Rotary Surface Grinder

Operation Manual

KHGR-600

Edition 1

Guarantee Affairs

1. This machine is guaranteed for one year in normal operation.
   (Working 8 hours a day.)

2. The machine and electric parts are offered free of charge, in case of damage in one year.

3. Before operating this machine, please read operation manual to protect the operator safety.

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Chapter One Safety regulations

1.1 General safety rules

Please comply strictly with the following general safety rules.

1. Only the well trained operators are assigned to carry out the operation and maintenance of this machine.
2. The operators shall be trained in safety and sanitation education in accordance with the local labor safety regulations and codes.
3. The operators shall be drawn to the attention of unsafe operations.
4. The lighting of the working environment shall comply with the local regulations.
5. Employ the non-conductive CO_2 fire extinguisher or ABC powder fire extinguisher as the standard fire-fighting equipment only.
6. The operators are required to read through this operation manual before attempting to operate this machine to get familiarized with the coverage of warning labels posted.
7. The operation manual shall always be kept available for the operators, if missing, please contact us immediately for assistance.
8. The longhair shall be banded or capped before attempting to operate this machine.
9. The operators shall wear goggles, mask and safety shoes.
10. Always keep the work ground of the machine neat and dry, all barriers shall be removed.
11. The maximum free space reserved for the machine is 600mm to prevent the personnel from being collided with the machine. The red restricted area is for authorized personnel only.
12. The operators and maintenance persons shall work in the restricted area. Pay attention to safety when leaving the restricted area.
13. The hoist shall be employed to load and unload the work piece more than 30 kg and the hoist shall be operated by the licensed operator.
14. All wheel guards and electrical connection box doors shall be always kept closed.
15. Turn off the power supply before attempting to carry out the maintenance work. Use adequate tools top perform the maintenance.

Chapter One Safety regulations

Cautions

1. The operators and maintenance person are not allowed to wear loose clothe with long sleeves, tie and gloves.
2. Never lean to the machine.
3. Never use hands or tools to adjust the wheel guard, left and right travel distance and jet nozzles.
4. Never employ the compressed air to wipe the machine because the air would blow up the grind dust to injure the eyes of the operator.

1.2 Machine operation safety rules

Please strictly stick to the following rules.

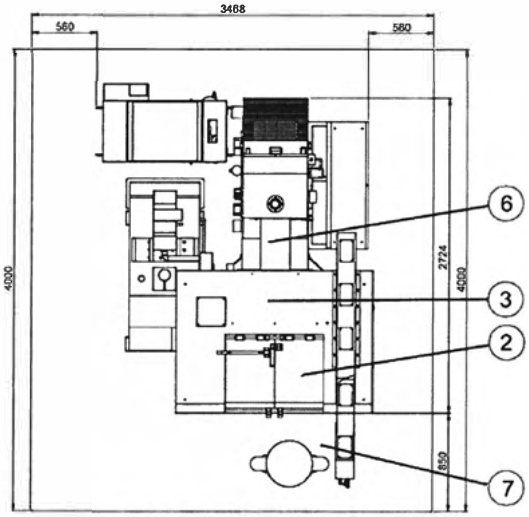
1. The maximum revolution this machine can stand is 2000m/min.
2. Before check the power or maintenance, be aware of all warning indicated on the labels nameplate.
3. In case the warning labels and nameplate are neither off nor not readable, please contact your distributor or us for free replacement.
4. When make check or repair, please wear insulated gloves, rubber shoes or leather shoe and nonconductive gear.
5. The machine shall be grounded properly.
6. When checking the electrical circuit, make sure that the circuit is on off-power mode.
7. When the electrical circuit is found in trouble, never attempt to open for check, ask the authorized repairmen for help.
8. When the hardness of the work piece is above HRC65° consult the grinding wheel manufacturer for help.
9. The wheel balance shall be performed by the skilled technician. Clean the flange and the front coupler of spindle before mounting the balanced wheel.
10. Before starting up the machine, make sure that the stop switch and the emergent stop switch are on the proper position.
11. Before starting up the spindle motor, check the correct the correct rotation direction of the spindle and the wheel. The spindle and wheel shall be kept free running for five minutes before starting grinding.
12. If the magnetic chuck is employed, the fixture shall be clean and neat with no dirt on it. If there is any wounded, polish it first.
13. Proper clamp shall be used to hold non-metal work piece, such as aluminum alloy and graphite which are not effective on the magnetic chuck. The clamp shall not contact the wheel.
14. Check by hand feeling to the work piece is firmly held on the magnetic chuck before running the wheel.
15. It is vital to stop the work table for adjusting the left and right travel distances.
16. In wet grinding operation, the flushing water for the spindle shall be stopped.
17. If it is easy to create powder dust in the grinding, the wet grinding is advisable.

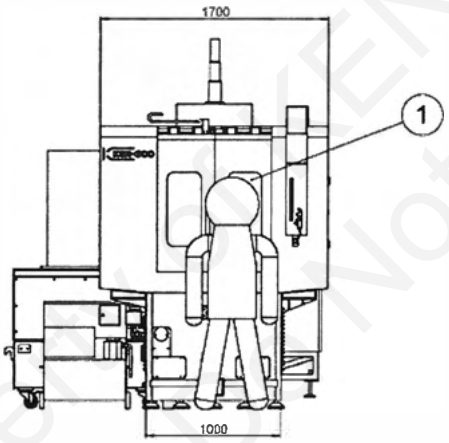
Chapter One Safety regulations

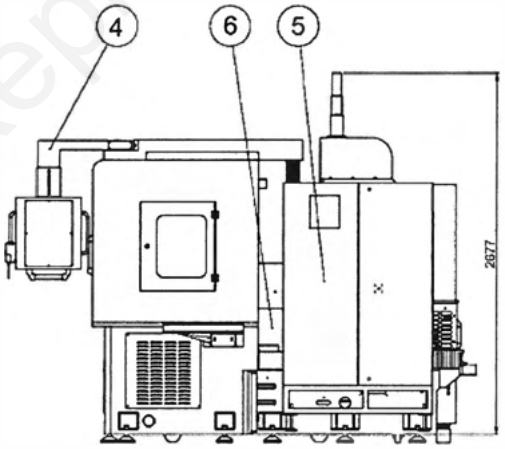
Cautions

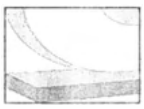
1. This machine shall be kept away from the powder explosion and explosive.
2. The flammable fluid shall never use as the cutting fluid.
3. This machine is not recommended to cut the wooden or plastic material. When cutting the graphite and ceramic material, please contact us for special accessory package.
4. The head sand wheel attached to the spindle shall be never used as he grinding wheel.
5. Never tamper with the application and capacity the machine is designed for. It is prohibited to work with the wheel, large sized or oversized work piece which is beyond the provisions the machine specifies.
6. Never tamper with modification of the electrical circuit of this machine which would render hazard.
7. Never by pass the interlock circuit.
8. Never touch the place where a thunder label is posted.
9. Never contact the electrical box and circuit with wet body and hands.
10. When checking the electrical circuit, never wear the metal decoration to avoid electric shock. A warning sign shall be hanged to prevent incidental wrongly start of switch by other person.
11. Never use the magnetic chuck to hold the very thin or unstable gravity work piece.
12. In grinding operation, there is nothing allowed to leave on the work table except the work piece.
13. In wet grinding, never intended to adjust the jet nozzle when the spindle is running.
14. When the work table is traveling and the grinding wheel is running, never to move or to replace the work piece.
15. When the spindle motor is turned off, never attempt to stop the rotation of the wheel by hand.
16. At the end of operation, never try to remove the cutting dust when the grinding wheel is still running.
17. Using the proper flange tool to dismount the grinding wheel. Never knock it off which may cause a bad crack to the grinding wheel.

1.3 Diagram of potential danger area









Chapter One Safety regulations

Hazard districts	Description
1	The operator's hand may be injured in the grinding zone clue to careless during grinding operation. (Danger of hand injury in grinding zone)
2	Danger of collision if operator looks at the workpiece when table is in motion.
3	Danger area of crushing by moving table.
4	Danger of electric shock if the control box is opened by untrained person.
5	Danger of electric shock if the electric power box is opened by untrained person.
6	Danger of crushing the maintenance man if crossfeed is switched on while maintenance man is working in this area.
7	Danger of electric shock for untrained person to open the cover of lubrication motor.
8	To avoid electric shock, motor, solenoid, and junction box of hydraulic should not be opened at will.
9	While the machine is running, no body except the operator is allowed in the slant-lined area. (Danger zone).
10	When walking though the space between machine and electric control box, people may be stumbled by the cables connecting electric control box and power box. The movable control box should be placed at a suitable distance from the machine to keep people from walking though the space between.
*	Never touch the positions where are lighting sing posted.

Chapter Two Summary of the machine

2.1 Basic description of the machine

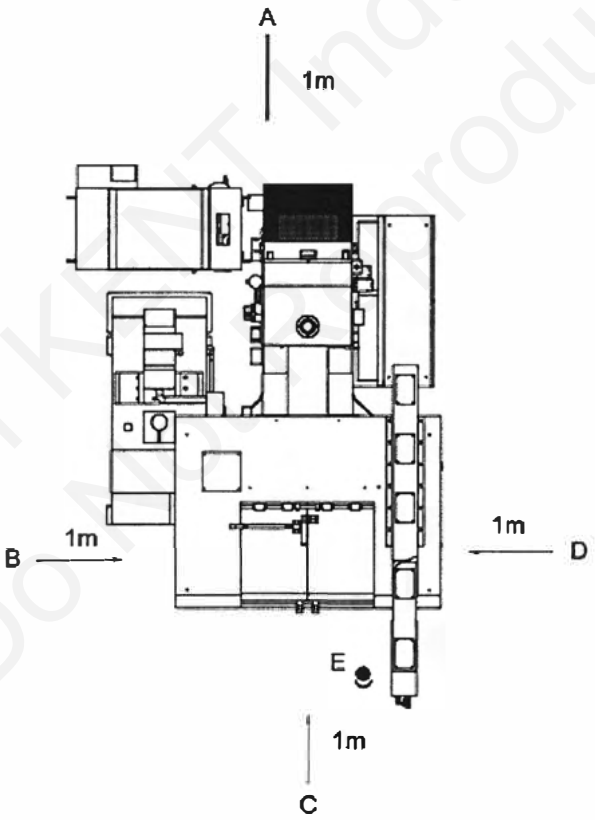
X-axis：The rotary table is driven by servo motor in auto mode, and the MPG is equipped for manually rotating in manual mode.

Y-axis and Z-axis：The downfeed and crossfeed are driven by servo motor in auto mode, and the MPG is equipped for manually infeed in manual mode.

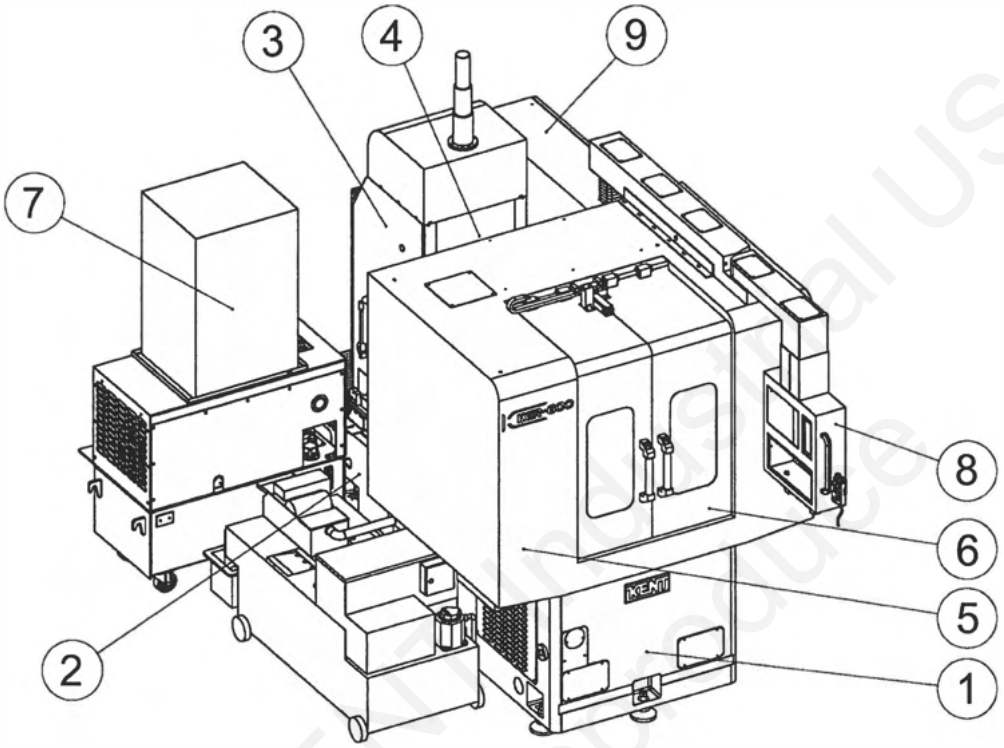
This machine is designed exclusively for grinding of metal materials. Any other non-metal material use should be operated by trained personnel.

2.1.1 Noise standards

The noise level is below 70dB under the noise test conducted in accordance with JIS B6004. Test distance from the machine is 1 meter, test height from the machine is 1.6 meter.



2.2 Exterior and part names



No	Name	No	Name
1	Machine base	7	Coolant unit
2	Rear base	8	Operation panel
3	Column	9	Electric control box
4	Spindle		
5	Machine cover		
6	Front door		

2.3 Working range

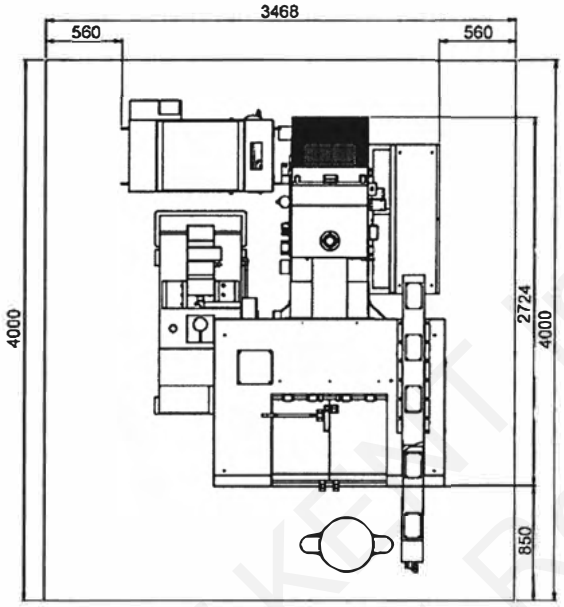
Description of working range

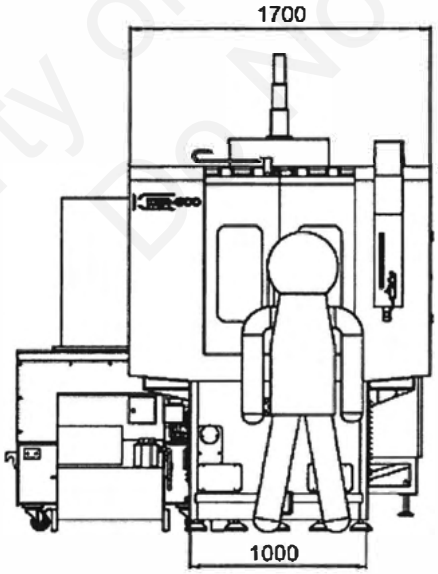
(1) Overall grinding diameter：600mm max.

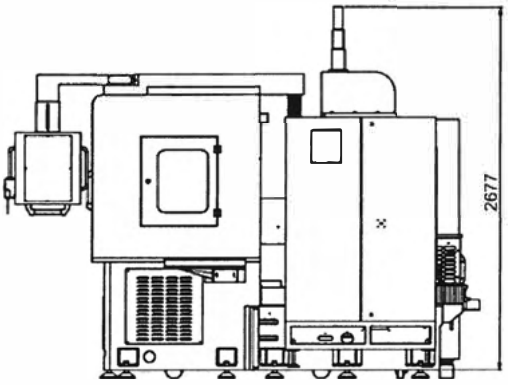
(2) Overall grinding diameter：Max distance between working table and spindle center is 600mm.
Min distance between working table and spindle center is 180mm.
Center is 180mm.

(3) Max table load：700kgs (magnetic chuck included)

(4) Grinding wheel dimension (OD × T × ID)：405×80 × 127mm







Chapter Three Preparation for installation

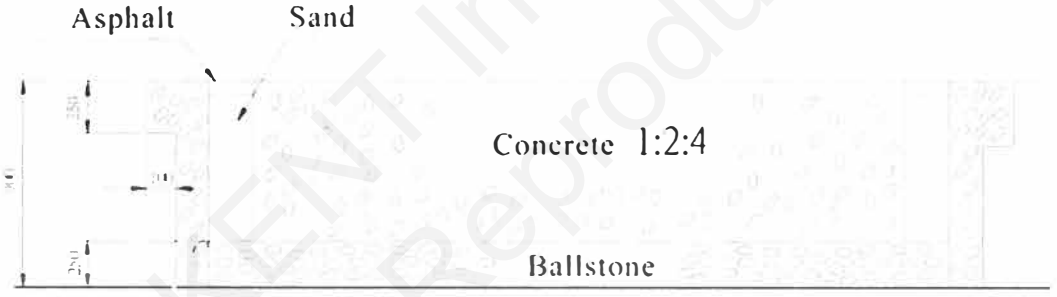
3.1 Foundation requirement

3.1.1 Selection of foundation ground

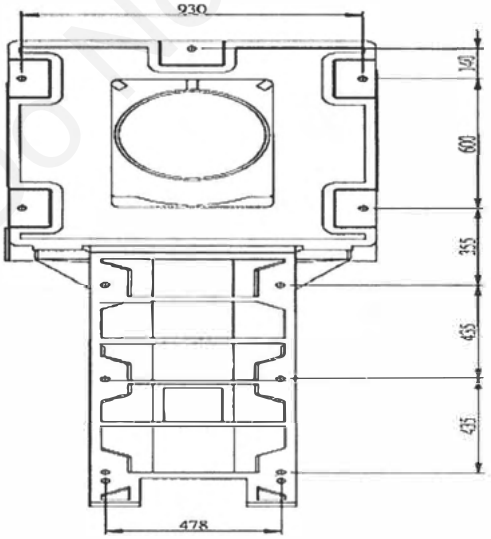
3.1.1.1 The condition of the foundation ground affects greatly the mechanical efficiency and working precision. It is very vital to avoid installing the grinding machine close to the milling machine, planning machine, even the inserting machine because the vibration and pulsation would be transmitted to the grinding machine and resulted in strained surface in the work piece.

3.1.1.2 The work table of the grinding machine shall be kept away from the direct sunshine which would create a deformation. Away from the electromagnetic interference, dust, metal dust and explosive gas.

3.1.1.3 The foundation shall be solid without subsidence. The strength of the foundation floor shall be greater than $5T/M^2$.



3.1.1.4 Foundation diagram



3.2 Power requirement

Power：13KW

Recommended cable：6.0mm^2 × 4 cores (S,R,T)

Internal control voltage：AC 24V, DC 24V

Chuck voltage：Max DC110V

Insulation impedance：DC500V AGDI > 1 MΩ (power terminal ~ 3P terminal)

Working temperature：5℃~40℃

Relative humidity：35~90% R/H (no dew)

Atmospheric humidity：No sale, corrosive gas and heavy dust.

3.3 Handling requirement

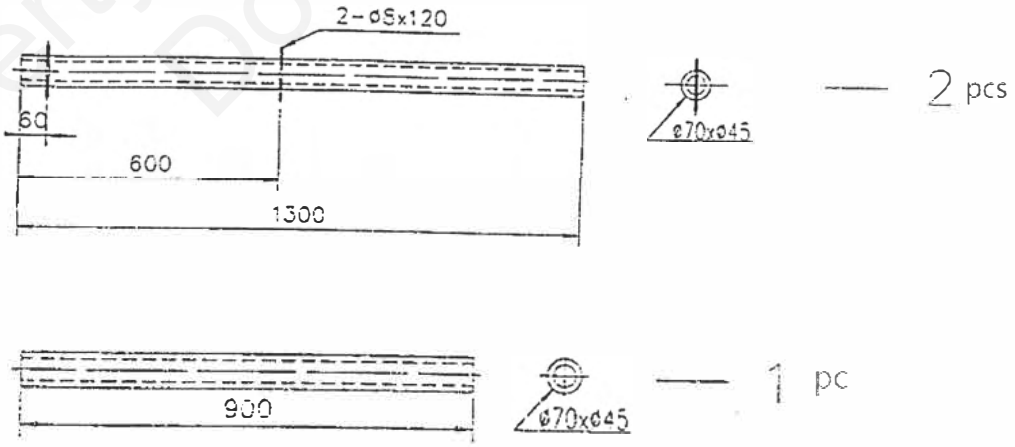
KGR-600 (H) weights net 56 tons and gross 60 tons, requiring a forklift or crane for handling.

Dis / Model	Net weight	Gross Weight	Forklift	Crane	Wire rope	
					Packing	Unpacking
KGR-600(H)	5600kg	6000kg	6 ton	6 ton	ψ 19mm×12M×2pc	ψ 19mm×12M×2pc ψ 19mm×3.3M×2pc

3.3.1 When using a crane to move the machine, check the height limits. At least 5m of space is required.

3.3.2 During moving take proper safety precautions, make sure the machine is stable at all times and check for damage to the crane cable. All non-associated personnel should not be within the work area.

3.3.3 Lifting tools：

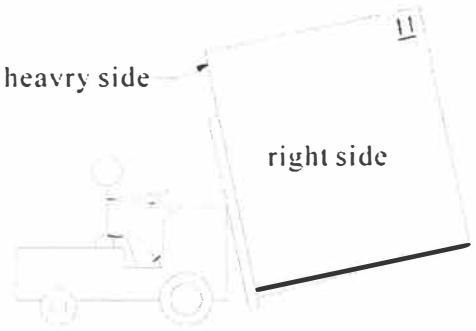


Chapter Four Transportation and installation

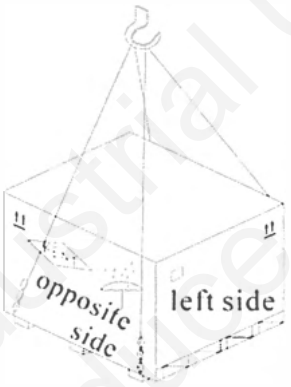
Before delivery, the machine has already been completely tested, adjusted and inspected for accurate calibration and operation. During transport and installation, make sure the machine does not become damaged by impact during movement or lowering.

4.1 Foundation requirement

When using a forklift (Fig 4-1)



When using a crane (Fig 4-2)



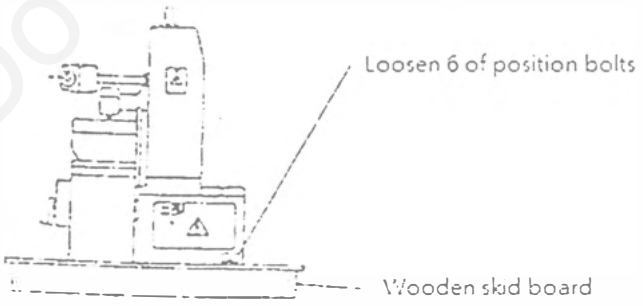
4.2 Unpacking

4.2.1 When opening the crate, begin with the crate lid, then open the front, rear left and right sides in order.

4.2.2 Use a nail extruder not a hammer to open the crate.

4.2.3 When lifting off the wooden crate cover, be sure not to damage the machine or scratch the paint.

4.2.4 Before moving the machine, loosen the positioning bolts as shown in diagram. (Fig 4-3)



(Fig 4-3)

4.2.5 When the machine is loaded in the crate for delivery, the company mounts the positioning blocks according to Chapter 4.5. If the machine needs to be moved, remount the positioning blocks as shown if Fig 4-11. The machine has been tested, adjusted and inspected to an accepted level of precision before leaving the plant. It is very important that during transport and installation, proper care must be taken. Take extreme care not to let the machine become damaged or persons be injured through impact.

4.3 Transport after unpacking

Operators of forklifts and cranes must be qualified according to local government law.

4.3.1 When using a forklift to transport the machine.

4.3.1.1 When using a forklift, transporting the machine must be down according to (Fig 4-4).

4.3.1.2 Make certain the positioning blocks are mounted in place.

4.3.2 Using cranes：

4.3.2.1 Before lifting the machine, check if the cables are damaged.

4.3.2.2 Attach the cables to the 4 lifting bolt of the two side of the machine body.

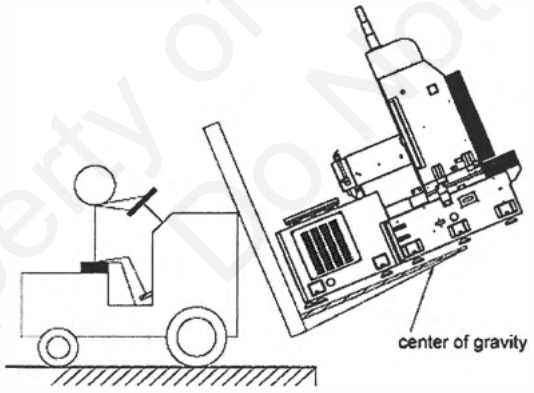
4.3.2.3 Make sure the machine's center of gravity is stable (as in Fig 4-5).

4.3.2.4 The steel cables must not come into contact with the hydraulic hoses, the electric box, and sheet metal.

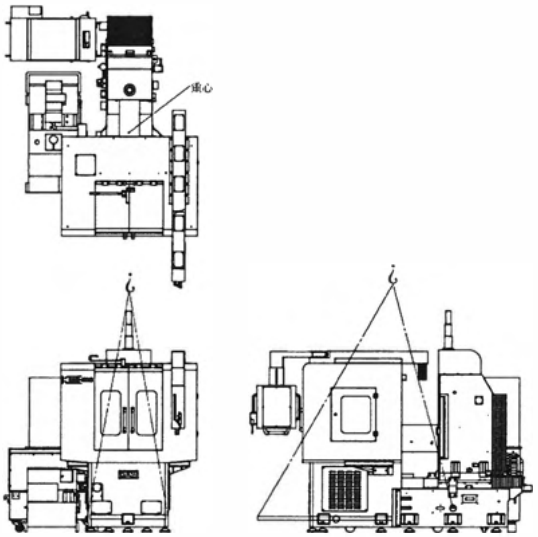
4.3.2.5 Take proper precautions during hoisting and movement.

4.3.2.6 When setting down the machine after transport, gradually slow speed, reduce vibration and avoid collision or impacts.

4.3.3 Be careful to avoid injury of personnel when transporting the machine.



(Fig 4-4)



(Fig 4-5)

4.4 Machine installation

4.4.1 Use anchor bolts

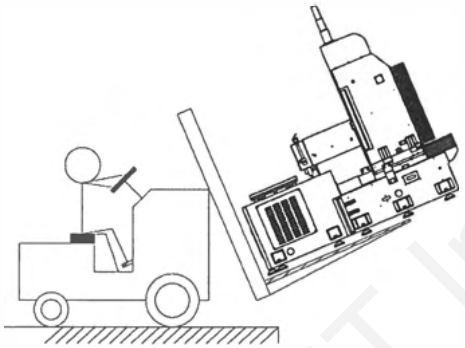
Machine weight：5,600 kg

4.4.1.1 Use the nuts to mount the anchor bolt to the machine, leaving at least 35mm of thread for adjustment. (Fig 4-6)

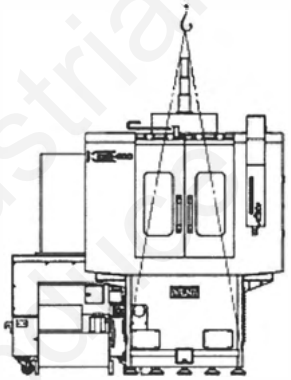
4.4.1.2 Slowly lower the machine so that the bolt are positioned opposite the anchor holes.

4.4.1.3 Use blocks to adjust the level.

4.4.1.4 Fill the anchor holes with concrete.



(Fig 4-6)

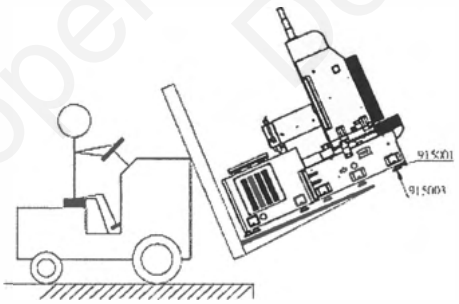


(Fig 4-7)

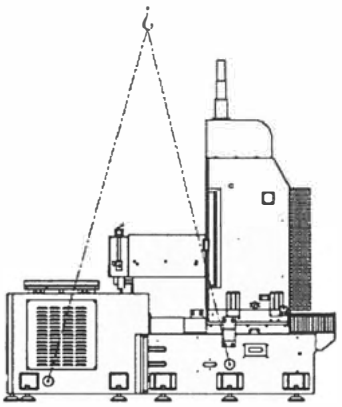
4.4.2 Use the leveling pads and leveling screws.

4.4.2.1 Use a nut to screw the leveling screw (915301) into the machine baes hole. (Fig 4-8).

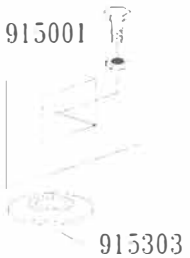
4.4.2.2. Slowly lower the machine, let the leveling bolts enter the holes in the leveling pads (915303). (Fig 4-9, 4-10)



(Fig 4-8)



(Fig 4-9)



(Fig 4-10)

4.5 Remove the positioning plate：

4.5.1 To prevent movement or collision of the work table an saddle influencing the machine's precision during transportation and transit, positioning plate have been screwed in to the machine. Before conducting test runs of the machine, the 3 positioning plate (D and E) must be removed.

4.5.2 When moving the machine again, be sure to reaffix the positioning plate.

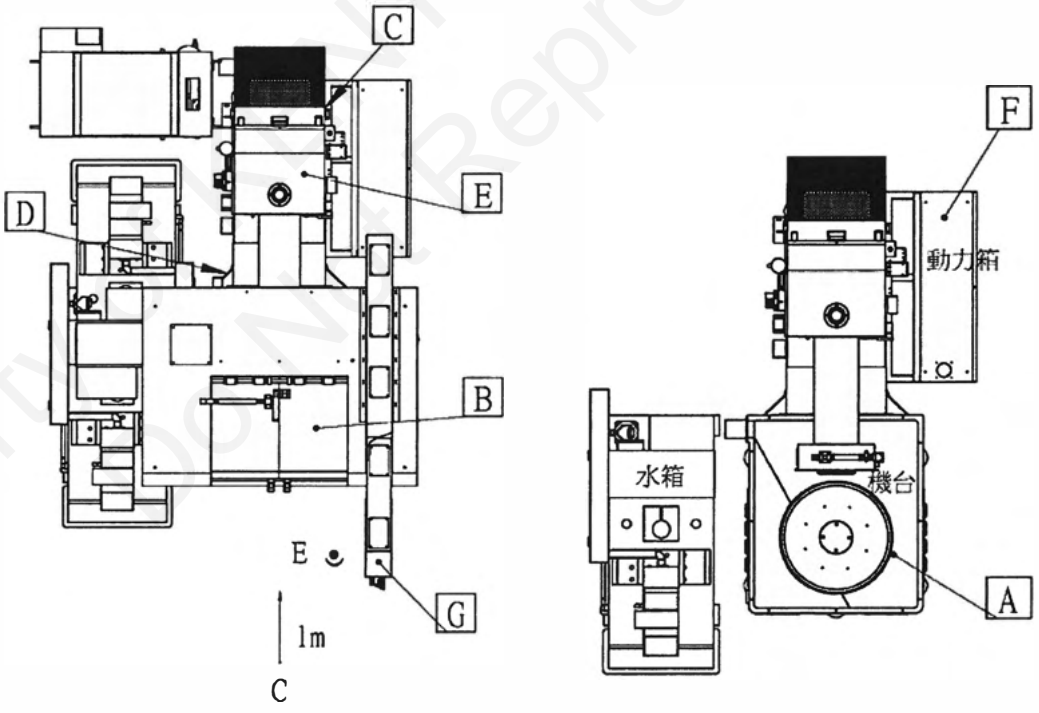
4.5.3 The machine has already applied with a corrosion-resistant oil to ensure superior operation and efficient lubrication.

Before operation, clean the A,B & C area：(See Fig.4-11)

① Work table surface ② Vertical hand wheel ③ Longitudinal mechanism
④ Wheel spindle ⑤ Work table speed level ⑥ Saddle V slideway
⑦ Cross hand wheel ⑧ Table V, flat slideway

4.5.4 Removing the moisture proof covering (See Fig 4-11)

A：On the work table
F：On the electrical box
G：On the operation panel



(Fig 4-11)

4.6 Level adjustment of work table：Level gauge specification 0.02mm/M.

4.6.1 Place 2 level gauges at the center of work table (Fig B). Level accuracy to be within 0.02mm (Fig A) by following procedure.

4.6.2 Adjusting level for work table

(1) Place level gauge at the center of work table (Fig B). Move work table to the center Position.

(2) Loosen leveling screws 1,3,4,5,8,9,10 adjust only screw 2,6,7,11 for leveling (Fig A).

(3) After complete leveling of 2,6,7,11, them adjust screws 1,3,4,5,8,9,10, to slightly contact with leveling pad.

(4) Verify level accuracy.

4.6.3 Adjusting level for saddle

(1) Place the level gauge at head (Fig C). Move the saddle to its center positon.

(2) Move the saddle backward and adjust screws 5,6,7,8, to adjust the level (Fig A,C).

(3) Move the saddle forward and adjust screw 4,5,8,9 to adjust the level (Fig A,C).

(4) Place the level gauge in another direction (Fig D), then move saddle to its center positon.

(5) Move the saddle backward and adjust screw 4,5,8,9, to adjust the level (Fig A,D).

(6) Move the saddle forward and adjust screw 4,5,8,9, to adjust the level (Fig A,D).

4.6.4 After performing the above adjustments to the linear and diagonal levels, check one more time to see if the work table and saddle are leveled to an accuracy standards (within 0.02mm). If not, adjust in order as in procedures 4.6.2 and 4.6.3. After finishing, tighten the leveling screw nuts.

4.6.5 Verify accuracy for work table with micrometer

(1) Place the micrometer at head, move the saddle forward and backward, measure radius (300mm) of table surface, ensure this accuracy in 0.003mm.

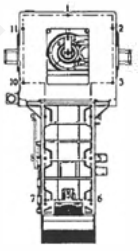


Fig A

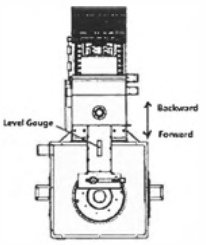


Fig C

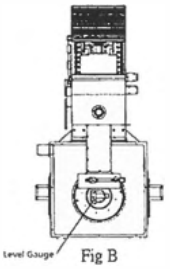


Fig B

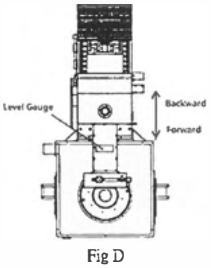
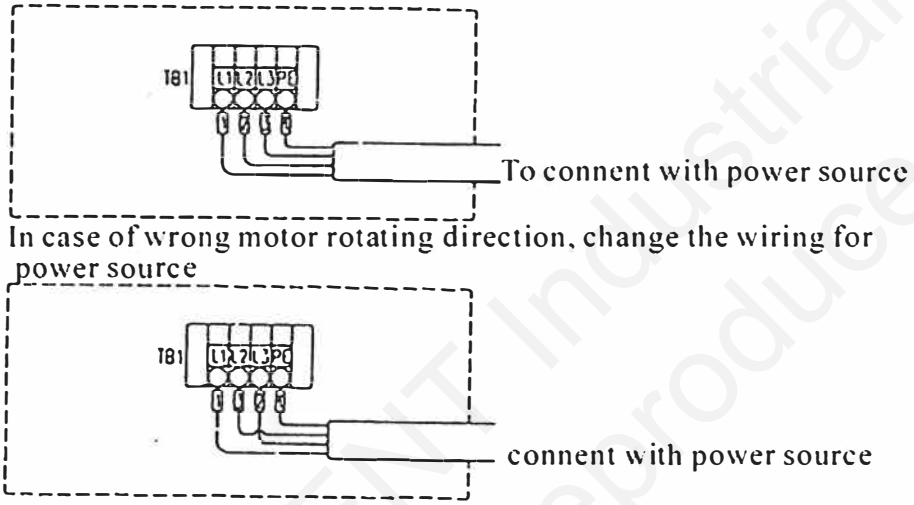


Fig D

4.7 Electrical connections and earthing

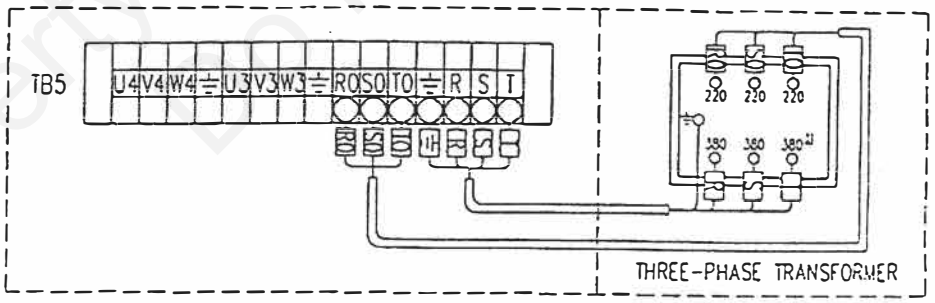
4.7.1 When installing the machine, besides connecting the power source as in section 3.2, all the conductors of wiring the hydraulic tank, coolant unit, electro-magnetic chuck, electric control box, conduit wirings have numbers to assist in their connection to the electric power box.

4.7.2 Wiring diagram



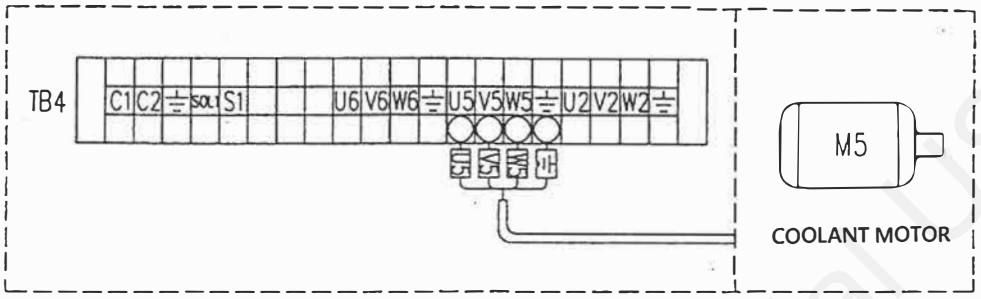
4.7.3 Connecting the three phase transformer (high voltage on primary side, low voltage on the secondary side). The primary side connection will vary according to the local power voltage and the secondary side connection output voltage is 220V.

For example：If the local power voltage is 380V, the primary side connections will be wired to the 380V and secondary side is 220V.

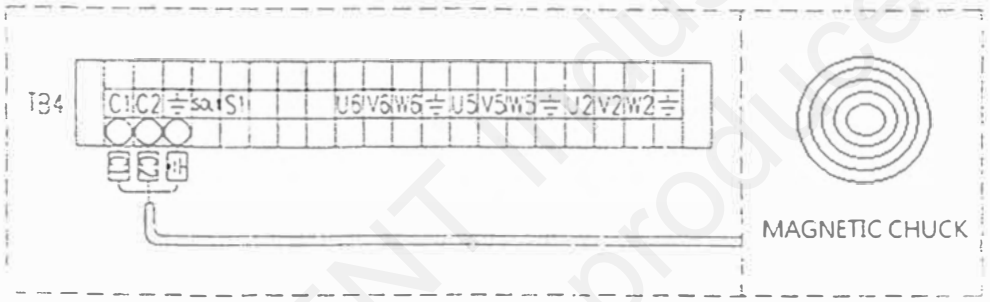


The connections area already completed before delivery of the machine, if the connection have to be redone because of maintenance to the transformer, follow the above diagram when doing the connections. Please notify the company if there are modifications in the input voltage.

4.7.4 Coolant pump motor connection



4.7.5 Work table magnetic chuck connection



Chapter Five Test operation

5.1 Preparations before test operation

5.1.1 Lubrication mechanism

To maintain the long service life span and mechanical performance, the proper lubricant shall be applied to the lubrication mechanism.

5.1.2 Lubrication system

The lubrication of the machine is manual pumping system.

5.1.3 Using lubrication oil：

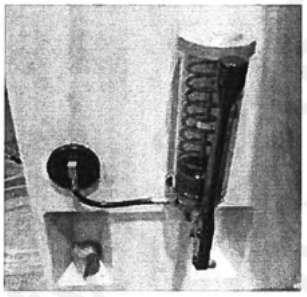
(1) Cross leadscrew and nuts.
(2) Vertical leadscrew and nuts.
(3) Bearing of table base. (Turn off table motor before supply oil).

5.1.4 The recommended lubrication as shown below

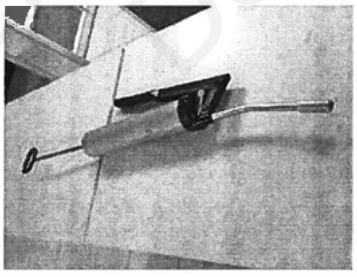
Brand	Mobil	BP	Castrol	Esso	Gulf	Shell	Total
Model	Mobilplex 48	Energrease LS3	Spheerol AP3	Beacon 3	Gulf Crown Grease No.3	Gadus S2 V100 3	Multis 3

5.1.5 Lubrication oil supply

1. Supply oil for Cross and Vertical leadscrew/nut 1~2 times every 3 days.



2. Supply oil for bearing of table base 1~2 times everyday.



Chapter Five Test operation

5.2 Inspection before operation

Please comply with the following provision for inspection before starting up the machine.

5.2.1 The machine shall be installed in the place where the external vibration can not reach.

5.2.2 Clean up the preventive or grease which was applied for shipping.

5.2.3 Calibrate the standing level.

5.2.4 Fill up the lubricants as provided as specified in the previous chapter.

5.2.5 Check the rotation direction of the spindle (grinding wheel). It shall run clockwise. Take off the grinding wheel before starting the spindle or the spindle running in counter clockwise would cause risk.

5.2.6 Fill up the hydraulic fluid to the specified level.

5.2.7 Adjust the proper travel stroke. The left and right travel distances are adjusted by two slide stop blocks.

5.2.8 Check again the correct connection of power cable. (Never use the double throw switch as the main power switch).

5.2.9 Check to see all retaining blocks are removed and lock up with check screws.

5.3.10 Never open the wheel cap when it is running to avoid hazard of crash and collision occurred on the grinding wheel.

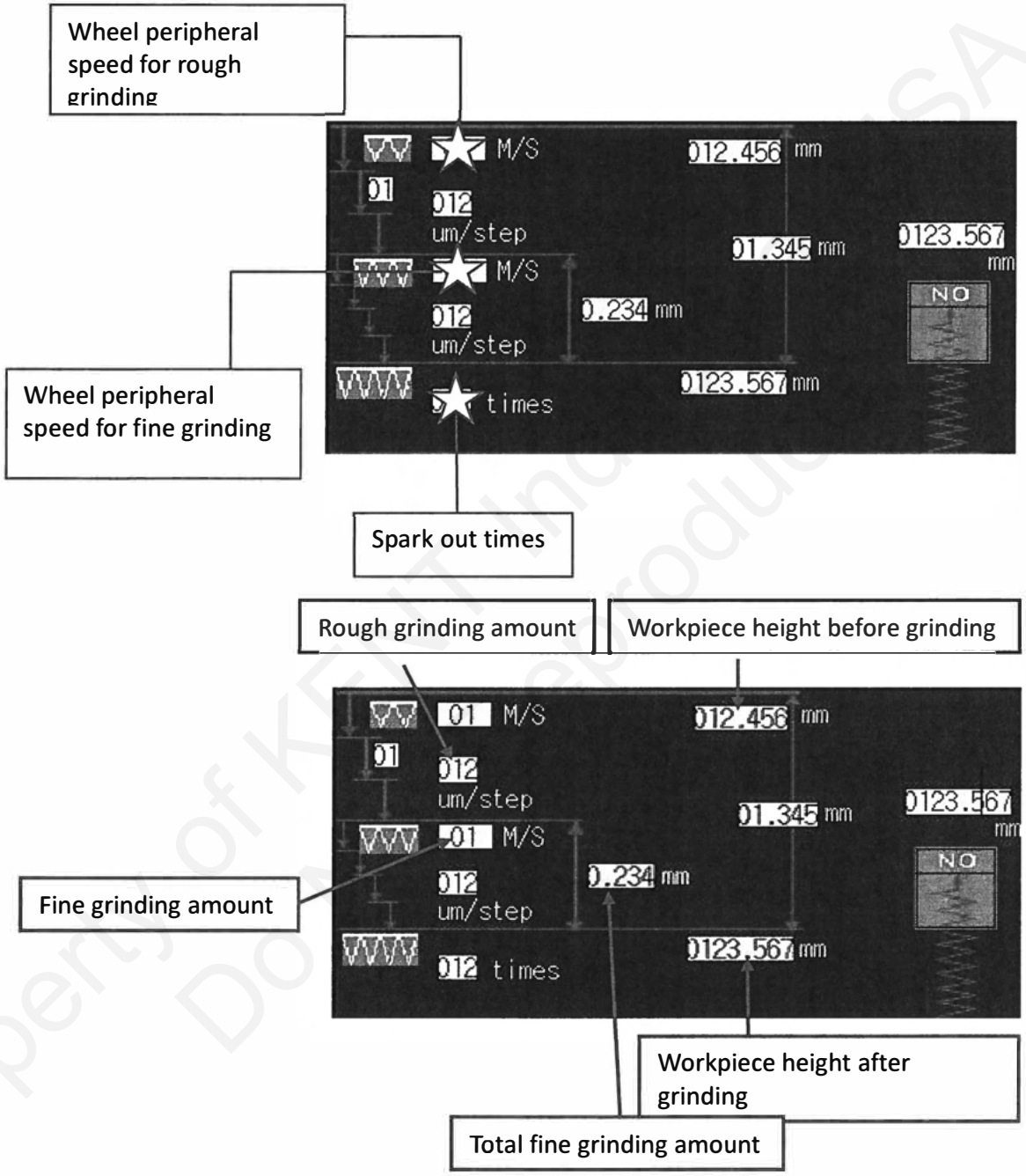
5.3.11 Check all the fittings of high pressure pipe are adequately tightened with the correct pipe numbers.

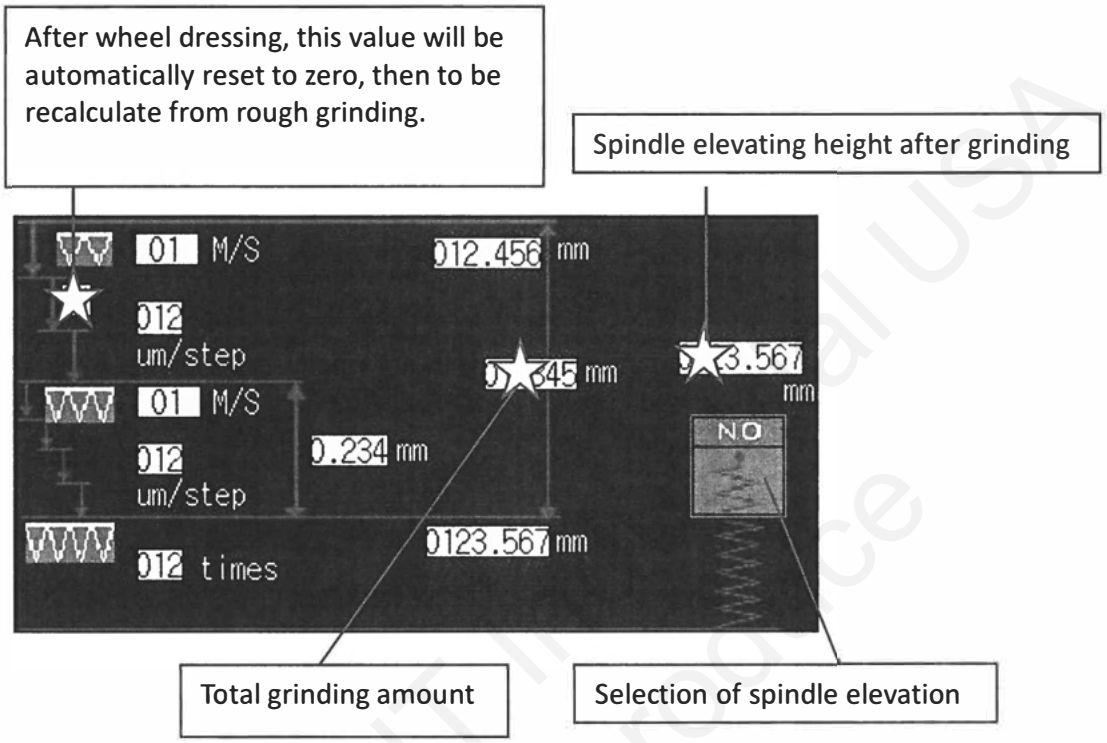
5.3.12 After finishing the checking before operation, look around to see there is a third party hinging around.

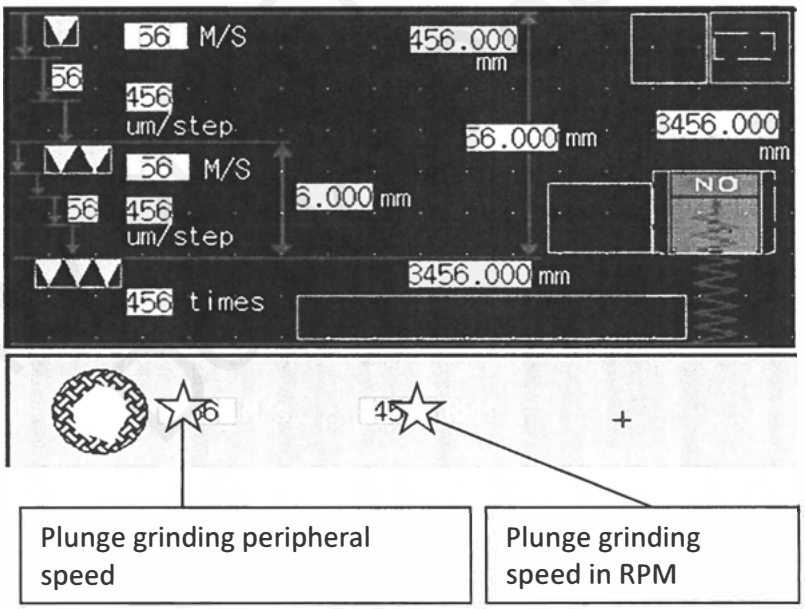
5.3.13 Operate the machine as provided in Chapter Six.

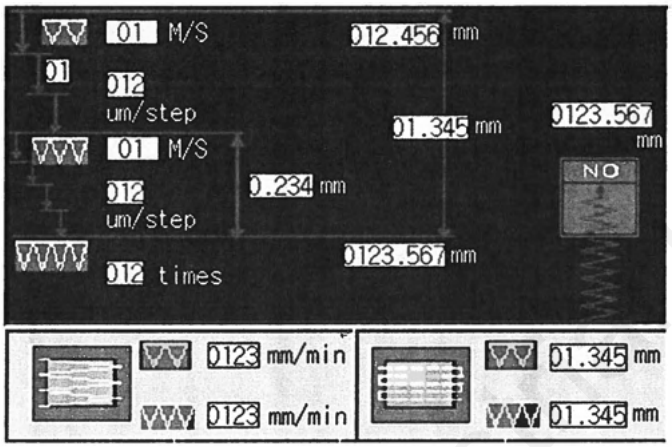
5.3.14 Always keep in mind where the stop switch and the emergent stop are located.

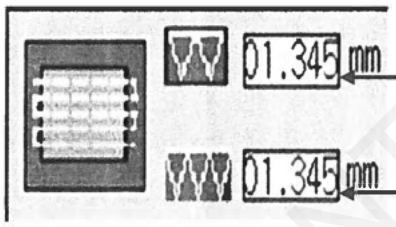
6.1 Touch screen





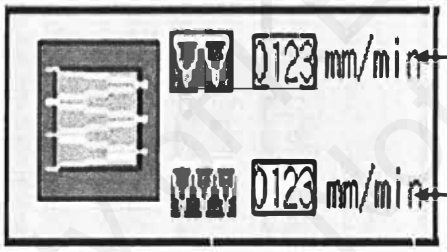






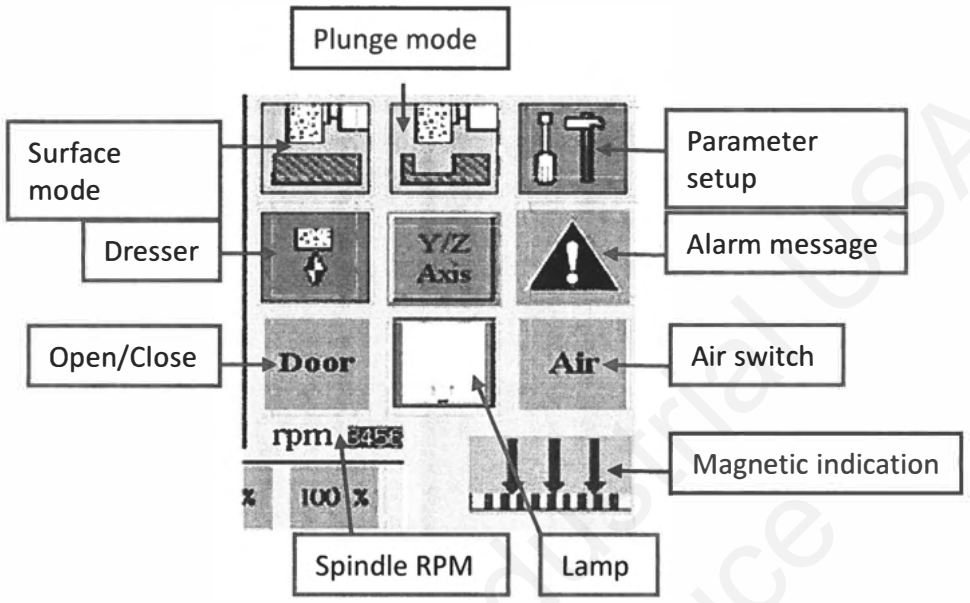
Z axis feeding speed in rough grinding (stepwise mode)

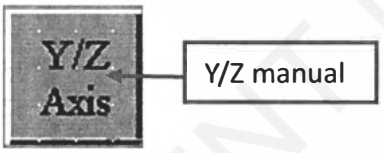
Z axis feeding speed in fine grinding (stepwise mode)

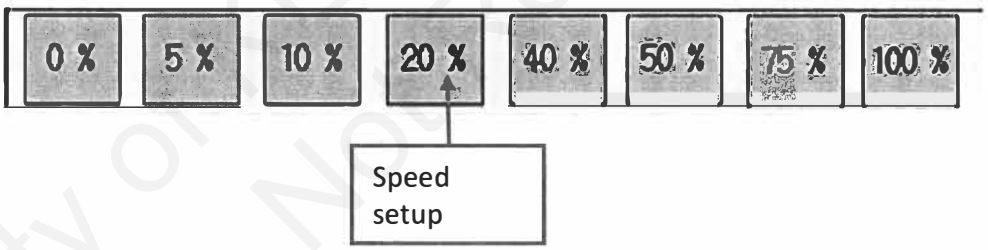


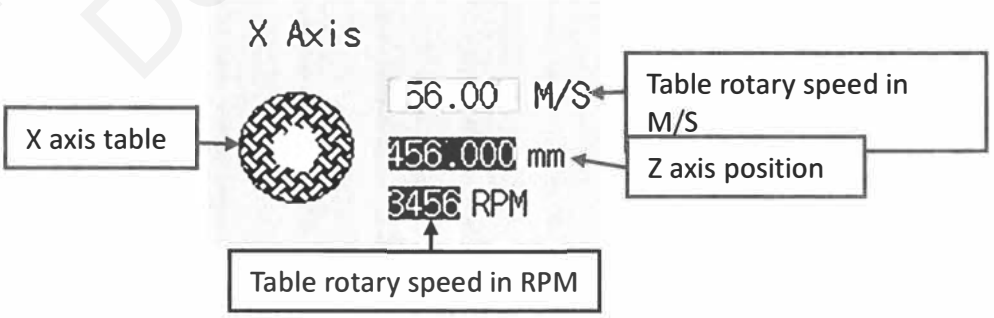
Z axis feeding speed in rough grinding (continuous mode)

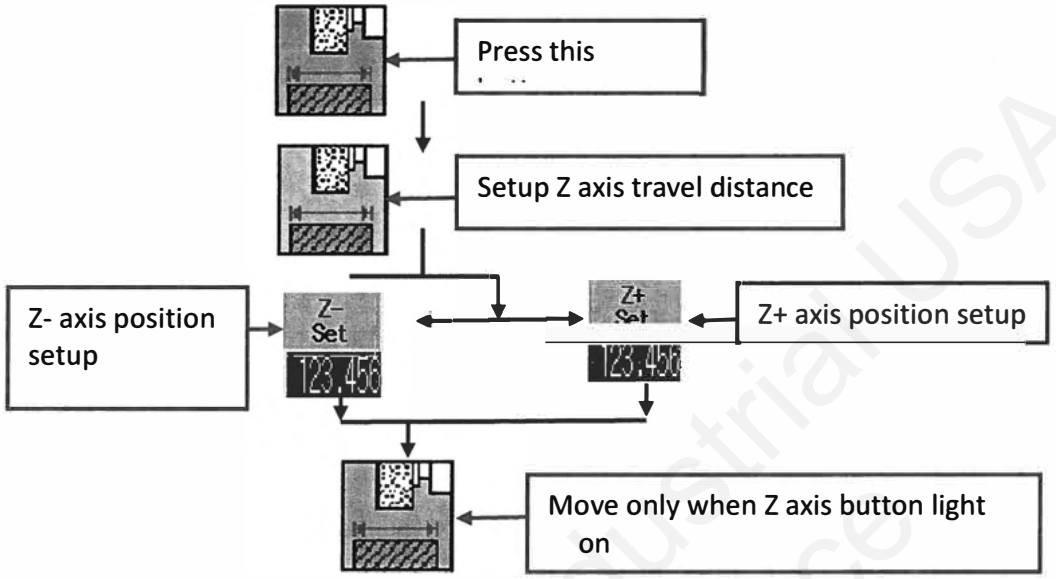
Z axis feeding speed in fine grinding (continuous mode)

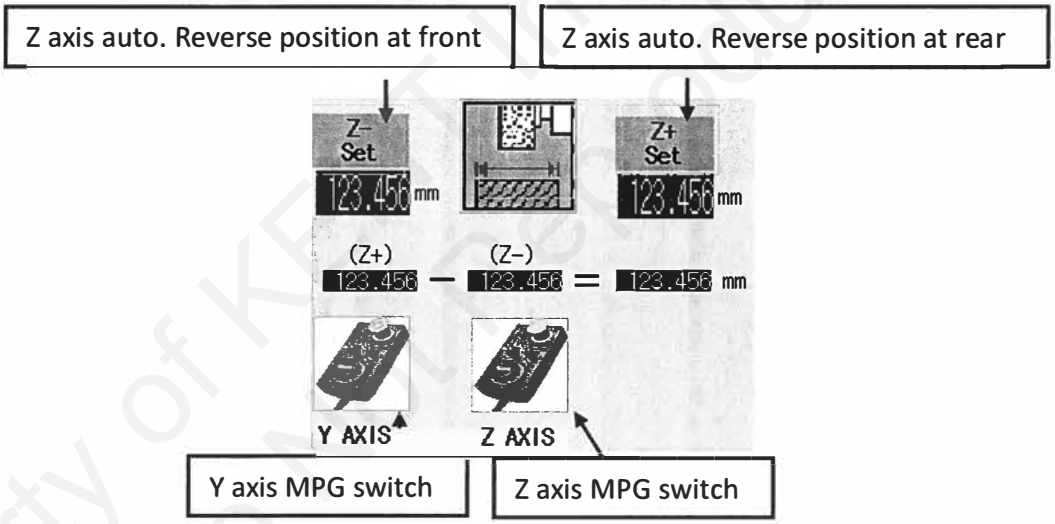


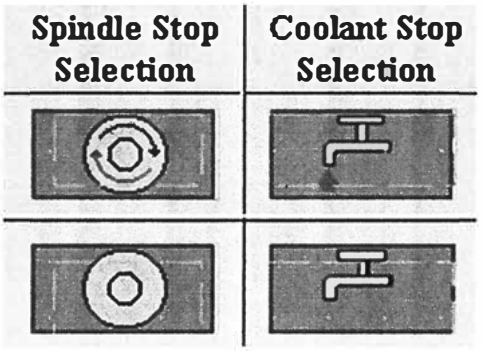


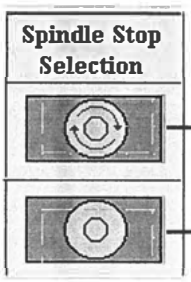






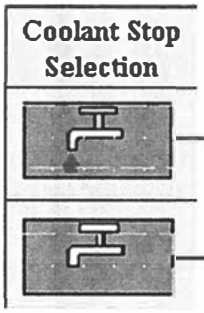






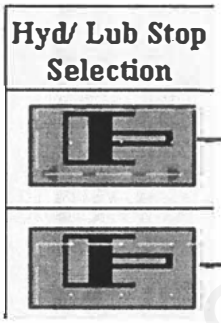
Spindle keeps rotating after auto grinding completed

Spindle stops after auto grinding



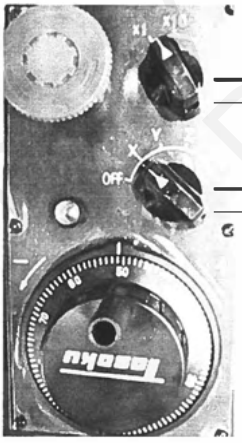
Coolant keeps flushing after auto grinding completed

Coolant stops after auto grinding completed



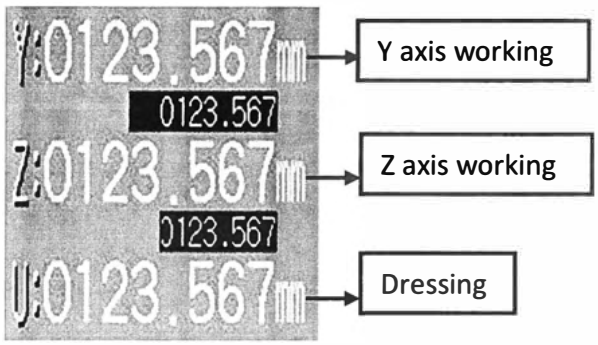
Hydraulic system keeps on after auto grinding completed

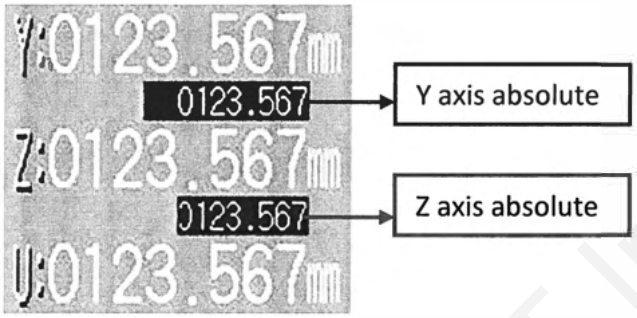
Hydraulic system stops on after auto grinding completed



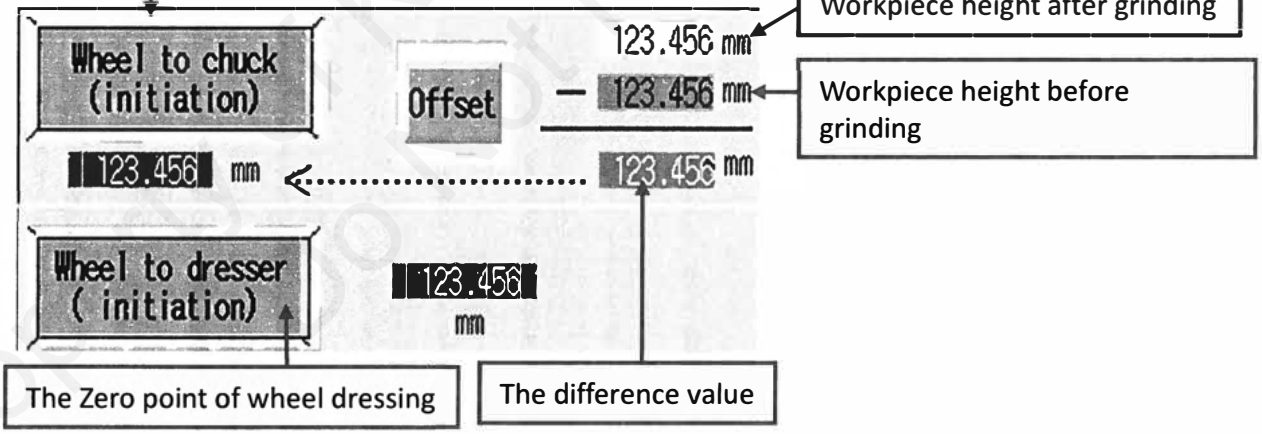
MPG magnification selection ×1、×10

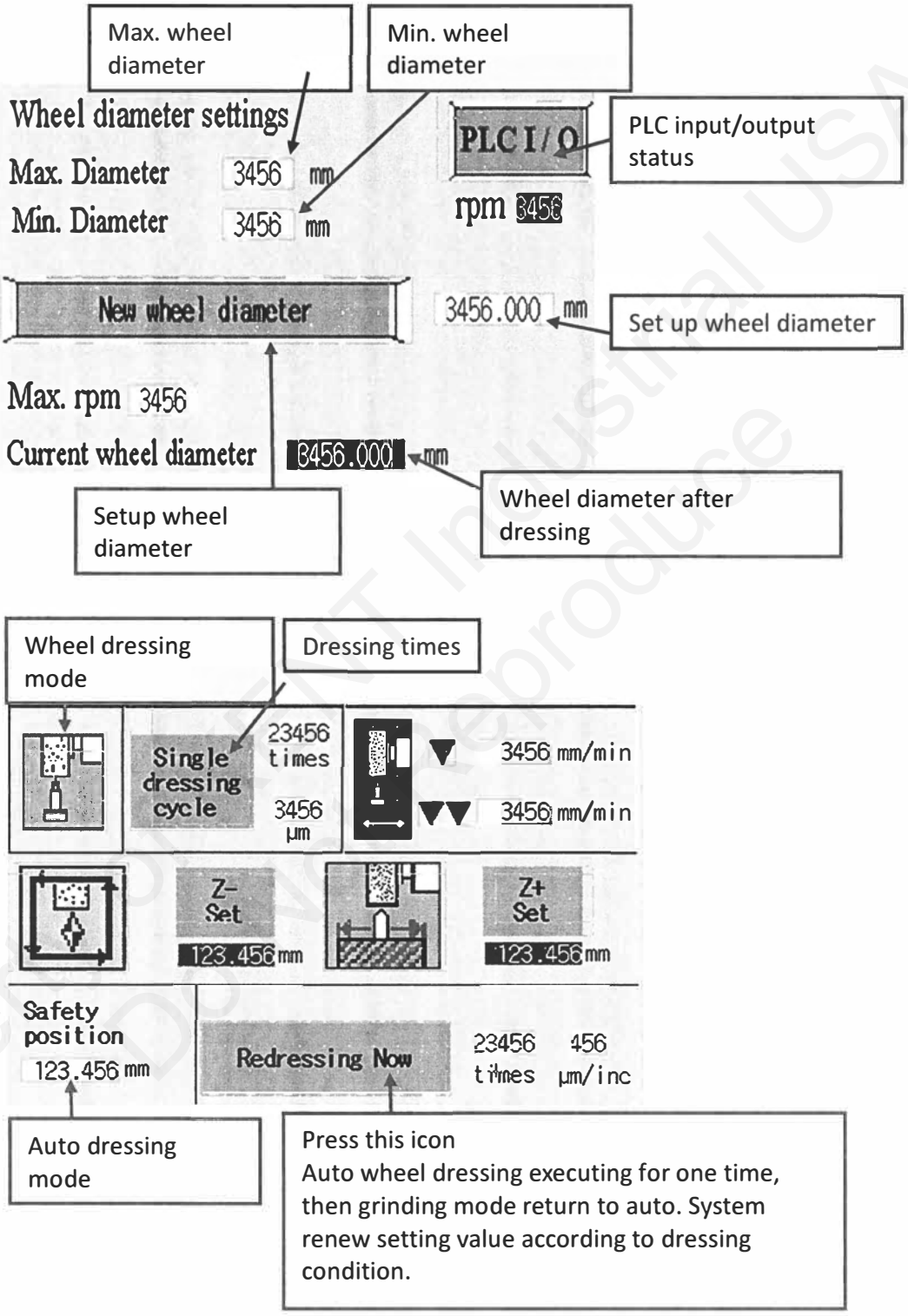
MPG axial selection

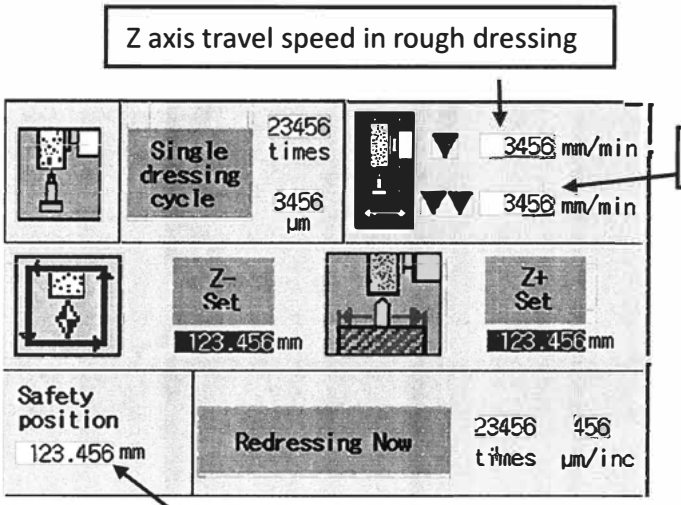


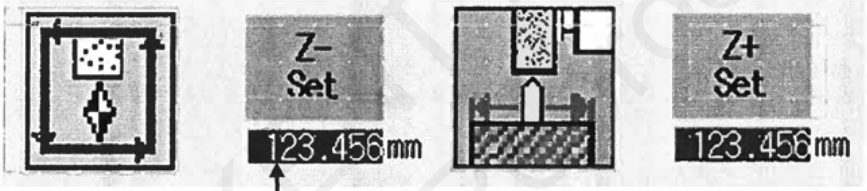


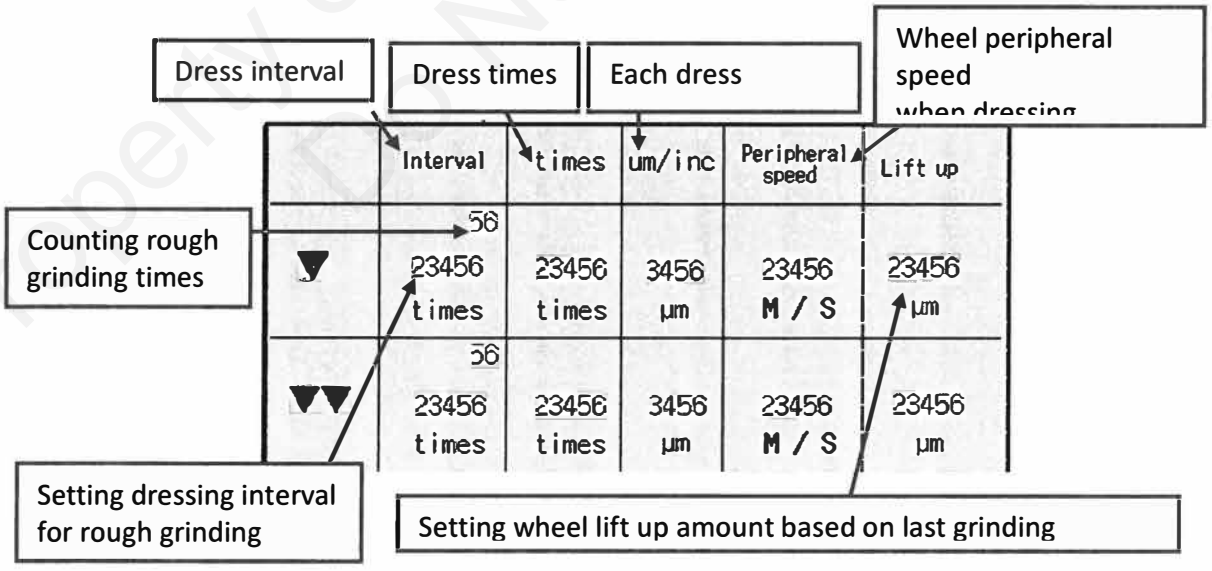
Magnet zero point
The zero point after finishing magnetic chuck surface grinding.



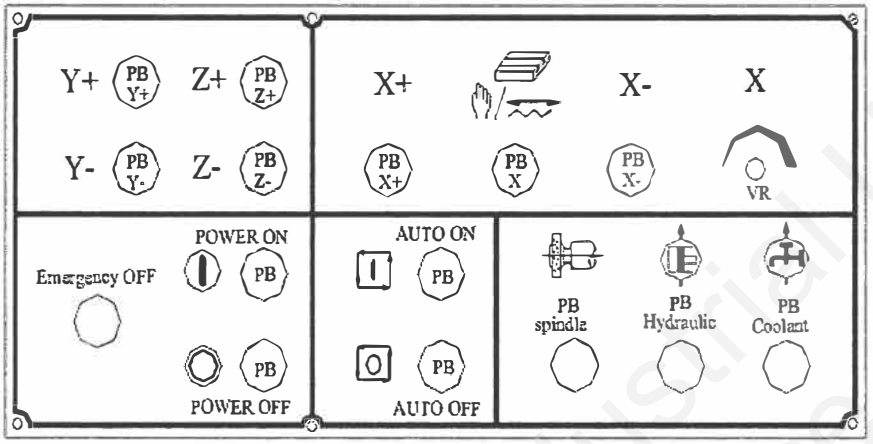


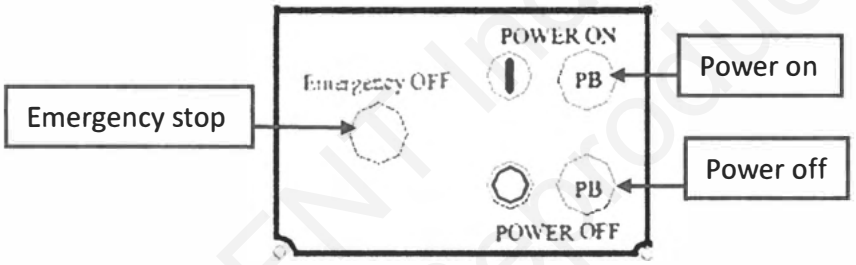


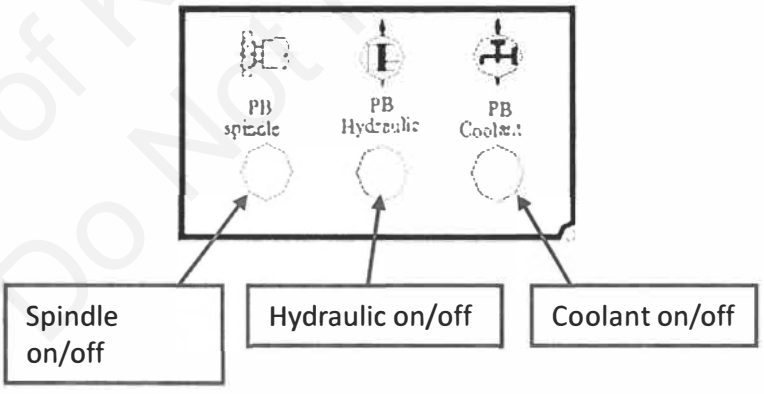


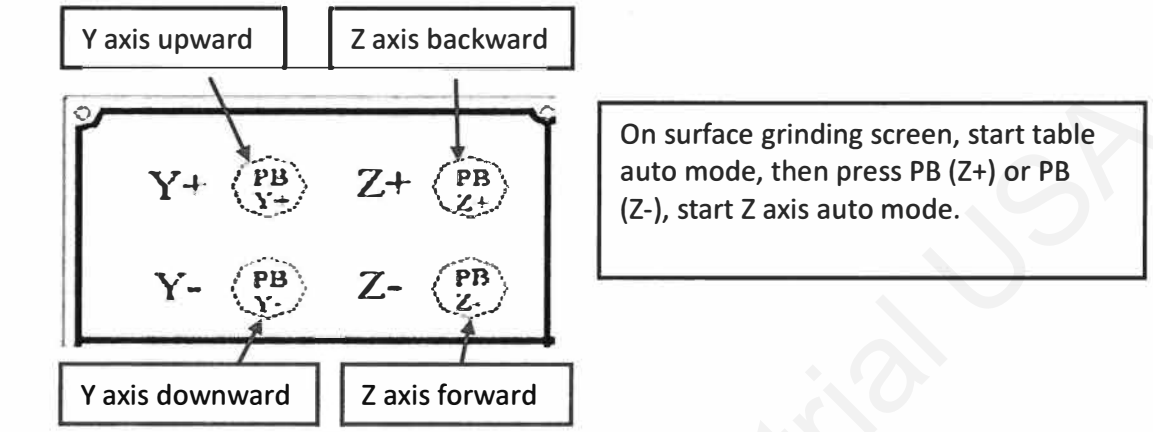


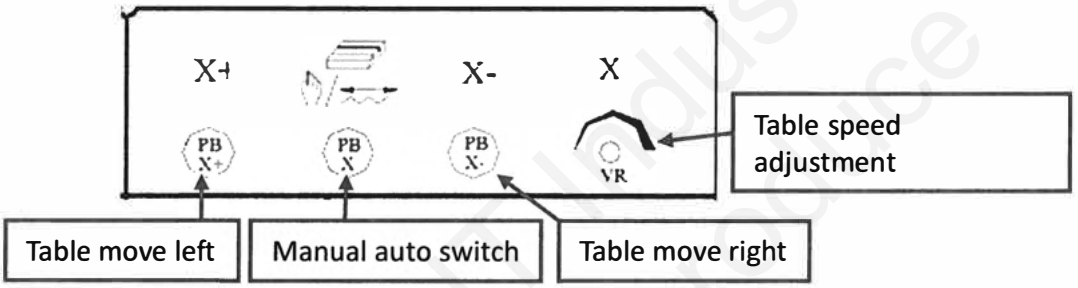
6.2 Operation panel

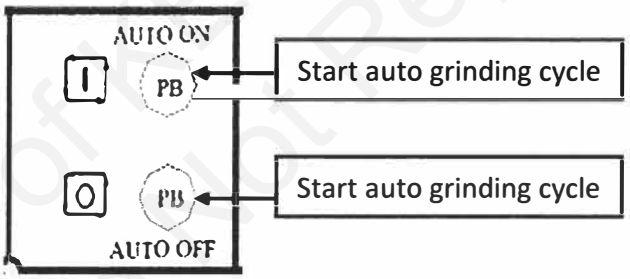


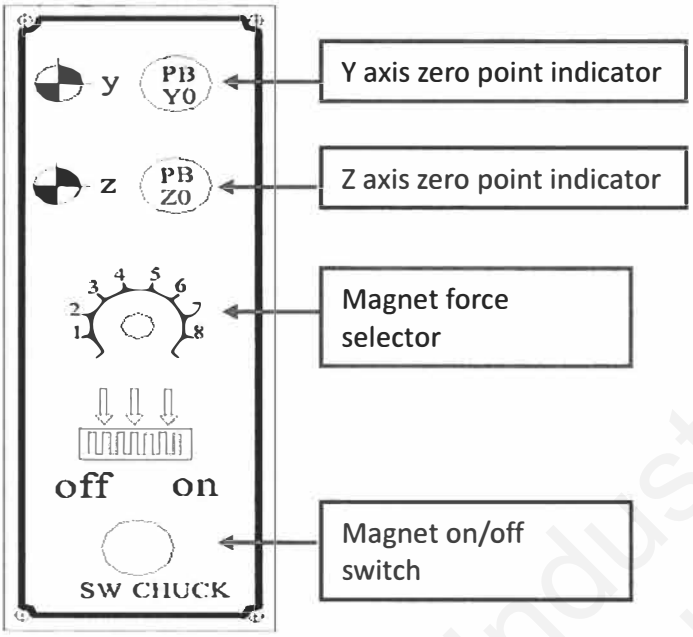












Alarm message

ALARM MESSAGES		
Spindle Motor Overload	Oil cooler Overload	Oil into motor overload
Coolant Motor Overload	Lubrication Pressure Low	Back to the oil motor overload
Y Axis Upward Limit Switch ON	Lubrication Oil Low	Into the oil filter canister
Z Axis Backward Limit Switch ON	MPG Emergency Stop	Back to the oil filter caniste
Z Axis Forward Limit Switch ON	B axis servo alarm	Accumulator bottle pressure
Y axis error	Z axis error	Process data error
Y axis servo alarm	Z axis servo alarm	Grinding data error
Min. wheel diameter		
Spindle rpm 3456		

6.3 Precautions in operation

6.3.1 Turn off the power before mounting/dismounting the grinding wheel on/off the wheel spindle.

6.3.2 Do not operate a grinding machine without wheel guards and do not open the wheel guards during operation.

6.3.3 Before the grinding wheel comes to a complete stop, do not place hands on the work table or attempt to remove the work piece.

6.3.4 Check and make sure that the work piece is firmly attached to the work table.

6.3.5 Do not attempt to hold or feed the work piece with hands.

6.3.6 The work piece to be ground may not exceed the machine's capacity and load.

6.3.7 Use correct grade grinding wheels and maintain their sharpness at all times.

6.3.8 When the machine is grinding, keep your hands and clothing away from the work table and grinding wheel.

6.3.9 If you are unfamiliar with electrical devices, do not attempt to connect the wiring on your won. This could result in immediate damage to the machine, malfunctions in its operation or electric shock of personnel.

6.3.10 Before using any grinding wheel, trial run it for five minutes. During trial operation, remember not to stand in any of the danger areas. If no problems in the trial run, the grinding wheel can then be used.

6.3.11 Operators doing dry grinding must wear safety glasses.

6.3.12 Do not run the grinding wheel at speed above its maximum safety peripheral speed.

6.3.13 Before starting the grinding wheel, make sure that the wheel guard are firmly affixed into place.

6.3.14 Do not set the downfeed increment too large, this will slow motor speed and generate large quantities of heat in the work piece.

6.3.15 The grinding wheel needs to be properly maintained when not in use and they should be stored in safe place after being removed from the machine.

6.3.16 Check if the rotation direction of the grinding wheel is the same as indicated on the wheel guard.

6.3.17 Before starting the machine, check and make sure that all the switches an pushbuttons are in the "OFF" position.

6.3.18 Operators and onlookers must wear safety glasses.

6.3.19 When adjusting the longitudinal stroke, the hydraulic motor must be off.

6.3.20 After work is completed and the work table is being cleaned, power to the wheel spindle motor must be switched off.

6.3.21 Sides of the grinding wheel connot be dressed (except forming grinding)

6.4 Proper use of grinding wheels

6.4.1 Selection of grinding wheel

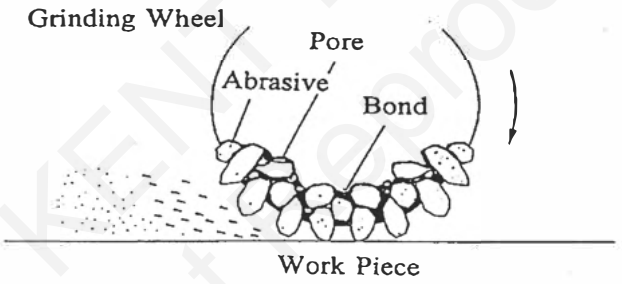
6.4.1.1 The structure and grinding function of the grinding wheel grinding wheels are driven mechanically at high speeds continuously generate minute yet hard and sharp particles and abrasive shavings. So, grinding wheels are an extremely useful grinding tool for all kinds of materials.

There are three major components which make up the grinding wheel as shown in Fig. 6-1 :

(1) Abrasive: Directly acts as a grinding edge on the work material.

(2) Bond: Bonds and maintains the grinding particles and also enables the wheel to operate safely under a fixed speed.

(3) Pore: Gaps between the abrasive and bond helps to clear away abrasive shavings and also protects the grinding function.



(Fig. 6-1)

Through the combination of the above three components, they produce the following characteristics:

(1) Acts as an abrasive for the cutting blade. As a result, extremely hard materials such as tool steel and super hard alloys can be machined.

(2) During use, abrasives will crack and disintegrate due to wear and dulling which will in turn create new abrasive material (this process is called "self-generation").

(3) Abrasives are extremely hard and have minute cutting edges. Because of the small size of these cutting edges, they are highly accurate in measurement precision, work precision and surface roughness.

(4) High grinding speeds (10 - 100 times the speed of cutting). Though the grinding particles are small, they possess numerous cutting edges and therefore its overall effectiveness is outstanding.

6.4.2 Grinding wheel grading method

WA	80	L	5	V	2400
Abrasive	Grain Size	Bond	Struct.	Binding Material	Max. peripheral Speed
A FA WA (38A) DA 32A (SA) PW PA AC C CC	10 180 12 220 14 240 16 280 20 320 24 400 30 500 36 600 46 700 54 800 60 1000 70 1200 80 1500 90 2000 100 2500 120 3000 150 4000	A N B O C P D Q E R F S G T H U I V J W K X L Y M Z	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14	V porcelain ??? B resin adhesive BU foaming resin adhesive R rubber adhesive MG magnesium oxide adhesive E S sodium silicate adhesive	1400 1500 1700 2000 2400 2700 3000 3600 4300 4800 6000

6.4.2.1 Three factors to select for ideal wheel grinding

(1) When doing grinding work, first one must select the right wheel for which there are three main factors.
   (a) High grinding efficiency
   (b) Low grinding wheel wear (long life)
   (c) Obtaining the desired precision and grinding quality

(2) Factors for grinding wheel selection
   Fixed conditions
   1. Material of workpiece
   2. Precision and surface roughness requirements
   3. Contact area for grinding
   4. Special grinding operating conditions
      Variable conditions
   5. Wheel speed
   6. Downfeed rate
   7. Condition of grinder
   8. Operation technique of workers

a. If the workpiece is steel or an alloy, alumna abrasive is most commonly used. For cast iron, non-ferrous metals and non-metals, the abrasive should be SIC. Fine grained abrasives are used for soft, ductile materials. Soft wheels are used for hard materials such as brass to prevent "Blockage" or "loading". Dense packed abrasive grains are for use on hard and brittle material.

b. When precision and surface roughness considerations require the use of a coarse grain grinding wheel, we suggest high speed grinding. When you want a fine polished surface, use a fine grain grinding wheel. It's also possible to obtain polished surface with a medium grained grinding wheel if the grinding wheel is dressed appropriately. Glass bonds are used on rough finishing and semi-procision finishing. Resin, rubber and shellac bonds are used for high precision polishing.

c. When considering the contact surface area, fine grain grinding wheels are sued for small contact surface areas. The harder and denser type abrasives are used on small contact surface areas and loose types are used on large contact surface areas.

d. When considering grinding work, glass bonds are generally used for precision grinding and grinding wheels with resin, rubber, and shellac bonds are most suited for special excellent polishing needs.

e. If you want higher rotation speed grinding wheels that deliver a relatively faster work pace, grinding wheel will tend to be soft. If you want to decrease (increase) the rotation speed, this will have the effect like a soft (hard) wheel. Glass bond grinding wheels are used at speed under 6500 S.F.P.M and rubber, shellac ad resin bond grinding wheels are used at speeds of 6500 S.F.P.M. and above.

f. For higher feeding rates and grinding pressures, a hard grinding wheel is required. If your work piece speed must be increased, then the cutting rate will automatically increase and result in faster wear of the grinding wheel. The type of wear can be improved by using grinding wheels with greater hardness. For more detailed information on grinding wheels. Contact your wheel manufacturer or distributor.

Grinding selection reference

Table 6-7

Material Being Ground			Hardness (Rockwell HRC)	Grinding wheel specs
Steel	Carbon Steel	Steel Plates Carbon Steel Carbon Steel pipe (tube) Carbon Steel pipe Carbon Steel pipe	HRC 25 and below	WA 46H WA 46J
			HRC 25 and above	WA 46J
	Alloy Steel	Nickel-Chromium Steel Nickel-Chromium Alloy Steel Chromium Steel Chrome-Moly Steel Aluminum Chrome-Moly Alloy Steel High-Carbon Chromium Alloy Bearings Stainless Steel Alloy Tool Carbon Steel	HRC 55 and below	WA 46J
			HRC 55 and above	WA 46I
	Tool Steel	High Speed Steel Alloy Tool Steel	HRC 60 and below	WA 46I
			HRC 60 and above	WA 46H
	Stainless Steel	Stainless Steel Heat Resistant Steel		WA 46I
				WA 36J
Iron	Cast Iron	Gray Cast Iron		C46J
		Special Cast Iron		GC461
		Cold Forged Cast Iron		
		Malleable Cast Iron		WA46K
	Non-Ferrous Metals	Brass		C30J
		Bronze		A46K
		Aluminum Alloy		C30J
		Sintered Carbide		GC60 - 100HI

For Non-Ferrous metals work pieces listed above, proper clamps should be used for grinding.

6.4.3 Three factors to select for ideal wheel grinding

(1) When doing grinding work, first one must select the right wheel for which there are three chief factors.
(a) High grinding efficiency
(b) Low grinding wheel wear (long lifespan wheel)
(c) Obtaining the desired precision and machining quality

(2) Conditions to consider when

Fixed conditions	1. Material being grinded
	2. Precision and
	3. Surface area for grinding
	4. Special grinding operating conditions
Variable conditions	5. Wheel speed
	6. Downfeed rate
	7. Condition of grinder
	8. Operation technique of workers

(1) If the material being ground is steel or an alloy, alumina abrasive is most commonly used. For no ferrous metals and non-metals, the abrasive should be SIC. Fine grained abrasives are for use on soft, highly ductile materials. Soft wheels are for use on hard materials such as bronze to prevent "blocked" abrasive grains are for use on soft and ductile materials.

(2) When precision and smoothness considerations require the use of a coarse grain grinding wheel, we suggest that you use high speed cutting. When you want a fine polished surface, use a fine grain grinding wheel. Also, if you use a medium grain wheel flange for fine polishing, it is still possible as long as make the necessary adjustments beforehand. Glass binders are used on rough finishing and semi-precision finishing. Resin, rubber and shellac binders are used for high precision polishing.

(3) When considering special grinding work, glass binders are commonly used for precision grinding and grinding wheels with resin, rubber, and shellac binders are most suited for special polishing needs.

(4) When considering special grinding work, glass binders are commonly used for precision grinding and grinding wheels with resin, rubber, and shellac binders are most suited for special polishing needs.

(5) If you want higher rotation speed grinding wheels that deliver a relatively faster work pace, grinding wheel will tend to be soft. If you want to decrease the rotation speed, this will have the effect like a soft wheel. Glass binder wheel flange are used at speed under 6500 S.F.P.M. and rubber. Shellac ad resin binder grinding wheels are used at speeds of 6500 S.F.P.M. and above.

(6) For higher cutting rates and grinding pressures, a hard grinding wheel is required. If your work piece speed must be increased, then the cutting rate will automatically increase and result in faster wear of the grinding wheel. The type of wear can be improved on by using grinding wheels with greater hardness. For more detailed information on wheels, contact your wheel manufacturer or distributor.

6.4.3.1 Wheel flange inspection

These following safety rules must be rigorously adhered to. Their purpose is to protect workers from potential injury.

Wheel inspection and installation：

Before mounting the grinding wheel, make an inspection of it. Generally, this can be down by testing the sound of the grinding wheel. Use the support passing through the axle hole of the grinding wheel, then use a wooden hammer to lightly tap the grinding wheel so that it makes a sound. Crack that con not be physically seen are revealed by the differing sounds that they make. A flawless wheel flange makes a distinct clear sound. Do not use wheel that are of poor quality. The two surfaces of the wheel have two sheets of absorbent paper used as a flexible pad between the wheel and flange. When installing, do not tear off this paper. Then gently take your hand and slip the grinding wheel in to the flange. Don't' use too much force. The wheel must be wiped clean, especially the orienting and positioning surfaces.

6.4.3.2 Balancing the grinding wheel

Effectively balancing the grinding wheel will relieve stress inside the grinding wheel and help you attain the maximum quality. Degree of grinding precision and grinding surfaces as well as the lifespans of the grinding wheel, wheel spindle and bearings are all closely linked to whether or not the grinding wheel is precision balanced. To achieve this objective, static balancing is generally sufficient.

6.4.3.3 After the grinding wheel, wheel flange and balance rod are precisely installed, the following method is used to balance the grinding wheel：

(1) The level of the balancing stand must be calibrated to within one grid.

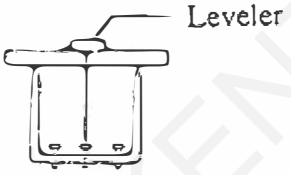
(2) Rotate the grinding wheel on the balance stand and mark its lowermost position (heaviest area) with a "S" using chalk. (see Fig 6-6).

(3) Then take the first balancing piece "G" and attach it opposite to the "G" mark. Caution the mark "G" cannot be moved here after (see Fig6-9).

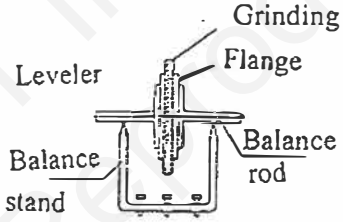
(4) After this, take the other two balancing piece "K" and attach to any position of equivalent distance "a" (See Fig. 6-9).

(5) Rotate the grinding wheel 90° repeatedly and inspect each time whether the grinding wheel is balanced. If it is not balanced, adjust the positions of the balance pieces "K" until the grinding wheel can be balanced (See Fig.6-10).

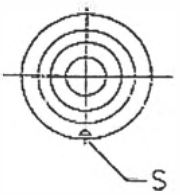
(6) After balancing the grinding wheel, test it by rotating it at normal grinding speed for at least five minutes.



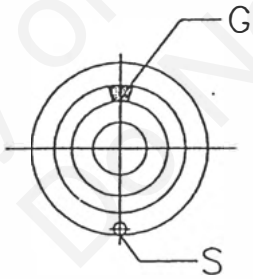
(Fig.6-5)



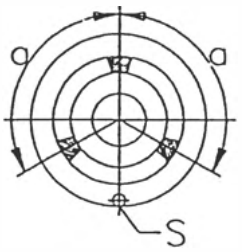
(Fig.6-6)



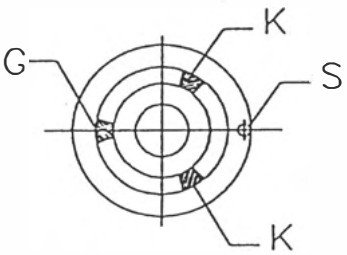
(Fig.6-7)



(Fig. 6-8)



(Fig.6-9)



(Fig.6-10)

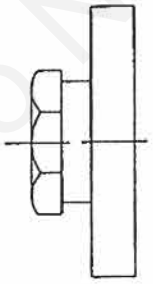
6.4.3.4 After the first time you balance the grinding wheel, it must then be mounted on the wheel spindle. Use the parallel dresser on the wheel head of the wheel spindle or the grinding wheel dresser on the work table to finish the grinding wheel.

Note：When using the diamond dresser on the work table, first set the work or travel direction and then rotate the handwheel.

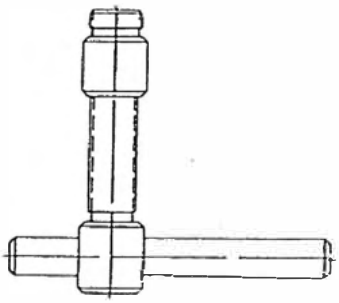
6.4.3.5 The grinding wheel must be finished to complete precision. This can be established by looking at the grinding surface. By using the above procedure to balance the grinding wheel. You must remove it from the wheel spindle and position the grinding wheel on the balance table and then carefully balance it. After this, you can mount it on the wheel spindle, dress the grinding wheel, repeating this procedure until it is perfectly balanced. Even a well balance grinding wheel can lose its balance through wear. Therefore, it is necessary to frequently inspect the grinding wheel and rebalance it when necessary.

6.4.3.6 Since the grinding wheel will absorb coolant, when the grinding wheel is stationary do not turn on the coolant or it will become off-balance by absorbing water on one side. If the grinding wheel is left idle for long periods of time, the moisture inside will concentrate at its lowest point causing it to become off-balance. Therefore, after grinding it will become off-balance if not allowed to spin for a period. If you let the machine spin and use centrifugal force to draw off the moisture, the grinding wheel will regain its balanced state.

6.4.3.7 Before mounting the grinding wheel on the wheel spindle, first wipe the extracting hole of the wheel flange and extraction base on the wheel spindle clean and then use your hand to push the grinding wheel onto the extractor on the wheel spindle. After this, tighten the nuts on the grinding wheel positioning screws (see Fig.6-11). To detach the wheel flange, use the grinding wheel extraction tool (see Fig.6-12).



(Fig. 6-11)



(Fig.6-12)

Note：If you want to grind different materials, the grinding wheel has to be changed as well. This is not very economically efficient since you waste a lot time unnecessarily to rebalance and finish the grinding wheel. We suggest that dedicate a single flange for each grinding wheel. In this way, you can save the time and trouble that you would take in doing the various disassembly work.

6.4.4 Grinding wheel dressing and correct use of the diamond dresser

6.4.4.1 The complete grinding wheel can be used to grasp the wheel balance attached to the electric clamp plate (but first use you hand to see if it is firmly attached) or the flat finishing wheel mounted on the main axle seat. The diamond has been inserted into the finishing wheel. The diamond finisher must be at a 5 degree angle with the grinding wheel, because the portion ground by the diamond should be along the rotation direction of the grinding wheel. In this manner, the diamond finisher can maintain its sharpness for finishing the grinding wheel.

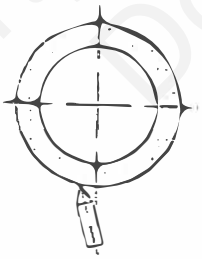
6.4.4.2 Changing the feed rate of dressing will enable you to change the coarseness of the grinding wheel. If you want to grind to a depth of 0.1~0.2mm, than a rough dressing of the grinding wheel is all that is necessary. Then by quickly rotating the handwheel, you can make the diamond dresser quickly pass through the grinding wheel. In this way, you can get greater rate of stock removal from the grinding wheel. If you want to do precision grinding with the same grinding wheel, then dress again. This time slowly dress 2~3 times with a dressing depth of 0.01mm per time.

6.4.4.3 Generally, light finishing is best for the lifespan of the grinding wheel and diamond dresser.

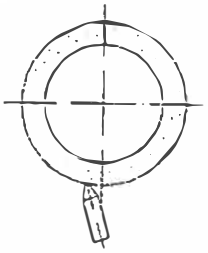
6.4.4.4 Diamond being excessively brittle and hard even slight impacts may cause cracking.

6.4.4.5 When dressing the grinding wheel, you must start from the center, because the outer edges tend to be worn more. If you begin dressing from the outside, this creates a larger pressure which might crack the diamond.

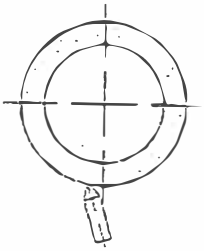
6.4.4.6 Grinding wheel dressing diagrams and precautions：



(Fig. 6-13)



(Fig.6-14)



(Fig.6-15)

(Fig.6-16)

(1) From the correct angle between the new diamond dresser and the grinding wheel. (Approx. 5 degrees) (See Fig.6-13)
(2) When the diamond is being worn by grinding, turn it over to preserve its sharpness. (See Fig.6-14)
(3) Dressers which have been turned over should be placed at the exact working position on the grinding wheel (see Fig.6-15)
(4) Diamond dressing the grinding wheel must begin from the center of the grinding wheel. (See Fig.6-16)

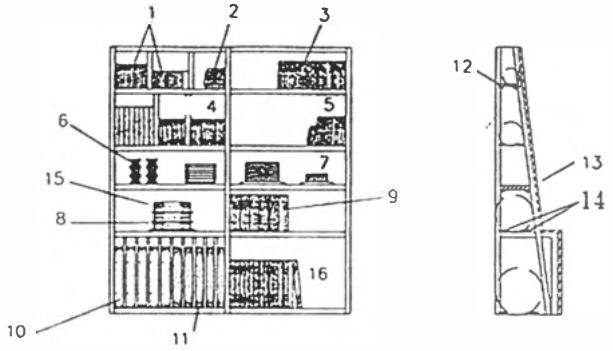
6.4.5 Grinding wheel storage：

6.4.5.1 Grinding wheels must be stored in a dry grinding wheel shelf (as shown in Fig.6-17) that is protected from impacts and vibration. When moving wheel, take extra precautions

6.4.5.2 The golden rule when storing grinding wheels is that they must be stored in an upright position. Thin grinding wheels and grinding wheels with sharp edges must be stored horizontally.

6.4.5.3 Caution

(1) Do not let oil or grease come into contact to the grinding wheel. Oil soaked grinding wheel will lose their grinding contact surface and slide during grinding. Also, this will significantly shorten their lifespan.
(2) Do not stack the grinding wheels flat as in Fig.6-18.



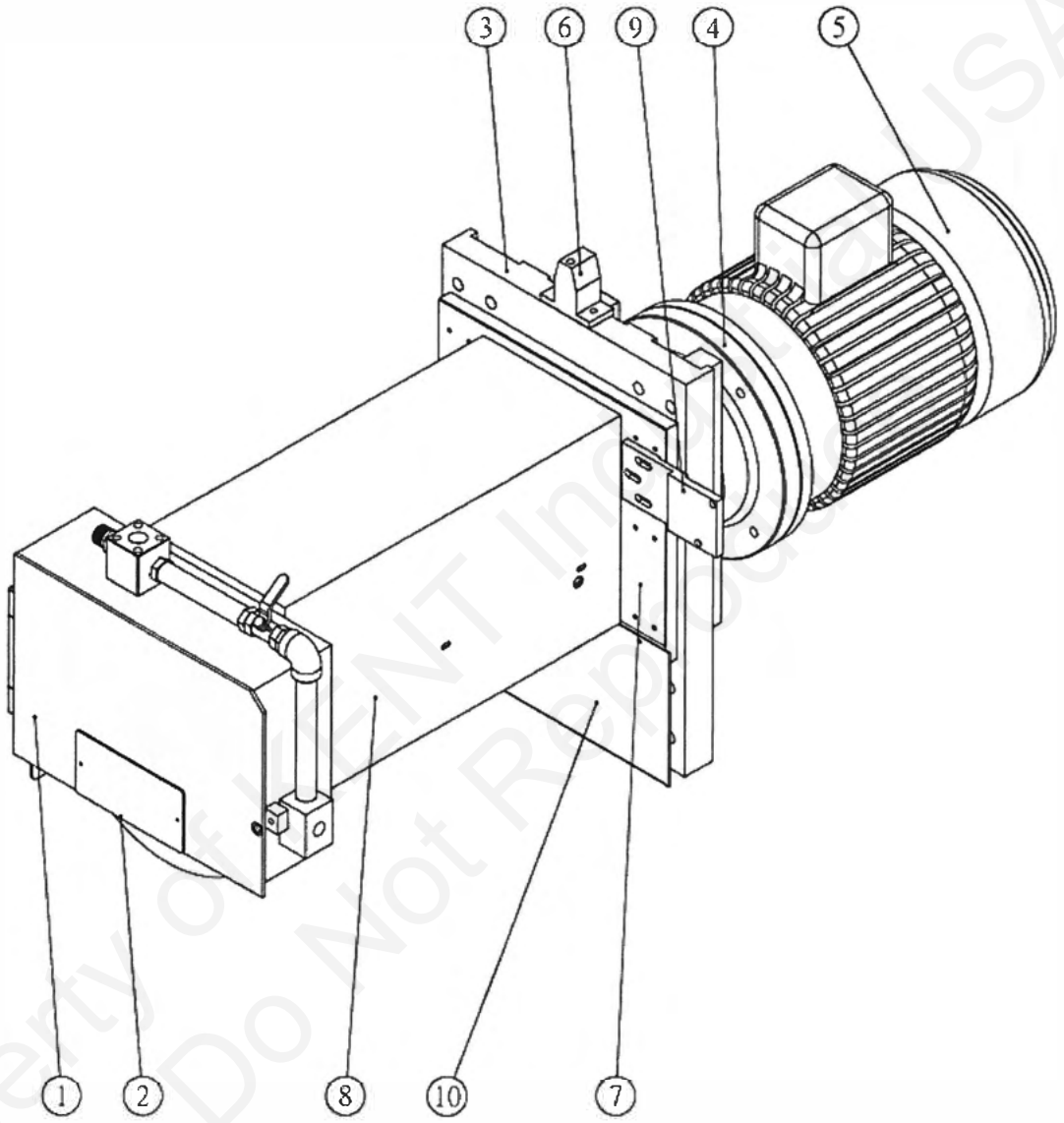
(Fig. 6-17)

1. Straight grinding wheels
2. Dish grinding wheels
3. Straight cup grinding wheels
4. Straight grinding wheels
5. Sawing plate shaped grinding wheels
6. Taper cup grinding wheels
7. Cutting-off grinding wheels
8. Wave shaped thick paper
9. Thick and high binding strength cylinder grinding wheels
10. Large straight grinding wheels
11. Large rounded edge grinding wheels
12. Sloped surface to prevent sliding
13. Board to prevent falling
14. Two supporting pieces placed on both sides of the grinding wheels
15. Thin cylinder grind wheel or low binding strength grinding wheels
16. Medium straight grinding wheels.

(Fig. 6-18)

Chapter Seven Maintenance parts list

7.1 Head

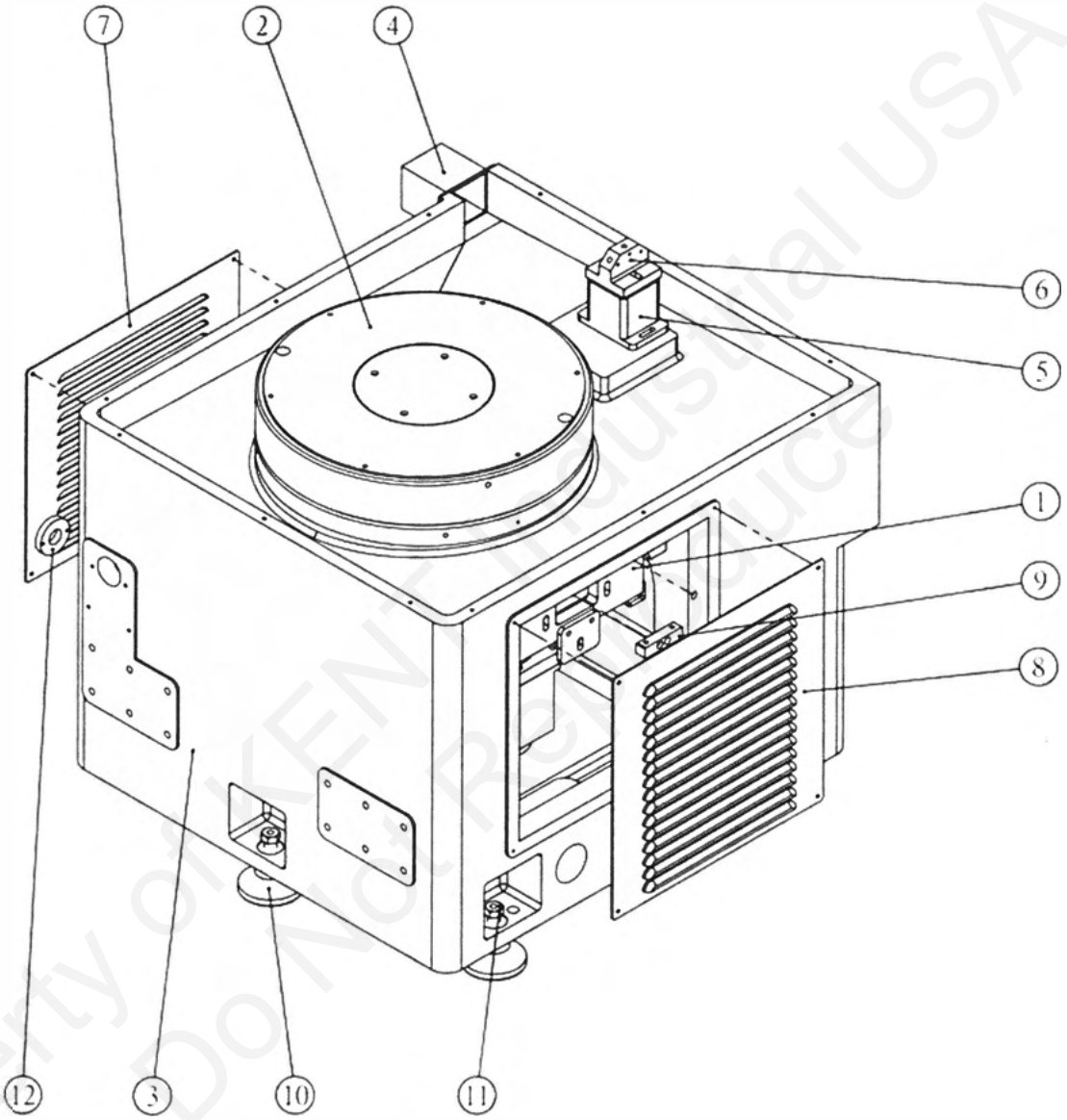


Chapter Seven Maintenance parts list

7.1.1 List of head

NO.	Parts number	Parts name	Quantity	Specification
1		Grinding wheel cover assembly	1	
2		Spindle	1	
3	0303-KB302100	Head assembly	1	
4	0303-KB300100	Spindle motor holder	1	
5	7131-09206203	Spindle motor	1	15HP×4P
6	0303-KE302500	Vertical limited block	1	
7	0303-KB300800	Cover	1	
8	0303-KB900800	Head housing	1	
9	0303-KB902200	Bracket	1	
10	0303-KE902200	Dustproof plate	1	

7.2 Basement

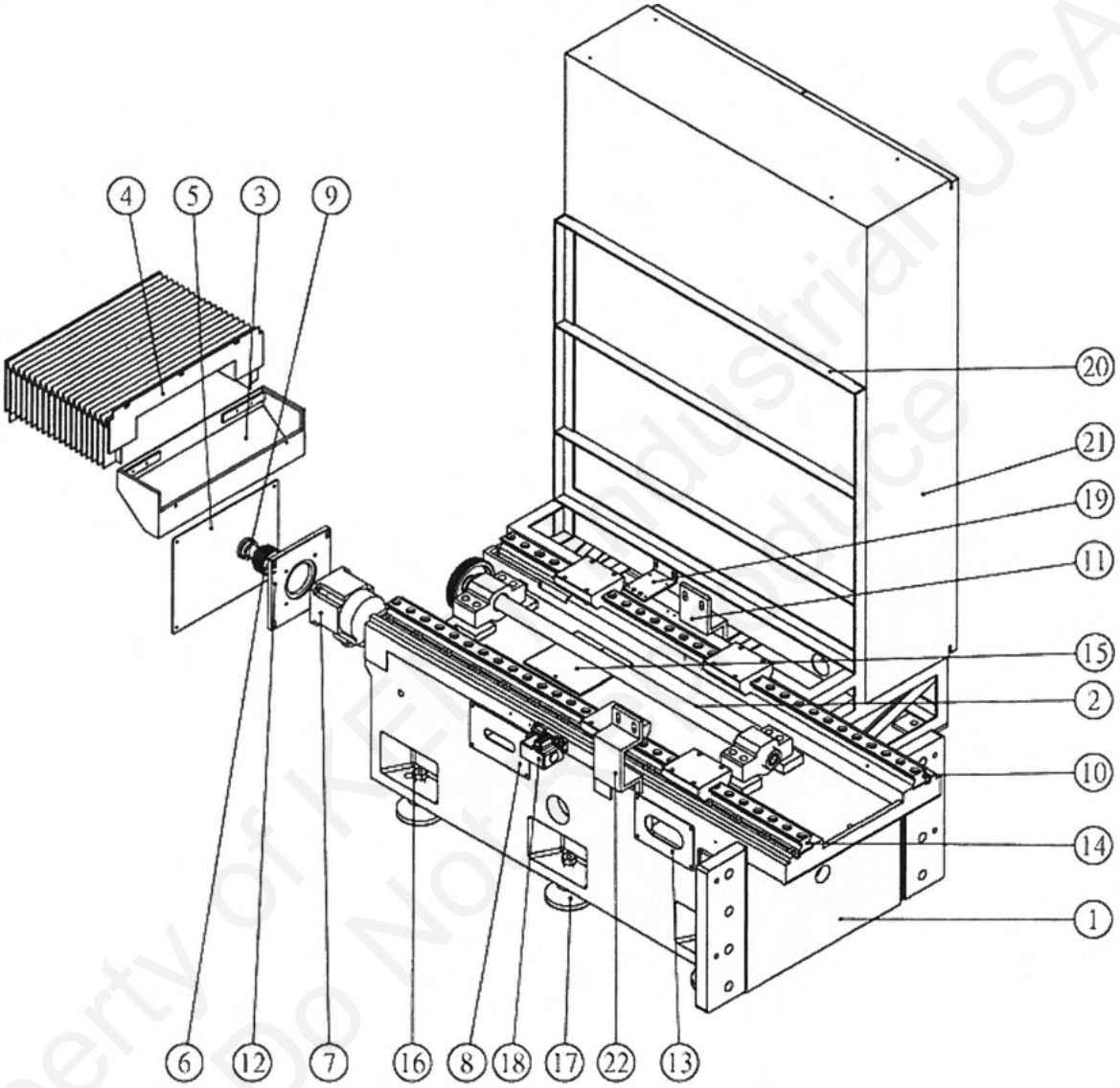


Chapter Seven Maintenance parts list

7.2.1 List of basement

NO.	Parts number	Parts name	Quantity	Specification
1		Gear reducer assembly	1	
2		Table assembly	1	
3	0303-MD100100	Basement assembly	1	
4	0303-MC902000	Drainage channel	1	
5	0303-MD300100	Dresser riser	1	
6	0303-MF200800	Dressing unit	1	
7	0303-MD101200	Side cover (Left)	1	
8	0303-MD101100	Side cover (Right)	1	
9	0303-MC202300	Adjustment block	1	
10	0303-91530700	Leveling pad	5	
11	0303-91530500	Leveling screw	5	M24*P2
12	0303-50103200	Nut	1	PG36

7.3 Rear basement

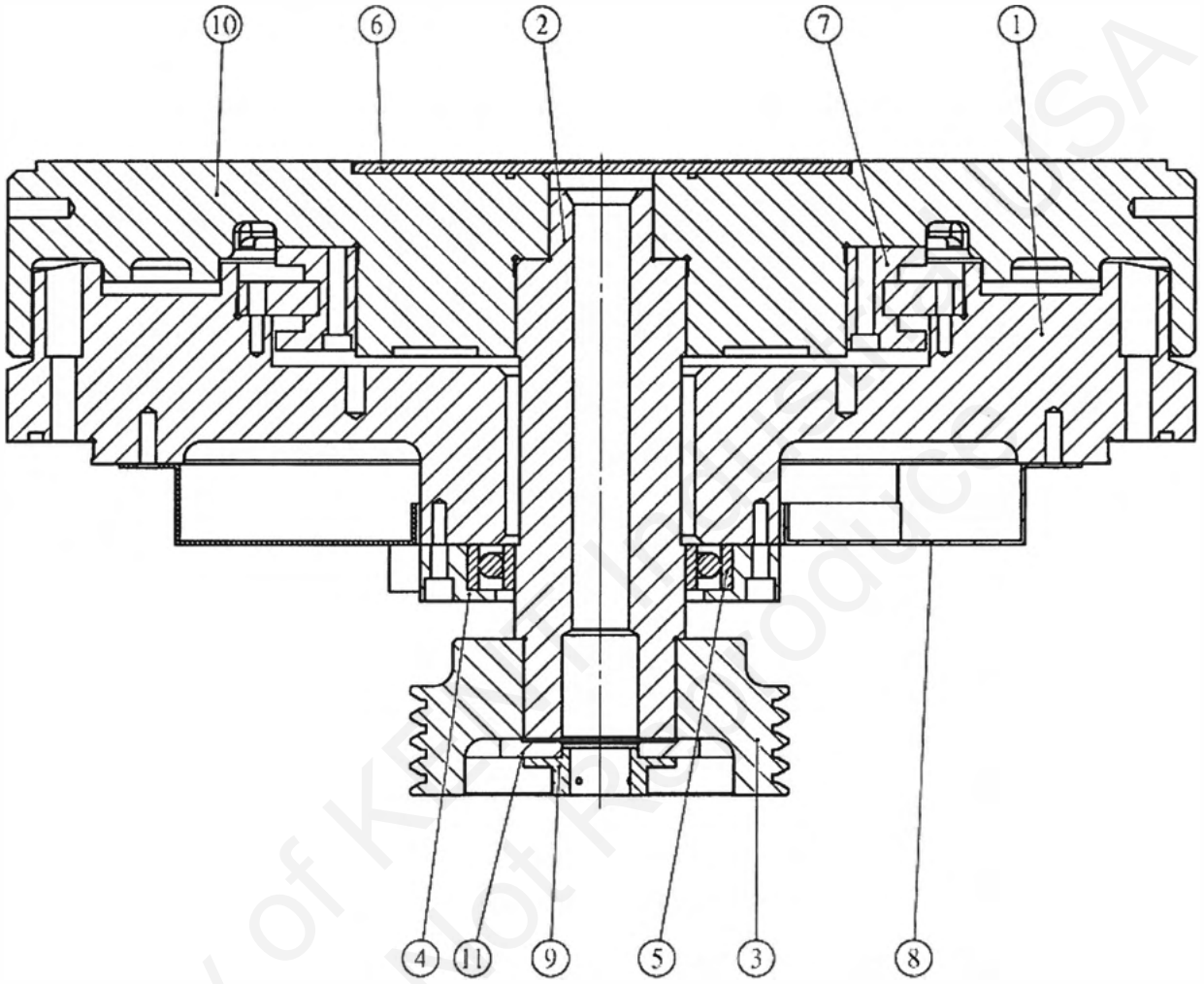


Chapter Seven Maintenance parts list

7.3.1 List of rear basement

NO.	Parts number	Parts name	Quantity	Specification
1	0303-KB100500	Rear basement	1	
2		Crossfeed assembly	1	
3	0303-KE401400	Crossfeed bellow holder	1	
4	0303-KB401500	Bellow	1	
5	0303-KC401700	Cover	1	
6	0303-KC402400	Pulley	1	
7	8900-00001076	Servo motor	1	HC-SFS102K
8	0303-KB402200	Side cover 1	1	
9	8900-00001114	Bushing	1	SEC-210(24x34)
10	0383-74111500	Wedge	30	
11	0303-54100900	Fixing plate	1	
12	0303-KE401700	Motor holder	1	
13	0303-MD400200	Side cover 2	1	
14	0303-KB409200	Linear guideway	2	
15	0303-KB401200	Cover	1	
16	0303-91530500	Leveling screw	6	M24*P2
17	0303-91530700	Leveling pad	6	
18	8900-00001216	Limit switch	1	VB-3211
19	0303-KB402300	Cable chain holder	1	
20	0303-KB100900	Electrical cabinet holder	1	
21	03C3-98003711	Electrical cabinet	1	
22	0303-KE402100	Fixing bracket	1	

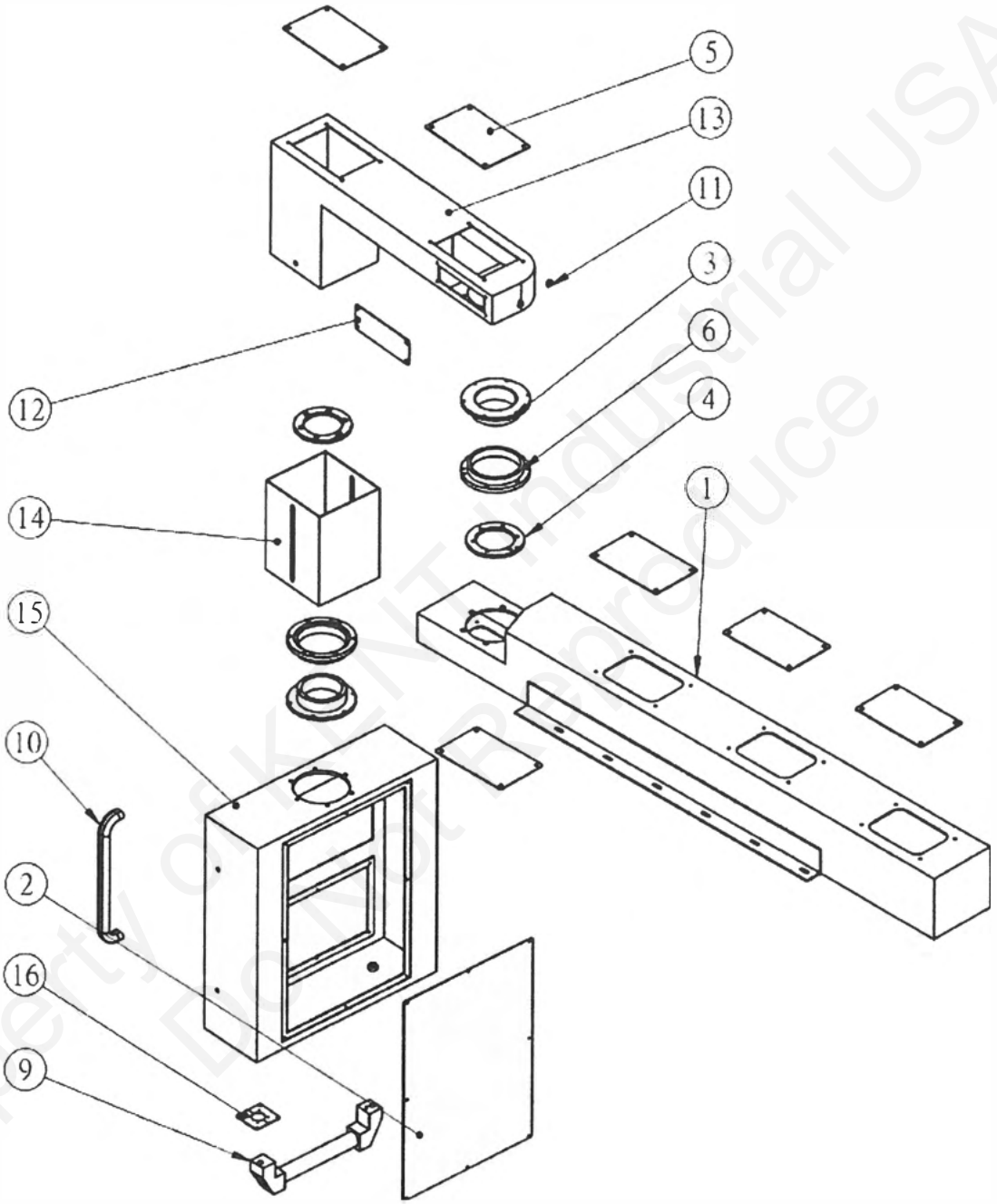
7.4 Rotating table



7.4.1 List of rotating table

NO.	Parts number	Parts name	Quantity	Specification
1	0303-MC201600	Supporter	1	
2	0303-MC200200	Shaft	1	
3	0303-MC200500	Pulley	1	
4	0303-MC200800	Collar	1	
5	3030-60184000	Deep groove ball bearing	1	6018ZZ
6	0303-MC200300	Cover	1	
7	3078-2603855511	Crossed roller bearing	1	AXRY260-EX PRR50
8	0303-MC202100	Oil trough	2	
9	0303-MC201800	Connector	1	
10	0303-MD200300	Rotating table	1	
11	0303-MD200600	Fixing plate for pulley	1	

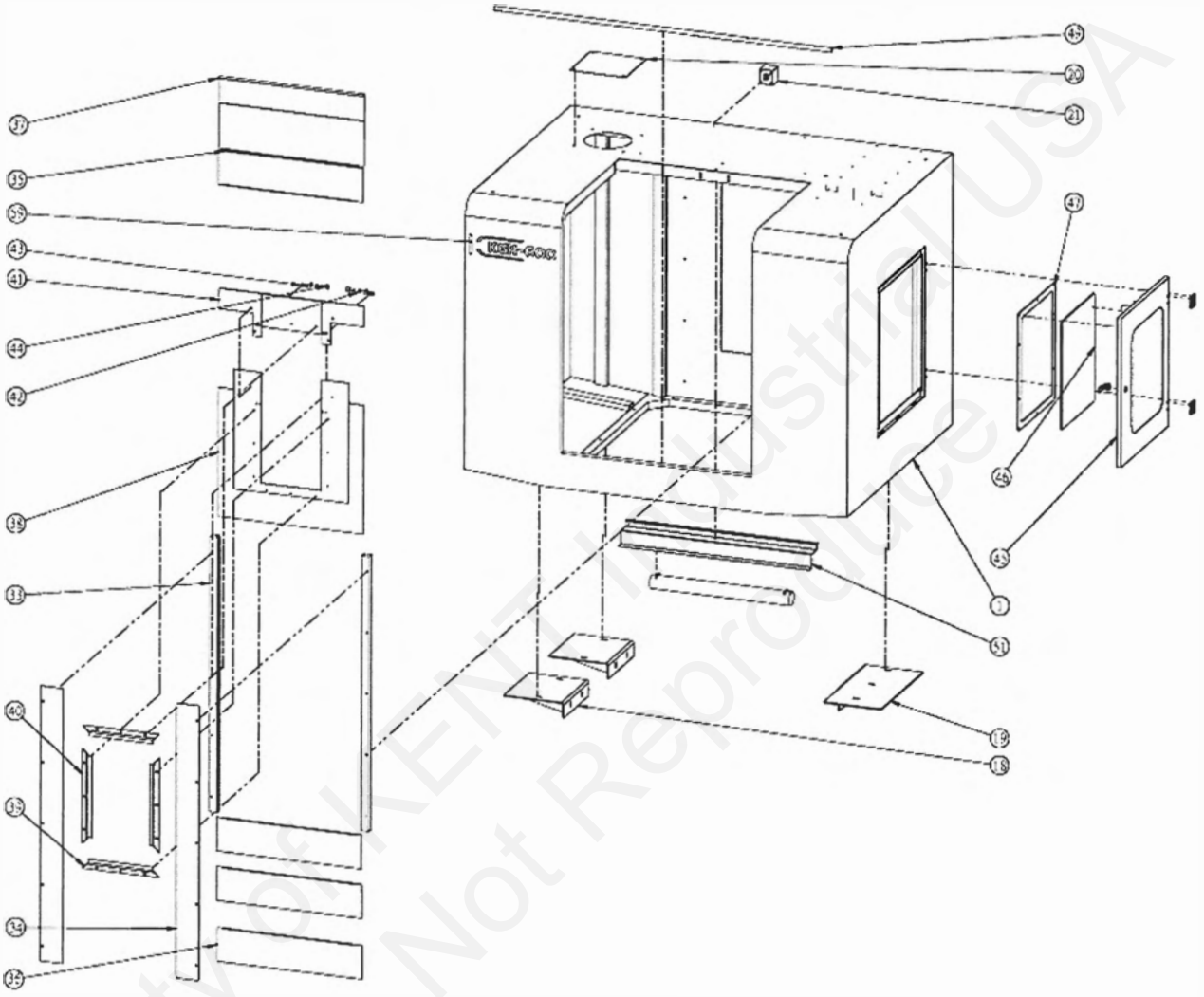
7.5 Operation Panel



7.5.1 List of Operation Panel

NO.	Parts number	Parts name	Quantity	Specification
1	0303-A607002-1	Wire trough	1	
2	0303-A607010-0	Cover	1	
3	0383-758104	Lower ring	2	
4	0383-758106	Plate	2	
5	0383-758110	Cover	6	
6	0383-758105	Upper ring	2	
9	8900-00001038	Handle	1	
10	4942-15300000	Handle	1	
11	0383-758027	Stopper	2	
12	0303-A607008-0	Cover	1	
13	0303-A613009	Wire trough	1	
14	0303-A613010	Cover	1	
15	0303-A607009	Operation Panel	1	
16	0303-A607055	Plate	2	

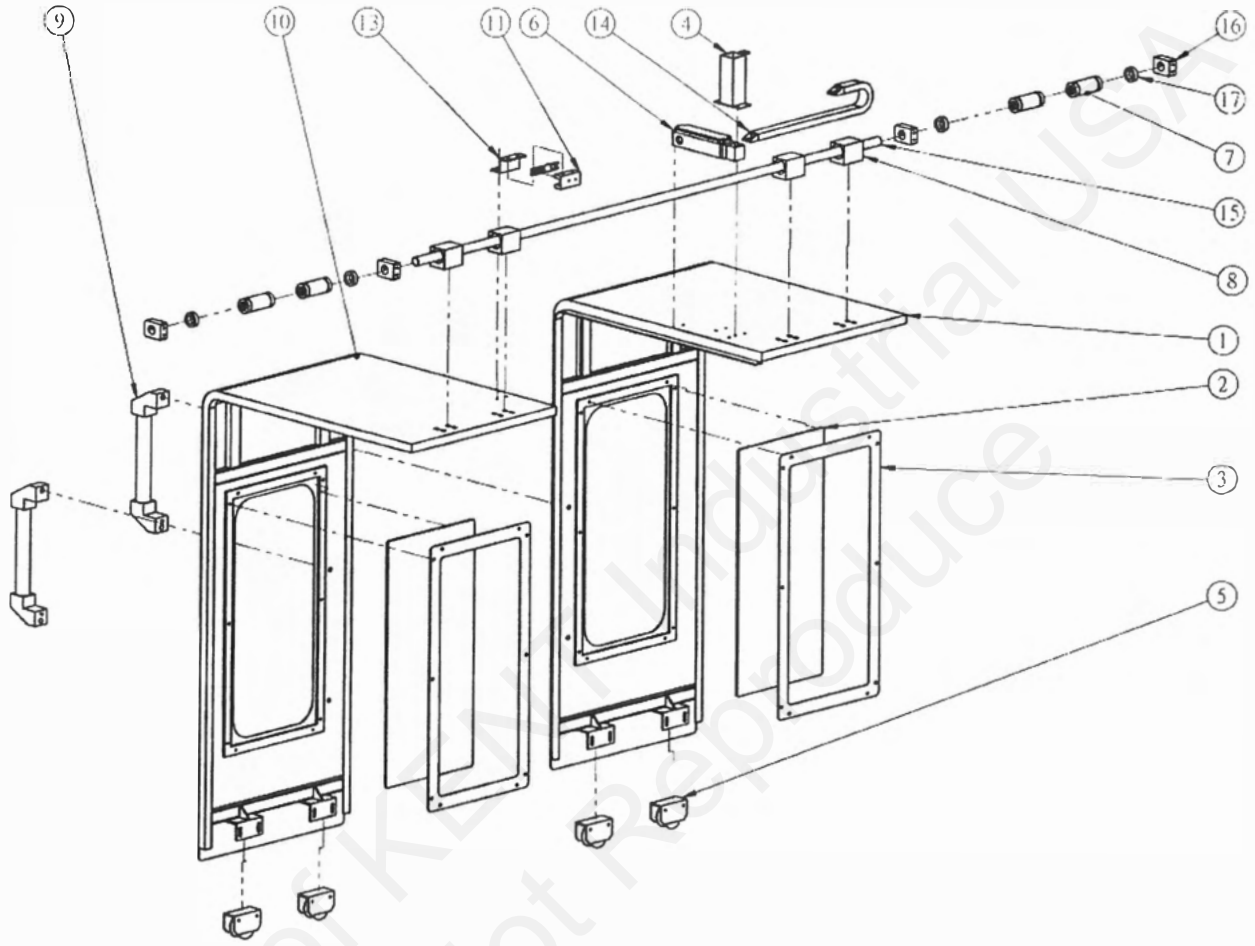
7.6 Splash Guard



7.6.1 List of Splash Guard

NO.	Parts number	Parts name	Quantity	Specification
1	0303-A607001	Splash guard	1	
18	0303-A607020-0	Supporter	2	
19	0303-A607021-0	Supporter	1	
20	0303-A607022-0	Plate	1	
21	0303-A607023-0	Adapter of coolant	1	
33	0303-A607030-0	Dust shield guide rail	2	
34	0303-A607029-0	Dust shield plate(2)	2	
35	0303-A607034-0	Splash shield plate(2)	3	
36	0303-A607035-0	Splash shield plate(3)	1	
37	0303-A607031-0	Splash shield plate(4)	1	
38	0303-A607032-0	Splash shield plate	1	
39	0303-KB9048-00	Brush	2	
40	A3-0100167	Brush	2	
41	0303-A607033-0	Splash shield plate	1	
42	0303-KB901300	Spacer ring	2	
43	03-KB902700	Bearing holder	2	
44	8900-00001110	Bearing	2	CFUR8-19
45	0303-A607026	Right door	1	
46	0303-A607027-0	Window	1	
47	0303-A607028	Plate	1	
49	0303-A607036-0	Sliding shaft lower	1	
50	0303-KZ9030-00	Bearing holder	4	
51	0303-A607041-0	Stopper	1	
52	0303-A613009	Lever of operation Panel	1	
53	0303-A613010	Lever of operation Panel	1	
54	0303-A607042-0	Splash shield plate	1	
55	8900-00001517	Lamp	1	NLM26SG-DV (NIKE)
56	8900-00001529	Door bolt	4	
57	8900-00001531	Door lock	1	
58	0303-A607038-0	Dust cover	1	
59	0303-A607043-0	Poster	1	
60	0303-A607009	Operation Panel	1	
61	0303-A607055	Plate	0.06	

7.7 Sliding door



7.7.1 List of Sliding door

NO.	Parts number	Parts name	Quantity	Specification
1	0303-A607012-0	Left door	1	
2	0303-A607013-0	Window	2	
3	0303-A607014-0	Plate	2	
4	0303-A607015-0	Cable tube	1	
5	83-758603	Wheel	4	
6	8900-00001017	Safety switch	1	
7	8900-00001040	Linear bush	4	
8	03A3-0011010	Supporter of linear bearing	4	
9	8900-00001038	Handle	2	
10	0303-A607011-0	Right door	1	
11	0303-A607016-0	Supporter of stopper	1	
13	A3-0010011	Flame of stopper	1	
14	4934-25260600	Cable chain	1	
15	0303-A607017-0	Linear shaft	1	
16	0303-A607018-0	Block of linear shaft	4	
17	0303-A607019-0	Polyether	4	