	1
535	GB/T818	Screw M4×20	2
536	CM1224C-05-022A	Locking screw	2
537	GB/T879	Pin 2×8	2
538	CM1224C-05-022B	Locking lever	2
539	CM1224C-05-007	Fixing seat	1
540	GB/T70	Screw M6×20	1
541	CM12224C-05-005	Cross slide	1

Tool Post Assembly



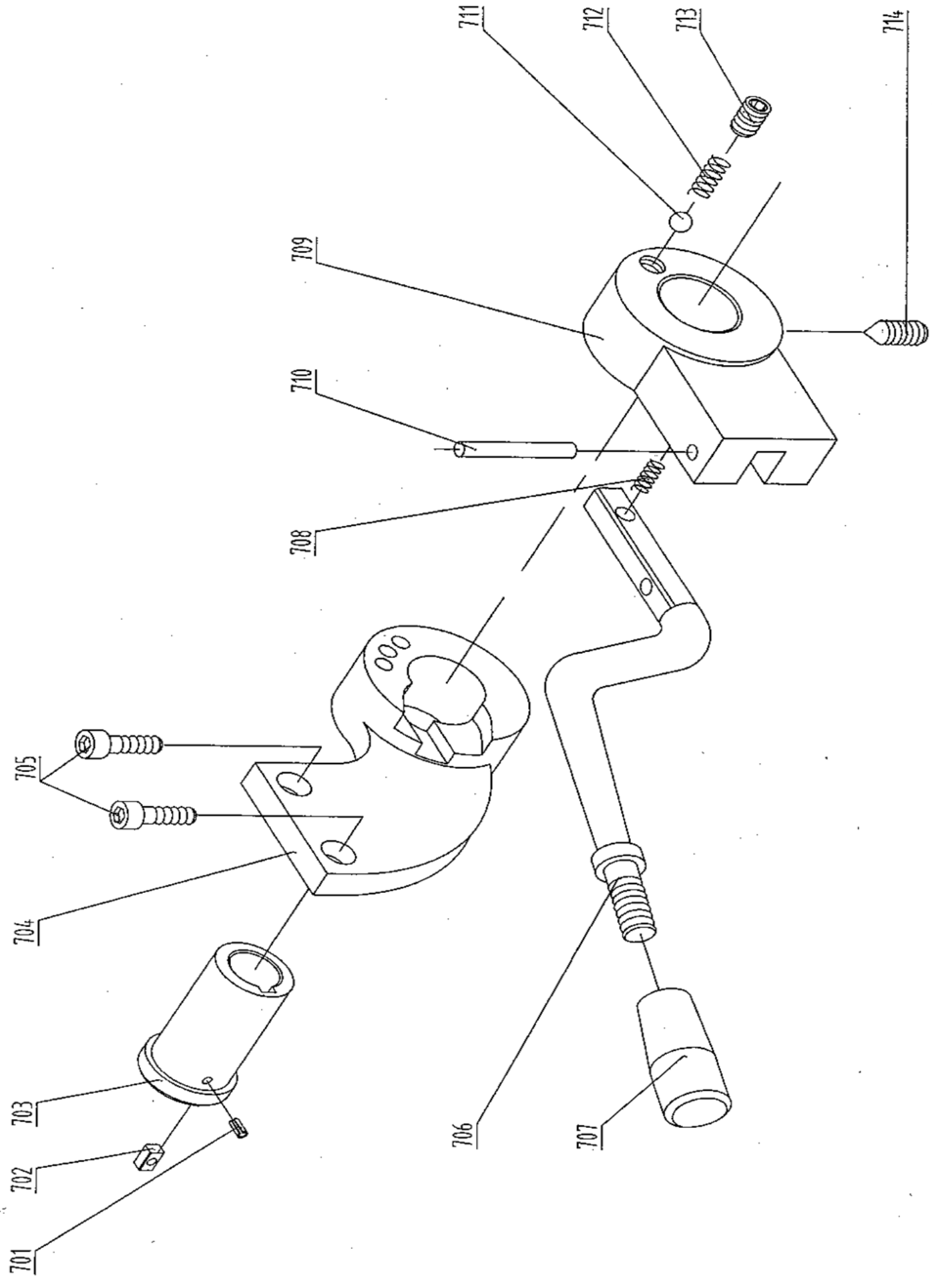
Index No.	Part No.	Description	QTY.
542	CM1224C-05-031	Handle	1
543	CM1224C-05-030	Handle	1
544	CM1224C-05-029	Handwheel	1
545	GB/T77	Screw M6×16	2
546	GB/T308	Steel ball6	1
547	CM1224C-06-007	Pressure spring	1
548	CM1224C-05-028	Graduation collar	1
549	GB/T810	Nut M10×1	2
550	GB/T301	Bearing 51100	1
551	GB/T70	Screw M4×30	2
552	CM1224C-05-027	Leadscrew seat	1
553	CM1224C-00-006	Indicator plate	1
554	JB/T7940.4	Oil cup 6	1
555	CM1224C-05-025	Leadscrew	1
556	CM1224C-05-020	Adjusting screw	2
557	GB/T879	Pin 2×8	2
558	CM1224C-05-022(B)	Clamping knob	1
559	CM1224C-05-022(A)	Clamping screw	1
560	CM1224C-05-010	Base of tool post	1
561	CM1224C-05-026	Leadscrew nut	1
562	CM1224C-05-019	Gib	1
563	GB/T70	Screw M8×24	2
564	CM1224C-05-009	Swivel base	1
565	GB/T78	Screw M6×12	1
566	CM1224C-05-016	Locking screw	1
567	CM1224C-05-043	T-block	1
568	CM1224C-05-011	Compressing spring	1
569	CM1224C-05-012	Locating block	1
570	CM1224C-05-014	Tool post	1
571	CM1224C-05-013	Screw	8
572	CM1224C-05-015	Washer	1
573	CM1224C-05-017	Lever	1
574	CM1224C-05-018	Handle	1

Tailstock Assembly



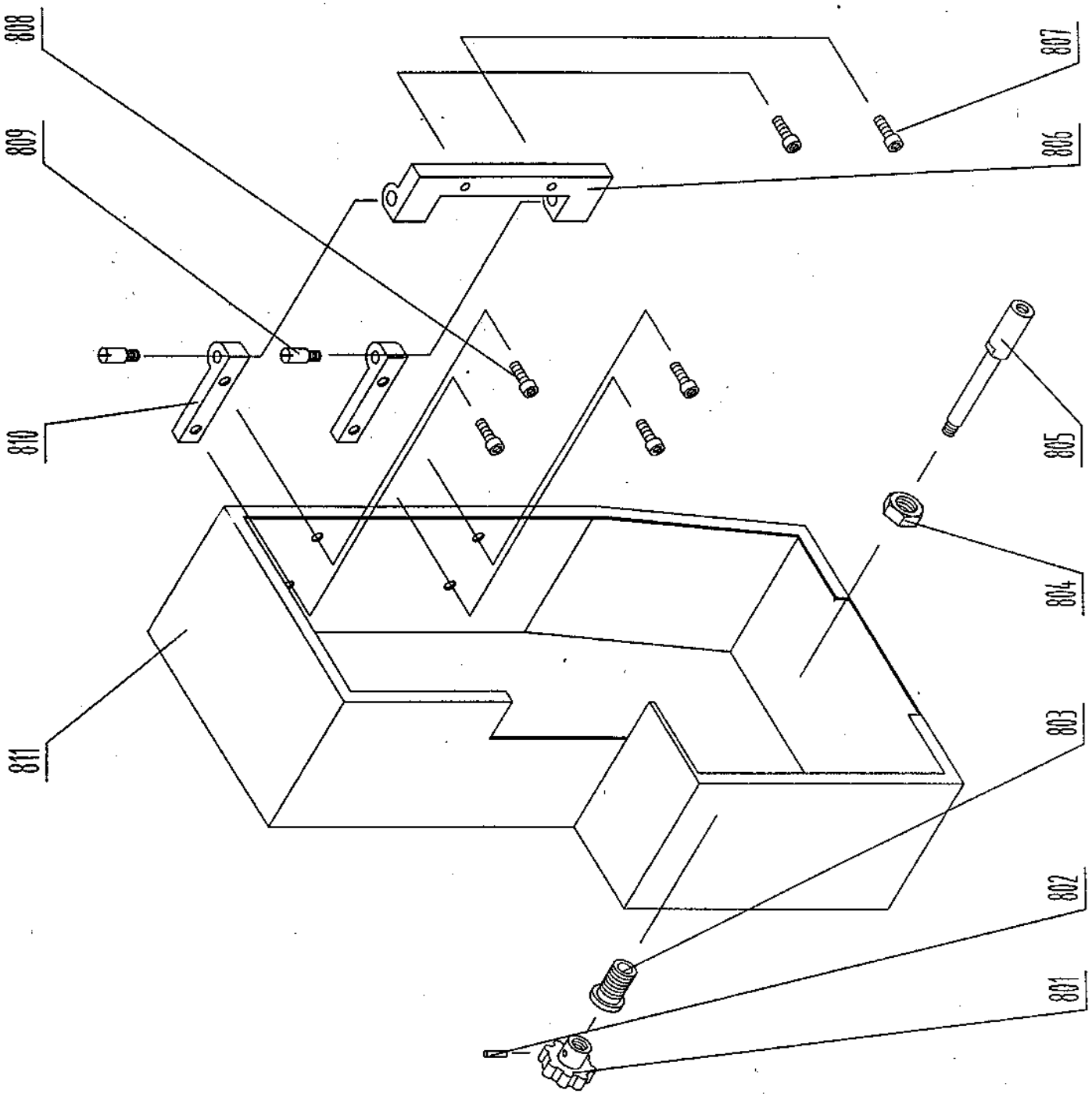
Index No.	Part No.	Description	QTY.
601	GB/T9204.1	Center M.T.3.	1
602	CM1224C-06-002	Tailstock quill	1
603	CM1224C-06-021	T-Key	1
604	CM1224C-06-004	Nut of leadscrew	1
605	GB/T78	Screw M6×10	1
606	CM1224C-06-001	Tailstock	1
607	CM1224C-06-003	Leadscrew	1
608	GB/T119	Pin 5×8	1
609	CM1224C-06-022	Sleeve	1
610	GB/T879	Spring pin5×24	2
611	CM1224C-06-005	Leadscrew seat	1
612	JB/T7940.4	Oil cup	3
613	GB/T70	Screw M6×16	4
614	CM1224C-06-006	Graduation collar	1
615	CM1224C-06-016	Handwheel	1
616	CM1224C-06-007	Spring	1
617	GB/T308	Steel ball 6	1
618	GB/T97.1	Washer 10	1
619	GB/T923	Nut M10	1
620	GB/T4141.1	Handle BM8×63	1
621	GB/T4141.11	Lever ball M6×20	1
622	CM1224C-06-008	Lever	1
623	CM1224C-06-009	Eccentric axle	1
624	GB/T4141.14	Lever grip M10×50	1
625	CM1224C-06-015	Lever	1
626	CM1224C-06-014	Clamping shaft	1
627	CM1224C-06-011	Sleeve of eccentric axle	1
628	CM1224C-06-010	Sleeve	1
629	CM1224C-06-019	Double end bolt	1
630	CM1224C-06-018	Fixing block	1
631	GB/T97.1	Washer 12	1
632	GB/T6170	Nut M12	1
633	CM1224C-06-013	Clamping axle	2
634	GB/T75	Screw M10×40	3
635	CM1224C-06-017	Fixing bracket	1
636	CM1224C-06-020	Base plate	1
637	GB/T68	Screw M6×12	2
638	CM1224C-06-012	Fixing block	2

Control Rod Assembly



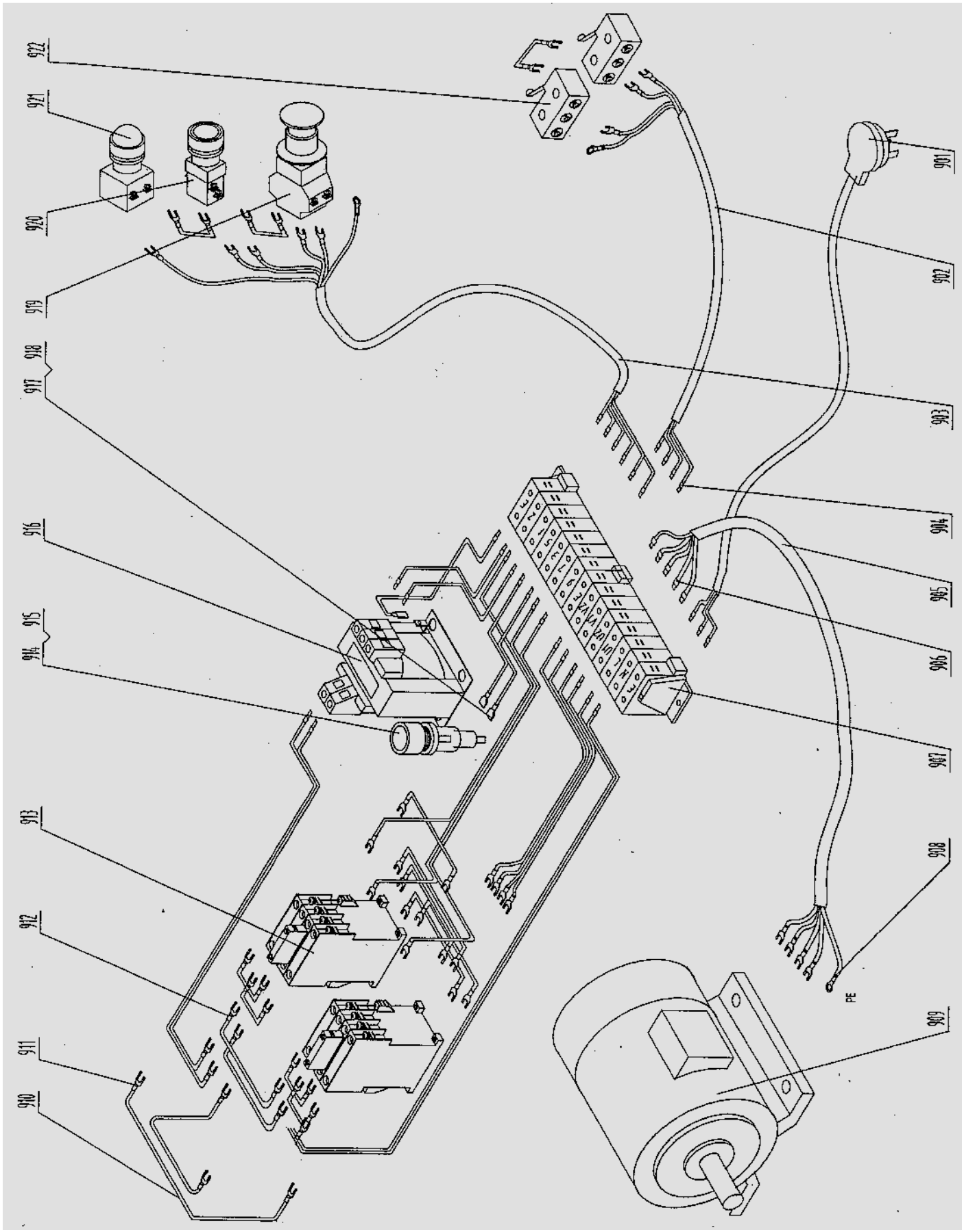
Index No.	Part No.	Description	QTY.
701	GB/T879	Spring pin 3×5	1
702	GB/T1096	Key B5×18	1
703	CM1224C-06-005	Axle	1
704	CM1224C-02-002	Bracket	1
705	GB/T70	Screw M6×12	2
706	CM1224C-07-001	Handle	1
707	GB/T4141.14	Knob BM10×50	1
708	CM1224C-07-004	Spring 1×6×22	1
709	CM1224C-07-003	Cover	1
710	GB/T119	Pin B5×35	1
711	GB/T308	Steel ball 6	1
712	CM1224C-07-006	Spring 1×6×9	1
713	GB/T77	Screw M8×10	1
714	GB/T78	Screw M8×12	1

Headstock Cover Assembly



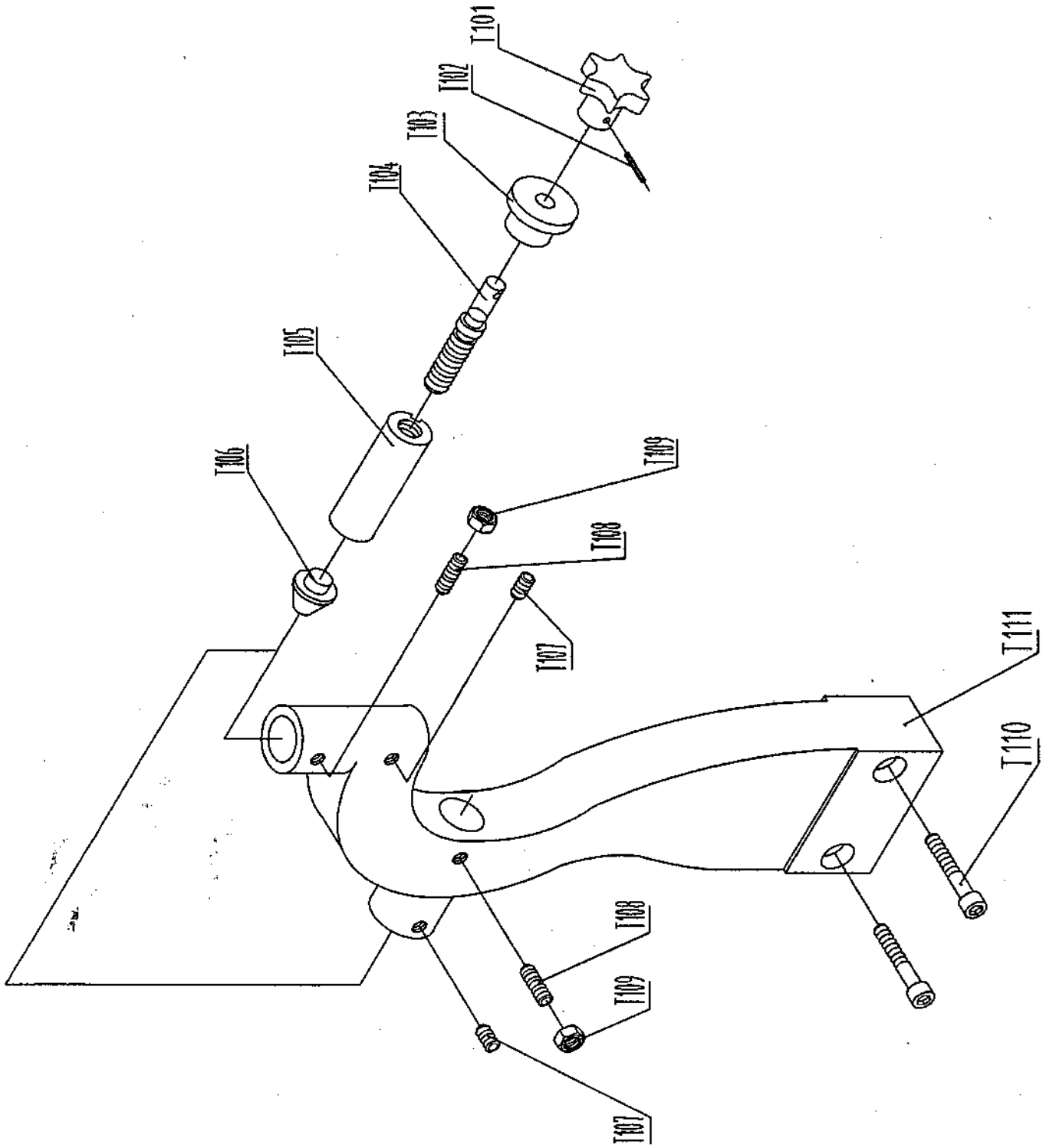
Index No.	Part No.	Description	QTY.
801	GB/T4141.4	Knob BM8×32	1
802	GB/T879	Spring 3×16	1
803	CM1224C-08-006	Sleeve	1
804	GB/T41	Nut M16	1
805	CM1224C-08-005	Locking rod	1
806	CM1224C-08-004	Supporting seat	1
807	GB/T70	Screw M6×16	2
808	GB/T70	Screw M6×12	4
809	CM1224C-08-002	Screw	2
810	CM1224C-08-003	Arm	2
811	CM1224C-08-001	Headstock cover	1

Electric System Assembly



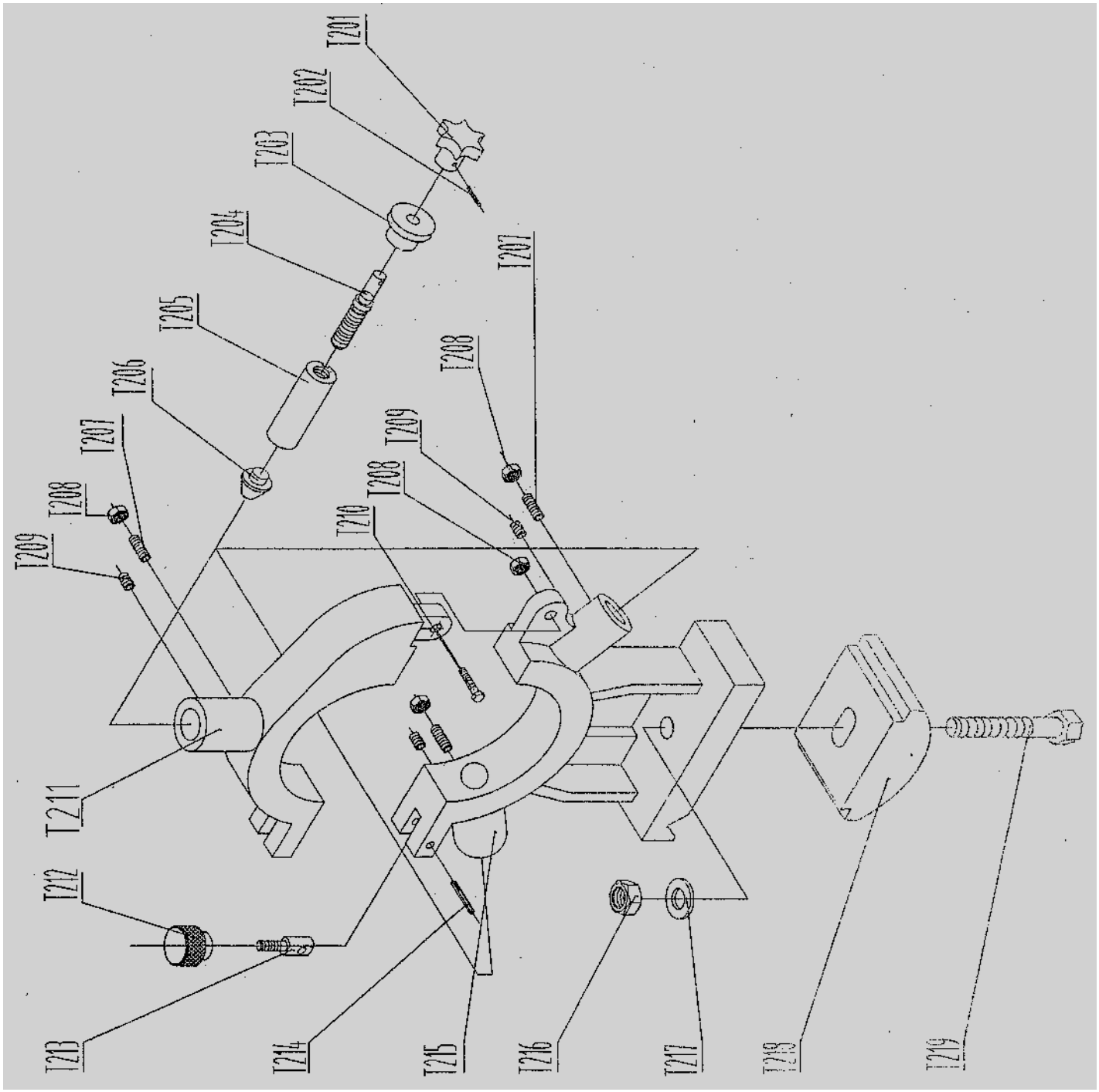
Index No.	Part No.	Description	QTY.
901	RVV3×25	Wire	2 meter
902	RVV4×1	4 core Jacket wire	1 meter
903	RVV6×1	6 core Jacket wire	1 meter
904	UT1-3	Terminal Ø1.0	16
905		Metal soft tube Ø10	0.5 meter
906	UTI5-4	Terminal Ø1.5	14
907	TD1515 (JXB15-18)	Connection block	1
908	OTI5-4	Terminal	3
909	YL90L4	Motor 1.1KW	1
910	BVR1	Copper core wire	3 meter
911	UT1-4	Terminal	20
912	BVR1.5	Copper core wire	2 meter
913	UTI5-4	Terminal	30
914	B16	Contactor	2
915	BLX	Fuse seat	1
916	BLX	Fuse core 2A	1
917	BK50	Transformer	1
918		Joint piece	2
919		Joint tube	2
920	LAY3	Emergency switch	1
921	LA19	Start switch	1
922	AD11	Indicator light(36v)	1
923	LXW5-11G2	Stop switch	2

Follow Rest Assembly



Index No.	Part No.	Description	QTY.
T101	JB/T727404	Star handle M8×30	2
T102	GB/T879	Pin 3×16	2
T103	CM1224C-05T02-003	Collar	2
T104	CM1224C-05T02-002	Adjusting screw	2
T105	CM1224C-05T02-004	Sleeve	2
T106	CM1224C-05T02-005	Clamping block	2
T107	GB/T78	Screw M6×8	2
T108	GB/T71	Screw M6×16	2
T109	GB/T6170	Nut M6	2
T110	GB/T70	Screw M8×35	2
T111	CM1224C-05T02-002	Follow rest	1

Steady Rest Assembly



Index No.	Part No.	Description	QTY.
T201	JB/T7274.4	Star handle M8×30	3
T202	GB/T879	Pin 3×16	3
T203	CM1224C-05T02-003	Collar	3
T204	CM1224C-05T02-002	Adjusting screw	3
T205	CM1224C-05T02-004	Sleeve	3
T206	CM1224C-05T02-005	Clamping block	3
T207	GB/T71	Screw M6×16	3
T208	GB/T6170	Nut M6	4
T209	GB/T78	Screw M6×8	3
T210	GB/T27	Bolt M6×25	3
T211	CM1224C-05T03-003	Cover of steady rest	1
T212	CM1224C-05T03-002	Knob	1
T213	CM1224C-05T03-001	Lever	
T214	GB/T879	Pin 5×30	1
T215	CM1224C-05T03-004	Base of steady rest	1
T216	GB/T41	Nut M12	1
T217	GB/T95	Washer 12	1
T218	CM1224C-06-018	Fixing plate	1
T219	GB/T5780	Bolt M12×70	1

Annex C: (cont.) EC Declaration of Conformity

In accordance with EN 45014:1998

We	Chester UK Ltd.
of	Clwyd Close, Hawarden Industrial Estate, Manor Lane, Hawarden, Chester, CH5 3PZ, UK
declare that product:	Craftsman Lathe
Serial number	

is in accordance with:

98/37/EEC	The Machinery Safety Directive and its amending directives
73/23/EC	The Low Voltage Directive and its amending directives
89/336/EEC	The Electromagnetic Compatibility Directive and its amending directives

and has been designed and manufactured to the following specifications:

BS EN ISO 12100-1&2: 2003	Safety of machinery. Basic concepts, general principles for design
BS EN 13128: 2001	Safety of machine tools - Milling machines (including boring machines)
EN 60204-1:1998	Safety of machinery. Electrical equipment of machines. General requirements
EN 61000-6-2:2001	Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments
EN 61000-6-4:2001	Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Signed by:

.....

CE05

Name:	Michael O'Hare
Position:	Managing Director
Done at:	Chester

845/04D0125