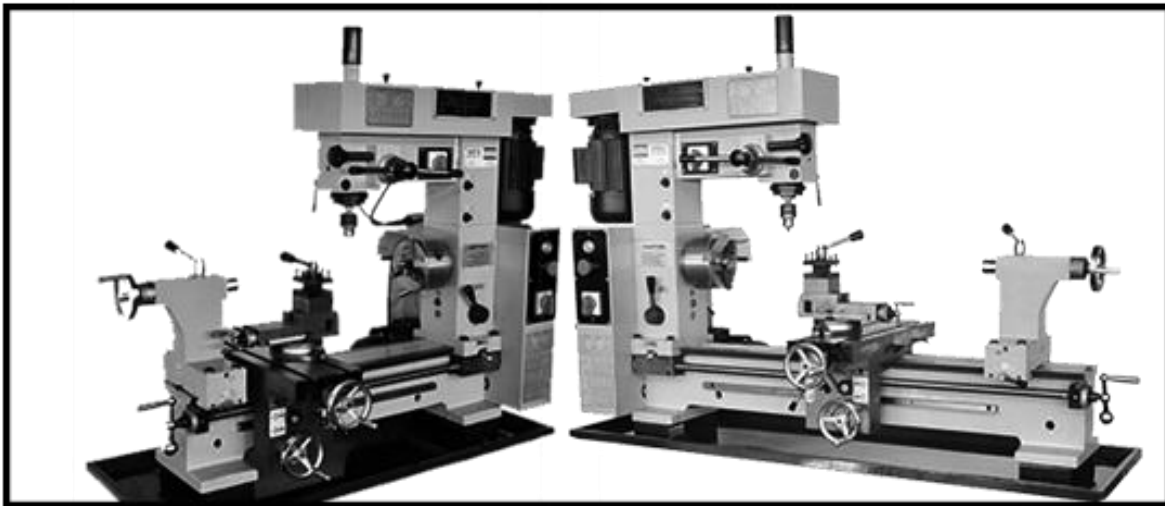


**BOLTON
TOOLS**

OPERATOR'S MANUAL



MULTI-PURPOSE MACHINE

MODELS: BT500 & BT800

BOLTON TOOLS 1136 SAMUELSON ST. CITY OF INDUSTRY, CA 91748

Many thanks for purchasing our Multi-Purpose Machine. Before operating, make sure you study the manual to have a better understanding of the operating procedures. This manual will guide you through assembly, will cover general maintenance, and review safety considerations.

Table of Contents

1. SPECIFICATION	5
2. APPLICATION	6
3. CONSTRUCTION	6
4. ELECTRICAL SYSTEM	6
4.1 COMPOSITION	6
4.2 OPERATION	6
4.3 CAUTION	6
4.4 SPECIFICATION OF FUSE	8
5. GENERAL DIMENSION	8
6. INSTALLATION	8
6.1 FOUNDATION	8
6.2 INSTALLATION OF DRILLING AND MILLING HEAD	9
6.3 LIFTING	9
6.4 CLEANING	10
6.5 LEVELING	10
7. LUBRICATING CHART	10
8. OPERATING INSTRUCTION	11
8.1 CAUTION	12
8.2 MAIN SPINDLE DRIVING	12
8.3 DRILLING-MILLING SPINDEL DRIVING	13
8.4 LONGIUDINAL FEED	13
8.5 CROSS FEEDING	14
8.6 THREAD CUTTING	14
8.7 TAIL STOCK	15
8.8 THREADING DIAL	15
9. CHECKING PROBLEMS AND REPAIRING	15
9.1 If you turn on the current and the spindle doesn't run	15
9.2 The motor is too hot or not powerful	15
9.3 temperature of the main spindle bearing is too high	16
9.4 Shortage of force when the spindle is running	16
9.5 Making small taper when external turning	16
9.6 During machining, the surface of your work piece is very rough.	16

10. MAINTENANCE	16
10.1 Daily Maintenance	16
10.2 Weekly Maintenance	17
10.3 Monthly Maintenance	17
11. STANDARD ACCESSORIES	17
12. OPTIONAL ACCESSORIES	18-44

1. SPECIFICATION

TURNING

Model	BT500	BT800
Distance between centers	19 ³ / ₅ "	31 ¹ / ₂ "
Swing over bed	16 ¹ / ₂ "	
Max. longitudinal travel	17 ³ / ₁₀ "	29 ¹ / ₁₀ "
Max. cross travel	7 ⁴ / ₅ "	
Spindle taper	M.T.4	
Travel of tailstock barrel	2 ⁴ / ₅ "	
Taper of tailstock barrel	M.T.3	
Spindle hole diameter	Ø1 ¹ / ₁₀ "	
Spindle speed	160-1360 RPM (7 steps)	
Longitudinal lead screw pitch	6 T. P. I. or 0.16 inch	
Thread can be cut	4-120 T.P.I. / 0.008-0.24 inch	
Range of automatic feeding (Longitudinal and cross)	0.002-0.014 inch	

DRILLING & MILLING

Spindle taper	M.T.3
Spindle travel	4 ³ / ₁₀ "
Max. distance between spindle center to column	11 ¹ / ₅ "
Max. distance between nose and table	12
Spindle speed	120-3000 RPM (16 steps)
Table size	18.70 x 6.30 inch
Drilling capacity	0.87 inch
End milling capacity	0.87 inch
Face milling capacity	3.15 inch

OTHERS

Motor power	0.55 KW / ³ / ₄ HP	
Voltage/Frequency	110V / 220V	
Net weight	539 lbs.	616 lbs.
Gross weight	605 lbs.	715 lbs.
Overall dimension (BT500)	57.48 x 22.83 x 38 inch	
Packing size (BT500)	56.3 x 22.83 x 43.31 inch	
Overall dimension (BT800)	69.29 x 22.83 x 38 inch	
Packing size (BT800)	44.49 x 22.83 x 43.31 inch	

2. APPLICATION

This precision machine is designed to perform various types of processing jobs. Counterface turning, drilling, threading, and cutting jobs on materials made up of round bar and bar materials. Feed can be controlled automatically or manually, suitable for machining metal, wood and other materials. It is extensively used in small machine shops, training schools, or in house for the hobby machinist.

3. CONSTRUCTION

The machine is compact, and easy to operate with a wide-range in speed. The function of turning, drilling, and milling can be achieved with one machine. Worktable feed can be controlled automatically or manually in a longitude and cross direction. The drilling/milling headstock can be rotated 180°. The machine was designed according to CE standard. It can also be controlled by a personal computer when connecting to it.

4. ELECTRICAL SYSTEM

4.1 COMPOSITION

The system consists of alternating current contactor (-K), red emergency button (-S1), green (-S2), pilot (-HL), micro switch (-S3,-S4,-S5), shift switch, etc. The system has the protection of lose-voltage, and cutting off the current when the cover is open.

NOTE: Not all BT800/BT500 have the limit switches.

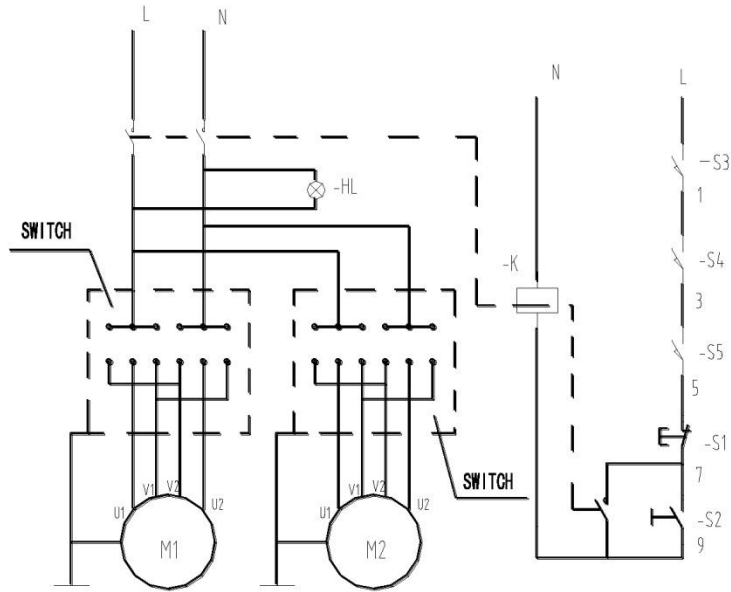
4.2 OPERATION

After all the preparations are finished, close all the protection guards, and release the red emergency button to its original position. Push the green button and you'll see the pilot green light turn on. This indicates alternating current through the main circuit board to fully power the machine. At this time your machine is ready to operate. Push the red emergency button, this will cause the alternating current to cut off and leave the machine in a safety position. At any time when the protection guards or doors are open, the machine will not start.

NOTE: Not all BT800/BT500 have the limit switches or lights.

4.3 CAUTION

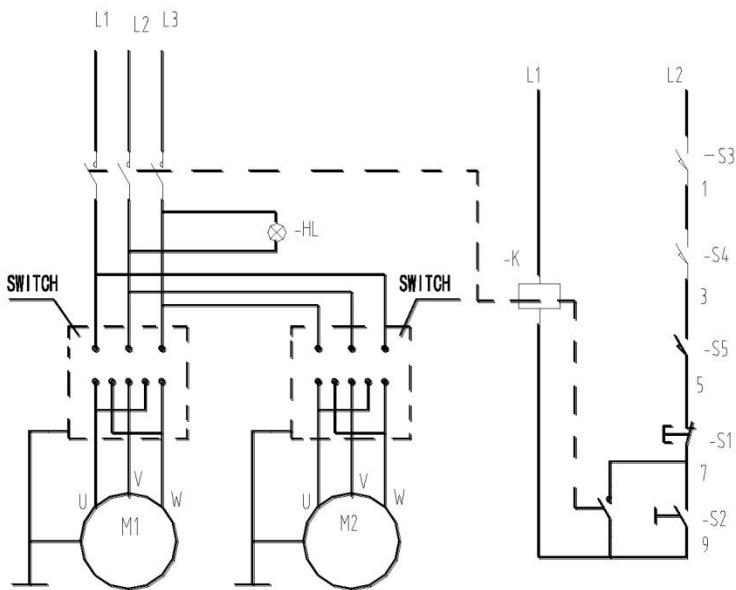
- (1) THE FOLLOWING DIAGRAM SPECIFIES, A FUSE MUST BE CONNECTED BETWEEN CURRENT AND THE MACHINE.
- (2) THE GROUND TERMINAL OF THE MACHINE MUST BE GROUNDED PERFECTLY.
- (3) BEFORE CUTTING OFF CURRENT TO THE MACHINE, DON'T OPEN DOOR TO THE ELECTRICAL SYSTEM. IF SOMETHING IS WRONG WITH THE ELECTRIC SYSTEM, PLEASE DISCONNECT POWER AND CALL BOLTON DIRECTLY AT 909-594-1683.



SWITCH WORKING DIAGRAM

POSITION	FORWARD	0	REVERSE
L-U1	×	-	×
N-U2	×	-	×
L-V1	×	-	-
N-V2	×	-	-
L-V2	-	-	×
N-V1	-	-	×

SINGLE PHASE



SWITCH WORKING DIAGRAM

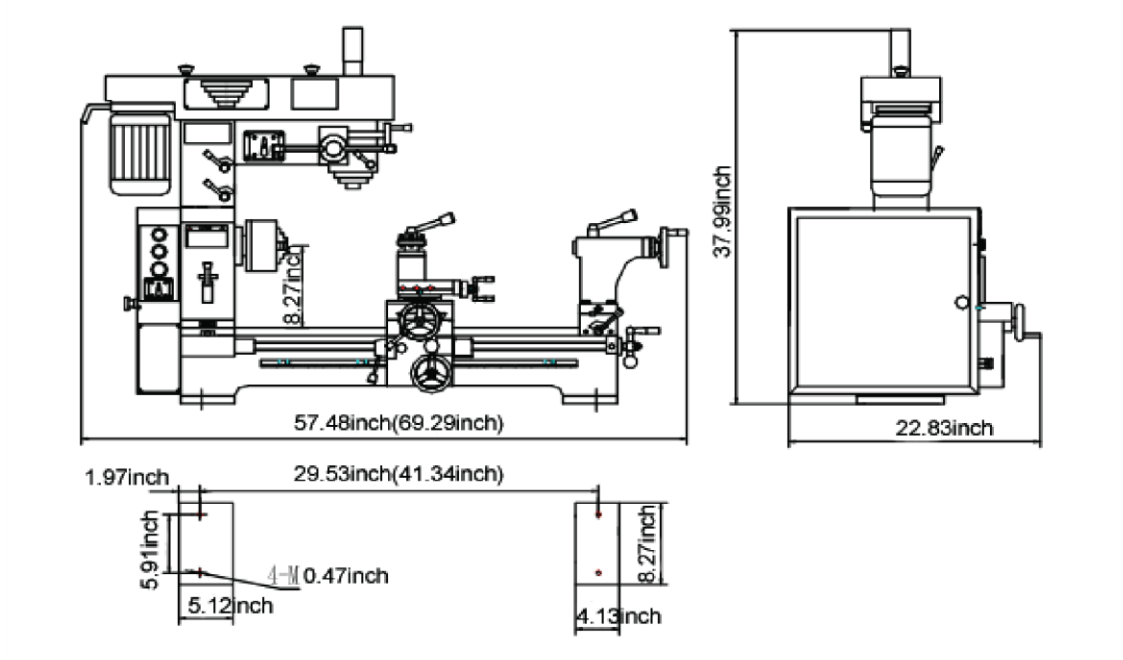
POSITION	FORWARD	0	REVERSE
L1-U	×	-	-
L2-V	×	-	×
L3-W	×	-	-
L3-U	-	-	×
L1-W	-	-	×

THREE PHASE

4.4 SPECIFICATION OF FUSE

VOLTAGE	SINGLE PHASE	THREE PHASE
110V	30A	
220V	20A	10A
380V		7.5A

5. GENERAL DIMENSION



Bed fixing hole size

Overall size

6. INSTALLATION

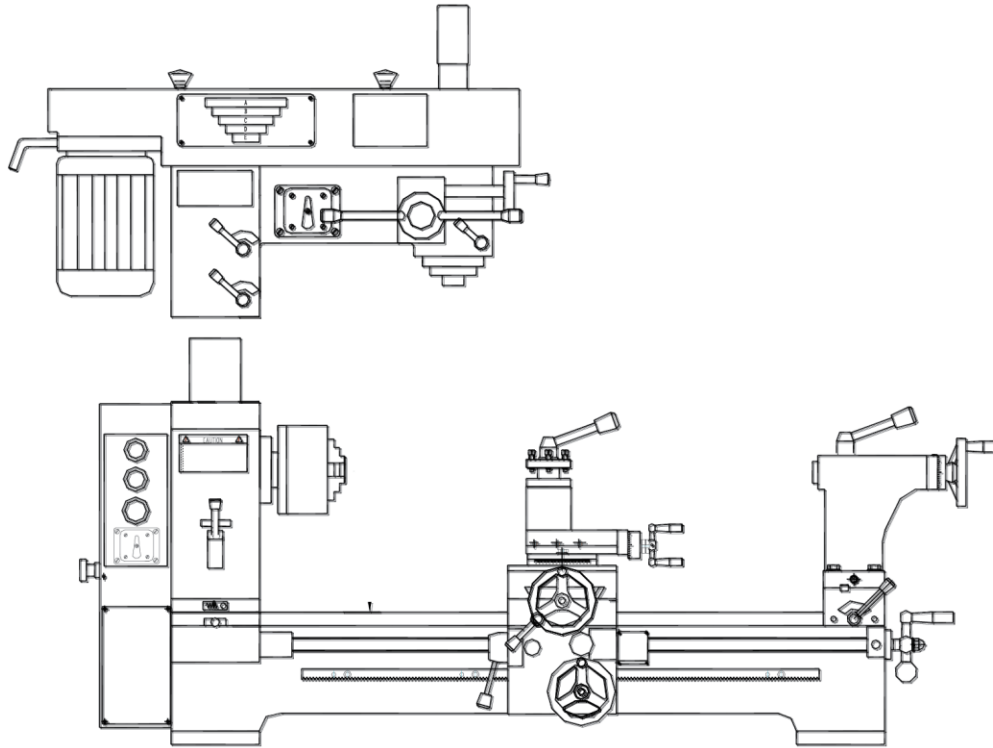
6.1 FOUNDATION

The base of the machines foundation must be solid without noticeable defects and heavy enough to support the weight of the machine. The floor installation must be fairly leveled.

If you use our stand, please place the stand in installation position, then make mark in installation hole position, then move the stand, cover the foundation bolts, place two adjustable iron spacer in the end of headstock and tailstock separately. In order to increase the touched square, please stagger the front and back iron spacers. Hereafter, place the stand on the adjustable iron spacers and fix with foundation bolts. Lift the machine on the stand and fix to stand by using the nut and bolts. If possible, you seek professional for help.

6.2 INSTALLATION OF DRILLING AND MILLING HEAD

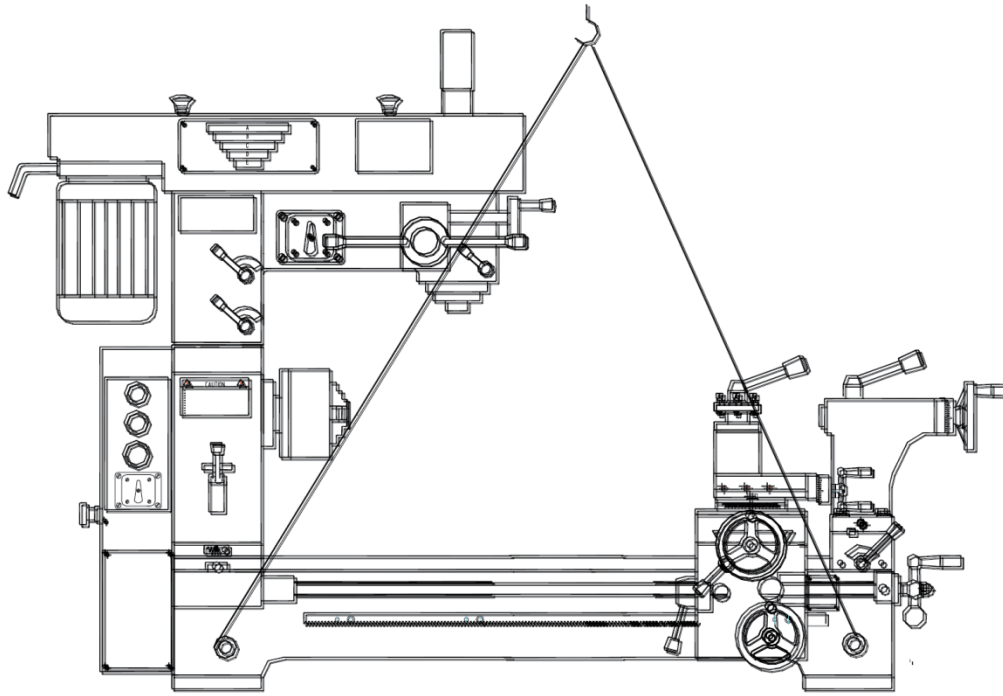
Firstly, clean the drill chuck, arbor taper, and spindle taper. Attach arbor into spindle and gently tighten draw bar. Before completely tightening the draw bar, attach drill chuck to arbor and tighten draw bar. Or attach arbor to drill chuck first, to create one unit. Then insert into spindle and tighten up with draw bar.



6.3 LIFTING

Before lifting the machine, place spacers on the machine in order to prevent its surfaces from being damaged. Position the tailstock and mill table to the far right on the lathe bed. Lock the slide and tailstock to avoid leaning. Use lifting straps, bars and power equipment to lift machine. DO NOT lift the machine by hand. Do not lift machine from any other points than the lifting holes provided. Place the machine carefully on the base, adjust the machine leveling position, and finally fit the machine properly.

NOTE: Lift machine with proper lifting equipment such as forklift, engine hoist or boom crane.



6.4 CLEANING

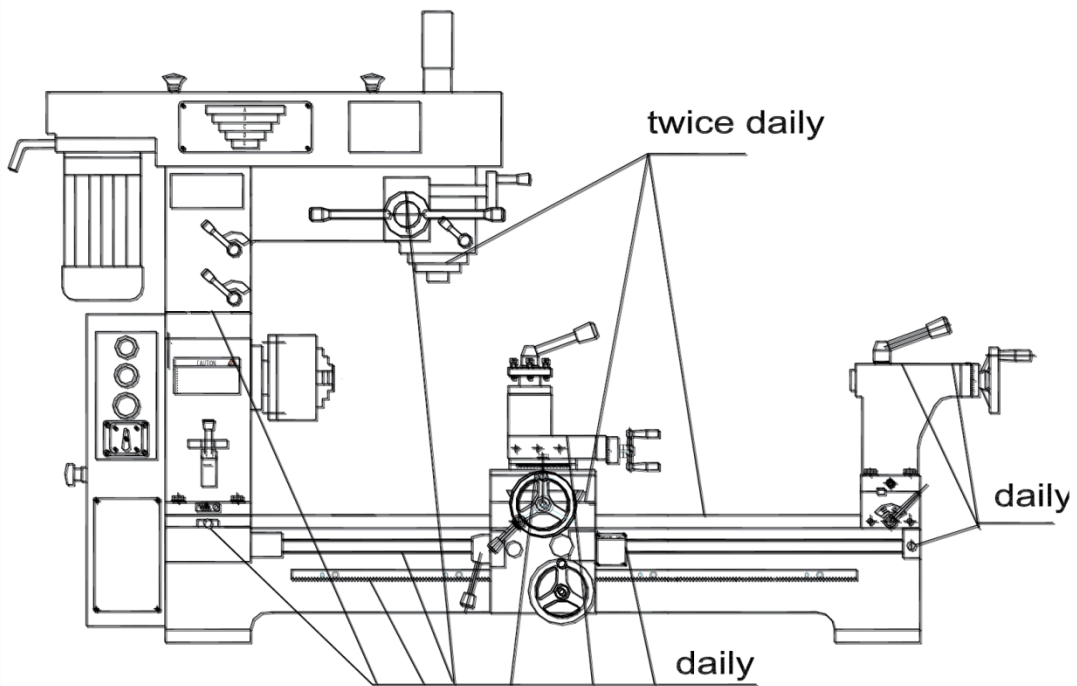
Before shipment, the unpainted surfaces are coated with antirust oil to protect them from corrosion. Before using, remove this protective coating by using a multi-purpose cleanser. Avoid chlorine-based solvents, such as acetone or brake parts cleaner, as they may damage painted surfaces. After cleaning, lubricate the slide way.

6.5 LEVELING

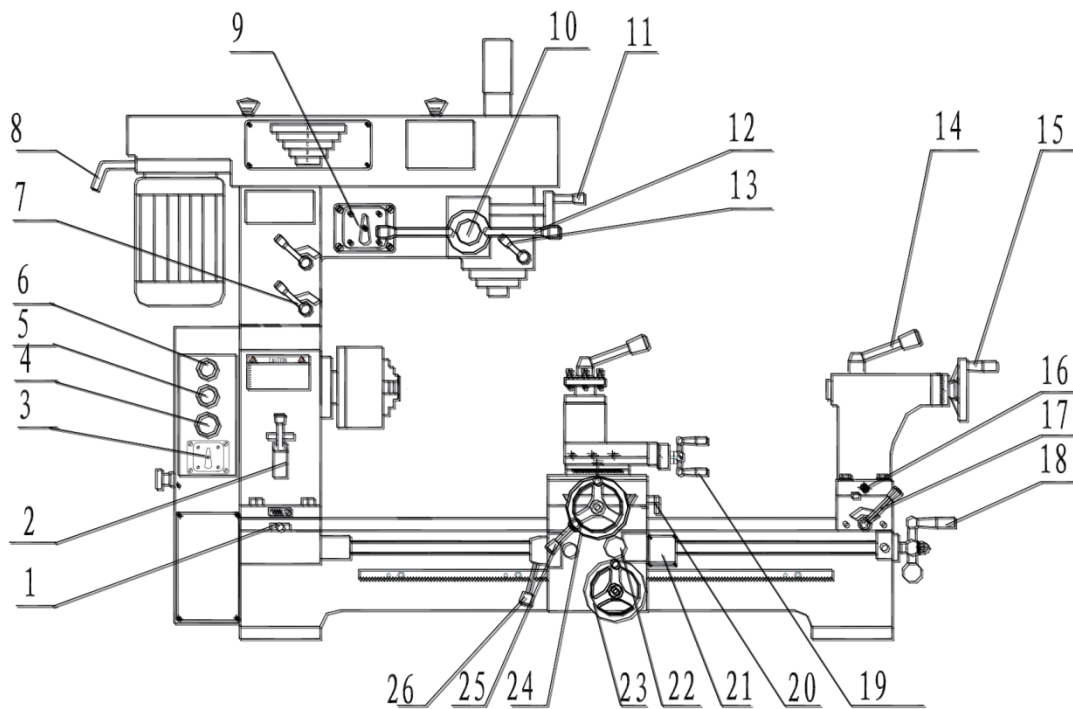
Level the machine in longitudinal and cross direction with a machinist precision level. Then tighten the foundation bolts and nuts.

7. LUBRICATING CHART

The machine lubricating points should be lubricated according to the lubricating chart. Driving bearings should be lubricated with grease regularly, clean once per year. The gears in the headstock should be lubricated with 15W-50 motor oil. Fill oil level according to oil gauge. ***DO NOT OVER FILL. THE LEVER ON THE INDICATOR WINDOW SHOULD BE $\frac{3}{4}$ OF THE WAY FULL. OVERFILLING WILL LEAD TO LEAKAGE OF OIL***The oil in the headstock should be changed regularly, the first time after half a month, the second time after 45 days, then every half year after that.



8. OPERATING INSTRUCTION



(1) Feed Lever	(15) Tailstock Handwheel
(2) Feed Rate Selection Lever	(16) Reset Screw
(3) Shift Switch	(17) Tailstock Lock Lever
(4) Emergency Stop	(18) Leadscrew Hand Crank
(5) ON Switch	(19) Tool post feed hand wheel
(6) Power Indicator	(20) Slide lock lever
(7) Locking lever	(21) Thread Chasing Dial
(8) Belt Tension Lever	(22) Longitudinal – cross feed clutch handle
(9) Reversing Switch - Mill	(23) Longitudinal Handwheel
(10) Micro Feed Clutch Lever	(24) Cross Feed Hand Wheel
(11) Fine Downfeed Handle	(25) Saddle lock lever
(12) Spindle Locking Lever	(26) Half nut lever
(13) Spindle Feed Lever	
(14) Tailstock Quill Lock	

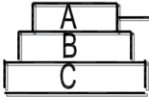
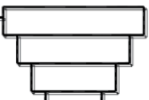

8.1 CAUTION

- a. PLEASE DON'T OPERATE THE MACHINE UNTIL YOU HAVE COMPLETELY BECOME FAMILIAR WITH THE CONTROLS, PARTS AND THEIR FUNCTIONS.
- b. CHECK LUBRICATING SURFACES AND SLIDES. REFER TO LUBRICATING CHART AND USE GREASE TO LUBRICATE.
- c. AFTER YOU ARE DONE MACHINING, YOU SHOULD CUT OFF CURRENT BY ENGAGING EMERGENCY STOP BUTTON.
- d. THE MACHINE IS NOT EQUIPT WITH LIGHTS. YOU SHOULD PROVIDE ENOUGH LIGHT AND AVOID WORKING IN THE DARK TO PREVENT ANY DANGEROUS EVENT FROM HAPPENING.
- e. ALWAYS KEEP YOUR WORKPIECE CLAMPED FIRMLY TO PREVENT IT FROM FLYING OFF. THE OUTSANDING PART OF THE PIECE SHOULD NOT BE MORE THAN 80MM (3"). THE LENGTH AND DIAMETER FOR THE OUTSTANDING PART SHOULD BE, NOT MORE THAN 4".
- f. WHEN ACCIDENTS HAPPEN DURING OPERATION, PLEASE CUT OFF POWER AT ONCE BY ENGAGING EMERGENCY STOP BUTTON.
- g. WHILE MAKING ANY ADJUSTMENTS TO THE MACHINE, WORK PIECE OR TOOL, MAKE SURE YOU CUT OFF THE POWER BY ENGAGING THE EMERGENCY STOP BUTTON.

8.2 MAIN SPINDLE DRIVE


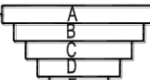

- a. Before starting the machine, you should check the belt tension. The belt should depress about 10mm (.393") under normal finger pressure. The tension of the belts can be adjusted by the Belt Tension Lever (8).
- b. With the main spindle running, you are able to stop, forward, and reverse by accessing the Shift Switch (3). If you need to change the spindle orientation while running, please turn the shift switch to the middle position and after a moment, switch in the opposite direction. Turning the switch directly to the opposite direction, will NOT change the direction in which the spindle spins.

c. Loose the lock lever. Change the belt position in the tower pulley, and tighten the belt. The main spindle can now access up to 7 speeds, as you can see in the following chart.

SPINDLE SPEEDS (○/min)						
						
MOTOR		MIDDLE			SPINDLE	
A-F	A-E	A-D	B-F	C-F	B-E	C-D
160	300	375	470	600	870	1360

8.3 DRILLING-MILLING SPINDLE DRIVING

- Check the guard is effective and in protective position. Push the start button to engage the power indicator light ON. The machine is now ready to run and operate. Access the shift switch to stop, forward, or reverse the gears of drilling-milling operation (9)
- Drilling-milling spindle feed can be changed by the Spindle Feed Lever (13). If micro feeding is needed, pull out the drilling-milling clutch lever (10). Then operate the Fine Downfeed Handle (11) to micro feed.

THE DRILLING-MILLING UNIT SPEEDS (○/min)							
							
MOTOR		MIDDLE				SPINDLE	
— A	— B	— A	— C	— A	— D	— B	— A
E —	E —	D —	E —	C —	E —	D —	B —
125	200	310	350	400	450	530	600
— B	— C	— B	— D	— C	— D	— C	— D
C —	D —	A —	C —	B —	B —	A —	A —
660	900	1380	1450	1670	2140	2350	3000

c. To change the speed of the drilling-milling spindle, access the Belt Tension Lever (8). Push lever backwards, loosen the belt and change the position on the pulley. Now push the lever forward to tighten the belt. Now you can lock the lever (8). By doing this, 16 speeds can be accessed as you can see in the chart above.

8.4 LONGITUDINAL FEED

- HAND FEEDING:** Turn the clutch handle (1) to the middle position. Have the half-nut lever (26) in disengaged position. Turn the hand wheel (23). Now longitudinal hand feeding can be achieved.

b. **AUTOMATIC FEEDING:** Have the half-nut lever (26) in engaged position. Longitudinal-cross feed clutch handle (22) in the inner position. Now cross auto-feed can be achieved. By changing the handle (2) position and gear A,B,C,D, 12 types of automatic feeds can be achieved as follows. (The left chart is for the inch lead 12 screw, and the right chart is for the metric lead screw)

	mm	A	24	30	36	42
		I	0.2	0.25	0.30	0.35
		II	0.1	0.125	0.15	0.175
	inch	I	0.008	0.010	0.012	0.014
		II	0.004	0.005	0.006	0.007
		III	0.002	0.025	0.003	0.0035

	mm	A	24	30	36	42
		I	0.2	0.25	0.30	0.35
		II	0.1	0.125	0.15	0.175
	inch	I	0.008	0.010	0.012	0.014
		II	0.004	0.005	0.006	0.007
		III	0.002	0.025	0.003	0.0035

8.5 CROSS FEEDING

a. Hand feeding can be achieved by operating the Cross Feed Hand Wheel (24) directly.
 b. Automatic feeding: half-nut lever (26) in engaged position. Pull out longitudinal-cross feed clutch handle (22), now cross automatic feeding can go. By changing the handle (2) position and gear A,B,C,D, 12 kinds of automatic feed amount can be obtained as above.(the left chart is for the inch lead screw, and the right chart is for the metric lead screw)

8.6 THREAD CUTTING

a. Keep the main spindle in low speed. Lead screw clutch handle (1) in the left position. Refer to the chart to adjust the Feed Rate Selection Lever (2) properly. The half-nut lever in the engaged position. Now you're ready to cut thread. You can achieve cutting different thread pitch (inch, metric) by changing Feed Rate Selection Lever (2) and gear A, B, C, D.

b. **CAUTION: IN CUTTING COURSE THREADS, DON'T LEAVE THE LEVER (2) OFF TO THE RIGHT OR LEFT POSITION. WHEN A THREAD NEEDS MANY PASSES TURN THE HANDWHEEL (15) TO MAKE THE TOOL TRAVEL AWAY FROM THE WORKPIECE. OPERATE THE ELECTRICAL SWITCH TO MAKE THE MOTOR RUN IN THE OPPOSITE DIRECTION. AFTER YOU ARE DONE, RETURN TOOL TO CONTINUE TO CUT THREADS. DO SO, AS MANY TIMES AS NEEDED TO FINISH CUTTING THREADS.**

	mm	A	36	42	48	60	72
		I	0.75	/	1	1.25	1.5
		II	1.5	1.75	2	2.5	3
	inch	I	3	3.5	4	5	6
		II	/	/	/	/	/
		III	/	/	/	/	/

	mm	A	24	27	30	33	36	39	42	48	60
		I	4	4.5	5	/	6	/	7	8	10
		II	8	9	10	11	12	13	14	16	20
	inch	I	16	18	20	22	24	26	28	32	40
		II	/	/	/	/	18	/	/	24	30
		III	/	/	/	/	18	/	/	24	30

	mm	D	24	27	30	36	42	48	60	72
		I	0.8	/	1	/	/	/	/	/
		II	0.4	0.45	0.5	0.6	0.7	0.8	/	/
	inch	I	0.2	/	0.25	0.3	0.35	0.4	/	0.6
		II	/	/	2.5	3	3.5	4	5	6
		III	/	/	1.25	1.5	1.75	2	2.5	3

	mm	D	24	27	30	33	36	39	42	48	60
		I	4	4.5	5	/	6	/	7	8	10
		II	8	9	10	11	12	13	14	16	20
	inch	I	16	18	20	22	24	26	28	32	40
		II	/	/	/	/	18	/	/	24	30
		III	/	/	/	/	18	/	/	24	30

8.7 TAIL STOCK

The tail stock can slide along the bed freely and can be locked in any position by using the Tailstock Lock Lever (17). Turning the Handwheel advances or retracts the quill in the tailstock. The graduated dial on the Handwheel is adjustable. Before shipment, the tail stock center and spindle center is aligned. However, we recommend that you take the time to ensure that the tailstock is aligned to your own desired tolerances. To use the tail stock to cut small tapers, loosen the screw; adjust the two reset screw (16) to make the deviation between spindle center and tail stock center. Now you can begin to machine. You can then return tailstock to its original position to eliminate taper.

8.8 THREADING DIAL

Threading dial performs the function of indicating the proper time to engage the half-nut so that the tool will enter the same groove of the thread on each successive cutting. Threading dial is marked with lines numbered 1.2.3.4.5.6, and a single line is marked on the housing of the threading dial (fixed line). The instruction plate (see the following figure) riveted on the threading dial shows the selection of matching the revolving lines with the fixed line.

When cutting threads, engage the half-nut on the appropriate number shown on the scale column; of the threading dial plate. 1-6 on the scale means the half-nut can be engaged on any of the numbered lines 1.2.3.4.5.6. You can only engage the half-nut for successive cutting when matching the numbered and fixed lines. 1,4 means that the half-nut can be engaged on 1,4 for successive cutting. If you engage the half-nut with the lead screw all the time while cutting threads, you don't need to use the threading dial. In this case, after cutting threads successfully, retract the tool back and reverse the motor out. Move the tool to the last starting position to make your next cut.

INDICATOR TABLE							
TPI	SCALE	TPI	SCALE	TPI	SCALE	TPI	SCALE
8	1,4	12	1-6	20	1,4	32	1,4
9	1-6	14	1,4	22	1,4	40	1,4
10	1,4	16	1,4	24	1-6		
11	1,4	18	1-6	28	1,4		

9. CHECKING POBLEMS AND REPAIRING

CAUTION: BEFORE CHECKING, PLEASE TURN OFF THE CURRENT.

9.1 If you turn on the current and the spindle doesn't run.

- The voltage is not right and the main switch turned offplease adjust the input voltage and turn on the main switch.
- The fuse in the electric box was broken please replace with a new one.
- Wire connectors are lose..... please check and repair.

9.2 The motor is too hot or not powerful.

- Overloading or overworking reduce amount of work.
- The voltage is too lowadjust to correct voltage.

- c. Poor quality of motor please replace with a new one.
- d. The fuse or wire connector are not good (easily make the motor short circuit. Please turn off the current and change a fuse.)
- e. The belt is too tight please loosen it to suitable position.

9.3 Temperature of the main spindle bearings is too high.

- a. Not enough grease to lubricate please fill the oil according to oil gauge.
- b. The bearing assembly is too tight.....adjust spindle nut properly.
- c. High speed turning for a long time slightly reduce the cutting amount.

9.4 Shortage of force when the spindle is running.

- a. The belt is too loose or worn and tore please adjust the belt tension to correct position or change a new one .
- b. The motor is burnt please replace with a new one .
- c .The fuse has brokenplease replace with a new one .

9.5 Making small taper when external turning.

- a. It is not on the same line between the spindle center and the tail stock centerplease adjust the tail stock according to the operation manual.
- b. The moving line of carriage isn't parallel to the spindle center.....please loose the lock screw of the headstock and adjust the spindle center to requirement and lock.

9.6 During machining, the surface of your work piece is very rough.

- a. The space of the spindle bearing is too big adjust it to the correct position or change it out.
- b. The space between the saddle and the gibe is too big adjust them to correct position.
- c. The tool is not sharp please sharpen it.
- d. The work piece doesn't lock tightly please lock it tightly.
- e. The precision of spindle bearing is too bad to wear please replace it with a new one.

10. MAINTENANCE

Precision comes with keeping the machine in great condition. It is advisable that maintenance is better than repair.

10.1 Daily maintenance

- a. Before using every day, lubricate all the moving parts.
- b. If the spindle temperature is too hot or too noisy, please stop the machine and check it. In order to keep its precision.
- c. When the machine is in trouble, please stop to repair it. If you are unsure, PLEASE CALL BOLTON DIRECTLY AT 909-594-1683.
- d. It is not allowed to work the machine with too many loads.
- e. Before leaving the workshop, please clean the working area. Unload the work piece and turn power off. Carefully clean the chips, shavings, and dust. Lubricate machine according to manual.

10.2 Weekly maintenance

- a. Clean and protect the screws.
- b. Check all sliding, turning, moving surfaces for lack of lubrication. Oil and lubricate as needed.

10.3 Monthly maintenance

- a. Adjust all the gibe space of the saddle.
- b. Lubricate the worn gear and half nut bearings in order to prevent wearing.

11. STANDARD ACCESSORIES

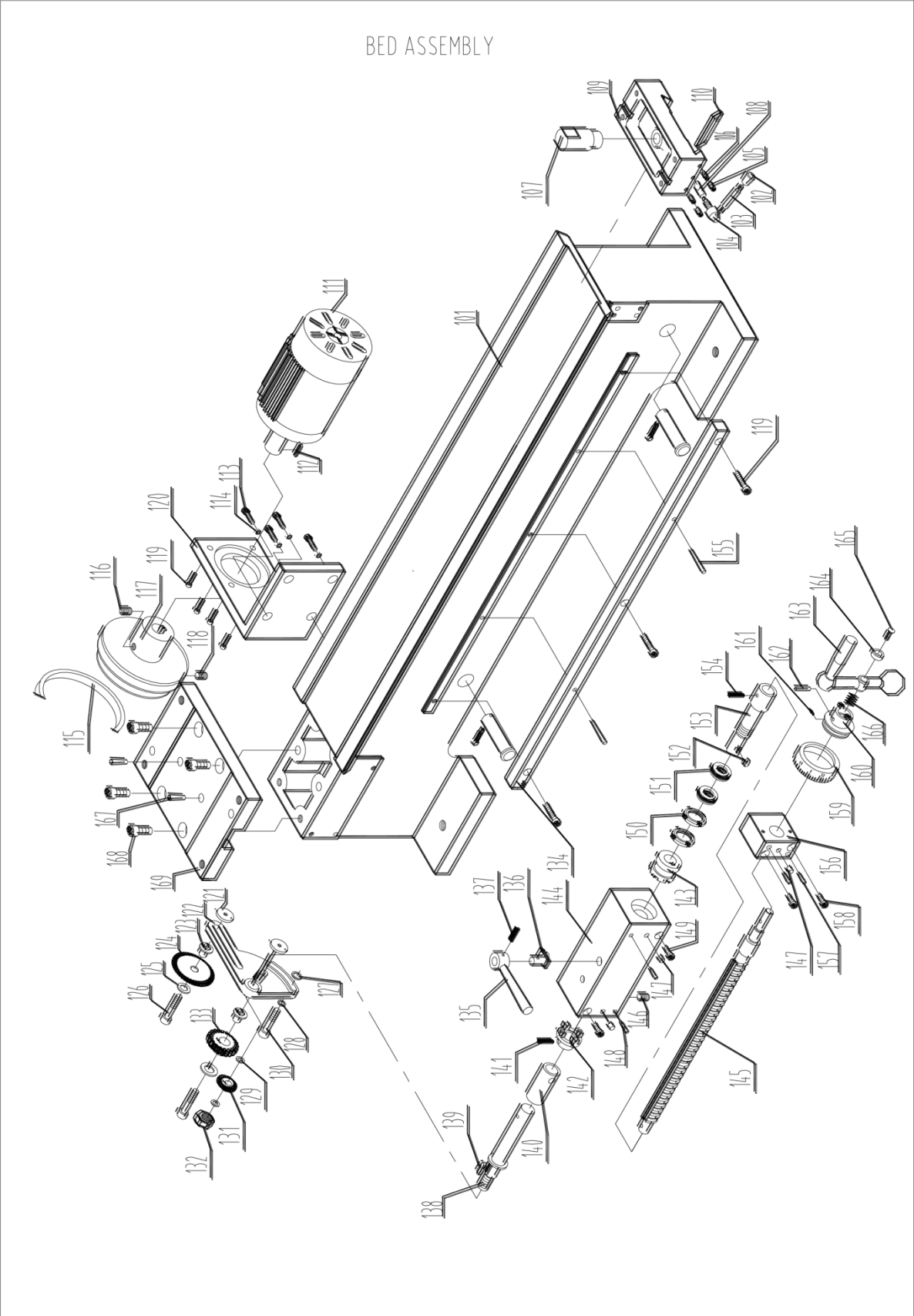
Item no.	Item Name	Specification	Quantity	Remarks
1	3-jaw chuck	5 1/10	1	Installed
2	Dead centers	M.T.3	1	
		M.T.4	1	
3	Wedge		1	
4	Tie Rod		1	Installed
5	Tie Rod Washer		1	Installed
6	Tool post wrench		1	
7	Double end wrench	0.51-0.63 inch	1	
8	Allen wrench	3mm	1	
		4mm	1	
		5mm	1	
		6mm	1	
9	"-" screw driver	3.94-.0.24 inch	1	
10	Duplex gears (m=1)	T=120/127	1	Metric, inch
		T=60/127	1	Inch
		T=60/120		Metric
11	Gear (m=1)	T=24	1	Metric, inch
		T=24	1	Metric, inch
		T=27	1	Metric, inch
		T=30	1	Metric, inch
		T=33	1	Metric, inch
		T=36	1	Metric, inch
		T=39	1	Metric, inch
		T=42	1	Metric, inch
		T=48	1	Metric, inch
		T=60	1	Metric, inch
		T=72	1	Metric, inch
T=120	1	Installed		
12	Drill chuck	B16/1.5-13	1	Installed
13	Drill stock		1	Installed

The descriptions and specifications given in the manual are subject to alteration without notice.

12. OPTIONAL ACCESSORIES (ACCORDING TO THE SUPPLY CONTACT)

Item No.	Item Name	Specification	Quantity	Remarks
1	Lathe tool		1	
2	Milling cutter holder		1	
3	Reversible thread tapping tools		1	
4	D.C. motor system		1	
5	Machine stand		1	
6	Protection for chuck		1	
7	Protection for lead screw		1	
8	Protection for tool post		1	
9	Protection for drilling and milling		1	
10	Follow rest		1	
11	Steady rest		1	

BED ASSEMBLY

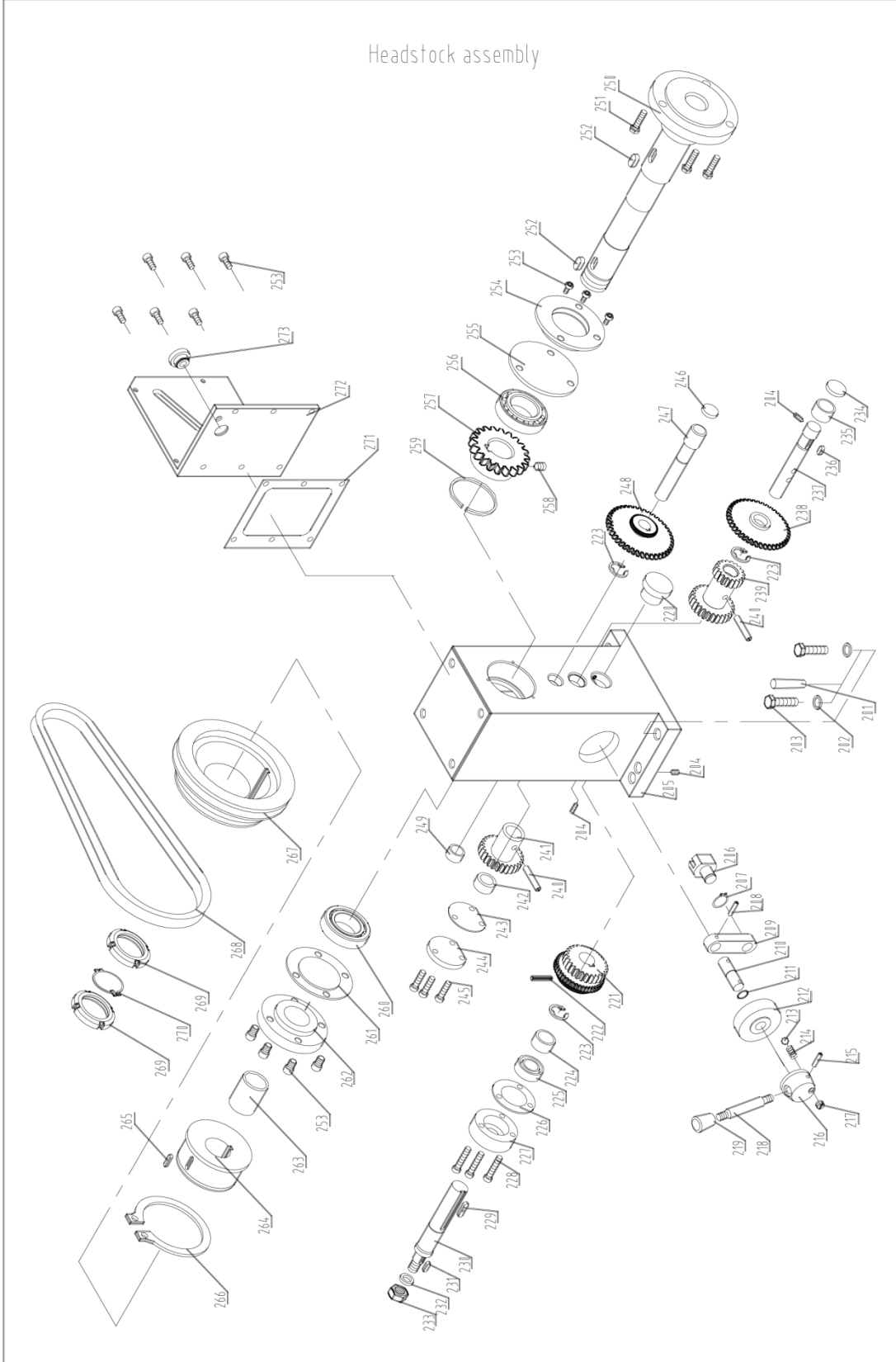


BED ASSEMBLY

Index No.	Part No.	Description	QTY.
101	HQ500-01-003(2)	Bed	1
102	GB/T4141.2	Handle knob M6×20	1
103	HQ400-00-016	Handle	1
104	HQ400-11-022	Locking screw	1
105	GB/T77	Screw M8×25	2
106	GB/T75	Screw M8×14	2
107	HQ400-11-034	Adjusting block	1
108	HQ400-11-015	Locking pin	1
109	HQ400-11-004	Tailstock carriage	1
110	HQ400-11-016	Gibe	1
111	YC-7144	Motor (0.55KW)	1
112	GB/T1096	Key A5×16	1
113	GB/T5782	Bolt M10×25	4
114	GB/T97.1	Washer 10	5
115	GB/T1171	V-belt Z630	1
116	GB/T78	Screw M8×8	1
117	HQ500-01-010	Pulley	1
118	GB/T78	Screw M8×6	1
119	GB/T70	Screw M6×20	4
120	HQ500-01-005	Motor mount	1
121	HQ400/3-01-009	T-nut	2
122	HQ500-01-001	Bracket	1
123	HQ400/3-01-010	T-bushing	2
124	HQ400/3-F-01	Change gear	1
125	GB5287-85	Washer 6	2
126	GB/T70	Screw M6×40	2
127	GB5287-85	Washer 6	1
128	GB/T97.1	Washer 6	1
129	HQ400/3-01-012	Washer	1
130	GB/T70	Screw M6×30	1
131	HQ400/3-F-01-009	Change gear	1
132	GB/T6170	Hex nut M10	1
133	HQ400/3-F01-015	Gear	1
134	CZ1224CHG-01-007 (1)	Rack	1
135	GB/T4141.7	Handle A10×80	1
136	HQ500-09-002	Eccentric lever	1
137	GB/T879	Spring pin 3×20	1
138	HQ400/3-04-001	Transmission shaft	1
139	GB/T1096	Key A4×12	1
140	HQ500-09-005	Sleeve	1
141	GB/T879	Spring pin 5×22	1
142	HQ400/3-04-003	Clutch jaw A	1
143	HQ500-09-001	Clutch jaw B	1
144	HQ500-09-003	Transmission box	1
145	HQ500-01-002	Lead screw	1
146	GB/T78	Screw M6×8	1
147	GB/T1155	Oil ball 6	2
148	GB/T117	Taper pin B5×55	2
149	GB/T70	Screw M6×50	2
150	HQ500-09-006	Spanner nut M17×1.5	2
151	GB/T301	Bearing 8103	2

Index No.	Part No.	Description	QTY.
152	GB/T1096	Key 5×10	1
153	HQ500-09-004	Shaft connector	1
154	GB/T879	Spring pin 4×24	1
155	GB/T879	Spring pin 5×30	2
156	HQ500-01-004	Lead screw seat	1
157	GB/T118	Taper pin 6×55	2
158	GB/T70	Screw M6×45	2
159	HQ500-01-006	Dial	1
160	HQ500-01-007	Dial seat	1
161	HQ500-10-016	Spring piece	1
162	GB/T879	Spring pin 4×20	1
163	HQ500-01-009	Crank handle	1
164	HQ500-01-008	Washer	1
165	GB/T819	Screw M4×12	1
166	GB/T2089	Spring 14×1×15	1
167	GB/T117	Taper pin B10×35	2
168	GB/T70	Screw M10×25	4
169	HQ500-01-003(1)	Fixing block	1

Headstock assembly

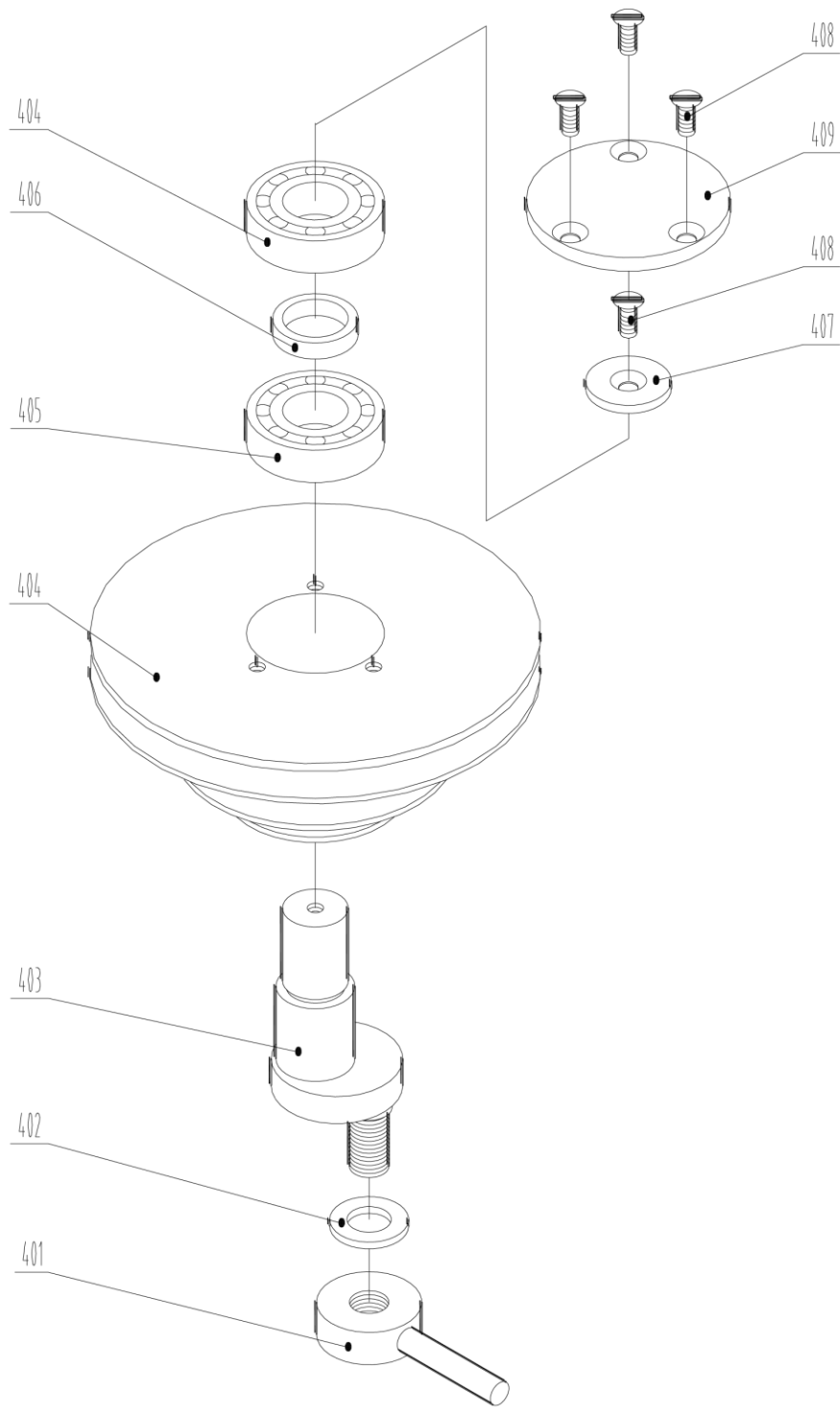


Headstock Assembly

Index No.	Part No.	Description	QTY.
201	GB/T117	Taper pin 8×40	2
202	GB/T97.2	Washer 10	4
203	GB/T5781	Bolt M10×35	4
204	GB/T78	screw M5×12	3
205	HQ500-02-005	Headstock	1
206	HQ500-02-027	Fork	1
207	GB/T894.1	Retain ring (external)12	1
208	GB/T879.1	Roll pin 5×18	1
209	CZ300-03-050	Fork arm	1
210	HQ400/3-02-041	Straight pin	1
211	GB/T3452.1	O-ring 8.5×1.8	1
212	HQ500-02-013	Spacer	1
213	GB/T308	Steel ball Φ6.5	1
214	GB/T2089	Spring 1×6×15	1
215	GB/T879	Spring pin 4×40	1
216	HQ400/3-02-042	Handle seat	1
217	GB/T73	flat point set screw M8×5	1
218	CM1224C-04-003	Handle rod	1
219	GB/T4141.12	Handle knob M10×32	1
220	GB/T1160	Oil level indicator	1
221	HQ500-02-025	Triplex gear	1
222	GB/T879	Spring pin 3×8	1
223	GB/T894.1	Retain ring (external)14	3
224	HQ500-02-015	Brass bushing	1
225	HG4-692-67	O ring PD15×30×10	1
226	HQ400/3-02-005	Gasket	1
227	HQ400/3-02-002	O-ring seat	1
228	GB/T65	Bolt M5×20	3
229	HQ500-02-028	Key	1
230	HQ500-02-021	Shaft D	1
231	GB/T1096	Key 4×8	1
232	GB/T848	Washer 10	1
233	GB/T6170	Nut M10	1
234	HQ500-02-020	Hole plug	1
235	HQ500-02-014	Brass bushing	1
236	GB/T1096	Key 5×14	1
237	HQ500-02-017	Shaft C	1
238	HQ400/3-02-012	Gear C	1
239	HQ500-02-026(2)	Gear C(2)	1
240	GB/T879	Spring pin 4×20	2
241	HQ500-02-026(1)	Gear C(1)	1
242	HQ400/3-02-038	Brass bushing	1
243	HQ400/3-02-026	Gasket	1
244	HQ500-02-022	Cover	1
245	GB/T818	Screw M5×12	3
246	HQ500-02-019	Hole plug	1
247	HQ500-02-009	Shaft B	1
248	HQ400/3-02-013	Duplex gear B	1
249	HQ400/3-02-030	Brass bushing	1
250	HQ500-02-010	Spindle	1
251	GB/T5783	Bolt M8×25	3
252	GB/T1096	Key 8×22	2

Index No.	Part No.	Description	QTY.
253	GB/T70	screw M5×16	1
254	DIY1619-02-036	Cover	1
255	DIY1619-02-037	Gasket	1
256	GB/T297	Taper roller bearing 2007109	1
257	HQ500-02-006	Gear A	1
258	GB/T71	screw M8×10	1
259	GB/T921	Locking ring 47	1
260	GB/T297	Taper roller bearing 2007108	1
261	HQ500-02-003	Gasket	1
262	HQ500-02-002	Flange	1
263	HQ500-02-004	Spacer	1
264	HQ500-02-024	Pulley spacer	1
265	GB/T1096	Key 10×25	1
266	GB/T894.1	Retain ring (external) 63	1
267	HQ500-02-001	Pulley	1
268	GB/T1171	V-belt O-710	1
269	GB/T812	Spanner nut M40×1.5	2
270	GB/T858	Locking washer 40	1
271	HQ500-02-012	Gasket	1
272	HQ500-02-011	Bracing plate	1
273	CM1224C-03-034	Oil plug	1

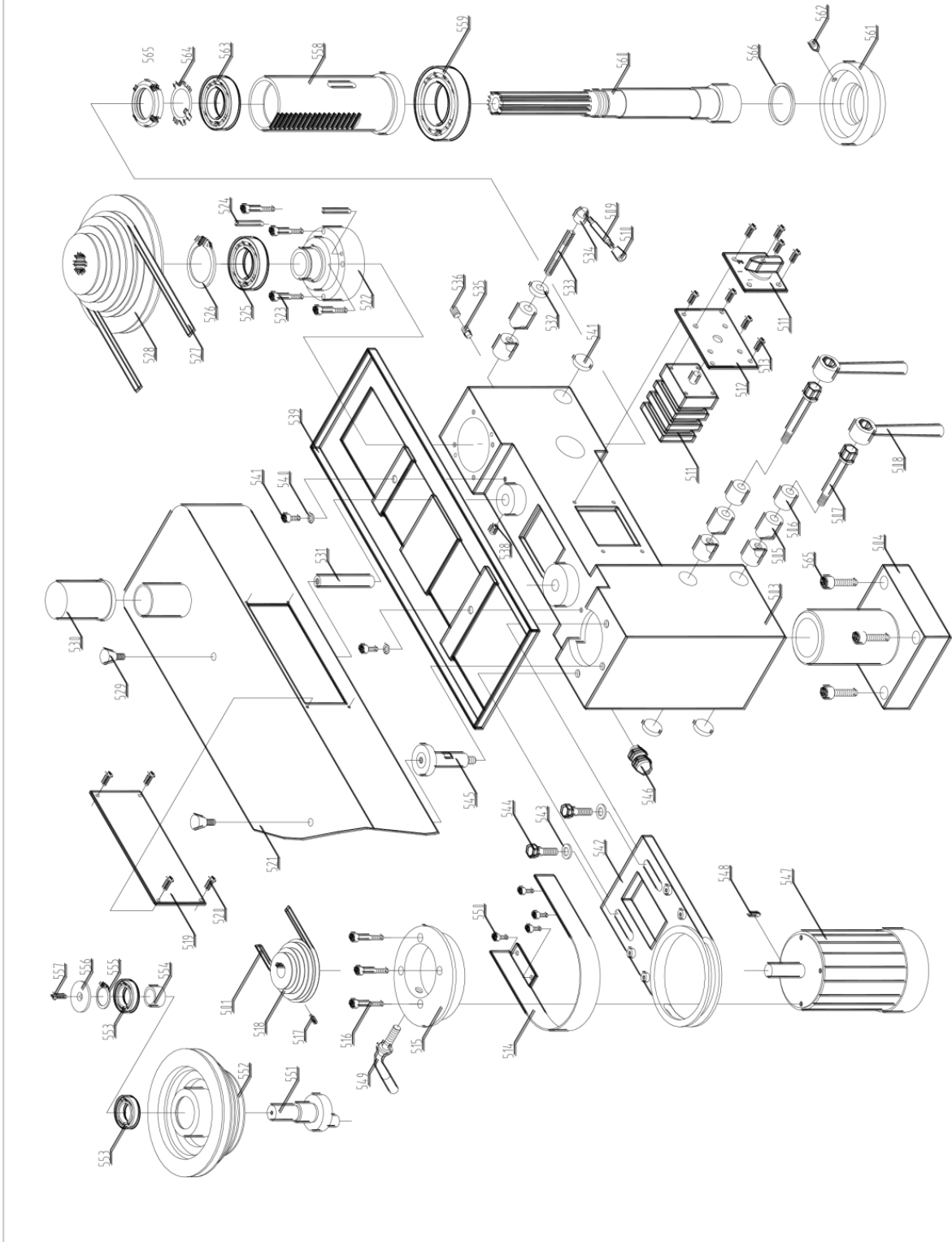
Middle pulley assembly



MIDDLE PULLEY ASSEMBLY

Index No.	Part No.	Description	QTY.
401	GB/T4141.8	Handle	1
402	GB/T97.1	Washer 12	1
403	HQ400/4-04-001	Pulley arbor	1
404	HQ400/3-02-034	Middle pulley	1
405	GB/T276	Bearing 104	2
406	HQ400/3-02-035	Spacer	1
407	HQ400/3-02-036	Cover	1
408	GB/T68	Screw M5×10	4
409	HQ400/3-02-037	Cover	1

MILLING & DRILLING ASSEMBLY

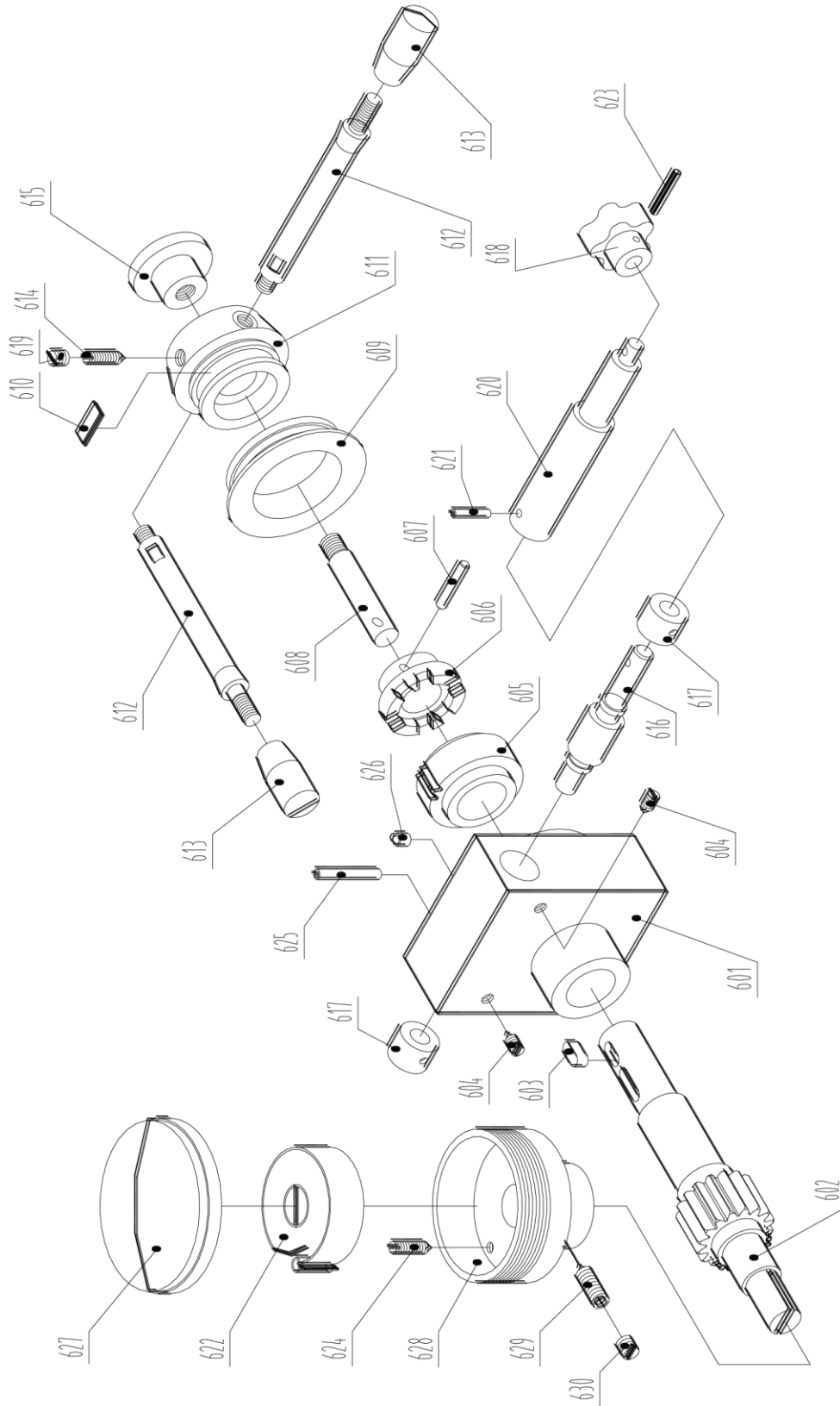


MILLING & DRILLING ASSEMBLY

Index No.	Part No.	Description	QTY.
501	GB/T1154-89	V-belt Z800	1
502	GB/T70	Screw M10×40	4
503	HQ500-05-002	Milling-drilling headstock	1
504	HQ500-05-001	Support column	1
505	HQ500-05-003	Locking block (pair)	3
506	HQ500-05-004	Spacer	3
507	HQ500-05-022	Screw	2
508	CX16-03-006	Handle	2
509	GB/T4141.15-84	Handle M10×50	2
510	GB/T4141.12-84	Handle knob BM10×32	2
511	HZ5-10	On-off switch	1
512	HQ500-05-020	Switch plate	1
513	GB/T818	Screw M5×8	4
514	HQ500-05-018	Frame cover	1
515	HQ500-05-014	Eccentric flange	1
516	GB/T 70	Screw 6×20	4
517	GB/T 73	Screw M8×12	1
518	HQ500-05-015	Motor pulley	1
519	GB/T 818	Screw M4×6	4
520	HQ500-05-011	See-through window	1
521	HQ500-05-016	Upper cover	1
522	HQ500-05-009	Pulley seat flange	1
523	GB/T 70	Screw M6×40	4
524	BG/T 117-86	Taper pin A5×45	2
525	GB/T 276	Ball bearing 108Z	1
526	GB/T 894.1	Retain ring (External) 40	1
527	GB1154-89	V-belt Z860	1
528	HQ500-05-010	Milling-drilling pulley	1
529	GB4141.26-84	Knob CM8×25	2
530	HQ400-24-021	Cap	1
531	HQ500-05-019	Upper cover post	1
532	HQ500-05-004	Spacer	2
533	GB/T899	Stud AM10×80	2
534	GB/T4141.16-84	Handle seat BM10×20	1
535	GB/T75	Screw M10×14	1
536	GB/T73	Screw M10×12	1
537	HQ500-05-005	Hole plug	3
538	GB/T79	Screw M8×12	1
539	HQ500-05-008	Lower cover	1
540	GB/T97.1	Washer 6	1
541	GB/T70	Screw M6×12	2
542	HQ500-05-013	Motor mount	1
543	GB/T 97.1-85	Washer 10	1
544	GB/T5781	Hex head screw M10×30	2
545	HQ500-05-012	Mill-drill cover post	1
546	D97-4-18(20)	Connection tube M18(20)×1.5	3
547	YL7144	Motor	1

548	GB/T1096-79	Key A5×16	1
549	HQ500-05-017	Tension handle	1
550	GB/T68	Screw M5×8	4
551	HQ500-06-004	Eccentric shaft	1
552	HQ500-06-003	Middle pulley	1
553	GB/T276	Ball bearing 104Z	2
554	HQ500-06-002	Spacer	1
555	GB/T893.1	Retain ring (external) 42	1
556	HQ500-06-001	Bearing cover	1
557	GB/T68	Screw M5×10	1
558	HQ500-08-001	Quill	1
559	GB/T297	Ball bearing 2007107	1
560	HQ500-08-002	Spindle	1
561	HQ400-22-002	Cover	1
562	GB/T71	Screw M5×8	1
563	GB/T297	Bearing 2007106	1
564	GB/T812	Spanner nut M30×1.5	1
565	GB/T858	Washer Φ30	1
566	GB/T3452.1-82	Gasket	1

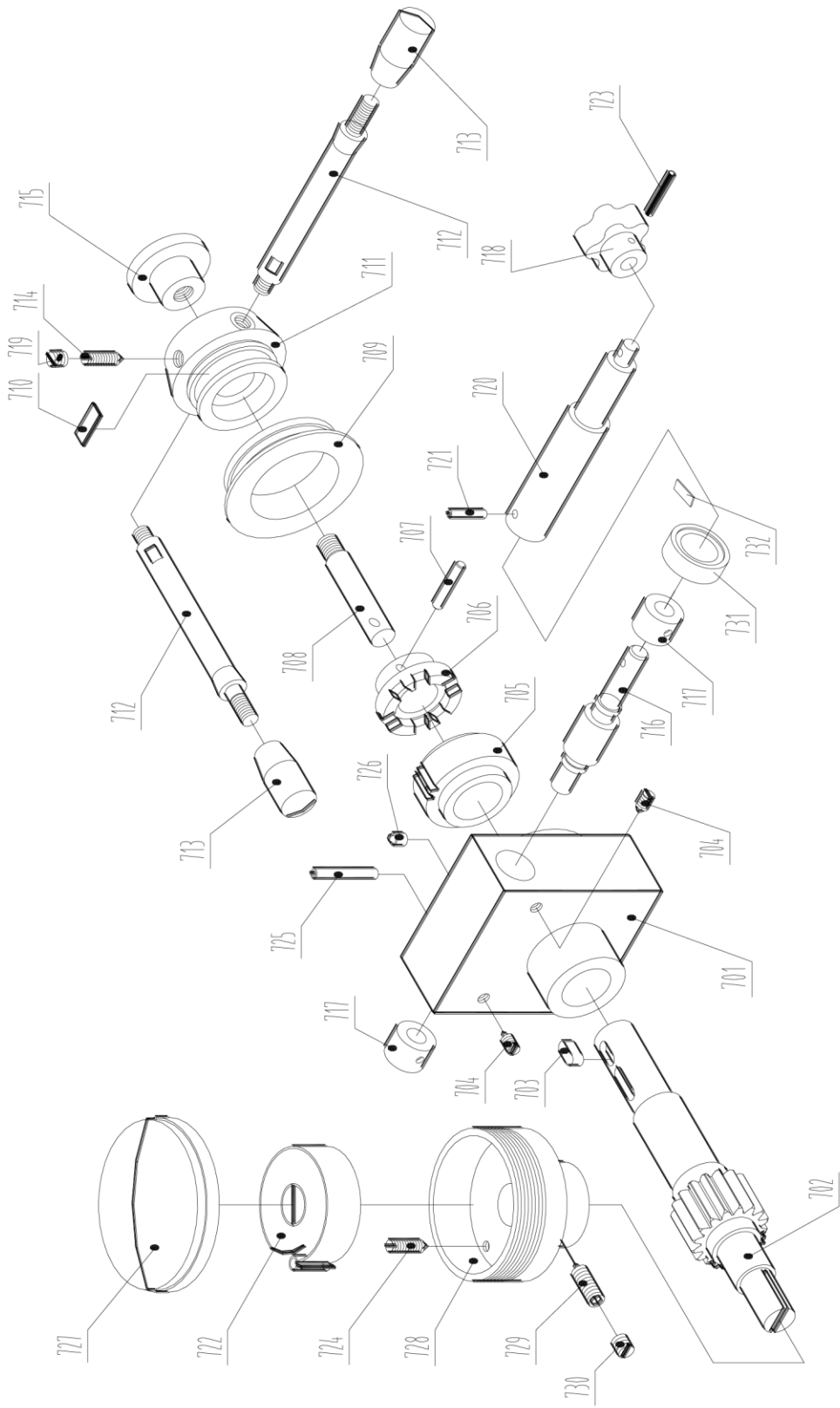
SPINDLE FEEDING ASSEMBLY



SPINDLE FEEDING ASSEMBLY

Index No.	Part No.	Description	QTY.
601	HQ500-07-002	Feeding box	1
602	HQ500-07-001	Gear shaft	1
603	GB1096-79	Key A6×14	1
604	GB/T71	Screw M6×8	2
605	HQ400-23-005	Worm wheel	1
606	HQ400-23-006	Clutch	1
607	GB/T119	Pin 5×28	1
608	HQ400-23-009	Shaft	1
609	HQ400-23-007	Dial	1
610	HQ400-23-008	Spring piece	1
611	HQ400-23-013	Dial seat	1
612	HQ400-23-001	Handle	2
613	GB/T4141.14	Handle knob BM8×40	2
614	GB/T71	Screw M6×10	1
615	GB/T4141.27	Handle BM10×40	1
616	HQ400-23-004	Worm	1
617	HQ400-23-010	Bushing	2
618	GB/T4141.4	Handle 12×50	1
619	GB/T73	Screw M8×12	1
620	HQ500-07-003A	Worm handle	1
621	GB/T879	Spring pin 4×20	1
622	HQ500-05-006	Volute spring	1
623	GB/T879	Spring pin 4×28	1
624	GB/T71	Screw M5×25	1
625	GB/T879	Spring pin 5×35	1
626	GB/T1155	Oil ball 6	1
627	HQ400-24-019	Cover	1
628	HQ500-05-007	Volute spring box	1
629	GB/78-85	Screw M8×20	1
630	GB/73-85	Screw M8×12	1

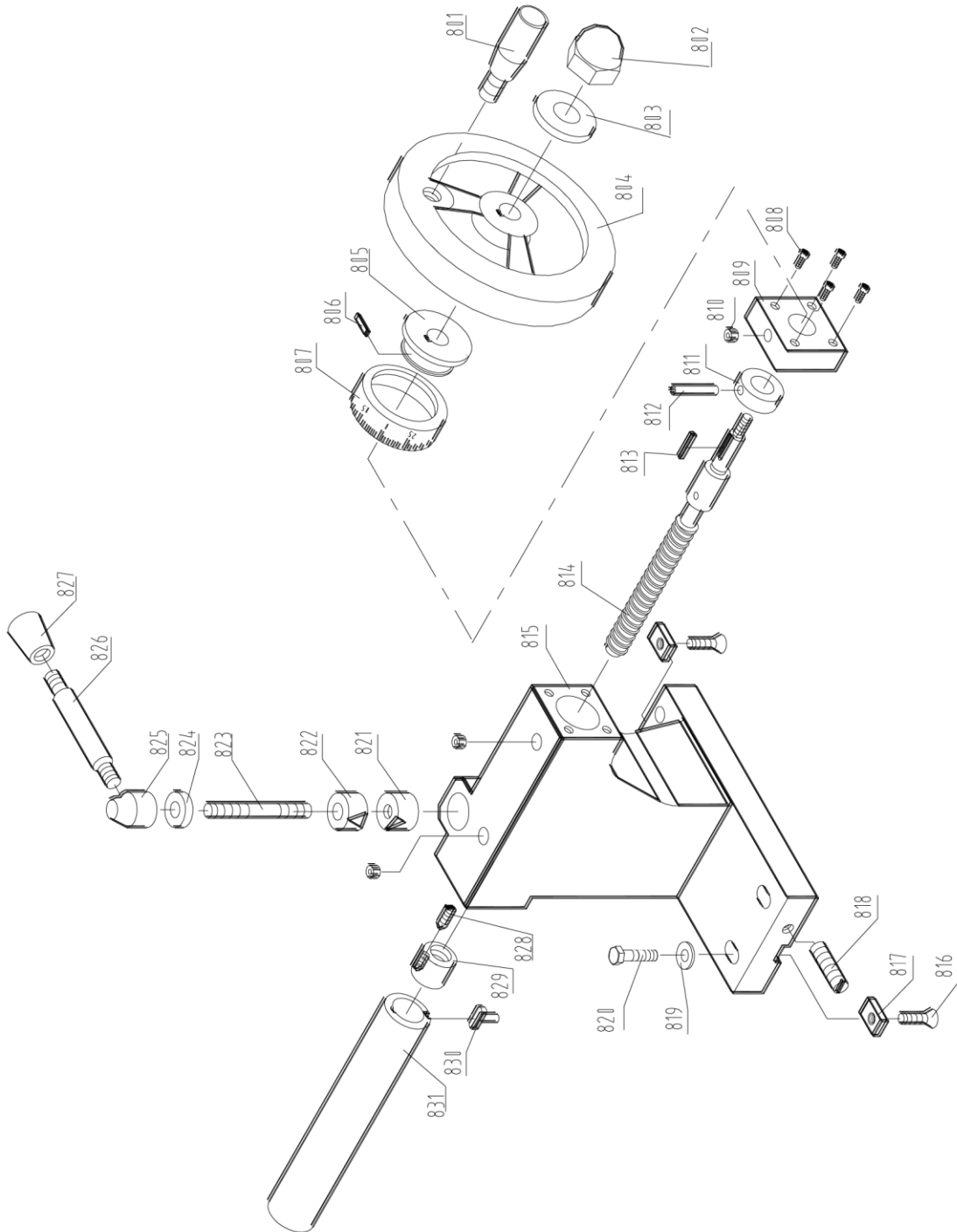
SPINDLE FEEDING ASSEMBLY



SPINDLE FEEDING ASSEMBLY

Index No.	Part No.	Description	QTY.
701	HQ500-07-002	Feeding box	1
702	HQ500-07-001	Gear shaft	1
703	GB1096-79	Key A6×14	1
704	GB/T71	Screw M6×8	2
705	HQ400-23-005	Worm wheel	1
706	HQ400-23-006	Clutch	1
707	GB/T119	Pin 5×28	1
708	HQ400-23-009	Shaft	1
709	HQ400-23-007	Dial	1
710	HQ400-23-008	Spring piece	1
711	HQ400-23-013	Dial seat	1
712	HQ400-23-001	Handle	2
713	GB/T4141.14	Handle knob BM8×40	2
714	GB/T71	Screw M6×10	1
715	GB/T4141.27	Handle BM10×40	1
716	HQ400-23-004	Worm	1
717	HQ400-23-010	Bushing	2
718	GB/T4141.4	Handle 12×50	1
719	GB/T73	Screw M8×12	1
720	HQ500-07-003A	Worm handle	1
721	GB/T879	Spring pin 4×20	1
722	HQ500-05-006	Volute spring	1
723	GB/T879	Spring pin 4×28	1
724	GB/T71	Screw M5×25	1
725	GB/T879	Spring pin 5×35	1
726	GB/T1155	Oil ball 6	1
727	HQ400-24-019	Cover	1
728	HQ500-05-007	Volute spring box	1
729	GB/78-85	Screw M8×20	1
730	GB/73-85	Screw M8×12	1
731	HQ500-07-005	Dial	1
732	HQ500-10-026	Spring piece	1

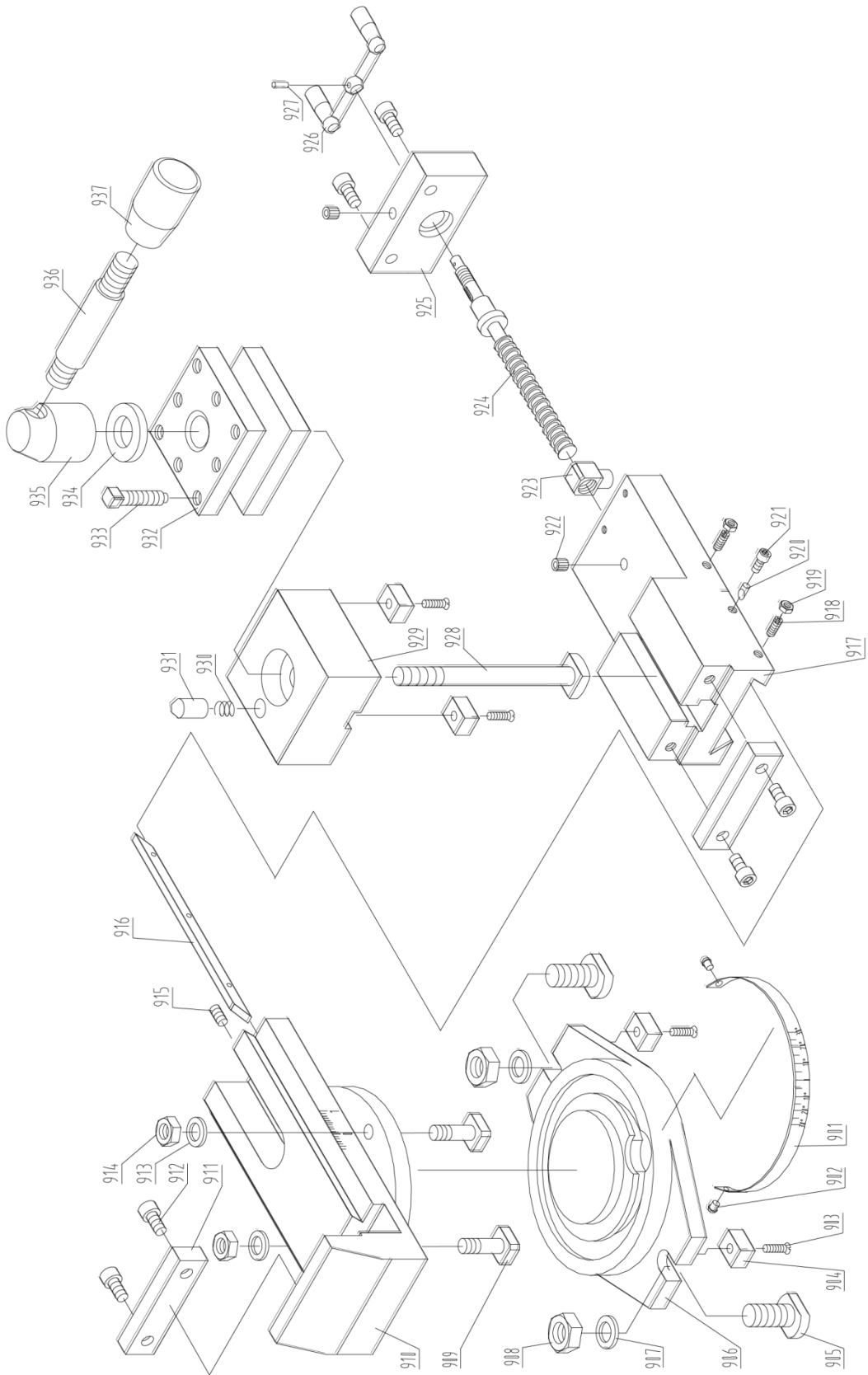
Tailstock assembly



TAILSTOCK ASSEMBLY

Index No.	Part No.	Description	QTY.
801	JB/T7270.5-94	Handle M6×50	1
802	GB/T923-88	Acorn Nut M10	1
803	GB/T97-85	Flat Washer 10	1
804	JB/T7273.3-94	Hand Wheel B12×100	1
805	HQ400/4-10-015	Scale ring base	1
806	HQ500-10-016	Spring piece	1
807	HQ400-13-010	Scale ring	1
808	GB/T70-85	Screw M5×20	4
809	HQ400-13-009	Feed Screw Socket	1
810	JB/T7940.4-95	Oiler	3
811	HQ400-13-008	Bracket	1
812	GB/T119-86	Pin D5×24	1
813	GB/T1096-79	Key C4×18	1
814	HQ400-13-006	Feed Screw	1
815	HQ400-13-001	Tail Stock Body	1
816	GB/T819-85	Screw M5×14	2
817	HQ400-13-004	Key	2
818	GB/T73-85	Screw M10×50	2
819	GB/T97.2-85	Washer 10	4
820	GB/T5780-86	Screw M10×40	4
821	HQ400-13-011	Locking block (Bottom)	1
822	HQ400-13-012	Locking block (Top)	1
823	GB/T899-85	Double-Screw Bolt AM10×40	1
824	HQ400-13-013	Washer	1
825	HQ400-13-004	Locking Nut	1
826	HQ400-13-005	Locking Lever	1
827	JB/T7271.3-94	Knob M10×32	1
828	GB/T71-85 Set	Screw M4×8	1
829	HQ400-13-007	Feed Nut	1
830	HQ400-13-003	T-Key	1
831	HQ400-13-002	Tail Stock Barrel	1

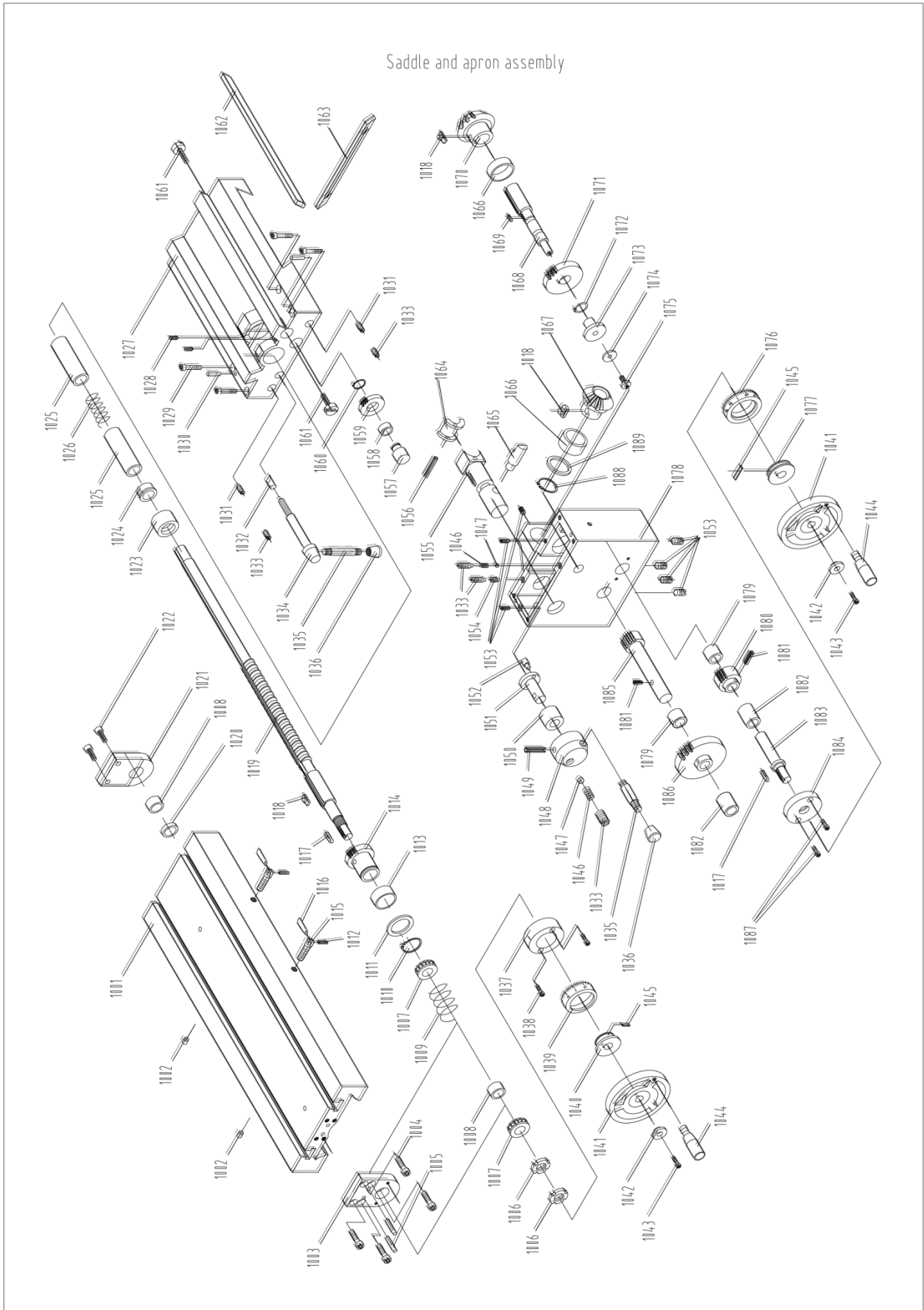
Toolpost assembly



TOOL POST ASSEMBLY

Index No.	Part No.	Description	Size	Qty
901	HQ400-14T02-002(1)	Angle ruler		1
902	GB/T827-1985	Rivet	2.5×5	2
903	GB/T68-1985	Screw	M4×12	2
904	HQ400-14T02-010	Key		2
905	HQ400-14T02-001	“T”-Bolt		2
906	HQ400-14T02-002	Base		1
907	GB/T97.1-1985	Washer	10	2
908	GB/T6170-2000	Nut	M10	2
909	GB/T37-88	Bolt		2
910	HQ400-14T02-005	Vice base		1
911	HQ400-14T02-006	Vice block		2
912	GB/T70.1-2000	Screw	M5×14	4
913	GB/T97.1-1985	Washer	8	2
914	GB/T6170-2000	Nut	M8	2
915	GB/T77-2000	Screw	M5×6	1
916	HQ400-14T02-014	Gib		1
917	HQ400-14T02-004	Moving Vice		1
918	GB/T71-1985	Screw	M5×14	2
919	GB/T6170-2000	Nut	M5	2
920	HQ400-14T02-007	Locking block		1
921	GB/T70.1-2000	Screw	M5×8	1
922	JB/T7940.4-1995	Oiler	6	2
923	HQ400-14T02-011	Nut		1
924	HQ400-14T02-012	Lead screw		1
925	HQ400-14T02-013	Lead screw bracket		1
926	GB/T70	Screw	M6×16	2
927	GB/T117-2000	Pin	3×16	1
928	HQ400-14T02-009	Bolt	M10×100	1
929	HQ400-14T02-008	Tool post base		1
930	GB/T1358-1993	Spring	5×0.6×30	1
931	HQ400-14-007	Set pin		1
932	HQ400-14-003	Tool post		
933	GB/T85-1998	Screw	M8×25	8
934	GB97.2-85	Washer	12	1
935	HQ400-13-004	Nut	M10	1
936	HQ400-14-006	Handle		1
937	JB/T7271.3-1994	Knob	M10×32	1
938	DJ136/2-012	Dial		1
939	DJ136/2-010	Dial seat		1
940	DJ136/2-011	Spring piece		1
941	GB/T810	Slotted round nut	M10×1	2
942	GB/T4141.10	Bi-Lever balance handle	8×25	1

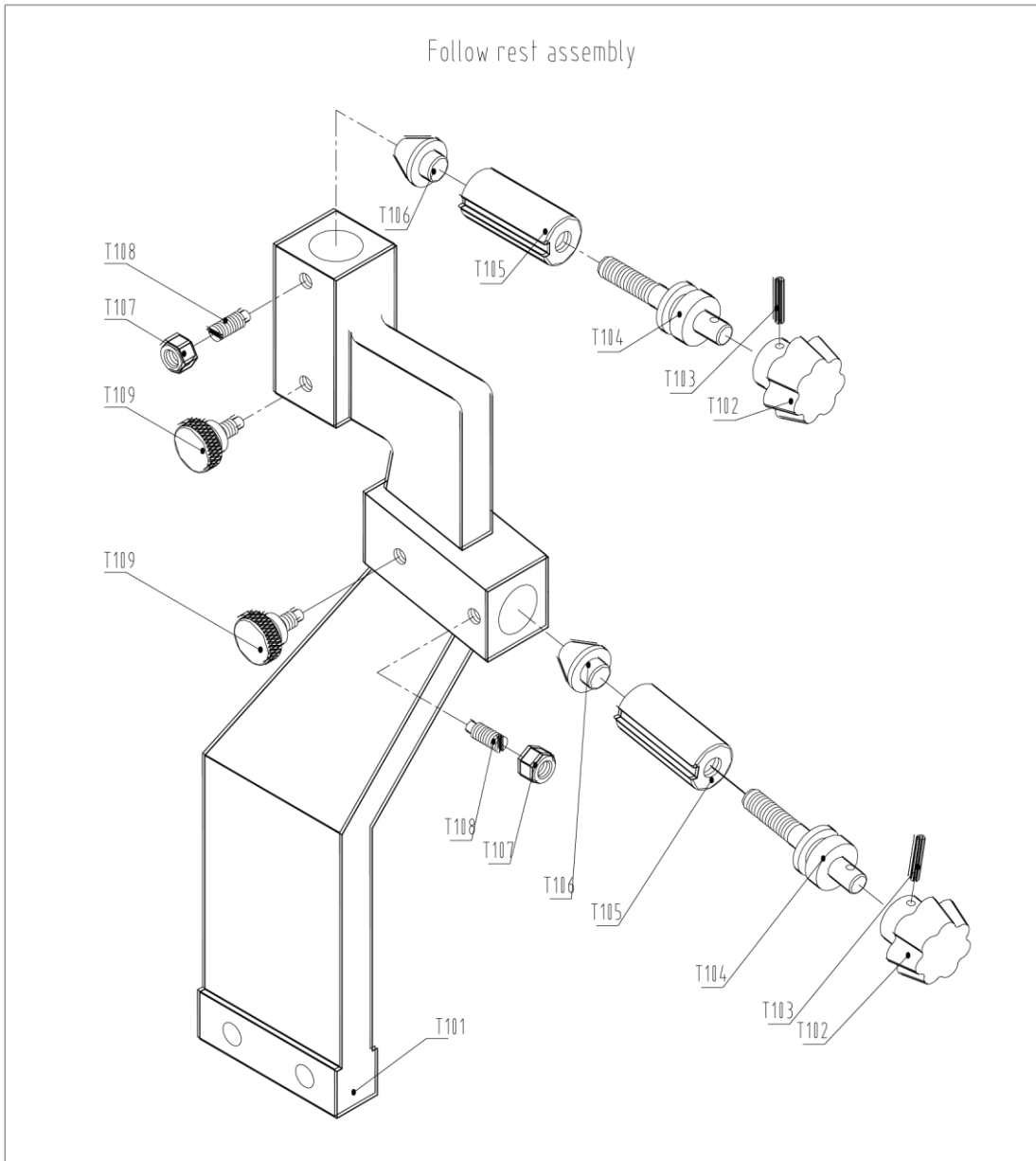
Saddle and apron assembly



SADDLE AND APRON ASSEMBLY

Index No.	Part No.	Description	QTY.
1001	HQ500-10-003	Table	1
1002	JB/T 7940.4-4	Oil ball 6	6
1003	HQ500-10-010	Lead screw seat (B)	1
1004	GB/T 70-85	Screw M5×16	4
1005	GB/T 879-5	Spring pin 5×20	2
1006	GB/T 810-13	Spanner nut M14×1.5	2
1007	GB/T 301-11	Thrust ball bearing8102	2
1008	HQ500-10-011	Spacer A	2
1009	HQ500-10-048	Spring B	1
1010	GB/T 894.1-9	Retain ring (external) 26	1
1011	HQ500-10-046	Washer	1
1012	GB/T 879-7	Spring pin 2×10	2
1013	HQ500-10-045	Spacer G	1
1014	HQ500-10-010	Gear A	1
1015	HQ500-10-006	Locking screw	2
1016	CM1224C-05-022B	Locking lever	2
1017	GB/T 1096-14	Key 4×18	2
1018	HQ500-10-030	T-Key	2
1019	HQ500-10-008	Cross feeding lead screw	1
1020	HQ500-10-050	Washer	1
1021	HQ500-10-007	Lead screw (A)	1
1022	GB/T 70-85	Screw M6X16	2
1023	HQ500-10-009	Cross feeding lead nut	1
1024	HQ500-10-051	Spacer	1
1025	HQ500-10-049	Spacer	2
1026	HQ500-10-047	Spring A	1
1027	HQ500-10-002	Saddle	1
1028	GB/T 71-85	Screw M6×8	10
1029	GB/T 70-85	Screw M6×35	4
1030	GB/T 117-6	Tap pin A5×25	2
1031	GB/T 75-85	Screw M8×16	2
1032	HQ400-11-014	Locking washer	1
1033	GB/T 73-85	Screw M8×8	5
1034	HQ500-10-025	Locking screw	1
1035	HQ400-00-016	Handle rod	2
1036	JB/T 7271.3-23	Handle knob M6×20	2
1037	HQ500-10-013	Fixing sleeve (A)	1
1038	GB/T 70-85	Screw M5×16	4
1039	HQ500-10-014	Dial	1
1040	HQ500-10-015	Dial seat (A)	1
1041	JB/T 7273.3-16	Hand wheel B12×100	2
1042	GB5287-85	Washer 5	2
1043	GB/T 70-15	Screw M4×12	2
1044	JB/T 7270.4-17	Handle M6×50	2

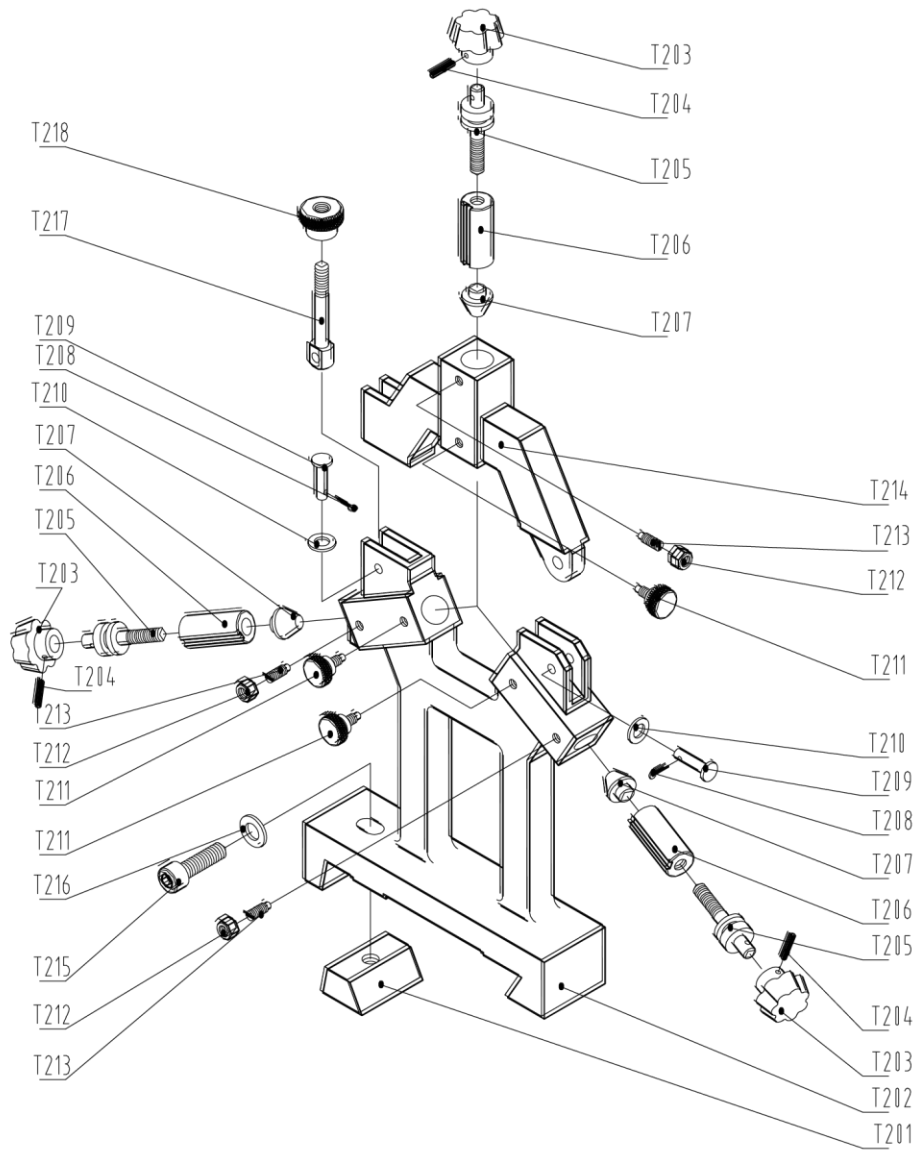
Index No.	Part No.	Description	QTY.
1045	HQ500-10-016	Spring piece	2
1046	CM1224C-06-007	Spring	2
1047	GB/T 308-2	Steel ball 6.5	2
1048	HQ500-10-036	Handle seat	1
1049	GB/T 879-86	Pin 4×40	1
1050	HQ500-10-035	Spacer (E)	1
1051	HQ500-10-034	Eccentric wheel	1
1052	HQ400/3-06-003	Arm	1
1053	GB/T 71-85	Screw M6×8	10
104	HQ500-10-001	Screw	1
1055	HQ500-10-033	Half nut seat	1
1056	GB/T 879-25	Spring pin 4×30	1
1057	HQ500-10-043	Shaft	1
1058	HQ500-10-037	Spacer (F)	1
1059	HQ500-10-042	Gear T32	1
1060	GB/T 894.1-27	Retain ring (external) 12	1
1061	HQ500-10-004	Screw	2
1062	HQ500-10-005	Table gib	1
1063	HQ500-10-026	Saddle gib	1
1064	HQ400/3-06-002B	Half nut	1
1065	HQ500-10-032	Stop pin	1
1066	HQ500-10-031	Spacer (D)	2
1067	HQ500-10-029A	Bevel gear	1
1068	HQ500-10-017	Shaft	1
1069	GB/T 1096-29	Key A5×8	1
1070	HQ500-10-029	Gear	1
1071	HQ500-10-027	Gear T48	1
1072	GB/T 894.1-27	Retain ring (external) 14	1
1073	HQ500-10-038	Pull-push knob	1
1074	GB/T 96-85	Washer 6	1
1075	GB/T 818-19	Screw M6×8	1
1076	HQ500-10-041	Dial	1
1077	HQ500-10-019	Dial seat (B)	1
1078	HQ500-10-028	Apron	1
1079	HQ500-10-024	Spacer (C)	2
1080	HQ500-10-023	Gear T25	1
1081	GB/T 879-21	Spring pin 4×20	2
1082	HQ500-10-022	Spacer (B)	2
1083	HQ500-10-020	Shaft	1
1084	HQ500-10-021	Fixing sleeve B)	1
1085	HQ500-10-040	Shaft gear T21	1
1086	HQ500-10-039	Gear T65	1
1087	GB/T 70-85	Screw M4×12	4
1088	GB894.1-86	Retain ring (external) 28	1
1089	HQ500-10-029B	Washer	1



FOLLOW REST ASSEMBLY

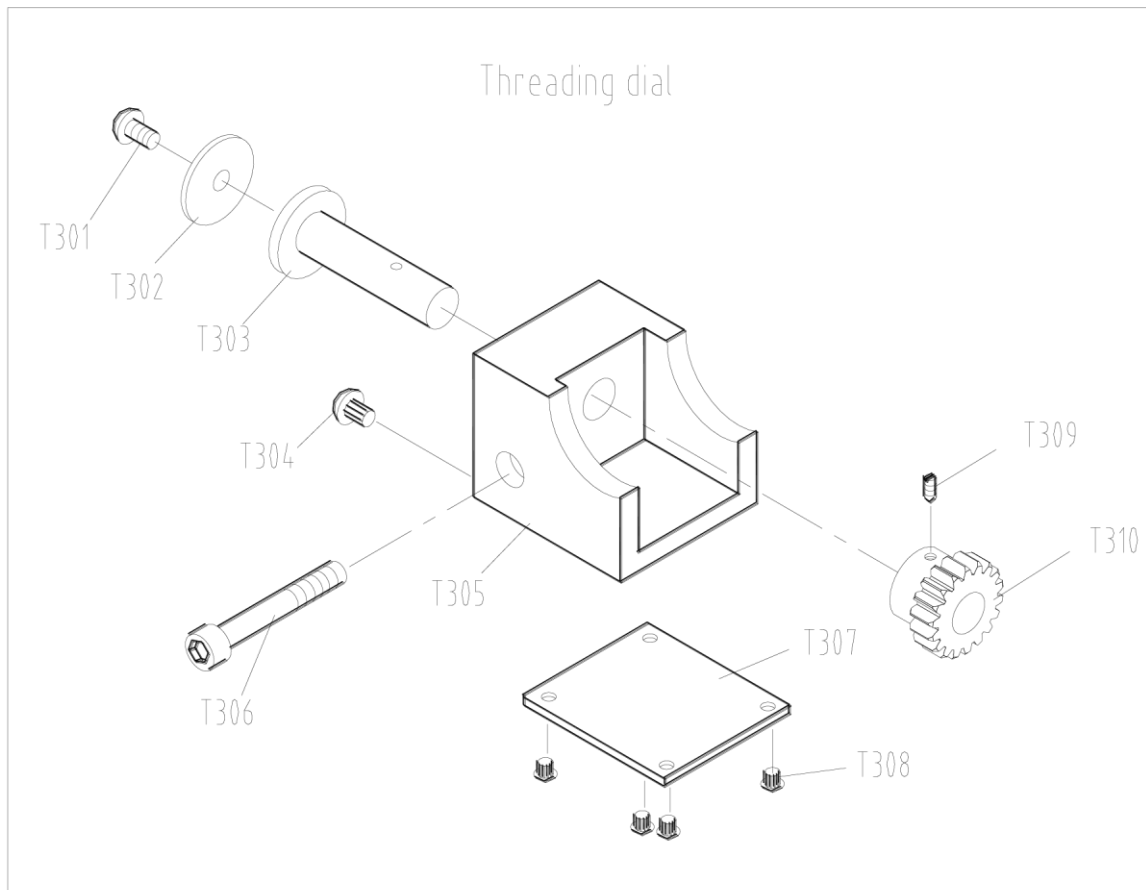
Index No.	Part No.	Description	QTY.
T101	HQ500-10T04-005	Follow rest frame	1
T102	JB/T72714.40	Handle 8×32	2
T103	GB/T879	Spring pin 3×16	2
T104	HQ500-10T04-001	Adjusting bolt	2
T105	HQ500-10T04-003	Sleeve	1
T106	HQ500-10T04-004	Brass head	2
T107	GB/T41	Hex nut M6	2
T108	GB/T75	Set screw M6×16	2
T109	HQ500-10T04-002	Knurled screw	2

Steady rest assembly



STEADY REST ASSEMBLY

Index No.	Part No.	Description	QTY.
T201	HQ500-10T05-005	Locking block	1
T202	HQ500-10T05-001	Steady rest base	1
T203	JB/T7274.4	Handle 8×32	1
T204	GB/T879	Spring pin3×16	3
T205	HQ500-10T04-001	Adjusting bolt	3
T206	HQ500-10T04-003	Sleeve	3
T207	HQ500-10T04-004	Brass head	3
T208	GB/T91	Cotter pin1.6×20	2
T209	GB/T882	Pin A6×26	2
T210	GB/T848	Washer 8	2
T211	HQ500-10T04-002	Knurled screw	3
T212	GB/T41	Hex nut M6	3
T213	GB/T75	Set screw M6×16	3
T214	HQ500-10T05-004	Steady rest head	1
T215	GB/T70	Screw M10×35	1
T216	GB/T848	Washer 10	1
T217	HQ500-10T05-002	Locking bolt	1
T218	HQ500-10T05-003	Knob	1



READING DIAL

Index No.	Part No.	Description	QTY.
T301	GB/T818	Screw M4×12	1
T302	HQ500-10T01-004	Indicator plate	1
T303	HQ500-10T01-002	Arbor	1
T304	GB/T827	Rivet 2×4	1
T305	HQ500-10T01-001	Threading dial seat	1
T306	GB/T70	Screw M6×50	1
T307	HQ500-00-017	Threading plate	1
T308	GB/T827	Rivet 2×4	4
T309	GB/T71	Screw M5×8	1
T310	HQ500-10T01-003	Gear T24	1