

Operation Manual

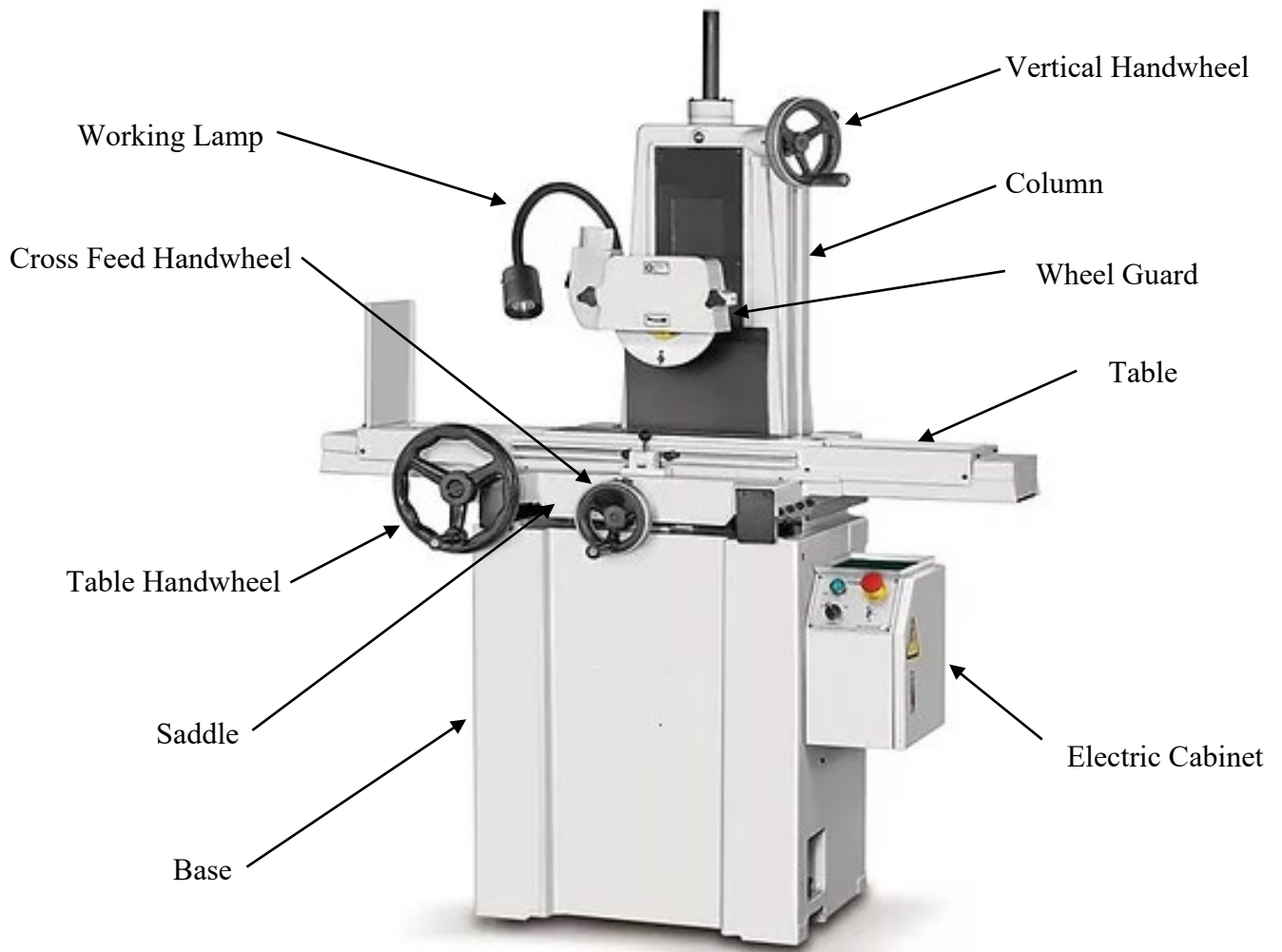
For

SG-618

The Precision Surface Grinding Machine

Version: 2022/11/A

Model : SG-618



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1 General Description

1.1 Construction (refer to the outline dimensions)

This machine is a small-sized horizontal precision surface grinding machine with a square shaped table. This machine had a simple construction, each part of which has an enough rigidity to meet high accuracy requirements. By the use of this machine it is possible to perform precision grinding effectively with a stabilized accuracy through a light and simple operation.

The construction of the machine		Main functions
Machine body Worktable	Column	Vertical feed and hand-wheel
	Wheel head	Wheel guard
	Wheel spindle	Motor, wheel flange
	Saddle	Guard, dogs Longitudinal feed hand-wheel, cross feed handwheel
	Base	Electric cabinet, Saddle clamping device

1.2 Specification

	ITEM	SG-618	
		INCH	METRIC
Capacity	Maximum grinding length	18.5"	470m/m
	Maximum grinding width	6.3"	160m/m
	Maximum distance from	15.9"	405m/m
	Working surface area	18.3"x 6"	465m/m x 150m/m
Saddle	Maximum longitudinal	18.9"	480m/m
	Maximum cross movement	7"	177m/m
Table	T-slot width	0.669"	17 m/m
Feeds	Longitudinal movement Table hand feed per revolution	4.2"	105m/m
	Cross movement of saddle	0.2"/rev	5m/m/rev
	Hand feed per revolution	0.00005"	0.02m/m
	Vertical movement of wheel	0.05"/rev	1m/m/rev
	Heed hand par revolution	0.0002"	0.005m/m
Grinding wheel	Diameter, standard	7.1"	180m/m
	Optional accessories up to	8"	205m/m
	Width	0.25"-0.63"	6-16m/m
	Bore	1.25"	31.75m/m
	Spindle revolution (50/ 60	2850/3420rpm	2850/3420rpm
Motors	Grinding wheel spindle	1HP/1.5HP	1HP/1.5HP
	Lubrication pump	0.02HP	0.02HP
Floor Space	LxWxH	39.4" x 39.4" x 70.9"	1200m/m x 1000m/m x 1800m/m
Weight	Approx	1507Lbs	550kgs

Note: Is constantly improving the design of its machines. Appearance, specifications and dimensions are subject to be changed without prior notice.

1.3 Standard Accessories

Specification	Quantity	Remark
1. Grinding wheel (WA46: 7.1" øx0.5"x1.25" ø)	1pc	
2. Grinding wheel adaptor & puller	1set	
3. Arbor for wheel balancing	1pc	
4. Diamond tool (1/4Carat) with a base	1set	
5. Dust sweeping plate	1each	
6. Working lamp	1set	
7. Leveling plates	3pcs	
8. Leveling bolts with nuts	3pcs	
9. Eyebolts	4pcs	
10. T-Nut	2pcs	
11. Necessary tools with a tool box	1set	
12. Lubrication oil (4 liter)	1can	
13. Plug (5/8")	4pcs	
14. Operation manual and inspection certificate	1copy each	
15. Spare paint	1can	

* Details of tools

NO	Name	Model SG-618	Quantity
1	Pin face box wrench	27mm, 46mm	1 for each
2	Hexagon-headed spanner	3,4,5,6,8	1 for each
3	Adjustable wrench	200m/m	1
4	Cross screw driver	No: 1	1

2 INSTALLATION

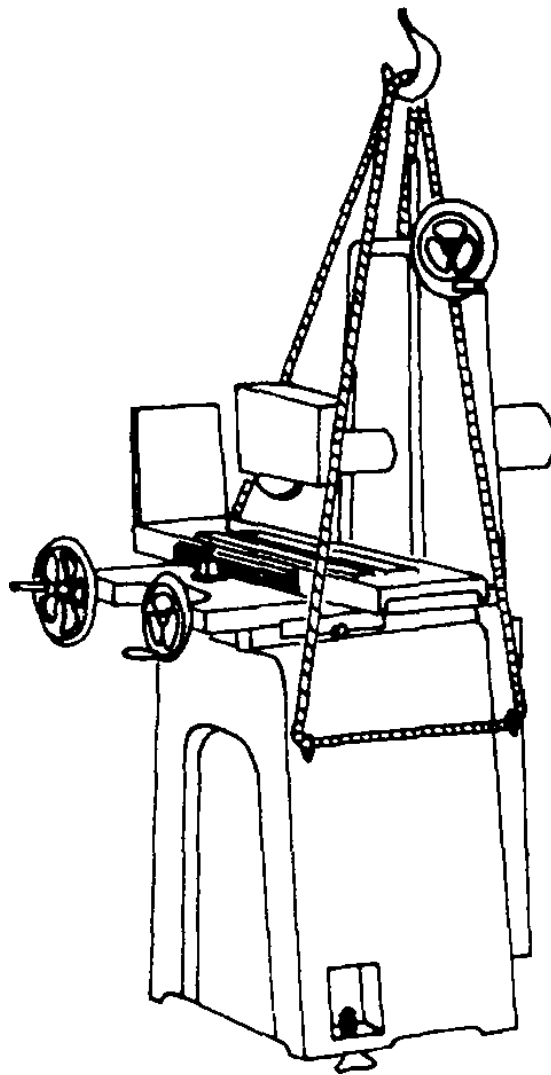
2.1 Transportation

Transporting of model SG-618:

- (1) When transporting the machine, care should be taken, so that any shock will not be given to the machine in the transportation.
- (2) Lifting of the machine should be made by passing wire rope (more than $\varnothing 8$) through the metal fittings (eyebolts) on the side of the base.

In this case insert quilted cloth or wastes between the machine and the rope. Care must be taken so that any scratches or damages will not be given to the machine.

Weight of the machine is approximately 680kgs(1507 lbs).....SG-618



2.2 Cleaning

Use light-oil immersed soft cloth, in order to remove rust, preventive oil applied on the machine. Avoid a use of gasoline or thinner.

2.3 Installation

- (1) Avoid places where there is much vibration or the machine might be exposed directly to the sun.

Installation can be made on a floor in a usual machine shop (with concrete more than 150mm in thickness). However, avoid places where there is much vibration or the machine might be exposed directly to the sun.

Any special foundation work is not required except for a very poor ground condition. In case installation must inevitably be made around a place where there are shapers or presses which become the origin of vibration, vibration-proof foundation work must be done.

The surface grinding machine is one of the machine tools which have an aversion to vibration. Accuracy of the surface grinding machine is impeded to a great degree by the transmission of vibration coming from outside.

- (2) First, put the three plates on a place to be mounted. Then, place the machine on them, so that each of the three leveling bolts of the machine will be placed in conformity with each of those plates.

2.4 Leveling Adjustment

Horizontal adjustment is made by use of the five leveling bolts. Place the precision level (sensitivity—one graduation 0.02m/m/M) on the surface of the table (or chuck). Make its adjustment within 0.04m/m/M for both the longitudinal and cross direction.

2.5 Power Sources Wiring

- (1) Electrical equipment (refer to the wiring diagram).

The electrical equipment of the machine consists of the following items:

Electric motor for grinding wheel.....	1.13kw 2P
Electric motor for dust suction system (OPT.).....	0.4kw 2P
Lubricating pump.....	10W
Working lamp.....	60W

For 2 voltages compatibles motor, make sure that the motor wiring match with the source voltage. (refer to the wiring diagram). The motor was already wired for high voltage for safety.

- (2) Before connection, make sure if the voltage is correct.

Connect the source (through your source switch) to the source cord on the rear part of the base.

Connect the working lamp to electric source.

Caution: Never press push button “ON” before oiling.

- (3) Checking the direction revolution.

Make an inching of the grinding wheel motor by pressing the push button switch and check to see the direction of its revolution. The direction of its revolution is clockwise, viewing the front of the machine.

In case the direction is reverse, replace two of the three cords with each other.

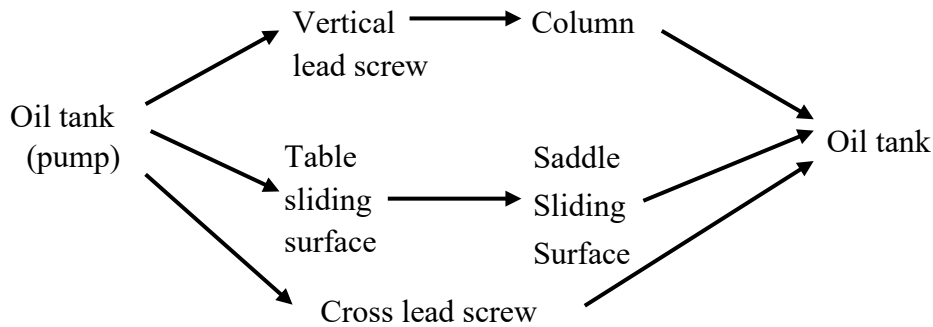
- (4) Connection of the dust suction motor to the magnetic switch inside the electric cabinet.

3 OILING AND LUBRICATION

3.1 Lubrication System

This machine uses a fully automatic lubrication system. Oiling can be made into the oil tank on the lower part of the column. When connecting the plug socket to the source, oiling to every part will be accomplished through the lubricating pump.

Oiling system



3.2 Lubricating Oil

It is recommended that the equivalent oil can be used.

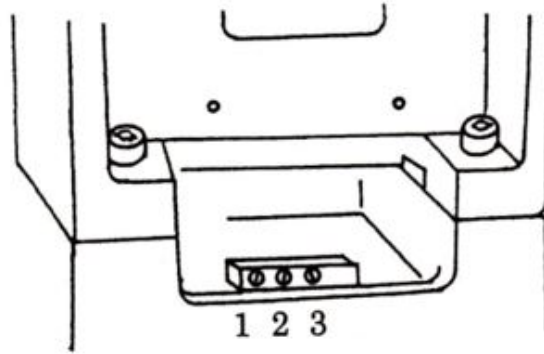
Service Point	Amount	Oil specification	Remarks
Lubricating oil tank	2 Liters	Mobil Vacuoline oil 1405 or slideway Lubricant ISO 32	Replenish in three to six months

*** Note:** in terms of the lubricating oil, please change the lubricant and clean the filter regularly. Therefore the machines' accuracy could last longer

3.3 Procedure of oiling

First, remove the cover on the lower part of the column and make an oiling into the oil tank. The capacity of the tank is approx. 4 liters. In a little while, oil will come to the inspection window on the upper part of the front of the column.

Caution: The lubricating pump operates as soon as the source is put "ON". So never fail to cut "OFF" the source switch at the time of the completion of the operation.



1. Flow adjusting screw for vertical slideway
2. Flow adjusting screw for cross leadscrew
3. Flow adjusting screw for longitudinal/cross slideways, and oil discharge

Method of adjustment:

- A. Clockwise (C.W.): Decreasing flow rate
- B. Anti-clockwise (A.C.W.): Increasing flow rate
- C. Normal adjustment
 - (1) Turn adjusting screw 1 (C.W.) to maximum
 - (2) Turn adjusting screw 2 (C.W.) to maximum,
then loosen (A.C.W.) approximately 90° (1/4 turn)
 - (3) Turn adjusting screw 3 (C.W) to maximum,
then loosen (1/4~1/2 turn) $90^\circ\sim 180^\circ$ till oil
dropping from pressure relief cooper tube.

4 TEST RUNNING AND OPERATION

4.1 Checking items before operating

Make sure of the following items again:

- (1) Legal running of the wheel spindle.
- (2) Legal running of the dust suction Motor (fan).
- (3) Working of the oiling pump.

4.2 Hand-wheel Operation

Vertical feed hand-wheel	Revolve clockwise	Rising
	Revolve counter-clockwise	Descending
Cross feed hand-wheel	Revolve clockwise	Retreating
	Revolve counter-clockwise	Advancing
Longitudinal feed hand-wheel	Revolve clockwise	Rightward
	Revolve counter-clockwise	Leftward

Longitudinal movement of the table is made with the wire-rope wound on the shaft of the hand-wheel. In case a hand-wheel condition is soft when operating hand-wheel (there are some slips), clamp the nut on the right lower part of the table to lock it.

Care should be taken in this case so that too strong a clamp will not be given to the nut.

4.3 Mounting and Dismounting of Grinding wheel

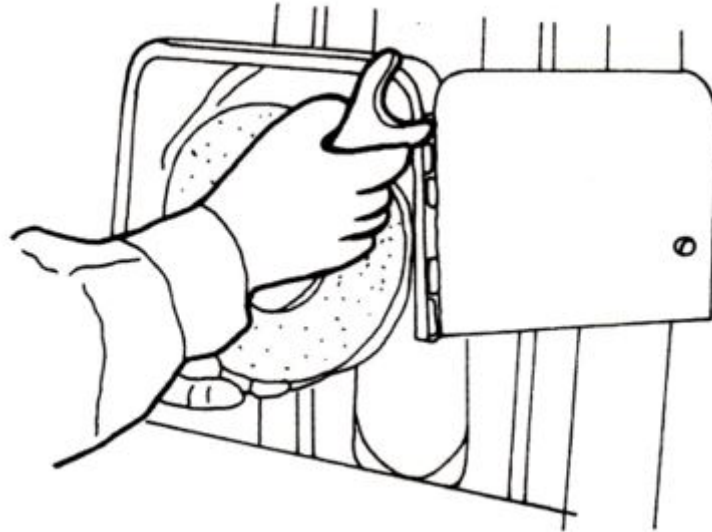
It is recommended to select a grinding wheel with abrasive grain, grain size, hardness (degree to be bound) and binding material suitable for the material, shape and accuracy of the work-piece. And make sure that there exist no cracks as a result of a sound test (by lightly tapping the wheel with a wooden hammer).

- (1) When mounting a new wheel to the machine, first, mount it to the grinding wheel flange and balance it roughly by use of the wheel balancing device.

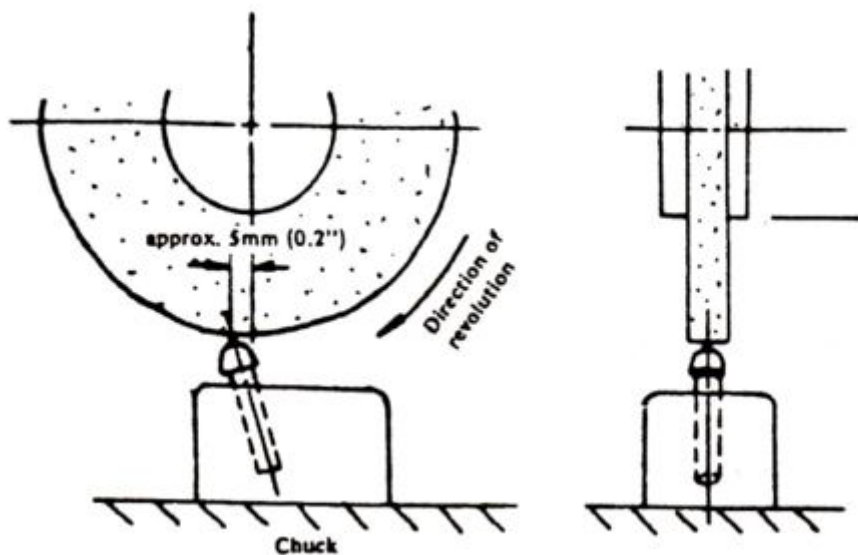
Note: Refer to the Paragraph 4.4 "Balancing of Grinding Wheel."

- (2) Wipe lightly a tapered end part of the wheel spindle and the tapered hole of the flange, and check to see that there are no dusts on them. Then, insert the wheel flange into the tapered part and clamp a hexagon-headed nut with the attached wrench.

At this time, hold down the wheel by left hand.



- (3) Close the wheel cover.
- (4) Start the wheel spindle by pushing the push button switch on the electric cabinet and make a racing of the wheel in a few minutes. At this time, do not allow your face to come near the wheel, because an accident may occur.
- (5) Make a rough dressing with the diamond dresser mounted on the chuck until swing of the outer periphery of the wheel disappears. Place the diamond in a position where its tip comes somewhat leftwards away from just under the center of the wheel.



- (6) Stop the revolution of the wheel and turn reversely the hexagon-headed nut, pressing down the wheel by left hand. Then, remove the wheel flange and make balance of the wheel precisely again.
 Note: It is recommended that balancing will be made timely at the time of operating, because the wheel becomes out of balance due to its wear.

4.4 Balancing of Grinding wheel

Explanation is made on how balancing of the wheel is done by the use of the wheel balancing device (special accessories).

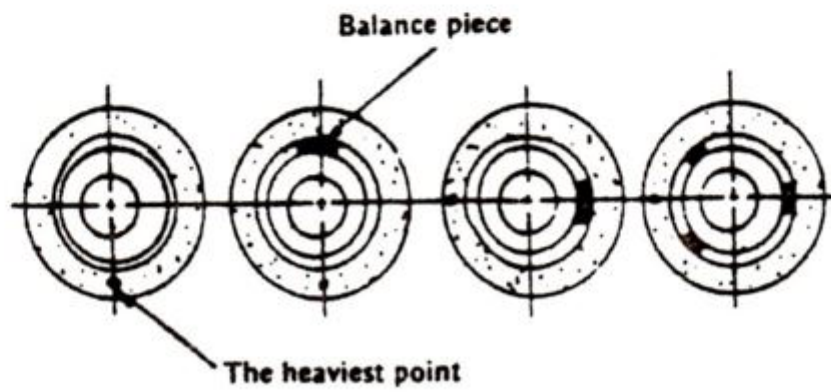
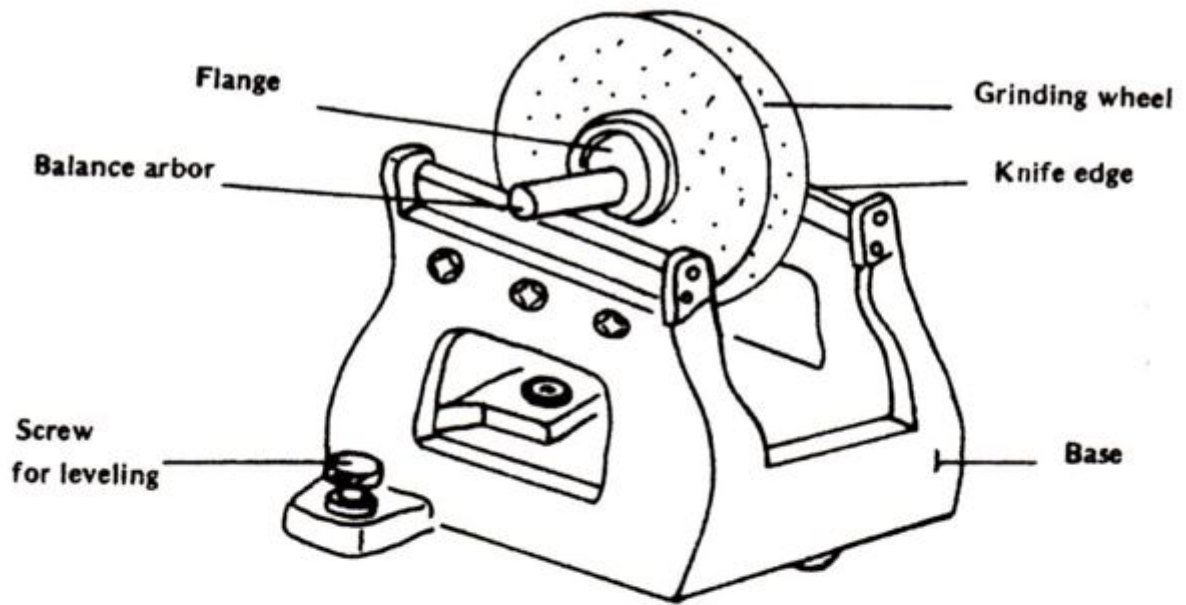
- (1) Place the device on a sturdy base and make out a level of the knife edge with the three adjusting bolts, looking at the attached level.
- (2) Insert the grinding wheel flange with a mounted wheel into the arbor for an exclusive use, and fix it, clamping the nut.

Note: Remove all the balance pieces.

- (3) Put the above onto the device and allow it to run lightly.
- (4) When the wheel is out of balance, it comes back a little to the opposite direction to that of revolution, and in a little while, the wheel makes a movement just like a pendulum and stops.
- (5) In the item (4) the heaviest part comes underneath, so, make a mark of that point with chalk.
- (6) Put on balance piece on a place on the opposite side to the position marked with chalk and fix it with a screw.
- (7) Check to see which is heavier, the side with the fixed balance piece or the opposite side (on the side marked with chalk), by use of the device.
- (8) On the opposite side to the heavier side, mount two balance pieces in symmetry with the line of gravity (angle is optional).
- (9) Check to see a balance of the wheel again. When the wheel is out of balance, repeat its balance until a complete balance is obtained, adjusting opened angles of the two balance pieces (make sure of moving them in symmetry with the line of gravity)

Note: Moment decreases as the balance pieces come near the center.

- (10) When balance is attained, the wheel does not swing any longer like the pendulum.



5 GRINDING OPERATION

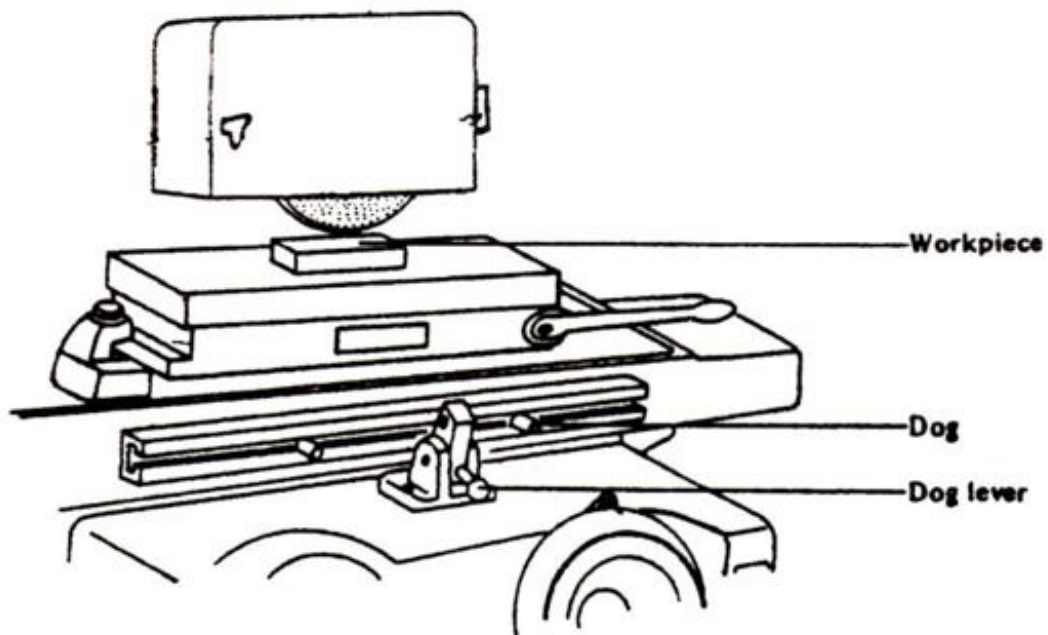
5.1 Basic Grinding Operation:

- (1) Mount the wheel, the balance of which has been attained.

A wheel out of balance worsens accuracy of the workpiece and shortens a service life of the wheel spindle.

- (2) Wipe well the surface of the chuck with a sweeping plate, wiper or wastes, and put quietly the workpiece onto the chuck for fixing the workpiece on it.
- (3) Adjust the position of the table dogs on the right and left side in accordance with the length of the workpiece.

Note: When the dog levers are felled down this side, a movement of the table to the right or left end will be possible without moving the position of the dogs. Accordingly, make use of this in a case where dressing become necessary during 5 operation.



- (4) When the vertical feed hand-wheel is revolved, the wheel is allowed to cut in the work. In this case, great care should be taken so that the wheel will not encroach upon the workpiece on account of overfeeding on occasion when it approaches the workpiece. It is also recommended that infeed will be made, allowing the longitudinal hand-wheel to operate slowly.
- (5) After the wheel has come in contact with the workpiece, proceed to the grinding operation, giving a suitable amount of infeed to the wheel
- (6) How to use dial indicators. For both the vertical and cross feed hand-wheel there exist dial indicators on their outside periphery to indicate the amount of feed. It is possible to loosen the two knobs to turn the dial in order to set it to the zero degrees, if necessary. In this case, push down the hand-wheel lightly by hand, so that it will not turn together with the dial.
- (7) Perform a spark-out after a coarse or fine grinding, if necessary. Then, remove the workpiece, putting the chuck "OFF".

A Criterion of the amount of infeed

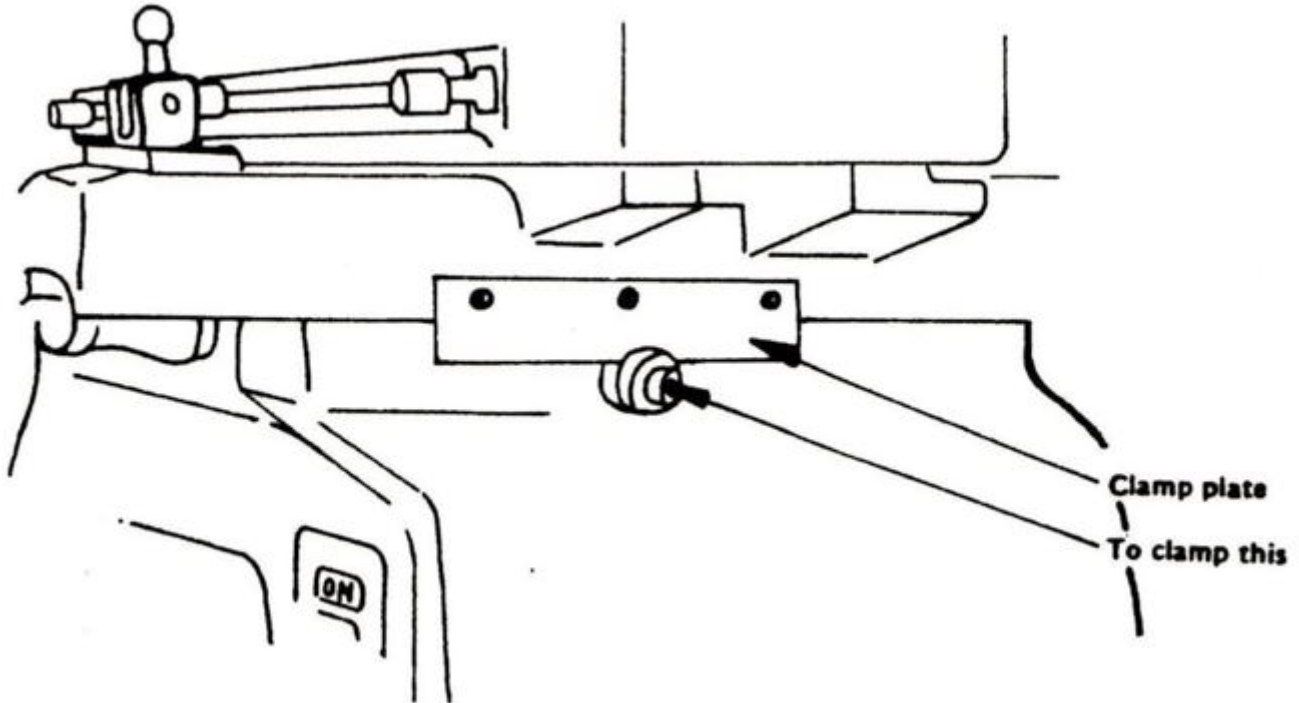
Dry traverse grinding	Coarse	Vertical feed	0.01 – 0.03 mm (0.0004 – 0.0012")
		Cross feed	2.5 – 5 mm (0.1 – 0.2")
	Fine	Vertical feed	0.0025 – 0.005mm (0.001 – 0.002")
		Cross feed	1 – 3 mm (0.04" – 0.12")
Dry plunge grinding	Coarse & fine	Vertical feed	0.0025 – 0.015mm (0.001 – 0.006")

Note:

- (1) The feed amount of wet grinding (coolant water) should be 50 – 100% more than that of dry grinding.
- (2) Select the amount of feed properly in accordance with grain size, hardness of the wheel and material or hardness of the workpiece.

5.2 Saddle Clamping Device

This device is applied for a plunge grinding which is done without giving any cross feed, especially for form grinding.



5.3 Dust Suction System

Be sure to use the dust suction system in the case of dry grinding.

Grinding dusts pollute the air in the shop and are harmful to the security of the machine and the health.

The height of the mouth of the dust suction is adjustable. Accordingly, efficiency of dust suctioning can be enhanced, when the mouth is lowered enough within the limits of that it does not impede with the workpiece.

Note: Never use the dust suction system in the case of wet grinding (coolant water).

6 MAINTENANCE

6.1 General Maintenance

It is essential that the following periodical maintenance will be kept, in order to keep the original accuracy within a long period of time.

- (1) Wipe every part of the machine, in particular, its polished part with oil-immersed cloth after wiping it with dry cloth at the time of completion of the operation.
- (2) Remove grinding chips in the inner part of the wheel guard or on the surface of the table.

6.2 Chuck

The surface of the chuck is an important surface which becomes a standard of accuracy, but it has a tendency to be scratched, because it is made of soft steel material. It is, therefore, necessary to treat it with consideration as much as possible. It becomes necessary to grind the surface of the chuck over again, if its accuracy gets out of order or there come out some scratches on it.

Note: For the grinding of the surface of the chuck it is recommended that a grinding wheel to the grade

WA46H will be used and its rough dressing performed with a small amount of infeed. Be sure that grinding will be done after excitation. Also, clean the surface of the chuck well and oil it thinly.

6.3 Grinding Wheel Spindle

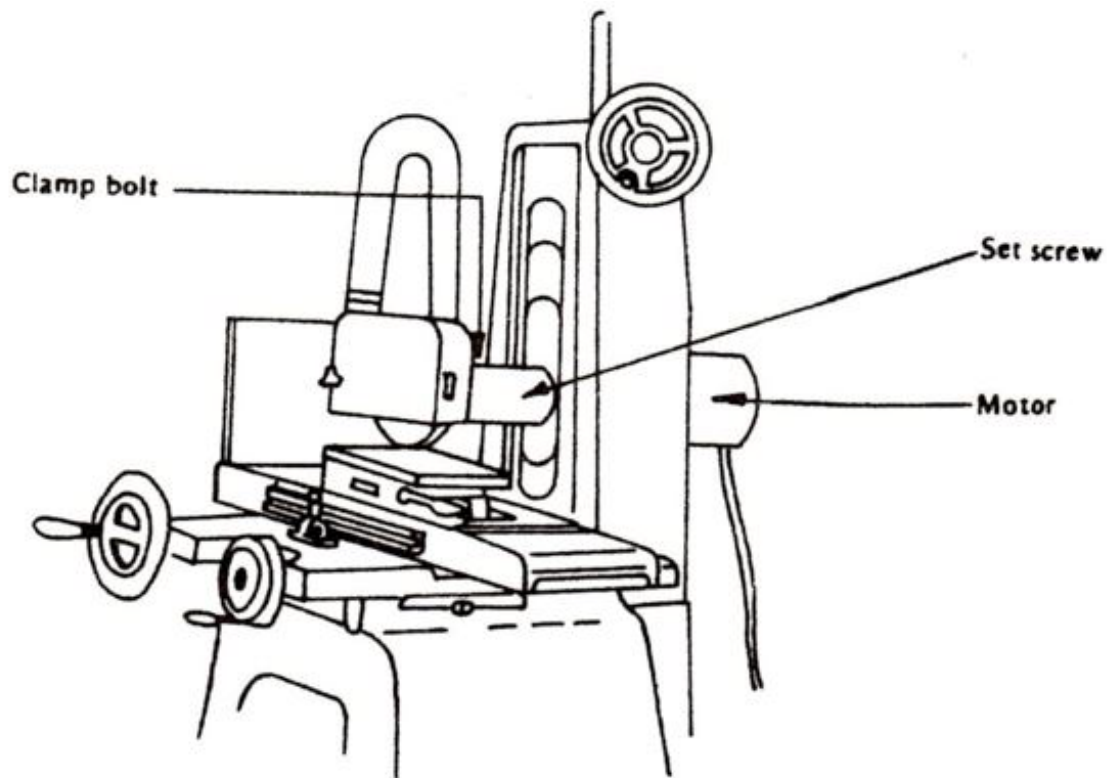
As grease lubrication is given for the grinding wheel spindle bearings, oiling is not required for it. In case its accuracy will be reduced after a few years usage of it (its service life is dependent upon the condition of usage), return it to our company for its repair or replace it with a new spindle.

Procedure for the replacement of the wheel spindle

- (1) Remove the wheel.
- (2) Loosen the clamp bolt and remove the guard.
- (3) Loosen the set screws positioning at the five points on the upper and lower part of the wheel head.
- (4) Remove the connections of the motor.
- (5) Pull out the motor backwards, keeping it by both hands.
- (6) Mounting of the wheel spindle should be made according to the reverse methods to the above

procedure.

In this case, never clamp the screw of the wheel head too strong.



6.4 Lubricating Oil

Change lubricating oil after first month operation and three to six months after for the next, respectively.

There is an exhaust port (threaded plug) on the lower part of the oil tank.

At the same time, clean the inner part of the oil tank and the filter of the pump.

Remark : Follow the direction to change lubricating oil is strongly suggested, since it is very helpful to the accuracy life.

6.5 Procedures of table wire changing

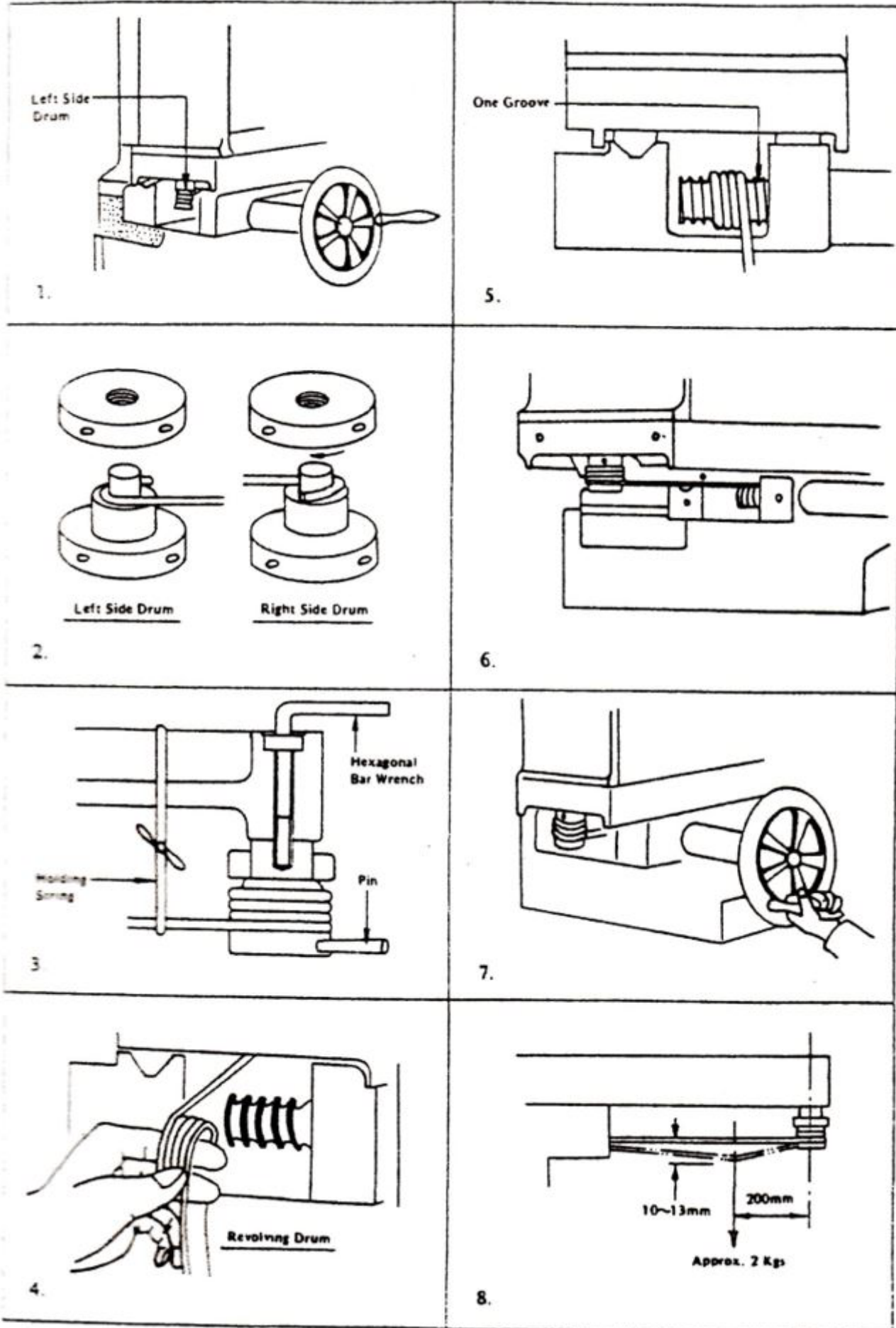
1. (1) Remove both side covers of table and saddle.
(2) Move the table to its right end and back by 40-50mm (1.6-2") as shown on drawing 1. of next page.
(3) Remove the drums on the both ends of table and worn-out old wire.
(4) Insert a new wire between table and saddle.
2. Wind up each end of wire by one turn on each drum as shown on drawing 2. and tighten the nut firmly.
(As the nut is tightened firmly, the wire is clamped securely. If the wire is wound in wrong direction, it

would be loosened as the nut is tightened.) The tightening of the nut is done with pins inserting in the side hole of drum and nut.

3. Clamp the right drum under the table and wind up the wire by three turns as shown on drawing 3. If no help is available, temporary holding by a string would be better as shown on drawing 3. If a help is available, have him hold the wire during this operation for preventing of its winding off.
4. (1) Stop the table at right end (Important).
(2) As shown on drawing 4. make complete three windings at the revolving drum.
5. Insert the windings to the drum.
Remark: When the table is at the right end position, one groove on revolving drum must be free from the engagement of wire as shown on drawing 5.
6. Stretch the wire and wind up it on the left side drum. Clamp the drum under the table. Then give a tension to wire as shown on Item 3 by means of hexagonal bar wrench and pin.
7. Move the table by handwheel slightly and check following items.
 - (a) Whether the wire is engaged in the groove securely.
 - (b) Whether the adjacent wire on the revolving drum is overlapped each other.
8. (1) Remove holding string on the right-hand of table.
(2) Move the table and adjust the tension of the wire according to the same way shown on Item 3.
Remark: The bigger the tension of wire, the shorter the life of wire. If the tension of wire is small, the slip of the wire will not give smooth running of the table. Adequate tension can be judged by giving a weight to the wire as shown on drawing 8.
9. Mount the covers of both side table and saddle.

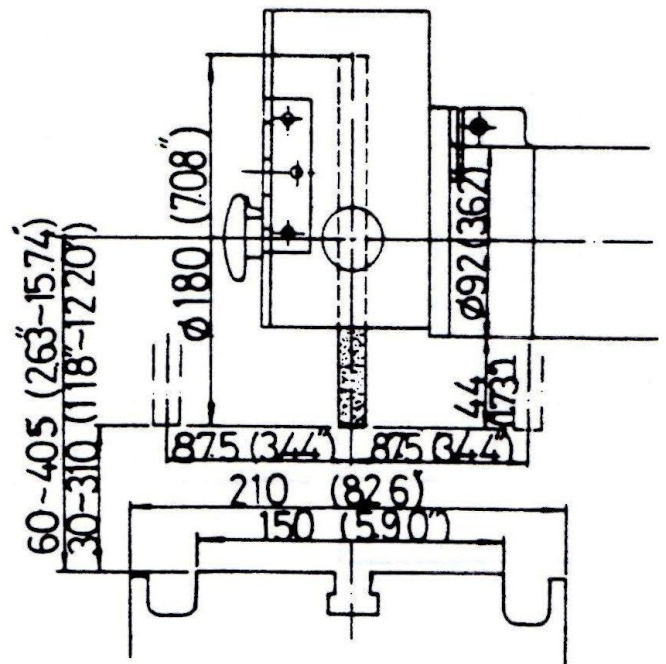
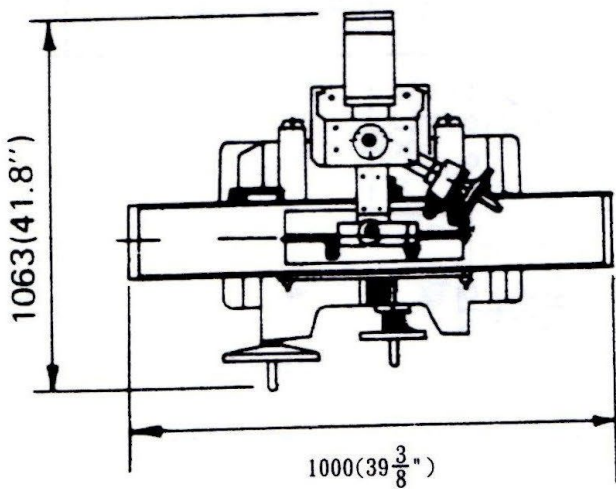
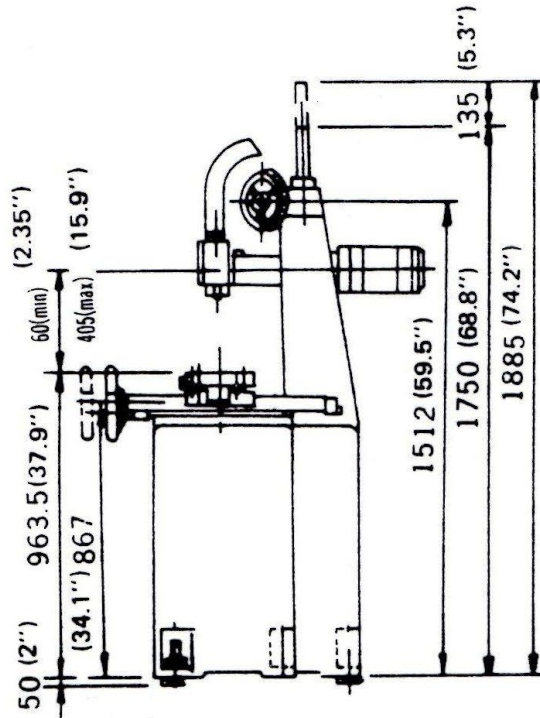
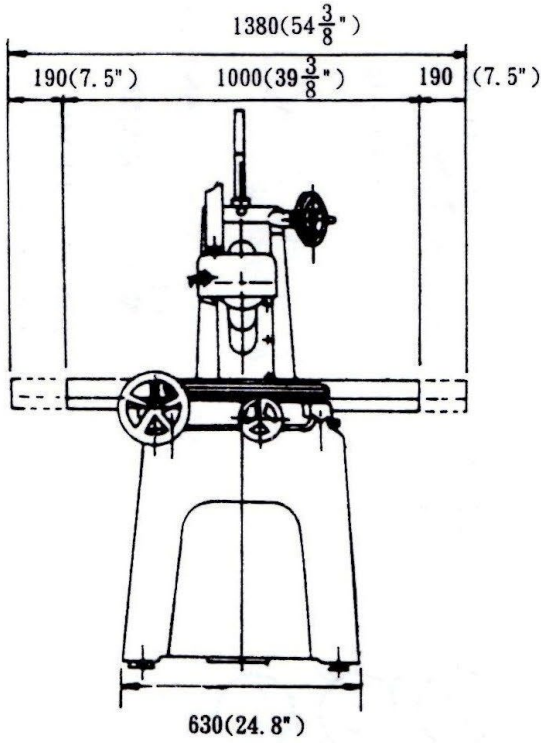
6.6 Safety operations

1. (Product after 2022) To avoid the spindle accidentally running when turning on machine power, an interlock is added. Operator must turn OFF the spindle switch first, then machine power can be turned On.

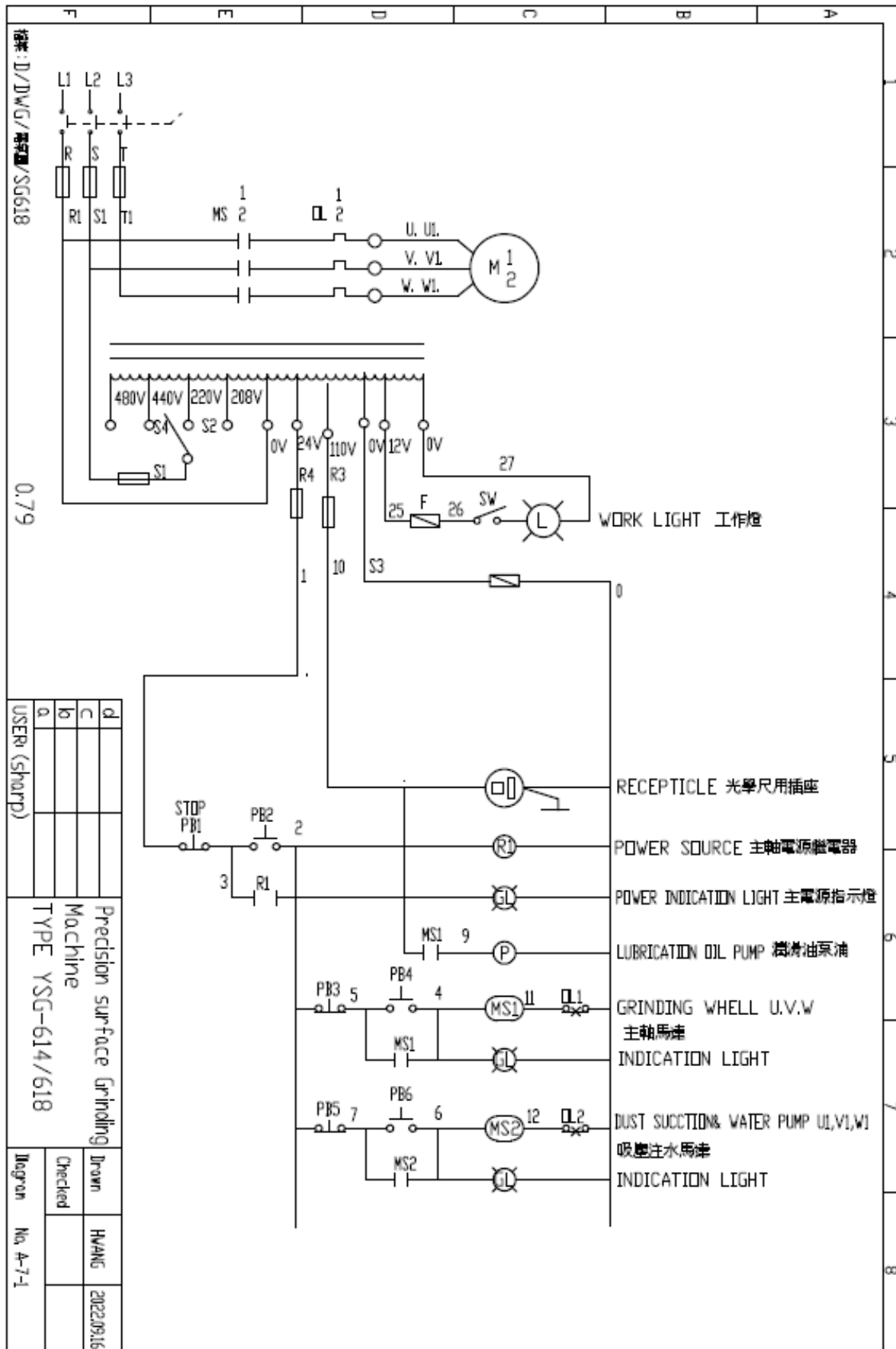


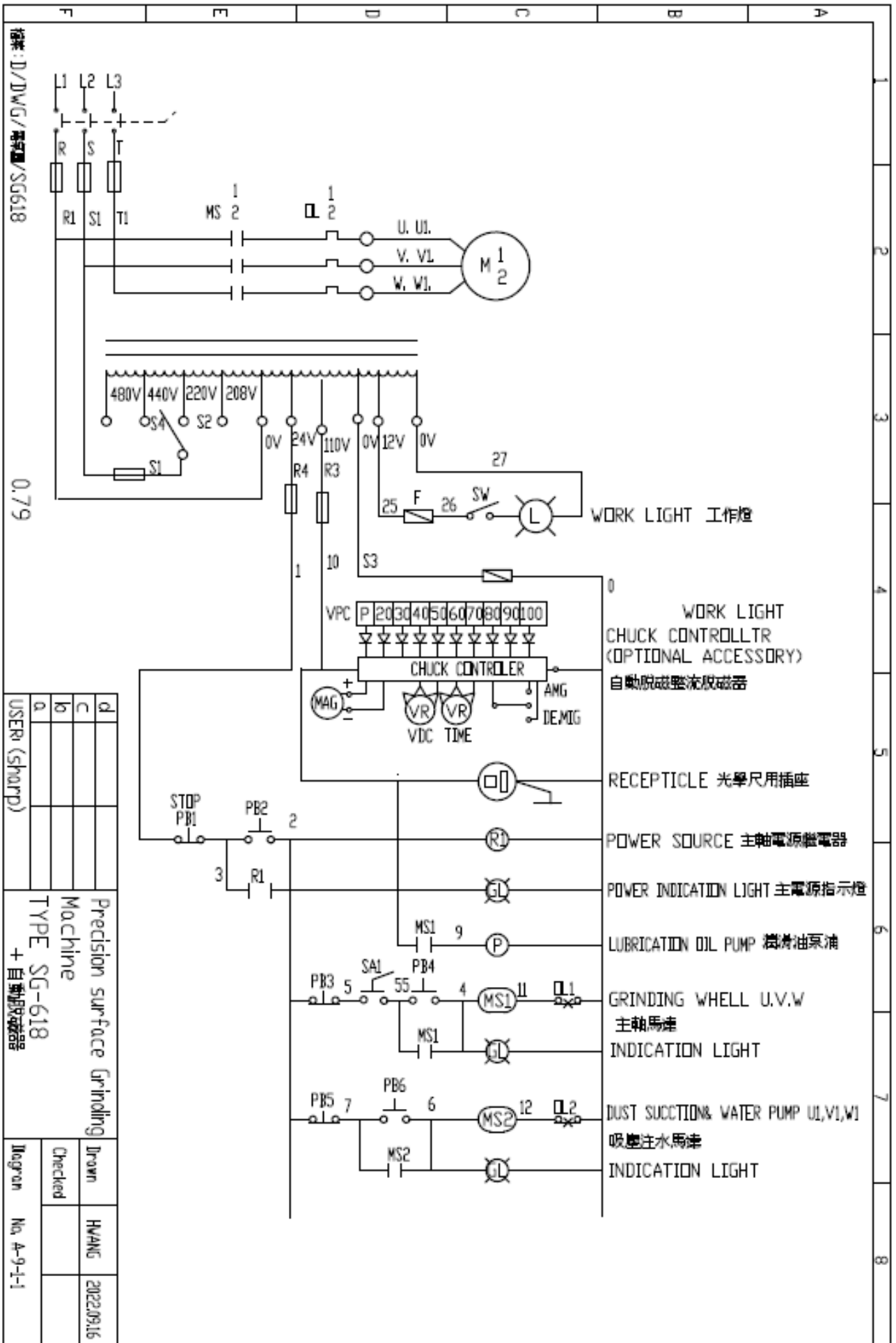
7 Attached Drawings

7.1 Outline dimensions for model



7.2 Electrical wiring Diagram





7.3 Wiring Diagram

