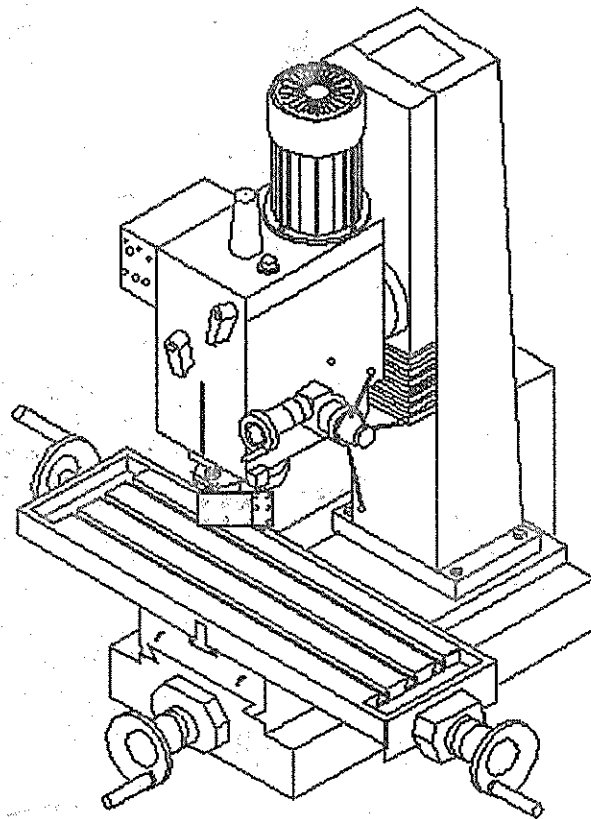


MODEL ZAY7045FG

MILLING & DRILLING MACHINE

OPERATION MANUAL

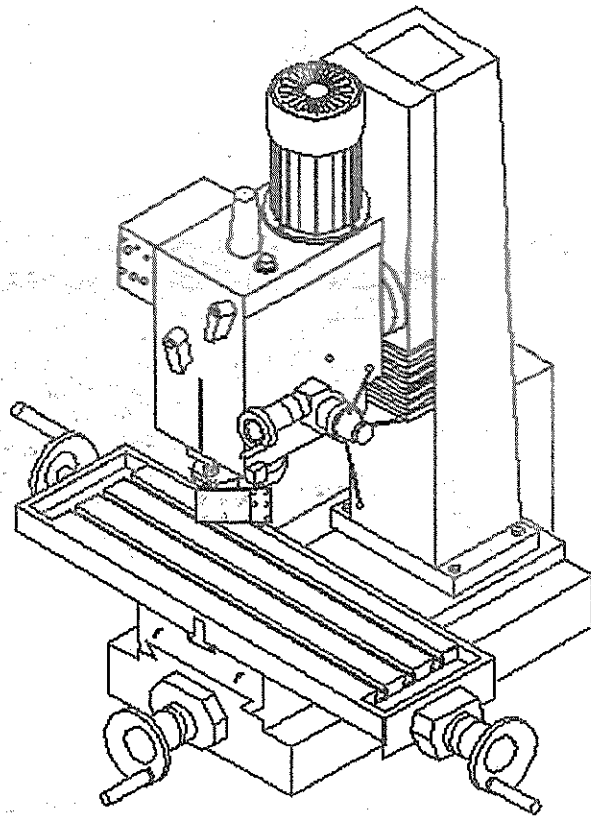


NEW

MODEL ZAY7045FG

MILLING & DRILLING MACHINE

OPERATION MANUAL



NEW

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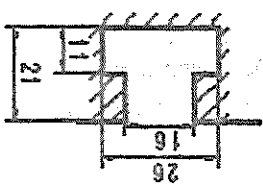
PARTS OF HEAD	16
PARTS OF SQUARE UPRIGHT	18
PARTS OF TABLE	19

Thank you for purchasing the ZAY7045FG Milling & Drilling machine, if properly cared

for and operated, this machine can provide you with years of accurate service.

Please read this manual carefully before using your machine.

1. SPECIFICATION

Model	ZAY7045FG
Max. drilling capacity	45mm
Max. face mill capacity	80 mm
Max. end mill capacity	32 mm
Max. tapping capacity	12 mm
Distance from spindle axis to column surface	265 mm
Swivel angle of head-stock at perpendicular direction	± 90°
Max. distance between spindle nose and table	450 mm
Spindle taper	MT4
Overall height (without stand)	1060mm
Working area of table	800 mm × 240 mm
Forward and backward travel of table	205 mm
Right and left travel of table	585 mm
Motor	1.5 kW (2 hp)
Voltage/Frequency	110V / 60HZ AND 220V
Spindle speed (4p) (r/min)	50 Hz 90, 165, 280, 540, 950, 1600 60 Hz 110, 200, 340, 650, 1140, 1920
Packing size (Length × Width × Height)	770 mm × 880 mm × 1160 mm
Net weight/Gross weight	320 kg/360 kg
T-SLOT	
Optional accessories	Face milling cutter φ63 mm Machine vice 125 mm Machine stand
Standard accessories	Double-head wrench 22 × 24 Allen wrench 4 mm 5 mm 6 mm Screwdriver(-) 150mm Taper sleeve Drill stock Drill chuck 13 mm Wedge Draw bar Draw bar washer Hand wheel

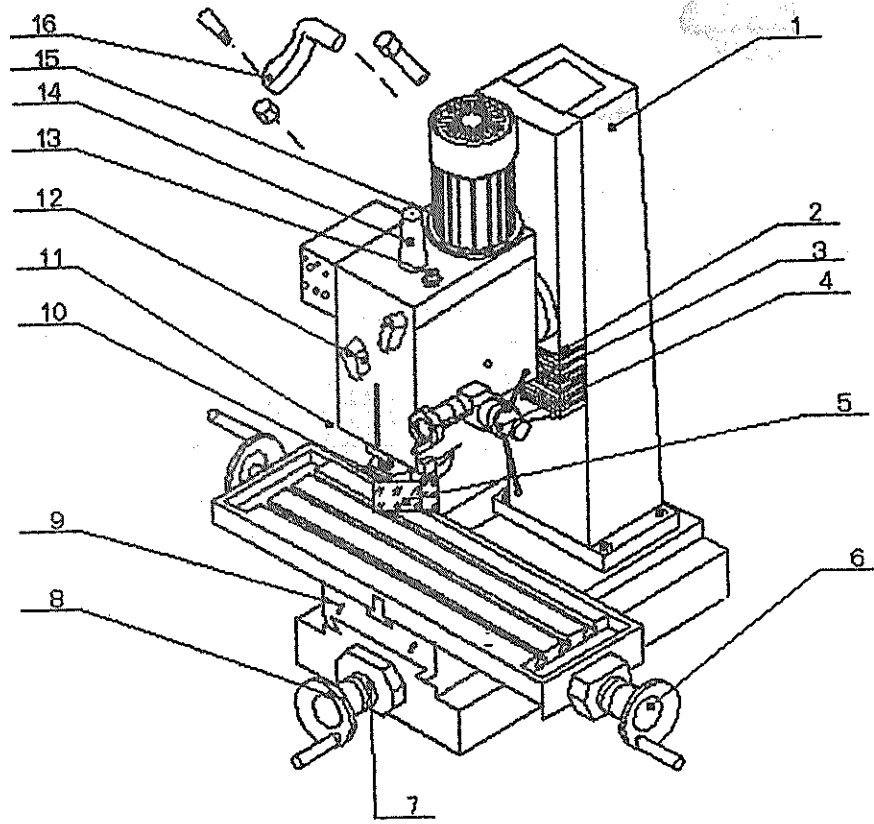


Fig.1

No.	Description	No.	Description
1	Square upright	9	Travel stop
2	Protection cover which looks organ	10	Positive depth stop gauge
3	Spindle micro feed handle wheel	11	Oil filler
4	Spindle feed handle	12	Speed lever
5	Shield for cutter	13	Oil filler and airflow plug
6	Longitudinal table feed handle wheel	14	Arbor bolt cover
7	Scale	15	Head body
8	Cross table feed handle wheel	16	Head handle

2. USE AND FEATURES (See Fig. 1)

- (1) This machine has several functions, such as surface cutting, drilling, milling, and tapping.
- (2) This machine is of fine quality, can be operated easily, and it is not limited to skilled operators.

(3) The drilling and milling operation can be performed by two methods:

(a) Hand operation (4), which makes quick feed drilling.

(b) Worm gear feed operation (3), which makes slow feed milling.

(4) Bronze adjustable nuts, which adjust the thread clearance and reduce the wear. They also make screws rotated smoothly and increase the thread accuracy.

(5) Whole upright (1), which makes this machine strong and stable, and also keeps high accuracy.

(6) Head of tough cast ensures its accuracy lasting enduring through the treatment of precise boring, grinding, and relieving internal stress.

(7) Smoothly and precisely gears transmitting.

(8) It is easy to change speed.

3. SAVE THIS MANUAL

You will need the manual for the safety warnings and cautions, assembly instructions, operating procedures, maintenance procedures, troubleshooting, parts list, and diagram. Keep your invoice with this manual.

Write the invoice number on the inside of the front cover. Keep this manual and your invoice in a safe, dry place for future reference.

4. NOTICE

The Warnings, Cautions, and Instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. The operator must understand that common sense and caution are factors, which cannot be built into this product, but must be supplied by the operator.

5. SAFETY WARNING & CAUTIONS

Please read all instructions before using this tool!

5.1 KEEP WORK AREA CLEAN

Cluttered areas invite injuries.

5.2 OBSERVE WORK AREA CONDITIONS

Do not use tools in damp, wet, or poorly lit locations.

5.3 KEEP CHILDREN AWAY

Children must never be allowed in the work area. Do not let them handle machines, tools, or equipment.

5.4 STORE IDLE EQUIPMENT

When not in use, tools must be locked up in a dry location to inhibit rust. Always lock up tools and keep out of reach of children.

5.5 DO NOT FORCE THE TOOL

It will do the job better and more safely at the rate for which it was intended. Do not use inappropriate attachments in an attempt to exceed the tool's capacities.

5.6 USE THE RIGHT TOOL FOR THE JOB

Do not use a tool for a purpose for which it was not intended.

5.7 DRESS PROPERLY

Do not wear loose clothing or jewelry, as they can be caught in moving parts. Nonskid shoes are recommended. Wear restrictive hair covering to contain long hair. Always wears appropriate work clothing.

5.8 USE EYE, EAR AND BREATHING PROTECTION

Always wear safety goggles if you are producing metal filings or wood chips. Wear dust mask or respirator when working around metal, wood, and chemical dusts and mists. Use ear protection when working in a loud or noisy environment.

5.9 DO NOT ABUSE THE POWER CORD

Protect the power cord from damage, either from impacts, pulling or corrosive materials. Do not yank machine's cord to disconnect it from the receptacle.

5.10 DO NOT OVERREACH

Keep proper footing and balance at all times. Do not reach over or across running machines.

5.11 MAINTAIN TOOLS WITH CARE

Keep tools sharp and clean for better and safer performance. Follow instructions for lubricating and changing accessories, inspect power cord periodically and, if damaged, have it repaired by an authorized technician. Inspect all hydraulic seals for leaks prior to use. Control handle and power switch must be kept clean, dry, and free from and grease at all times.

5.12 REMOVE ADJUSTING KEYS AND WRENCHES

Be sure that keys and adjusting wrenches are removed from the tool or machine work surface before operation.

5.13 AVOID UNINTENTIONAL STARTING

Be sure that you are prepared to begin work before turning the start switch on.

5.14 STAY ALERT

Watch what you are doing. Do not operate this machine when you are tired.

5.15 DO NOT OPERATE THIS MACHINE WHILE UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR PRESCRIPTION MEDICINES

5.16 CHECK FOR DAMAGED PARTS

Before using any tool, any part that appears damaged should be carefully checked to determine that it would operate properly and perform its intended function. Check for alignment and binding of moving parts, any broken parts or mounting fixtures, and any other condition that may affect proper operation. Any part that is damaged should be properly repaired or replaced by a qualified technician. Do not use the tool if any switch does not turn on and off properly.

- (1) Please admit well-suited methods to sleep, which avoid damage to the machine.
- (2) Be sure to fix the head on the upright before moving machine. While moving machine, please keep its balance and safety.
- (3) Do not mount machine at the sunshine place to avoid the deformity of machine and the loss of accuracy.
- (4) Check to see if the motor turning in clockwise direction before connecting the electric distribution line.
- (5) Mount machine to a sturdy table or base. It is advisable that the table you choose be well constructed to avoid any vibration during operation.

7 SCHLIPPING AND INSTALLATION

Use extreme caution to prevent loose materials from being caught in the machine. Never operate this machine with loose clothing, long hair, jewelry, or other items, which may become caught in the tools or work-pieces. In case of entanglement, the OFF switch immediately.

6.3 ENTANGLEMENT

operation.
 Always stand to one side of the plane in which the materials are spinning, to avoid being hit if an item is ejected. Never allow bystanders to be in the proximity of this machine while in operation. Always wear certified eye protection. Never attempt to machine any item if it is not adequately held. Because milling tools and work-pieces turn at high speed, there is a danger of being injured by materials that may be ejected. Use safe practices to avoid injury from ejected material. Because milling tools and work-

6.2 EJECTED MATERIAL

recommend you use a circuit, which is protected by an appropriate circuit breaker.
 Never operate any tool if there is an electrical hazard. Never operate an electrical tool in wet conditions. Never operate a tool with an improper electrical cord or extension cord. Never operate an electrical tool unless you are plugged into a properly grounded outlet. We

6.1 ELECTRICAL SAFETY

and those around you.
 Using this machine may create special hazards. Take particular care to safeguard yourself

6 SPECIAL WARNINGS WHEN USING THIS DRILLING/MILLING MACHINE

For your own safety, maintenance should be performed regularly by a qualified technician.

5.19 MAINTENANCE

not use this tool for a purpose for which it was not intended.
 There are certain applications for which this tool was designed. Do not modify this tool and do not attempt to force a small tool or attachment to do the work of a larger industrial tool.

5.18 USE THE RIGHT TOOL FOR THE JOB

the warranty.
 When servicing, use only identical replacement parts intended for use with this tool. Replacement parts are available from Harbor Freight Tools. Use of any other parts will void

5.17 REPLACEMENT PARTS AND ACCESSORIES

(6) Four holes are provided on the machine base for mounting. Before tightening bolts make sure the worktable on the machine is level lengthwise and crosswise. Use shims if necessary.

8 CLEANING AND LUBRICATING (see fig. 2)

(1) Your machine has been coated with heavy grease to protect it before shipping. This coating should be completely removed before operating the machine. Commercial degreaser, kerosene or similar solvent may be used to remove the grease from the machine, but avoid getting solvent on rubber parts.

(2) After cleaning, coat all bright work with a light lubricant. Lubricate all points in Fig.2 with medium consistency machine oil.

(3) Remove the oil filler plug fill the lubricant such as SAE 68 oil in level to the gear box until the oil level reach the middle of oil fluid level indicator. Then lock the plug.

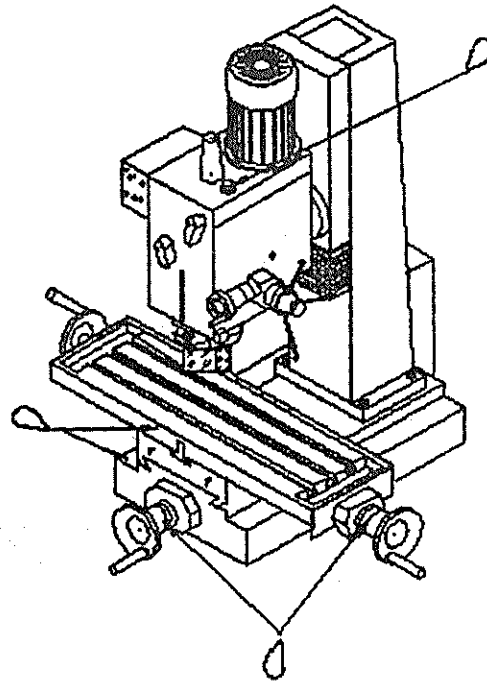


Fig.2

9 LEVELING THIS MACHINE

Before operation, it is critical to level the work surface both lengthwise and crosswise, using a precision level. It will not be possible to maintain accuracy of machined parts if the mill is not properly leveled to start.

10. USING AND SAFEGUARDING

10.1 USE OF MAIN MACHINE PARTS (see Fig. 1)

- (1) To raise and lower the head by head handle (16).
- (2) Forward-Stop-Reverse switch for tapping operation clockwise or counter clockwise.
- (3) Feeding by spindle feed handle (3).
- (4) To adjust the table left and right travel by the table feed handle wheel (6).
- (5) To adjust the table fore and after travel by the table feed handle wheel (8).
- (6) To operate the spindle handle wheel (4) for micro feed.
- (7) To adjust the scale (7) size according to working need.

10.2 PRECAUTION FOR OPERATION

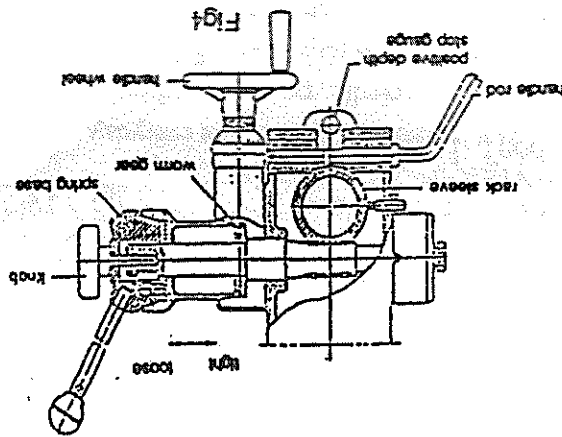
Check all parts for proper condition before operation. If normal safety precautions are proceed carefully, this machine can provide you with standing of accurate service.

- (1) Before operation
 - (a) Fill the lubricant.
 - (b) In order to keep the accurate precision the table must be free from dust and oil deco.
 - (c) Check to see that tools are corrective set and the work-piece is set firmly.
 - (d) Be sure of the speed is needed.

- (2) Be sure that chuck key is removed from the chuck before turning on power.
 (1) Be sure that drill bit or cutting tool is securely locked in the chuck.

10.3 SAFETY RULES FOR MILLING-DRILLING

- (c) Lock the rack sleeve at the desired height with fixed bolt machining height.
 spring base. Then turning the handle wheel by micro set the spindle of work piece
 (b) Turn tight of the knob be use to taper friction force coupling the worm gear and
 (a) Adjust the positive depth stop gauge to the highest point position.
 (5) Preparing for milling (except addition power feed system) (see Fig. 4)
 state for pass hole.
 decide spindle stroke setting the positive depth stop gauge for drilling blind hole or free
 Turn off the knob make loose the taper body of worm gear and spring base. Then we
 (4) Preparing for Drilling (except addition power feed system) (see Fig. 4)



- degree you wish on the scale, and then screw the three nuts.
 (b) Unscrew three nuts while the work-piece needs to be bevel drilled, turn to the
 When the desired height is reached, tighten the brake bolts avoid vibration.
 handle on the left to raise and lower the head on its rack and pinion mechanism.
 (a) To raise and lower the head, loosen the two heavy-duty head lock nuts. Use the head
 (3) Adjustment of Head
 (d) Cover the machine with cloth to keep out the dust.
 (c) Clean the machine and coat it with lubricant.
 (b) Turn down the tools.
 (a) Turn off the electric switch.
 (2) After operation
 (e) Be sure of everything is ready before using.

- (3) Adjust the table or depth stop gauge to avoid drilling into the table.
- (4) Shut off the power, knock down the drill bit or cutting tool and clean the table before leaving the machine.
- (5) Caution: when partially uses a clamp or a vise to secure work-piece to keep the work-piece from rotating with the drill bit or cutting tools.
- (6) Warning: For your own safety, don't wear gloves when operating the machine.

10.4 ADJUSTING TABLE SLACK AND COMPENSATE FOR WEAR (See Fig. 5)

- (1) Your machine is equipped with wedge strip adjustment to compensate for wear and excess slack on cross and longitudinal travel.
- (2) Clockwise rotation the wedge strip bolt with a dog screw for excess slack otherwise a little counter clockwise if too tight.
- (3) Adjust the wedge strip bolt until feel a slight drag when shifting the table.

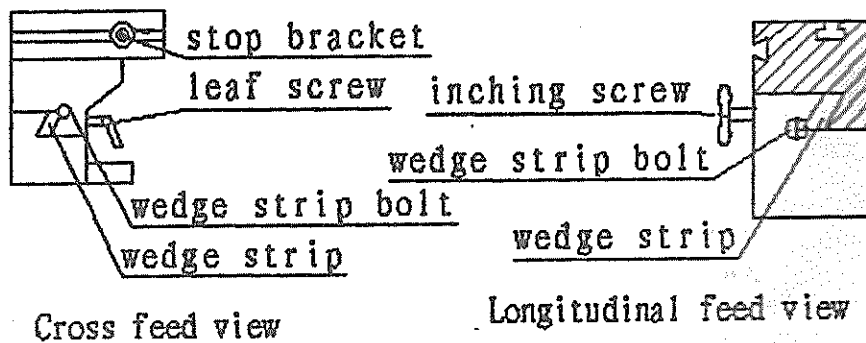


Fig.5

10.5 CLAMPING, TABLE BASE AND MACHINE BASE

- (1) When milling longitudinal feed, it is advisable to lock the cross feed table travel to insure the accuracy of your work. To do this, tighten the small leaf screw located on the right side of the table base.
- (2) To tighten the longitudinal feed travel of the table for cross feed milling, tighten the two small leaf screws on the front of the table base.
- (3) Adjustable travel stops are provided of the front of the table for control of cross travel and desired milling length.

10.6 CHANGING SPEED

- (1) Turn power off.
- (2) Select proper speed, turn speed lever to the pointed position.
- (3) If the gears are not engaging, put down the arbor bolt cover, screw the spindle to engage the gears, then put on the arbor bolt cover.
- (4) Be sure for correct lever then turn power on.

13 TROUBLE SHOOTING

- (3) Change the lubricant in the gearbox each year.
- (2) Check electric cord, plugs, and switches at least once a year to avoid loosening or wearing.
- (1) Adjust table to horizontal position for maintenance of accuracy.

12.4 YEARLY MAINTENANCE

- (2) Lubricate bearing, worm, and worm shaft to avoid wear.
- (1) Adjust the accurate gap of slide both on cross and longitudinal feed.

12.3 MONTHLY MAINTENANCE

- (2) Check to see if sliding surface turning parts lack of lubricant. If the lubricant is insufficient, fill it.
- (1) Clean and coat the cross lead screw with oil.

12.2 WEEKLY MAINTENANCE

- antirust oil before leaving.
- source, take chip or dust away from machine and follow instructions lubricating or coating
- (3) Keep work area clean, release vise, cutter, work-piece from table, switch off power immediately to check it for keeping accurate performance.
- (2) If temperature of spindle caused overheating or strange noise, stop machine
- (1) Fill the lubricant before starting machine everyday.

12.1 DAILY MAINTENANCE (by operator)

- maintaining than to remedy it after being out of order at any time.
- That's easier to keep machine in good conditions and the best performance by means of

12 MAINTAINING

When ambience is not other voice, machinery's noise less than 83 dB(A) or equal to, from machinery's the left, the starboard, the front to 500 mm's place.

11 NOISE

- securely, but do not over tightening.
- (2) To Install Face Mill or Cutter Arbor
 Insert cutter and cutter arbor into the taper of spindle. Tighten arbor bolt detach bolt with the other hand
 After taper has been broken loose, holding chuck arbor on hand turn detach the arbor wrench. Rap the top of the arbor bolt with a mallet.
 Loosen the arbor bolt at the top of the spindle shaft approximately two turns with a
- (1) Removing Face Mill or Drill Chuck Arbor

10.7 TO CHANGE TOOLS

LEVERS	R.P.M	L-1	L-2	L-3	H-1	H-2	H-3
	60 Hz	110	200	340	650	1140	1920
	50 Hz	90	165	280	540	950	1600

13.1 NO RUNNING AFTER SWITCH ON:

- (1) The switch is at the position of "stop" --- Turn the switch to "forward" or "reverse".
- (2) Break down of fuse in switch box---Replace with new one.
- (3) In case of too much current, the overload relay jumps away automatically. ---Press the overload relay, and it will return to the correct position.
- (4) The gears are not engaged. ---Adjust speed lever.

13.2 MOTOR OVERHEAT AND NO POWER:

- (1) Overload---Decrease the load of feed.
- (2) Lower voltage---Adjust to accurate voltage.
- (3) Spoiled contact point of magnetic switch---Replace with new one.
- (4) Breakdown of contactor relay---Connect it or replace with new one.
- (5) Motor is poor---Replace with new one.
- (6) Break down of fuse or poor contact with wire (It is easily to spoil motor while short circuit) ---Shut off power source at once and replace fuse with new one.
- (7) Dull cutter---Sharpen cutter and keep it sharp.

13.3 THE TEMPERATURE OF THE SPINDLE BEARING IS TOO HOT.

- (1) Grease is insufficient---Fill the grease.
- (2) The spindle bearing is fixed too tight---Turn with no speed and feel the tightness with hand.
- (3) Running with high speed for a long time---Turn it to lightly cutting.

13.4 TABLE TRAVEL HAS NOT BALANCED:

- (1) The gap of spindle taper is too wide---Adjust bolt in proper.
- (2) Loosening of leaf bolt ---Turn and fasten in place.
- (3) Feed too deep---Decrease depth of feed.
- (4) Feel a heavy drag when shifting the table---Adjust wedge strip or table nut.

13.5 SHAKE OF SPINDLE AND ROUGHNESS OF WORKING SURFACE HAS TAKEN PLACE DURING PERFORMANCE:

- (1) The gap of spindle taper is too wide---Adjust the gap in proper or replace bearing with new one.
- (2) Spindle loosening up and down ---Make two of inner bearing covers on the top tight each other. Do not over-tight two inner bearing covers with the taper bearing, it is OK as long as no gap between them.
- (3) The gap of taper sliding plate too wide---Adjust the tension of proper.
- (4) Loosening of chuck ---Fasten chuck.
- (5) Cutter is dull---Sharpen it.
- (6) Work-piece has not hold firmly---Be sure to tighten.

13.6 MICRO FEED DOES NOT WORK SMOOTHLY:

- (1) Loosening of clutch---Be sure to tighten.
- (2) Worm and worm shaft has worn out---Replace new one.

Cutter arbor
End mills
Reamers
Taper drill

Each of machines is equipped with a MT4 spindle taper (examples below). Contact your local distributor or a mater cutting tool distributor to obtain any of these accessories.

17 EXTRA TOOLS AND ACCESSORIES

No.	BEARING MODEL	BEARING NAME	ASSEMBLY PLACE	AMOUNT
1	8103	Thrust ball bearing	Table	4
2	8105	Thrust ball bearing	Square upright	1
3	6003	Collar ball bearing	Square upright	1
4	6007-2Z	Collar ball bearing	Head	1
5	6202-2Z	Collar ball bearing	Head	2
6	6003-2Z	Collar ball bearing	Head	3
7	6008-2Z	Collar ball bearing	Head	2
8	7206E	Taper ball bearing	Spindle	1
9	7208D	Taper ball bearing	Spindle	1

16 LIST OF BEARING

of table is 2.5mm.

- (1) Direct feed: Operator turns the handle rod to drive the spindle. The handle rod turn one circle and the stroke of the spindle is 8mm.
- (2) Micro-feed: Feed handle-wheel turns one revolution and the stroke of spindle or the stroke

15.2 FEED MOTION HAS TWO WAYS

off the power first, then turn the speed lever to the proper position.
rotational speed of the power motor is 1400r/min. User can select one of the six grades of speed (80r/min--1250r/min) by changing the position of the slipping gears. Before changing speed, cut Power Motor → Three Classes Gear Train → Spline Spindle Joint → Spindle. The rated

15.1 KINEMATICS CHAIN OF MACHINE

15 KINEMATICS CHAIN AND FEED MOTION

Complete parts list is attached. If parts are needed, contact your local distributor.

14 ORDERING REPLACEMENT PARTS

after a period of use.

- (3) Inaccurate horizontal labels--Check and maintains table for keeping accurate horizontal piece.
- (2) Often use of hammer to strike work-piece--Forbidden to use hammer to strike work-holding work-piece.
- (1) Imbalance of heavy work-piece--Must be considerate of the principle of balance while

13.7 WITHOUT ACCURACY IN PERFORMANCE:

- (3) Loosening of hand-wheel fixed screw--Be sure to tighten it.

Taps

Collets

Adapter sleeves

18 ELECTRIC CONTROL SYSTEM (Wiring diagram is behind)

The electric control system of machine can have the machine tapping, milling and drilling. A knob, a red mushroom button and a green button on the switchboard have the machine tapping, milling and drilling.

18.1 MATTERS NEEDING ATTENTION

- (1) Before using the machine, user must install a fuse box in front of the power outlet. After making the knob in the middle of position, connect with the power supply, and the machine is stopping position.
- (2) Before starting the machine, be sure that the machine has been ground connection, and examine every operation parts being on rest condition or not.
- (3) The green button is the starting button. While selecting milling & drilling, push the green button, the machine spindle is forward, otherwise, user must exchange the phase position of the three-phase power, and have the machine being forward. The red mushroom push-button has two functions. When user selected milling & drilling state, the red push-button has stopping function; when user selected tapping state, the red push-button has reverse function.
- (4) Being on tapping, the spindle will be forward immediately while the spindle is reversing and raising to knock the up travel switch.
- (5) In order to avoid damaging to man or machine, before having the follow operations: changing tools, installing works, adjusting travel, etc. Be sure that the machine has been stop.

18.2 MILLING AND DRILLING

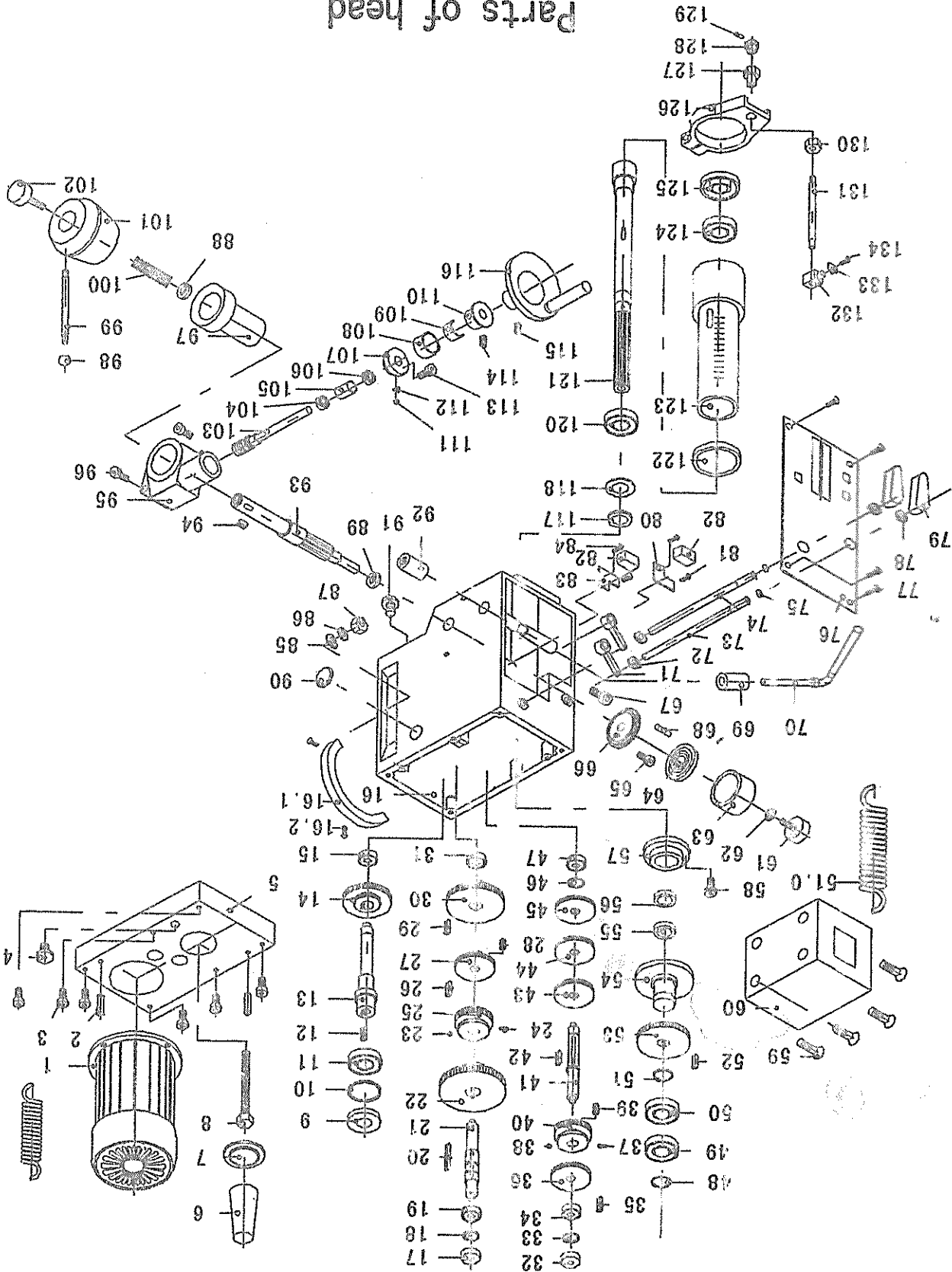
Anti-clockwise turn the knob to the state of MILLING & DRILLING, push the green button, the machine is started and the green pilot lamp is light, the spindle is forward. When pushing the red mushroom button, the machine stops.

18.3 TAPPING

Clockwise turn the knob to the tapping state, push the green push-button, the machine is started and the green pilot lamp is light, the spindle is forward. While feeding to the pre-setting depth, the machine is reverse immediately, and the red pilot lamp is light, At the same time, the tap is withdrawing from the work-piece.

In critical situation, push the red mushroom button and the red pilot lamp is light, At the same time, the tap is withdrawing from the work-piece.

Parts of head



Parts of Head

No.	Name of parts	Amount	No.	Name of parts	Amount
1-01	Motor and cable	1	1-34	Bearing (6202-2RS-Z2)	1
1-02	Pin	2	1-35	Guide key	1
1-03	Screw	6	1-36	Gear	1
1-04	Airflow plug	1	1-37	Spring	1
1-05	Head body cover	1	1-38	Steel ball	1
1-06	Arbor bolt cover	1	1-39	Bolt	1
1-07	Oil seal	1	1-40	Gear	1
1-08	Arbor bolt	1	1-41	Shaft	1
1-09	Oil seal	1	1-42	Key	1
1-10	Inner ring	1	1-43	Gear	1
1-11	Bearing (6007-2RS-Z2)	1	1-44	Gear	1
1-12	Key	1	1-45	Gear	1
1-13	shaft	1	1-46	Inner ring	1
1-14	Bevel wheel	1	1-47	Bearing (6003-2RS-Z2)	1
1-15	Ball bearing (6003-2RS-Z2)	1	1-48	Inner ring	1
1-16	Head body	1	1-49	Bearing (6008-2RS-Z2)	1
1-16.1	Scale	1	1-50	Bearing (6008-2RS-Z2)	1
1-16.2	Rivet	1	1-51	Inner ring	1
1-17	Oil seal	2	1-52	Key	1
1-18	Inner ring	1	1-53	Gear	1
1-19	Bearing (6202-2RS-Z2)	1	1-54	Spindle sleeve gear	1
1-20	Guide key	1	1-55	Oil seal	1
1-21	Shaft	1	1-56	Oil seal	1
1-22	Gear	1	1-57	Seal seat	1
1-23	Steel ball	1	1-58	Bolt	3
1-24	Spring	1	1-59	Screw	4
1-25	Gear	1	1-60	Switch box and cable	1
1-26	Key	1	1-61	Screw handle	1
1-27	Gear	1	1-62	Washer	1
1-28	Bolt	1	1-63	Spring cover	1
1-29	Key	1	1-64	Eddy spring	1
1-30	Gear	1	1-65	Hexagon-socket lead screw	3
1-31	Bearing (6003-2RS-Z2)	1	1-66	Spring base	1
1-32	Oil seal	1	1-67	Guide screw	1
1-33	Inner ring	1	1-68	Pin	1

No.	Name of parts	Amount	No.	Name of parts	Amount
1-69	Braking block	1	1-106	Ball bearing	1
1-70	Handle rod	1	1-107	Worm-wheel cover	1
1-71	Driving lever	2	1-108	Scale-loop	1
1-72	Washer	2	1-109	Spring piece	11
1-73	Lever shaft (left)	1	1-110	Scale-loop seat	1
1-74	Lever shaft (right)	1	1-111	Rivet	1
1-75	Inner ring for shaft	2	1-112	Indicator	1
1-76	Name plate	1	1-113	Hexagon-socket head screw	1
1-77	Screw	4	1-114	Screw	1
1-78	Oil seal	2	1-115	Screw	1
1-79	Speed lever	2	1-116	Handle-wheel	1
1-80	Travel switch seat (A)	1	1-117	Circular nut	1
1-81	Screw	2	1-118	Lock washer	1
1-82	Travel switch	2	1-120	Ball bearing	1
1-83	Travel switch seat (B)	1	1-121	Spindle shaft	1
1-84	Screw	2	1-122	Rubber washer	1
1-85	Washer	3	1-123	Rack sleeve	1
1-86	Elasticity washer	3	1-124	Bearing	1
1-87	Nut	3	1-125	Oil seal	1
1-88	Inner ring for shaft	1	1-126	Base for scale lever	1
1-89	Inner ring for shaft	1	1-127	Base for lever	1
1-90	Oil level	1	1-128	Handle with pattern	1
1-91	Oil plug	1	1-129	Pin	1
1-92	Braking block	1	1-130	Nut	1
1-93	Shaft with gear	1	1-131	Lever for scale	1
1-94	Key	1	1-132	Locating block	1
1-95	Feed seat	1	1-133	Feed indicator	1
1-96	Hexagon-socket head screw	2	1-134	Screw	1
1-97	Worm-wheel	1			
1-98	Plastic ball	3			
1-99	Handle lever	3			
1-100	Spring	1			
1-101	Spring base	1			
1-102	Lock screw	1			
1-103	Worm shaft	1			
1-104	Ball bearing	1			
1-105	Spacing collar	1			

Parts of Table

No.	Name of parts	Amount	No.	Name of parts	Amount
2-1	Table Handle with Wheel	3	2-27	Hex Set Screw	2
2-2	Dial Clutch	2	2-28	Table Clutch	1
2-3	Spring Pin	3	2-29	Left Flange	1
2-4	Reed	2	2-30	Table Screw	1
2-5	Dial	2	2-31	Right Flange	1
2-6	Thrust Bearing (8103)	4	2-32	Hex Set Screw	2
2-7	Hex Set Screw	10	2-33	Anti-dust Plate	1
2-8	Meter Indicator	2	2-34	Anti-dust Plate	1
2-9	Square Flange	1	2-35	Hex Set Screw	2
2-10	Rivet Of Scutcheon	4	2-36	Anti-dust Plate	1
2-11	Oil Ball	5	2-37	Hex Set Screw	1
2-12	Table Screw	1	2-38	Table Nut	1
2-13	Base	1	2-39	Hex Set Screw	2
2-14	Washer	4	2-40	Center Base	1
2-15	Spring Washer	4	2-41	Knob	2
2-16	Hex Head Bot	4	2-42	Fixed Block	1
2-17	Column Base	1	2-43	Gib Strip Bolt	2
2-18	Spring Washer	4	2-44	Gib Strip	1
2-19	Hex Set Screw	4	2-45	Table Base Nut	1
2-25	Fixed Block	2	2-46	Gib Strip	1
2-26	Moveable Fixed Ring	2	2-47	Leaf Screw	2

Parts of upright

No.	Name of parts	Amount
3-1	Square upright	1
3-2	Lock washer	4
3-3	Hexagon-socket lead screw	4
3-4	Hexagon-socket lead screw	1
3-5	Lock washer	1
3-6	Big bevel gear	1
3-7	Adjustment ring	1
3-8	Radial ball bearing	1
3-9	Flat key	1
3-10	Guide-screw	1
3-11	Flat key	1
3-12	Nut	1
3-13	Bearing base	1
3-13.1	Taper pin	2
3-14	Thrust ball bearing	1
3-15	Screw	3
3-16	Screw	4
3-17	Adjustment screw	1
3-18	Inlay key	1
3-19	Slip saddle	1
3-20	Handle	2
3-21	Protective cover	1
3-22	Angle iron	1
3-23	Screw	2
3-24	Screw	1
3-25	Hexagon-socket lead screw	1
3-26	Lock washer	1
3-27	Small bevel gear	1
3-28	Adjustment ring	1
3-29	Axle to bevel gear	1
3-30	Flat key	1
3-31	Support	1
3-31.1	Taper pin	2
3-32	Lock washer	1
3-33	Hexagon-socket lead screw	4
3-34	Screw	1
3-35	Crank handle	1
3-36	Handle	1

