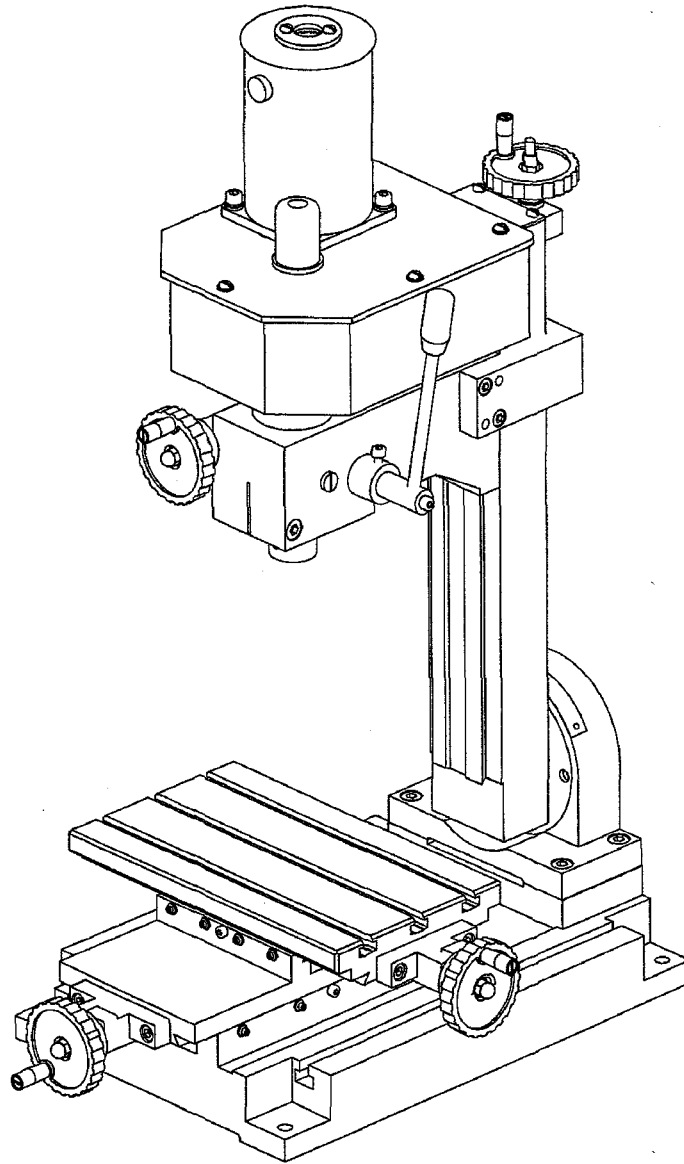


# ***MICRO MILL***

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## ***Instruction Manual***



***Read all instructions and warnings before using this machine***

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**-SUPER X1-**

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# Safety Considerations

This machine is designed for drilling, deep milling and face milling of small work pieces within the limits of the machine. If the operator is intending to operate the machine beyond the design limits, please contact the manufacturer or dealer for advise.

a) Before operating this machine:

- *read the instruction manual completely.*
- *undergoing professional training in drilling and milling work.*
- *familiarize yourself with the design limits of this machine.*
- *take every safety precaution possible.*

b) Important safety information:

- *the noise level during operation is 70~75dB(A).*
- *the temperature range suitable for operation and storage is -20 to 40 °C.*

c) Special warnings:

- *Warning! After interruption of power (i.e. a power failure), the machine must be switched off immediately. Pay particular attention to the risk of power being restored suddenly after power is lost!*
- *Warning! Always wear eye protection during operation.*

d) Correct handling of the machine:

- *the net weight of this machine is 40Kg. It is recommended that appropriate lifting equipment be used when moving this device.*
- *if the operator must lift the machine, seek aid from a second person and ensure that the weight is within your capability and use common sense - i.e. always bend the knees and not the back when lifting heavy objects.*

# CHAPTER 1 SPECIFICATIONS

This MICRO milling machine is capable of multiple functions in milling and drilling. There are various kinds and sizes of cutting tools available. Be sure to use the correct cutter for the intended job.

## 1.1 Machine Specifications

Max. table travel	180mm (7")
Max. cross slide	90mm (3 1/2")
Spindle stroke	30mm (1 3/16")
Throat	140mm (5 1/2")
Max. Power	150W
Spindle Speed	L:100~1000rpm H:100~2000rpm
Taper of hole in spindle	MT#2
Drilling Capacity	10mm (3/8")
End Milling Capacity	10mm (3/8")
Face Milling Capacity	20mm (4/5")
Machine Weight	GW: 56Kg NW: 40Kg
Shipping Dimensions	500mm x 400mm x 630mm (LxWxH)

# CHAPTER 2 MACHINE INSTALLATION

## 2.1 Locating the Machine

The machine should be bolted to the work bench to prevent it from moving about and to maintain precise operation.

### Selecting a good location

1. The work bench should be sturdy and have a flat even surface.
2. Avoid locations with direct sunlight, heavy moisture or dust.

### Mounting Instructions

1. Drill four holes through the work bench to match the holes in the machine's base.  
Ensure that you provide sufficient room for the movement of the work table and Y-axis hand wheel.
2. Use metal shims to level the machine and attach the machine to the workbench with the four M8 bolts and nuts provided.

## 2.2 Check the following before switching on the machine:

To avoid injury and damage to the machine, please assure the following:

1. Remove all tools used to mount the machine to the workbench.
2. Check that your supply voltage is correct (see the label on the front of the machine).
3. Remove all objects in the vicinity of the machine.
4. Remove the preservative using a good solvent, then lightly oil all machined surfaces.
5. Check the tip angle of the column and tighten the column bolts.
6. Check the chuck, chuck holder and fixing pin on the spindle to make sure they are free to rotate.
7. Check the operation of all handwheels and feed screws for proper operation.
7. Check the High-Low speed range selection for proper setting.
8. Check that the speed control knob is turned fully anti-clockwise to the OFF position.
9. Check that the Forward-Off-Reverse switch is in the OFF position.

## 2.3 Check the following when test running the machine (see chapter 8):

1. Check that the FORWARD direction rotates the spindle clockwise.
2. Look for any faulty operation, switch OFF immediately and make any reparations before continuing use of the machine.

# CHAPTER 3 MAINTENANCE

## 3.1 Preventative Maintenance

### 3.1.1 Daily Maintenance

1. Inspect each operating part and ensure sufficient lubrication.
2. Check for loose or broken parts.
3. Remove all obstacles around the machine to prevent machine damage and to ensure operator safety.
4. Clean the machine after use and oil all bare metal surfaces to prevent rust.
5. Watch for any unusual operation - stop and repair immediately.

### 3.1.2 Seasonal Maintenance

1. Use a clean cotton cloth or soft gauze to clean all parts of the machine.
2. Check for smooth operation of the headstock and table.
3. Check for proper spindle operation.
4. Check for loose nuts and bolts.
5. Check the condition of all switches and the power cable and plug. Use a qualified electrician if repairs are necessary.

### 3.1.3 Repairs and Maintenance

1. Keep a record of all maintenance and repairs carried out.
2. Do not perform any repairs whilst the machine is running.
3. Inspect the machine regularly and perform all repairs immediately.
4. If you are unsure about any repairs, contact the manufacturer or dealer for assistance.

## 3.2 Maintenance of Accessories

### 3.2.1 Maintenance of Cutters

1. Whilst installing a cutting tool, place an oily rag around it to avoid damaging the cutter, the machine's table or your workpiece should the cutting tool fall.
2. Store the cutting tools in a suitable wood or plastic box to prevent damage to the cutting edges.
3. Always verify that the spindle is turning in the proper direction. Otherwise proper cutting action will be defeated. If unsure about the direction of rotation, increase the spindle speed slowly, when starting the machine, and check carefully.
4. Before starting the machine, move the workpiece near the cutter. After starting the machine use minor movements to start the cutting action.

5. Keep cutting tools sharp. Dull cutters are hard on the machine and on the work-piece and leads to imprecise cutting action.

### **3.2.2 Tips for Using Accessories**

1. Keep taper shanks clean.
2. Keep pairs of cutters and holders together whenever possible to reduce the setup time the next time you use them.
3. Use the wrenches supplied and keep them close at hand to tighten the drawbars and chucks. Using the wrong tool can cause damage to the machine.
4. Use proper wrenches to tighten nuts and bolts. Never use pliers or hammers.

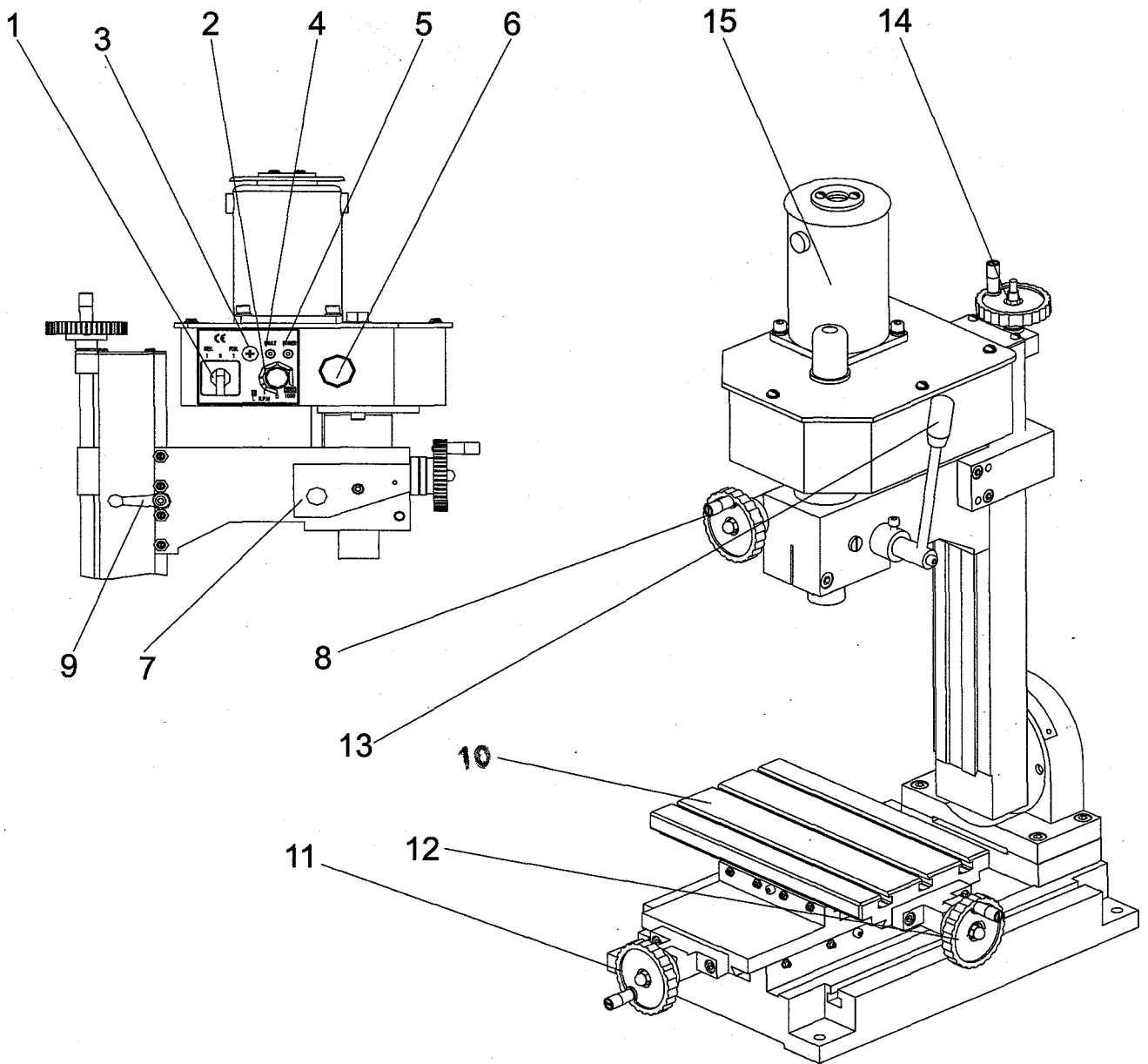
### **3.3 Lubrication**

Be sure to keep all moving parts in contact properly lubricated. A plastic oil-can is provided for this purpose. Please use lubricate on all sliding faces and leadscrews.

After working, clean the machine especially the exposed metal surfaces such as the worktable and apply a thin layer of oil to protect them from rust.

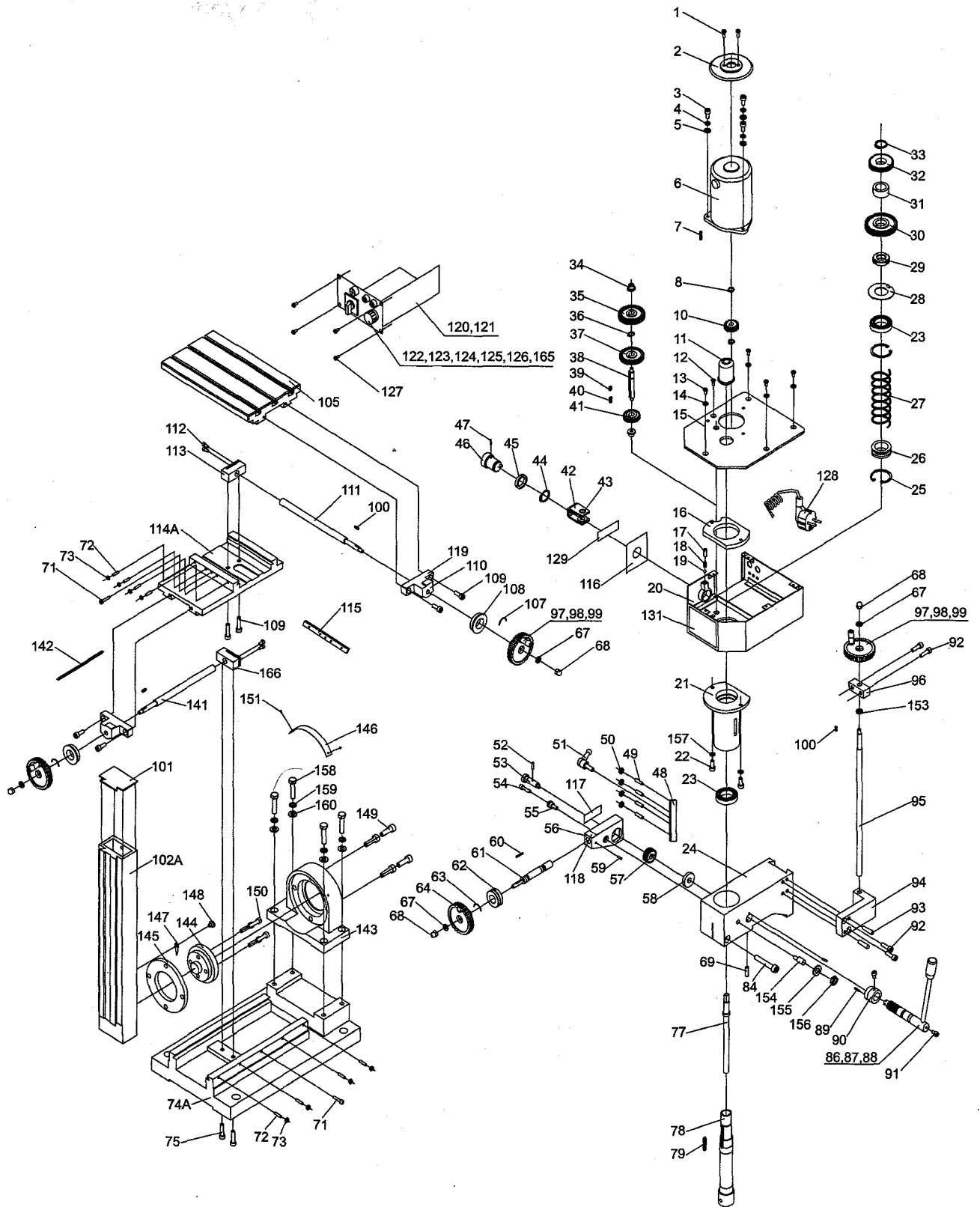
# CHAPTER 4 MACHINE STRUCTURE

## 4-1 Feature



1. Forward/off/Reverse Switch*	2. Variable Speed Control Knob*
3. Fuse box*	4. Power light (green)*
5. Yellow light *	6. High/Low change knob*
7. Clutch Lever	8. Fine Feeding Handwheel
9. Lock handle	10. Work table
11. Cross Feed Handwheel	12. Longitudinal Feed Hand Wheel
13. Handle	14. Lifting Handwheel
15. DC Motor	

# 4-2 Parts Diagram



## Part list I

No.	Description	Q'ty	No.	Description	Q'ty
1	Screw M4*12	2	40	Key 4X12	1
2	Protect cover for motor	1	41	Change gear	1
3	Screw M6*12	3	42	Dial fork	1
4	Spring washer 6	3	43	Flange lining	2
5	Washer 6	3	44	Check ring 21	1
6	DC motor	1	45	Spacer	1
7	Round key 3*16	1	46	H/L change knob	1
8	Check ring for shaft 8	2	47	Spring pin 2X12	1
10	Motor gear	1	48	Wedge	1
11	Safety cover	1	49	Screw M5X18	4
12	Screw M4X6	1	50	Nut M5	4
13	Screw M4X8	4	51	Handle	1
14	Washer 4	4	52	Pin A3X12	1
15	Up cover	1	53	Joint shaft	1
16	Sleeve support plate	1	54	Screw M5X18	1
17	Screw M6X5	1	55	Joint screw	1
18	Compression spring	1	56	Worm base	1
19	Steel ball 5	1	57	Helical gear	1
20	Gear-box	1	58	Spacer	1
21	Spindle sleeve	1	59	Pin A3X18	1
22	Screw M6X14	2	60	Key 2X18	1
23	Bearing 61905-2E	2	61	Worm shaft	1
24	Spindle box	1	62	Dial	1
25	Check ring for hole 38	2	63	Damp spring	1
26	Spring seat ring	1	64	Hand wheel	1
27	Compression spring	1	67	Washer 6	4
28	Round nut stop gasket	1	68	Top nut M6	4
29	Round nut M24X1.5	1	69	Screw M6X20	1
30	Spindle gear	1	71	Screw M4X20	2
31	Spacer	1	72	Screw M4X18	8
32	Spindle gear	1	73	Nut M4	8
33	Check ring for shaft 20	1	74	Base	1
34	Powder metallurgy bearing	2	75	Screw M6X20	2
35	Gear	1	77	Lock screw	1
36	Check ring for shaft 10	1	78	Spindle	1
37	Change gear	1	79	Key 4X28	1
38	Shift shaft	1	84	Screw M8X50	1
39	Key 4X8	1	86	Gear shaft	1

## Part list I

No.	Description	Q'ty	No.	Description	Q'ty
87	Handle shaft	1	128	Power line	1
88	Long handle sleeve	1	129	Caution label	1
89	Spring pin 3X12	2	131	Main label	1
90	Mark show sleeve	1	*132	Drill chuck	1
91	Screw M5X8	2	*133	Inside Six horn Wrench S:3,6	1
92	Screw M6X20	4	*134	Double end Wrench: 5.5*7, 8*10	1
93	Pin 6X26	2	*135	Round nut wrench D=38-42	1
94	Nut block	1	*136	Oil can	1
95	Lifting screw	1	*137	Fuse	1
96	Screw support	1	*138	Taper shank	1
97	Hand wheel	3	*139	Chuck key	1
98	Handle bolt	3	*140	T nut	4
99	Handle sleeve	3	141	Cross screw	1
100	Key 3X10	3	142	Cross wedge	1
101	Cover board	1	143	Connect plate support	1
102	Fuselage	1	144	Connect flange	1
105	Worktable	1	145	Round clamp plate	1
107	Damp spring	2	146	Scale	1
108	Dial	2	147	Finger	1
109	Screw M6X16	4	148	Screw M6*6	1
110	Screw base	2	149	Screw M8*25	4
111	Lengthways screw	2	150	Screw M6*25	4
112	Screw M4X8	4	151	Label rivet 2*3	2
113	Screw nut	2	153	Spacer	1
114A	Saddle	1	154	Adjust screw	1
115	Wedge	2	155	Washer 10	1
116	Change speed label	1	156	Nut M10	1
117	Joint label	1	157	Spring washer	2
118	0 position label	2	158	Bolt M8*30	4
119	Dial label	1	159	Spring washer	4
120	Electricity box	1	160	Washer 8	4
121	PC Board	1	161	Block up plate	1
122	Power light	1	162	Rear splash guard	1
123	Fuse box	1	163	Washer 4	2
124	Metachoresis switch	1	164	Screw M4*14	2
125	Forward/reverse switch	1	165	Yellow lamp	1
126	Electricity label	1	166	Cross nut	1
127	Screw ST2.9X6.5	4			

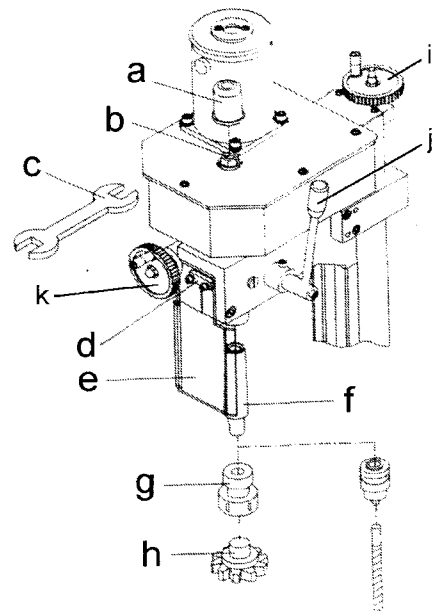
Note: With "\*" Not Shown in Parts Diagram.

# CHAPTER 5 MECHANISM ADJUSTMENT

## 5.1 Installation and Removal of Taper Shank

### Installation

1. Turn off the mains power and unplug the machine.
2. Remove the protective cover (a).
3. Wipe the spindle sleeve (f) and the taper shank (g).
4. Put the taper shank (g) onto the spindle sleeve (f).  
The cutter (h) should be held with an oily cloth to protect the machine and your fingers.
5. Use the #14 open ended wench (c) to tighten (clockwise) the spindle draw bar (b) for holding the taper shank.
6. Pull out the fixing pin!
7. Install the protective cover (a).
8. Install the clear safety protection panel (e) if provided.



### Removal

1. Turn off the mains power and unplug the machine.
2. Remove the clear safety protection panel (e) if provided.
3. Remove the protective cover (a).
4. Ensure that an oily cloth is placed around the cutter (h) to protect the machine and your fingers!
5. Use the #14 open ended wench (c) to loosen (anti-clockwise) the spindle draw bar (b).
6. Knock the taper shank (g) gently using a plastic hammer to remove the spindle sleeve.
7. Install the protective cover (a).

## 5.2 Vertical Travel Adjustment

The lifting handwheel (i) is used to control the vertical travel of the headstock.

1. Loosen the locking handle on the left hand side of the headstock.
2. Rotate the lifting handwheel (i) to coarsely adjust the headstock up and down as necessary.
3. Tighten the locking handle.
4. Use the long handle (j) to move the headstock down a maximum of 30mm when working.

### **5.3 Fine Vertical Feeding**

1. To use the fine feed handwheel (k), push the clutch lever (on the left hand side of the headstock) in. To return to normal feeding, pull the clutch out.

### **5.4 Adjusting the Tilt Angle of the Headstock**

1. Turn off the mains power and unplug the machine
2. Remove any cutters in the headstock to prevent personal injury or damage to the machine.
3. Hold the headstock firmly during this procedure to also prevent injury or damage.
4. Loosen the four locking bolts using the large hex wench provided.
5. Adjust the headstock to the required angle.
6. Tighten the bolts to lock it in position.

### **5.5 Gib Adjustment**

After continuous or hard use, any 'play' observed in the table mechanism or headstock column may be taken up by adjusting the 'gibs' (miter wedges) located in the slide mechanism. Periodic checking and adjusting of the gibs will assure continued machining precision and reduce chatter or vibration.

#### **The following items may require adjustment:**

1. Base and saddle seat sliding face.
2. Saddle seat and work table sliding face.
3. Headstock seat and connecting strut sliding face.
4. Headstock and spindle box slide face.

#### **Adjustment procedure for each slide:**

1. Loosen all lock nuts.
2. Back off the set screws.
3. Tighten each set screw carefully until gentle contact is made. Work from the centre screw, then alternate outwards. Assure the slide moves smoothly without play and without binding.
4. Tighten each lock nut uniformly (hold the set screw with a screwdriver to prevent rotation) and again check for smooth operation of the slide.

# CHAPTER 6 OPERATING NOTES

## 6.1 Method of Operation

### Drilling or Deep Milling

1. Follow the instructions in chapter 5 to install cutters. Ensure that the cutter is installed securely.
2. Select the most appropriate speed level. **Note, change the High-Low speed setting only when the machine is stopped. Also always check that it is fully engaged!**
3. Use a vise or clamps to hold the workpiece to the worktable.
4. Adjust the worktable (longitudinal axis Y) and the saddle seat (cross axis X) into position.
5. Adjust the vertical column to the required starting position.
6. Remove all adjusting tools and other obstacles from the machine.
7. Turn on the main power, select the Forward direction and turn the speed control clockwise to the appropriate speed setting.
8. Using either the course or fine vertical headstock movement, drill or mill to the depth required. Refer to the scale on the headstock for the drilling or milling depth.
9. When finished, return the headstock to its fully up position, turn off power and clean the machine.

### Face Milling

1. Follow the instructions in chapter 5 to install cutters. Ensure that the cutter is installed securely.
2. Select the most appropriate speed level. **Note, change the High-Low speed setting only when the machine is stopped. Also always check that it is fully engaged!**
3. Use a vise or clamps to hold the workpiece to the worktable.
4. Adjust the worktable (longitudinal axis Y) and the saddle seat (cross axis X) into the start position.
5. Adjust the vertical column to the required position. The fine vertical feed mechanism may be used to determine the depth of cut.
6. Remove all adjusting tools and other obstacles from the machine.
7. Turn on the main power, select the Forward direction and turn the speed control clockwise to the appropriate speed setting.
8. Turn the handwheel of the worktable (Y axis) and the saddle seat (X axis) to perform face milling.
9. When finished, return the headstock to its fully up position, turn off power and clean the machine.

### **Drilling or Milling Speed**

Before performing any machining operation, set the speed required. The operating speed range is 100 to 2000 rpm. Generally you should use higher speeds for soft materials and small holes and lower speeds for hard materials and large holes.

## **6.2 Operation Checklist**

Please check the following items when operating the machine to ensure proper operation and safety.

### **Inspect the machine before turning it on**

1. Check that the chuck or cutter is tight and secure.
2. Check for loose machine parts.
3. Check the High-Low range lever is in the correct position.
4. Check that the workpiece is held securely.
5. Remove any tools or obstacles around the machine.

### **During Operation**

1. Do not operate the machine whilst under the influence of alcohol or other drugs.
2. Do not wear gloves, necktie or other loose garment whilst operating the machine.
3. Use the appropriate cutting tool for the job.
4. The machine will vibrate or shake under the following conditions:
  - (a) Excessive depth of cut.
  - (b) Excessive speed of feed.
  - (c) Excessive spindle speed.
  - (d) Loose workpiece, vise, clamps or gibs.
  - (e) Machine is not securely fastened to the workbench.

## CHAPTER 7 GENERAL SAFETY INSTRUCTIONS

**Warning!** When using electric power tools, basic safety precautions should always be followed in order to reduce the risk of fire, electric shock and personal injury. Read the following instructions carefully before using this product and make a copy of them for your workshop wall.

- 1. Keep your work area clean.** Cluttered areas and benches invite injury.
- 2. Always be aware of your work environment.** Do not expose this machine to rain. Do not use it in damp or wet locations. Do not use it where there is a risk of fire or explosion.
- 3. Guard against electric shock.** Work on an insulated rubber surface and avoid bodily contact with earthed surfaces such as pipes and refrigerators. Consider installing an 'earth leakage detector' for further protection.
- 4. Keep children away.** Do not let visitors touch the equipment or power cord. All visitors should be kept well away from the work area.
- 5. Store idle tools.** When not in use, all tools should be stored in a dry secure place (i.e. locked up), out of reach of children.
- 6. Do not force tools.** Use tools only for the job that they were intended and operate them at a safe rate within their intended range.
- 7. Dress properly.** Do not wear loose clothing or jewelry - they can be caught in moving parts. Heavy duty (steel capped) non-skid footwear is recommended and protective hair covering should be used to contain long hair.
- 8. Use safety glasses.** Also use a face or dust mask if the operation is dusty.
- 9. Use dust extraction equipment where necessary.** Provide adequate ventilation and turn on extraction and collection equipment.
- 10. Do not abuse the power cord.** Never carry any tool by the cord. Never yank the cord to remove the plug from the socket. Keep the cord away from heat sources, liquids such as oil and sharp edges. Do not place or drop heavy objects or equipment on the cord.
- 11. Secure your workpiece.** Use a clamp or vise to hold your work. It is better than using your hand and it frees both hands for operating the equipment.
- 12. Do not overreach.** Keep proper footing and balance at all times.
- 13. Maintain tools with care.** Keep cutting tools sharp and clean for better and safer performance. Follow instructions for lubrication and maintenance. Inspect the equipment's power cord periodically and, if damaged, have a qualified person repair it. Keep handles dry, clean and free from oil and grease.
- 14. Disconnect the power.** When adjusting, cleaning and changing accessories on electrical equipment.

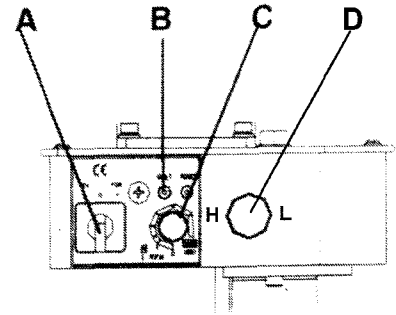
- 15.Remove adjusting keys and tools.** Always develop the habit of checking for keys and other tools before turning on any equipment.
- 16.Avoid unintentional starting.** Always check that equipment is switched off before plugging it in. Keep your fingers well away from the switch when moving handtools.
- 17.Use outdoor extension leads.** Use a heavy-duty outdoor power cord when operating outside.
- 18.Stay alert.** Watch what you are doing. Use common sense. Do not operate any equipment when tired or under the influence of drugs.
- 19.Check for damaged parts.** Before using any tool check all parts, especially safety equipment such as guards, to determine if it will operate properly and perform its intended function safely. Check for alignment of parts, smooth operation of moving parts, any breakage, secure mounting and any other condition that may affect the tools operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service centre unless otherwise indicated in the instruction manual. Have defective switches or other electrical items replaced by a qualified electrician. Do not use the tool if any defect is evident particularly an electrical switch.
- 20.Warning!** Using any accessory or attachments other than those recommended in this instruction manual may present a risk of damage to the equipment or of personal injury.
- 21.Always have this equipment repaired by a qualified person.** This electric tool is in accordance with the relevant safety requirements. Repairs must be carried out only by qualified persons using original replacement parts, otherwise this may result in considerable danger to the user.

# CHAPTER 8 OPERATION & OTHER

## 8.1 Operation

### 1. INITIAL START

Taking all precautions stated, set the High-Low range knob (D) to LOW. Turn OFF the Forward-Off-Reverse switch (A) and turn the speed control (C) fully anti-clockwise until it clicks. Insert the electric plug into the power outlet and switch it on. Select FORWARD on the direction switch (A). The green lamp (B) will light. Start the machine by GENTLY turning the VSC (Variable Speed Control) knob (C), clockwise. A click will be heard as motor power is turned on, but the spindle will not rotate until the knob is turned a little further. The speed will increase progressively as this knob is turned.



Run for a total of 5 minutes during which time gradually increase the spindle speed to its maximum. Run for, at least, 2 minutes at the maximum speed before stopping the machine and disconnecting the mains supply.

Check that all components are secure and working freely and correctly.

Check also that your mounting of the machine is secure.

Repeat this procedure for the HIGH speed range.

**CAUTION: NEVER attempt to change the speed range setting from LOW to HIGH or HIGH to LOW whilst the machine is running. Always check that it is fully engaged!**

### 2. STARTING UNDER NORMAL CONDITIONS

1. Take all necessary precautions previously stated and ensure that the workpiece is fixed securely.
2. Set the speed range control knob to HIGH or LOW as required.
3. Set the Forward-Off-Reverse switch to FORWARD or REVERSE as required.
4. Proceed to start the machine as described in section 1 above.
5. When you have finished with the machine, turn the Forward/Off/Reverse switch to the OFF position then disconnect the mains supply.

**ATTENTION:** The VSC system of this machine has an automatic motor overload function. If excessive torque is applied to the motor, due to feeding too fast or a tool jamming, the system will stop operating and the yellow lamp (B) will light. To start again, turn the VSC knob OFF and then turn it ON again, gently increasing the speed to that required. The system will reset automatically and the yellow lamp will turn off.



## Packing list

No.	Descriptions	Q'ty
1	Micro mill	1
2	Instruction Manual	1
3	L Hex. End Wrench S 3,6	Each 1
4	Double end Wrench 5.5*7, 8*10	Each 1
5	Socket head Wrench 38~42	1
6	Oil Can	1
7	Fuse	1
8	Key for Drill Chuck	1
9	Handle	3 set
10	T-nut	4

For further information, contact:

**PROCON TECHNOLOGY**

PO Box 655, Mt. Waverley  
VIC 3149. Ph: 1300304125

Or on the internet:

[www.procontechology.com.au](http://www.procontechology.com.au)