

HIGH PRECISION SURFACE GRINDER

Model: AGS 2448AH AGS 2448AHD

AGS 2480AH AGS 2480AHD

This 24" series surface grinder is hydraulic and electrical combined high precision machine tool. The operator is required to know about general grinding processes and the special features of this grinder. So when he is using this machine, he can operate it properly.

PLEASE NOTE:

When the grinder is not working properly, please advise the distributor immediately with the model number, serial number and manufacturing date of the machine. This is needed in order to speed up our service. Thank you for your cooperation!

CONTENT

DESCRIPTION	Page No.
**Installation Guide Line	4
1. 24" Series Contour and Nomenclature	8
Specification and Standard Accessories	9
2. Transport and Installation	10
2-2 2448AHD Foundation and Floor Space	13
2-3 2480AHD Foundation and Floor Space	14
3. Leveling and Adjustment	15
4. Cleaning and Setup	17
5. Hydraulic System and Oil Selection	18
Hydraulic Tank and Parts List	20
Comments for Hydraulic Oil Choice and Usage	21
6. Lubrication System and Way Oil Selection	23
**Electric Diagram and Parts List	25
7. 2448/2480AH Control Panel and Its Electric Diagram	26
8. 2448/2480AHD Control Panel and Its Electric Diagram	32
9. Procedure for Operating 2448/2480AH Series'	
Automatic Crossfeed	39
10. Procedure for Operating 2448/2480AHD Series'	
Automatic Crossfeed	40
11. Connection of Single Phase Transformer	41
Connection of Three Phase Transformer	42
12. 2448/2480AH Limit Switch Position	43
2448/2480AHD Limit Switch Position	44
***Daily Inspection	45
***Precaution to Be Taken During Operation	46
13. Balancing the Grinding Wheel	48
14. General Comments of Grinding	50
15. Wheel Inspection	50
16. Dressing the Wheel and Correct Treatment of	
Dressing Diamond	51
17. Storage of Grinding Wheels	52
18. Selection of Suitable Grinding Wheels	54
19. Wheel Selection Table	55
20. Reference for Grinding Condition	65

21. Usage of the Optional Attachment	67
a. Parallel Dressing Attachment	67
b. Angle Forming Attachment	67
c. Sine Bar	68
d. Radius Forming Attachment	68
e. Coolant System	71
f. Common Cases in Side Grinding	71
g. Right Angle Grinding	73
22. Complete Knockdown Drawing and Part list	75
Up Column Ass'y	76
Spindle Set Ass'y	78
Down Feed Unit Ass'y	80
Crossfeed Ass'y	83
Longitudinal Handfeed Ass'y	85
Cylinder Set Ass'y	88
Hydraulic Ass'y	90
Balance Structure Ass'y	94
AGS 2448 Front Casting Structure	96
AGS 2480 Front Casting Structure	98

Note: We follow a policy of continuous improvement of all our products. We reserve the right to change specification, mechanics or designs at any time without notice.

General Safety Rules

Do

- (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 operators 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 CO2 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 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 filter mask, 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 articles.
- (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 line should be drawn to mark those areas where personnel are restricted from entering.
- (12) Operation and maintenance personnel must only work inside areas for safe operation or maintenance.
- (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 doors must be closed at all times, except when maintenance work is being done.
- (15) Before maintenance work, the power source should be turned off and only proper tool should be used.

Don't

- (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 with tools.
- (4) To prevent eye injury to personnel by dusts and particles, compressed air should not be used to clean the machine.

Safety Rules for this Machinery

Do

- (1) Only use grinding wheel with a maximum peripheral speed of 2000m/min or greater.
- (2) Before inspecting or maintaining the power source, first make sure that you are adhering to the instructions on the related warning signs.
- (3) If warning or instruction sign 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, insulation gloves, rubber or leather boots and other non-conducting protective items should be used.
- (5) Electrical parts need grounding must be grounded according to 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 pieces with a hardness of HRC 65.
- (9) The grinding wheel balancing should only be done by a trained personnel. After balancing the grinding wheel, it can be mounted onto the wheel spindle. Before mounting, wipe clean the flange and the mounting portion of the 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

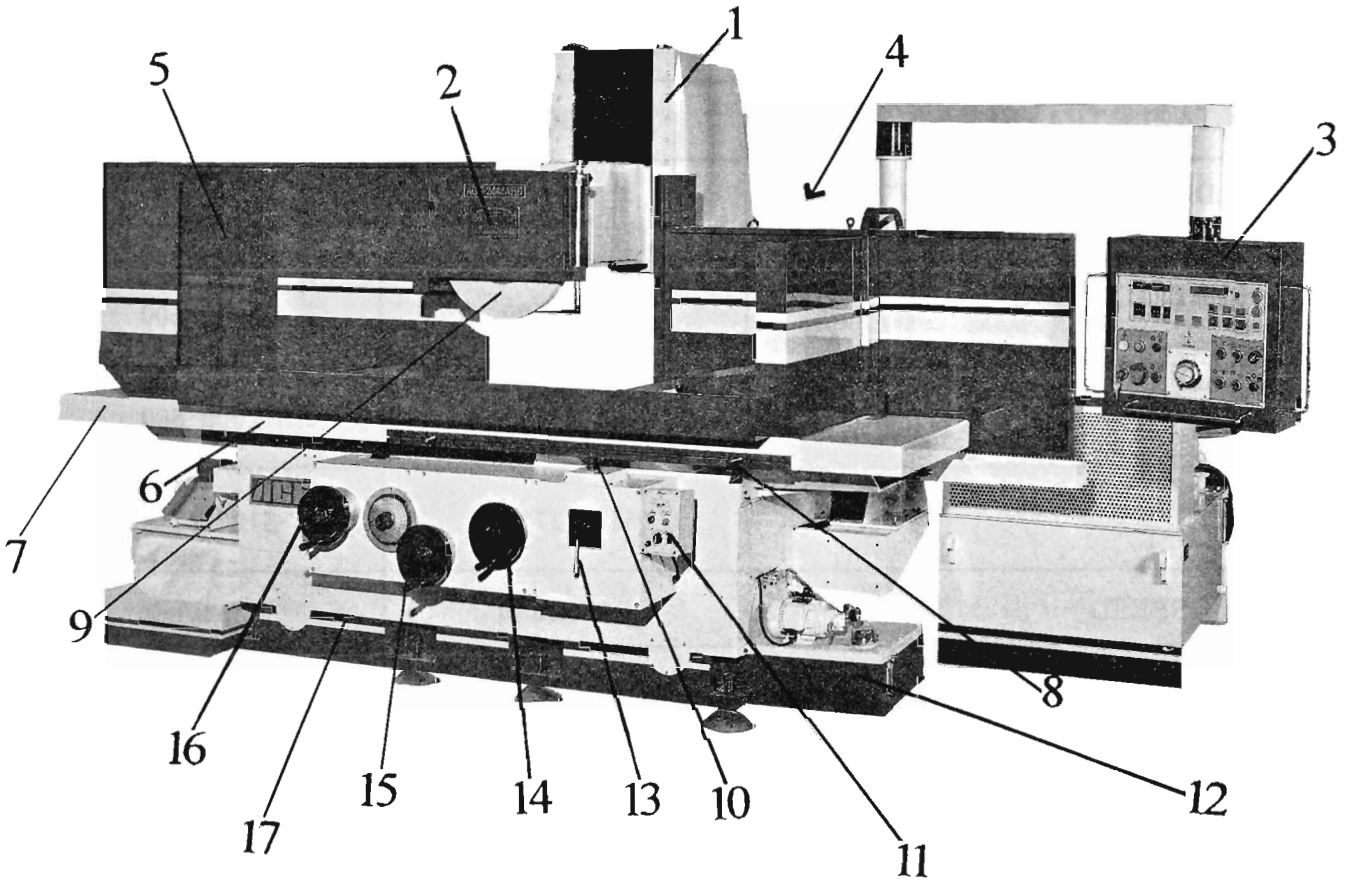
starting the wheel spindle motor, let the grinding wheel spin freely for at least five minutes before starting to grind the work piece.

- (12) Make sure the surface of the electromagnetic 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 held onto the magnetic chuck. These 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 that produce dust during grinding process.

Don't

- (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 an authorized distributor 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 haphazardly change the use and/or capacity setting on the machine and do not use grinding wheels that 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

24 " SERIES CONTOUR AND NOMENCLATURE



2448AHD

- | | |
|-------------------------------------|---------------------------------------|
| 1.UP COLUMN | 2.WHEEL GUARD |
| 3.PENDANT CONTROL PANEL (Rem.1) | 4.ELECTRIC CABINET (Rem.2) |
| 5.SPLASH GUARD SET | 6.TABLE |
| 7.DUST COVER OF TABLE (Rem.3) | 8.LONGITUDINAL TRAVEL STROKE ADJUSTER |
| 9.WHEEL | 10.DIRECTION CHANGE ARM |
| 11.ELE.MAG.CHUCK.CONTROLLER (Rem.4) | 12.CONTINUE LUBRICANT PUMP |
| 13.FLOW CONTROL LEVER | 14.HANDWHEEL (VERTICAL) |
| 15.HANDWHEEL (CROSS-FEED) | 16.HANDWHEEL (LONGITUDINAL) |
| 17.BASE | |

Rem1 : If machine model is AH type ,This set will be a option accessory).

Rem2 : Electric cabinet is installed behind the pendant control panel support stand.

Rem3 : If ELE. MAG. CHUCK is not ordered , then This equipment won't be installed.

Rem4 : If machine model is 2480 series, This will be a bellows type dust cover.

SPECIFICATION AND STANDARD ACCESSORIES

UNIT:MM

ITEM	MODEL	2448AH 2448AHD	2480AH 2480AHD
GRIND RANGE (L*W*H)		1200*600*550	2000*600*550
MAX.TABLE TRAVEL		1300	2100
MAX.DISTANCE BETWEEN TABLE SURFACE AND SPINDLE CENTER		800	800
TABLE DIMENSION L*W		1200*600	2000*600
ELECTRO-MAG. CHUCK L*W		1200*600	2000*600
GRINDING WHEEL O.D*H.D*T.		510*127*50	510*127*50
TABLE SPEED		5-25m/min	5-25m/min
AUTO. CROSS-FEED CARRIAGE		0-38	0-38
CROSS HAND WHEEL DIAL		0.02	0.02
VERTICAL TRAVEL HAND WHEEL DIAL		0.005	0.005
MOTOR OF SPINDLE		15HP	15HP
MOTOR OF HYDRAULIC TANK		5HP*6P	7.5HP*6P
MOTOR OF UP-DOWN RAPID FEED		1HP*4P(AH TYPE) 400W DC SERVO (AHD TYPE)	1HP*4P(AH TYPE) 400W DC SERVO (AHD TYPE)
NET. WEIGHT		6850KGS	11450KGS

ACCESSORIES:

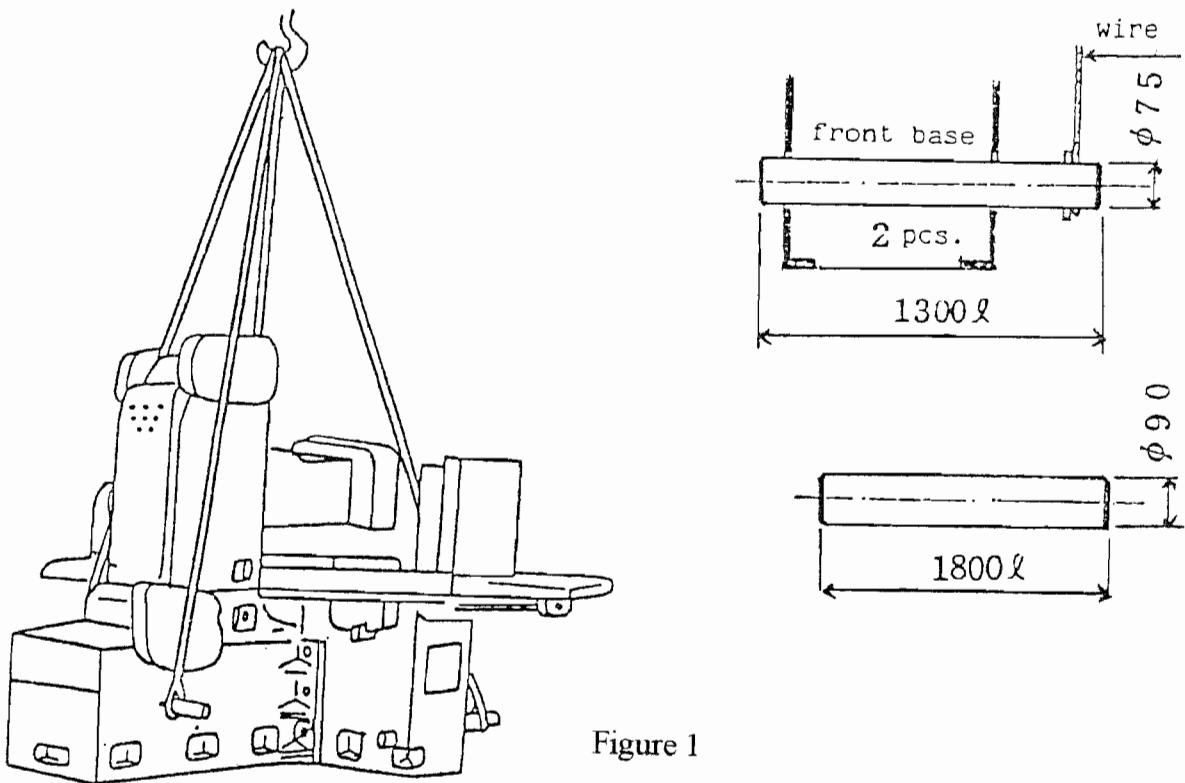
Standard accessories

- | | |
|--|--|
| 1.Grinding wheel..... 1 pc. | 2.Wheel flange and weight..... 1 pc. |
| 3.Tool box with tools..... 1 set. | 4.Splash guard..... 1 set. |
| 5.Base screw & Plate..... 1 set. | 6.Wheel balancing arbor..... 1 pc. |
| 7.Wheel balancing arbor..... 1 pc. | 8.Flange extractor..... 1 set. |
| 9.Diamond dresser..... 1 pc. | 10.Automatic lubricant equipment.... 1set. |
| 11.Coolant equipment with paper filter | 1set. |

2. TRANSPORT AND INSTALLATION

2-a. When moving the machine, it is very important to prevent machine from vibration and bumping. This is done to protect the accuracy of the machine.

2-b. After taking off the wooden crate, please use hoisting cables to transport the machine. You have to prepare three steel bars and two hanging cables. Put two bars into the front base holes, and the other bar into the rear base hole under the saddle, and then put some soft clothe between cables and column to protect from damage the machine. After locating all the bars and cables, you can slowly raise up the machine. (see figure 1) Make sure the machine is properly balance. If not, please relocate the cable position. Repeat the procedure until machine is safely moving up. Note: The cable needs to be at least one inch thick in diameter.

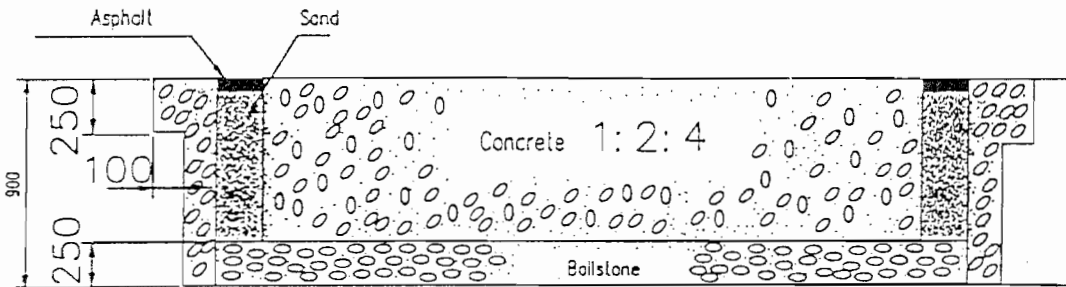


2-c. There are also four hooks on the outside of the hydraulic tank, please use ropes or steel cables to raise up the tank.

2-d. Site and its requirements

1. Selecting the installation site

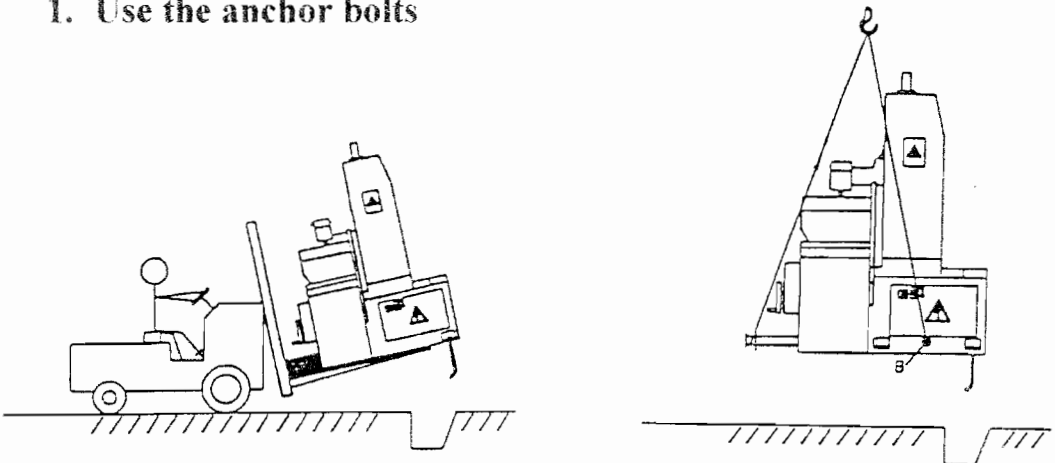
- The site in which the machine is to be installed will deeply influence its function and grinding accuracy. The grinder may not be placed by milling, boring, and drilling machine or even pressing machines, because the vibration produced by these machines will transfer over to the grinder and cause wavy patterns to form on the grinding surface.
- The machine must also be protected from sunlight, so that parts of the machine will not be subjected 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.
- 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 grinder is installed must have a foundation strength of above 5 tons per meter square.
Note: See the following figures for foundation



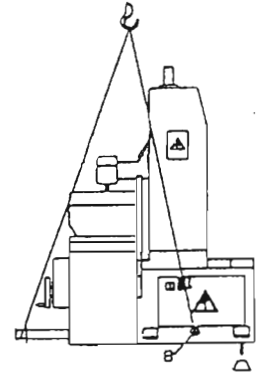
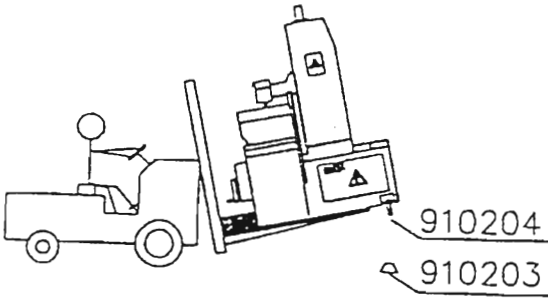
2-e. Foundation

When you are installing the grinder, you can also use the forklift to install it. The forklift must have been rated at least eight tons.

1. Use the anchor bolts



- *Use the nuts to mount the anchor bolt to the machine, and leaving at least 35mm of thread for level adjustment.
 - *Slowly lower the machine so that the bolts are positioned on top the anchor holes.
 - *Use taper blocks to adjust the leveling.
 - *Fill the anchor holes with concrete.
2. Use leveling pads and leveling screws

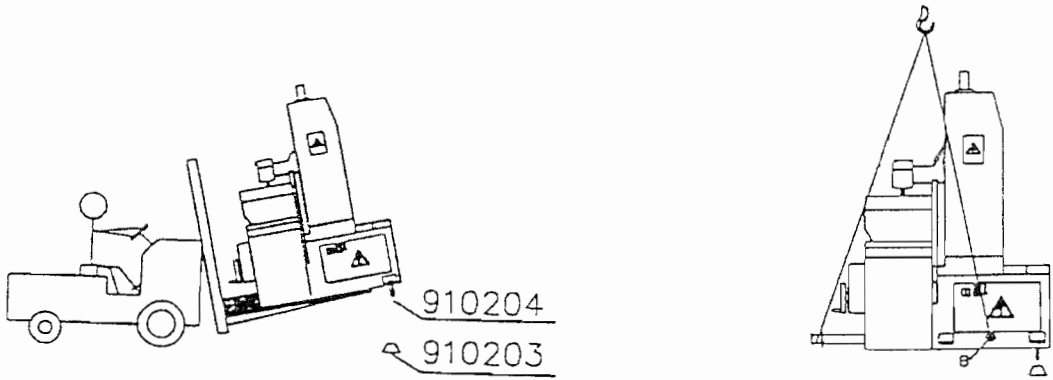


- *Screw in the leveling screws onto the machine base. For easy leveling and steadiness of the grinder, please make leveling screws as deep as possible.
- *Slowly lowering down the machine, and let the round head of the leveling screws fall onto the holes of leveling pads.
- *Adjust the level of the machine.

2-f. Remove the locking plates:

Please remove all locking plates before leveling. They are located between all moving parts, i.e. saddle, table, etc.

- *Use the nuts to mount the anchor bolt to the machine, and leaving at least 35mm of thread for level adjustment.
 - *Slowly lower the machine so that the bolts are positioned on top the anchor holes.
 - *Use taper blocks to adjust the leveling.
 - *Fill the anchor holes with concrete.
2. Use leveling pads and leveling screws

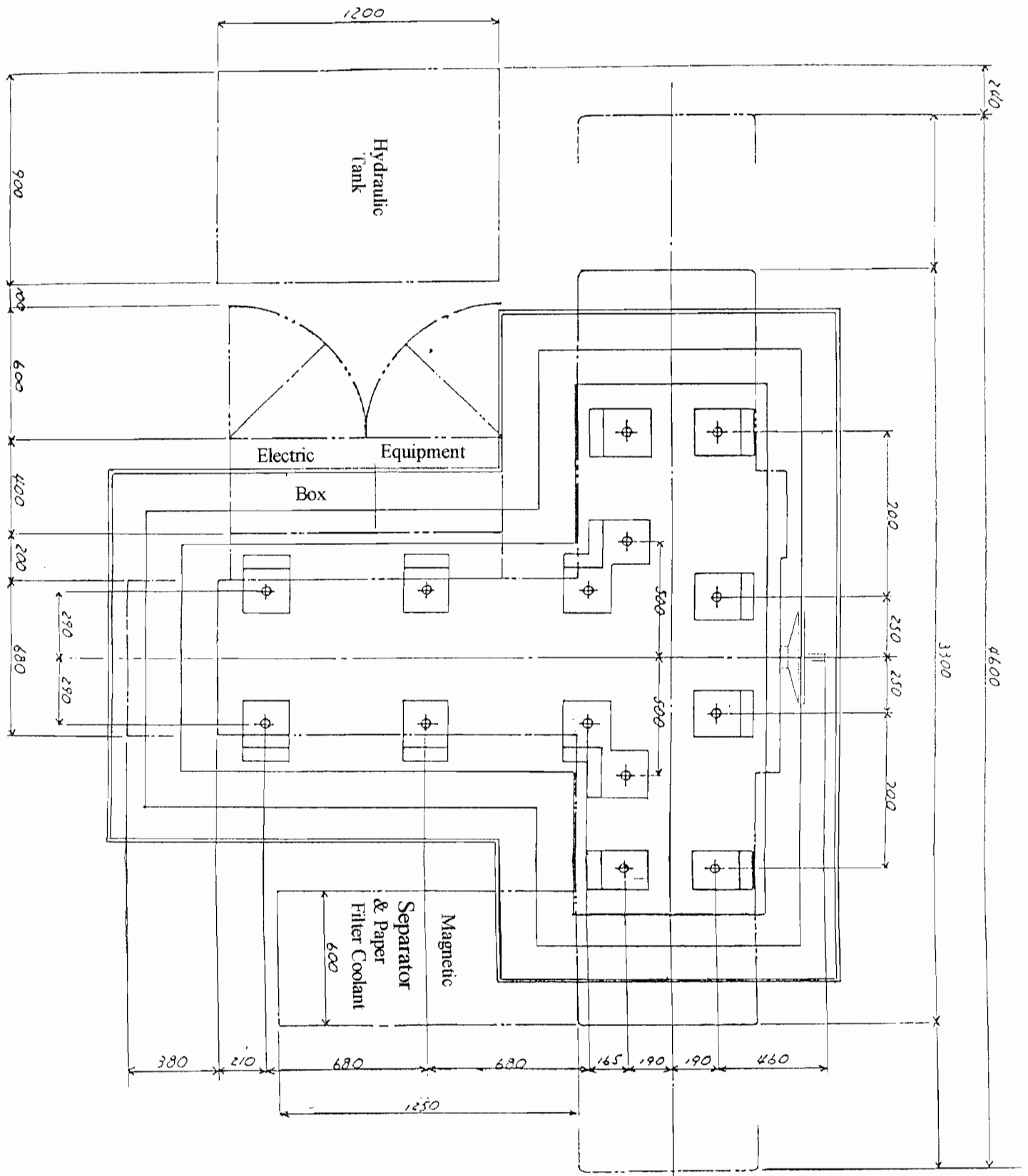


- *Screw in the leveling screws onto the machine base. For easy leveling and steadiness of the grinder, please make leveling screws as deep as possible.
- *Slowly lowering down the machine, and let the round head of the leveling screws fall onto the holes of leveling pads.
- *Adjust the level of the machine.

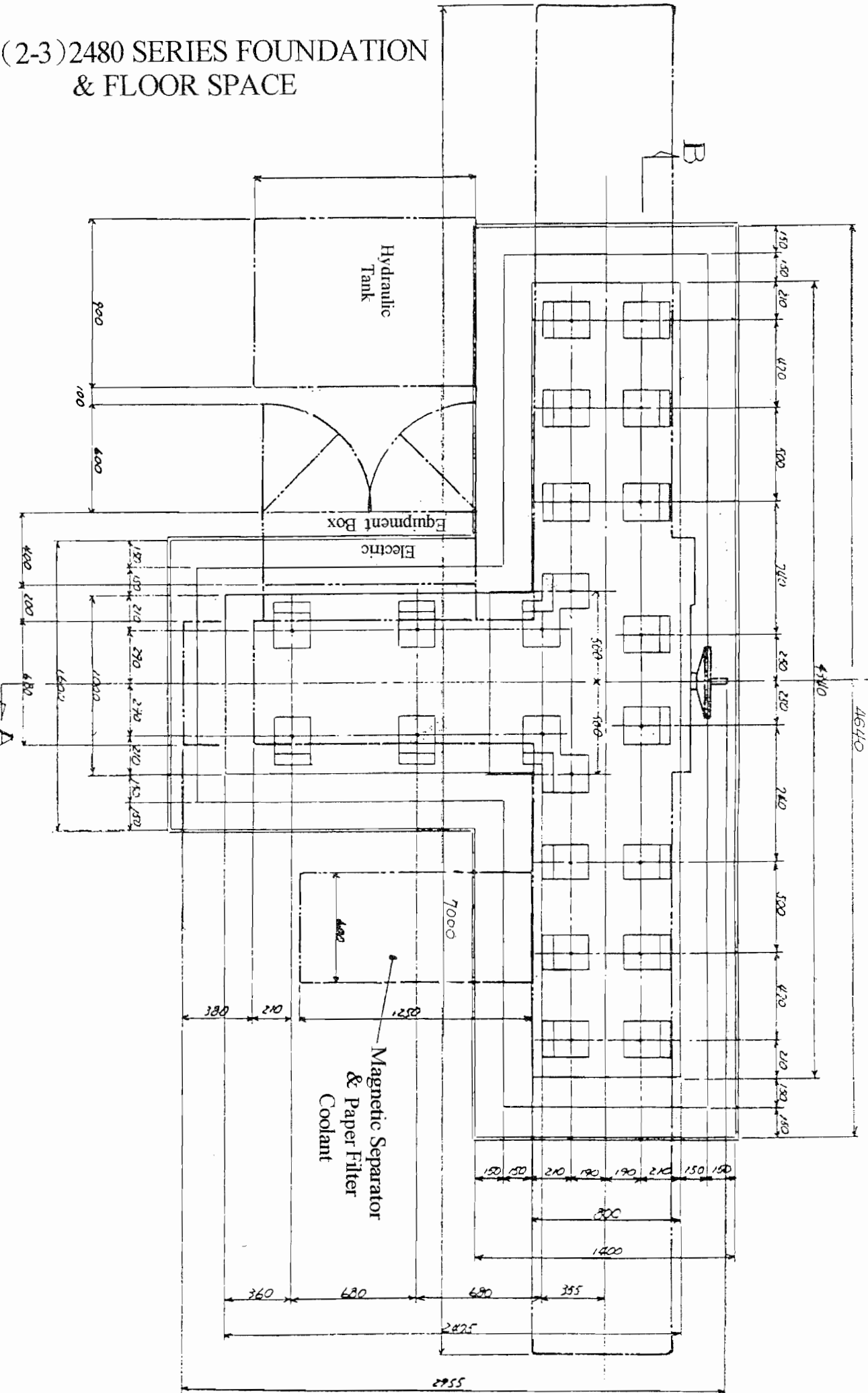
2-f. Remove the locking plates:

Please remove all locking plates before leveling. They are located between all moving parts, i.e. saddle, table, etc.

(2-2) 2448 SERIES FOUNDATION & FLOOR SPACE



(2-3) 2480 SERIES FOUNDATION & FLOOR SPACE



3. LEVELING AND ADJUSTMENT

3-a. Leveling adjustment of work table: Level gauge specification 0.02mm/M.

1. Turn the table handwheel: Move the work table to the center position. Turn the crossfeed handwheel: Move the column to the middle position. By moving table left or right and column front and back, the level can be adjusted to within 0.04mm/M.

2. Adjusting the work table level.

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

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

After adjusting the level as above, move the table to the left position to adjust the leveling screws #11, 12 and 14 (as shown on Fig. C).

Move the table to the right position to adjust the leveling screws #1, 3, 4 to adjust the level (as shown in Fig. D).

Move the table back to its center position, and check whether its level is leveled or not. Repeat procedure a to d, if it's not.

1. Adjusting the saddle level

- a. Set the level gauge flat at the fixed position on the spindle housing (as shown in Fig. E).
- b. Move the column (Column is located on top of the saddle, please make a note of it!) to the rear position to adjust leveling screws #6 and 9 to adjust the level (as shown in Figs. A and E).
- c. Move the column to the front position to adjust the leveling screws #5 and 10 to adjust the level (as shown in Fig. E).
- d. Place level gauge in another direction (as shown in Fig. F), then move the column to its middle position.
- e. Move the column to the rear position to adjust the leveling screws #7 and 8 to adjust the level (as shown in Fig. F).
- f. Move the column to the front position to adjust the leveling screws # 5 and 10 to adjust the level (as shown in Fig. F).

4. After performing the above adjustments to the linear and diagonal levels, please check one more time to see if the work table and saddle are leveled to accuracy standard (within 0.04mm). If not, please adjust level again according to procedure specified in 3-a. 2 and 3. After finishing leveling, slightly tighten the leveling screw nuts.

Note: When the grinder is leveled the first time, please re-level the grinder again within one month. Thereafter please level it every six months to maintain its grinding accuracy.

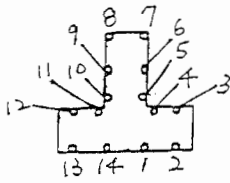


Fig A

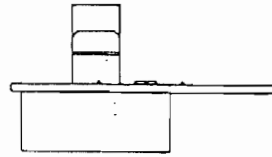


Fig D

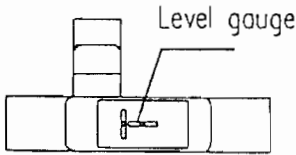


Fig B

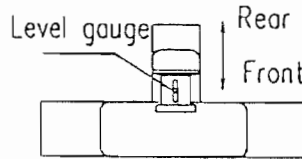


Fig E

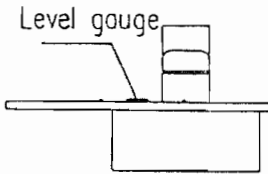


Fig C

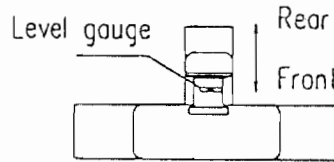


Fig F

4. CLEANING AND SETUP

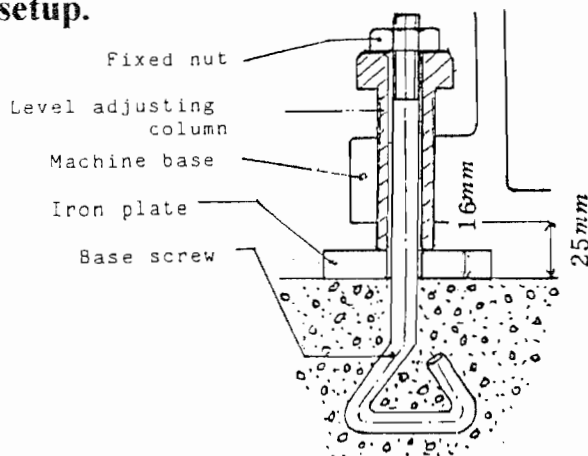
1. Cleaning

Before packing, the grinder has been applied with rustproof grease to prevent rusting. Before operation or leveling of the machine, you need to wipe it off by soft cloth and cleaning agent such as WD 40.

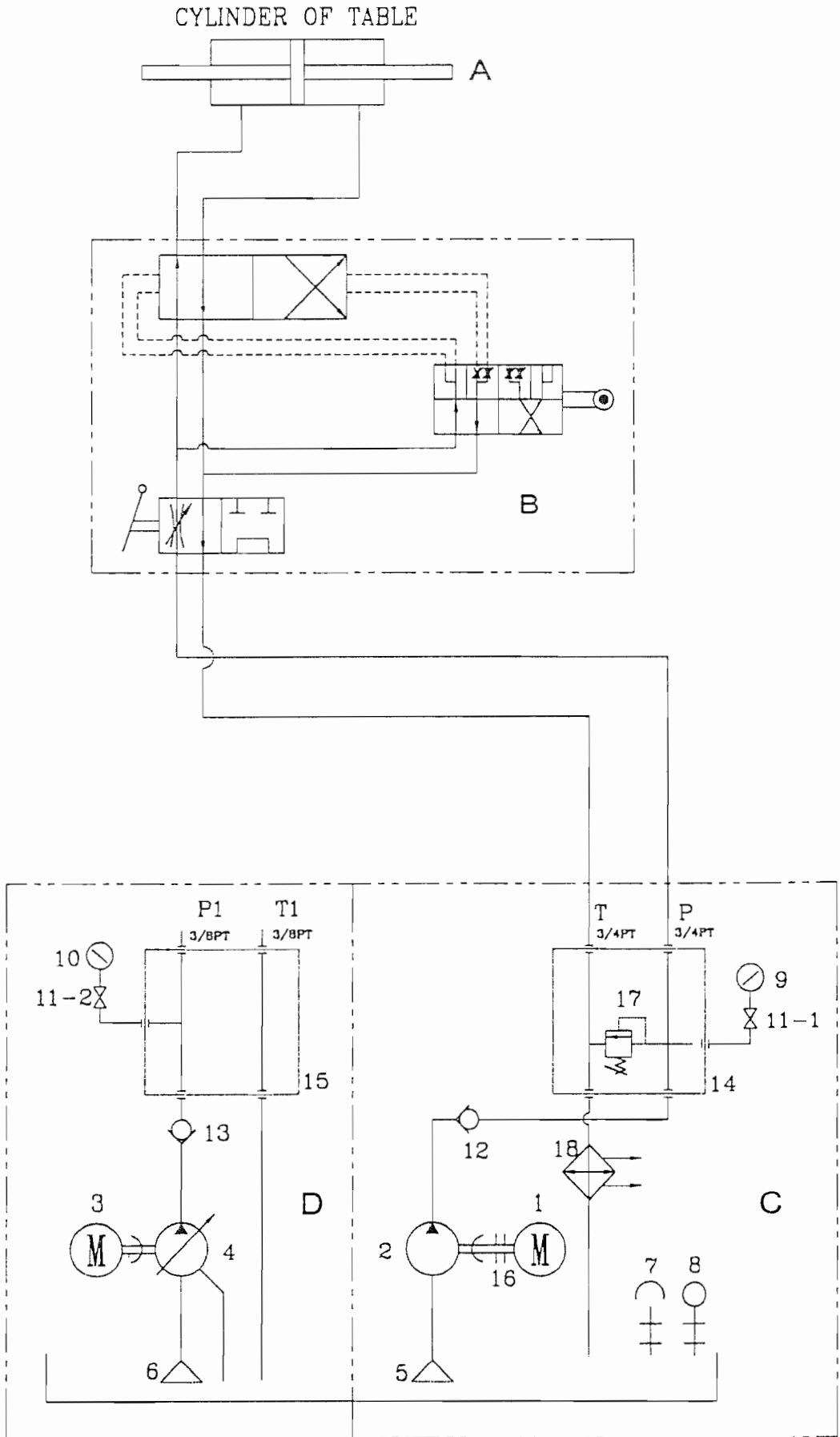
Notice: Any volatile oil and cutting fluid are prohibited to use as cleaning agent.

2. Setup

- a. Location of the machine has to escape from unsteady land, direct sunshine and changeable temperature.
- b. Build the ground work as figure shown before.
- c. Dig for foundation screw holes at indicated places on the concrete ground (It's strongly suggested.).
- d. Setup order: Raising up the grinder (same procedure if you use the fork truck), put foundation screws into the screw holes on the machine base and then tightening the nuts on the foundation screws.
- e. Aim the foundation screws at the holes on the concrete ground. Then slowly lowering down the grinder.
- f. Before completely set down the grinder, put in iron plated at the rear base of the machine, and one on each right and left of the front machine base. (Iron plates are prepared by the user and they should be at least one inch in thickness and 12 inch in square.)
- g. Fill the foundation screw holes with new concrete, and make sure they are packed solidly.
- h. After the concrete solidified, adjust the foundation screws until the machine is leveled. Please use the adjustment method mentioned before. Finally, take out the iron plates and machine is setup.



5. HYDRAULIC SYSTEM AND OIL SELECTION

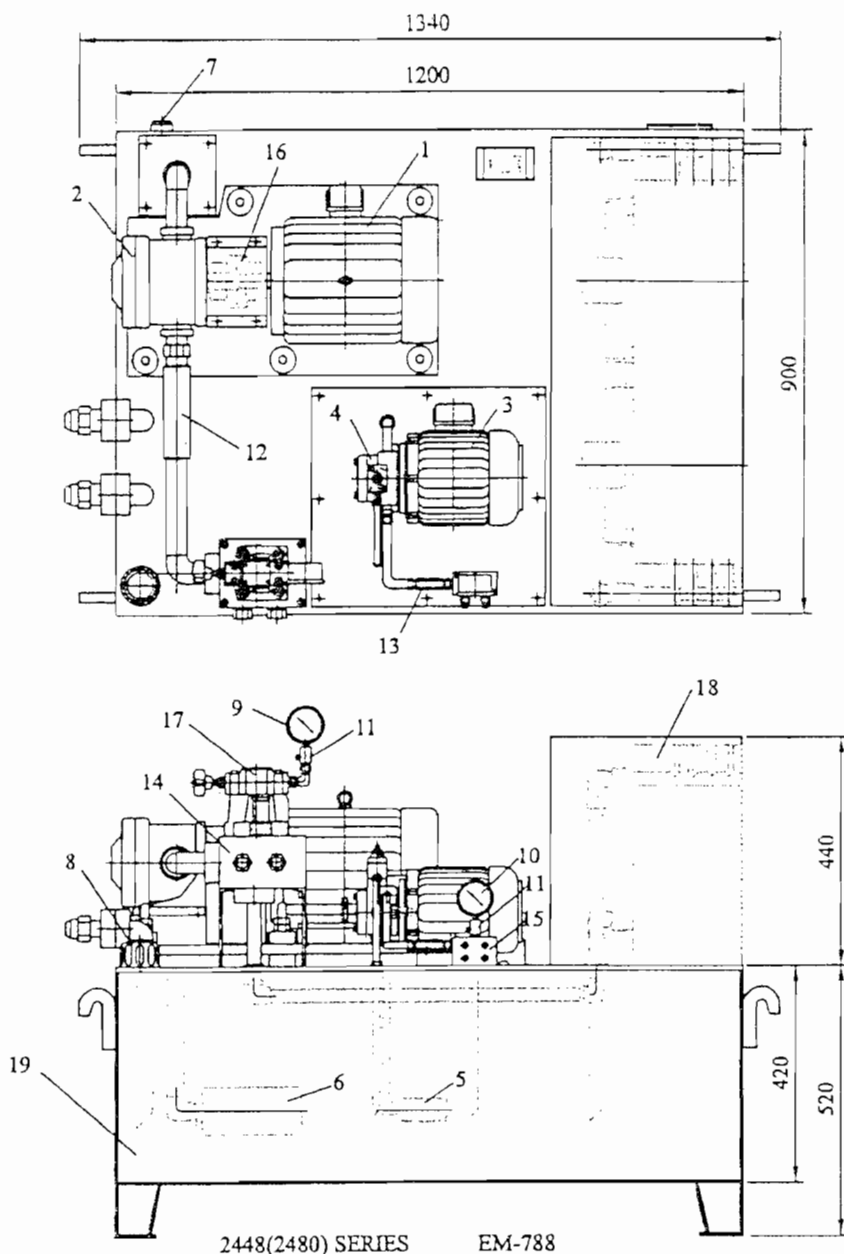


2448/2480 SERIES HYDRAULIC SYSTEM PARTS LIST

NO.	PART NO.	PARTS NAME	REMARK
A	Cylinder Assembly	Cylinder Of Table	
B	Vavle Assembly	Flow and direction Control Unit	
C D	Hydraulic Pump Unit		
C	(Main Pump Unit)		
1		Motor	
2		Pump	
5		Suctioner Strainer	
6		Oil Filter	
7		Level Gauge	
8		Oil Filter	
9		Pressure Guage	
11-1		Pressure Guage Cock	
12		Inlet Check Valve	
14		Manifold	
16		Coupling	
17		Relief Valve	
18		Cooler	
D	(Auxiliary Pump Unit)		
3		Motor	
4		Pump	
6		Suctioner Strainer	
10		Pressure Guage	
11-2		Pressure Guage Cock	
13		Inlet Check Valve	
15		Manifold	

If the user not order the hydraulic parallel dresser , then "D" section won't be installed.

HYDRAULIC TANK LAYOUT & PARTS LISTS



19	TANK	1200x900x520	1	
18	COLLER	EM-373	1	
17	RELIEF VALVE	HRF-G06-1-10	1	
16	COUPLING	E-97	1	
15	MANIFOLD	EM-374	1	
14	MANIFOLD	EM-372	1	
13	INLET CHECK	CIT-03-05-10	1	
12	INLET CHECK	CIT-10-05-10	1	
11	GAUGE COCK	1/4"(CU)	2	
10	PRESSURE GAUGE	2-1/2"x35KG	1	
9	PRESSURE GAUGE	2-1/2"x100KG	1	
8	OIL FILLER	AB-1163	1	
7	LEVER GAUGE	LS-7"	1	
6	SUCTIONER STRAINER	PS-06	1	
5	SUCTIONER STRAINER	19.SS-2-100	1	
4	PUMP	VPVC-F12-A2-02	1	
3	ELEC. MOTOR	1HP4P	1	
2	PUMP	VPNE-61-2-30	1	
1	ELEC. MOTOR	5HP6P	1	
NO	DESCRIPTION	SPECIFICION	QTY	NOTE

COMMENTS FOR HYDRAULIC OIL CHOICE AND USAGE

***Hydraulic oil has to maintain an adequate viscosity.**

More or less viscosity of the oil will decrease after usage. If that happens, it will decrease the working efficiency and increase mechanical wear of the hydraulic system. Therefore we suggest brand and viscosity number of the oil to get the best result from the hydraulic system.

***Hydraulic oil will deteriorate after a period of usage.**

When hydraulic oil deteriorates, it takes the physical form similar to grease. This sediment form will cause uneven pressure in hydraulic system, and it will also decrease the life of the hydraulic components. So please change hydraulic oil according schedule.

***The normal hydraulic oil is transparent and colorless.**

Besides periodically changing hydraulic oil, if you find hydraulic oil is in the following conditions, please change oil immediately to protect hydraulic system.

1. Oil became dark brown color and produced funny odor.
2. Oil became milky white color because of water permeation.

***Hydraulic oil recommendation**

BRAND	KAO-KUANG	BP	ESSO	MOBIL	SHELL
OIL NO.	R-53	ENERGUL HL100 4.5° E/50°C 33cst/50°C	ESSTIC 50°C 4.7° E/50°C	D.T.E. Oil Medium 3.93° E/50°C 28.9cst/50°C	Teilus oil 29 4.0° E/50°C 29cst/50°C

***First time to change hydraulic oil is three months after usage. Then thereafter please change it once every year.**

Note: Please compensate the wearing of hydraulic oil anytime in order to maintain a standard working oil capacity.

***Hydraulic oil pressure of the main pump has to be kept between 20~25kg/cm².**

Note: To adjust the hydraulic pressure, please refer to the hydraulic tank unit assembly diagram.

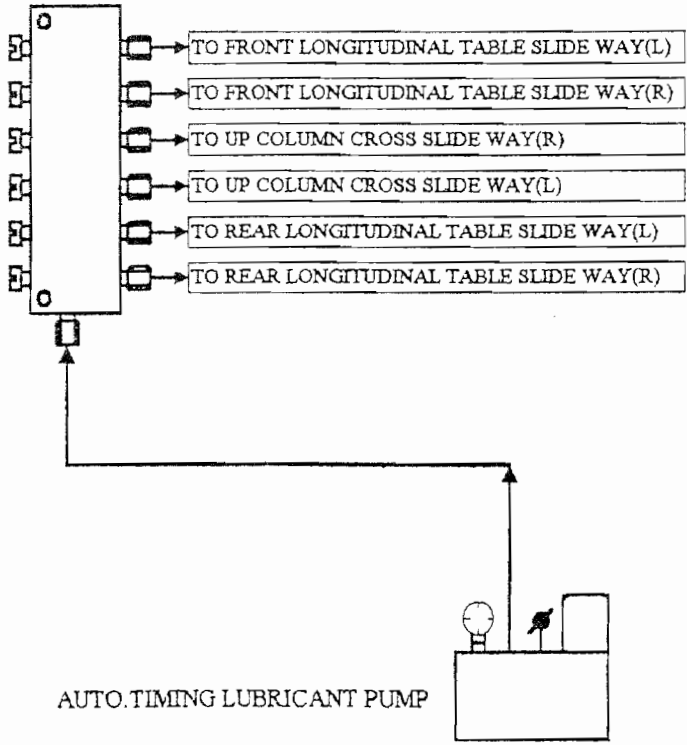
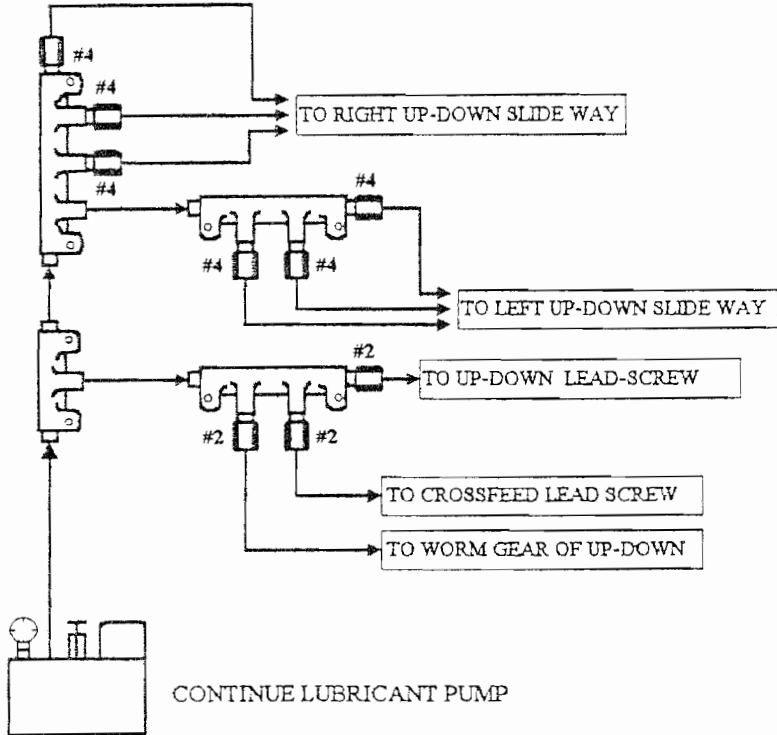
***Hydraulic oil pressure of the auxiliary pump has to be kept between 18~22kg/cm².**

Note: Section “D” of the part list will not exist, if the customer does not order the hydraulic parallel dresser.

- **The oil capacity of the hydraulic tank is approximately 85 gallons.**
- **Every two years, clean the filter inside the hydraulic oil tank. (Replace them if necessary)**

6. LUBRICATION SYSTEM AND WAY OIL SELECTION

2448/2480 SERIES



LUBRICATION INSTRUCTION SYSTEM AND DIAGRAM

24" series

Reliability and smooth running of the machine are ensured only by the correct choice of lubrication oil.

1. Lubrication pumps:

- a. When the hydraulic system is turned on, the circulating lubrication pump will operate continuously. The pump puts out approximately 500cc every minute if the pump pressure is kept between 6~9 kg/cm².
- b. Automatic timing lubrication pump will be activated when the circuit control power is turned on. It is a one-shot type lubrication pump. It pumps 3~6cc per 30 minutes. The amount of every shot is selected by the user, and the factory default value is 6cc.

2. Lubrication oil: Mobile Vactra #2 way oil, Chevron 68X waylube oil or equivalent.

3. Lubrication tank:

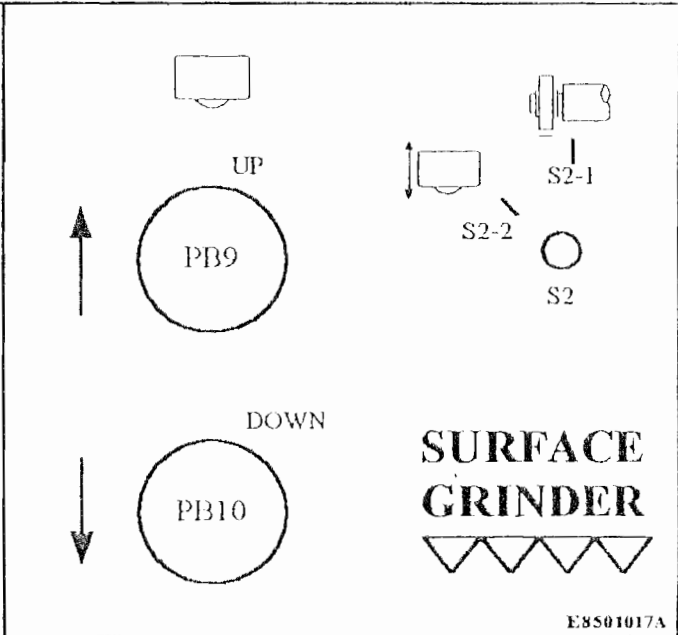
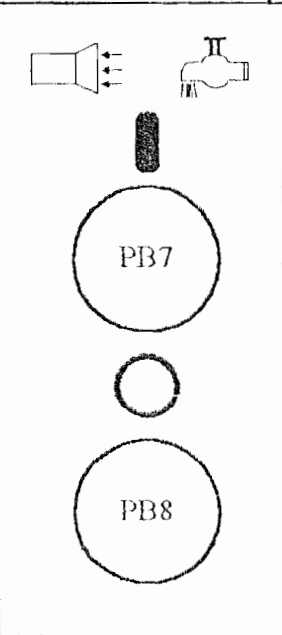
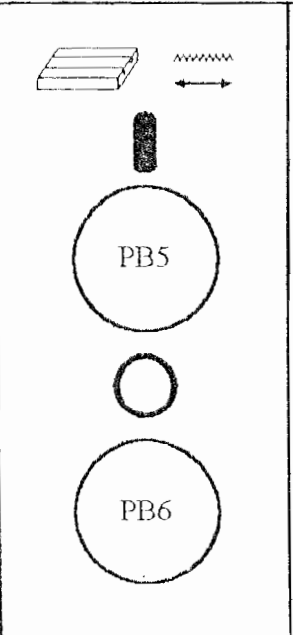
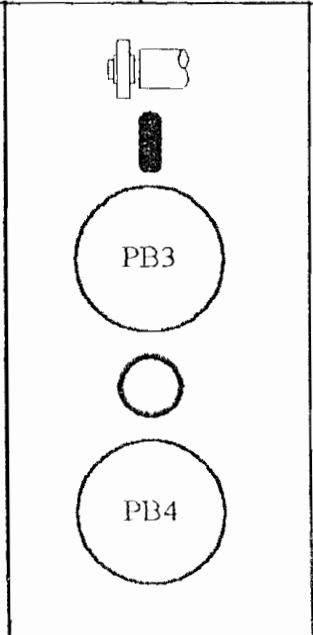
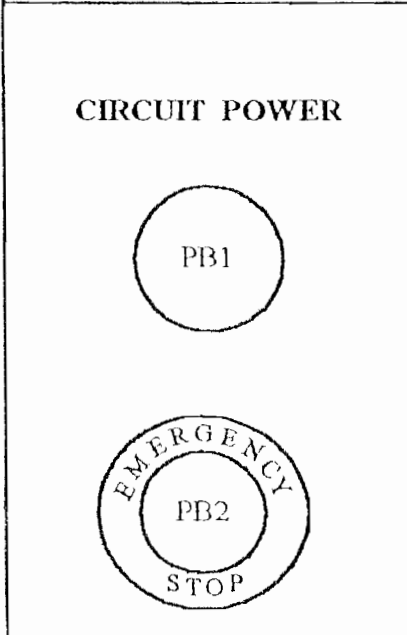
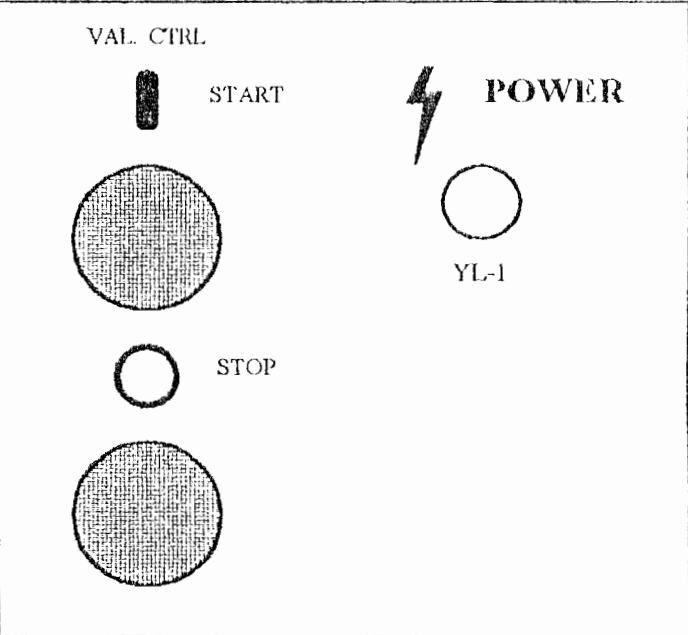
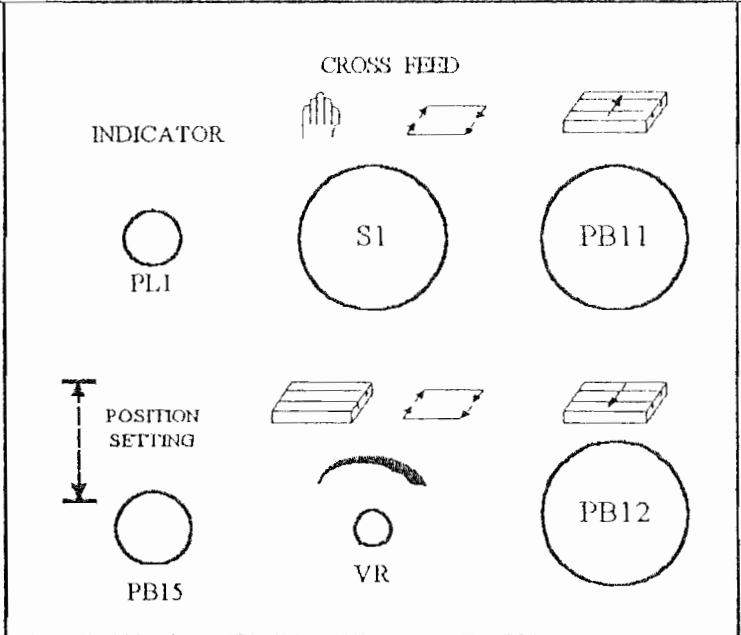
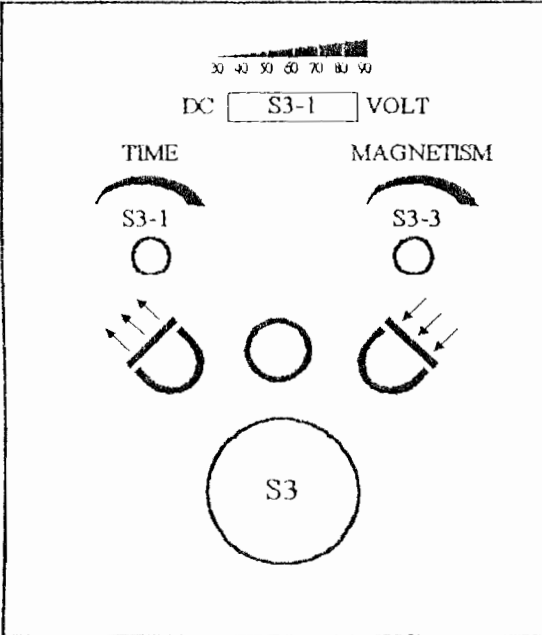
- a. Tank of circulating pump is about 9 gallons.
- b. Automatic timing lubrication pump is about 0.4 gallon.

4. Lubrication point: Please see drawing on the previous page.

5. Please check the oil quantity of the lubrication tank often. Make sure the oil level is always 70% of the tank.

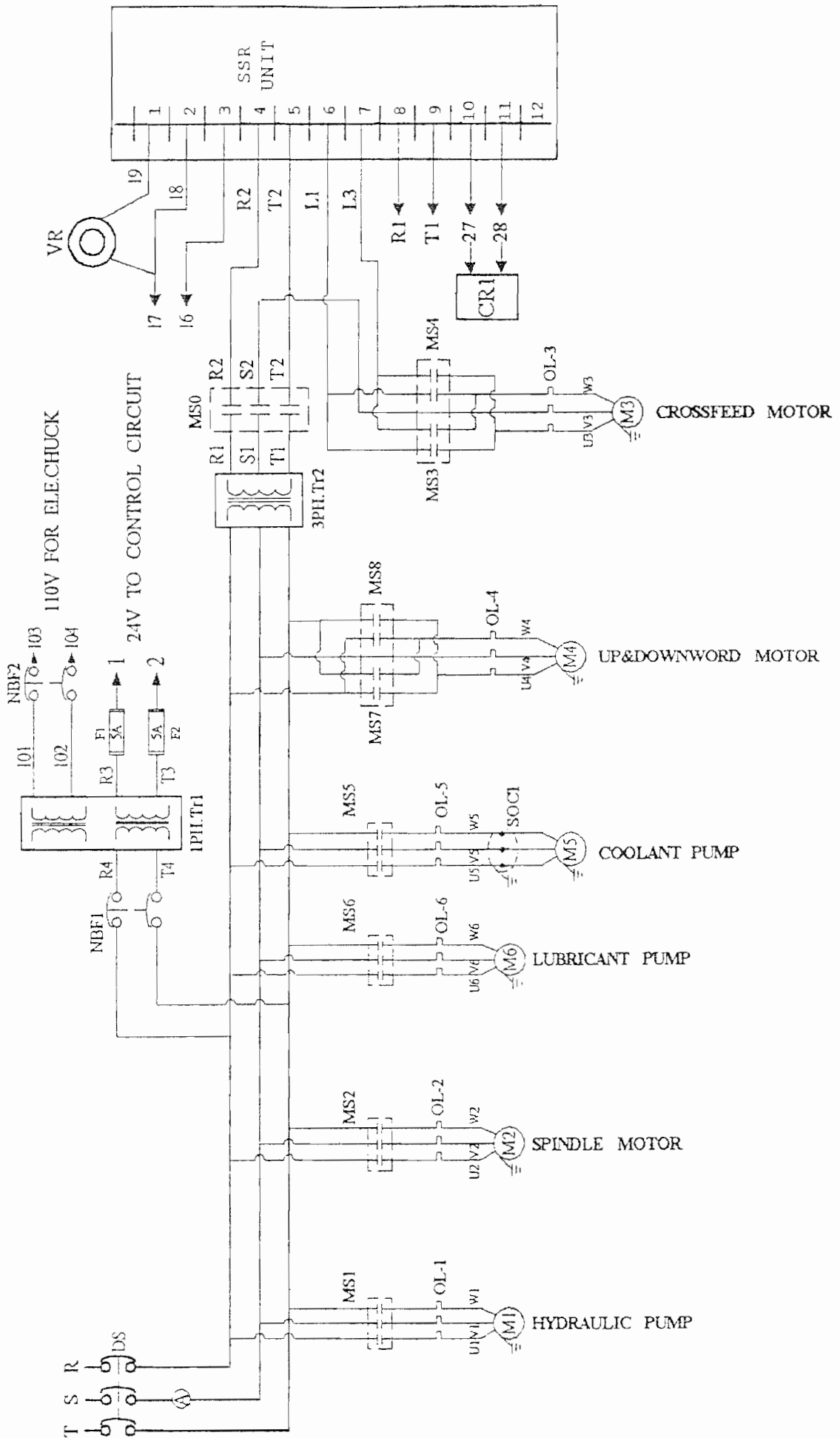
6. Occasionally please check every lubrication point. It is very important for maintaining the machine accuracy.

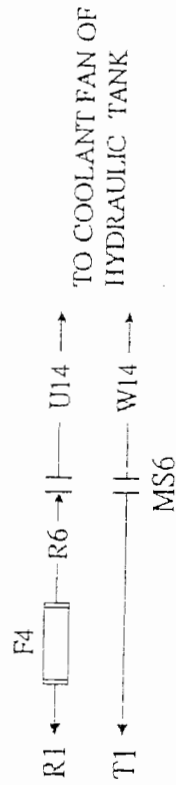
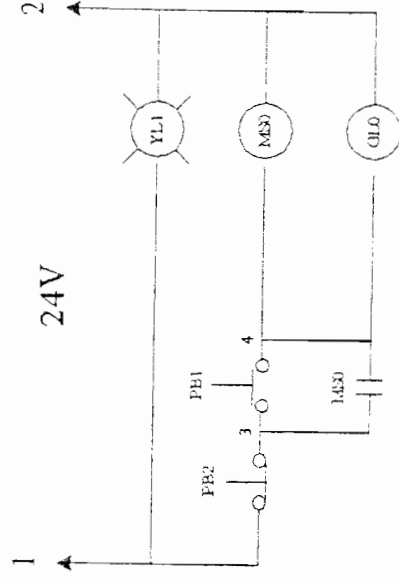
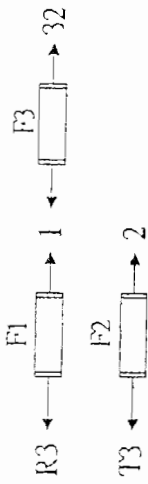
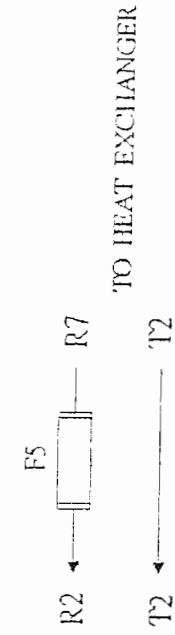
Electric Diagram and Part List



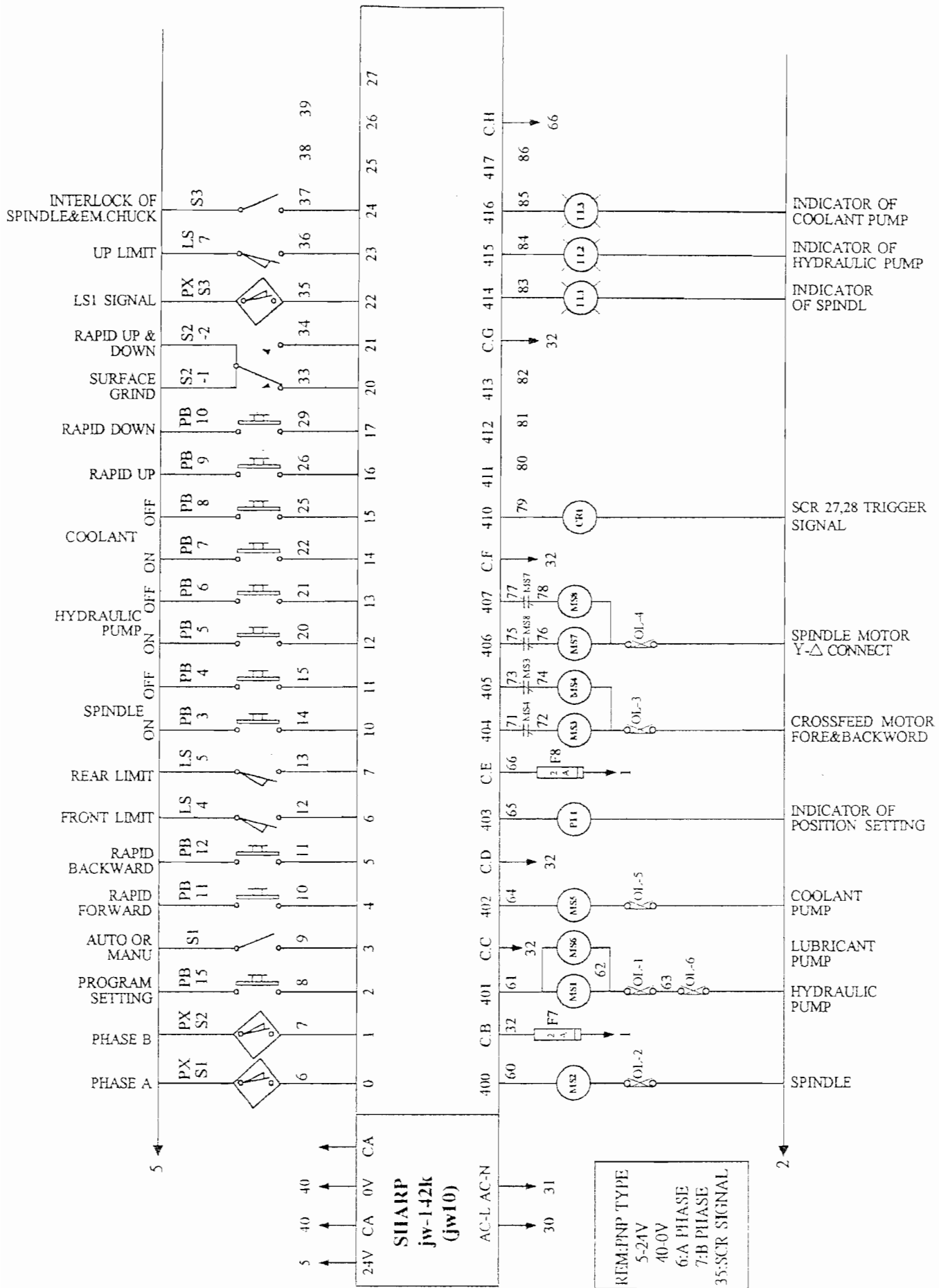
E8501017A

2448/2480AH SERIES MAIN ELECTRIC CIRCUIT DIAGRAM 1/2





2448/2480AH SERIES GRINDER SHARP PLC CONTROL CIRCUIT



2448/2480AH LAYOUT OF MAIN ELECTRICAL BOX

A

NFB

MSC

CR0
(MSC)

CR1

MS6
OL-6

MS1
OL-1

MS2
OL-2

MS3
OL-3

MS4

MS7
OL-4

MS8

MS5
OL-5

SHARP
PLC

F
1

F
2

F
3

F
4

F
5

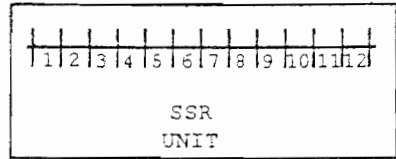
F
6

F
7

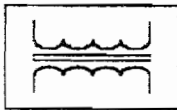
F
8

NFB1

NFB2

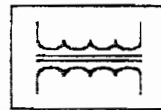


3PH Tr.



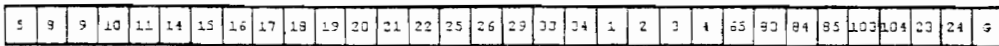
TR1

1PH Tr.

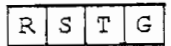


TR2

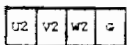
TB1



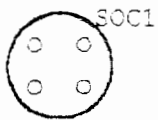
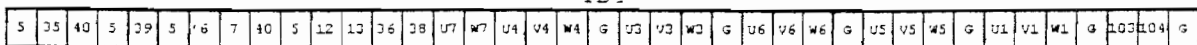
TB3



TB2



TB4



2448/2480 AH CONTROL PANEL & ELECTRIC PARTS DESCRIPTION 1/2

YL1	INDICATE LAMP OF POWER SOURCE.
PB1	PUSH BUTTON "ON" OF CONTROL CIRCUIT SOURCE WITH INDICATE LAMP (IL0).
PB2	PUSH BUTTON "OFF" OF CONTROL CIRCUIT SOURCE.(ALSO AS A EMERGENCY STOP).
PB3	PUSH BUTTON "ON" OF SPINDLE MOTOR WITH INDICATE LAMP(IL1).
PB4	PUSH BUTTON "OFF" OF SPINDLE MOTOR.
PB5	PUSH BUTTON "ON" OF HYDRAULIC PUMP WITH INDICATE LAMP(IL2).
PB6	PUSH BUTTON "OFF" OF HYDRAULIC PUMP.
PB7	PUSH BUTTON "ON" OF COOLANT OR DUST-SUCTION WITH INDICATE LAMP(IL3).
PB8	PUSH BUTTON "OFF" OF COOLANT OR DUST-SUCTION .
PB9	PUSH BUTTON FOR SPINDLE HEAD RAPID UPWARD. (ONLY S2 SWITCH CHOOSE ON MODE IS WORKABLE)
PB10	PUSH BUTTON FOR SPINDLE HEAD RAPID DOWNWARD.(ONLY S2 SWITCH CHOOSE ON MODE IS WORKABLE)
PB11	PUSH BUTTON FOR SPINDLE SEAT FORWARD.
PB12	PUSH BUTTON FOR SPINDLE SEAT BACKWARD.
PB15	PUSH BUTTON"OFF" FOR AUTO CROSS-FEED STORKE SETTING.
PL1	INDICATOR OF AUTO CROSS-FEED STORKE SETTING CONDITION.
S1	MULTI-SELECT SWITCH OF OPERATION MODE.
VR	VARIABLE SPEED OF AUTO CROSS-FEED.
S2	SELECT SWITCH OF RAPID UP&DOWN OR SURFACE GRIND..
S2-1	SURFACE GRINDING MODE.
S2-2	SPINDLE HEAD RAPID UP&DOWN MODE.
S3	SELECT SWITCH FOR CHUCK MAGNETIC OR DEMAGNETIC CONTROL.
S3-1	INDICATE LED OF STRENGTH OF MAGNETISM.
S3-2	VARIABLE RESISTANCE FOR DEMAGNETIZE TIME ADJUSTING.
S3-3	VARIABLE RESISTANCE FOR STRENGTH OF MAGNETISM ADJUSTING.
MS0	MAGNETIC CONTACTOR FOR CIRCUIT CONTROL SOURCE.
MS1	MAGNETIC CONTACTOR FOR HYDRAULIC PUMP MOTOR.
MS2	MAGNETIC CONTACTOR FOR SPINDLE MOTOR.
MS3 MS4	MAGNETIC CONTACTOR FOR SPINDLE SEAT CROSS-FEED MOTOR.
MS5	MAGNETIC CONTACTOR FOR COOLANT OR DUST-SUCTION MOTOR.
MS6	MAGNETIC CONTACTOR FOR LUBRICANT PUMP.
MS7 MS8	MAGNETIC CONTACTOR FOR SPINDLE SEAT UP&DOWN MOTOR.
M1	HYDRAULIC PUMP MOTOR.
M2	SPINDLE MOTOR.
M3	SPINDLE SEAT FORWARD&BACKWARD CONTROL MOTOR.
M4	COOLANT&DUST-SUCTION MOTOR.
M5	SPINDLE SEAT UP&DOWN MOTOR.
LS1	APPROXIMATE SWITCH FOR AUTO CROSS-FEED TRIGGER SIGNAL.
PXS1 PXS2	APPROXIMATE SWITCH FOR SETTING STROKE OF AUTO CROSS-FEED.
LS4 LS5	LIMIT SWITCH FOR MAX. TRAVEL OF SPINDLE SEAT.
OL1,OL2 OL3,OL4 OL5,OL6	CURRENT OVERLOAD.
1PH tr.	1 PHASE TR.(FOR CONTROL CIRCUIT &EM.CHUCK POWER SUPPLY. AND POWER OF FAULT SIGNAL OF SERVO DRIVER).
3PH tr.	3 PHASE TR.(FOR SPINDLE SEAT RAPID UP&DOWN AND CROSS-FEED,LUBRICANT PUMP,PAPER FILTER MOTOR).

SURFACE GRINDER MICROCOMPUTER CONTROLLER

UNIT: 1 μ

L.D.D1 FEEDS

UNIT: 2 μ

CPS FEEDS SETTING

L.D.D2 FEED TIMES SETTING

CPS2 FEED TIMES SETTING

L.D.D3 SPARK OUT SETTING

PS SPARK OUT SETTING

ON

CPBa

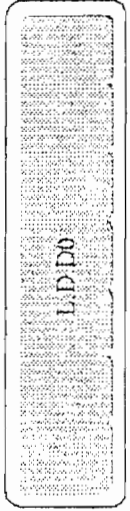
R.P.B RESET

OFF

CPBb

OPB ORIGIN

CPB1 MANUAL



DISPLAY OF GRINDING WHEEL POSITION

PB 2-1 RAPID TRAVERSE UP

PB 2-2 RAPID TRAVERSE DOWN

PB 3-1 SLOW TRAVERSE UP

PB 3-2 SLOW TRAVERSE DOWN

PB 4-1 STEP UP

PB 4-2 STEP DOWN

CPB5 AUTO START

POWER

ILL

2448/2480AHD CONTROL PANEL(METRIC)

CIRCUIT POWER

PBa

S3

S7

S4

S1

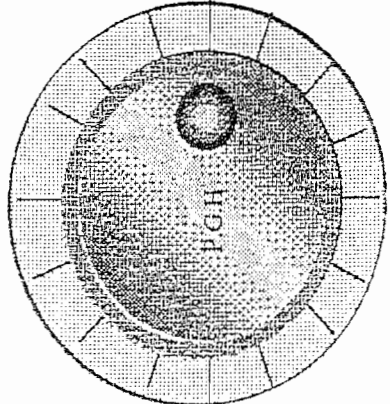
PBb

MULTIPLIER

CS2 X1 X2 X8

P

C



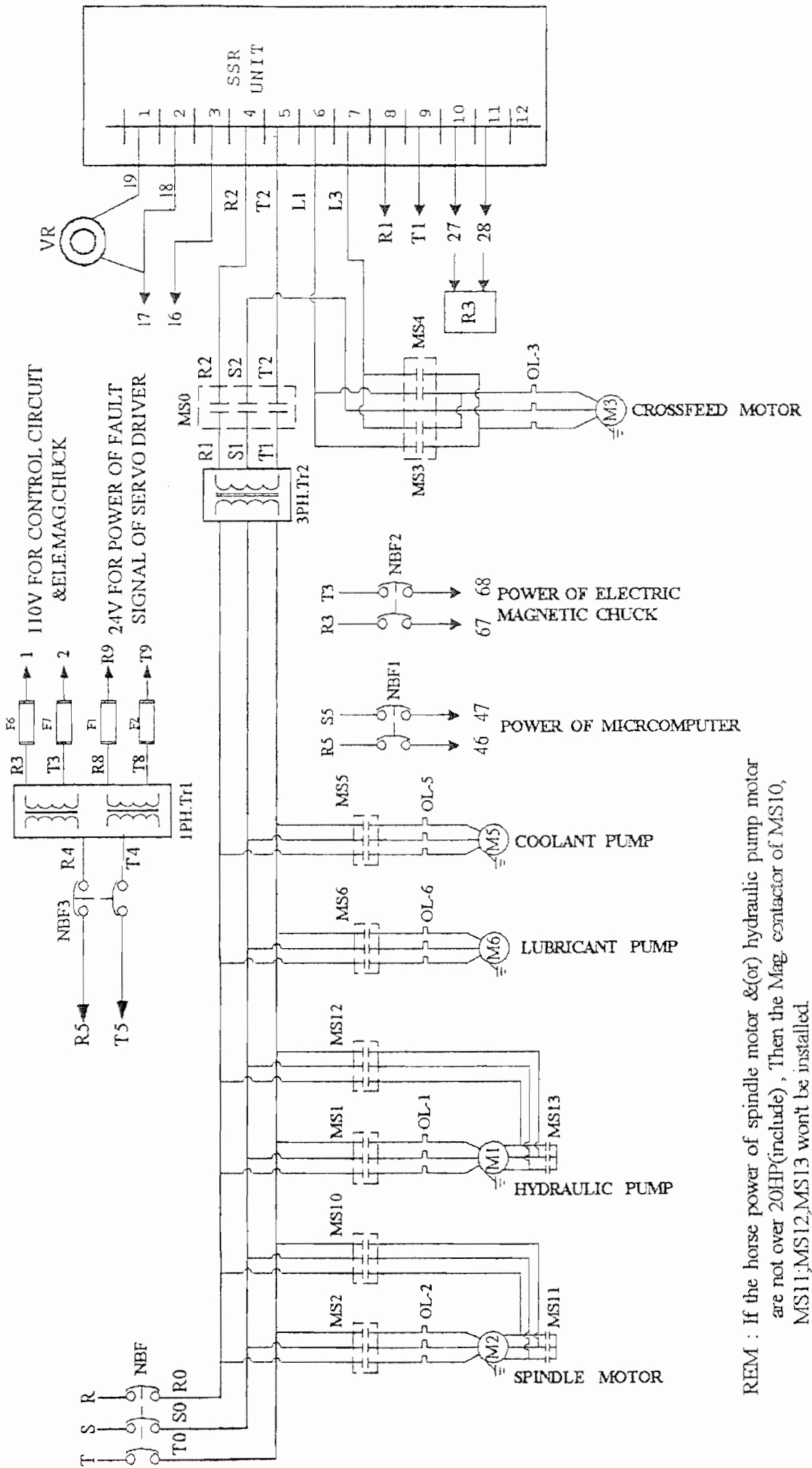
S2

S5

S6

VR

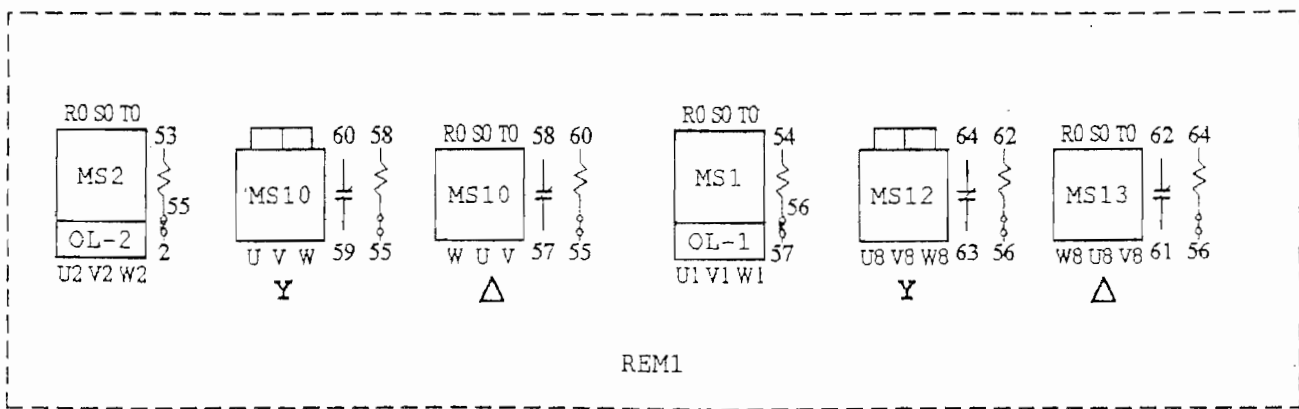
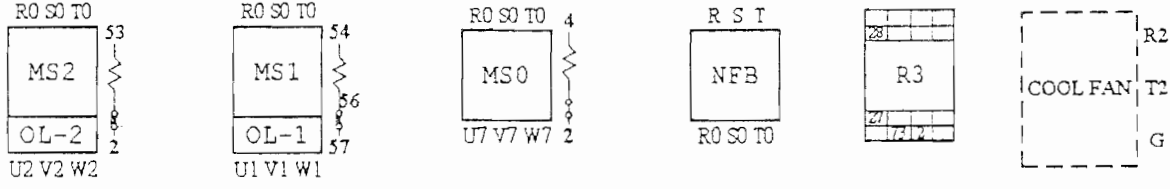
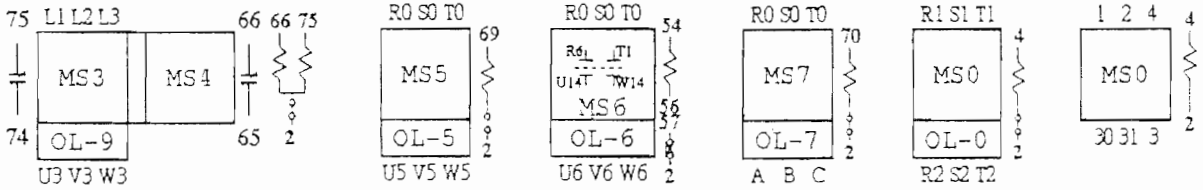
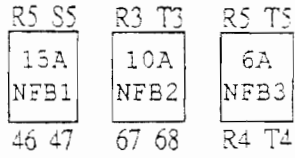
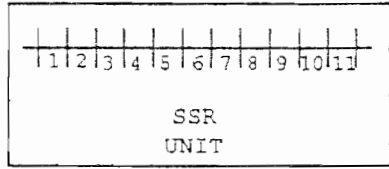
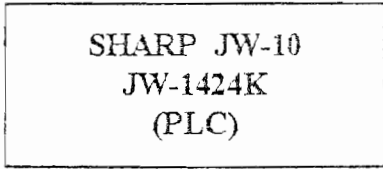
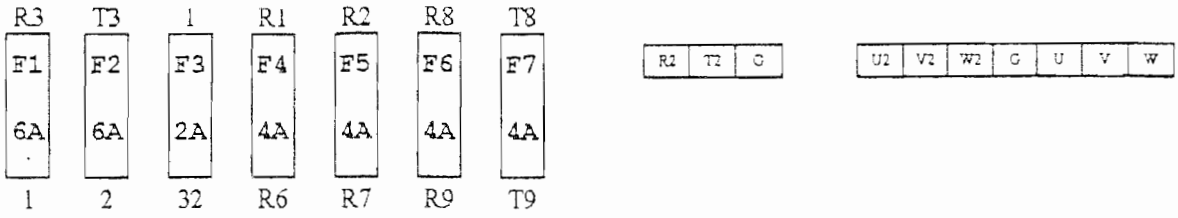
PBI POSITION SETTING



REM : If the horse power of spindle motor &(or) hydraulic pump motor are not over 20HP(include) , Then the Mag. contactor of MS10, MS11,MS12,MS13 won't be installed.

2448/2480AHD LAYOUT OF MAIN ELECTRICAL BOX 1/2

1
2
3
4
16
17
18
19
52
5
40
33
34
5
8
9
10
11
14
15
20
21
22
25
29
5
12
13
42
43
1
2
4
5
26
71
72
73
R2
T2
R1
S1
T1
G
R0
S0
T0
G
R5
S5
T5
R9
T9
46
47
67
68
5
6
7
40



REM1 : IF THE SPINDLE MOTOR OR HYDRAULIC PUMP MOYOR IS OVER 20 HP
THE WIRE CONNECT OF MOTOR IS USED Y-Δ CONNECTION

2448/2480AHD LAYOUT OF MAIN ELECTRICAL BOX 2/2

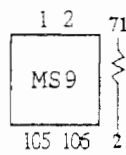
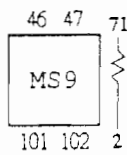
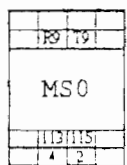
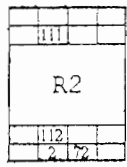
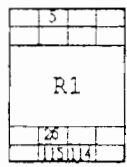
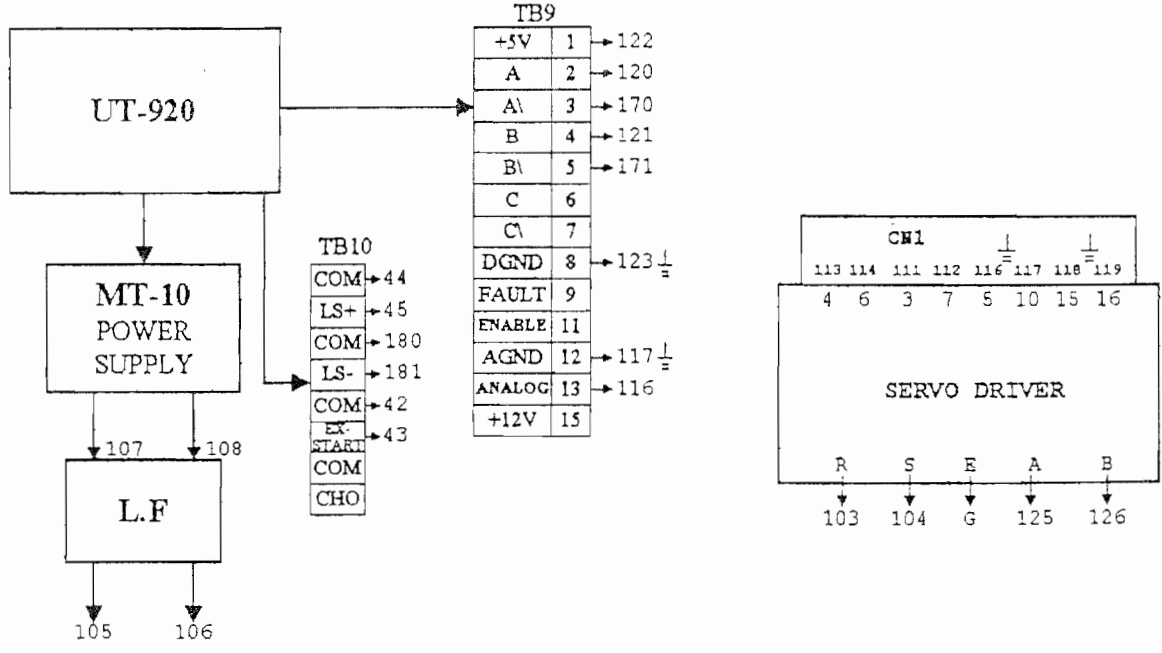
130
131
132
44
45
180
181
42
43

120
121
122
123
170
171
124

118
119

125
126

TB8



TB7

23	24	G	69	70	67	68	R9	T9	46	47	101	102	103	104	1	2	4	5	26	71	72
----	----	---	----	----	----	----	----	----	----	----	-----	-----	-----	-----	---	---	---	---	----	----	----

ENCODER FEEDBACK						
A	C	H	K	N	R	L
Green	White	Black	Red	Brown	Yellow	$\frac{1}{2}$
120	121	122	123	170	171	124
CHA	CHB	+5V	GND.	CH \bar{A}	CH \bar{B}	CASE

UPPER SWITCH : 44,45
LOWER SWITCH : 180,181
INFEEED SWITCH : 42,43



I.L	INDICATE LAMP OF POWER SOURCE.
PBa	PUSH BUTTON "ON" OF CONTROL CIRCUIT SOURCE WITH INDICATE LAMP (IL0).
PBb	PUSH BUTTON "OFF" OF CONTROL CIRCUIT SOURCE.(ALSO AS A EMERGENCY STOP).
S1	SWITCH OF HYDRAULIC MOTOR .
S2	SWITCH OF SPINDLE MOTOR.
S3	SWITCH OF HYDRAULIC PARALLEL DRESSER PUMP .(OPTION ACCESSORY)
S4	SWITCH OF COOLANT PUMP.
S5	SWITCH OF CROSS-FEED MANUAL OR AUTO MODE.
S6	RETURN SWITCH OF CROSS-FEED.
S7	SELECT SWITCH OF SURFACE OR PLUNGE MODE.
VR	VARIABLE STEP SPEED OF AUTO CROSS-FEED MODE.
PB1	INDICATOR OF AUTO CROSS-FEED STORKE SETTING CONDITION.
CPBa	PUSH BUTTON "ON" OF MICROCOMPUTER CONTROL.
CPBb	PUSH BUTTON "OFF" OF MICROCOMPUTER CONTROL.
OPB	PUSH BUTTON OF ORIGIN RETURN (TO SET THE WHEEL HEAD RETURN TO REFERENTIAL ZERO POINT).
RPB.	PUSH BUTTON OF ZERO RESET (TO SET THE L.D.D0 TO REFERENTIAL ZERO POINT).
CPB1	PUSH BUTTON OF MANUAL CONTROL MODE WITH INDICATE LAMP(IT IS A NORMAL TURN ON CONDICTION TILL PUSHING THE "PB5". (REM.1)
L.D.D0	LED DISPLAY OF GRINDING WHEEL REFERENTIAL POSITION.
L.D.D1	LED DISPLAY OF FEEDS SETTING (SETTING NUMERAL UNIT).
L.D.D2	LED DISPLAY OF FEEDING TIMES (AUTO MODE).
L.D.D3	LED DISPLAY OF SPARK OUT TIMES (AUTO MODE).
CPS1	DIP SWITCH OF FEEDS SETTING.
CPS2	DIP SWITCH OF FEEDING TIMES.
CPS3	DIP SWITCH OF SPARK OUT TIMES.
CPB5	PUSH BUTTON OF AUTO CONTROL MODE WITH INDICATE LAMP.(AS SOON AS PUSH THE "PB1" THE CONTROL CONDICTION WILL CHANGE TO THE MANUAL MODE) .
PB2-1	PUSH BUTTON OF DRIVING THE WHEEL HEAD RAPID TRAVERSE UP.
PB2-2	PUSH BUTTON OF DRIVING THE WHEEL HEAD RAPID TRAVERSE DOWN.
PB3-1	PUSH BUTTON OF DRIVING THE WHEEL HEAD SLOW TRAVERSE UP.
PB3-2	PUSH BUTTON OF DRIVING THE WHEEL HEAD SLOW TRAVERSE DOWN.
PB4-1	PUSH BUTTON OF DRIVING THE WHEEL HEAD STEP UP (THE QUANTITY IS SETTING BY "PSI".
PB4-2	PUSH BUTTON OF DRIVING THE WHEEL HEAD STEP DOWN (THE QUANTITY IS SETTING BY "PSI".
CS1	SELECT SWITCH OF MICROCOMPUTER OR ROTARY HANDLE CONTROL. (C:MICROCOMPUTER CONTROL. P:ROTARY HANDLE CONTROL).
CS2	SELECT SWITCH OF MULTIPLE OF 1, 2, 3 UNIT OF ROTARY HANDLE CONTROL.
P.G.H	ROTARY HANDLE OF PULSE GENERATOR.

REM1:IT IS ALSO A INTERRUPTER, WHEN SOMETIME THE "PB" IS PRESSED,THE USER CAN INTERRUPT THE FUCTION ANYTIME BY PRESSING THE "PB1"

2448/2480 AHD CONTROL PANEL & ELECTRIC PARTS DESCRIPTION 2/2

MS0	MAGNETIC CONTACTOR FOR CIRCUIT CONTROL SOURCE.
MS1	MAGNETIC CONTACTOR FOR HYDRAULIC PUMP MOTOR.
MS2	MAGNETIC CONTACTOR FOR SPINDLE MOTOR.
MS3 MS4	MAGNETIC CONTACTOR FOR SPINDLE SEAT CROSS-FEED MOTOR.
MS5	MAGNETIC CONTACTOR FOR COOLANT.
MS6	MAGNETIC CONTACTOR FOR LUBRICANT PUMP.
MS7	MAGNETIC CONTACTOR FOR HYDRAULIC PARALLEL DRESSER PUMP.
MS9	MAGNETIC CONTACTOR FOR POWER OF SERVO DRIVER & NC CONTROLLER.
MS10 MS11	MAGNETIC CONTACTOR OF Y- Δ STARTING&RUNNING CONNECT FOR HYDRAULIC PUMP MOTOR IS OVER 20 HP.
MS12 MS13	MAGNETIC CONTACTOR OF Y- Δ STARTING&RUNNING CONNECT FOR SPINDLE MOTOR IS OVER 20 HP.
R1,R2,R3	AUXILIARY RELAY FOR NC. CONTROL SYSTEM.
NFB	NO FUSE BREAKER FOR MAIN POWER SUPPLY.
NFB1	NO FUSE BREAKER FOR POWER OF MICROCOMPUTER.
NFB2	NO FUSE BREAKER FOR POWER OF ELECTRIC MAGNETIC CHUCK.
NFB3	NO FUSE BREAKER FOR POWER OF SERVO DRIVER.
M1	HYDRAULIC PUMP MOTOR.
M2	SPINDLE MOTOR.
M3	SPINDLE SEAT FORWARD&BACKWARD CONTROL MOTOR.
M6	COOLANT PUMP MOTOR.
M6	LUBRICANT PUMP
LS1	APPROXIMATE SWITCH FOR AUTO CROSS-FEED TRIGGER SIGNAL.
PXS1 PXS2	APPROXIMATE SWITCH FOR SETTING STROKE OF AUTO CROSS-FEED
LS4 LS5	LIMIT SWITCH FOR MAX. TRAVEL OF SPINDLE SEAT.
OL1,OL2 OL3,OL4 OL5,OL6	CURRENT OVERLOAD.
F1,F2,F3 F4,F5,F6,F7	FUSES
1PH tr1.	1 PHASE TR.(FOR CONTROL CIRCUIT &EM.CHUCK POWER SUPPLY. AND POWER OF FAULT SIGNAL OF SERVO DRIVER).
3PH tr2.	3 PHASE TR.(FOR SPINDLE SEAT RAPID UP&DOWN AND CROSS-FEED,LUBRICANT PUMP,PAPER FILTER MOTOR).
1PH tr3.	1 PHASE TR.(FOR SERVO MOTOR DRIVER)..
S.S.R UNIT	CROSS-FEED MOTOR CONTROL UNIT.

9. PROCEDURE FOR OPERATING 2448/2480AH SERIES ' AUTOMATIC CROSSFEED

- (1) At first, make the S2 select at surface mode ( S2-1). Then choice S1 select switch on the menu operate mode (). After that, operation the PB11 or PB12 push button switch (for rapid forward or backward). to sent the spindle seat to the first grinding edge of workpiece "A" (please refer FIG.1)

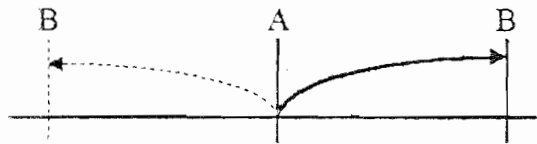






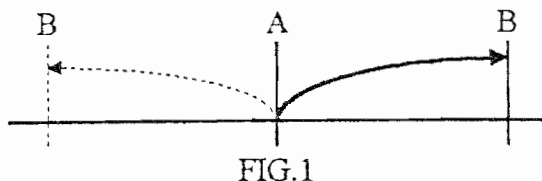
FIG.1

- After the above procedures, press PB1 push button switch (position setting switch with condition indicator PL1) once, Then indicator of PL1 will be flashed continue with 1 second frequency. And operation PB11 or PB12 switch to sent the spindle seat to the second edge of workpiece "B". Then one more pressing the PB15 push button, and indicator of PL1 is going to stop flashing and keep lighting, till the S1 select switch changeover to auto mode (). with the indicator of PL1 turn off, the procedure is completed.


- (2). If the setting is not correct; for instance: setting "A" & "B" two points almost close together, or only just setting one point "A". then switching S5 select switch to the auto mode (). this moment the indicator of PL1 will be quickly flashed with 0.1 second frequency. It means the setting is mistake please resetting again.
- (3). This system has auto memory function; when the machine is operation and power is failure suddenly or the emergency stop switch is pushed to interrupt operation. unless the user turn the cross-feed leadscrew manually, before restarting the power supply. otherwise the previous setting won't be changed.


10. PROCEDURE FOR OPERATING 2448/2480AHD SERIES' AUTOMATIC CROSSFEED

- a. At first, select the S7 switch to surface mode (). Then choose S5 switch to the manual operating mode (). After that, use S6 switch (for rapid forward or backward) to move column to the first grinding edge of work piece-- "A" (please refer to FIG.1).

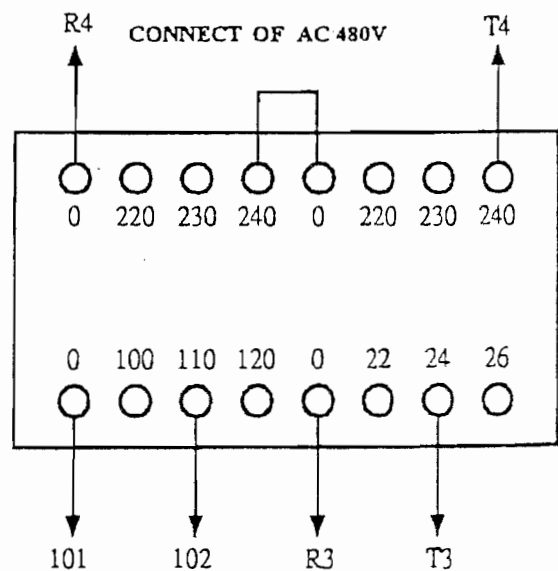
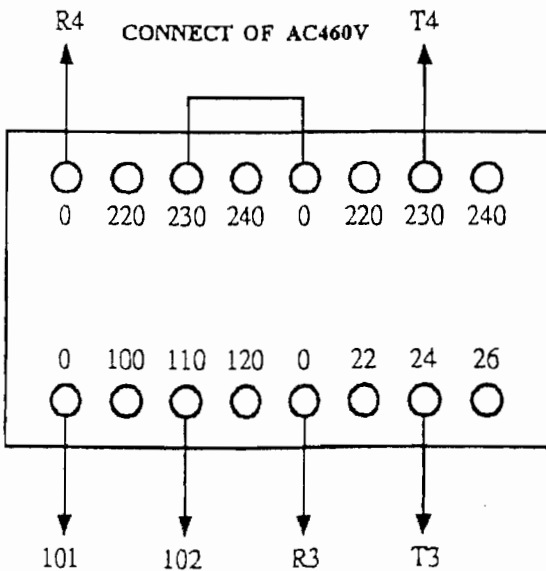
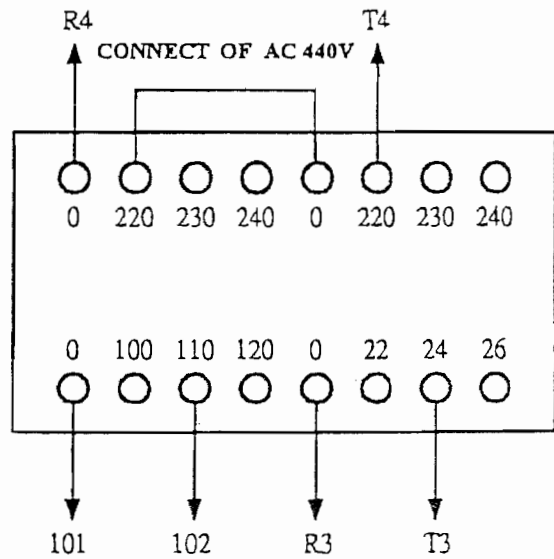
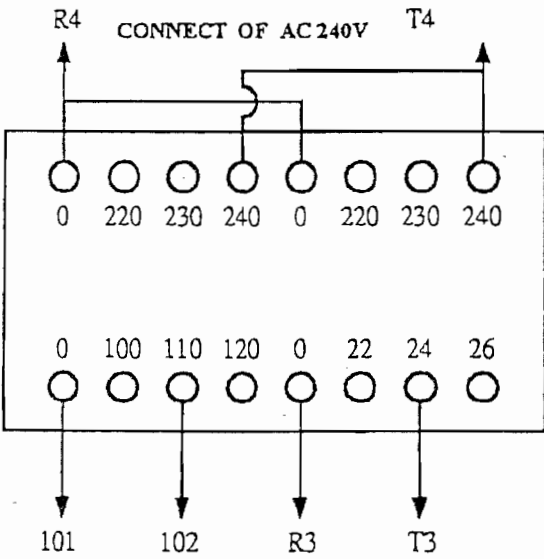
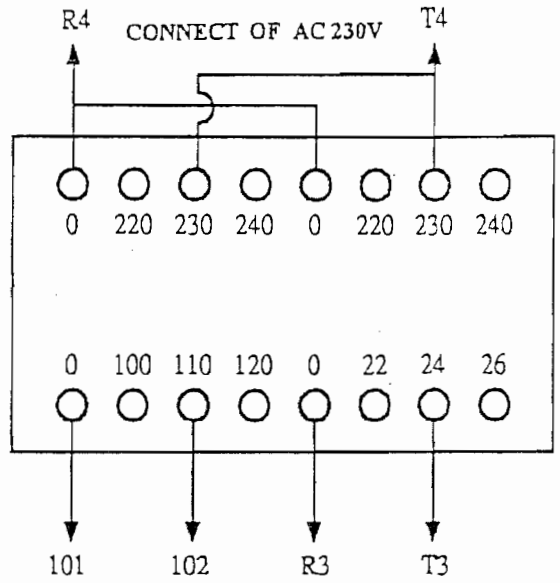
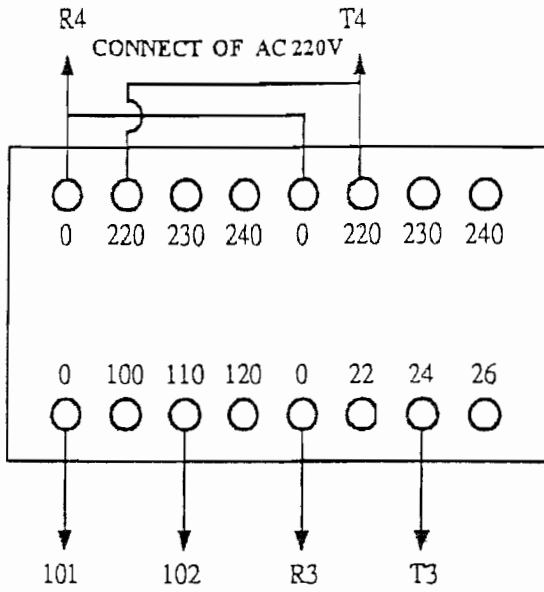


After the above procedures, press push button PB1 (position setting button with condition indicator PL1) once to memorize the first edge, then the indicator light of PL1 will flash continuously with one second interval. Next use S6 to sent the column to the second edge of the work piece-- "B".

Then once more, press the PB1 and PL1 will stop flashing, and keep lighting until S5 switch is change over to auto crossfeed mode (). With the indicating light of PL1 turned off, the procedure is complete.

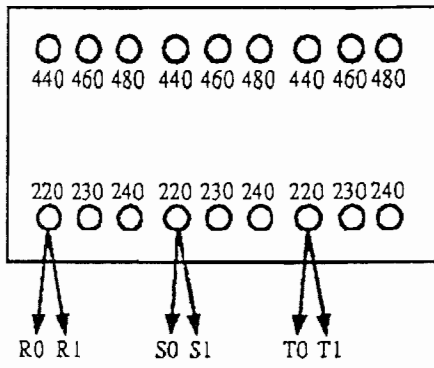
- b. If the setting procedure is not correct: Setting point A & B too close together, or just setting only point A then switch S5 to the auto crossfeed mode (), will cause indicator light of PL1 to flash with 0.1 second interval. This means the setting procedure is not correct, 0.2 and please repeat procedure 'a' again.
- c. This system has an automatic memory function, i.e., when the machine is operating and a sudden power failure occurs, or the emergency stop button is pushed to interrupt the operation, the previous setting will not change unless the user turn the crossfeed handwheel manually before restarting the power supply.

11. CONNECTION OF SINGLE PHASE TRANSFORMER

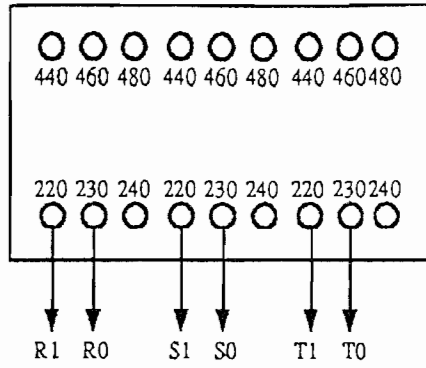


CONNECTION OF THREE PHASE TRANSFORMER

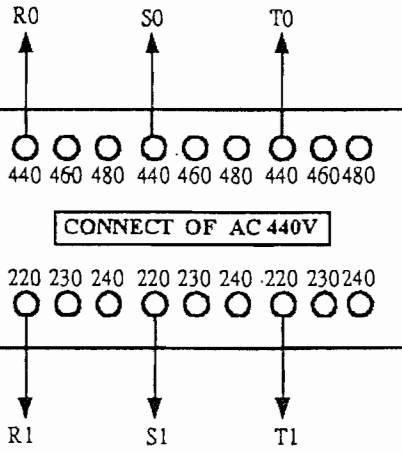
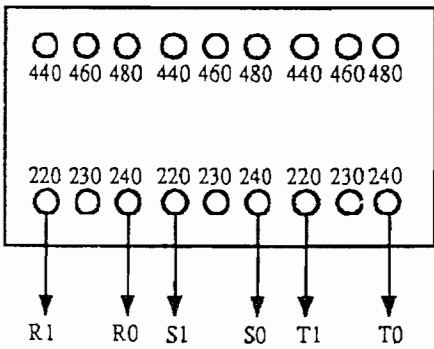
CONNECT OF AC 220V



CONNECT OF AC 230V

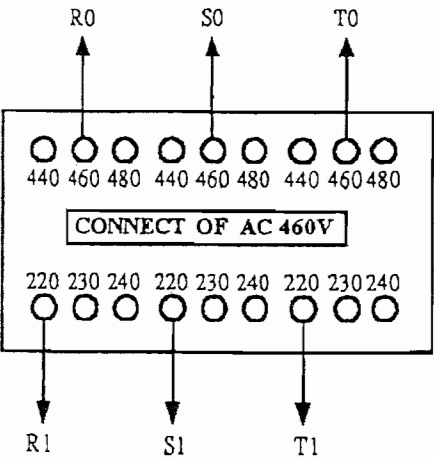


CONNECT OF AC 240V

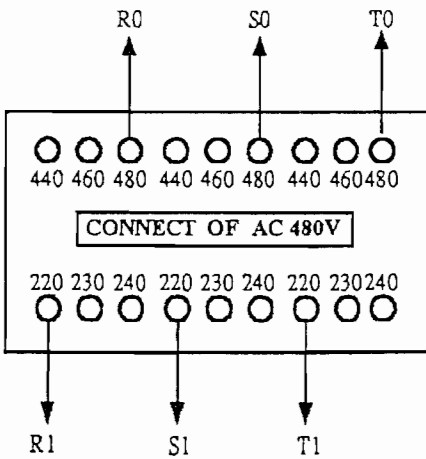


CONNECT OF AC 440V

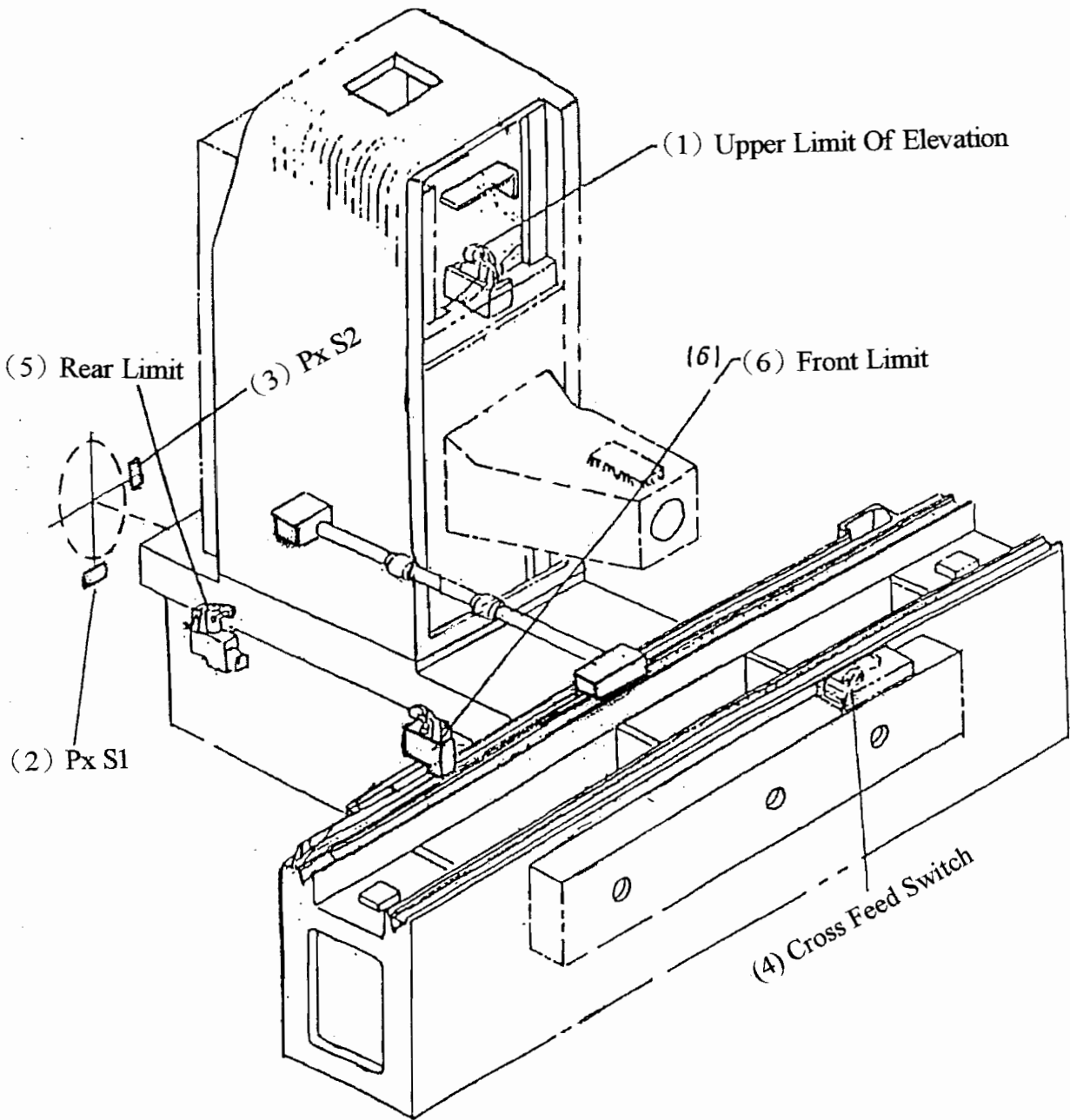
CONNECT OF AC 460V



CONNECT OF AC 480V



12. 2448/2480AH LIMIT SWITCH POSITION

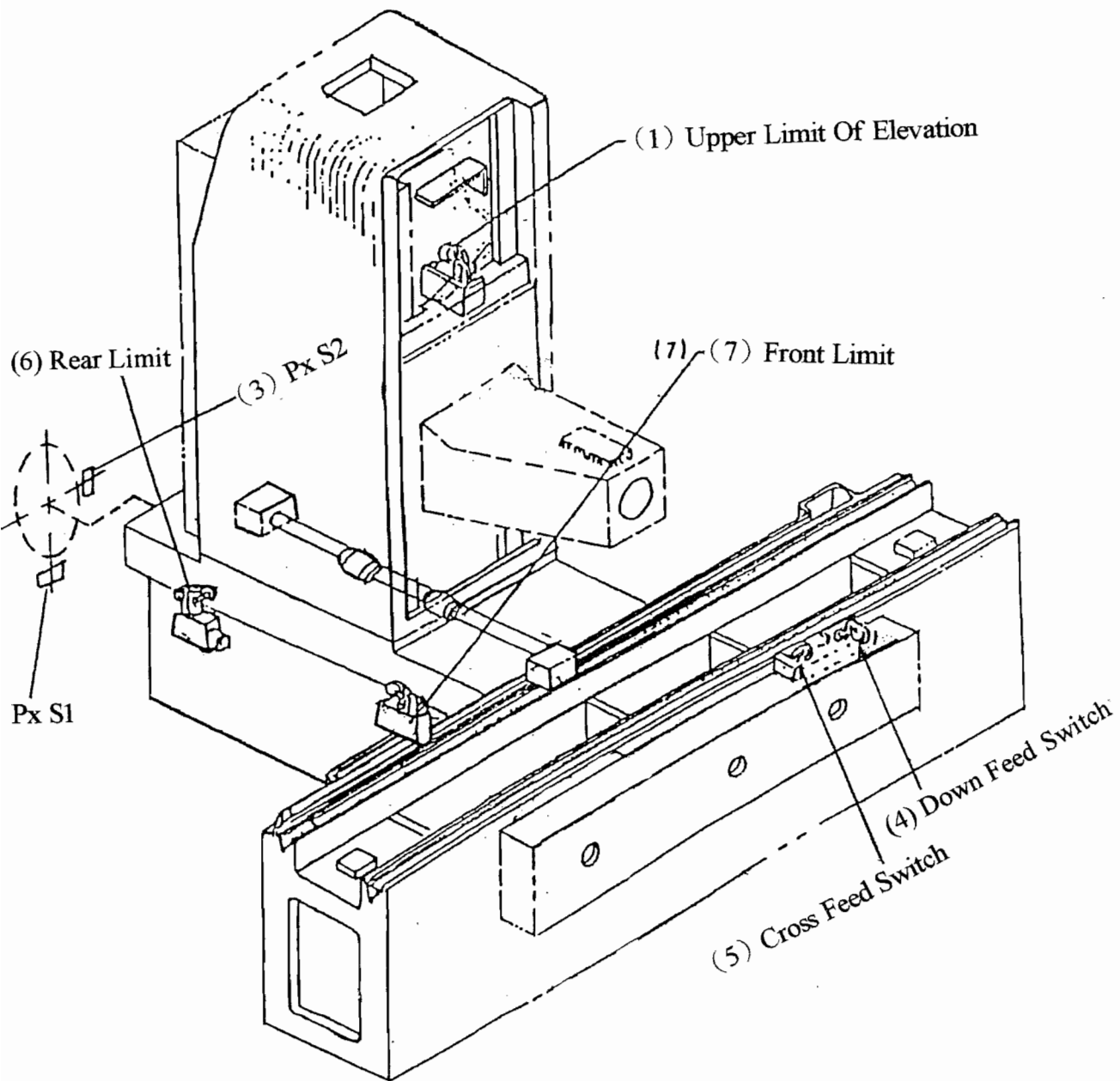


Description:

1. LS-7
2. PXS1
3. PSX2
4. PSX3
5. LS-4
6. LS-5

* For Above Code NO. ,Please Refer To Circuit Diagram

2448/2480AHD LIMIT SWITCH POSITION



Description:

1. LS-7
2. PXS1
3. PSX2
4. PSX3
5. LS1
6. LS-4
7. LS-5

* For Above Code NO. ,Please Refer To Circuit Diagram

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 5 cm 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	Warming Up		√	Visual	Daily	Approx. 30 min

PRECAUTION TO BE TAKEN DURING OPERATION

- 1. Turn off the power before mounting/dismounting the grinding wheel on/off the wheel spindle.**
- 2. Do not operate a machine without wheel guard and do not open wheel guard during operation.**
- 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.**
- 4. Check and make sure that the work piece is firmly attached to the work table.**
- 5. Do not attempt to hold or feed the work piece with one's hands.**
- 6. The work piece to be ground may not exceed the machine capacity and load.**
- 7. Use correct grade grinding wheels and maintain their sharpness at all time.**
- 8. When the machine is grinding, keep your hands and clothing away from the work table and wheel flange.**
- 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.**
- 10. Before using any grinding wheel, test run it for five minutes. During trial operation, remember not to stand in any of the danger areas. If no problems arise in the test run, the grinding wheel then can be used.**
- 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.**
- 12. Do not run the grinding wheel at speeds above its maximum safety standards.**
- 13. Before starting up the grinding wheel, make sure that the wheel guard is firmly affixed into place.**
- 14. Please do not set the downfeed increment too large, because this will slow down motor speed and generate large amount of heat on the work piece.**
- 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.**
- 16. Check if the direction of the grinding wheel is the same as denoted on the wheel guard.**

- 17. Before the machine is start, check and make sure that all the switches and buttons are in the “OFF” position.**
- 18. Operators and onlookers must wear safety glasses.**
- 19. When adjusting the right and right travel, the hydraulic motor must be shut off.**
- 20. After the work is completed and the work table is being cleaned, power to the spindle motor must be switch off.**
- 21. Sides of the grinding wheel can not use for finishing (except form grinding).**

13. 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 life spans of the grinding wheel, spindle assembly and bearings are closely linked to whether or not grinding wheel is precision balanced. To achieve this objective, static balancing is generally sufficient.

a. After the grinding wheel, wheel flange and balancing arbor 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 balancing stand and mark its lowermost position (heaviest area) with a 'S' using chalk (see figure 13-2, 13-3).
3. Then take the first balancing piece 'G' and attach it opposite to the 'G' mark. Caution: The 'G' mark cannot be moved hereafter (see Figure 13-4).
4. After this take the other two balancing pieces 'K' and attach to any position of equivalent distance 'a' (see figure 13-5).
5. Rotate the grinding wheel 90 degree 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 figure 13-6).
6. After balancing the grinding wheel, test it by rotating it at normal grinding speed for at least five minutes.

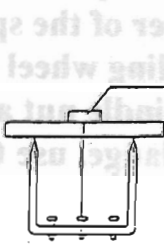


Fig 13-1

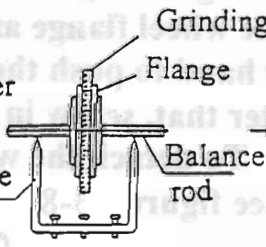


Fig 13-2

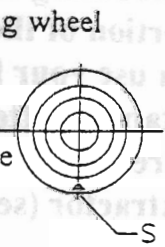


Fig 13-3

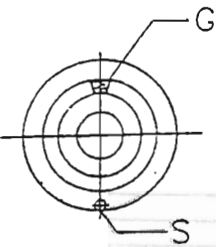


Fig 13-4

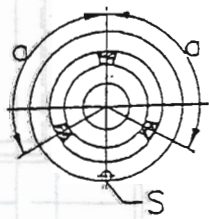


Fig 13-5

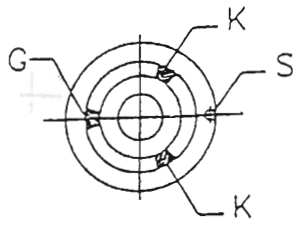


Fig 13-6

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

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

- c. 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 wheel, you must remove it from the spindle and position the grinding wheel on the balancing stand and then carefully balance it. After this, you can mount it on the spindle, dress the grinding wheel, repeating this procedure until it is perfectly balanced. Even a well balanced grinding wheel can lose its balance through wear. Therefore, it is necessary to frequently inspect the grinding wheel and re-balance it when necessary.
- d. 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 period of time, the moisture inside will concentrate at its lowest point causing it to become off balance. Therefore, if the wheel is not allowed to spin for a period, it will become off balance. If you let the spindle spin and use centrifugal force to draw off the moisture, the grinding wheel will regain its balanced state.
- e. Before mounting the grinding wheel on the spindle, first wipe the taper portion of the wheel flange and taper of the spindle clean, and then use your hand to push the grinding wheel onto the spindle taper. After that, screw in the spindle nut and tighten it (see figure 13-7). To detach the wheel flange, use the grinding wheel extractor (see figure 13-8).

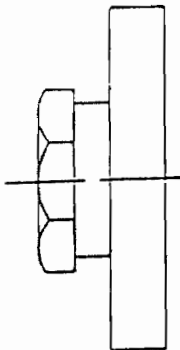


Fig 13-7

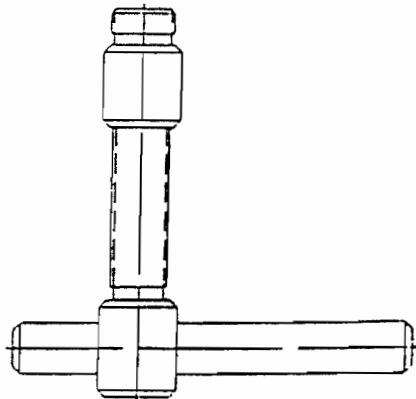


Fig 13-8

Note: If you want to grind different materials, the grinding wheel has to be changed as well. This is not very economical if you change and balance the wheels all the time. We suggest that you dedicate a single wheel flange for each grinding wheel. This way, you can save time and trouble for balancing different wheels.

14. GENERAL COMMENTS OF GRINDING

The quality of a resulting grinding surface depends on both choosing the right grinding wheel and correct operational method.

1. Stock removal efficiency

For intensive stock removal of a material, the coarse grid wheel (about 30~36) is dressed by passing the diamond over quickly, so that the surface of the wheel is rough and sharp.

2. Surface finish required

If a fine finish is required, a finer grid of wheel is required (about 40~80). The diamond in this case is passed slowly over the wheel. This is done to break up the grains within the wheel.

3. Distortion of the work piece

If the work piece shows too much distortion when being ground, this means that the stock removal rate is too great, and the longitudinal and cross movements of the table is too slow, or in another word, the grinding wheel is being “clogged” by the work piece.

4. Undesirable burns and grinding cracks

If burn marks and grinding cracks appear, that means the wheel is too hard or the wheel is “clogged”.

15. WHEEL INSPECTION

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

Wheel inspection and installation:

Before mounting the grinding wheel, please carefully inspect it!

Generally, this is done by making a sound of the grinding wheel. Use a supporting bar passing through the axle hole of the grinding wheel, then take a wooden hammer to lightly tap the wheel, so that it would make a sound. Cracks that can not be seen physically are revealed by the

different sounds that they make. A flawless wheel makes a distinctive crystal sound. Do not use a wheel that is very poor in quality!

The two surfaces of the wheel have two sheets of absorbent paper. They are used as flexible pads between the wheel and the flange. When installing the wheel, do not tear off these papers. Then gently take your hand and slip the grinding wheel onto the flange. Don't use too much force! The wheel must be wiped clean, especially the two orienting and positioning surfaces.

16. DRESSING THE WHEEL AND CORRECT TREATMENT OF DRESSING DIAMOND

- a. The complete grinding wheel can be dressed by the diamond, which is based on the electro-magnetic chuck (before dressing, use your hand to see if it is firmly in place), or the dressing device which is called over head parallel dresser. The diamonds in both cases have been designed to dress the grinding wheel at an angle of approximately 5 degree. The reason being, the portion of wheel that has been dressing by the diamond should be along the rotating direction of the grinding wheel. In this manner, the diamond tip can maintain its sharpness through out the dressing process.
- b. Changing the feed rate of dressing the wheel will enable you to change the coarseness of the grinding wheel. If you want to grind a depth between 0.1~0.2mm, then a rough dressing of the grinding wheel is all that is necessary. To do so, all you need to do is to turn the crossfeed handwheel quickly, and you can make the diamond dresser passes through the wheel quickly. In this case, you can get a greater rate of stock removal from the wheel. If you want to do precision grinding with the same wheel, then dresses it again. This time do it slowly two-to-three time again, and dress it with a depth of 0.01mm per path.
- c. Generally, light dressing is the best solution for elongating the life span of the wheel and the diamond tip.
- d. Diamonds, being excessively brittle and hard, are susceptible to slight impact. They are in another word easily cracked.
- e. When dressing the wheel, you must start from the center, because the outer edges tend to wear more. If you begin dressing from the outer edge, this will put more pressure on the diamond. It might possibly crack the diamond.

f. Grinding wheel dressing diagrams and precautions:

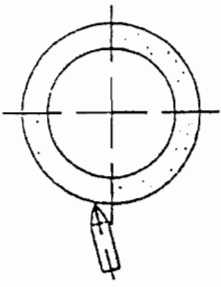


Fig 16-1

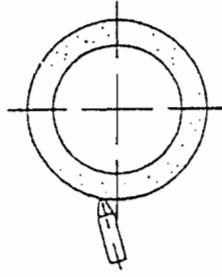


Fig 16-2

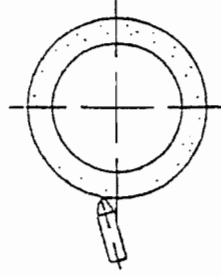


Fig 16-3



Fig 16-4

1. Form a correct angle between the new diamond dresser and the wheel (approx. 5 degree) (see figure 16-1).
 2. When the diamond is being worn by grinding, turn it over to preserve its sharpness (see figure 16-2).
 3. Dresser, which has been turned over, should be placed back at the exact dressing position of the grinding wheel (see figure 16-3).
 4. Diamond dressing of the grinding wheel must begin from the center of the grinding wheel (see figure 16-4)
- g. After a period of time, the diamond must change its tip, i.e. it must be reset to ensure economical operation. This resetting process should be taken before any of the tips has been ground off. Otherwise, there is a danger of breaking it, losing it or becoming too small to be reset. This then could cause a fortune to the user.



(1)



(2)



(3)

1. The new diamond with tip.
2. The diamond now must be reset.
3. Too late! The diamond can no longer be reset, as it has no more tip. Resetting should be done by specialists only.

17. STORAGE OF GRINDING WHEELS

1. Grinding wheels must be stored in a dry wheel shelf (as shown in figure 17-1). That is protected from impact and vibration. When moving the grinding wheel, please take extra precautions.
2. The golden rule when storing grinding wheels is that they must be stored in an upright position. Thin grinding wheels and wheel with sharp edges must be stored horizontally.

3. Cautions:

a. Do not let oil or grease come into contact with the grinding wheel. Oil soaked grinding wheel will lose their grinding edge and glide during grinding. Also this will significantly shorten the wheels' life span.

b. Do not stack the grinding wheels flat as shown in figure 17-2.

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.

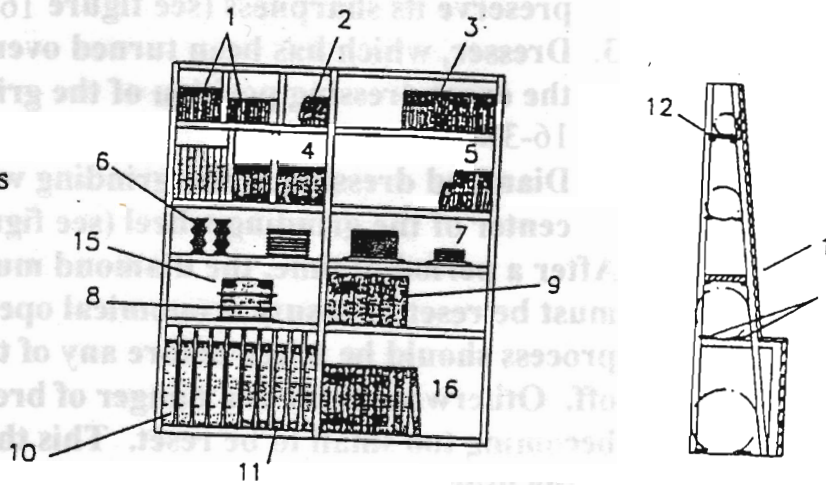


Fig. 17-1 Grinding wheel finishing shelf

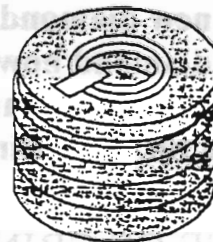


Fig. 17-2 Do not stack grinding wheels flat.

3. SELECTION OF SUITABLE GRINDING WHEELS

a. 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 18-1:

1. **Abrasive:** Directly acts as a grinding edge on the working material.
2. **Bond:** Bonds maintain the grinding particles and also enable the wheel to operate safely under a fixed speed.
3. **Pore:** Gaps between the abrasive and bond help to clear away abrasive shaving and also protect the grinding function.

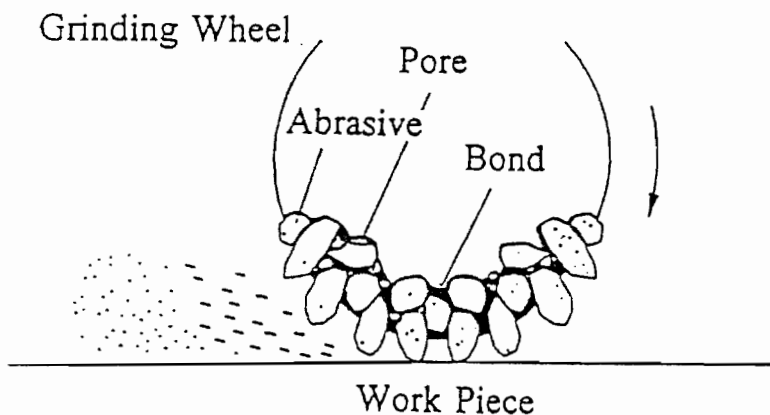


Figure 18-1

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 usage, abrasives will crack and disintegrate due to wear and cutting, which will in turn create new abrasive material (this process is called "self generation").
3. Abrasives are extremely hard and have sharp cutting edges. Because of the small size of these cutting edges, they are highly

accurate in measurement precision, work precision and surface roughness.

- 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.

19. WHEEL SELECTION TABLE

WA	80	L	5	V	2400
Abrasive	Grain Size	Bond	Struct	Binding Material	Max. Cycle Speed
A	10 180	AN	0	V	1400
FA	12 220	BO	1	porcelain ???	1500
WA	14 240	CP	2	B	1700
(38A)	16 280	DQ	3	resin	2000
DA	20 320	ER	4	adhesive	2400
32A	24 400	FS	5	BU	2700
(SA)	30 500	GT	6	foaming resin	3000
PW	36 600	HU	7	adhesive	3600
PA	46 700	IV	8	R	4300
AC	54 800	JW	9	rubber adhesive	4800
C	60 1000	K X L Y	10	MG	6000
CC	70 1200	MZ	11	magnesium oxide	
	80 1500		12	adhesive	
	90 2000		13	E	
	100 2500		14	S	
	120 3000			sodium silicate	
	150 4000			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 is 1150rpm). The relationship between the rotation speed and peripheral speed is as follows:

$$\text{Peripheral speed (m/min)} = \frac{3.1416 \times D \text{ (mm)} \times \text{rotation speed (rpm)}}{1000}$$

The machine specifications are: Wheel outer diameter (D)= 508 mm
Rotation speed = 1150rpm (at 60HZ)

$$3.1416 \times 508 \times 1150$$

$$\text{Peripheral speed} = \frac{\text{-----}}{1000} = 1940 \text{ m/min}$$

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

a. Abrasives

Types, characteristics and usage of abrasives

Each type of man made abrasives possess their own physical properties. Because their hardness and ductility are different, certain abrasives can be selected for grinding different types of material. The number of abrasives, which is available, has increased along with the development of new material. The following table 19-1 is a list of the characteristics and usage of common abrasives:

Table 19-1 Characteristics and usage of abrasives

	Material Type	Symbol		Composition	Properties	Uses
		JIS	CNS			
A L U M I N A	Black alumina	A	A	$\text{Al}_2\text{O}_3 > 97$ $\text{TiO}_2 = 2.5$	extremely high ductility	grinding of ordinary steel and precision grinding of soft steel
	White alumina	WA	WA	$\text{Al}_2\text{O}_3 > 99.5$ Pores	excellent fragmentation and sharpness	precision and light grinding or alloy steel, tool steel
	Pale alumina	PA	PA	$\text{Al}_2\text{O}_3 > 99.3$ $\text{Cr}_2\text{O}_3 = 0.08$ $\text{TiO}_2 = 0.2$	excellent hardness & ductility	precision grinding of steel alloy and special steel
	Monocrystal alumina (gray)	HA	HA	$\text{Al}_2\text{O}_3 > 99.5$ $\text{TiO}_2 = 0.1$	strong ductility, low heat grinding, hard, fragmenting resistant	general forming, threading, teething and tool grinding of steel alloy
	Polycrystal alumina (dark brown)	A (44A)		$\text{Al}_2\text{O}_3 > 95$ $\text{TiO}_2 = 3$ $\text{SiO}_2 = 1$	crystalline structure	heavy grinding of relatively strong ductile steel
	Sintered alumina	(75A)		$\text{Al}_2\text{O}_3 = 90$ $\text{TiO}_2, \text{Fe}, \text{SiO}_2, \text{CaO}, \text{MgO}$	fine crystal possesses high ductility and wear resistant	heavy grinding of stainless steel

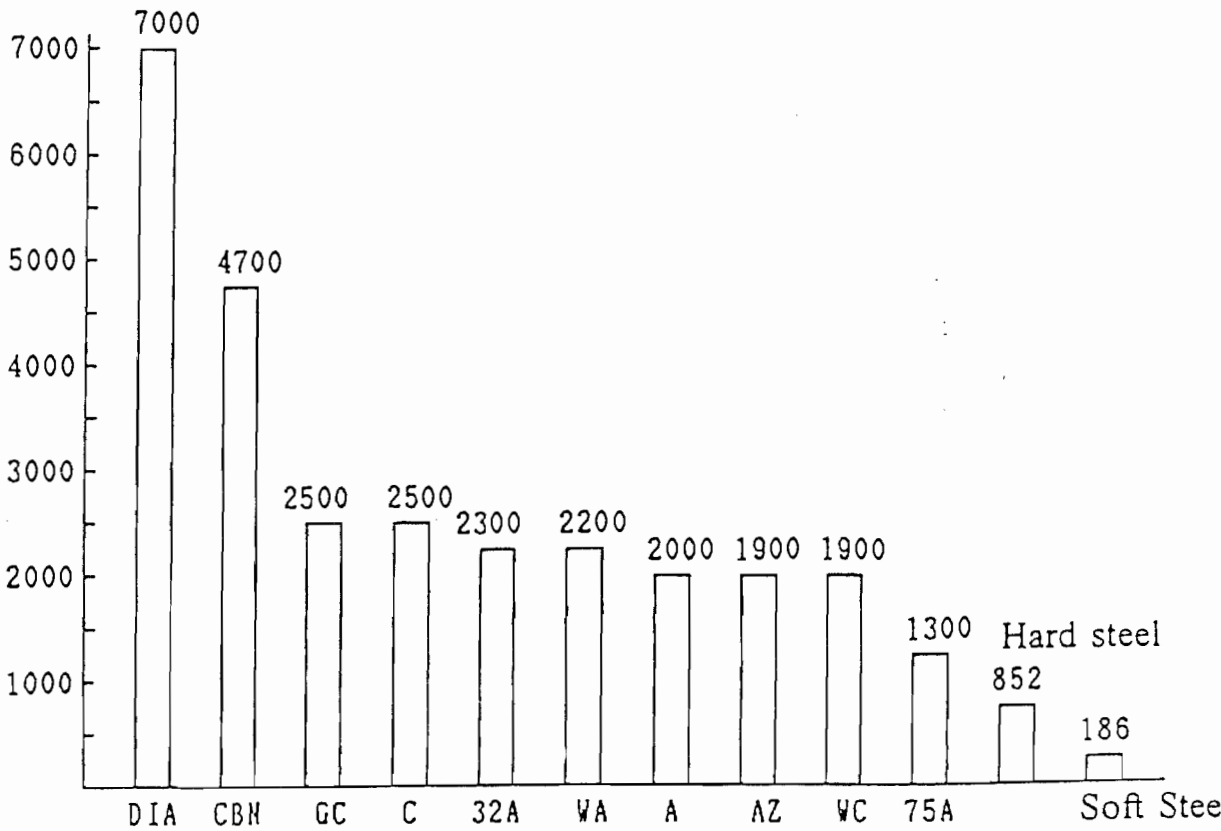
	Alumina	AZ		$Al_2O_3 > 75$ $ZrO_2 15 \sim 25$	crystal combining Al_2O_3 and ZrO_2 possess high mechanical grinding resistance and chemical stability	heavy grinding of stainless steel material
C S A A R N B D O S -	Black carbosand	C	C	$SiC > 98.5$	extremely hard, low fragmentation	Grinding of non ferrous materials with strong grain resistance
	Green carbosand	GC	GC	$SiC > 99.5$	relatively hard, readily fragmented	Grinding of ultra strong alloys
U H L A T R R D A	Cubic lattice boron nitride			BN100	low fragmentation and safe to use with heat and hard surfaces	Grinding of hard steel alloys, cobalt and nickel based ultra strong alloys
	Diamond			C100	maximum hardness, sturdy and wear resistant	Grinding of non ferrous metal, vitreous carbons and porcelain

Select grinding wheel hardness > hardness of material to be ground.

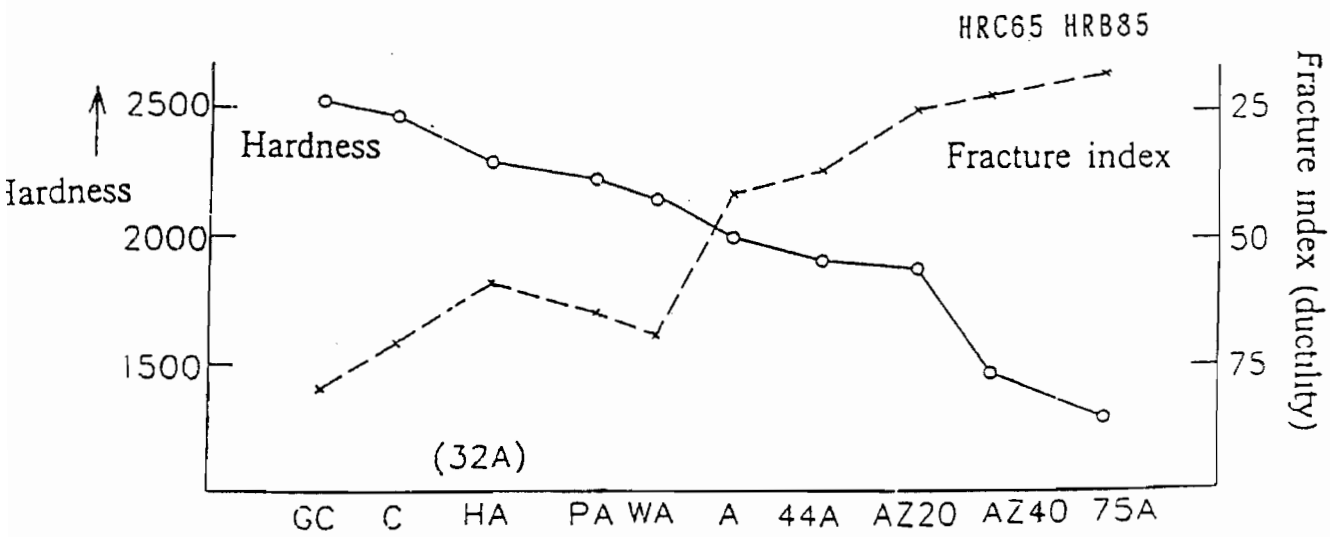
excellent	$Al_2O_3 > 99.5$
hardness & ductility	$C100 = 100$ $TiO_2 = 0.2$
	$Al_2O_3 = 99.5$ $TiO_2 = 0.1$
	$Al_2O_3 = 98$ $TiO_2 = 0.2$ $SiO_2 = 1$
	$Al_2O_3 = 90$ $TiO_2 = 0.5$ $CaO = 0.5$ $SiO_2 = 1$

1. Abrasive hardness and fracturing index:

The abrasive hardness is the degree of resistance while being punctured. The fracturing index of abrasive (ductility) is the ability not to fracture and crush under a impact force. Chart 19-2 is a comparison of the various abrasive hardnesses. Graph 19-3 shows the relationship between abrasive hardness and its fracture index.



19-2 Hardness Comparison



19-3 Abrasives used in mechanical grinding

Note: A large fracture index value indicates excellent hardness. Low values indicate ductility.

b. Grain size

After fused crystals are crushed, rolled and sorted in different grain size. The number indicated grain size approximates the number of sieve holes on a one-inch line. For instance, no. 8 abrasive has a grain size, which can pass through a sieve with density of eight holes per inch.

coarse	grain size	fine
←-----→		
great	grinding amount	small
←-----→		
rough	machining degree	precision
←-----→		
ductile soft	material property	brittle hard
←-----→		
wide	area of contact	narrow
←-----→		
large	size of grinding wheel	small
←-----→		
viscous	bond	brittle
←-----→		

Table 19-2 Relationship between grain size and grinding conditions

1. Average grain diameter by grain size

The size of the abrasive is indicated through its grain size (number). The grain size of an abrasive is not the size of a single grain but an compilation of the various grain diameters within a certain range and is commonly denoted as average grain size.

Grain Size#	#10	12	14	16	20	—	24	30	36	46	54
Ave Grain Size	2.0	1.7	1.4	1.2	1.0	0.8	0.7	0.6	0.5	0.35	0.3
Grain Size	60	70	80	90	100	120	—	150	180	220	
Ave Grain Size	0.25	0.2	0.17	0.14	0.12	0.1	0.08	0.07	0.06	0.05	

Table 19-3 Average abrasive grain diameter table

2. Note

- a. Average grain size for normal surface grinders is #36~80.
- b. Ordinarily, finer grain sizes are required to obtain an excellent fine processed surface.

C. Binding

1. Definition of binding strength

The binding of a grinding wheel represents the ability of the wheel to hold abrasive grains or is also called the grinding wheel binding strength and is commonly called hardness. This indicates that the grinding wheel can resist an amount of compression force, shear force and impact force of the abrasive grain being ripped away from the grinding wheel during grinding.

The binding strength is suited to the grinding wheel when the abrasive grains break apart creating new cutting edges and those losing their cutting effect are stripped away revealing new abrasive grains, which is called self-generation. When binding is too weak, the abrasive grains fall away before grinding occurs. If the binding is too strong, the abrasive grains do not fall off the wheel after they are worn. Their edges become smooth and causing the work material to burn.

Binding strength is typically represented by the English letter A through Z, with A being the weakest and Z being the strongest.

2. Grinding conditions for binding strength

	binding strength	
weak	←-----→	strong
brittleness	work material	ductility
hardness	←-----→	softness
	contact surface	
wide	←-----→	narrow
	wheel peripheral speed	
fast	←-----→	slow
	material peripheral speed	
slow	←-----→	fast
	machine precision	
excellent	←-----→	poor
	operator skill	
experienced	←-----→	novice

Table 19-4 Grinding conditions and binding strength

Note: Ordinary surface grinding binding strength ranges from H-K

e. Binders

1. Definition of binder

Keep abrasive together on the wheel and allows the wheel to safely rotate at a certain speed on a type of material.

2. Characteristics and usage of different types of binders

Item	Vitrified	Resinoid	Rubber	Magnesia
Symbol	V	B	R	Mg
Composition	feldspar, enamel, soluble clay	synthetic resins	natural rubber or synthetic rubber, sulfur	magnesia
Method of manufacture	pressing, calcining	cold pressing, thermal pressing	rolling, pressing	pressing, calcining
Forming method	tunnel kiln bell-jar kiln	low temp. oven	low temp. oven	non-burning
Burning temperature	1200 ~ 1350°C	around 200°C	around 180°C	normal temps.
Characteristics	1. most common 2. ease in adjusting binding and structure 3. excellent chemical stability	1. suited for high rotation speeds 2. slightly flexible 3. strengthener can be added to the inside of the grinding wheel	1. high flexibility 2. suited for thin wheel flanges	good grinding results can be achieved at low speeds
Maximum Peripheral Speed	1. standard speed 2000m/min 2. maximum speed 2400m/min and above.	1. standard speed 3000m/min 2. maximum speed 4800m/min and above	4000 m/min	1800m/min
Uses	ordinary precision grinding, tool grinding, free grinding, special grinding, super precision grinding, enamel grinding, pulp grinding	free grinding, cast piece burr rough grinding, cutting, non-ferrous metal and non metal grinding, lapping or precision polishing	cutting, wheel finishing	tool grinding, flat grinding or ultra-thin work material

Table 19-6

3. Grinding wheel selection reference

Material Being Ground			Hardness (Rockwell HRC)	Wheel Flange Specs	
S T E E L	Carbon Steel	Steel Plates	HRC 25 and below	WA 46H WA 46J	
		Carbon Steel			
		Carbon Steel			
		Tubing			
	Alloy Steel	Carbon Steel	HRC 25 and above	WA 46J	
		Tubing			
		Carbon Steel			
		Tubing			
	T O O L S T E E L	Alloy Steel	Nickel-Chromium Steel	HRC 55 and below	WA 46J
			Nickel-Chromium Alloy Steel		
Chromium Steel					
Tool Steel		Chrome-Moly Steel	HRC 55 and above	WA 46I	
		Aluminum Chrome-Moly Alloy Steel			
		High-Carbon Chromium Alloy Bearings			
		Stainless Steel Alloy			
S T E E L	Tool Steel	High Speed Tool Steel	HRC 60 and below	WA 46I	
		Steel Alloy Tool Steel	HRC 60 and above	WA 46H	
S T E E L	Stainless Steel	Stainless Steel		WA 46I	
		Heat Resistant Steel		WA 36J	
I R O N	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	

Table 19-7

For non-ferrous metal material listed above, proper clamps should be used for grinding.

f. Three factors to select for ideal grinding wheel

- 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 life span wheel)**
 - c. Obtaining the desired precision and machining quality**
- 2. Conditions to consider when selecting a wheel**

Fixed conditions

- 1. Material being ground**
- 2. Precision and smoothness requirements**
- 3. Surface area for grinding**
- 4. Special grinding operating conditions**

Variable conditions

- 1. Wheel speed**
- 2. Downfeed rate**
- 3. Condition of grinder**
- 4. Operation technique of workers**
 - a. If the material being ground is steel or an alloy, alumina abrasive is most commonly used. For nonferrous metals and non-metal, the abrasive should be SiC. Fine grained abrasive are for use on soft, highly ductile materials. Soft wheel are for use on hard materials such as bronze to prevent blockage or loading. Dense packed abrasive grains are use for use on hard and brittle material. Loose packed abrasive grains are use on soft and ductile materials.**
 - b. 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 grained wheel for fine polishing, it is still possible as long as you make the necessary adjustment before hand. Glass binders are used on rough finishing and semi-precision finishing. Resin, rubber and shellac binders are used for high precision polishing.**
 - c. 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.

- d. 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.
- e. If you want higher rotation speed grinding wheels that deliver a relatively faster work pace, grinding wheel will tend to be soft. If you want to decrease the rotation speed, this will have the effect like a soft wheel. Glass binder wheel are used at speed under 6,500 S.F.P.M. and rubber, shellac ad resin binder grinding wheels are used at speeds of 6,500 S.F.P.M. and above.
- f. For higher cutting rates and grinding pressures, a hard grinding wheel is required. If your grinding speed must increase, the cutting rate will have to increase, and it will result in a 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.

20. REFERENCE FOR GRINDING CONDITION

1. Downfeed of grinding wheel

Work material Finish	Down feed			Cross feed
	Cast iron, Soft steel, Hardened steel	Stainless & Heat resistant steel	Tool steel	
Fine	0.0002-0.0004" 0.005-0.01mm		0.0002-0.0006" 0.005-0.015mm	under $\frac{1}{4}$ of wheel thickness
Rough	0.0006-0.0012" 0.015-0.03mm	0.0008-0.0012" 0.02-0.03mm	0.0008-0.0012" 0.02-0.03mm	under $\frac{1}{2}$ of wheel thickness

Down feed	Great	Small
Grinding resistance	great	small
Heat produced	much	less
Surface finish	rough	fine
Wheel worn out	much	little

2. Crossfeed

Cross feed	Great	Small
Grinding resistance	great	small
Heat produced	much	less
Surface finish	rough	fine
Wheel worn out	much	little

3. Table longitudinal traverse

Table traverse	Quick	Slow
Grinding resistance	great	small
Heat produced	less	much
Surface finish	rough	fine
Wheel worn out	much	little

Suitable speeds of the table traverse

Work material	Soft steel	Heat treated steel	Tool steel	Cast iron
Speed: M/Min.	6-15	20-25	6-25	16-20

4. Suitable peripheral speeds of wheel: 1200~1800 M/Min

Wheel speed Condition	Quick	Slow
Grinding resistance	small	great
Heat produced	much	less
Surface finish	fine	rough
Wheel worn out	small	great
Safety	bad	better

Material	Peripheral speed
Steel	20-30M/Min.
Cast iron	18-20M/Min.
Tungsten Carbide	8-18M/Min.
Zinc alloy and light metal	25-30M/Min.

21. USAGE OF THE OPTIONAL ATTACHMENT

a. Parallel dressing attachment

The wheel can be dressed either by diamond on the chuck or parallel dresser, which is mounted on top of the spindle housing. The diamond is arranged at an angle to the center of the line of the wheel (as shown on figure 21.1), so that when the diamond loses its sharpness, it can be turned to another angle. This is to make sure there is always a sharp diamond edge available to dress the wheel. The dressing method and the principle of over head parallel dresser are the same to the table-top dresser. Experience has shown that, for high precision grinding, dressing from the table top is better than the over head parallel dresser. The reason being the former is more stable than the latter, and the latter will cause a slight undulation on the surface of the wheel.

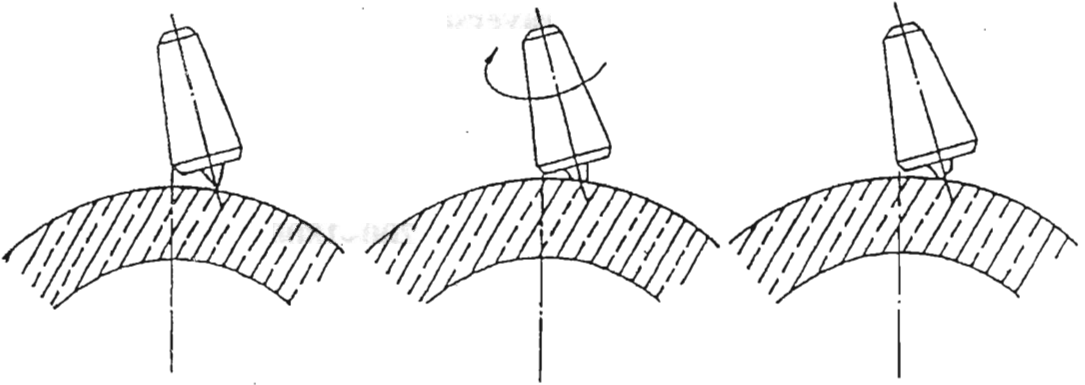
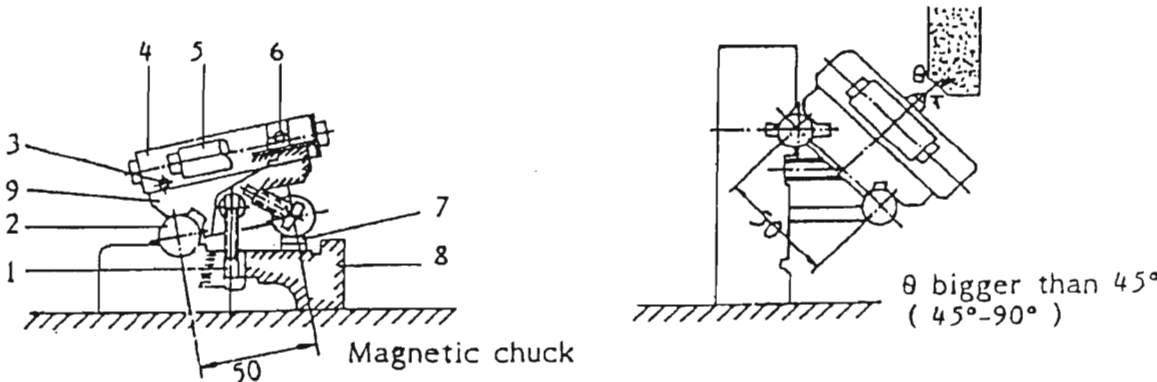
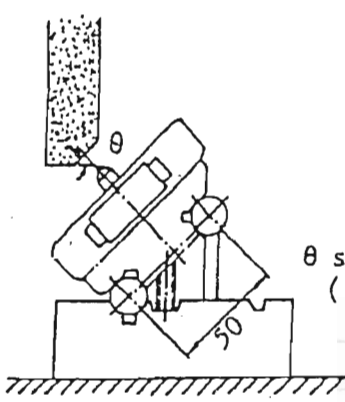


Figure 21.1

b. Angle forming attachment

1. Let the attachment be attracted to the magnetic chuck, and keep a 90 degrees right angle between the attachment and the wheel. The magnetic chuck should be kept level.
2. The value in question will be the Sine of angle times 50. That is $B = \sin\theta \times 50$.
3. Get a block gauge under the base of the Sine bar stand. Fix it with the fastening bolts, and the forming angle is done.





θ smaller than 45°
($0^\circ - 45^\circ$)

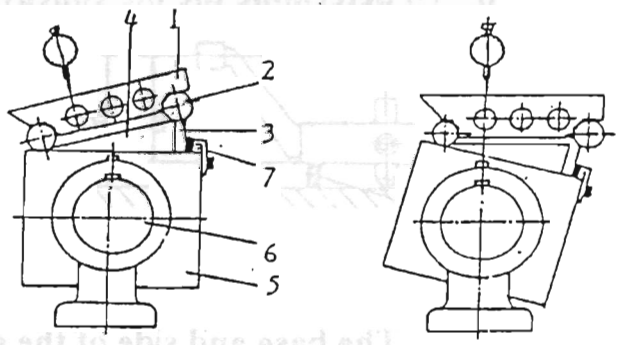
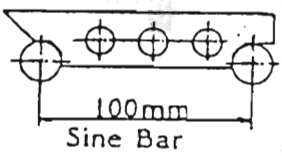
1. Fastening bolt
2. Mandrel
3. Slide adjustment bolt
4. Slide base
5. Handle
6. Diamond fixed hole
7. Block gauge
8. Build-in base
9. Sine Bar stand

c. Sine bar

The sine bar is used to form the inclined angle of the magnetic chuck, when the forming angle of the surface is large.

1. The value in question equals the Sine of the angle times 100, i.e.
 $B = \text{Sin}\theta \times 100$.
2. Get a block gauge, which has the thickness equals to B.
3. Put this gauge at one end of the sine bar and let it be attached to the inclinable magnetic chuck. This sine bar shall be kept parallel to the longitudinal direction of the grinder.
4. Press the dial gauge against the surface of the sine bar, and meanwhile turn the crossfeed handwheel, so that the saddle moves back and forth to check the angle accuracy of the magnetic chuck.

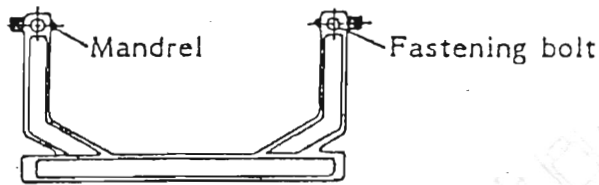
- | | |
|------------------------------------|----------------------------------|
| 1. Mandrel | 5. Inclinable Magnetic Chuck |
| 2. Sine Bar | 6. Mandrel of the Magnetic Chuck |
| 3. Block gauge | 7. Stop block |
| 4. Application of the trigonometry | |



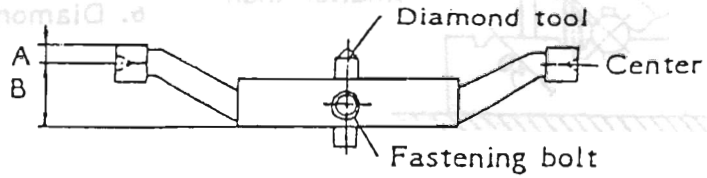
d. Radius forming attachment

The radius forming attachment is composed of a main stand, several swing rods and a diamond tool.

1. Main stand



2. Swing rod and diamond tool



A name plate, with A and B, is attached to the swing rod. They mean:

A: The distance between the upper rim and the center

B: The distance between the bottom rim and the center

The R forming is the adjustment of the distance between the diamond tool and the swing rod center.

3. To determine the concave and convex R:

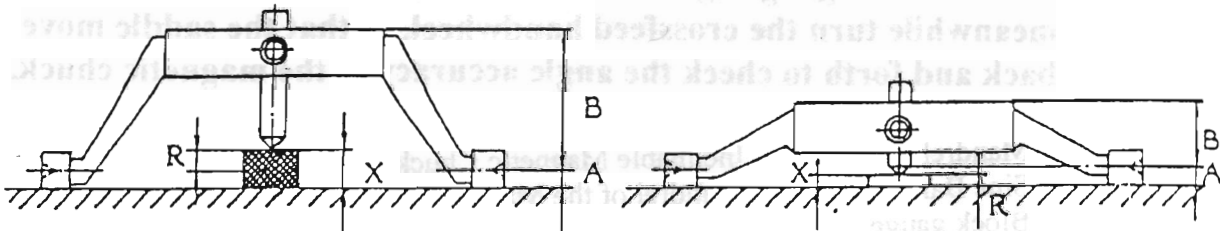
a. If the tool is parallel to the center line, it equal OR.

b. To determine the convex R: Put the swing rod on a place disk.

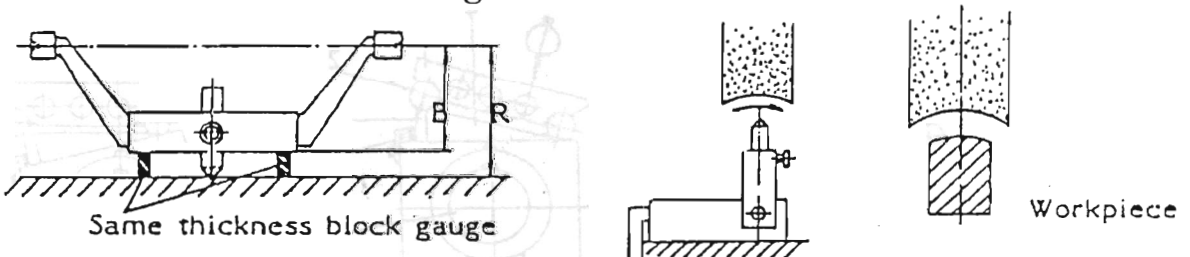
Put a block gauge of certain thickness under the diamond tool.

Then $R=X-A$.

c. To determine the small concave R.



d. To determine the big concave R: $R=B+X$.



e. Note:

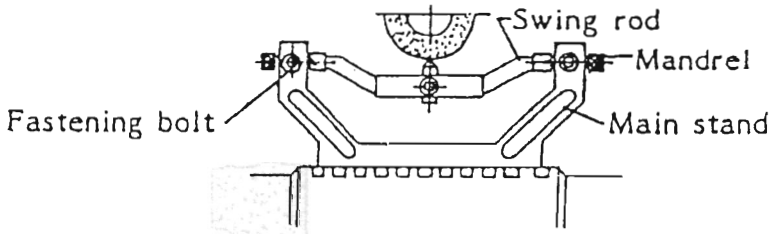
1. The base and side of the grinding wheel shall be well dressed.

2. The radius forming attachment shall be parallel to the grinding wheel.

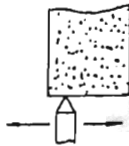
3. The diamond tool shall be parallel to the radius forming attachment.

4. Operation of the radius forming attachment:

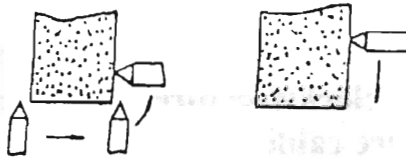
a. Find the center of the grinding wheel. Then fix the work table.



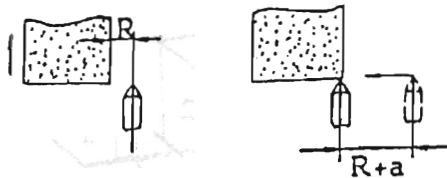
b. Turn the downfeed handwheel at $1/3$ on the width of the wheel so the wheel cuts into 0.02mm of the diamond tool. Now turn crossfeed handwheel to dress the grinding wheel, and turn calibration reading on the downfeed back to zero.



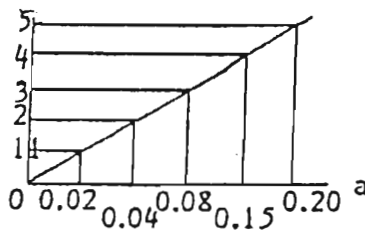
c. Turn the diamond tool over an angle 90 degrees and elevate it into a proper position (greater than R size in question).



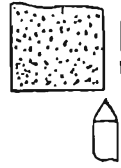
d. Elevate the grinding wheel so that it goes away from the diamond tool and the wheel in such position that the distance between the side of the wheel and the center of the diamond tool is just R .



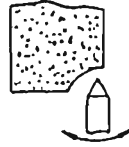
e. Move the diamond tool $(R+a)$ left ward, with "a" found in the following table.



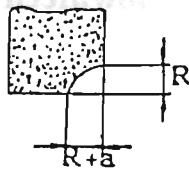
- f. Turn the downfeed handwheel so that the grinding wheel approaches the diamond tool.



- g. Turn the swing rods 90 degrees each time, inching 0.05mm until the R is determined.



- h. The wheel finally becomes the following shape.



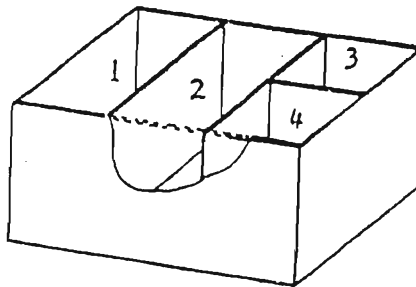
e. Coolant system

Insert the power plug into the socket (at the rear side of the electric cabinet).

Press the push button switch to start the coolant pump, the pump should rotate in the clockwise direction. If not, interchange any two wires of the four-wire cable.

Adjust coolant flow by turning the ball valve to suitable rate.

Cooling water collected from table and returned to coolant tank through return hose then filter in the coolant tank by turns of cabinet #1,2,3, and 4.

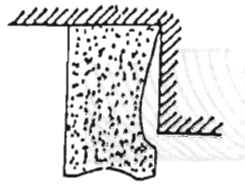
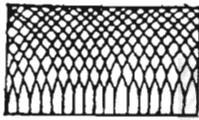


*Coolant tank capacity: 110 liters.

*Coolant pump: 1/8 HP

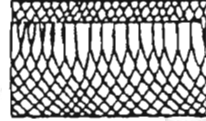
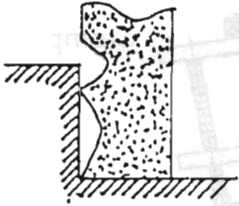
f. Common cases in side grinding

1.



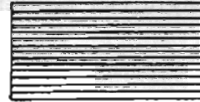
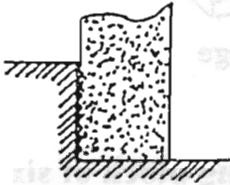
In the case shown in the figure above, the side grinding wheel and the work have a smaller contact surface, in which case the efficiency is higher, and the surface roughness is better.

2.



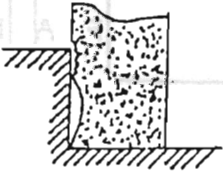
In the figure above, the wheel and the work have two sections of contact, and the surface of grinding is bad. The surface has to be corrected into the shape shown in (1).

3.



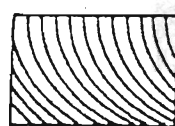
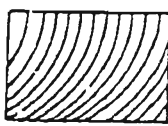
The wheel did not cut to “relief angle”, thus it contacts the whole face of the work, causing the surface of processing rough and rugged. Also the greater face of contact will cause burns and cracks.

4.



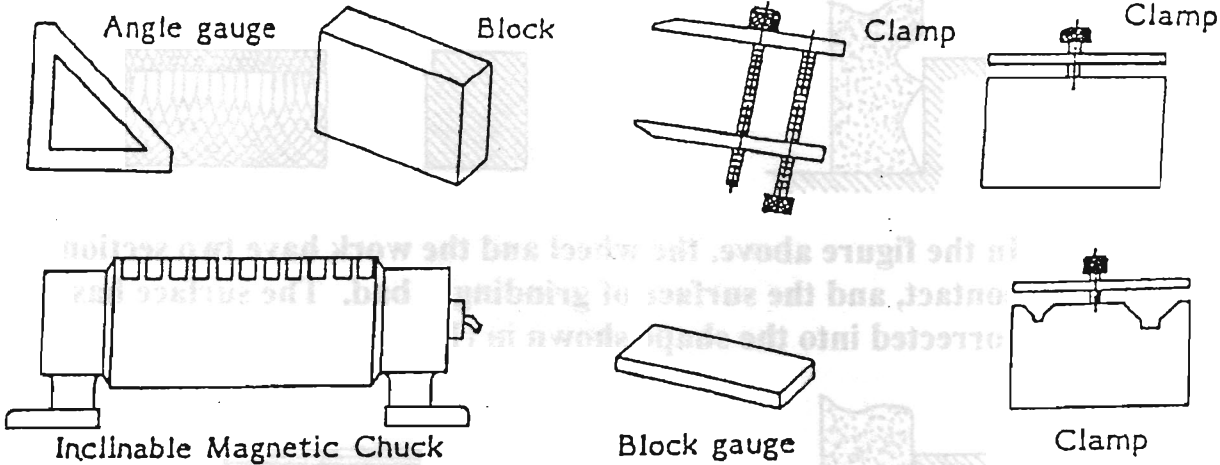
The “relief angle” of the wheel is lower than the surface of the work, so that the work face becomes two sections, the upper section resembling that in (3) and the lower section in (1). Now it is necessary to enlarge the “relief angle” part so it will be higher than the face of the work.

5. If the spindle does not constitute a right angle with the work table surface, the side faces will turn out to be shown:



g. Right angle grinding

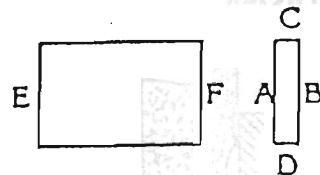
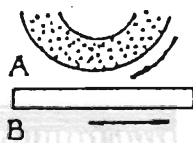
1. Tools



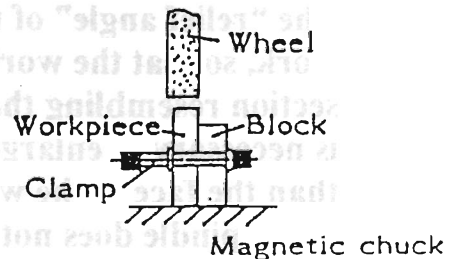
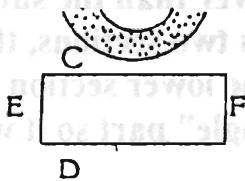
2. Use of the jigs and tools: Take the grinding block of six faces A, B, C, D, E, F. For example:

a. Under 200mm:

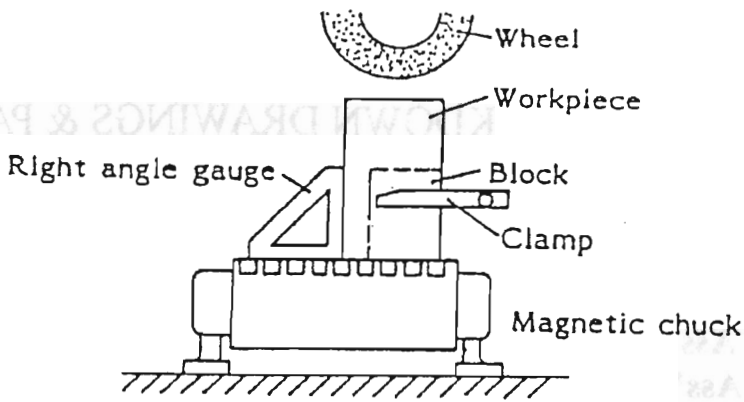
***Grinding of the first basic face, or the surface grinding of A and B,**



***Grinding of C and D**



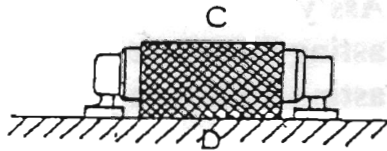
***Grinding of E and F**



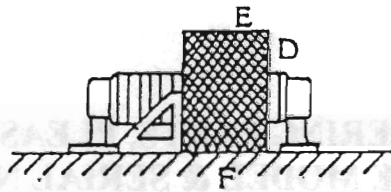
b. Over 200mm:

***Grinding of the first basic face or A.**

***Grinding of C and D: Turn the inclinable magnetic chuck into 90 degrees.**



***Grinding of E and F.**



- 3. Precaution:** The grinding of right angle depends on the patience and clever mind of the operator for its precision. For instance, whether the burrs after grinding is done well, whether the tools are kept clean, whether the work table are kept clean, the accuracy of the angle gauge, etc., all have a direct influence over the precision of the product.

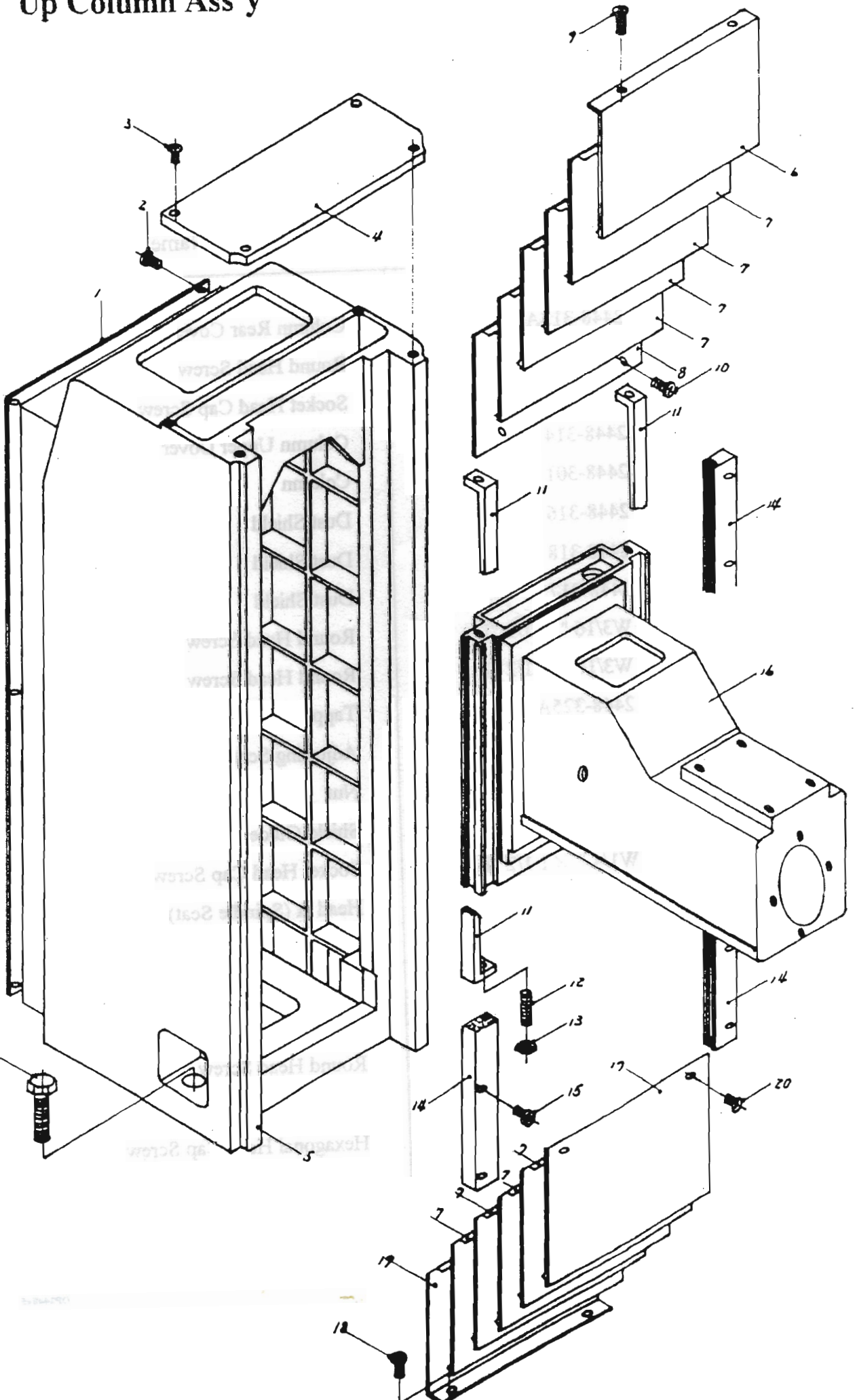
22. COMPLETE KNOCKDOWN DRAWINGS & PARTS LISTS

Description	Page
Up Column Ass'y	76
Spindle Set Ass'y	78
Down Feed Unit Ass'y	80
Crossfeed Ass'y	83
Longitudinal Handfeed Ass'y	85
Cylinder Set Ass'y	88
Hydraulic Ass'y	90
Balance Structure Ass'y	94
AGS 2448 Front Casting Structure	96
AGS 2480 Front Casting Structure	98

Note: WHEN ORDERING PARTS, PLEASE MENTION:

- 1. MACHINE MODEL & SERIAL NUMBER.**
- 2. INDEX NUMBER.**
- 3. PART NUMBER AND NAME.**
- 4. YEAR OF PRODUCTION.**
- 5. QUANTITY.**

Up Column Ass'y

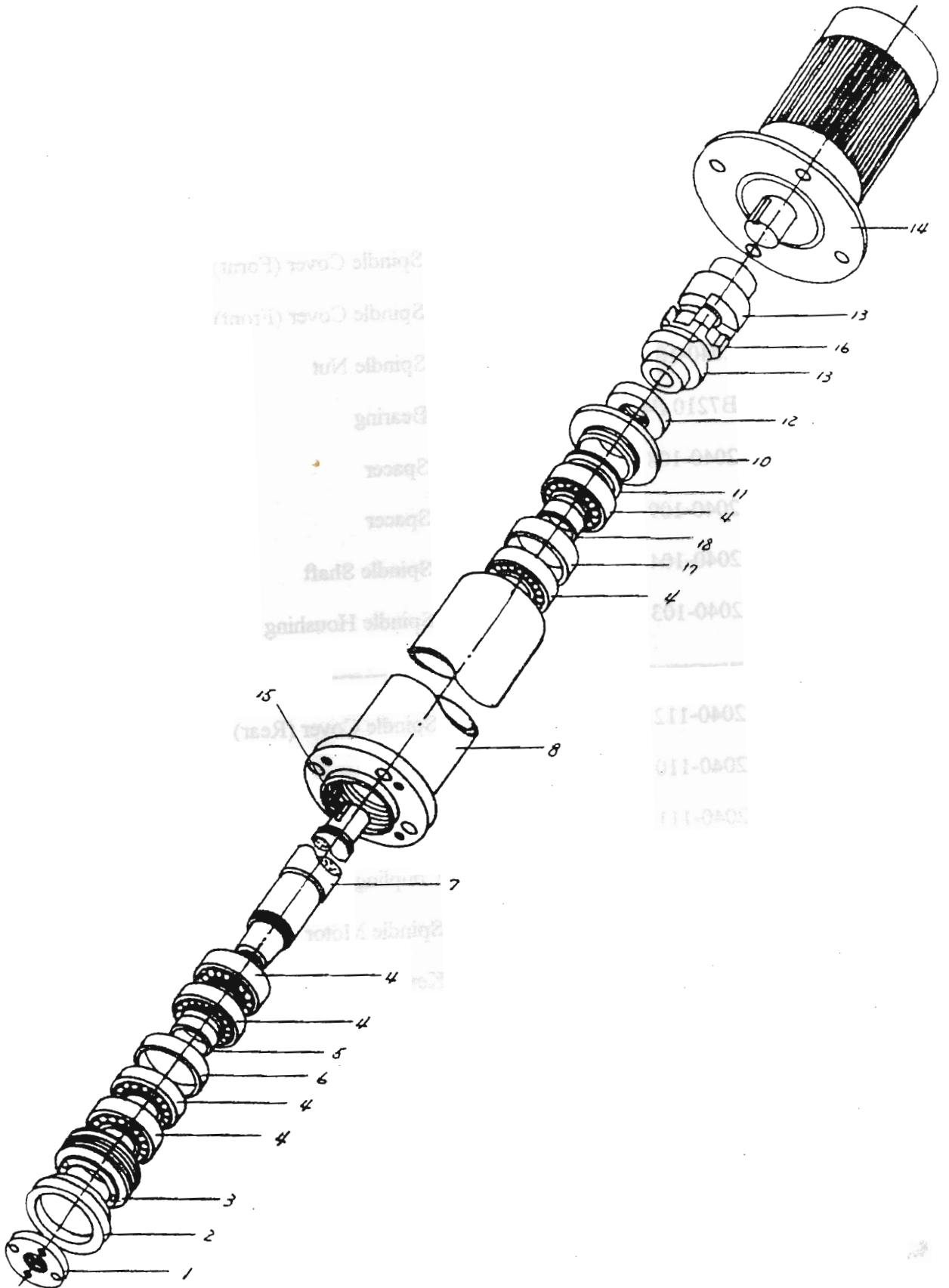


UP COLUMN ASS'Y

(2448,2480 SERIES)

Index No.	Parts No.	Parts Name	Q'ty
1.	2448-313A	Column Rear Cover	1
2.	W1/4 " × 1/2 "L	Round Head Screw	8
3.	W1/4 " × 3/4 "L	Socket Head Cap Screw	4
4.	2448-314	Column Upper Cover	1
5.	2448-301	Column	1
6.	2448-316	Dust Shield	1
7.	2448-318	Dust Shield	8
8.	2448-317	Dust Shield	1
9.	W3/16 " × 1/2 "L	Round Head Screw	2
10.	W3/16 " × 1/2 "L	Round Head Screw	2
11.	2448-325A	Tapper Plate	3
12.	W1/8 " × 4 "L	Adjusting Screw	3
13.	W 3/8"	Nut	6
14.	2448-315	Shield Guide	2
15.	W1/4 " × 1 1/2 "L	Socket Head Cap Screw	28
16.	2448-202	Head A (Spindle Seat)	1
17.	2040-320	Dust Shield	1
18.	W3/16 " × 1/2 "L	Fixed Dust Shield	2
19.	2448-319	Dust Shield	1
20.	W3/16 " × 1/2 "L	Round Head Screw	2
21.			
22.	W 1"*2 1/2"L	Hexagonal Head Cap Screw	5

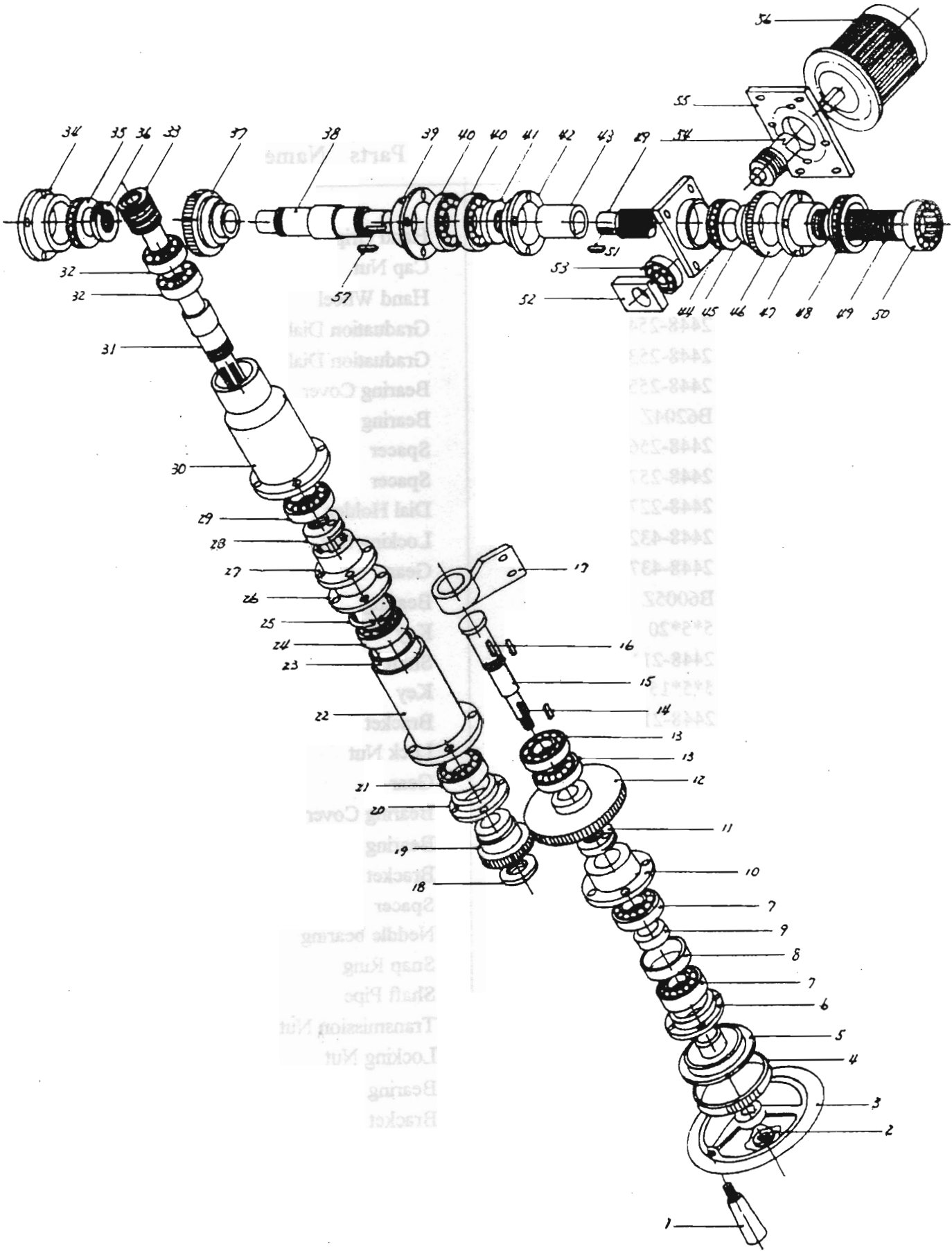
Spindle Set Ass'y



SPINDLE SET ASS'Y
(2448,2480 SERIES)

Index No.	Parts No.	Parts Name	Q'ty
1.	2040-107	Spindle Cover (Fornt)	1
2.	2040-105	Spindle Cover (Front)	1
3.	2040-106	Spindle Nut	1
4.	B7210 P4	Bearing	4
5.	2040-108	Spacer	2
6.	2040-109	Spacer	2
7.	2040-104	Spindle Shaft	1
8.	2040-103	Spindle Houshing	1
9.	-----	-----	-
10.	2040-112	Spindle Cover (Rear)	1
11.	2040-110	Spacer	1
12.	2040-111	Spindle Nut	1
13.	1632-111	Coupling	2
14.	10HP*4P	Spindle Motor	1
15.	10*8*35L	Key	1
16.	1632-113	Rubber Coupling	1

Down Feed Unit Ass'y



DOWN FEED UNIT ASS'Y

(2448,2480 SERIES)

P. 1OF2

Index No.	Parts No.	Parts Name	Q'ty
1.	1020-728	Hand Grip	1
2.	1020-729	Cap Nut	1
3.	1020-714	Hand Wheel	1
4.	2448-254	Graduation Dial	1
5.	2448-253	Graduation Dial Holder	1
6.	2448-255	Bearing Cover	1
7.	B6204Z	Bearing	2
8.	2448-256	Spacer	1
9.	2448-257	Spacer	1
10.	2448-227	Dial Holder	1
11.	2448-432	Locking Nut	1
12.	2448-437	Gear	1
13.	B6005Z	Bearing	2
14.	5*5*20	Key	1
15.	2448-211	Shaft	1
16.	5*5*15	Key	1
17.	2448-212	Bracket	1
18.	AN-10	Lock Nut	1
19.	2448-232	Gear	1
20.	2448-233	Bearing Cover	1
21.	B6210Z	Bearing	1
22.	2448-234	Bracket	1
23.	2448-234-1	Spacer	1
24.	NA4911UU	Neddle bearing	1
25.	R-80	Snap Ring	1
26.	2448-235	Shaft Pipe	1
27.	2448-236	Transmission Nut	1
28.	2448-241	Locking Nut	1
29.	B6207	Bearing	1
30.	2448-216	Bracket	1

DOWN FEED UNIT ASS'Y

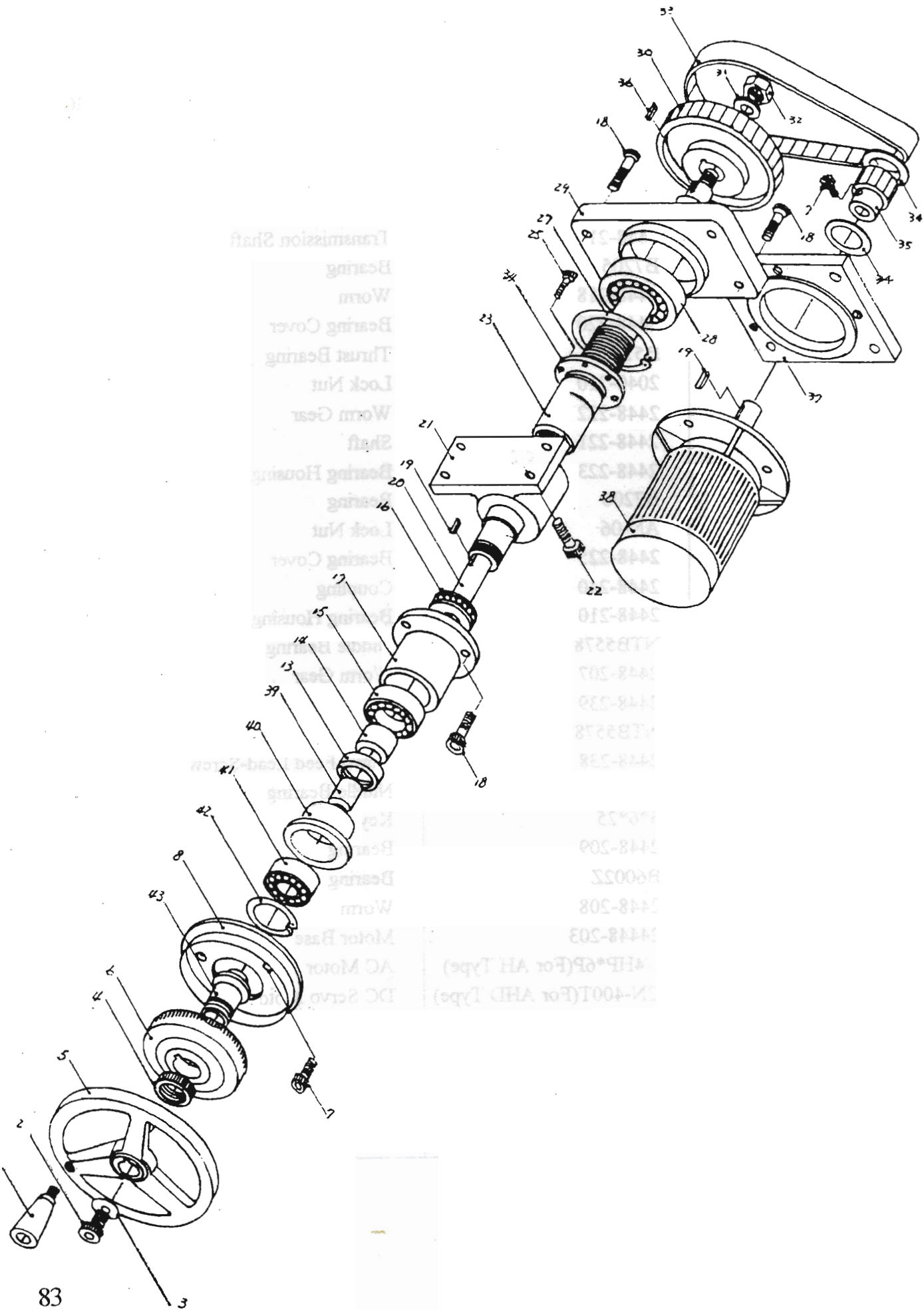
(2448,2480 SERIES)

P.2OF2

Index No.	Parts No.	Parts Name	Q'ty
31.	2448-217	Transmission Shaft	1
32.	B7205	Bearing	2
33.	2448-218	Worm	1
34.	2448-220	Bearing Cover	1
35.	B51306	Thrust Bearing	1
36.	2040-210	Lock Nut	1
37.	2448-222	Worm Gear	1
38.	2448-221	Shaft	1
39.	2448-223	Bearing Housing	1
40	B7206	Bearing	2
41.	AN-06	Lock Nut	1
42.	2448-225	Bearing Cover	1
43.	2448-240	Coupling	1
44.	2448-210	Bearing Housing	1
45.	NTB5578	Niddle Bearing	1
46.	2448-207	Worm Gear	1
47.	2448-239	Lead-Screw Nut	1
48.	NTB5578	Niddle Bearing	1
49.	2448-238	Down Feed Lead-Screw	1
50.	TA5525	Niddle Bearing	1
51.	6*6*25	Key	1
52.	2448-209	Bearing Housing	1
53.	B6002Z	Bearing	1
54.	2448-208	Worm	1
55.	24448-203	Motor Base	1
56.	1/4HP*6P(For AH Type)	AC Motor	1
	CN-400T(For AHD Type)	DC Servo Motor(400W)	1

Op2448e6

Cross Feed Ass'y

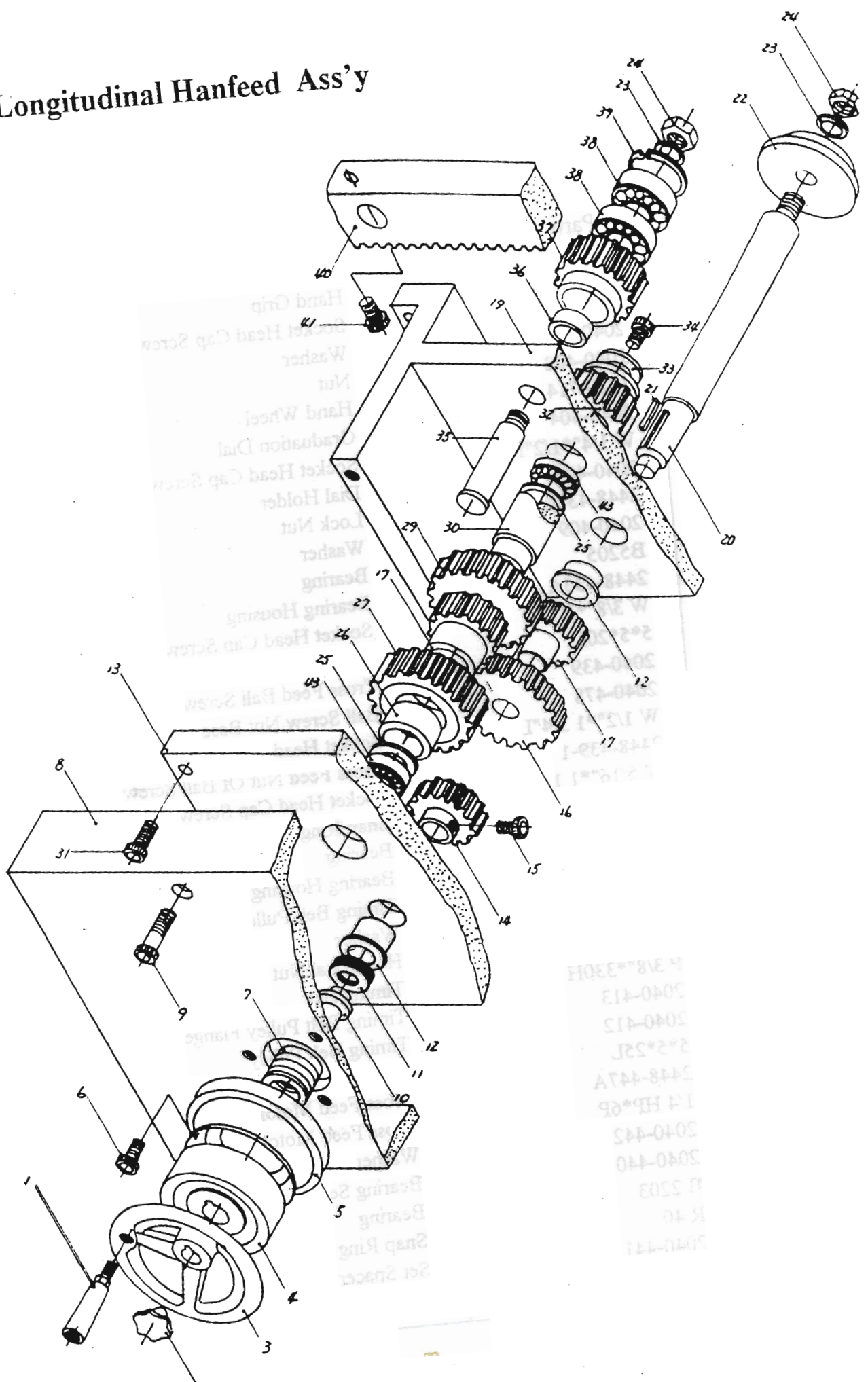


CROSS-FEED ASS'Y

(2448,2480 SERIES)

Index No.	Parts No.	Parts Name	Q'ty
1.	1020-728	Hand Grip	1
2.	W 1/4"*5/8"L	Socket Head Cap Screw	1
3.	2040-414	Washer	1
4.	2040-402	Nut	1
5.	1020-714	Hand Wheel	1
6.	2040-404	Graduation Dial	1
7.	W 1/4"*1/2"L	Socket Head Cap Screw	7
8.	2040-405	Dial Holder	1
13.	2448-432B	Lock Nut	1
14.	2040-409	Washer	1
15.	B5205	Bearing	1
17.	2448-435A	Bearing Housing	1
18.	W 3/8"*1"L	Socket Head Cap Screw	15
19.	5*5*20L	Key	1
20.	2040-439	Cross Feed Ball Screw	1
21.	2040-478	Ball Screw Nut Base	1
22.	W 1/2"*1 3/4"L	Socket Head Cap Screw	4
23.	2448-439-1	Cross Feed Nut Of Ball Screw	1
25.	W 5/16"*1 1/4"L	Socket Head Cap Screw	6
27.	R-52	Snap Ring	1
28.	B 1205Z	Bearing	1
29.	2448-443	Bearing Housing	1
30.	2040-411	Timing Belt Pulley	1
31.	W 1/2"	Washer	1
32.	W 1/2"	Hexagonal Nut	1
33.	P 3/8"*330H	Timing Belt	1
34.	2040-413	Timing Belt Pulley Flange	2
35.	2040-412	Timing Belt Pulley	1
36.	5*5*25L	Key	1
37.	2448-447A	Cross Feed Motor Fixed Plate	1
38.	1/4 HP*6P	Cross Feed Motor	1
39.	2040-442	Washer	1
40.	2040-440	Bearing Seat	1
41.	B 2203	Bearing	1
42.	R 40	Snap Ring	1
43.	2040-441	Set Spacer	1

Longitudinal Hanfeed Ass'y



LONGITUDINAL HANDFEED ASS'Y

(2448,2480 SERIES)

P. 1OF2

Index No.	Parts No.	Parts Name	Q'ty
1.	1020-728	Hand Grip	1
2.	1020-729	Cap Nut	1
3.	1020-714	Hand Wheel	1
4.	2040-521	Dial	1
5.	2040-523	Dial Holder	1
6.	W 1/4"*3/4"L	Socket Head Cap Screw	3
7.	2040-520	Spring	1
8.	2448-103	Base Plate	1
9.	W 5/16"*10"L	Socket Head Cap Screw	6
10.	2040-519	Sleeve	1
11.	NTB-2035	Needle Bearing	1
12.	2040-505	Bush	1
13.	2448-505	Gear Housing Plate	1
14.	2040-517	Gear	1
15.	W 1/4"*1/2"L	Set Screw	1
16.	2040-513	Gear	1
17.	2040-512	Gear	2
18.	-----	-----	-
19.	2448-504	Gear Housing Plate	1
20.	2448-506	Shaft	1
21.	5*5*40L	Key	1
22.	2040-516	Power Plate	1
23.	W 1/2"	Washer	2

LONGITUDINAL HANDFEED ASS'Y

(2448,2480 SERIES)

P.2OF2

Index No.	Parts No.	Parts Name	Q'ty
24.	W 1/2"	Hexagonal Nut	2
25.	1020-N805	Spacer	2
26.	2040-514	Spacer	1
27.	2040-524	Gear	1
28.	-----	-----	-
29.	2040-511	Gear	1
30.	2040-515	Shaft	1
31.	W 5/16"*1"L	Socket Head Cap Screw	4
32.	2040-510	Gear	1
33.	W 1/4"	Washer	1
34.	W 1/4"*1/2"L	Socket Head Cap Screw	1
35.	2040-509	Shaft	1
36.	2040-508	Washer	1
37.	2040-507	Gear	1
38.	B6203Z	Bearing	2
39.	R-40	Snap Ring	1
40.	2448-114	Rack	1
41.	W 3/8"*1"L	Socket Head Cap Screw	3
42.	-----	-----	-
43.	B6003Z	Bearing	2

Cylinder Set Ass'y

CYLINDER SET ASS

Parts Name

Hexagonal Nut

Washer

Rubber Pad

Socket Head Cap Screw

End Bracket

Cylinder Bracket

Cylinder Chamber

Socket Head Cap Screw

Dust Seal

Oil Ring

End Bracket

O Ring

Wear Ring

O Ring

O Ring

Cylinder Pipe

Cylinder Pipe

Cylinder Rod

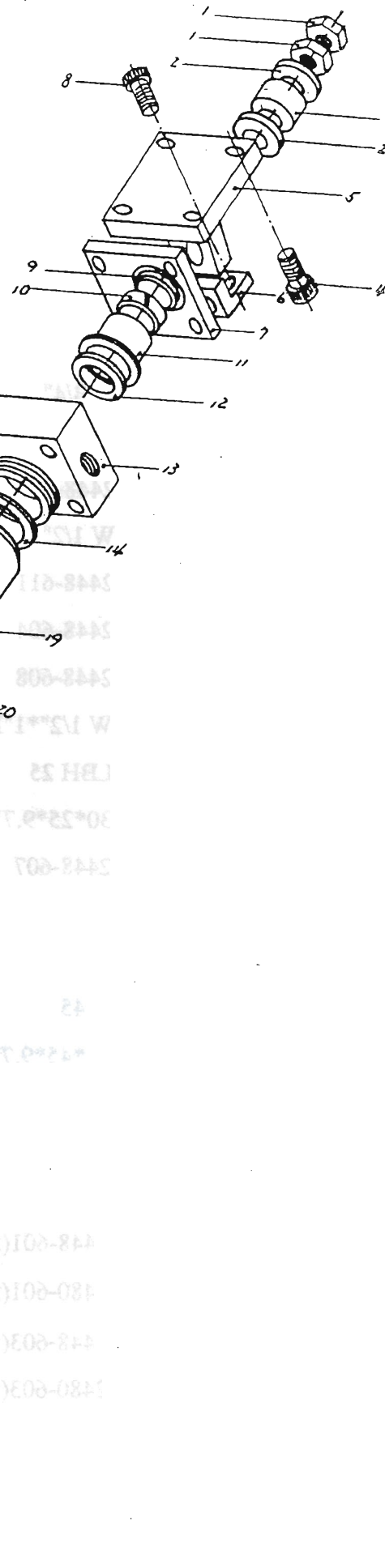
Cylinder Rod

148-601 (for 2448 series)

180-601 (for 2480 series)

148-603 (for 2448 series)

180-603 (for 2480 series)



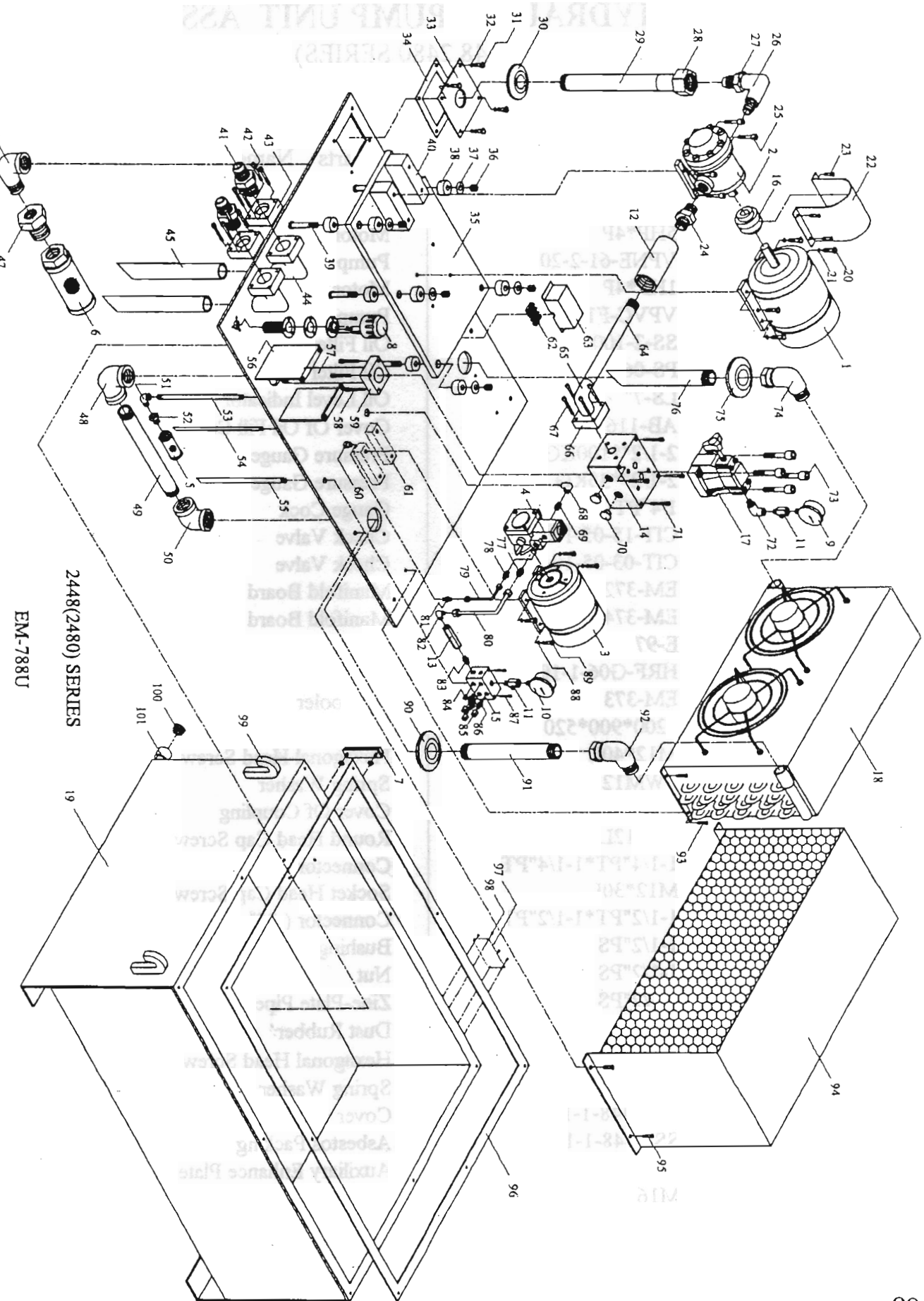
CYLINDER SET ASS'Y

(2448,2480 SERIES)

Index No.	Parts No.	Parts Name	Q'ty
1.	W 3/4"	Hexagonal Nut	4
2.	2448-610	Washer	4
3.	2448-609	Rubber Pad	2
4.	W 1/2"*1 1/2"L	Socket Head Cap Screw	8
5.	2448-611	End Bracket	2
6.	2448-604	Cylinder Brcket	2
7.	2448-608	Cylinder Clamper	2
8.	W 1/2"*1"L	Socket Head Cap Screw	4
9.	LBH 25	Dust Seal	2
10.	30*25*9.7W	Wear Ring	2
11.	2448-607	Oil Seal Bracket	2
12.	USH 25	U-Packing	2
13.	2448-602	End Cover	2
14.	G 45	O Ring	2
15.	50*45*9.7W	Wear Ring	1
16.	2448-605	Piston	1
17.	P 44	O Ring	1
18.	P 21	O Ring	1
19.	2448-601(for 2448 series)	Cylinder Pipe	1
	2480-601(for 2480 series)	Cylinder Pipe	1
20.	2448-603(for 2448 series)	Cylinder Rod	1
	2480-603(for 2480 series)	Cylinder Rod	1

Op2448e1

Hydraulic Pump Unit Ass'y



2448(2480) SERIES

EM-788U

HYDRAULIC PUMP UNIT ASS'Y

(2448,2480 SERIES)

P. 1OF3

Index No.	Parts No.	Parts Name	Q'ty
1.	5HP*4P	Motor	1
2.	VPNE-61-2-20	Pump	1
3.	1HP*4P	Motor	1
4.	VPVC-F12-A2-02	Pump	1
5.	SS-2-100	Oil Filter	1
6.	PS-06	Oil Filter	1
7.	LS-7"	Oil Level Indicator	1
8.	AB-1163	Cover Of Oil Fill Cover	1
9.	2-1/2"*100KG	Pressure Gauge	1
10.	2-1/2"*35KG	Pressure Gauge	1
11.	1/4"PT	Gauge Cock	2
12.	CIT-15-05-10	Check Valve	1
13.	CIT-03-05-10	Check Valve	1
14.	EM-372	Manifold Board	1
15.	EM-374	Manifold Board	1
16.	E-97	Coupling	1
17.	HRF-G06-1-10	Relief	1
18.	EM-373	Oil Cooler	1
19.	1200*900*520	Tank	1
20.	M12*40L	Hexagonal Head Screw	4
21.	SWM12	Spring Washer	4
22.		Cover Of Coupling	1
23.	M5*12L	Round Head Cap Screw	4
24.	1-1/4"PT*1-1/4"PT	Connector	1
25.	M12*30L	Socket Head Cap Screw	4
26.	1-1/2"PT*1-1/2"PT	Connector (90°)	1
27.	1-1/2"PS	Bushing	1
28.	1-1/2"PS	Nut	1
29.	1-1/2"PS	Zinc-Plate Pipe	1
30.	ST-12	Dust Rubber	1
31.	M8*20L	Hexagonal Head Screw	4
32.	SWM8	Spring Washer	4
33.	CP-2448-1-1	Cover	1
34.	SS-2448-1-1	Asbestos Packing	1
35.		Auxiliary Enhance Plate	1
36.	M16	Nut	12

HYDRAULIC PUMP UNIT ASS'Y

(2448,2480 SERIES)

P.20F3

Index No.	Parts No.	Parts Name	Q'ty
37.	WM16	Washer	6
38.	φ 50* φ 16*25H	Rubber Pad	12
39.	M16*110L	Hexagonal Head Screw	6
40.	EM-375	Plate Pad	2
41.	1-1/4"PT*1-1/4PH	Asbestos Packing	2
42.	M12*45L	Round Head Screw	8
43.	1-1/4" with Oring-G40	Flange	2
44.	1-1/4"PT*1-1/4PT"	Connector	2
45.	1-1/4"PT*300L(Slope)	Zine-Plate Pipe	2
46.	1-1/2"PT(F)*1-1/2PT"(M)	Connector (90°)	1
47.	1-1/2"PT(F)*2PT"(M)	Bushing	1
48.	1"PT*1"PT	Connector	1
49.	1"PT	Zine-Plate Pipe	1
50.	1"PT*1"PT	Connector	1
51.	1/2"PT(F)*1/2PT"(M)	Connector (90°)	1
52.	1/2"PT(F)*3/4PT"(M)	Bushing	1
53.	1/2"PT*1/2"PT	Zine-Plate Pipe	1
54.	1/4"PT*300L(slope)	Zine-Plate Pipe	1
55.	3/8"PT*300L(slope)	Zine-Plate Pipe	1
56.	2448-HP1	Holding Plate	2
57.	1"PT	Zine-Plate Pipe	1
58.	M12*45L	Round Head Socket Cap Screw	4
59.	1-1/4" with Oring-G40	Flange	1
60.	1/4"PT*1/4"PT	Socket	1
61.	2448-MP1	Pad Of Motor	2
62.	SJT-15-3P	Terminal broad	1
63.	2448-TB1	Cover Of Terminal broad	1
64.	1-1/4"PT	Steel Pipe	1
65.		90° Pipe	1
66.	1-1/4" with Oring-G40	Flange	1
67.	M12*45L	Round Head Socket Cap Screw	4
68.	1/2"PT(F)*1/2"PT(F)	Connector (90°)	1
69.	1/2"PT*1/2"PT	Connector	1
70.	1"PT	PT Plug	2
71.	M8*110L	Round Head Socket Cap Screw	4
72.	1/2"PT(F)*1/2"PT(M)	Connector (90°)	1

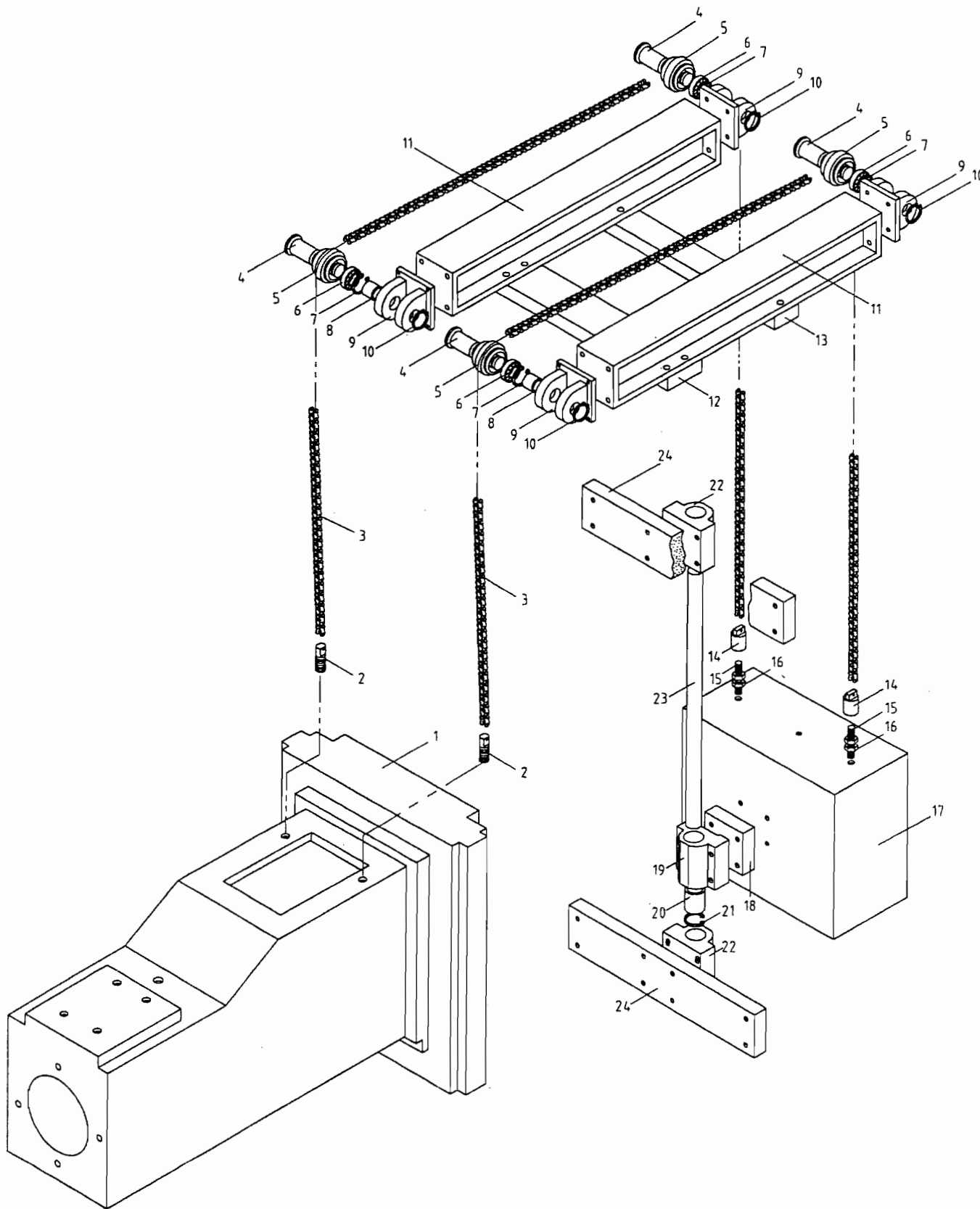
HYDRAULIC PUMP UNIT ASS'Y

(2448,2480 SERIES)

P.3OF3

Index No.	Parts No.	Parts Name	Q'ty
73.	M16*50L	Universal Connector (90°)	1
74.	1"PT(M)*1"PS(F)	Round Head Socket Cap Screw	4
75.	ST-08	Dust-Rubber	1
76.	1"PT*300L(Slope)	Zinc-Plate Pipe	1
77.	3/4"PT* ϕ 22mm	LE Connector (90°)	1
78.	1/4"PT* ϕ 5/16 "	LE Copper Connector	1
79.	ϕ 5/16"	Copper Pipe	1
80.	ϕ 12	Zinc-Plate Pipe	1
81.	1/4"PT* ϕ 5/16 "	LE Copper Connector	1
82.	3/8"PT* ϕ 12	LE Connector (90°)	1
83.	3/8"PT*1/4"PT	Connector	1
84.	1/4"PT	PT Plug	1
85.	1/4"PS	Plug Screw	3
86.	1/4"PT*1/4"PS	Connector	3
87.	M5*65L	Socket Head Cap Screw	2
88.	SWM8	Spring washer	4
89.	M8*20L	Hexagonal Head Screw	4
90.	ST-08	Dust Rubber	1
91.	1"PT	Zinc-Plate Pipe	1
92.	1"PT(F)*1"PS(M)	Universal Connector (90°)	1
93.	M5*12L	PT Plug	4
94.	2448C1	Cover Of Cooler	1
95.	M5*12L	Round head Screw	4
96.	2448-AP1	Asbestos Packing	1
97.	2448-NP1	Name Plate	1
98.	ϕ 2.5mm	Rivet	4
99.	2448-HB	Hang Bar	4
100.	1/2PT"	PT Plug	1
101.	1/2PT"	Socket	1

BALANCE STRUCTURE ASS'Y



BALANCE STRUCTURE ASS'Y

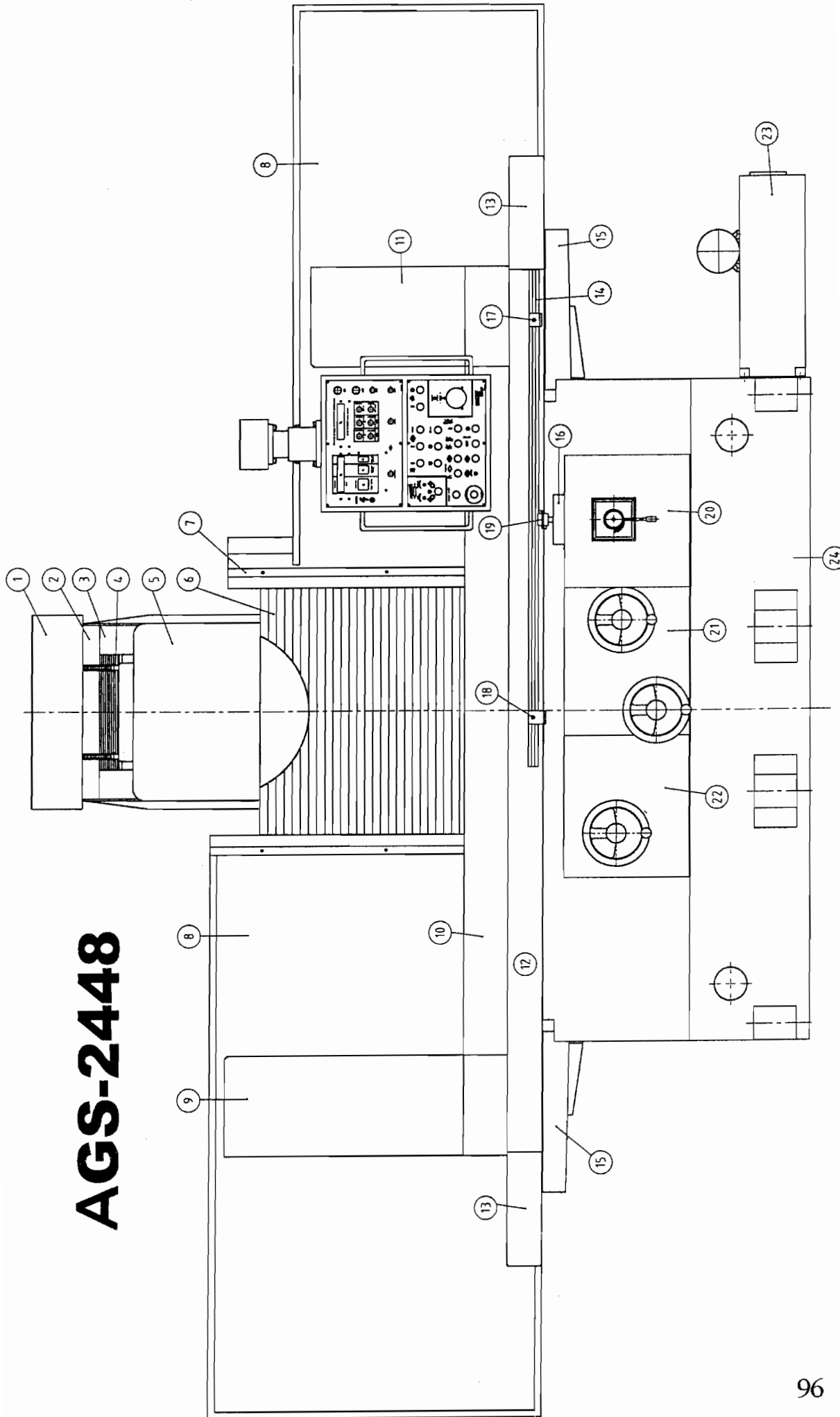
(2448,2480 SERIES)

Index No.	Parts No.	Parts Name	Q'ty
1.	2448-101	Spindle seat	1
2.	2448-347	Chain Link	8
3.	φ 5/8"	Chain wire	4
4.	2448-348	Shaft Of Chain Sproket Wheel	1
5.	2448-349	Chain Sproket Wheel	1
6.	6003ZZ	Bearing	1
7.	R35	Snap Ring	8
8.	2448-350	Washer	1
9.	2448-341	Base Of Chain Sproket Wheel	2
10.	S17	Snap Ring	2
11.	2448-340	Supporting Frame	3
12.	2448-314	Supporting Plate	3
13.	2448-353	Supporting Plate	6
14.	2448-345	Chain Link	2
15.	2448-346	Adjusting Screw	28
16.	5/8"	Nut	1
17.	2448-351	Balance Block	1
18.	2448-360	Pad Of Balance Block	2
19.	2448-343	Guide Base Of Balance Block	1
20.	2448-359	Bush	2
21.	R47	Snap Ring	1
22.	2448-342	Base Of Guide Bar	5
23.	2448-244	Guide Bar	1
24.	2448-354	Fixed Plate	2

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AGS 2448 FRONT CASTING STRUCTURE

AGS-2448

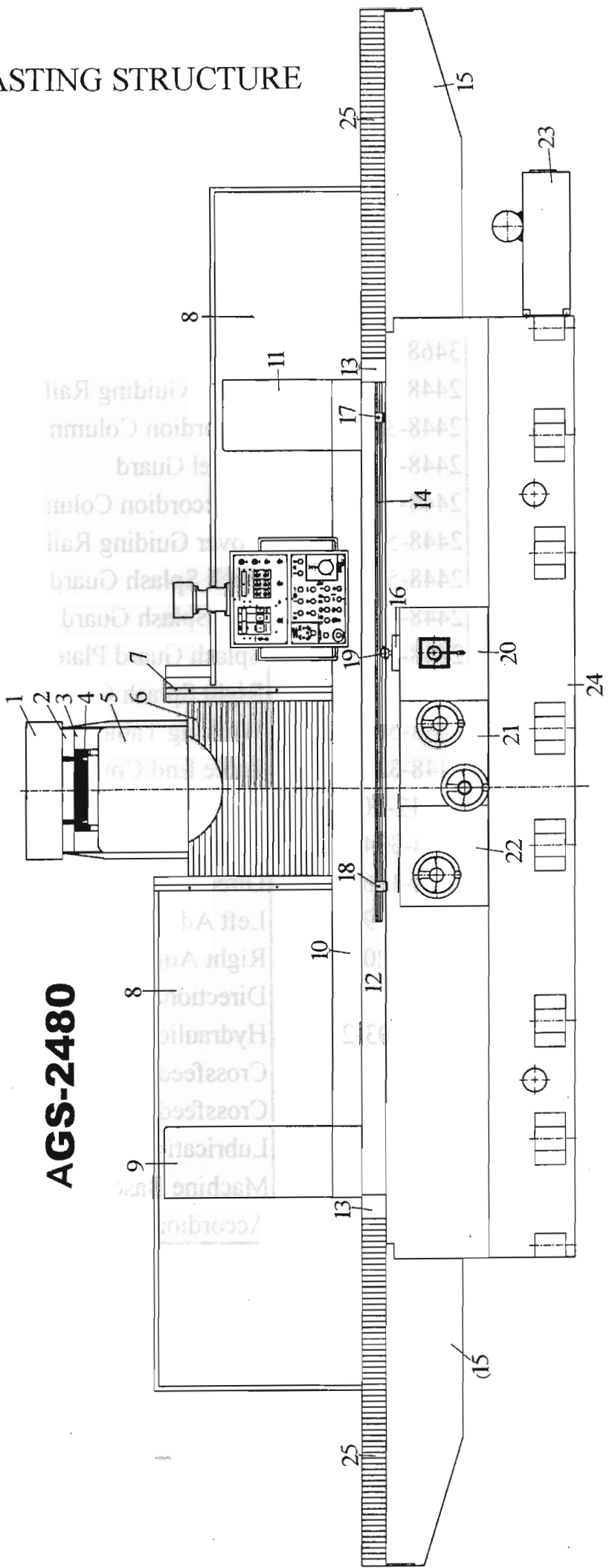


AGS 2448 FRONT CASTING STRUCTURE

Index No.	Parts No.	Parts Name	Q'ty
1	2448-358	Cover for Balancing Assembly	1set
2	3468-366	Upper Column Locating Plate	1
3	2448-368	Cover Guiding Rail	2
4	2448-367	Accordion Column Cover	1
5	2448-303	Wheel Guard	1
6	2448-537	L-Accordion Column Cover	1
7	2448-536	Cover Guiding Rail	2
8	2448-526	Back Splash Guard Plate	1 set
9	2448-106	Left Splash Guard	1
10	2448-108	Splash Guard Plate	1
11	2448-107	Right Splash Guard	1
12	2448-501	Working Table	1
13	2448-503	Table End Cover	2
14	T1512-307	Table Dog Guide Rail	1
15	2448-113A	Lower Table Cover	2
16	2448-116	Direction Control Valve Cover	1
17	2448-119	Left Adjusting Dog	1
18	2448-120	Right Adjusting Dog	1
19	1020-616	Directional Control Valve	1
20	2448-103-2	Hydraulic Valve Cover	1
21	2448-103-1	Crossfeed Front Cover	1
22	2448-103-1	Crossfeed Front Cover	1
23	2448-132	Lubrication Tank	1
24	2448-101	Machine Base	1

8445-20A

AGS 2480 FRONT CASTING STRUCTURE



AGS-2480

AGS 2480 FRONT CASTING STRUCTURE

Index No.	Parts No.	Parts Name	Q'ty
1	2448-358	Cover for Balancing Assembly	1 set
2	3468-366	Upper Column Locating Plate	1
3	2448-368	Cover Guiding Rail	2
4	2448-367	Accordion Column Cover	1
5	2448-303	Wheel Guard	1
6	2448-537	L-Accordion Column Cover	1
7	2448-536	Cover Guiding Rail	2
8	2448-526	Back Splash Guard Plate	1 set
9	2448-106	Left Splash Guard	1
10	2448-108	Splash Guard Plate	1
11	2448-107	Right Splash Guard	1
12	2448-501	Working Table	1
13	2448-333	Table End Cover Plate	2
14	T1512-307	Table Dog Guide Rail	1
15	2448-334	Lower Accordion Cover Support	2
16	2448-116	Direction Control Valve Cover	1
17	2448-119	Left Adjusting Dog	1
18	2448-120	Right Adjusting Dog	1
19	1020-616	Directional Control Valve	1
20	2448-103-2	Hydraulic Valve Cover	1
21	2448-103-1	Crossfeed Front Cover	1
22	2448-103-1	Crossfeed Front Cover	1
23	2448-132	Lubrication Tank	1
24	2480-101	Machine Base	1
25	2448-331A	Accordion Way Cover	2