Precision Surface Grinder

Operation Manual

KGS-2040 AH/ AHD

Edition 1

2025/03

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 Installation guidelines

1.1 General safety rules

1. The employer must select trained, qualified personnel to operate and maintain the machine.
2. The employer must adhere to local national safety laws and regulations for teaching operator's safety and hygiene education.
3. The employer must caution operators to watch for unsafe operation practices.
4. The brightness of the lighting equipment at the machine work environment must conform to local government regulations.
5. The machine's fire extinguisher must use non-conducting CO_2 fire extinguisher or ABC dry fire extinguisher.
6. The operation manual must be read before operating the machine and the danger notices and instructions on the machine should be noted.
7. The operation manual must be kept ready at all times. If an accident should happen, please contact our company's representatives.
8. For persons with long hair, their hair must be properly restrained or wear a hat before operating or maintaining the machine.
9. When operating the machine, safety glasses, a mouth muffle and work safety shoes must be worn.
10. The machine and its surrounding area must be kept clean and orderly so to prevent slippery surfaces and to remove unnecessary obstacles.
11. A maximum 600mm of movement space for the machine should be reserved to prevent personnel from being crushed by coming into contact with the machine. Moreover, a yellow (or other easily identifiable color) line should be drawn to mark the area where personnel are restricted from entering. (Refer to figure in see1.3)
12. Operation and maintenance personnel must only work inside work area for safe operation or maintenance in the danger area outside the operation zone is necessary, the operator and maintenance man have to be careful about safety.
13. When moving work pieces that exceed 30 kilograms, use a hoist operated by licensed personnel to lift and lower these pieces.
14. All protective guards and electric door must be closed at all times, excepting when maintenance work is doing.
15. Before maintenance work, the power source should be turned off and only proper tool should be used.

1. Persons wearing ties, gloves, loose fitting clothing and shirts with very long sleeves must not operate or maintain the machine.
2. Operation personnel within their work area must not lean on the machine.
3. When the machine is in operation, wheel guard, right and left stroke adjusters and nozzles must not be adjusted by hand or any tools.
4. To prevent eye injury to personnel by dusts and particles, compressed air should not be used to clean the machine.

1.2 Safety rules for this machinery

1. Only use grinding wheel with a maximum admissible peripheral speed of 2000m/min or greater.
2. Before inspecting or maintaining the power source, first make sure that you are adhering the instructions on the related warning signs.
3. If warning or instruction signs should fall off the machine or become illegible, reaffix with replacement signs or contact your sales representative or this company for replacements.
4. When inspecting electrical sections of the machine, insulating gloves, rubber or leather boots and other non-conducting protective items should be used.
5. Electrical parts need earthen must be earthed according to the diagrams.
6. Before inspecting electrical circuits, first confirm with instruments that the circuit is turned off.
7. When the electrical portions malfunction only qualified personnel should carry out the maintenance work.
8. Check with the grinding wheel manufacturer about grinding wheel specifications for work piece with a hardness of HRC65.
9. The grinding wheel balancing should be done by trained personnel only. After balancing the grinding wheel, it can be mounted onto the wheel spindle. Before mounting, wipe clean the flange and the mounting portion of wheel spindle.
10. Before starting the machine, check the location of the machine stop and emergency stop pushbuttons.
11. Before starting up the wheel spindle motor, first inspect the grinding wheel and check the turning direction of the wheel spindle. After starting the wheel spindle motor, let the grinding wheel spin freely for at least five minutes before starting to grind the work piece.

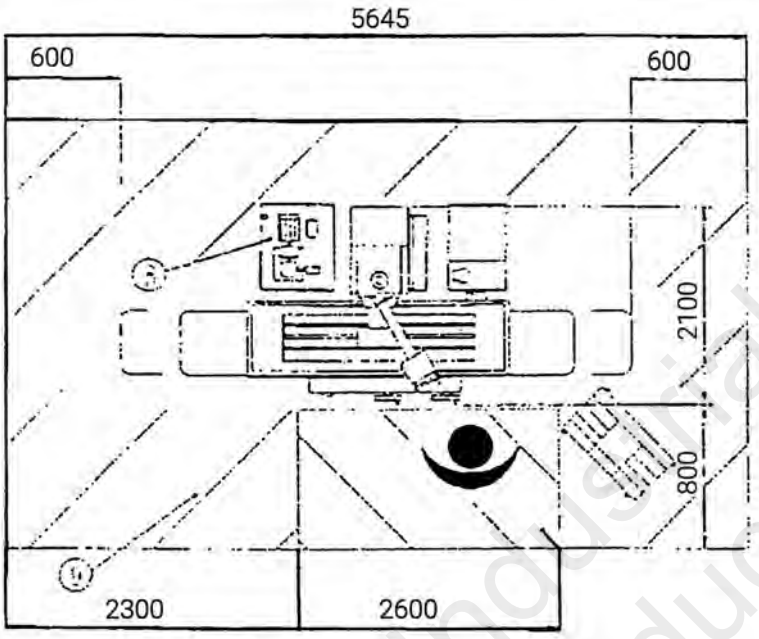
12. Make sure the surface of the electric magnetic chuck is clean before mounting work pieces. If there is scarring on the surface, first regrind its surface.
13. Use the proper clamps when mounting non-magnetic material work pieces such as aluminum, graphite, etc., or work pieces that are difficult to be hold on the magnetic chuck. There clamps cannot come into contact with the grinding wheel.
14. When the grinding wheel is not turning, the operator should check with his hands and see whether the work piece is firmly attached to the magnetic plate.
15. Adjust the left or right stroke only when the table stops.
16. For wet grinding, before turning off the spindle motor, first turn off the coolant system.
17. Please wet grind materials which produce dust during grinding process.

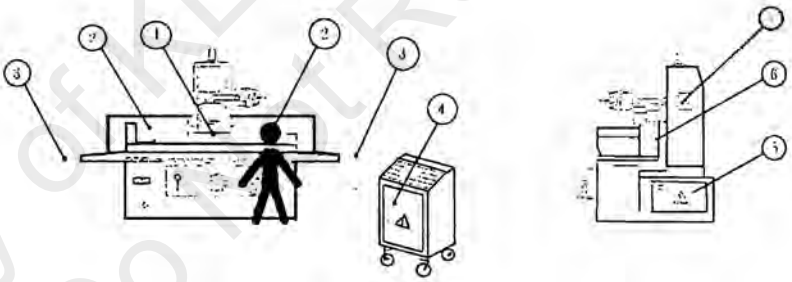
1. The machine must not be installed in areas with explosive powders or materials.
2. Combustible liquids must not be used as a cutting fluid.
3. The machine should not be used to grind lumber, plastics or other combustible materials. Please contact KENT USA. If you wish to use optional or special accessories provided by the company to grind graphite or porcelain.
4. The grinding wheel on the wheel spindle head cannot be worked as a disk sander.
5. Do not arbitrarily change the use and/or capacity setting on the machine and do not use grinding wheels which do not conform to listed specifications or work pieces that are excessively large or heavy.
6. To avoid risk of accident, user should not modify the electrical circuitry without prior authorization.
7. Do not change interlocking circuits into bypass circuits.
8. Do not come into contact with those areas of the machine that are labeled with lightning signs.
9. Do not come into contact with the electrical box or circuits when one's body or hands are wet.
10. When inspecting or maintaining electrical sections, keep all metallic personal items away from possible contact. In addition, hang a warning sign to prevent other personnel from inadvertently starting the machine.
11. Do not use very thin and short work pieces or work pieces which have complex shapes or unstable centers of gravity on the magnetic chuck for grinding.

12. When grinding, besides securely mounting the work piece, one should make sure no other object is placed on the machine.
13. During wet grinding, the nozzles cannot be adjusted when the wheel spindle is rotating.
14. When the work table is in motion or when the wheel spindle is rotating, the work piece can not be moved or changed.
15. After the wheel spindle motor is turned off, do not use your hand or any other object to stop or slow down the grinding wheel.
16. During grinding and before the grinding wheel stops rotating after work is finished, do not attempt to clean the shavings off the work piece or to move the workpiece.
17. When taking off the grinding wheel, use a flange extractor to detach it. Do not use nay method that involves pounding the grinding wheel. This could result in damage to the grinding wheel.

1.3 Diagram for potential danger area

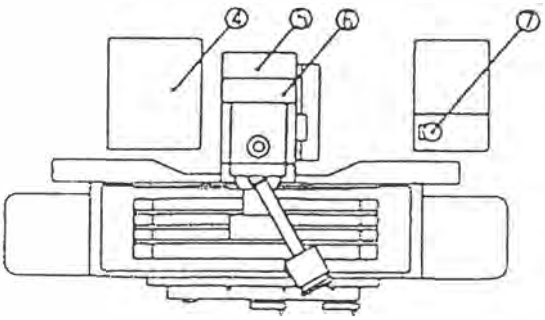
Hazard districts	Description
1	In spindle shaft working district where the grinding wheel rotates swiftly, is easily susceptible to hand injury.
2	In working table traveling district where the operator head is subjected to collision when extending out to look at the working object.
3	In working table traveling district, it is risky for the operator or the third person walking into this district.
4	Non-professional person is not allowed to tamper with the control panel which would result in electric shock.
5	Non-professional person is not allowed to tamper with the power cabinet which would result in electric shock.
6	While the maintenance man is carrying inspection work in this district, no body shall tamper with the start-up of machine which would sandwich the maintenance man.
7	Non-professional person is not allowed to tamper with opening lubricating tank, motor box lid which would result in electric shock.
8	To avoid electric shock, motor, electric magnetic valve, and junction box should not be opened at will.
9	While the machine is running, not body is allowed an access to the slant-lined area except the operator.
10	The movable control box should be placed at a suitable distance from the machine to keep people from walking through the space between.
※ Never touch the positions where there are lightning sign posted.	

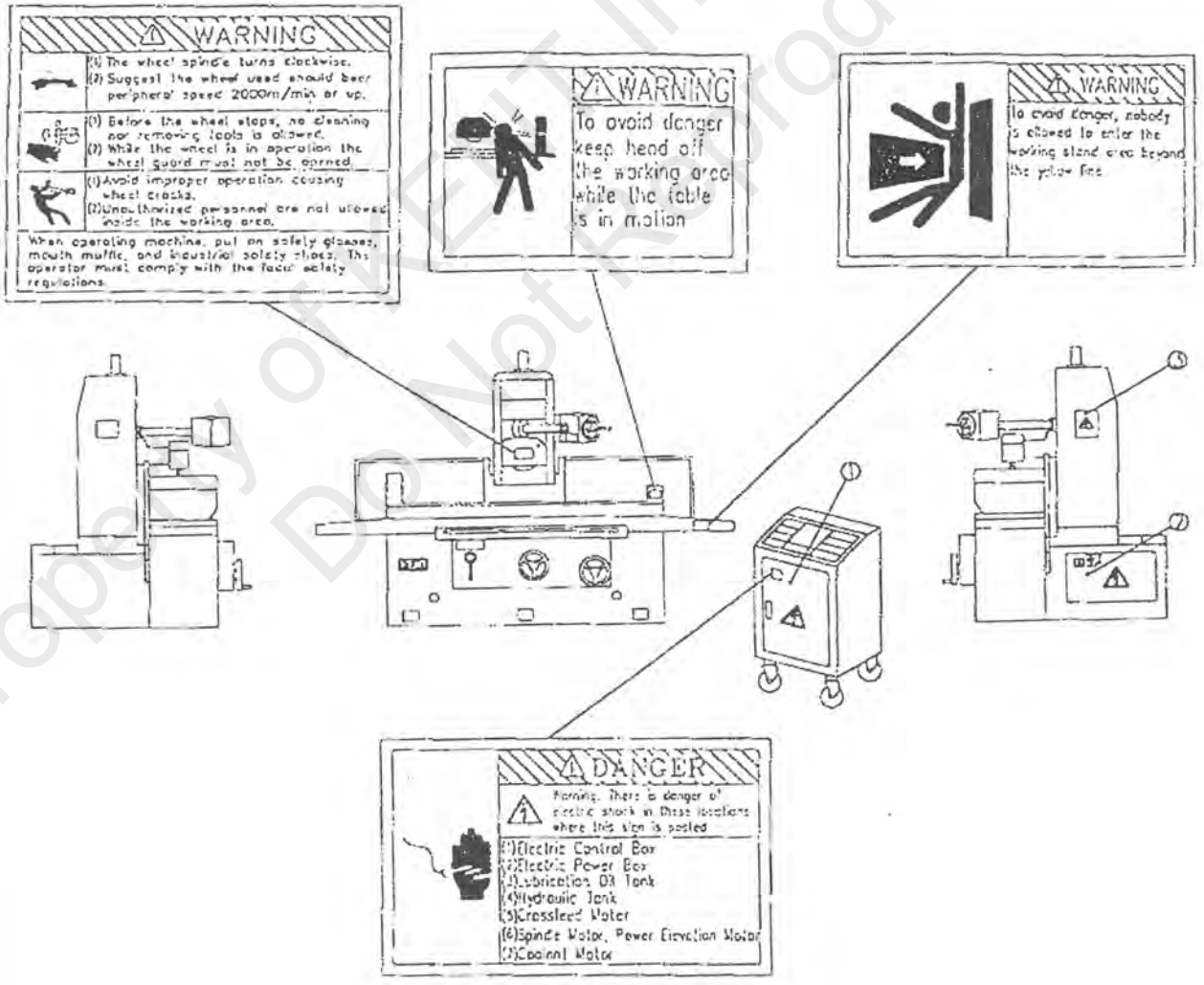




1.4 Diagram for warning signs location

No	Noman Cloture
1	Electric Control Box
2	Electric Power Box
3	Lubrication Oil Tank
4	Hydraulic Tank
5	Crossfeed Motor
6	Spindle Motor, power Elevation Motor
7	Coolant Motor

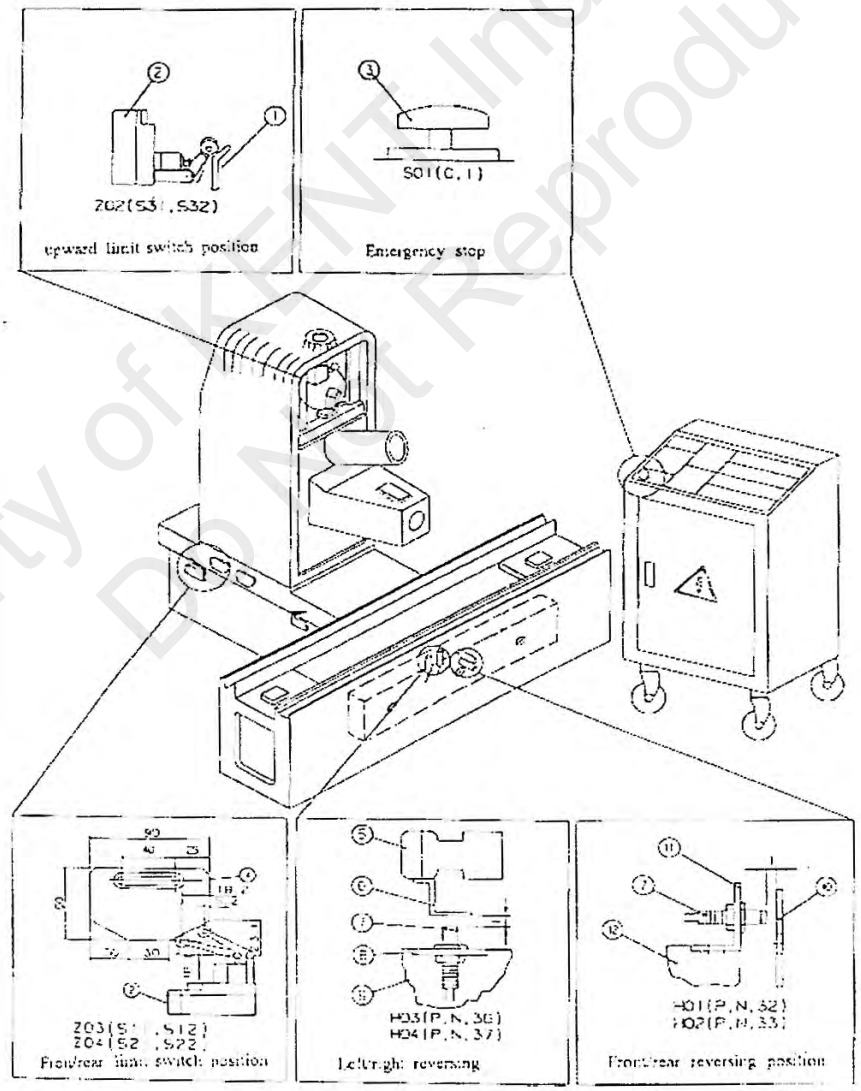




1.5 Safety device placement diagram

1.5.1

Item	Nomenclature	Parts number
1	Dog	
2	Limit switch	7075-11315310
3	Emergency stop P.B.	03C3-95000010
4	Left mirco switch stop	0303-25405400
5	Guide stop	0303-50600401
6	Left sensor	0303-50600701
7	Proximity switch	9930-00000052
8	Plats to fasten proximity switch	0303-560601101
9	Cover for adjuster	0303-50600801
10	Light shield	0303-32507800
11	Approximate switch cell	0303-9503400
12	Bearing seat	0303-41101001



2.1 Basic description of the machine and noise standards

2.1.1 Basic description of the machine

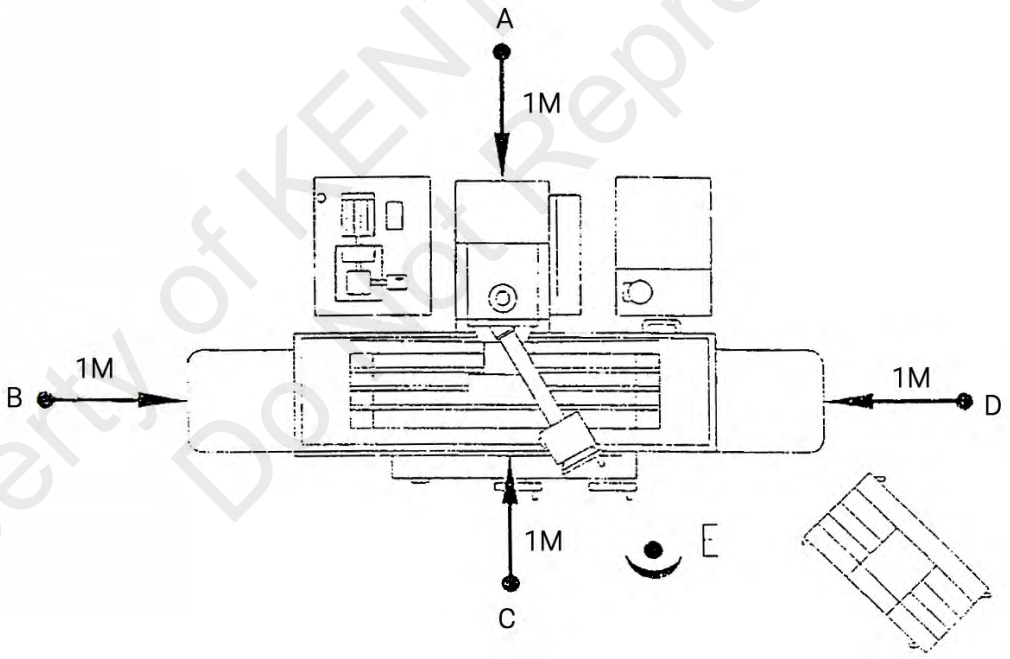
The X axle movement of the machine (from left to right) can be driven hydraulically or manually. (And AHD series the Y-axial (vertical) movement can be driven hydraulically for auto downfeed (only for AHD machine), or be manual feeding, rapid power elevation is driven by motor MS series the Y-axial (vertical) movement auto downfeed can be drive by dervo, motor, rapid power elevation is driven by motor). The front/rear (Z axle), auto-crossfeed can be down by the crossfeed motor.

The following are types of work piece materials which can used on the machine：

Steels (carbon steel, alloy steel), stainless steel, cast iron and non-ferrous metals (like copper, aluminum), porcelain, composites. Also those who operate the machine must be personnel which have undergone training.

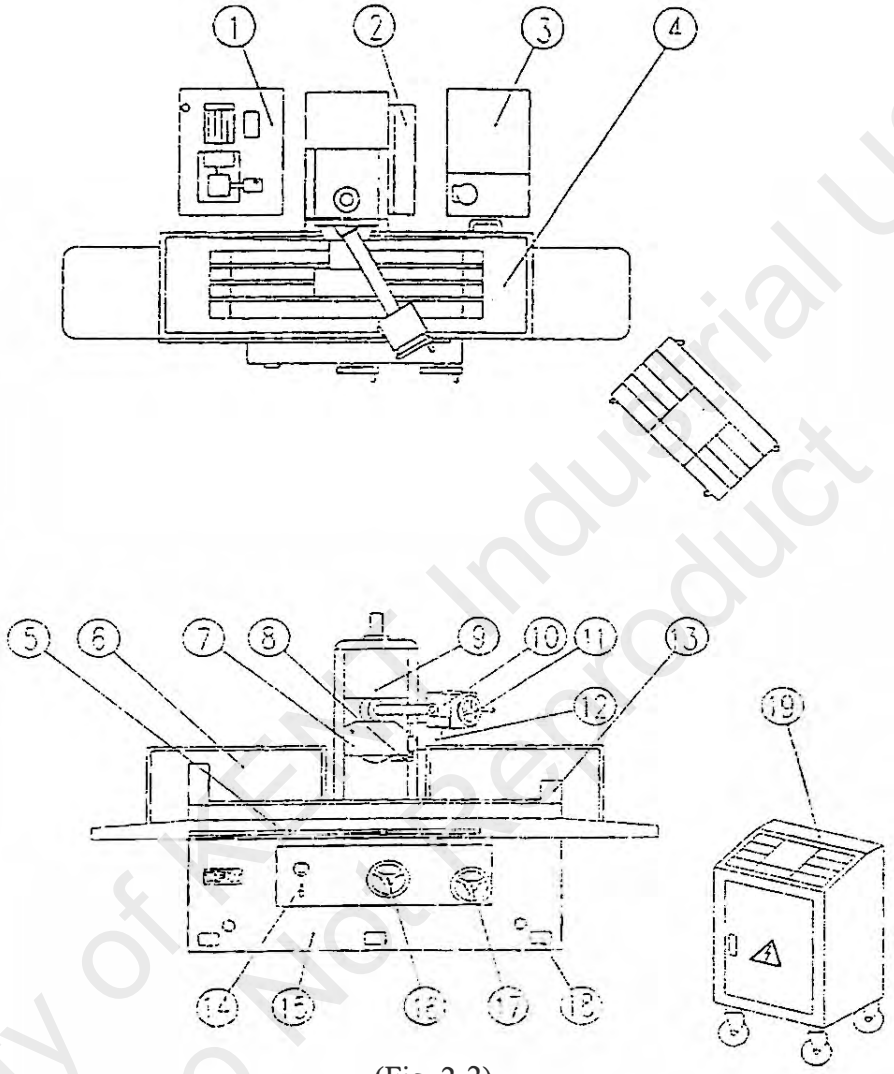
2.1.2 The machine's noise level (the height of test positions is 1.6m from the floor)

The results of noise testing (according to ISO 3744) for the machine is below 71dB.



(Fig. 2-1)

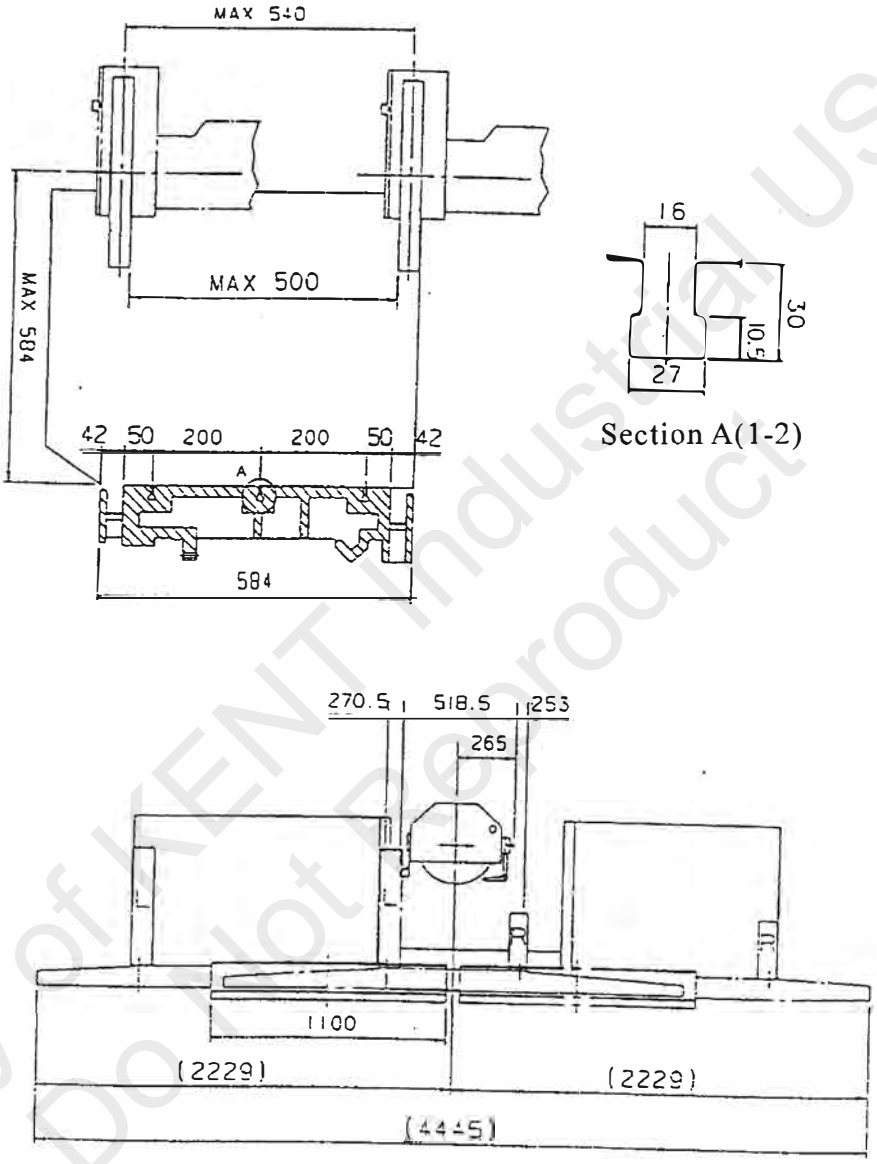
2.2 Exterior and part names



(Fig. 2-2)

No	Name	No	Name	No	Name
1	Hydraulic tank	8	Nozzle	15	Machine base
2	Electric power box	9	Column	16	Hand wheel forward/backward
3	Coolant tank	10	Auto downfeed mechanism	17	Hand wheel left/right
4	Table	11	Vertical handwheel	18	Site for fastening leveling screw
5	Traverse adjust handle	12	Lubricating device	19	Electric control box
6	Large rear splash guard	13	Splash guard		
7	Wheel guard	14	Table speed control lever		

2.3 Work area



(Fig.2-3)

2.3.1 Work range specs

1. Maximum work piece grinding length：1000mm
2. Work piece grinding height: maximum distance from work table to center of wheel spindle-584mm.
3. Maximum work piece grinding width: 500mm
4. Maximum work table load：1000kg (including magnetic chuck)

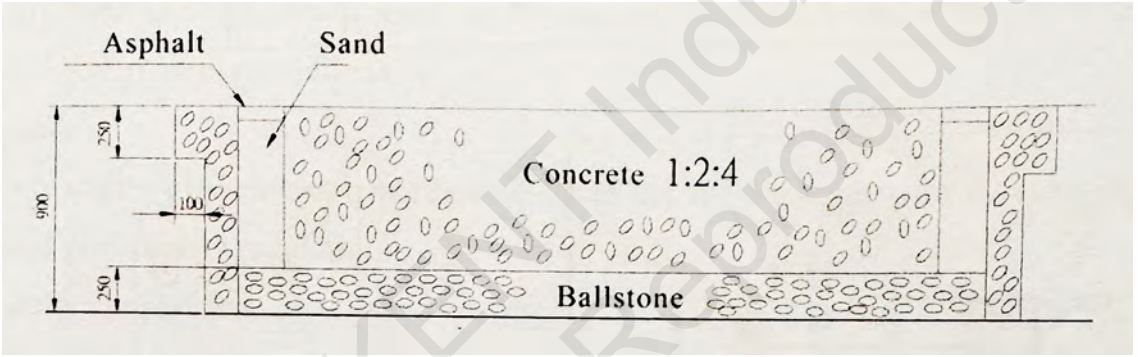
3.1 Site Requirements

3.1.1 Selecting the installation location

3.1.1.1 The site in which the machine is to be installed will deeply influence its function and grinding precision. The grinder may not be placed nearby milling, planning, drilling machine or even punching machines because the vibration produced by these machines will be transferred over to the grinder and cause patterns to form on the grinding surface.

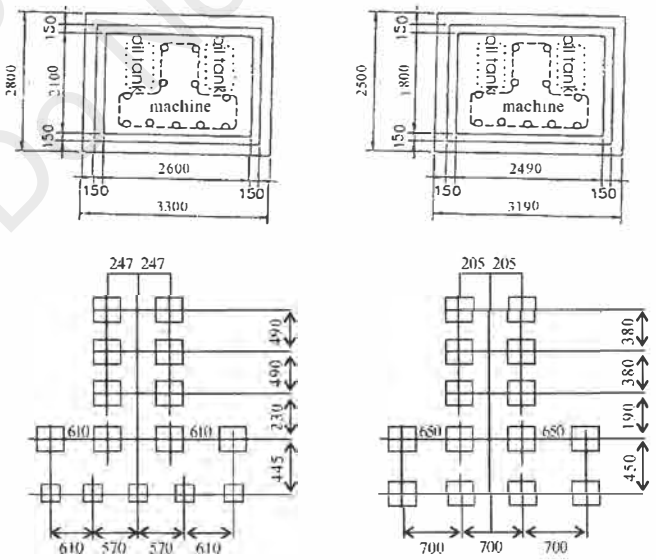
3.1.1.2 The machine must also be protected from sunlight so that the parts of the machine will not be subject to warping from the heat. Additionally, the machine must not be installed in places with magnetic interference or locations with combustible dust, metallic particles or explosive gases.

3.1.1.3 The grinder must not be installed in areas with weak floor surfaces which might cause deformation to occur in the machine. The floor where the machine is installed must have a foundation strength



(Fig 3-1)

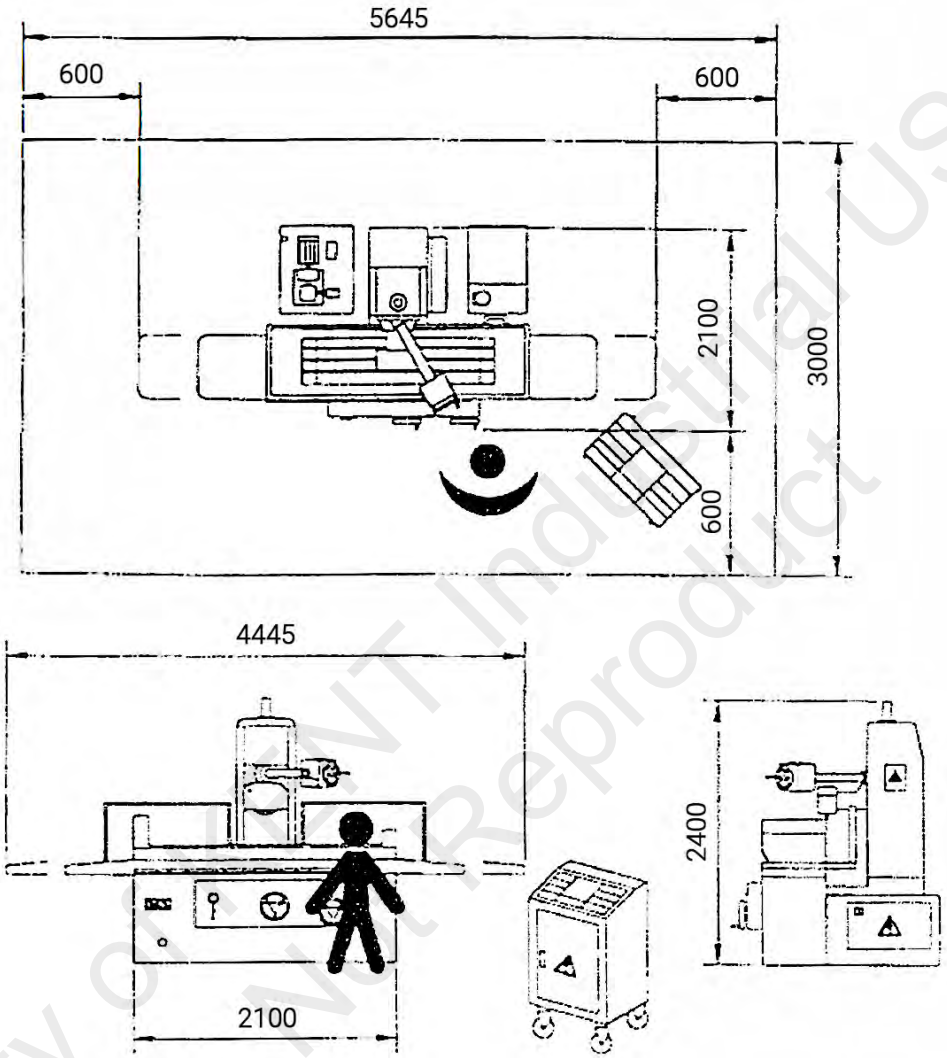
3.1.1.4 Foundation diagrams unit：mm



(other) (general)

(Fig. 3-2)

3.1.2 Space required by the machine



(Fig. 3-3)

3.2 Power requirements

3.2.1 Power specifications

Power used by the machine：8.8 KW

Recommended power cord：6.0mm^2 × 4 (L1,L2,L3,PE)

Power Voltage: AC 415V +/- 10% Power Frequency: 50/60HZ +/- 2%

Power Consumption: 8.8 KW Internal Control Voltage: AV 24V, DC 24

Magnetic Chuck Voltage: Max DC 90V

Insulating Resistance: DC 500V AGDI 1 MΩ to above

(Between power terminals block and earth terminals)

Insulating Impedance: AC1000 V 50/60HZ 1 min above

(Between power terminals block and earth terminals)

Operation Temperature: 5° C ~ 40° C

Relative Humidity: 35 ~ 90% R/H (no dew formation)

Atmospheric Humidity：Must not contain salts, corrosive gases or high levels of dust.

3.3 Requirements for moving equipment

The machine's net weight is 5,000kg and gross weight is 6,000kg. A fork lift or crane can be used to move it.

3.3.1 Forklifts

Only forklifts of six tons or more can be used and the forklift operator must be qualified according to local government regulations.

3.3.2 Cranes

Only cranes of six tons or more can be used and the crane operator must be qualified according to local government regulations.

3.3.2.1 Before unpacking

Steel cable: 19mm × 12000mm -2

3.3.2.2 After unpacking

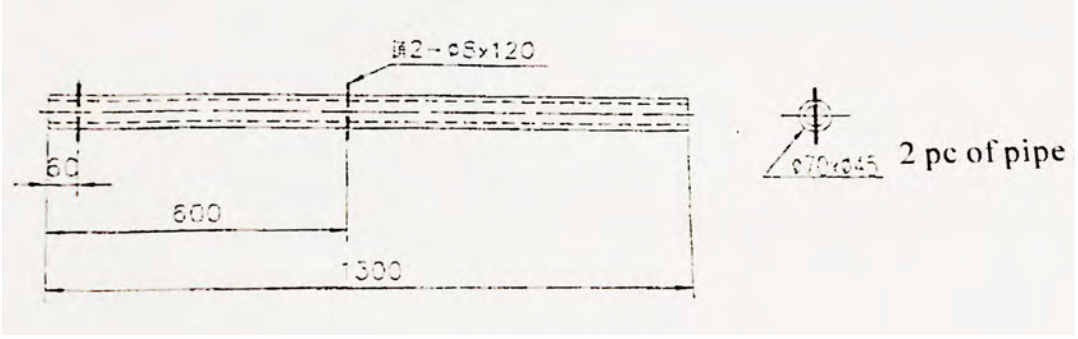
Steel cable:

A – 19mm × 3250mm -2

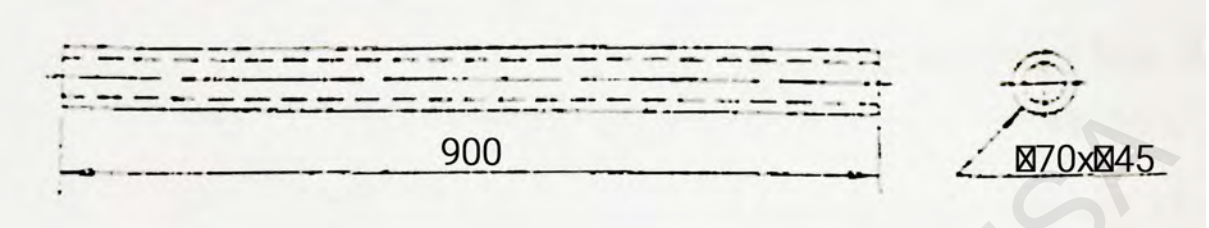
B – 19mm × 3000mm -2

Hoisting and moving tools: Unit: mm

(1)



(2)



(Fig. 3-4)

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

3.3.2.4 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.

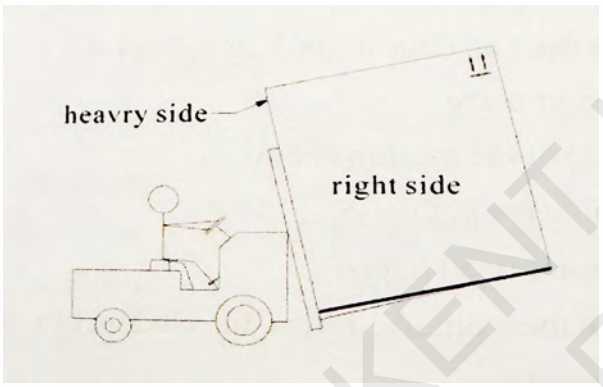
Before delivery, the machine has already been completely tested, adjusted and inspected for accurate calibration and operation. During transport and installation, make sure the machine does not become damaged by impact during movement or lowering.

4.1 Transport before unpacking

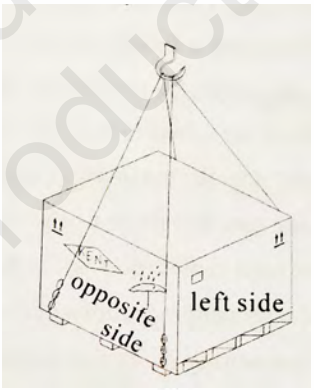
Weight / Machine	Net weight	Gross weight
KGS-510	5,000kg	6,000kg

1. When using a forklift
   Use at least a 6 ton forklift

2. When using a crane
   (a) Use at least a 6 ton crane
   (b) 12 m cables



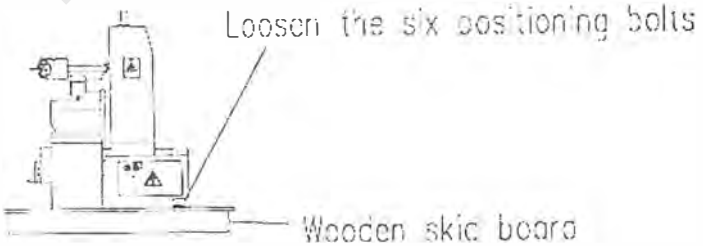
(Fig 4-1)



(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 diagram4-3.



(Fig 4-3)

4.2.5 When the machine is loaded in the crate for delivery, the company mounts the positioning blocks according to Chapter4.5. If the machine needs to be moved, remount the positioning blocks as shown in 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 laws.

4.3.1 When using a forklift to transport the machine.

4.3.1.1 When using a forklift, transporting the machine must be done according to Fig4-4.

4.3.1.2 Make certain the positioning blocks are mounted in place.

4.3.1.3 Attach the cables to the crane bolt of the two side of the machine body.

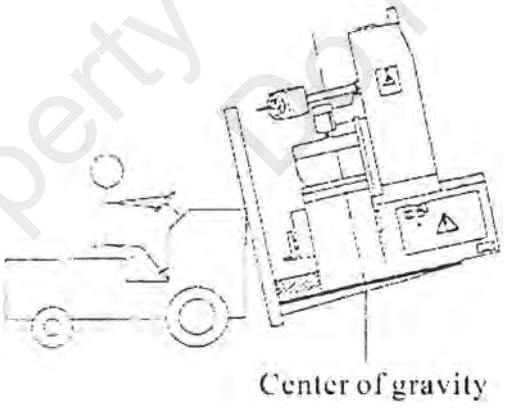
4.3.1.4 Make sure the machine's center of gravity is stable (as in Fig4-5)

4.3.1.5 Make sure that the machine's positioning blocks are fixed in place.

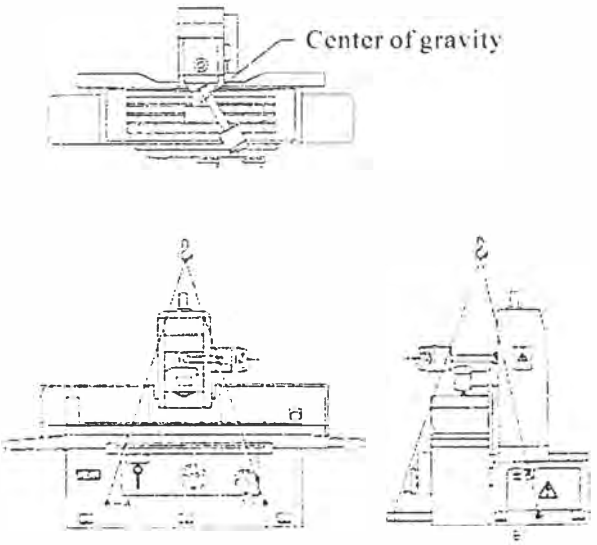
4.3.1.6 The steel cables must not come into contact with the hydraulic hoses, the electric box, sheet metal. Take proper precautions during hoisting and movement.

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

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



(Fig. 4-4)

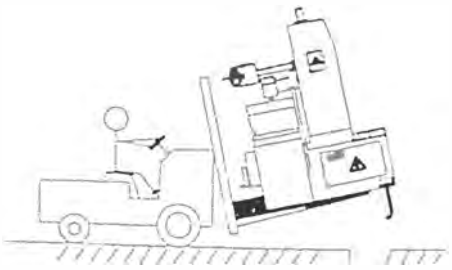


(Fig. 4-5)

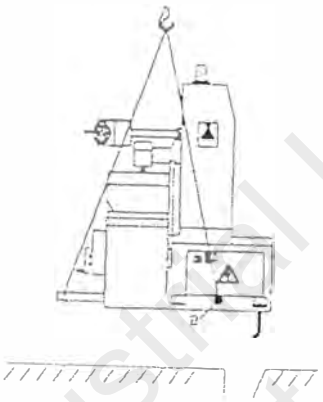
4.4 Machine installation

4.4.1 Use anchor bolts

Machine weight：5,000 kgs



(Fig. 4-6)



(Fig.4-7)

4.4.1.1 Use the nuts to mount the anchor bolt to the machine, leaving at least 35mm of thread for adjustment.

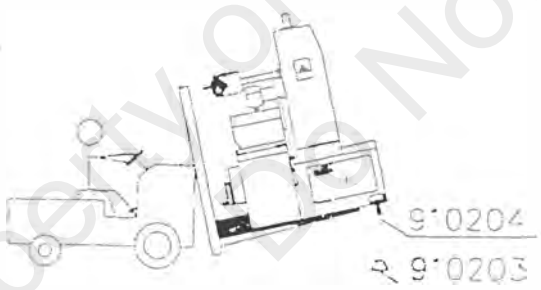
4.4.1.2 Slowly lower the machine so that the bolts are positioned opposite the anchor holes.

4.4.1.3 Use blocks to adjust the level.

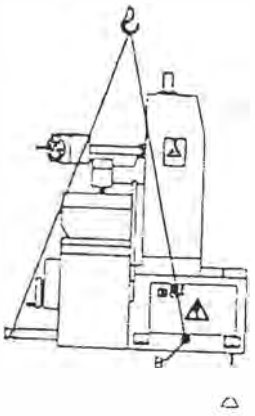
4.4.1.4 Fill the anchor holes with concrete.

4.4.2 Use the leveling pads and leveling screws

Machine weight：5,000 kgs



(Fig. 4-8)

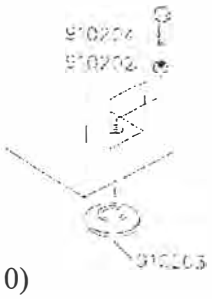


(Fig. 4-9)

4.4.2.1 Use a nut to screw the leveling screw into the machine base hole.

4.4.2.2 Slowly lower the machine, let the leveling screws enter the holes in the base pads.

4.4.2.3 Adjust the level of the machine.



(Fig. 4-10)

4.5 Remove the positioning plates:

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

4.5.1 Removing the moisture proof covering: (see Fig.4-11)

h. Electric power box i. electric control box

a. on the work table

4.5.2 To prevent movement or impact of the work table and saddle seat influencing the machine's precision during transport and moving, positioning devices have been screwed into the machine. Before conducting test runs of the machine, these positioning blocks must be removed. Positioning blocks j.k.l.m. must be removed.

4.5.3 When moving the machine again, reaffix the positioning blocks.

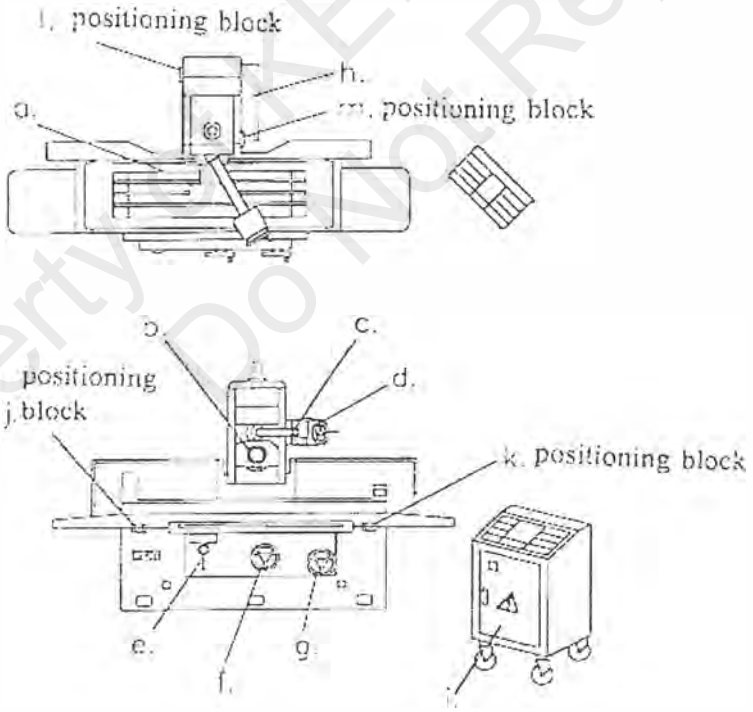
Positioning block numbers：411045 × 4

4.5.4 Before operation, clean the following area: (See Fig. 4-11)

a. work table surface b. wheel spindle c. auto downfeed graduation dial

d. vertical graduation dial e. work table speed lever f. cross graduation dial

g. longitudinal graduation dial



(Fig. 4-11)

4.6 Level adjustment of work table: for 515/615 level gauge specification 0.02mm/M

4.6.1 Turn the right and left handwheels, moving the work table to the central position and right and left positions. Turn the front to and rear handwheesls to an upright position, moving a central position and right and left position. By following this procedure, the level accuracy can be adjusted to within 0.02mm.

4.6.2 Adjusting the work table level

Other

(1) Place the level gauge at the center of the work table (as shown in Fig.B). Move the work table to its center position.

(2) Loosen level adjustment screws #1,3,4,5,6,9,10,11,12,14,15 then adjust screws #2,7,8,13 to adjust the level.

(3) After adjusting the level as above, move the work table to the left and right and adjust screws #11,12,13,14,15 (as shown in Fig.C).

(4) Move the work table to its right edge, adjust, screw #1,2,3,4,15 to adjust the level (as shown in Fig. D).

(5) Move the work table back to its center position and check whether it is level or not.

General

(1) Place the level gauge at the center of the work table (as shown in Fig. B). Move the work table to its center position.

(2) Loosen level adjustment screws #1,2,4,5,6,9,10,11,12,14 then adjust screws #2,7,8,13 to adjust the level.

(3) After adjusting the level as above, move the work table to the left and right and adjust screws #11,12,13,14 (as shown in Fig. C).

(4) Move the work table to its right edge, adjust screws #1,2,3,4 to adjust the level. (As shown in Fig D).

(5) Move the work table back to its center position and check whether it is level or not.

4.6.3 Adjustment of the saddle

(1) Set the level gauge flat at the fixed position on the wheel head (as shown in Fig.E). Move the saddle to its center positon.

(2) Move the saddle back and adjust screws 5,6, to adjust the level (as shown in Fig. A,E).

(3) Move the saddle forward and adjust screws 4,7 to adjust the level (as shown in Fig.A.E)

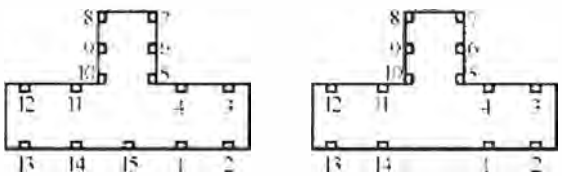
(4) Place the level gauge in another direction (as shown in Fig.F), then move the saddle to its center

position.

(5) Move the saddle back and adjust screws 5,6 to adjust the level (as shown in Fig. A,F)

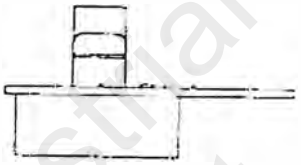
(6) Move the saddle forward and adjust screws 4,7 to adjust the level (as shown in Fig.A.F)

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) and adjust in order as in procedures 4.6.2 and 4.6.3. After finishing, tighten the leveling screw nuts.

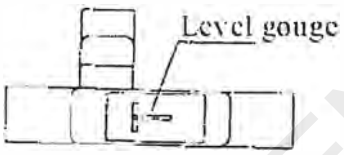


(other) (general)

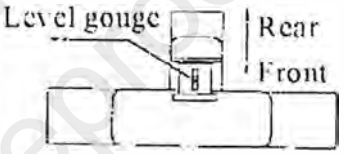
(Fig. A)



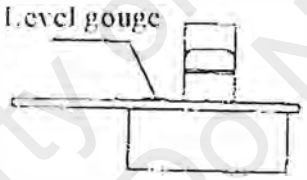
(Fig. D)



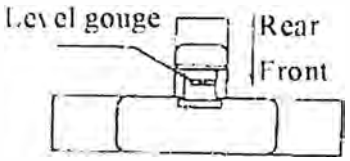
(Fig. B)



(Fig. E)



(Fig. C)



(Fig. F)

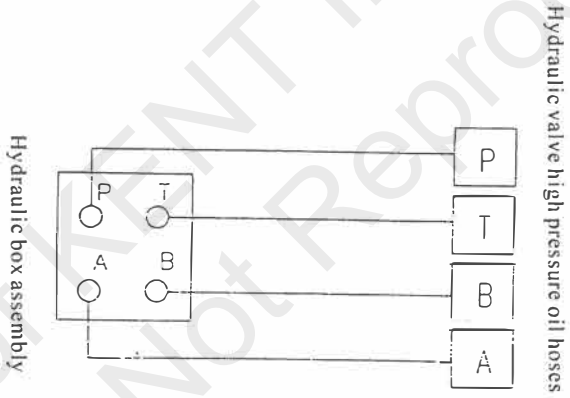
4.7 Hydraulic line layout

4.7.1 The machine has been completely tested before leaving the plant. With regard to the hydraulic line layout, each hose is affixed with red tags with white lettering as shown in Fig4-12 to prevent misconnection of these hoses. Do not remove these tags from the hoses so that they can be referred to again when moving machine.

Tags

(Fig. 4-12)

4.7.2 Hydraulic layout diagram

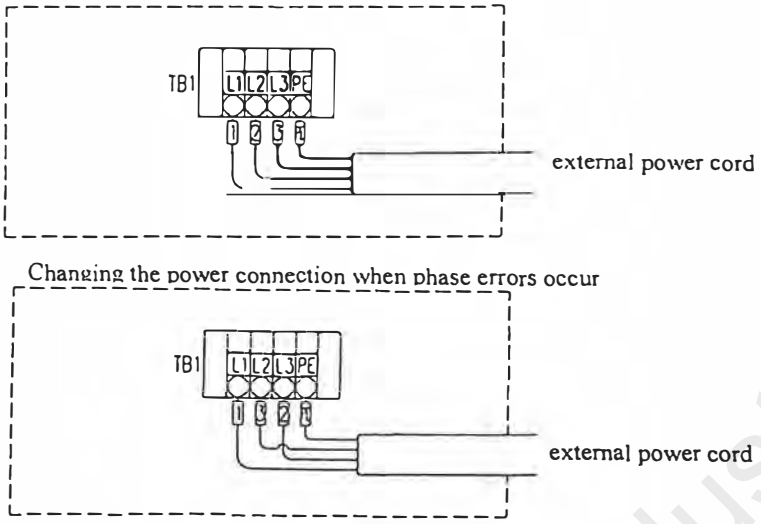


(Fig. 4-13)

4.8 Electrical connections and grounding

4.8.1 When installing the machine, besides connecting the power cord as in section 3.2, the hydraulic tank, rinsing mechanism, magnetic plate, electric control box, coils, connectors and their cables all have numbers to assist in their connection to the electric box.

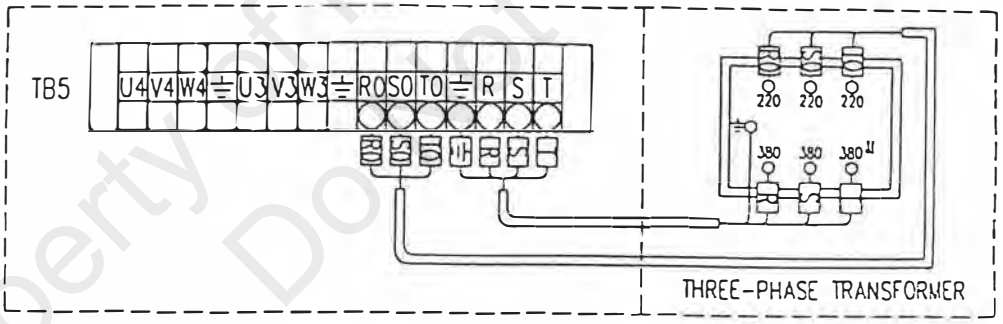
4.8.2 Wiring diagram



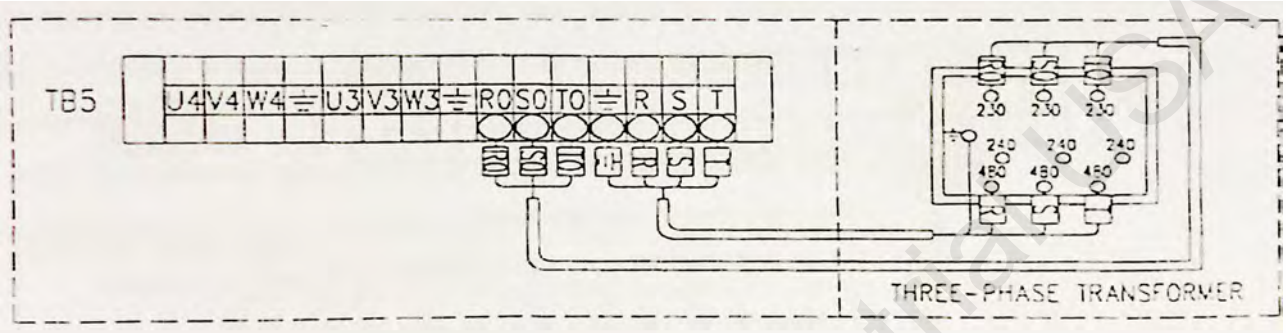
(Fig. 4-14)

4.8.3 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 connections continue to be the output voltage 220V.

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



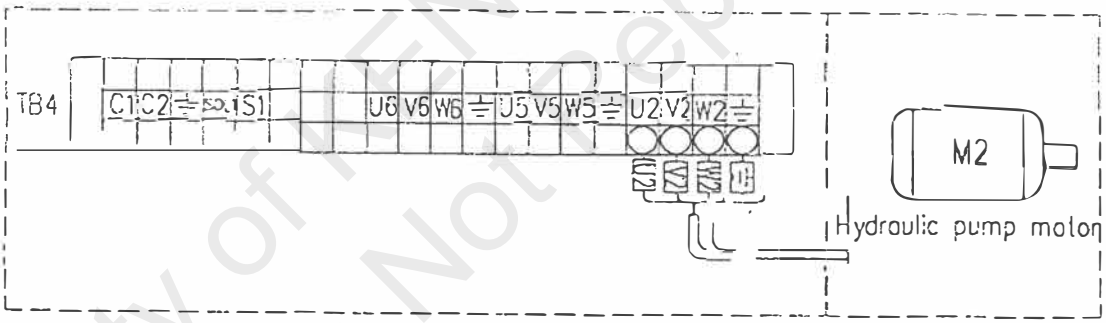
For example：If the local power voltage is 440V, the primary side connections will be wired to the 440V section.



(Fig. 4-15)

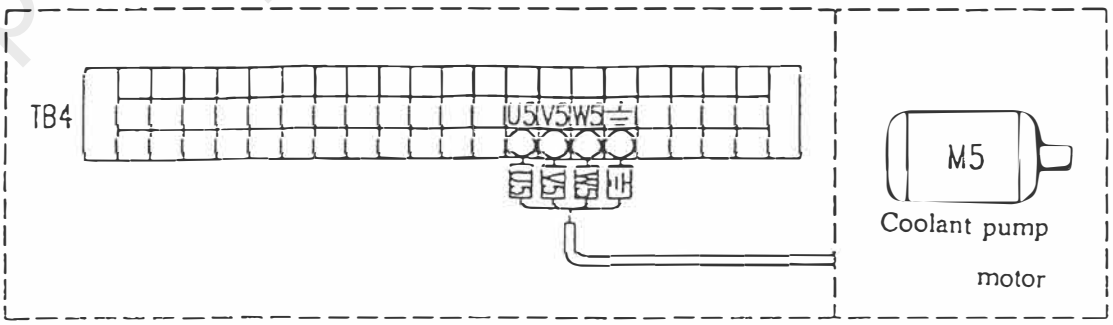
The connections are already completed before delivery of the machine, unless the connection have to be redone because of maintenance to the transformer. Follow the above diagram when doing the connections. Please notify the company if there are modifications in the input voltage.

4.8.4 Connecting the hydraulic pump motor



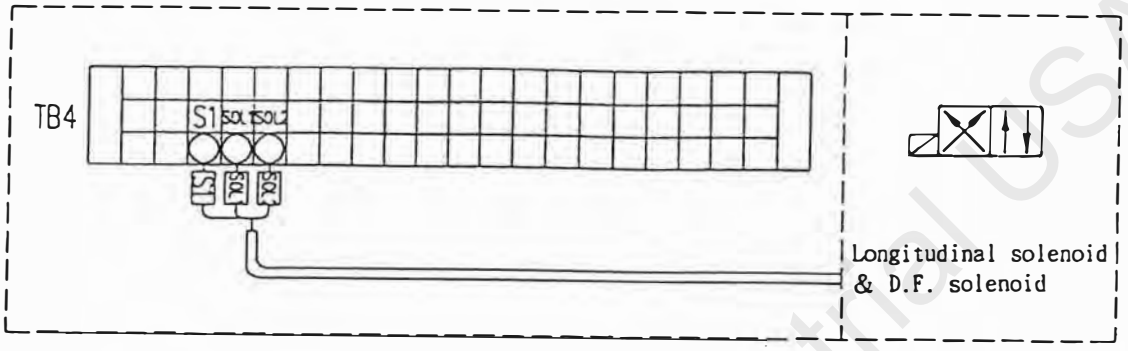
(Fig. 4-16)

4.8.5 Coolant pump motor connection



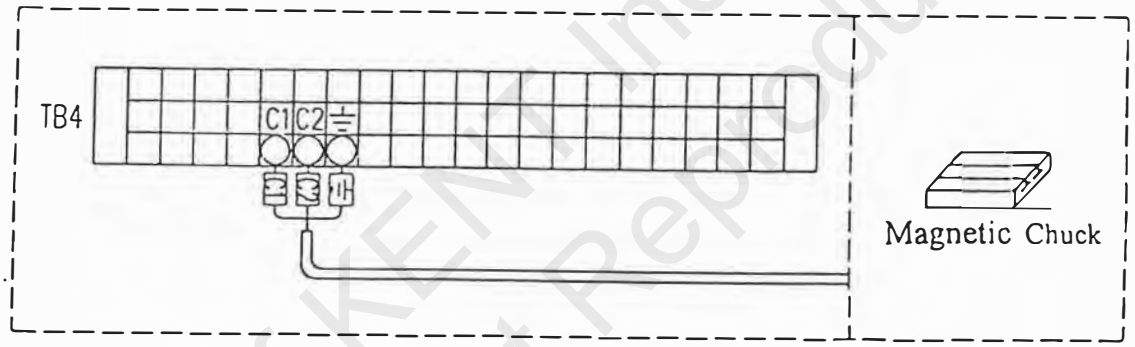
(Fig. 4-17)

4.8.6 Hydraulic solenoid valve connection



(Fig. 4-18)

4.8.7 Work table magnetic chuck connection



(Fig. 4-19)

5.1 Preparations before test operation

5.1.1 Lubrication device

To extend the lifetime of the machine and protect the machine's functions. It is necessary to select the proper lubrication oil for use in the lubrication system.

5.1.2 Features

After the hydraulic pump motor is started on the automatic lubrication pump.

5.1.3 Lubrication oil (below is a table of recommended lubrication oils)

Brand	Mobil	ESSO	Shell	CPC
Type	Vactra Oil No.2	Febis K68	Tonna S2M 68	Slideway #68

5.1.4 Lubrication system

The machine's lubrication system functions on two parts of the machine.

5.1.4.1 Using lubrication oil:

(1) Longitudinal slideway (between the work table and machine base).

(2) Cross slideway (between the column and the machine base).

5.1.4.2 Using grease：(Below is a table of recommended greases)

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

(1) Cross leadscrew and nuts

(2) Vertical leadscrew and nuts

5.1.5 Use instructions

During use, check if the motor is running and also check the lubrication oil level.

5.1.5.1 How to change the lubrication oil

(1) Open the oil tank cap.

(2) Fill clean oil through the filter.

(3) Fill the oil tank to the red full mark (high).

5.1.5.2 The lubrication oil in the tank must be clean. (After use a new machine for one month, must be change the lubrication oil then change the lubrication oil every three month).

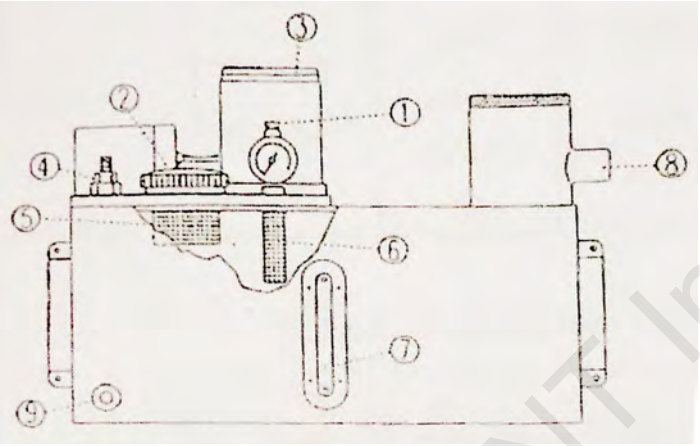
5.1.5.3 If debris in the lubrication oil tank blocks the oil from being sent out, the oil absorption screen should be cleaned immediately

5.1.5.4 When opening the oil feed switch, do not apply too much pressure.

5.1.5.5 Adjustment of the discharged amount (as shown in Fig.5-1). Loosen the locking bolt, set to the desired number graduation (about setting at 4~5 kg/cm^2)

5.1.5.6 When the oil level falls below the lowest red line, it is time to fill the tank with oil.

Lubrication device



(1) Oil supply switch
(2) Oil tank lid
(3) Oil filter
(4) Motor
(5) High fill mark
(6) Low fill mark
(7) Oil absorption screen

(Fig.5-1)

5.1.5.8 Before running the machine, first start the hydraulic pump motor. Run for 20 minutes allowing the lubrication oil from the oil pump to distribute on each if the rails.

5.1.5.9 Before operating the machine. Run through the inspection items.

5.2 Hydraulic system

5.2.1 The hydraulic tank dimensions are 740 × 500 × 560 mm with a capacity of 140 L and a weight of 180kg.

5.2.2 Our company uses R-68 hydraulic oil. The tank must be cleaned and oil be changed after one month of initial use. Afterwards, the oil should be changed every six months.

5.2.2.1 Recommended hydraulic oil table:

Brand	Mobil	Esso	Shell	CPC
Type	DTE 26	Nuto H68	Tellus S2 VX 68	R68

5.2.2.2 Fill the tank to capacity before use (fill no higher than the mark on the fluid level indicator).

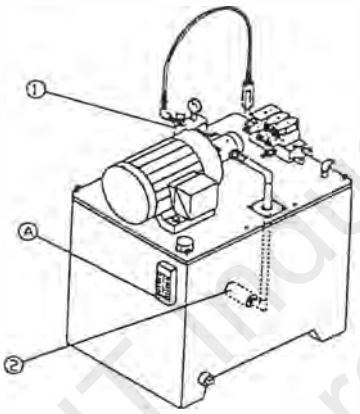
5.2.2.3 The work table is driven hydraulically, before starting, make sure that there are no people or objects to the right or left travel directions.

5.2.2.4 The highest pressure of the oil is 28kg/cm^3. Position (1) in the diagram is dial which adjusts the pressure (this is adjusted already before leaving the plant, so there is no reason for the operator to adjust it).

5.2.2.5 When changing hydraulic oil, clean the oil filter first. If damaged, replace the oil filter.

5.2.2.6 When oil level drops below the lowest level of the fluid indicator, add oil.

5.2.2.7 Refer to chapter three of the maintenance manual for a list of parts.



(Fig. 5-2)

5.3 Safety inspection before operation

Please closely adhere to the following instructions. Once these preparations are complete, the machine can be started.

5.3.1 The machine must installed in an area where it is free from outside vibrations.

5.3.2 Clean the corrosion resistant oil and grease off the machine.

5.3.3 Install and calibrate the machine level.

5.3.4 Add lubrication oil according to outlined procedures.

5.3.5 Check the rotation direction of the wheel spindle (grinding wheel) to make sure it is rotating in a clockwise direction. Before starting up the wheel spindle, first remove the grinding wheel. This is because damage may occur if the wheel spindle is spinning in counterclockwise direction.

5.3.6 Fill oil tank full with hydraulic oil.

5.3.7 The speed lever which controls the work table movement must be in the “OFF” position (vertical position).

5.3.8 Adjust the work travel to a suitable position. The lift /right travel of the work table is adjusted by means of the stroke adjusting handle. The way to adjust this is to pull the handle to appropriate

position and then letting go of the handle.

5.3.9 Check again whether the power cord is correctly connected to the non-fuse breaker.

5.3.10 Make sure that all the positioning blocks are removed and.

5.3.11 The wheel guard can not be opened while in use to prevent damage to the grinding wheel.

5.3.12 Check that each high pressure pipe joints of the oil tank is securely fastened and connected according to numbers shown in the figure.

5.3.13 The machine can be started after each safety item has been checked. First check if there are other personnel in the danger areas of the machine. If so, ask them to leave so that the machine can be operated.

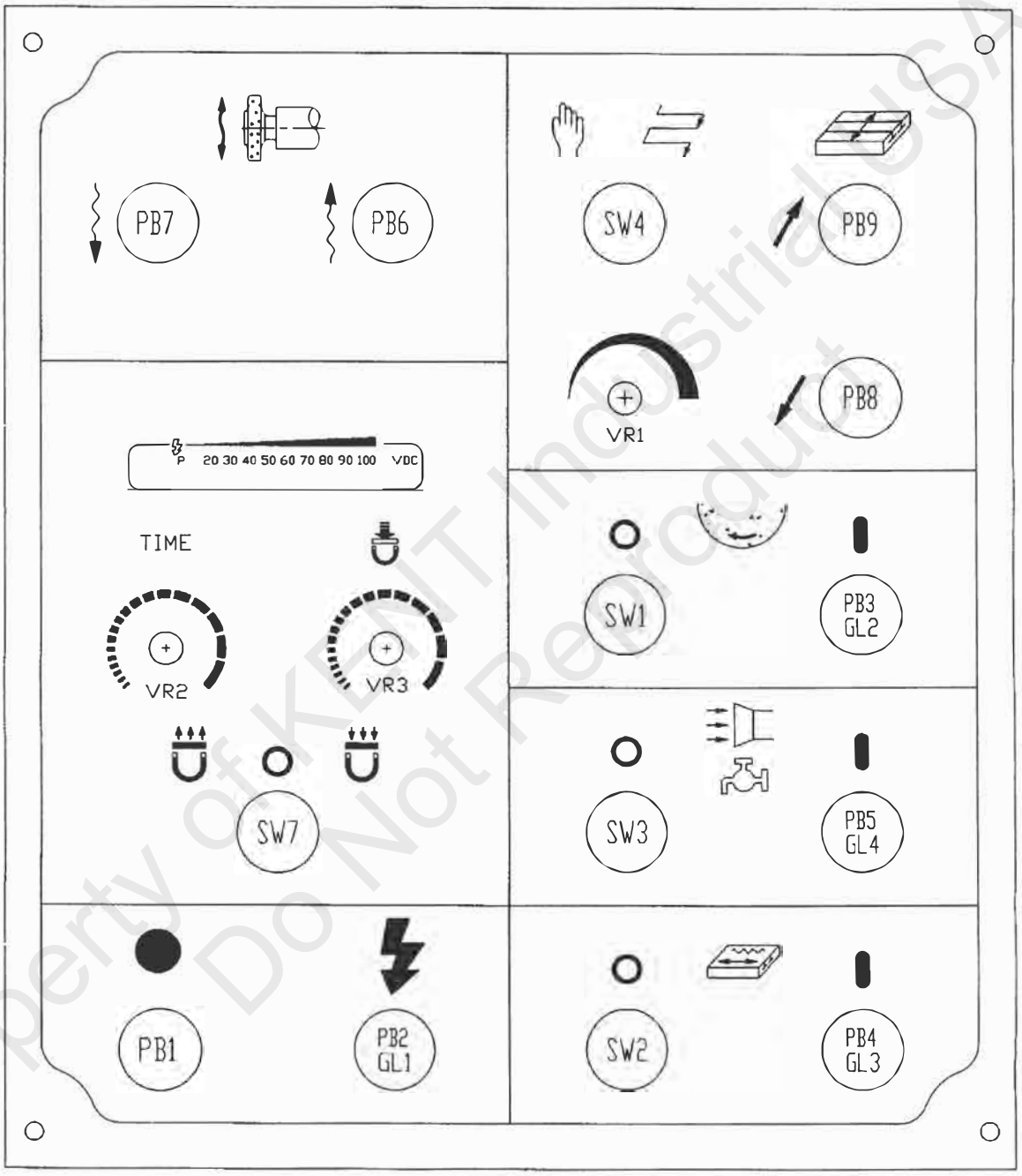
5.3.14 For details concerning machine operation, refer to Chapter Six.

5.3.15 Check for the position of the emergency stop switches.

5.3.16 Make sure that the work table speed lever is in the "STOP" position.

6.1 Operation panel instructions

6.1.1 Operation panel (KGS-2040 AH)



6.1.2 Operation panel layout (KGS-2040AH)

PB1：Emergency stop push-button

PB2 & PB 1：Power start push-button and power indicator light

PB3 & PB 2：Grinding wheel spindle motor start push-button and indicator light

PB4&PB3：Hydraulic pump motor push-button and indicator light.

PB5&PB4：Coolant pump push-button and indicator.

PB06：Grinding wheel up push-button.

PB07：Grinding wheel down push-button.

PB08：Column backward movement push-button.

PB09：Column forward movement push-button.

SW1：Grinding wheel spindle motor stop push-button.

SW2：Hydraulic pump motor stop push-button.

SW3：Coolant pump stop push-button.

SW4：Column forward/backward movement automatic/manual mode selector.

SW7：Magnetic chuck magnetization /demagnetization mode selector.

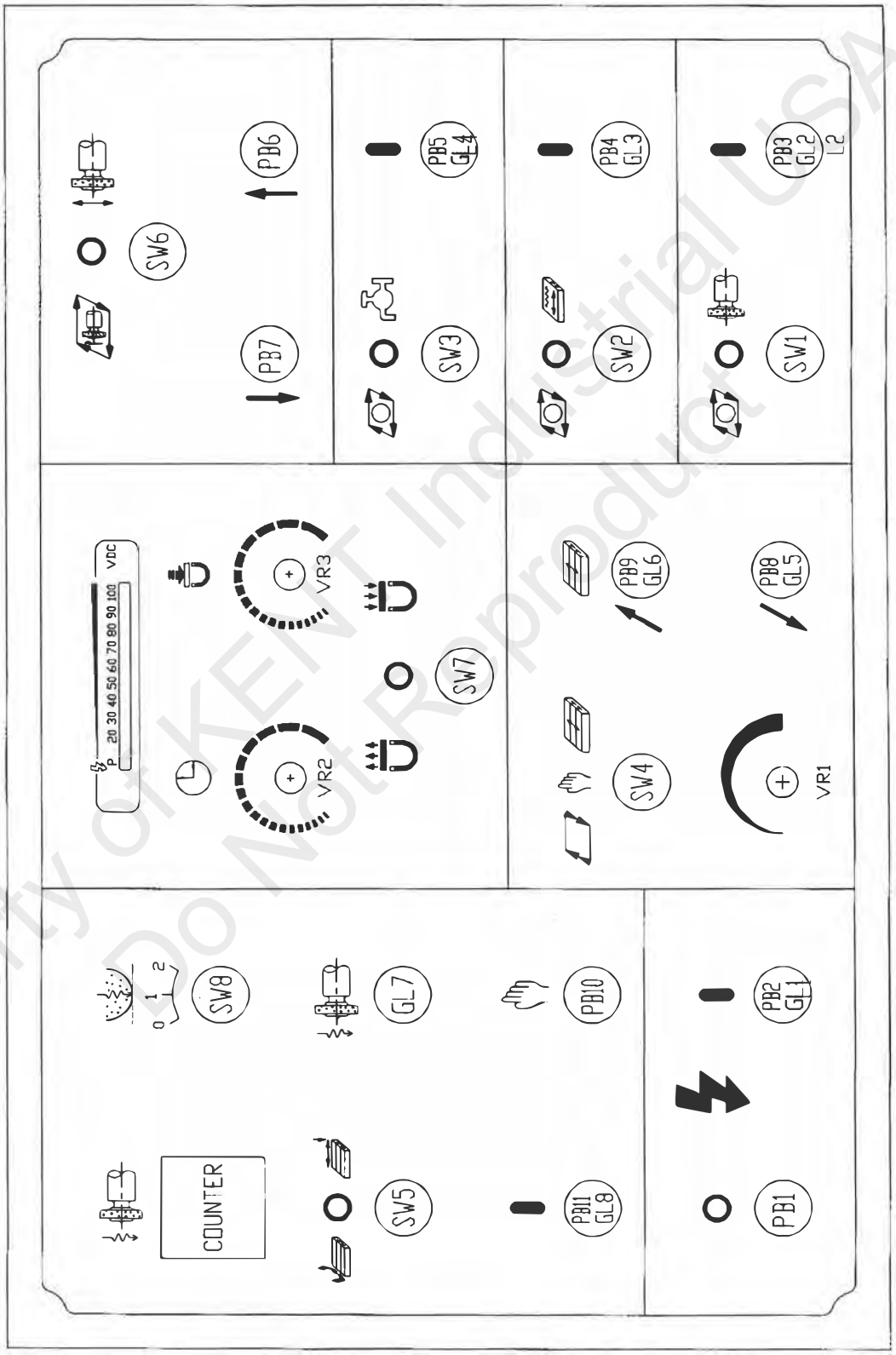
RL：Magnetic chuck magnetization/ demagnetization indictor.

VR1：Variable resistor (controls the magnetic strength cross feed amount).

VR2：Variable resistor (controls the magnetic strength of the magnetic chuck).

VR3：Variable resistor (controls the demagnetization time of the magnetic chuck).

6.1.3 Operation panel (KGS-2040 AHD)



6.1.4 Operation panel layout (KGS-2040 AHD)

PB1：Emergency stop push-button

PB2& GL1：Power start push-button and power indicator light

PB3& GL2：Grinding wheel spindle motor button and indicator light

PB4&GL3：Hydraulic pump motor switch and indicator light

PB5&GL4：Coolant pump push-button and indicator

PB6：Grinding wheel up push-button and indicator (upward direction)

PB7：Grinding wheel down push-button (downward direction)

PB8& GL5：Column forward movement push-button, stroke front reversing point redirection setting push-button and indicator

PB9&GL6：Column backward movement push-button, stroke rear reversing point setting push-button and indicator

PB10：Grinding wheel single downfeed button

PB11&GL8：Grinding wheel automatic downfeed start button

SW1：Grinding mode selector

SW2：Work table hydraulic mode selector

SW3：Coolant mode selector

SW4：Column forward/backward movement automatic/manual mode selector

SW5：Surface grinding/plunge grinding mode selector

SW6：Grinding wheel up/down mode selector

SW7：Magnetic chuck magnetization/demagnetization mode selector

SW8：Spark-out grinding frequency selector (0-5 times)

VR：Variable resistor (controls the cross feed amount)

VR2：Variable resistor (controls demagnetization time of the magnetic chuck)

VR3：Variable resistor (controls the magnetic strength of the magnetic chuck)

Counter：Downfeed counter and setting

RL：Magnetic chuck magnetization/demagnetization indictor

6.1.5 Machine operation：

6.1.5.1 Before operation

Closely adhere to the following instructions. Once these preparations are complete, the machine can be started.

(1) Install and calibrate machine level.

(2) Lubricate the machine according to the lubrication procedures.

(3) Check the rotation direction of the wheel spindle (grinding wheel). It should be rotating in a clockwise direction. Before starting the wheel spindle, remove the grinding wheel. This is because it is dangerous for the grinding wheel to rotate in a counterclockwise direction.

(4) Check if there is sufficient oil in hydraulic tank.

(5) The speed lever which controls the work table movement must be in the "OFF" position (vertical position). Adjust to the appropriate travel distance. The right/left stroke is adjusted by means of the two stroke adjustment blocks.

(6) Check again to see whether the power cable is properly connected.

6.1.5.2 Operation

(1) Power switch "ON"~"OFF"

(a) Press down on the flat push-button PB2 power switch, the GL1 indicator will light indicating that the electrical control box is ready.

(b) Pressing PB1 will turn off the power. To turn on power, turn PB1 switch clockwise, pull switch clockwise, pull it up and then press PB2.

(2) Work table longitudinal movement operation

(a) After switching SW2 to the left or right, push the PB4. This will start the hydraulic pump motor and light the GL3 indicator. If SW2 is at its central position, the hydraulic pump motor will stop and the GL3 light will turn off.

(b) "  " indicates the 'automatic stop' function. When we set the SW2 switch to the "  " position, the hydraulic motor will automatically stop and the work table will stop when the downfeed is complete.

(c) Turning clockwise the work table speed lever causes the work table to move faster turning it 90 degrees, the work table will move with move with maximum speed.

(d) If the work table moves unsteadily when it start up, this probably due to air left in the hydraulic pumps. This air is easily drawn off. When the work table begins to move faster or in longer travel distance, the air will automatically be drawn off.

(e) Be turning the SW2 to the central position, the hydraulic pump motor will stop and the GL3 light will turn off. At this time, you can use the left/right handwheel on the work table (or directly turn the work table speed lever to zero flow position).

(3) Front/rear reversing point set procedure：

(a) KGS-510 crossfeed is achieved by column moving forwards and backwards.

(b) By turning the SW4 to the "☜" position the PB8, column will move in a forward direction and the GL5 will light. By pressing the PB9, column will move backwards and the GL6 will light. The above function requires that the SW5 be turned to the "⇉" or "○" position, before movement begins. This is the crossfeed safety device. When the SW5 is turned to the "⇉" position, only plunge grinding can be done and the crossfeed function does not take effect.

(c) For the KGS-510 AHD model, the crossfeed automatic reversing positions is directly operated on the control panel. The setting procedure is as follows.

(i) When the SW4 is positioned at "☜" press the PB8 (or PB9). This will move the column to the first direction change point. Then, by turning the SW4 to the "⇉" position, the GL5 and GL6 indicators will flash intermittently. This indicates it is in the ready to set mode. Then press the PB8 (or PB9) once. At this time, the reversing point is set (PB8/PB9 for front /rear reversing point, either the GL5 or GL6 will light indicating that the reversing point has already been set, while the other will continually flash).

(ii) Then when the SW4 is positioned at "☜" press the PB8 (or PB9). This will move the column in a reverse direction to the second point of the direction change. Then, by turning the SW4 to the "⇉" position, the GL5 (or GL6) indicator which has not yet been set will flash. Press the button which is flashing. This will set the other reversing point.

(iii) If SW4 selection switch is turned to "⇄" for operation when only one reversing point is set, the GL5 and GL6 will flash fast, intermittently indicating ERROR. At this time, you must reset the reversing change.

(iv) If the rear reversing point (set by PB9) is in front of the front reversing point (set by PB8), the GL5 and GL6 indicator lights will flash fast, intermittently indicating an ERROR (indicating the set position and actual position do not correspond). At this time. You will need to reset these positions.

(v) If the PB1 is turned off, do not attempt to turn the cross feed handwheel. This is to prevent the change of direction position from being moved and a malfunction from occurring (this is because when the PB1 is off, the P.L.C is unable to calculate the movement amounts). If operating the front/rear machine handwheels, you must after turning on the PB2 again recheck the front and rear reversing points.

(d) After the front and rear reversing points are set, turn the SW4 to the "  " position and press the PB8 (or PB9) and then release. You can then adjust the VR1 for the crossfeed increment when the table moves to left/right reversing points, it crossfeeds automatically with increment set by VR1. When the SW4 is turned to the "  " above operation will be interrupted.

(e) The left side of the machine bade has two limit switches for the maximum limit of movement of the column. This is a safety mechanism which prevents the forward/backward movements from exceeding the range of safety.

(4) Grinding wheel upward/downward power operation：

(a) After turning the SW6 to the right and left sides, push the PB6 button. This will move the grinding wheel upwards. When the button is released, the movement will stop. By pushing the PB7 button, the grinding wheel downwards and will stop when released.

(b) "  " indicates the automatic stop function. When set to the "  " position, the downward automatic feed mechanism will raise the grinding wheel automatically 5mm (0.2") after finish the downfeed times and spark out grinding.

(c) When the grinding wheel moves downward and comes into contact with the work piece, switch to handwheel downward control of the grinding wheel for safety reasons.

(d) In view of safety consideration, when pressing the grinding wheel fast downward mode, it is advisable to first stop the rotation of the spindle motor.

(5) Coolant system operation

(a) After turning the SW3 to the right and left sides, press the PB5 coolant motor start button.

(b) Adjust the control valves to attain the desired flow amount.

(c) "  " indicates the automatic stop control device. When set in this position, the coolant pump will automatically stop after the automatic dowfeed is complete.

(6) Grinding wheel spindle operation：

(a) Turn the SW1 to the right or left side and the SW7 to the right side. This will light the P01 indicator. By pressing the PB3, the wheel spindle motor will start. If the SW7 is turned to its center positon, the grinding wheel motor will stop.

(b) "  " indicates the automatic stop control device. When set in this position, the grinding wheel wheel spindle will automatically stop after the grinding wheel automatic downfeed is complete.

(7) Magnetic chuck operation：

(a) Magnetization

Turn the SW7 to the right. This will magnetize the magnetic chuck. By using the VR3 to adjust the magnetization.

(b) Demagnetization

Turning the SW7 to the left will demagnetize the magnetic plate. During demagnetization, the RL indicator needle will shake back and forth. This will gradually decrease until the indicator needle stops moving entirely which indicates the diamagnetism process is complete.

(8) Automatic downfeed operation (AHD series)

(a) Turn the auto downfeed graduation dial to set the increment for each automatic feed. Altogether, there are six settings to select from 0.005, 0.001, 0.015,0.02,0.03,0.04 (metric).

(b) The automatic downfeed times can be set on the counter (1-9999 times). The fine grinding times can also be set on the counter (1-9999 times).

(c) By pressing the PB10 once, the GL7 will light for a period of one cycle. At this time, the up/down automatic feed will automatically downfeed one time. This is called manual jogging operation.

(9) Example：Automatic grinding

(a) Automatic surface grinding

(i) Determine the total grinding amount (i.e 0.6mm or 0.0.24")

(ii) Set the automatic downfeed increment per time (i.e 0.02mm or 0.008")

(iii) Use the counter to set the number of automatic downfeed times.

0.6/0.02 = 30 times (0.024/0.008 = 30 times)

(iv) Set the spark-out times (0-2 times)

(v) When doing surface grinding：

Turn the SW5 to the left, when the work table moves to the left reversing point, the wheelhead will automatically downfeed one time that means the automatic downfeed occurs at the right side of the workpiece. By pressing the PB11 button, the GL8 will light. At this time, automating feeding will start. The counter will then show the downfeed times. When the total number of downfeed times (i.e 30 times) is complete,

the limit switch will stop the automatic cutting and begin spark out grinding (i.e 2 times).

(b) Automating plunge grinding

(i) Determine the total grinding amount (i.e. 1.2mm or 0.048")

(ii) Set the automatic downfeed amount per time (i.e 0.02mm or 0.008")

(iii) Use the counter to set the number of automatic downfeed times.

1.2/0.02 = 60 times (0.048/0.008 = 60 times)

(iv) Set the spark out times 0-2 times

(v) When doing plunge grinding：

Turn the SW5 to the right, when the work table has moved to the left edge, automatic downfeed will be down one time (at the right edge of the work material). The crossfeed function is not possible for plunge grinding due to the interlock of the control circuit.

(c) If you set the selector switches SW1, SW2, SW3 and SW6 to their left position, after the number of automatic downfeed and spark-out grinding times are set, the grinding wheel spindle, hydraulic pump motor and coolant pump will automatically stop operating and the grinding wheel will rise approx. 5mm (0.2") away from the work table and stop running. At this times, the work table will automatically stop at the right edge to make work material removal more convenient.

6.1.6 Handwheel and work table speed lever operation：

6.1.6.1 Longitudinal handwheel：(Refer to figure and name No.17 in Chapter two, section 2.2)

When the longitudinal handwheel is pressed in and turned, the table can be moved longitudinally. However when the work table is driven hydraulically, the handwheel will disengage.

6.1.7 Crossfeed handwheel：(Refer to figure and part name No.16 in Chapter two, section 2.2)

6.1.7.1 Crossfeed handwheel is pressed in and turned, the column can be moved forward or backward.

6.1.7.2 Each gradient unit of the cross handwheel is 0.02mm and one complete tur is 5mm.

6.1.8 Vertical handwheel：(Refer to figure and part name No.11 in Chapter two, section 2.2)

6.1.8.1 By turning the vertical handwheel, the wheel head moves upwards and downwards.

6.1.8.2 Each graduation of the upper-lower hand bar is 0.002mm and one complete turn is 0.5mm.

6.1.9 Work table speed lever：(Refer to figure and part name No.14 in chapter two, section 11)

The work table speed lever controls the work table's hydraulic movement. The extreme right position on the work table speed lever is idle. Turning it in a clockwise motion will slowly begin to move. Turning the lever a full 90 degree moves the table at its maximum speed.

6.2 Handwheel and worktable speed control level operation：

6.2.1 Longitudinal handwheel：(Refer to figure and name No.11 in chapter two, section 2.2)

When the longitudinal handwheel is pushed in and truned, the table can be moved longitudinally. However when the work table is driven hydraulically, the handwheel will disengage.

6.2.2 Crossfeed handwheel：(Refer to figure and part name No.15 in chapter two, section 2.2)

6.2.3 By turning the crossfeed handwheel, the saddle can be moved forward or backward.

6.2.4 Each graduation of the cross handwheel is 0.02mm and one complete turn is 5mm.

6.2.5 Vertical handwheel：(Refer to figure and part name No.16 in chapter two, section 2.2)

6.2.6 By depressing and turning the vertical handwheel, the wheel head moves upwards and downwards.

6.2.7 Work table speed level：(Refer to figure and part name No.13 in chapter two, section 2.2)

The work table speed control level controls the work table's hydraulic movement. The extreme right position of speed level is idle. Turning it clockwise, the table will begin go move slowly. Turning the level 90 degree moves the table at its maximum speed.

6.3 Precautions to be taken during operation (KGS-2040 AHD)

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 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 one's hands.

6.3.6 The work piece to be grinded 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 wheel flange.

6.3.9 If you are unfamiliar with electrical devices, do not attempt to connect the wiring on your own. This could result in immediately 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 arise in the trial run, the grinding wheel can then be used.

6.3.11 Operators doing dry grinding must wear safety glasses and a filter mask. During continuous dry grinding, dispose of the dust that is produced to avoid injury.

6.3.12 Do not run the grinding wheel at speeds above its maximum safety standards.

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

6.3.14 Do no 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 direction of the grinding wheel is the same as denoted on the wheel guard.

6.3.17 Before the machine is started, check and make sure that all the switches and buttons are in the "OFF" position.

6.3.18 Operators and onlookers must wear safety glasses.

6.3.19 When adjusting the right, left travel, the hydraulic motor must be shut 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 cannot use for finishing (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

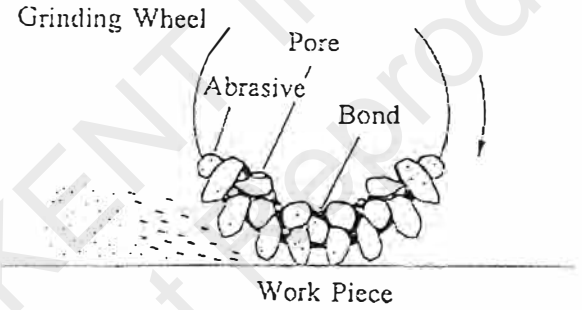
Grinding wheels are driven mechanically at high speeds continuously generate minute yet hard and sharp particles and abrasive shavings. So, grinding wheels are an extremely useful grinding tool for all kinds of materials.

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

Note：
To select a grinding wheel, you must first determine whether you want the maximum rotation speed greater than the rotation speed of the wheel spindle (our machine is1740rpm).
The relationship between the rotation speed and peripheral speed is as follows：

$$\text{Peripheral speed (m/min)} = \frac{\pi \times D\ (mm) \times \text{rotation speed (rpm)}}{1000}$$

The machine specifications are：wheel outer diameter = 355mm
rotation speed = 1740 rpm (at 60Hz)

$$\text{Peripheral speed} = \frac{\pi \times 355 \times 1740}{1000} = 1940\ \text{m/min}$$

When running the machine (at 60 Hz), the peripheral speed of the grinding wheel must be greater than 2000 m/min.

Grinding selectin reference

Material being ground			Hardness (Rockwell HRC)	Grinding wheel specs
Steel	Carbon steel	Steel plates Carbon steel Carbon steel Tubing Carbon steel Tubing Carbon steel Tubing	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 Aluminum chrome-moly alloy steel High-carbon chromium alloy bearings Bearings Stainless steel alloy Tool carbon steel	HRC 55 and below	WA 46J
			HRC 55 and above	WA 46I
	Tool steel	High speed tool steel Steel alloy tool steel	HRC 60 and below	WA 46I
			HRC 60 and above	WA 46H
	Stainless Steel	Stainless steel		WA 46I
		Heat resistant steel		WA 36J
Iron	Cast iron	Gray cast iron		C46J
		Special cast iron		GC46I
		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.

6.4.2.1 Three factors to select for ideals 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 selecting a wheel

Fixed conditions	1.Material being grinded
	2.Precision and smoothness requirements
	3.Surafce 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 non 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 'blockage' or 'loading'. Dense packed abrasive grains are for use on hard and brittle material. Loose packed 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 the contact surface area, fine grain grinding wheels are used for small surface areas. The harder and denser cutting type abrasives are used on small surface areas and loose types are used on large surface areas.

(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 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 done 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 cannot 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 into the flange. Don't use too much force. The wheel must be wiped clean, especially the orienting and positioning surfaces.

6.4.4 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.

6.4.4.1 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.

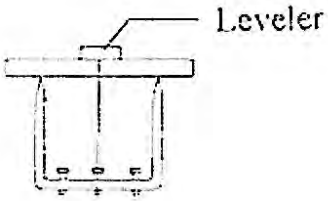
(2) Rotate the grinding wheel on the balance stand and mark its lowermost position (heaviest area) with a ‘S’ using chalk (see Fig.6-6).

(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 Fig.6-9)

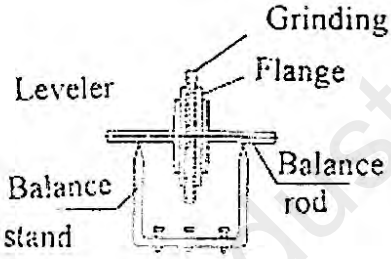
(4) After this, take the other two balancing piece ‘K’ and attach to any position of equivalent distance ‘a’ (see Fig.6-9)

(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).

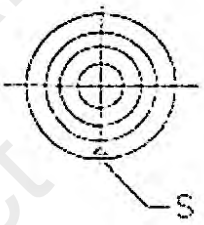
(6) After balancing the grinding wheel, test it by rotating it at normal grinding speeds for at least five minutes.



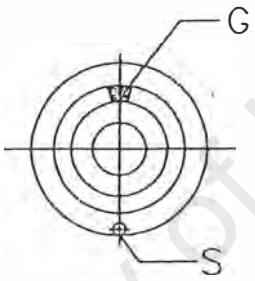
(Fig. 6-5)



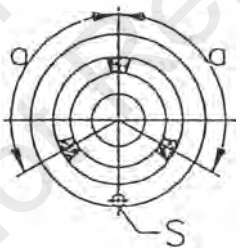
(Fig. 6-6)



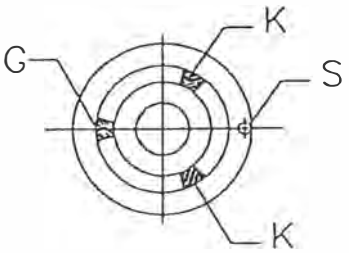
(Fig.6-7)



(Fig. 6-8)



(Fig. 6-9)



(Fig. 6-10)

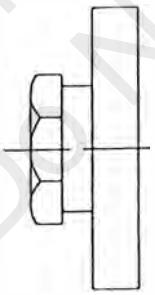
6.4.4.2 After the first time you balance the grinding wheel, it must then be mounted on the wheel spindle. Use the parallel dresser on the wheel head of the wheel spindle or the grinding wheel dresser on the work table to finish the grinding wheel.

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

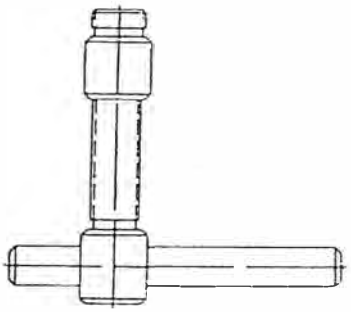
6.4.4.3 The grinding wheel must be finished to complete precision. This can be established by looking at the grinding surface. By using the above procedure to balance the grinding wheel, you must remove it from the wheel spindle and position the grinding wheel on the balance table and then carefully 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.

6.4.4.4 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.

6.4.4.5 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 will 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.

6.4.5 Grinding wheel dressing and correct use of the diamond dresser

6.4.5.1 The complete grinding wheel can be used to grasp the wheel balance attached to the electric clamp plate (but first use your 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 grindingwheel.

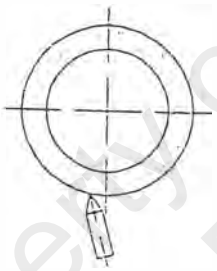
6.4.5.2 Changing the feed rate of dressing will enable you to change the coarseness of the grinding wheel. If you want to grind to a depth of 0.1 - 0.2mm, than a rough dressing of the grinding wheel is all that is necessary. Then by quickly rotating the handwheel, you can make the diamond dresser quickly 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.

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

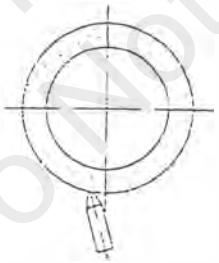
6.4.5.4 Diamond being excessively brittle and hard even slight impacts may cause cracking.

6.4.5.5 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.

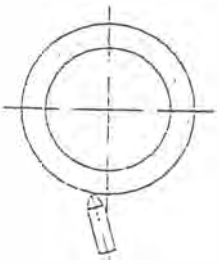
6.4.5.6 Grinding wheel dressing diagrams and precautions：



(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)

6.4.6 Grinding wheel storage：

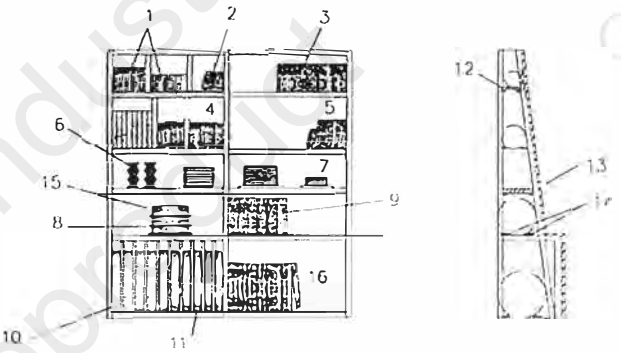
6.4.6.1 Grinding wheels must be stored in a dry grinding wheel shelf (as shown in Fig.6-17) that is protected From impacts and Vibration. When moving the grinding wheel, take extra precautions.

6.4.6.2 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.

6.4.6.3 Caution：

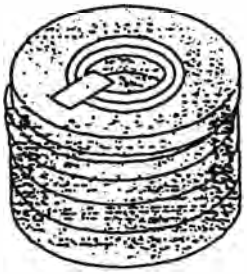
(1) Do not let oil or grease come into contact to the grinding wheel. Oil soaked grinding wheel will lose their grinding contact surface and slide during grinding. Also, this will significantly shorten their lifespan.

(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

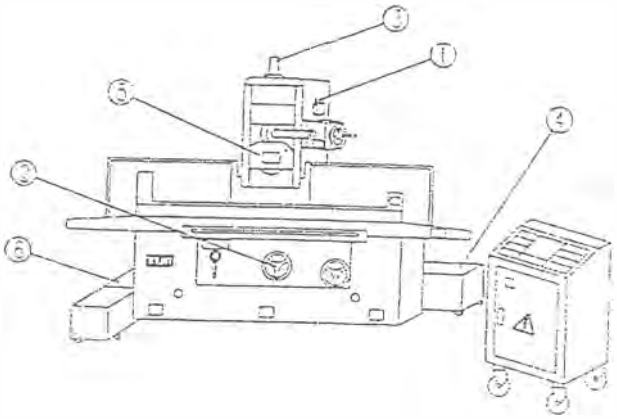


(Fig. 6-18)

7.1 Daily maintenance for operators

7.1.1 Daily inspection

(Oil supply, Water supply)



① Lubrication tank
② Crossfeed leadscrew
③ Downfeed leadscrew
④ Hydraulic tank
⑤ Wheel spindle
⑥ Coolant tank

(Fig. 7-1)

No	Location Used	Oil type	Inspection times	Recommended Oil		Note
				KNET	Marker Brands	
1	Lubrication tank	Lubrication oil	Every week	Kent-JK90	Mobil Vactra oil No.2 Esso febis K68 Shell Tonna S2M 68 CPC sideway 68	Capacity 12L
2	Crossfeed leadscrew	Grease	Every day		Mobil Mobilplex 48	
3	Dwonfeed leadscrew	Grease	Every day		BP Energrease LS3 Castrol Spheerol AP3 Esso beacon 3 Gulf crown grease No.3 Shell Gadus S2 V100 3 Total mulits 3	
4	Hydraulic tank	Hydraulic oil	Ever months	Kent-T68	Mobil dte 26 Esso nuto H68 Shell Tellus S2 VX 68 CPC R68	Capacity 140L
5	Wheel spindle	Temperature resistant grease	Permanent	Except when the bearings are damaged, the grease does not have to be changed or added. Only the company may do this, the user or distributor should not attempt to disassemble on their own.		
6	Coolant tank	Cutting fluid	Every three months	Kent-S22 (fully synthetic)<as called for by the work material>	Fully synthetic cutting fluid or what is called for by the work material or wheel flange	Capacity 110L

7.1.1.1 After use a new machine for three months, change the hydraulic oil once in the hydraulic tank (4). Then, clean the hydraulic tank and change the oil at one year intervals.

7.1.1.2 Every two years, clean the filter inside the hydraulic oil tank (replace when necessary).

7.1.1.3 Depending on its use, clean the coolant tank and replace the water inside.
(We recommend that this be down once every three months).

7.1.1.4 Keep the lubrication tank have clear lubricant. (The lubricant should be replace after one month usage for new machine, then be replaced every three months).

7.1.2 Daily inspection

(Pre-operation checklist)

Item	Inspection Subject	Inspection Condition		Inspection Method	Inspection Interval	Inspection Standard
		Before Start	After Start			
1	Lubrication Mechanism	✓		Visual	Daily	Above low line
2	Work table speed lever	✓		Visual	Daily	At "off" position
3	Wheel	✓		Visual	Daily	At least 5cm distant from work piece
4	Coolant system	✓		Visual	Daily	Coolant level is above low line when system is "off"
5	Hydraulic System	✓		Visual	Daily	Hydraulic fluid level is above low line when system is "off"
6	Wheel Spindle Motor	✓		Visual	Daily	OFF
7	Wheel Guards	✓		Visual	Daily	Closed and fastened
8	Electric control box	✓		Visual	Daily	Closed and locked
9	Start direction position		✓	Press rapid push-button	Daily	Before and after testing, look if the labels match
10	Warming up		✓	Visual	Daily	Approx. 30min

7.1.3 Daily inspection

(Post-operation checklist)

Item	Inspection Subject	Inspection Condition		Inspection Method	Inspection Interval	Inspection Standard
		Before Start	After Start			
1	Lubrication Mechanism		✓	Visual	Daily	Above low line
2	Wheel spindle motor		✓	Visual	Daily	At least 5cm distant from work piece
3	Emergency stop push button		✓	Visual	Daily	Check and make sure the emergency stop pushbuttons functions are normal, then make it at "off" position
4	Hydraulic system		✓	Visual	Daily	Switch at "off" position
5	Coolant system		✓	Visual	Daily	Switch at "off" position
6	Work table surface		✓	Visual	Daily	Stopped & Clean
7	Waste oil box		✓	Visual	Daily	Clean
8	Shaving box		✓	Visual	Daily	Clean

The eighth item (waste shaving box) is equipped with a magnetic filter or paper filter in the optional accessories.

7.2 Positions of the lubrication and filling mechanisms

7.2.1 Lubrication mechanism (self-lubricating)

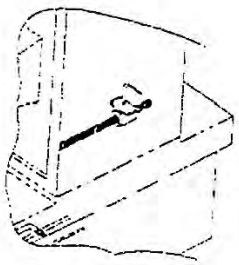
Lubrication method：Auto cycle

Lubrication device

7.2.2 Crossfeed leadscrew, manual lubrication

Lubrication mothod：Use grease gun, about 5 C.C. one time per week

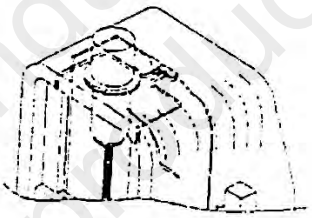
Cross leadscrew



(Fig. 7-2)

(1) Grease nipple (oil injection mouth)

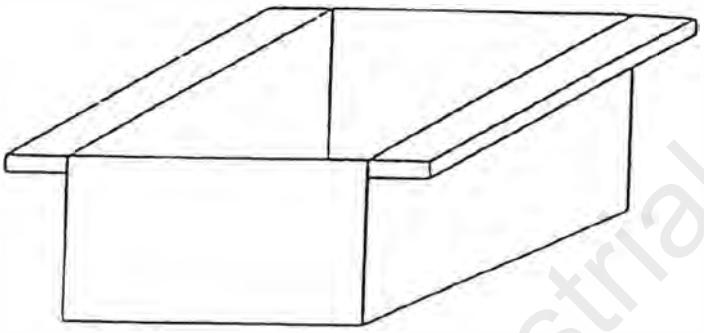
Upward/downward (vertical) leadscrew



(Fig.7-3)

(1) Grease nipple (oil injection mouth)

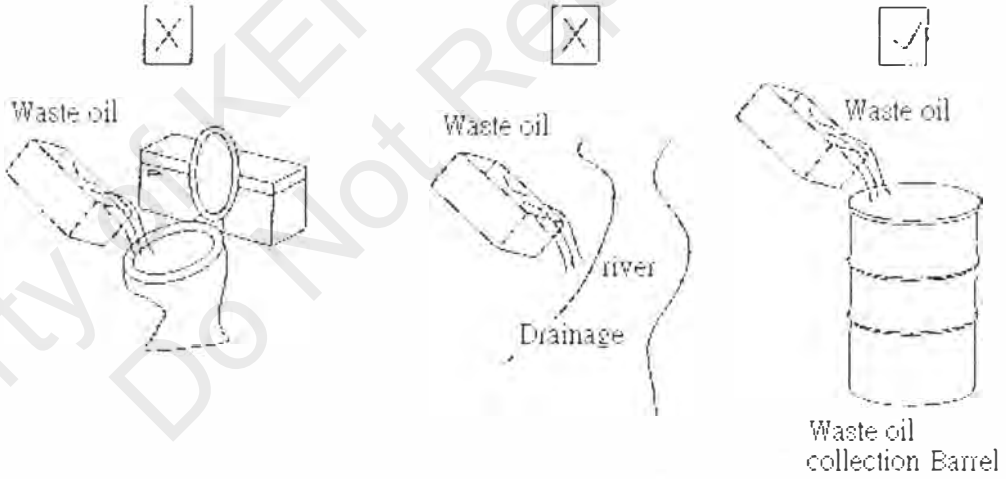
7.3 Waste oil box



(Fig 7-4)

Note：

We recommend that you clean out the waste oil inside the waste oil box daily. Out of consideration for the environment, do not dump the waste oil box into a river or drainage. You should prepare a designated drum for waste oil disposal and send it to experts for disposal.



(Fig 7-5)