OPERATION MANUAL

CONTENT

OPERATION MANUAL

CONTENT

CE. MACHINERY DIRECTIVE 89/392/EEC OPERATION MANUAL

PRESERVE THIS MANUAL FOR FUTURE REFERENCE AND USE.

MACHINE NAME: HORIZONTAL SURFACE GRINDING MACHINE

MODEL: SUPRA-1428AHD

SUPRA-1632AHD

SUPRA-1640AHD

CHAPTER 1

SAFETY PRECAUTIONS

Safety first!

We're glad to provide the information for using machines safely, to assist and keep safety while you're working, and to help avoiding any damage to the machine. We have two different kinds of manuals:

1) OPERATIONAL MANUAL

2) ELECTRICAL MANUAL

Please check if there's any pages missing in your manual as soon as you receive the machine. Let us or the agent nearby know if there's any insufficiency.

Put your manual near the machine in case you want to read it. Also keep the manual carefully so that you will be able to read it any time you wish.

Please use your experience and the information from this manual to get the safest working circumstance.

1. General operating safety precautions:

1.1 : Machine usage ---- Obey every message you from the manuals.

1.2 : Only an operator who is well trained for grinding machines should operate and maintain the machine.

1.3 : Please read and understand the manuals before using the machines.

1.4 : Keep the work area clean, and leave no oil spot.

1.5 : Do not wear gloves while operating machines.

1.6 : Please wear suitable outfit while operating machines. Tie up your sleeve links and don't wear any necktie.

1.7 : Do not touch any moving or rotating parts of machine.

1.8 : Do not touch or open the parts where we have the electric sign on them, such as electrical box.

1.9 : Turn off the power before maintenance or leaving machine unattended.

1.10: Make sure you have enough light in your working area.

1.11: Propose non-electric-conductor fire extinguisher (dry powder) for preparation.

1.12: Stop machine immediately if anything unexpected happens.

2. Safety precautions for operating machine

For using this machine safely, please ask every operator, maintenance man, or any other persons to obey the safety precaution. To obey the safety precautions below will reduce the danger of any possible damage.

2.1 : This machine can only grind metallic work piece. But do not grind magnesium or magnesium alloy.

2.2 : This machine cannot be used in a place where there is gas which is easy to burn or explode.

2.3 : Do not disassemble any protective guard before use.

2.4 : Please read and understand your manual before operation.

2.5 : Check the position of emergency stop buttons and other stop button before operation.

2.6 : Confirm the function of each buttons before operation.

2.7 : Wear safety glasses.

2.8 : Make sure every switch is in the position of "OFF" before operation.

2.9 : Require people with experiences to balance and install the grinding wheel.

2.10: Check the running direction of the grinding wheel before operation.

2.11: Turn on the power to make the grinding wheel to run for 10 minutes at least, then start to work.

2.12: Check if the work piece is secured on the table or magnetic chuck and is very steady before operation.

2.13: Stop the movement of the table before adjusting the travel of cross or longitudinal movement.

2.14: Before changing the procedure of grinding, make sure the machine has stopped totally first.

2.15: Never use any coolant liquid that is easy to burn or poisonous.

2.16: The grinding wheel of this machine should be able to handle at least 2300M/min speed.

2.17: Do not grind on the side of the grinding wheel.

2.18: Obey precautions as other chapters describbed.

2.19: Please wait until machine has stopped to clean and set-up.

2.20: Do not change any electrics or parts of machine.

2.21: Require a qualified personelle to maintain the electric parts of machines.

2.22: Do not tear the warning signs on the machines. If they are not clear, please contact your agent or our sales department for your replacement.

2.23: Never mount a work-piece too large for the machine.

2.24: Use the correct lifting equipment for handling .

2.25: Never use excessive depth of grinding or feed rate.

2.26: Do not run the machine unattended.

2.27: No personelle shall mount any grinding wheel unless he has been TRAINED.

2.28: Do turn off coolant before stopping wheel.

2.29: Do not grind material for which the wheel is not designed for.

2.30: Do dress the wheel regularly to avoid loading.

CHAPTER 2

GRINDER DESCRIPTION

2.1 : Introducion to the AHD surface grinding machine:

The X axis of the grinder (moves from left to right) is driven hydraulically or manually. The Z axis (up and down) uses a power elevation motor, up/down automatic feed or manual feed. The front or rear (Y axis), cross-feeding can be done automatically by the AC motor.

1. COLUMN:

Enlarged, honeycomb-ribbed column especially suitable for heavy duty grinding.

2. CONSTRUCTION:

Construction of table, saddle and base is casted with high grade casting iron, strongly ribbed.

3. SPINDLE:

Enlarged spindle set is supported by 4 pieces of pre-loaded precision angular contact ball heavy duty.

4. SLIDE-WAY

Vertical, cross double vees and longitudinal one vee & one flat slide-ways are coated with Turcite-B, provide stable movement and durable accuracy.

5. AUTOMATIC CONTINUOUS LUBRICATION SYSTEM:

All slide-ways and screws are fully oiled by automatic continuous lubrication system to eliminate wears.

6. CROSS FEED:

Ball screw for cross travel, powered by AC motor.

7. HYDRAULIC TABLE:

Table speed ranges 60Hz,5-25m/min. With rack and pinion table drive for hand operation.

8. PROXIMITY SWITCH:

Provide built-in-type (hidden) proximity switch, easy operation.

9. TABLE SPEED CONTROL:

Presentable hydraulic table speed control allows operator to pre-set table speed, and enables to get same speed when engaging hydraulic table every time.

10. HAND WHEELS:

Zero-setting slip-rings with vernier on vertical hand-wheel, and vernier on cross-feed hand-wheel.

11. The following are workpiece materials which can used on the grinders:STEELS [carbon steel, alloy steel], stainless steel, cast iron, copper, aluminum. DO NOT grinding magnesium. Do not dry grinding and do not grind non-magnetic material on the magnetic chuck.

12. Operator must be have under gone training.

Note:AHD means grinder with auto downfeed, table movement by hydraulic and motorized cross-feed. 3A means grinder with motorized elevation, table movement by hydraulic and motorized cross-feed.

2.2 : Noise level and operator position

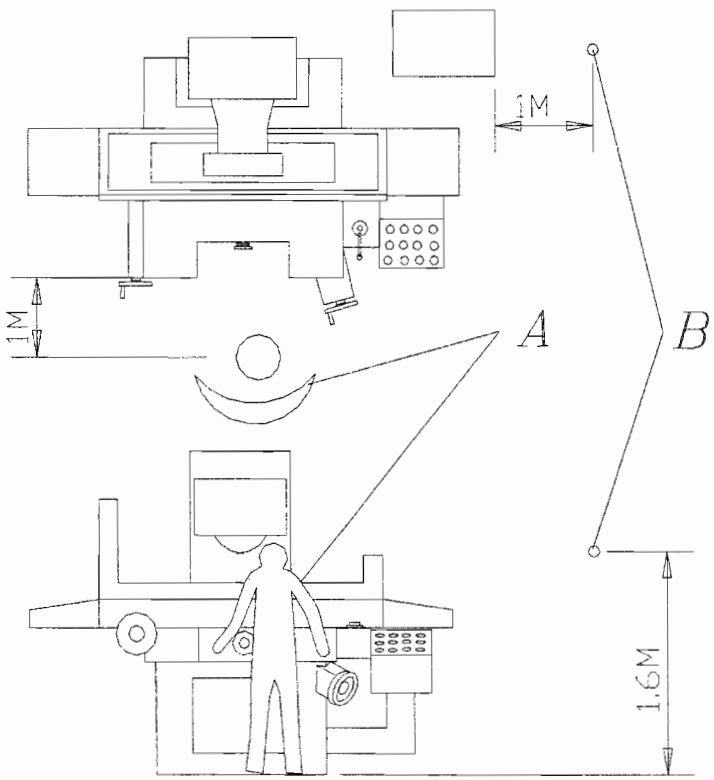
The noise level of this machine is under 75dB. To test noise level:

(1) Background noise: under 60 dB.

(2) To test the status of your machine: At a distance of 1 meterfrom the surface of grinder and at a height of 1.6 meter from the floor.

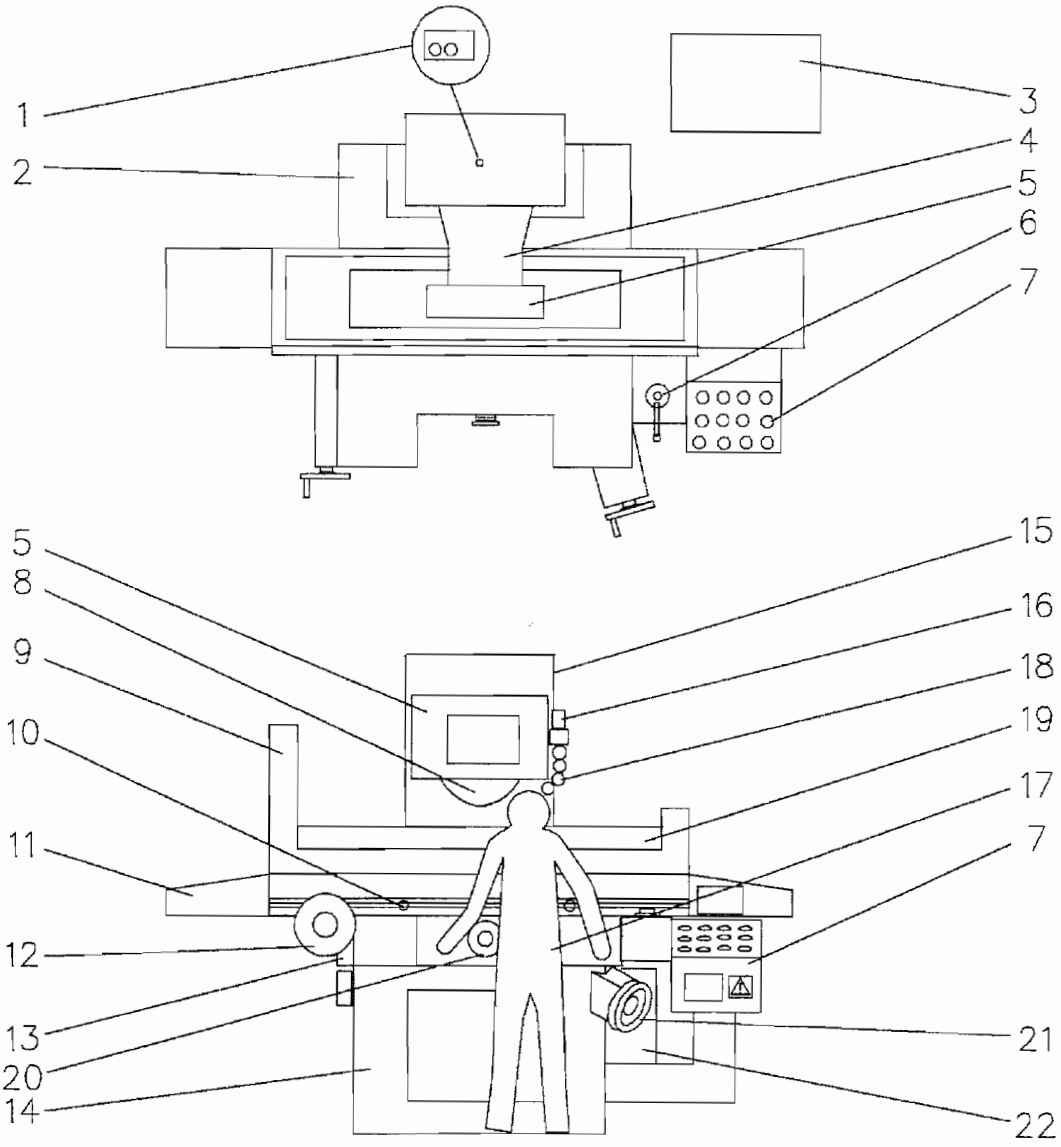
(3) Apparatus: Qualified for IEC 651, noise meter for TYPE 1.

Set in : FAST .

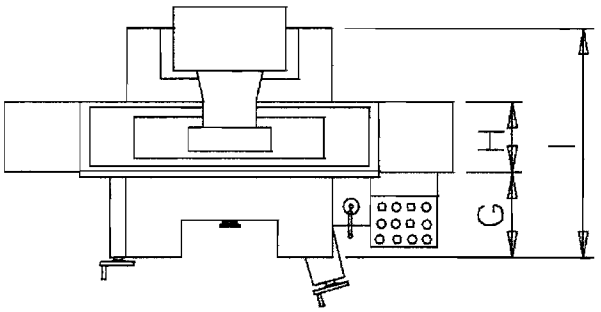


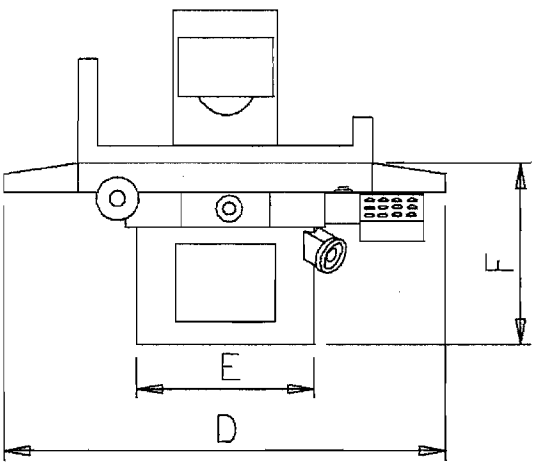
2.3 : The main parts of machine, and the position of operator.

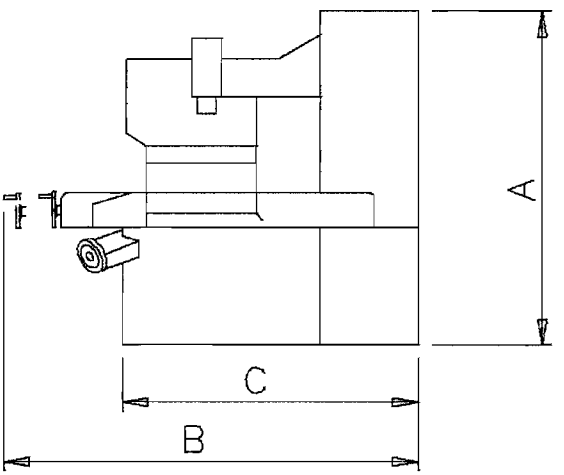
NO	UNIT NAME	NO	UNIT NAME
1.	Lubricant oil tank	12.	Table hand feed handwheel
2.	Saddle	13.	Cross travel
3.	Hydraulic oil tank	14.	Base
4.	Spindle seat	15.	Column
5.	Grinding wheel guard	16.	Coolant valve
6.	Table speed control unit	17	Operator site
7.	Control panel	18	Coolant nozzle
8.	Grinding wheel	19.	Plate for splash guard
9.	Splash guard	20	Cross feed handwheel
10.	Longitudinal travel limits	21	Vertical feed handwheel
11.	Table	22	Electric box



2.4 : Dimensions and floor requirement for 14" AHD series.







14" AHD	A
Standard Column	1940mm(76.4")
Special High Column	2040mm(80.3")

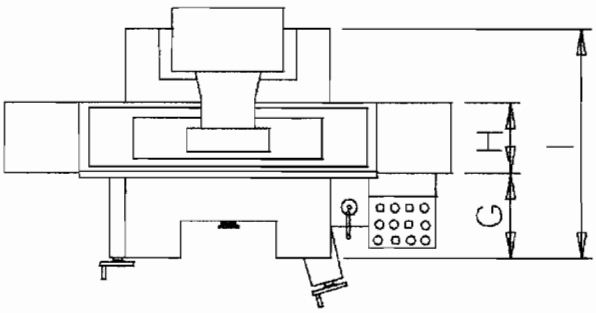
UNT=MM

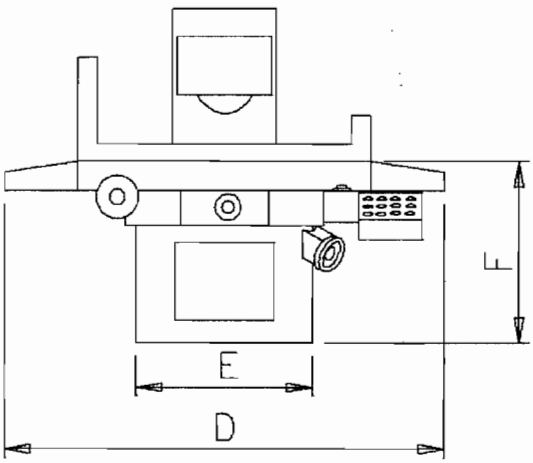
SERIES	A	B	C	D	E	F	G	H	I
1428AHD	1940/2040	1920	1315	2120	1050	950	410	430	1240
1436AHD	1940/2040	1920	1315	2550	1050	950	410	430	1240

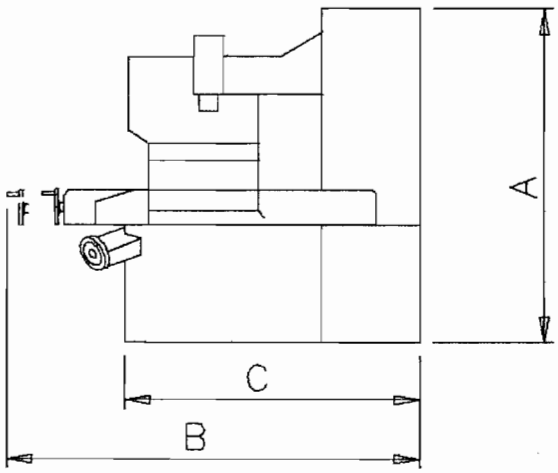
UNT=INCH

SERIES	A	B	C	D	E	F	G	H	I
1428AHD	76.4"/80.3"	75.6"	51.8"	83.5"	41.3"	37.4"	16.2"	16.9"	48.9"
1436AHD	76.4"/80.3"	75.6"	51.8"	100.3"	41.3"	37.4"	16.2"	16.9"	48.9"

2.4.1 : Dimensions and floor requirement for 16" AHD series.







16" AHD	A
Standard Column	1940mm(76.4")
Special High Column	2040mm(80.3")

UNT=MM

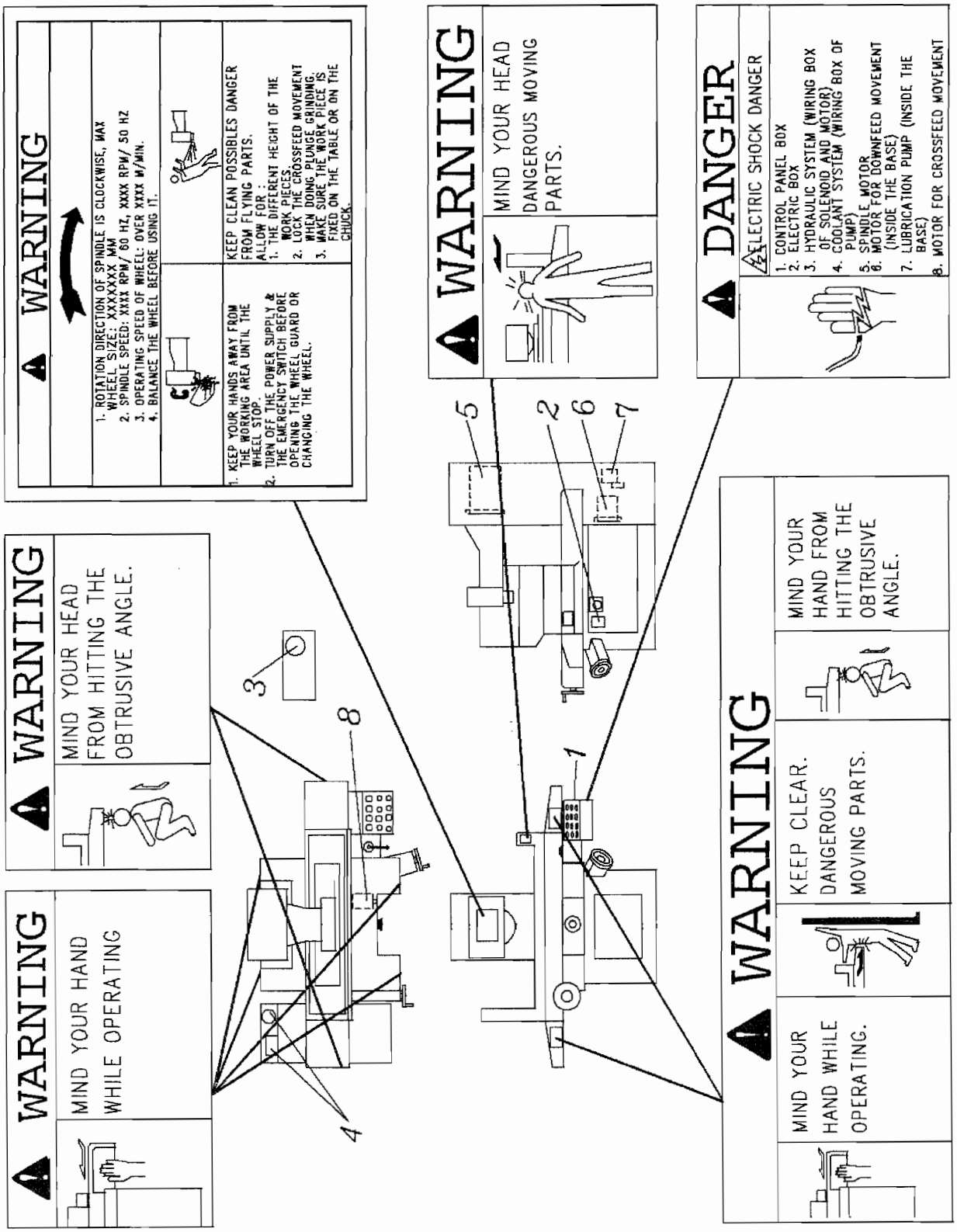
SERIES	A	B	C	D	E	F	G	H	I
1632AHD	1940/2040	2185	1500	2360	1050	950	490	535	1520
1640AHD	1940/2040	2185	1500	2720	1050	950	490	535	1520

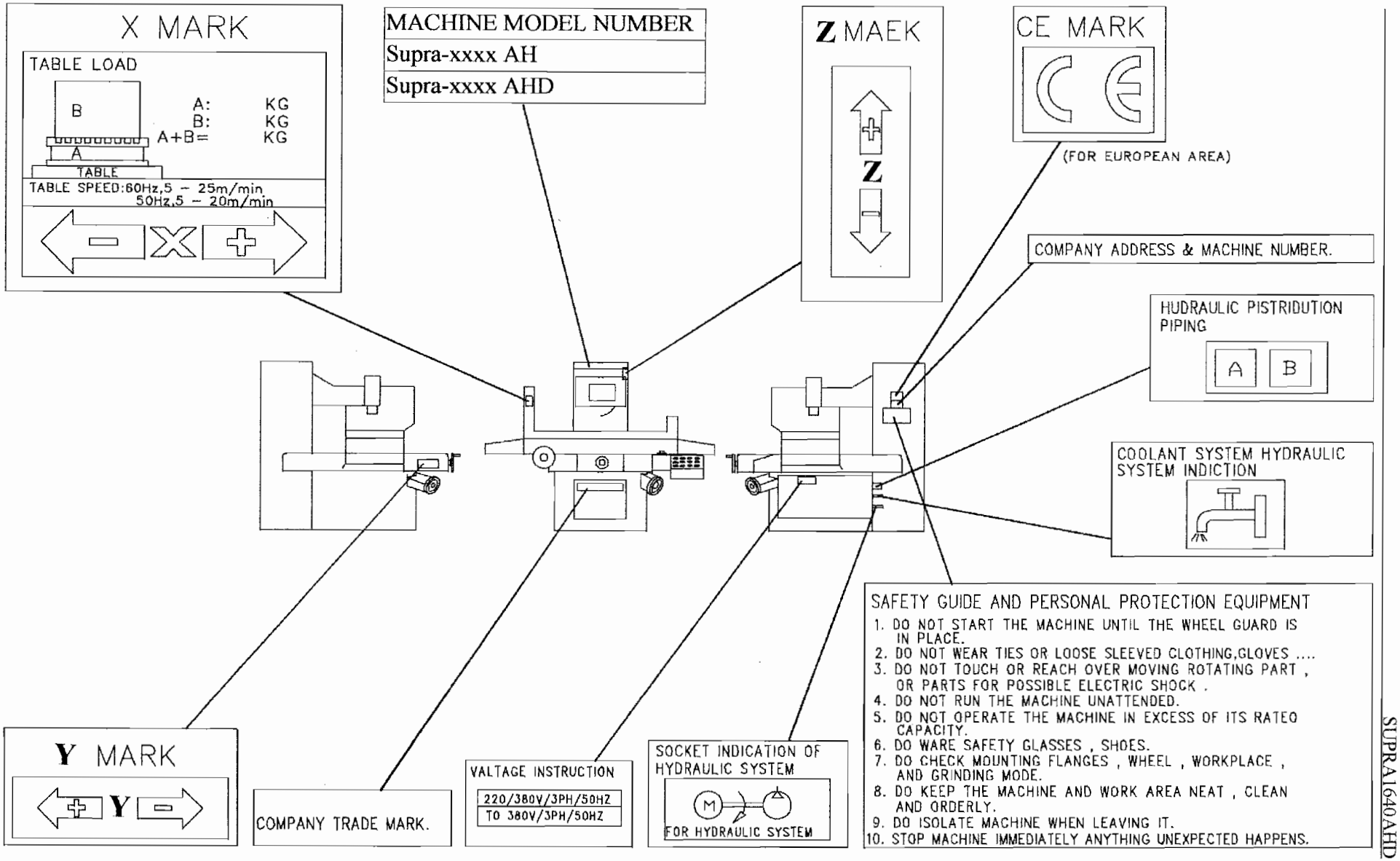
UNT=INCH

SERIES	A	B	C	D	E	F	G	H	I
1632AHD	76.4"/80.3"	86.0"	59.1"	92.9"	41.3"	37.4"	19.3"	21.1"	59.9"
1640AHD	76.4"/80.3"	86.0"	59.1"	107"	41.3"	37.4"	19.3"	21.1"	59.9"

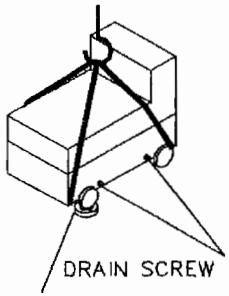
2.5 : The warning signs

There are warning signs on this machine to warn you every possible danger to keep your safety. Please read and fully understand the warning signs before operating.




X MARK
TABLE LOAD
B
A
TABLE
A:
B:
A+B=
KG
KG
KG
TABLE SPEED:60Hz,5 ~ 25m/min
50Hz,5 ~ 20m/min
X
MACHINE MODEL NUMBER
Supra-xxxx AH
Supra-xxxx AHD
Z MAEK
Z
CE MARK
(FOR EUROPEAN AREA)
COMPANY ADDRESS & MACHINE NUMBER.
HUDRAULIC PISTRIDUTION PIPING
A
B
COOLANT SYSTEM HYDRAULIC SYSTEM INDICTION
SAFETY GUIDE AND PERSONAL PROTECTION EQUIPMENT
1. DO NOT START THE MACHINE UNTIL THE WHEEL GUARD IS IN PLACE.
2. DO NOT WEAR TIES OR LOOSE SLEEVED CLOTHING,GLOVES ....
3. DO NOT TOUCH OR REACH OVER MOVING ROTATING PART , OR PARTS FOR POSSIBLE ELECTRIC SHOCK .
4. DO NOT RUN THE MACHINE UNATTENDED.
5. DO NOT OPERATE THE MACHINE IN EXCESS OF ITS RATEO CAPACITY.
6. DO WARE SAFETY GLASSES , SHOES.
7. DO CHECK MOUNTING FLANGES , WHEEL , WORKPLACE , AND GRINDING MODE.
8. DO KEEP THE MACHINE AND WORK AREA NEAT , CLEAN AND ORDERLY.
9. DO ISOLATE MACHINE WHEN LEAVING IT.
10. STOP MACHINE IMMEDIATELY ANYTHING UNEXPECTED HAPPENS.
Y MARK
Y
COMPANY TRADE MARK.
VALTAGE INSTRUCTION
220/380V/3PH/50HZ
TO 380V/3PH/50HZ
SOCKET INDICATION OF HYDRAULIC SYSTEM
M
FOR HYDRAULIC SYSTEM

COOLANT TANK



SPECIFICATION

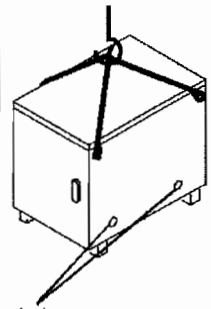
PUMP POWER : 1/8 HP/3P
FLOW RATING : 26 L/MIN
TANK CAPACITY : 130 LITRES
TANK WEIGHT : 100 KG
TOTAL WEIGHT : 220 KG
VOLTAGE : ☐ V

RECOMMENDED BRANDS OF COOLANT:
SUN,SHOWA,ESSO,BP,SHELL,MOBIL,CASTROL CASTROL , ARAL . Such as CASTROL SYNTILO , R coolant or MOBIL SOLVAC 1535 coolant for ferrous metal grinding .

WARNING :
1. DRAIN WATER WITH THE PUMP .
2. DRAIN THE REMAINING COOLANT FROM THE TANK BOTTOM .

* MAKE SURE TO PUT THE ANTI-SLIPPINT BLOCKS AGAINST THE TANK WHEELS AFTER CLEANING .

TABLE HYDRAULIC BOX



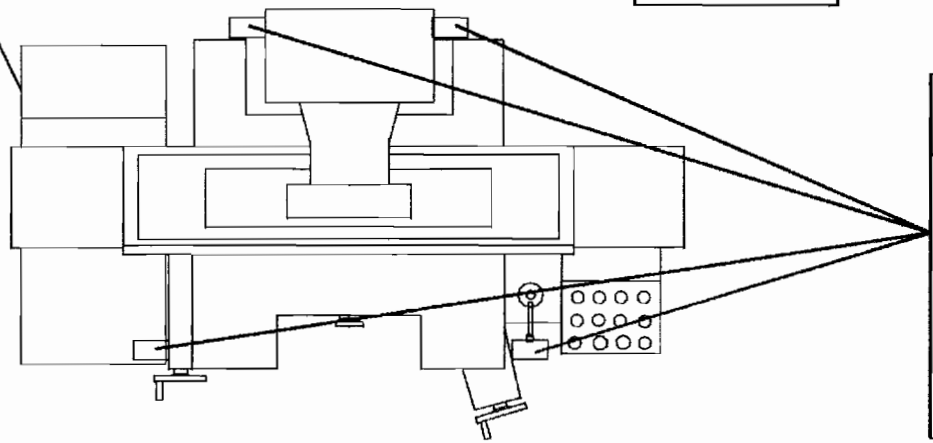
VOLOTAGE: ☐ V
HYDRAULIC MOTOR : 3 HP/6P
PUMP SPEC : VPNC 36-2-20
VOLUMN DELIVERY: 42 L/MIN/60HZ,35 L/MIN/50HZ
WORKING PRESSURE : 15 - 18 KG
TANK VOLUME: 95 LITERS
TANK WEIGHT : 133 KG
COOLANT WEIGHT: 92 KG
TOTAL WEIGHT: 225 KG

SUGGESTED HYDRAULIC OIL :

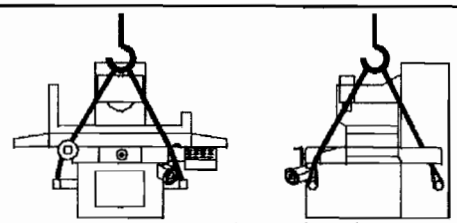
ESSO: UNIVIS32	BP : ENERGO SHF32
SHELL : TELUS32	TOTAL : EQUIVIS ZS32
MOBIL : D.T.E.24	SHOWA : A-R32
CASTROL : HYSPIN , AWH32	

RENEWING OIL NOTICE
1. DRAIN THE OIL WITH THE PUMP.
2. DRAIN THE REMAINING OIL FROM THE DRAIN SCREW BOLTS.

NO DRAINING THE OIL FROM (A) WHEN THE TANK IS FULL TO PREVENT THE OIL SPLASHING FROM (A) .



LIFTING SCREW BOLT

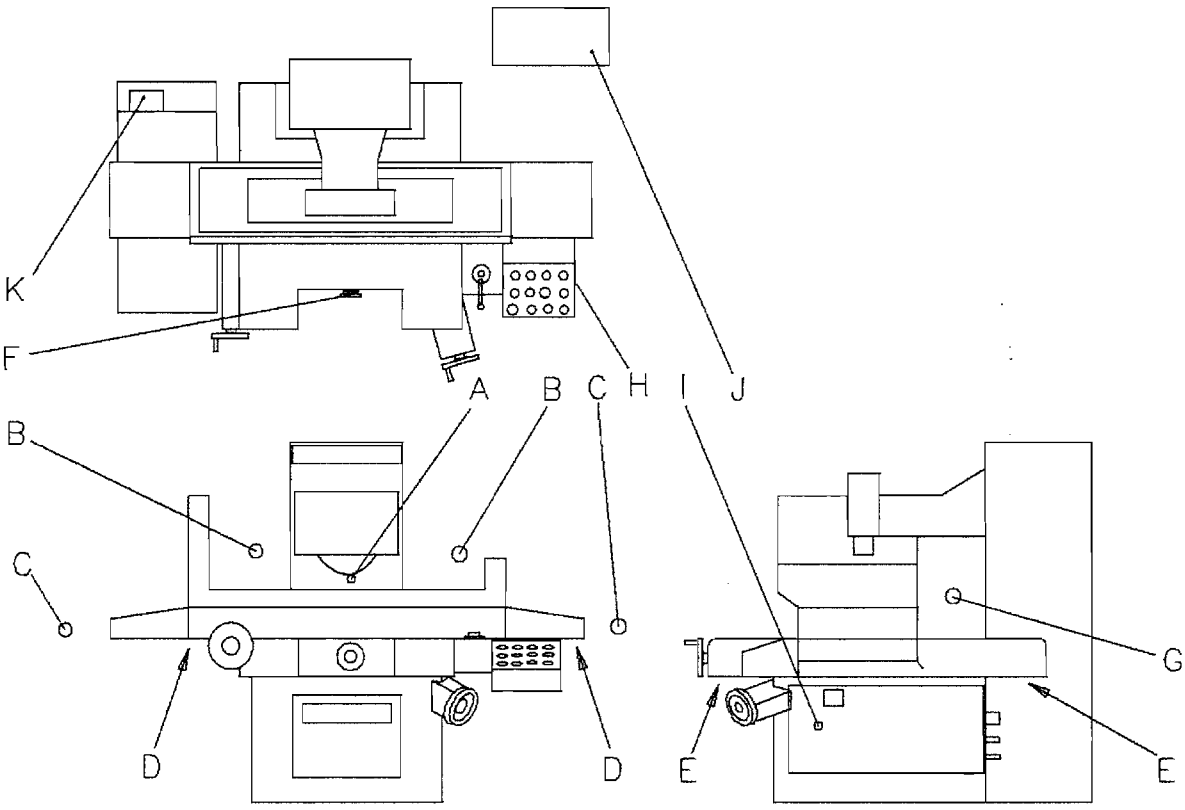


WEIGHT: XXXX KGS
XXXX LBS

12280M11

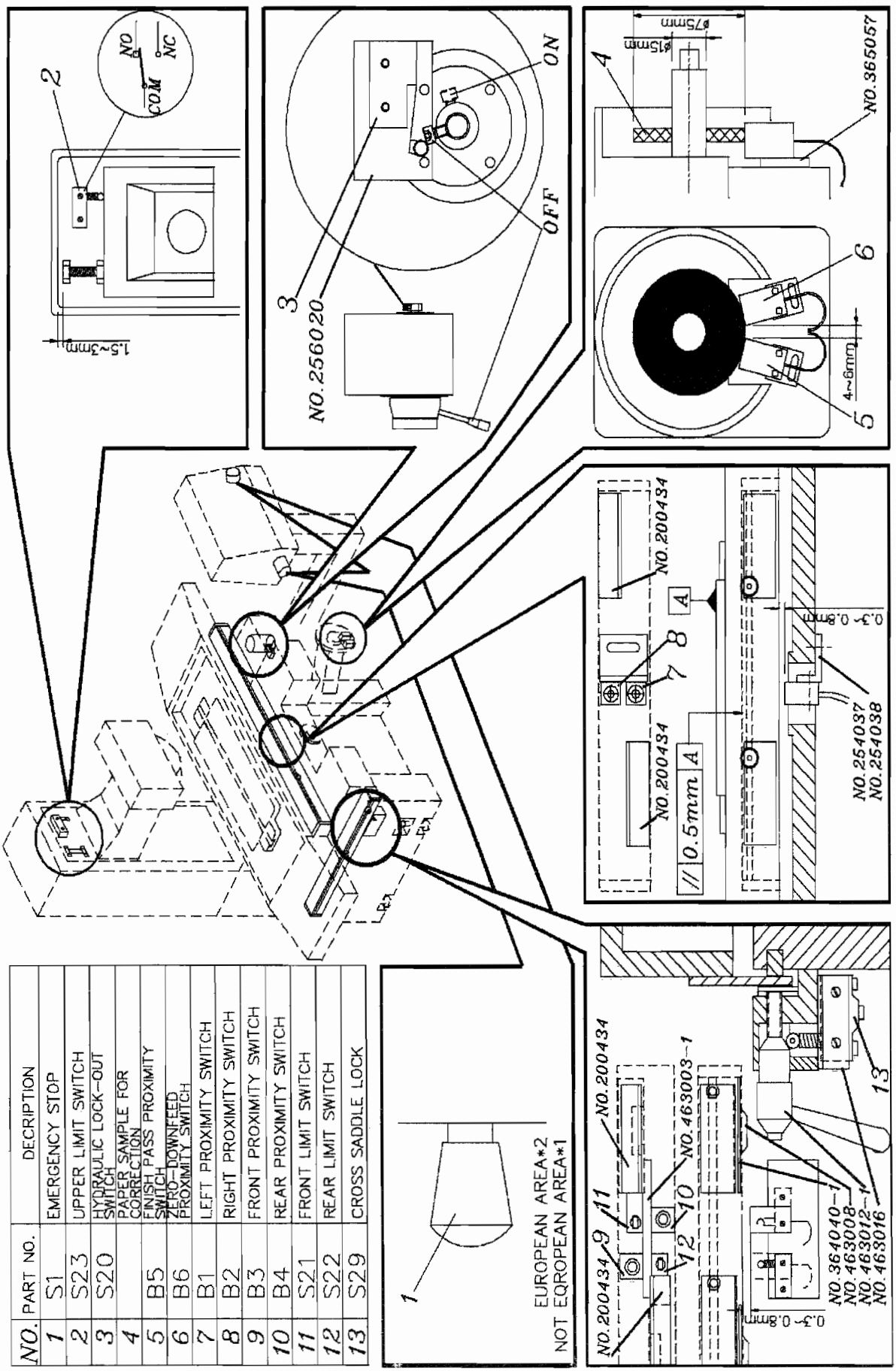
2.6 : Potential hazardous area

This machine is designed for grinding metallic work piece; therefore, there are many electric devices and equipments in this machine. Don't open them on purpose or go near these dangerous area while operating or during maintenance.



DANGER ZONE	DESCRIPTION
A	CUTTING DANGER: PUT HAND IM THE WORKING AREA OF RUNNING SPINDLE WHEEL
B	HITTING DANGER: PUT HEAD INTO THE WORKING AREA OF TABLE TO CHECK
C	SQUEEZING DANGER: PASSING THOUGH THE WORKING OF TABLE
D	SQUEEZING. DANGER: PUT NAND TNTO THE WORKING AREA OF TABLE
E	SQUEEZING DANGER: PUT NAND INTO THE WORKING AREA OF SADDLE
F	TANGLE DANGER: WEARING LOOSEN OR WIDE CLOTHE BENEATH THE WORKING AREA OF SADDLE
G	SQUEEZING DANGER: OTHERS START THE SADDLE WHILE DOING MAINTANANCE
H	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE CONTROL BOX
I	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE ELECTRICAL BOX
J	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE MOTOR COVER OR THE WIRE CONNECTING COVER OF SOLENOID FROM THE OIL TANK
K	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE VIEWING CONNECTING BOX FROM TNE COOLANT TANK

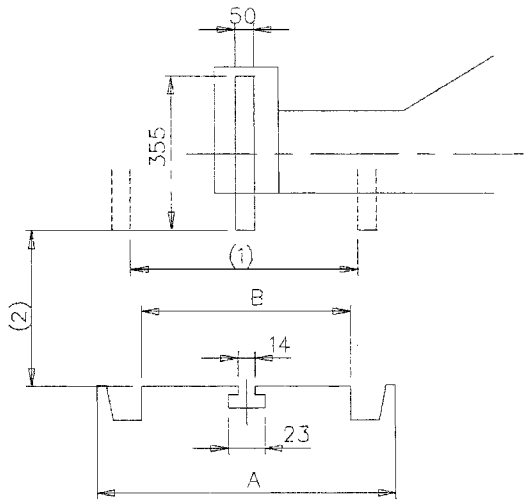
2.7:The position of safety limit switches on grinder



NO.	PART NO.	DECRIPTION
1	S1	EMERGENCY STOP
2	S23	UPPER LIMIT SWITCH
3	S20	HYDRAULIC LOCK-OUT SWITCH
4		PAPER SAMPLE FOR CORRECTION
5	B5	FINISH PASS PROXIMITY SWITCH
6	B6	ZERO-DOWNFEED PROXIMITY SWITCH
7	B1	LEFT PROXIMITY SWITCH
8	B2	RIGHT PROXIMITY SWITCH
9	B3	FRONT PROXIMITY SWITCH
10	B4	REAR PROXIMITY SWITCH
11	S21	FRONT LIMIT SWITCH
12	S22	REAR LIMIT SWITCH
13	S29	CROSS SADDLE LOCK

2.8: Working area

Unit :Metric



UNIT:MM(INCH)	1428AHD
1.OVERALL GRINDING WIDTH	330(12.99")
2.OVERALL GRINDING HEIGHT(STANDARD COLUMN)	450(17.72")
2.OVERALL GRINDING HEIGHT(HIGH COLUMN)	720(28.35")
3. OVERALL GRINDING LENGTH	712(28.03")
4. TABLE LOAD	470kg(1034lbs)
5. TABLE SPEED	5-25M/MIN(60HZ) 5-20M/MIN(50HZ)
6. SIZE OF CHUCK (CHUCK IS OPTION)	12"x24"
A.	430(16.93")
B.	305(12")

NOTE: THE TABLE LOAD DOES NOT INCLUDED THE WEIGHT OF CHUCK.

UNIT:MM(INCH)	1632AHD	1640AHD
1. OVERALL GRINDING WIDTH	410(16.14")	410(16.14")
2.OVERALL GRINDING HEIGHT(STANDARD COLUMN)	450(17.72")	450(17.72")
2. OVERALL GRINDING HEIGHT(HIGH COLUMN)	720(28.35")	720(28.35")
3. OVERALL GRINDING LENGTH	813(32")	1020(40.16")
4. TABLE LOAD	617kg(1357.4lbs)	675kg(1485lbs)
5. TABLE SPEED	5-25M/MIN(60HZ) 5-20M/MIN(50HZ)	5-25M/MIN(60HZ) 5-20M/MIN(50HZ)
6. SIZE OF CHUCK (CHUCK IS OPTION)	16"x32"	16"x40"
A.	535(21.06")	535(21.16")
B.	406(15.98")	406(15.98")

2.9 : Assembly drawing of wheel flange and spindle

(1) Specification of wheel flange:

Outer diameter: ϕ 355 mm(ϕ 14"). Inner diameter: ϕ 127 mm(ϕ 5")

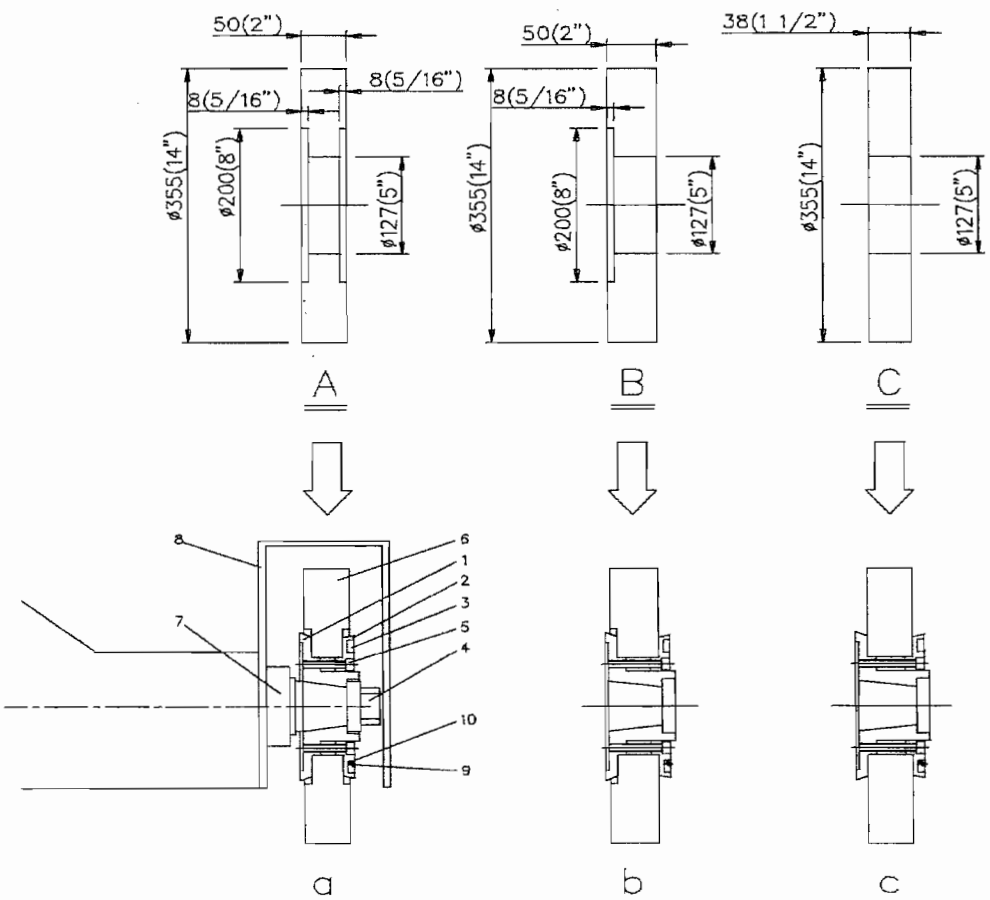
Thickness:38 - 50 mm(1 1/2" – 2").

The flange must be able to handle wheel speed about 2000 m/min.

(2) Distance A:20mm from wheel flange to wheel cover.

(3) Flange is equivalent to ISO-R666.

NO.	Parts	Parts no.	Q'TY	Remark
1	Flange	NO.381019	1	
2	Flange block	NO.381020	1	
3	Balance block	NO.381021	3	
4	Flange nut	NO.381017	1	M18*P1.5,,Left-hand
5	Flange screw		6	M8*P1.25
6	Grinding wheel	OD/ID/Width	1	14"/2"/5"
7	Spindle	NO.381A	1	
8	Wheel cover	NO.381B	1	Guard, 4mm thickness
9	Screw		3	M4x0.7Px4L(mm)
10	Steel ball		3	Hardness: 60 HRc,4mm



2.10 Specification for 14" series

DESCRIPTION		**1428AHD**	**1436AHD**
Table size		305x712mm(12"x28")	305x915mm(12"x36")
Max. grinding length	Longitudinal	712mm(28")	9154mm(36")
Max. grinding width	crosswise	330mm(13")	
Max .distance from table surface to spindle center		Standard column: 720mm(28.4")	
Standard magnetic chuck size		300x700mm(11.75"x27.5")	300x900mm(11.75"x38.4")
Longitudinal movement of table	Max. travel, hydraulic	760mm(30")	960mm(37.75")
	Max. travel, manual	830mm(32.6")	1000mm(37.75")
	Table speed	60HZ,5-25M/min/50HZ,5-20M/min	
Cross transverse travel	Auto transverse increment	1-25mm(0.04-1")	
	Max. auto transverse travel	350mm(13.75")	
	Max. manual transverse travel	380mm(15")	
	Handwheel per revolution	5mm(0.2")	
	Handwheel per graduation	0.02mm(0.001")	
Wheelhead vertical infeed	Automatic infeed	0.001-0.04mm(0.00005"-0.002")	
	Step feed(JOG)	0.001mm(0.00005")	
	Rapid travel approx.	150mm/min(5.91in/min)	
	Slow travel approx.	6mm/min(0.24in/min)	
	Handwheel per revolution	1mm(0.05")	
	Handwheel per graduation	0.005mm(0.0005")	
Grinding spindle	Speed	60HZ,1750rpm/50HZ,1450rpm	
	Power rating	7.5kw(10HP)	
Standard grinding wheel	Diameter	355/50/7127mm(14"x2"x5")	
	Width		
	Bore		
Weights (Approx.)	Net	3020Kgs(6644lbs)	3291gs(7240lbs)
	Gross	3520Kgs(7744lbs)	3941Kgs(8670lbs)
Packing Dimensions	L x W x H	2200x1950x2235mm (87"x77"x88")	2650x2050x2235mm (105"x81"x88")

NOTE: 1. The manufacture reserves the right to modify the design, specification, etc., to improve the performance of the machine without notice. All the specifications shown are just reference.

2.10.1 Specification for 16" series

DESCRIPTION		1632AHD	1640AHD
Table size		406mmx813mm(16"x32")	406mmx1020mm(16"x40")
Max. grinding length	Longitudinal	813mm(32")	1020mm(40")
Max. grinding width	Crosswise	410mm(16")	
Max. distance from table surface to spindle center		STANDARD COLUMN: 720mm(28.31")	
Standard magnetic chuck size		400x800mm (15.68x31.5")	400x1000mm (15.68x39.25")
Longitudinal movement of table	Max. travel, hydraulic	890mm(35")	1060mm(41.68")
	Max. travel, manual	930mm(36.5")	1100mm(43.25")
	Table speed	60HZ,5-25M/min ; 50HZ,5-20M/min	
Cross transverse travel	Auto transverse increment	1.0-25mm(0.04"-1")	
	Max. Auto. Transverse travel	430mm(17")	
	Max. manual transverse travel	460mm(18")	
	Handwheel per revolution	5mm(0.2")	
	Handwheel per	0.02mm(0.001")	
Wheelhead vertical infeed	Automatic infeed	0.001-0.04mm(0.00005"-0.002")	
	Step feed(jog)	0.001mm(0.00005")	
	Rapid travel approx.	150mm/min(5.91in/min)	
	Slow travel approx.	6mm/min(0.24/min)	
	Handwheel per revolution	1mm(0.05")	
	Handwheel per	0.005mm(0.0005")	
Grinding spindle	Speed	60HZ,1750 RPM /50HZ,1450 RPM	
	Power rating	5.55kw(7.5HP),7.5kw(10HP)	
Standard grinding wheel	Diameter	355mm(14")	
	Width	50mm(2")	
	Bore	127mm(5")	
Weights (Approx.)	Net	3606kgs(7933lbs)	4040kgs(8888lbs)
	Gross	4256kgs(9363lbs)	4720kgs(10384lbs)
Packing Dimensions	L x W x H	2450x2250x2235mm (97"x89"x88")	3000x2250x2235mm (119"x89"x88")

NOTE:1. The manufacture reserves the right to modify the design, specification, etc, to improve the performance of the machine without notice. All the specifications shown are just reference.

2.11: Standard accessories and optional accessories

Standard accessories:

(1) Tool box with tools .....1 SET
(2) Wheel extract screw & nut ..1 PCS
(3) Wheel balancing arbor.....1 PCS
(4) Leveling screw with blocks.1 SET
(5) Grinding wheel .....1 PCS
(6) Wheel flange.....1 PCS
(7) Touch-up paint.....1 CAN(each)
(8) Auto. lubrication equipment (fitted with the grinder)
(9) Diamond dresser .....1 PCS
(10) Sweeping plate.....1 PCS
(11) Halogen light.....1 PCS

Optional accessories

1.Electric magnetic chuck 300x600MM(for 1428AHD series).
2.Electric magnetic chuck 300x900MM(for 1436AHD series).
3.Electric magnetic chuck 400x800MM(for 1632AHD series).
4.Electric magnetic chuck 400x1000MM(for 1640AHD series).
5.Coolant system with manual paper feeding device.
6.Coolant system with manual paper feeding device and magnetic separator.
7.Coolant system with auto paper feeding device.
8.Coolant system with auto paper feeding device and magnetic separator.(Volumn:80 liters).
9.Coolant system with auto paper feeding device and magnetic separator.
10.Coolant system with auto paper feeding device and magnetic separator.(Volumn:120 liters).
11.Balancing wheel stand.
12.Wheel balancing stand.
13.Spare wheel flange(suitable for ϕ 14" grinding wheel).

14.Manual parallel dressing attachment.
(suitable for ϕ 14" grinding wheel).

15.Parallel dressing attachment by electrical motor driven.
(suitable for ϕ 14" grinding wheel).

16.Diamond dresser.

17.Chuck control with de-magnetizer.

18.De-magnetizer.

19.Spare wheel flange(suitable for ϕ 14" grinding wheel).

20.Splash guard baffle(1428AHD).

21.Splash guard baffle(1436AHD).

22.Splash guard baffle(1632AHD).

23.Splash guard baffle(1640AHD).

24.Manual pulse generator (Micro downfeed movement, AHD series).

Note:Not all optional accessories are available in USA.

CHAPTER 3

REQUIREMENT OF MACHINE

3.1 : Space requirement

The minimum space for machine:

For your convenience to operate, please take the walkway into Consideration. Therefore, the ideal space for machine should be:

	1428AHD	1436AHD	1632AHD	1640AHD
Length	3950mm(155.5")	4550mm(179.1")	4290mm(168.9")	4820(189.8")
Width	2970mm(116.9")	2970mm(116.9")	3235mm(127.4")	3235mm(127.4")
Height	3000mm(118.1")	3000mm(118.1")	3000mm(118.1")	3000mm(118.1")

Note: TO KEEP THE MACHINE FROM THE ENVIRONMENT, WHICH MIGHT CAUSE ANY EXPLOSION.

3.2 : Requirement of the ground

Firm, steady, well constructed ground, and a well leveled machine are the essential conditions for precision grinding. The heat from sunshine, and vibration might also influence precision grinding.

The foundation for the machine required:

(1) The bearing strength for machine should be more than 2 TONS/M^2.

(2) Avoid letting the sun shine directly on the grinder.

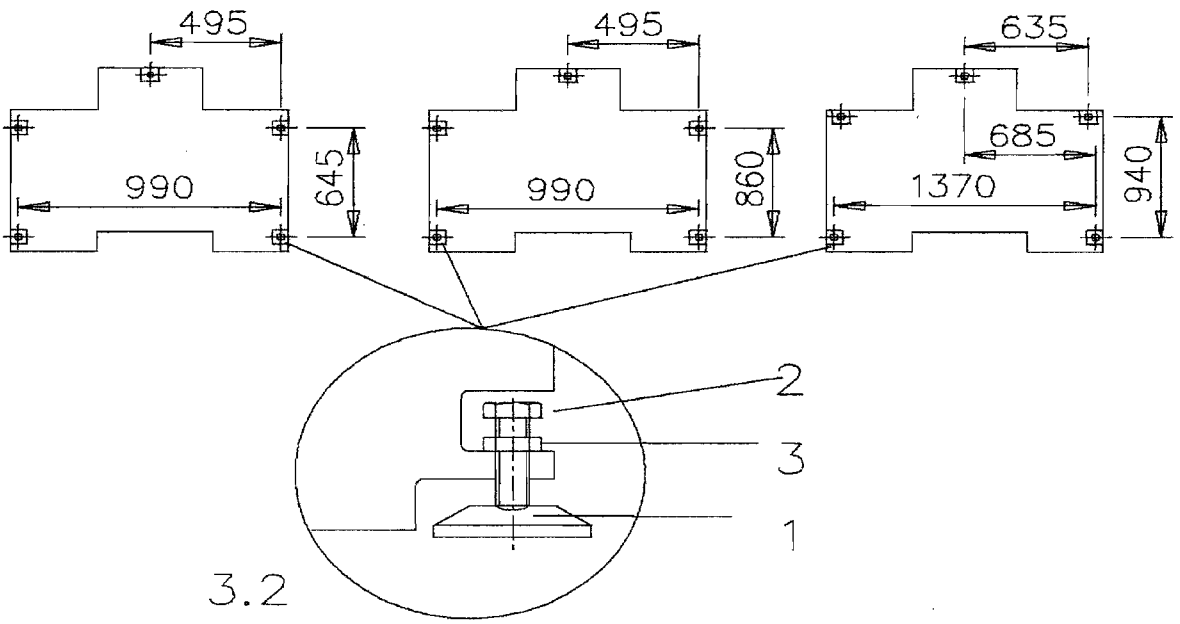
(3) Avoid locating machine near other machines, such as press.

(4) Good ventilation.

(5) Please install your machine base on the foundation plan.

(6) Foundation drawing refer to the following:

1428AHD,1426AHD 1632AHD 1640AHD



3.2

	Part name	Part no.	Q,TY
1	Leveling block	100506-1	5
2	Leveling screw	100505	5
3	NUT	M22*2.5P	5

Note: The grinder should be properly adjusted with level within 0.02mm/M or 0.0008in/40in

3.3 : Requirement of the environment

Because there is no anti-explosion electrical device, this machine cannot be used in a potentially explosive environment. The requirement of the environment for this machine are as below:

(1) Temperature: 5--40℃; however, if you are doing very precise grinding, please keep the temperature near 20℃.

(2) Relative Humidity: 30%--95%, no dew allowed.

(3) The height of sea levelne:please contact the manufacture.

(4) Atmosphere: Don't allow dust,corrosive fumes, salt, or acidic air in the neighbourhood.

(5) Avoid any vibration environment.

(6) Avoid letting sun shine directly on the machine.

(7) Avoid the disturbance from electromagnetism.

(8) Light level: above 300 Lux.

3.4 : Requirement of the electricity

(1) Voltage: 3 Phases, AC voltage which is decided by customers, rated voltage:Standard-230v/460v.

(2) Frequency: 50/60 HZ, 0.99--1.01 rated frequency.

(3) Voltage for electromagnetic chuck: MAX. DC 110V(optional parts).

(4) Electricity consumption: 10.5 KVA(for14" grinding wheel).

(5) Connecting wire: 3.5m ㎡(L1, L2, L3, PE).

3.5 : The specification of coolant water, hydraulic oil, and lubrication oil:

(1) Coolant water: Depends on what the customer chooses.

Don't choose any low point combustion liquid or any harmful liquid.

Capacity for coolant tank:_100 _Liters .

Please replace the coolant water every month;add if under level.

(2) Hydraulic oil: ISO CB32 or HL32.

Capacity :_110 _ Liters. Please replace every six months. Also please check the level of the oil gauge everyday.

(3) Lubrication oil: ISO G68.

Capacity :_ 20 _ Liters. Please check the level of the oil gauge everyday.

Note: Diseases of the skin may be produced by continuous contact with oil, particularly with neat oil, and also with soluble oil. The following precautions should be taken:

1: Avoid unnecessary contact with the oil.

2: Wear protective clothing.

3: Use protective shields .

4: Do not wear oil soaked or contaminated clothing.

5: After work thoroughly wash all parts of the body that have come into contact with oil.

6: Change the oil regularly.

7: Dispose of the oil correctly.

CHAPTER 4

LIFTING

4.1 : Lifting by the crane

4.1.1 :Procedure to lift the crate

(1) Gross weight of the crate: It is showed on the crate, or please check the list below:

MODEL	1428AHD	1436AHD	1632AHD	1640AHD
Weight	3520Kgs (7744lbs)	3700Kgs (8140lbs)	4000Kgs (8800lbs)	4500Kgs (9900lbs)

(2) The capacity of the crane must be over the gross weight of the crate.

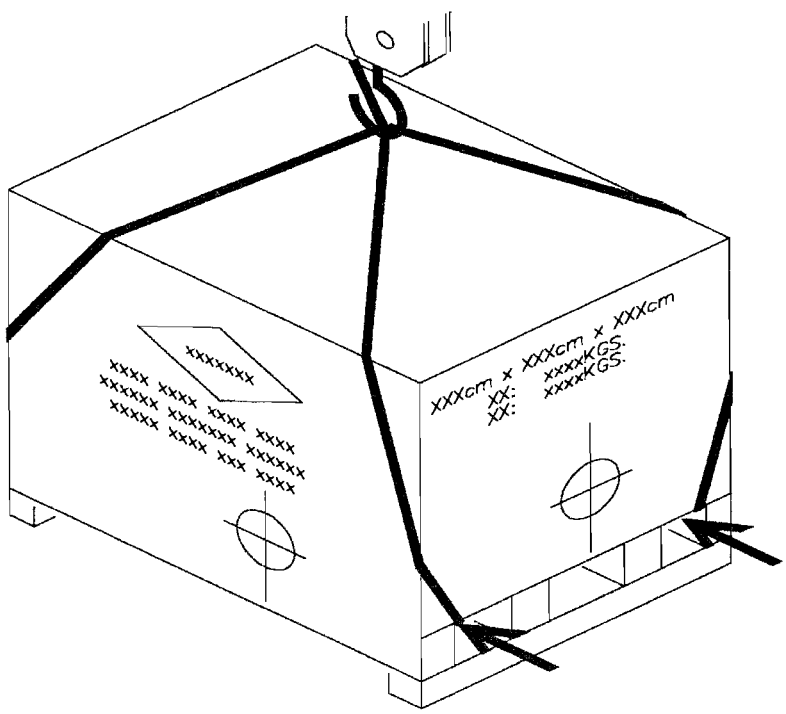
(3) Prepare suitable slings.

(4) Re-check your slings before lifting and moving.

(5) Please check Drawing 4.1.1 to put the slings into position.

(6) Operators should keep away when lifting, and be sure not to allow any person to stand under the wooden case.

(7) Operator must be qualified personnel:



4.1.1

Note: We recommend the following for lifting:

1. All equipment should be examined by one person only.
2. Lay sling on a flat surface in a well lighted area.
3. Examine both sides of the sling.
4. Slings must be examined over the whole length by the eyes of the examiner.

4.1.2 : Procedure for moving machine

(1) Weight of machines as below:

MODEL	1428AHD	1436AHD	1632AHD	1640AHD
Weight	3020Kgs (6644lbs)	3330Kgs (7326lbs)	3550Kgs (7810lbs)	4000Kgs (8800lbs)

(2) The capacity of the crane must be over the net weight of the machine.

(3) Prepare suitable slings.

(4) Please re-check your slings before lifting the machine.

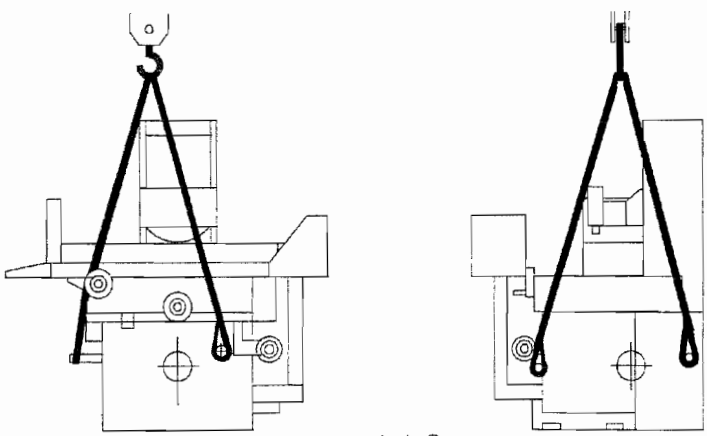
(5) Check the position of slings on Drawing 4.1.2 again. Do not to let the ropes ruin the finish of machines.

(6) Re-check all the clamps again. Please use drawing 4.3 for your reference.

(7) Check the lifting screws.

(8) Operators should keep away when lifting, and be sure not to allow any person to stand under the machine.

(9) Operator must be qualified personnel.



4.1.2

4.2 : Moving by fork lift

4.2.1 :When moving the whole wooden case by using a fork lift, check:

(1) Gross weight of crate: Showed on the crate, or please check the following list.

MODEL	1428AHD	1436AHD	1632AHD	1640AHD
Weight	3520Kgs (7744lbs)	3700Kgs (8140lbs)	4000Kgs (8800lbs)	4500Kgs (9900lbs)

(2) Make sure load capacity of the fork lift is over gross weight of the crate.

(3) The way to lift the crate is shown on drawing 4.2.1. The forks of the fork lift should be over the length of machine .

(4) Do not lift up more than 120 mm (5").

(5) Operators should be qualified.

4.2.2 :When moving the machine by using a fork lift, please check

(1) Weight of machines as below:

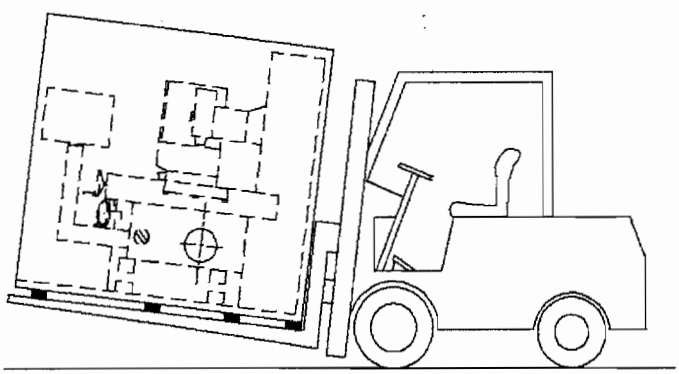
MODEL	1428AHD	1436AHD	1632AHD	1640AHD
Weight	3020Kgs (6644lbs)	3330Kgs (7326lbs)	3550Kgs (7810lbs)	4000Kgs (8800lbs)

(2) Make sure load capacity of the fork lift is over net weight of the machine.

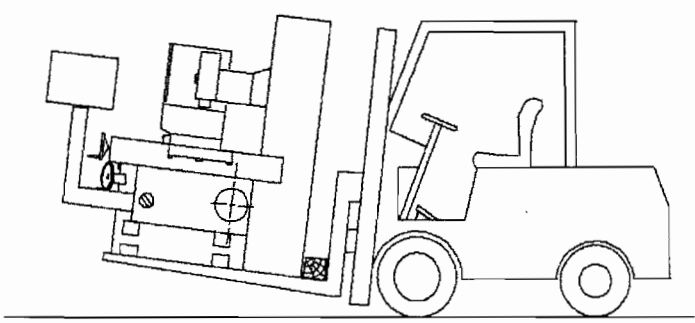
(3) The way to lift the machine is shown on drawing 4.2.2. The forks of the fork lift should be over the length of machines.

(4) Re-check all the clamps again. Please referred to drawing 4.3.

(5) Operator should be qualified.



4.2.1



4.2.2

4.3 : Clamping for machine

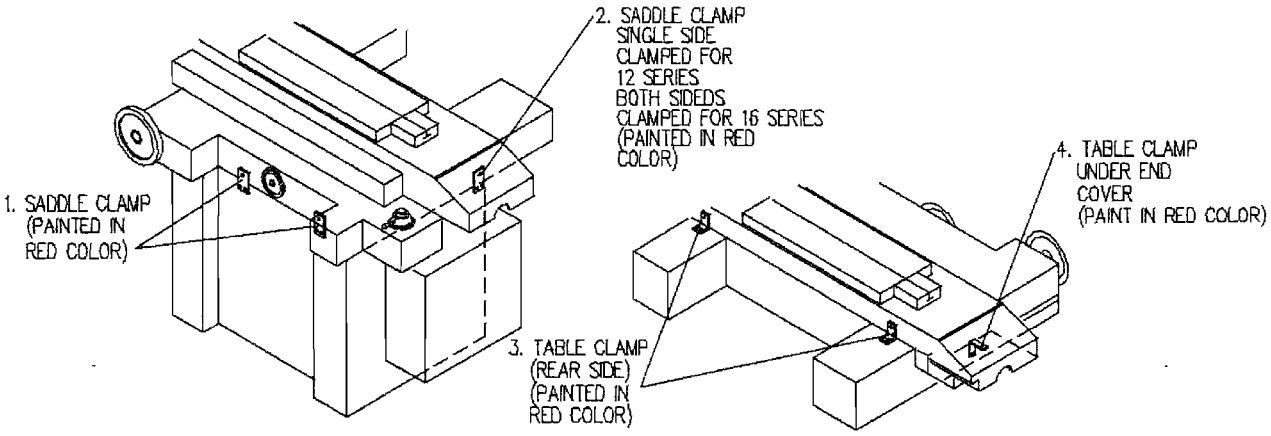
Before moving the machine, all the clamps must be tightened up.

This is to make the machine steady.

On the drawing shows below, the screw for the clamps is M8*1.25P.

NO.1	Clamps for front saddle Part NO.(363022)	NO.3	Clamps for front saddle Part NO.(364043)
NO.1	Clamps for front saddle Part NO.(363022)	NO.4	Clamps for front saddle Part NO.(364045)

Keep the clamps so that it's easy to move the machine at a later day.



4.4 : Installation of machine

4.4.1 : Environment for installation

The environment of the installation will affect the precision of grinding machines. Since the purpose of grinding machines is to have precise working result, you have to be careful on the environment of installation. Basically, you have to take vibration, temperature into consideration. And if you want to grind precision parts, you have to control the temperature. We suggest the temperature for precision grinding is within 20℃±2℃.

4.4.2 : Installation

Place the machine on the ground which is more than 2 TON/M^2, and screw in the leveling bolts. Please referred to the drawing 3.2.

4.5 : Adjust the leveling of machines

Please adjust the leveling very carefully because the first installation will affect the precision and the life of machine. And surely will affect the precision of your work piece.

The accuracy of the level gauge is 0.02mm/M or 0.0008in/40in, and please adjust the level of machine within 0.02mm/M. The procedure of adjustment is as below:

(1) : As the drawing shown below, put the leveling gauge on the table. Make sure the table is in the center of machine. Place level gauge (A) in crosswise direction, and put the level gauge (B) in the longitudinal direction.

(2) : Check with chapter 4.4.2. Adjust the fixing bolts NO. 4,5, until the bubble of level gauge (B) comes to the center, then adjust the fixing bolt (1) until the bubble of level gauge (A)comes to the center on the level gauge.

(3) : Screw tight the fixing nuts (NO. 6) on the leveling bolts NO.1,4,5.

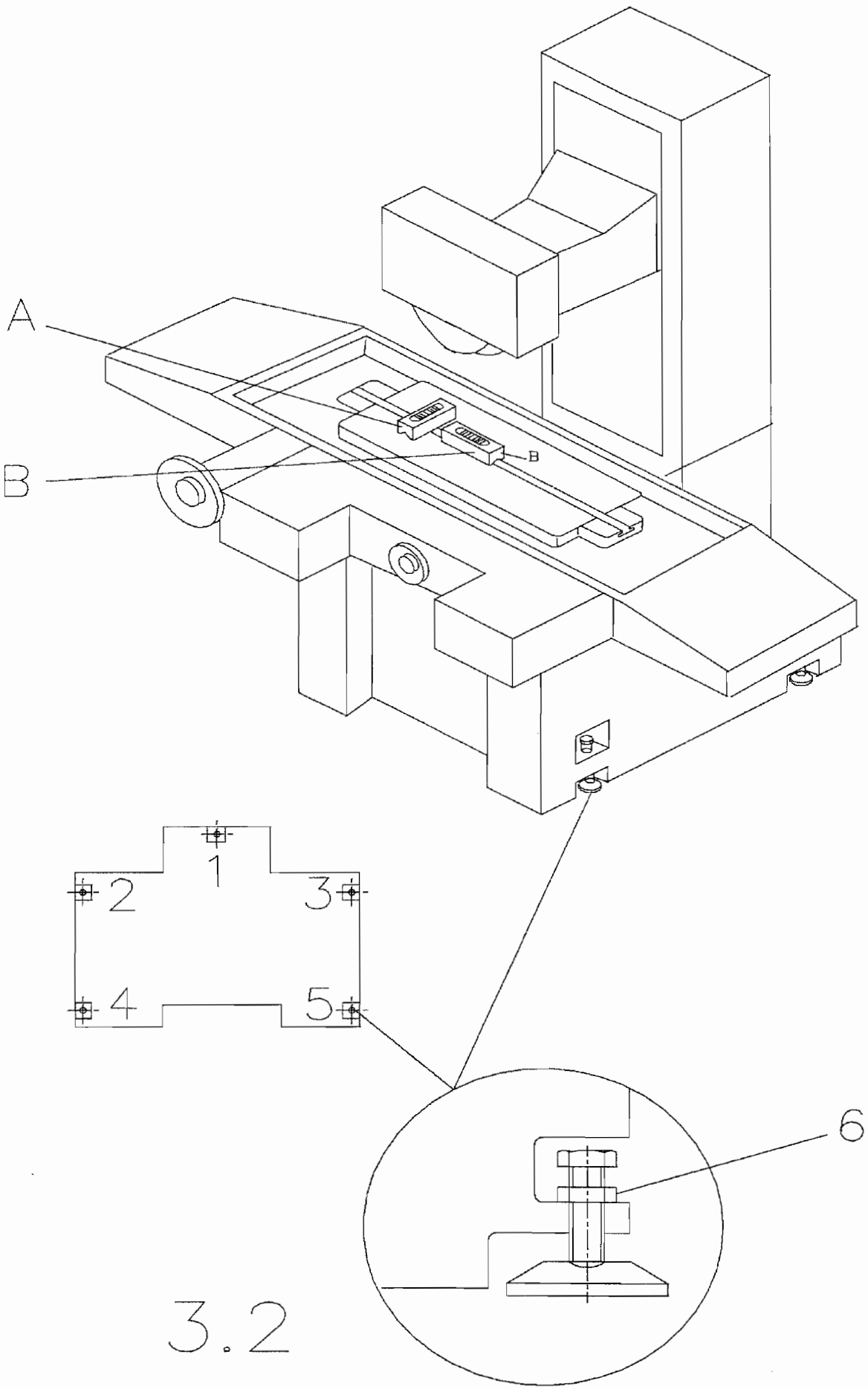
(4) : Screw tight the leveling bolts NO. 2,3. Make sure they have touched leveling blocks, and the bubble of the level gauge on the machine doesn't move, then screw tight the nut NO. 6.

(5) : Turn the hand wheel of the table. Make the table move left or right, then check if the bubble of level gauge (B) is still within 0.02mm/M.

(6) : Turn the hand wheel of saddle. Check the bubble on level gauge (A), to see if it is still within 0.02mm/M.

(7) : If the bubble of level gauge in procedure (5) & (6) is over 0.02mm/M, please adjust according procedure (1), (2),(3), &(4).

(8) : Please use hammer to slightly tap the leveling pads again after all the procedure had done. This is to ensure all leveling bolts are firmly supported.



3.2

CHAPTER 5

PREPARATION BEFORE OPERATING MACHINE

5.1 : To remove desiccant and clean the cosmoline:

The machine had coated with the cosmoline and hanged desiccant to prevent rusting. The brown film on the surface of machine is anti-rust oil. We coated the cosmoline on the table, nose of spindle...., etc., and the desiccant will be put inside the electrical box, or hang on the table...., etc.

After installation , please take off the desiccant and use cleaning rags with diesel gas to wipe off the cosmoline. Do not use any solvent that might corrode metal to wipe off cosmoline.

Note: Do not eat desiccant which is silica gel.

5.2 : Remove the clamp

Take ch. 4.3 for your reference, please remove the clamps before turning on the machine. Do not throw away the clamps for the use of next transportation.

5.3 : Fill the lubrication oil

Fill the lubrication oil before usge. Suggested lubrication oil is as below:

MOBIL: VACTRA,#2. GULF: slide-way 68.

ESSO: FEBIS, K68. CASTROL: Magna BD 68.

SHELL: TONNA, T68.

The capacity of oil tank is 0.5 gallons.

5.4 : Installation of hydraulic system

Please check the drawing below about the oil inlet and outlet of the hydraulic system. First, please place the hydraulic tank on the right and beside the machine. Second, connect the hydraulic pipes according to the drawing below. Pipe A is for oil outlet, and pipe B is for oil inlet.

Because the hydraulic tank is empty, please fill it with hydraulic oil.

The capacity of hy lic tank is 27gallons, please fill in about 25 gallons

liters to make gau; of oil level to achieve 4/5 of the scale.

Suggested hydraul l:

ESSO: UNIVIS 32 BP:ENERGO SHF32

SHELL: TELUS 3: TOTAL: EQUIVIS ZS32

MOBIL:D.T.E. 24 5 SHOWA: A-R32

CASTROL: HYSP ıWH32

To ensure the perf nce of hydraulic system, please obey the followings:

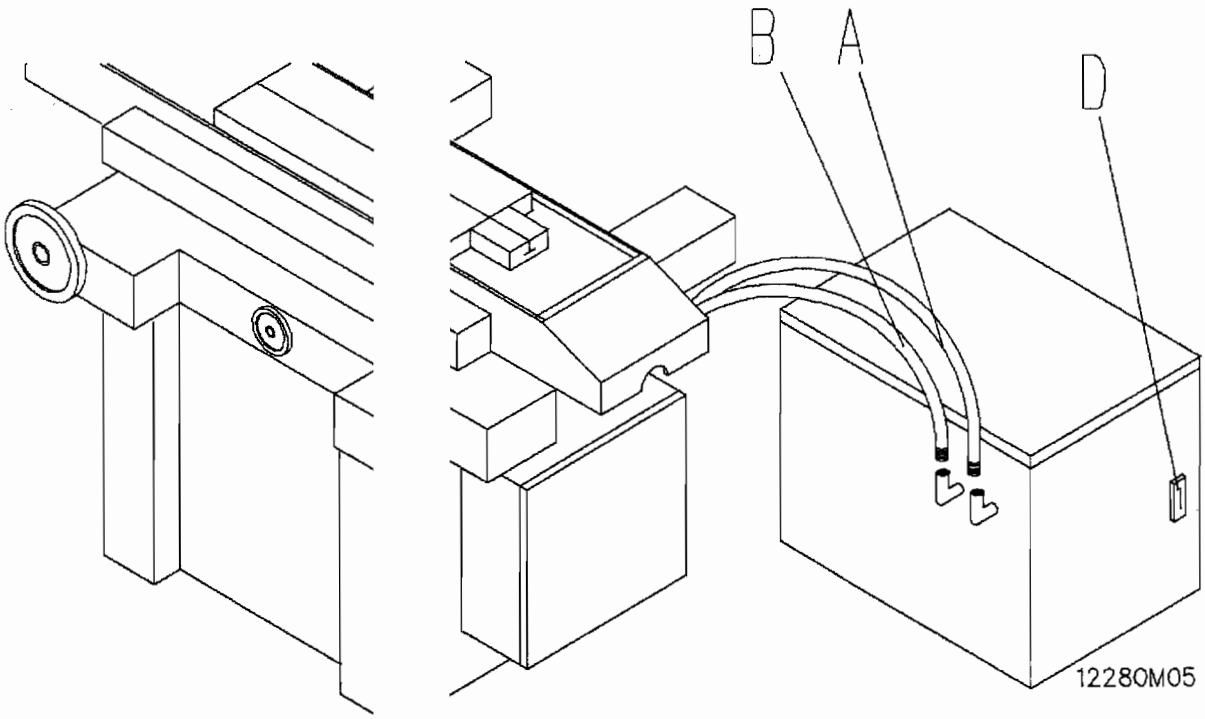
(1) First-time oil ı cement should be done after 3 months of operation.

(2) Replace oil at erval of 6 months after the first eplacement.

(3) Check the pres of pump between 15Kg/ cm^2~20Kg/cm^2.

(4) Clean the filte ıydraulic tank every six months.

Please discard waste material according to the government sanitation or e ınment law.



5.5 : Coolant system c(ction

1. Place coolant s n at the left side of the machine, connect (A, B) pipe to the mac as below drawing shows.

2. Coolant fluid:

a. Please select the one which meets the government sanitation law, and it's not harmful to for human body.

b. Consult with local coolant products suppliers about proper coolant by specifying material of work-piece, and grinding wheel.

c. For combination percentage of water and coolant, please read the direction first or consult with the supplier. (common percentage for combination of water and coolant is 15 -25:1).

d. Always fill properly-mixed coolant into coolant tank, instead of adding water or coolant respectively.

e. Replace all the coolant liquid in coolant tank every month. It is very important for a fine grinding to keep coolant clean.

f. Recommended brands of coolant(water soluble coolant):
SUN, SHOWA, ESSO, BP, SHELL, MOBIL, CASTROL, ARAL, Such as CASTROL SYNTILO,R coolant or MOBIL SOLVAC 1535 coolant for ferrous metal grinding.

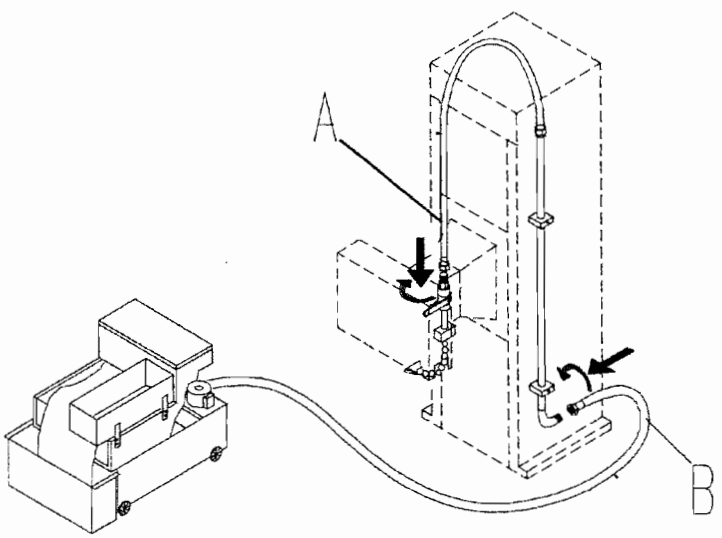
3. Capacity of coolant system:

a.Coolant system with auto paper feed device:34 gallons.

b.Coolant system with auto paper device and magnetic separator:34 gallons.

4. Please dispose the waste oil according to the government sanitation law.

5. When you want to replace old coolant on the coolant tank, please start the coolant pump and drain the used coolant to the other tank by hose B.



5.6 : Power connection

Please check voltage & frequency according to chapter 3.2 for the reference of power source. Also please connect the power of hydraulic system, coolant system, electromagnetic chuck. The total power consumption is 10.5KVA. Please use the formula below to calculate the electric current:

$$A = \frac{KVA \times 1000}{V \times \sqrt{3}} \text{ (AMPERE)}$$

A : Electric current
V : Voltage
KVA: Total power consumption

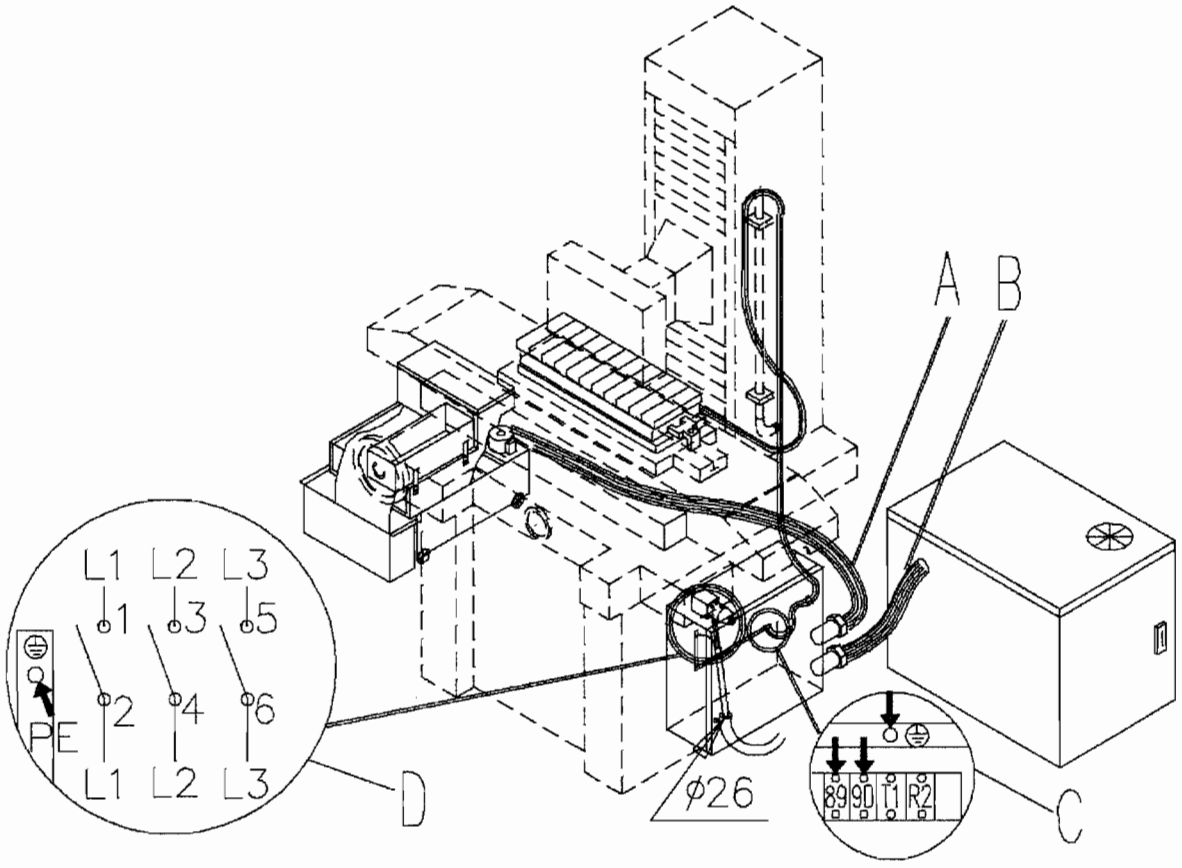
Below is the relationship of voltage, total power consumption and the electric current.

Amp / Voltage / R.Power	220v	230V	340V	380V	415V	440V	460V	575V
7.5Hp	30A	30A	20A	20A	20A	15A	15A	15A
10Hp	40A	40A	30A	25A	25A	20A	20A	20A

Please check the local law about the size of electric power line. If there's no PE line in the power system, please use grounding copper bar. The grounding resistance should be 100 OHMS. Please check the drawing below to connect the power.

1. Connect cord of coolant system (cord A): plug into the socket which labeled __A__.
2. Connect cord of hydraulic system (cord B): plug into the socket which labeled __B__.
3. Connect cord of electromagnetic chuck (cord C): screw them on to terminals (89),(90) which are inside the electric box. The voltage of it is DC 110 Volt.
4. Connect cord of the external power (cord D) to the terminals L1,L2, L3, PE. Do not connect neutral line to PE terminal. If you don't have the PE line, please set a grounding copper bar instead.
5. Phase examination: The spindle will run clockwise when you push the button for spindle motor, or if you push the button of coolant system, the coolant will come out....., .etc., they are all the signs of correct phase . If the phase is not correct, please push

POWER OFF immediately, and also turn off the main power switch. Then change the position of power line L1, L3 respectively.



5.7 : Re-check before operation

For your safety, please check the following steps before starting to operate for the first time.

(1) Fill enough lubrication oil into the lubrication tank.

(2) Fill enough hydraulic oil into the hydraulic tank.

(3) Fill enough coolant liquid into the coolant tank.

(4) Take off the clamps on the machine.

(5) Remove all the cosmoline from the machine.

(6) Take off the desiccant that is hung on the machine.

(7) Connect the power-cords of hydraulic system and the input power to the machine.

(8) Connect the power-cord of coolant system to the machine.

(9) Connect power of electromagnetic chuck to the machine.

(10) Make sure the table speed control is at the OFF position.

(11) Confirm the position of EMERGENCY STOP (E-STOP) button.

(12) Confirm the mounting of grinding wheel on the spindle.

(13) Confirm the voltage and frequency of the power source.

(14) Confirm the power-cord's connections.

(15) Confirm the phase of the power source.

(16) Confirm the leveling bolts are supporting the machine, and the level is within 0.02mm/M or 0.0008"/40"

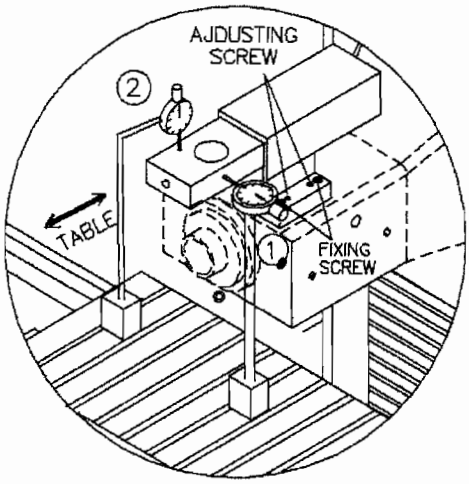
(17) Confirm the wheel guard which should be closed.

5.7.1:Dismantling procedure of the machine.

The dismantling procedure is the reversed procedure of the installation

5.8: THE WAY TO ADJUST PARALLEL DRESSER:

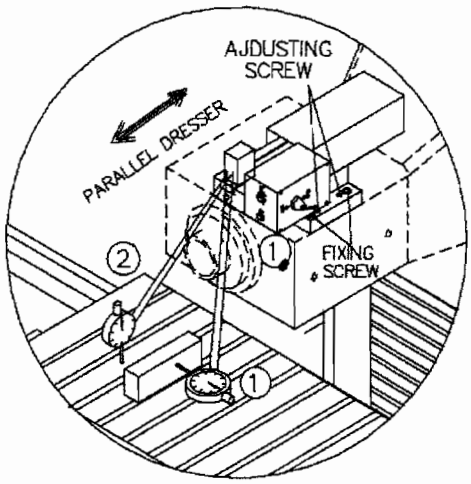
(SPECIAL ACCESSORIES)



THE WAY TO ADJUST MANUAL PARALLEL DRESSER:

(1) FIX THE DIAL ON THE SURFACE OF TABLE OR CHUCK.TURN THE NEEDLE OF DIAL TO THE SIDE OF SHOW ON DRESSER AS DRAWING ①.MOVE TABLE IN AND OUT TOMEASURE IF THE ACCURACY IS WITHIN 0.0002"(0.005MM).

(2) FIX THE DIAL ON THE SURFACE OF TABLE OR CHUCK.TURN THE NEEDLE OF DIAL ON THE OF PARALLEL DRESSER, AS DRAWING ② .MOVE THE TABLE IN AND OUT TO MAKE SURE THE ACCURACY IS WITHIN 0.00008"(0.002MM).



THE WAY TO ADJUST ELECTRO PARALLEL DRESSER:

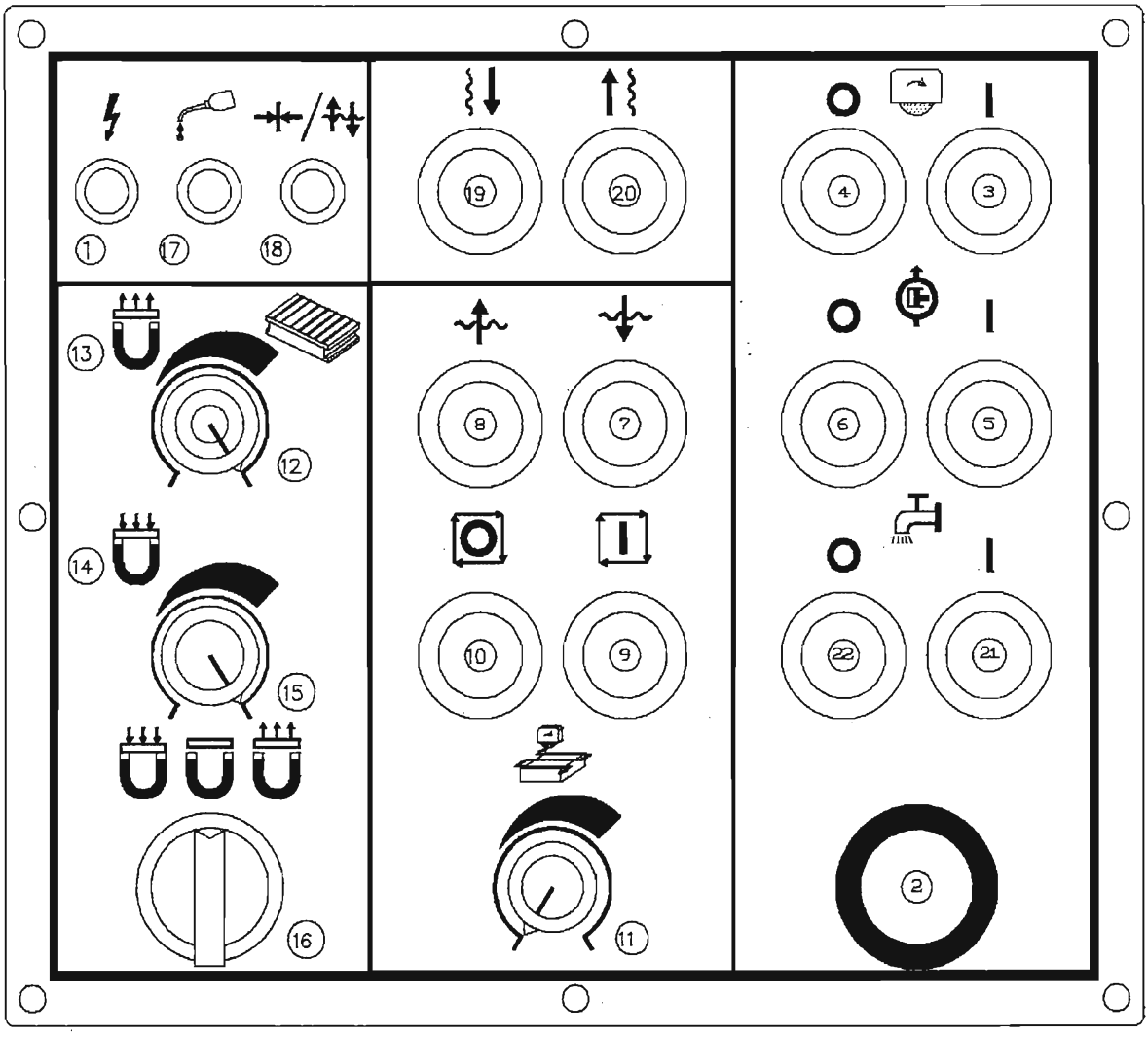
(1) FIX THE DIAL ON THE PARALLEL DRESSER.PUT A WORK-PIECE THAT IS ALREADY BEEN GROUND ON THE SURFACE OF CHUCK. TURN THE NEEDLE OF THE DIAL ON THE SIDE OF WORK-PIECE AS DRAWING ① SHOWED.TURN ON ELECTRO PARALLEL DRESSER AND MEASURE IF THE ACCURACY IS WITHIN 0.0002"(0.005MM).

(2) FIX THE DIAL ON THE PARALLEL DRESSER, AND TURN THE NEEDLE OF THE DIAL ON THE SURFACE OF TABLE OR CHUCK AS DRAWING ② SHOWED. TURN ON ELECTRO PARALLEL DRESSER AND MEASURE IF THE ACCURACY IS WITHIN 0.00008"(0.002MM)

CHAPTER 6

HOW TO OPERATE THE MACHINE

6.1 :Control panel FOR 3A Series

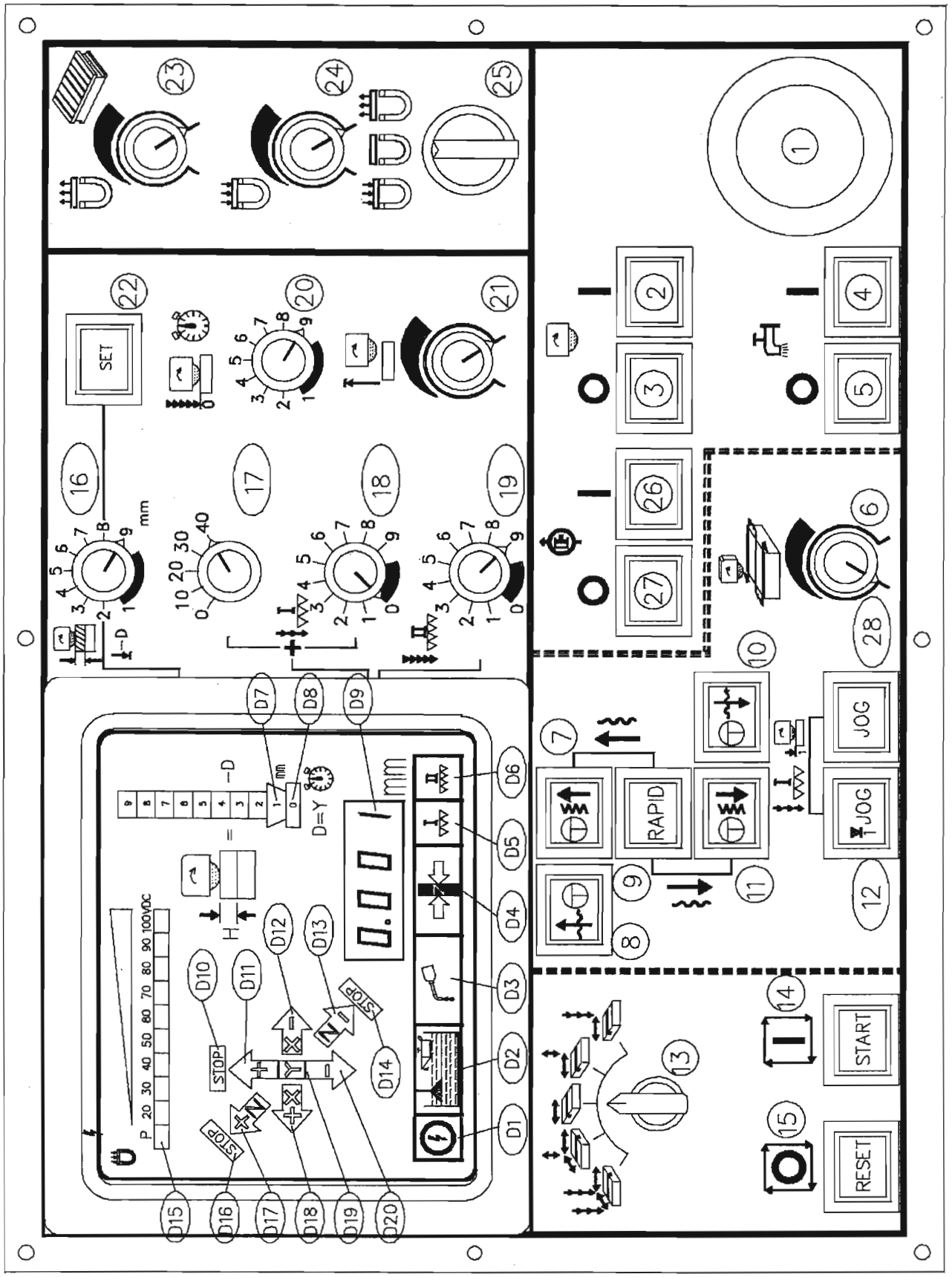


.1.1:Description of 3A control panels (Operation instruction)

NO.	PART NO.	SYMBOLIC DEFINITION	DESCRIPTION
1.	C72-LED-R	Power Indication Lamp	To indicate power is on or off.
2.	C23-25R1B	Emergency stops button.	To stop all motors and functions.
3.	C36-G	Spindle (wheel-head)start button	To start the spindle.
4.	C36-R	Spindle (wheel-head) stops button	To stop the spindle
5.	C36-G	Hydraulic start button	To start the hydraulic system
6.	C36-250G24V	Hydraulic stops buttons	To stop the hydraulic system
7.	C101-PW2A	Rapid outward button	To change to the outward direction (available in auto crossfeed mode)
8.	C101-PW2A	Rapid inward button	To change to the inward direction (available in auto crossfeed mode)
9.	C30	Start button	To confirmed the working mode selection.
10.	C36-R	Reset button	To cancel the working mode selection confirmed by start button.
11.	C79-VR1A	Variable step increment of crossfeed selector switch	To select required step increment of crossfeed in auto mode.
12.	C99-VR500RB	Demagnetizing time adjust switch	To adjust demagnetizing time. Larger work-pieces, and high carbon containing work-pieces like tool steel,SKD,SKH,SKS,SCM,SNCM,etc.take longer time to demagnetizing.
13.	C72-LED-G	Demagnetizing indication lamp	To indicate the function of demagnetizing power adjust switch is working.
14.	C72-LED-R	Magnetizing indication lamp	To indicate the function of magnetizing power adjust switch is working.
15.	C99-VR50KB	Magnetizing power adjust switch	To adjust magnetizing power of chuck.

16. C93 Magnetizing/demagnetizing selector switch
    (a) On position: To magnetizing, use power-adjust-switch (14) to adjust power of magnetizing.
    (b) Middle position: To stop chuck functions and the hydraulic system.
    (c) OFF position: To demagnetize, use time-adjust-switch (12) to adjust time of demagnetizing.
17. C72-LED_G Lubricant performance status indication lamp
    Light-on represents normal lubricant oil supply lubricant pump is activated by starting hydraulic system).
    Light off could be caused by:
    1. Lubricant pump is not started.
    2. Oil filter is blocked.
    3. Oil pressure is not enough.
    4. Power supply for lubricant pump is cut off.
    5. Lubricant pump is out of order.
18. C72-LED-R Crossfeed locked indication lamp
    To indicate the movement of crossfeed is not able.
19. C101-PW2A Rapid down pushes button
    To go downward rapidly.
20. C010-PW2A Rapid up pushes button
    To go upward rapidly.
21. C36-G Coolant pump start button
    To start the coolant system.
22. C36-R Coolant pump stop button
    To stop the coolant system.

6.2: CONTROL PANEL LAYOUT FOR AHD (in metric) SERIES



6.2.1 Description of control panel for AHD series (Operation instruction)

NO.	ELECTRICAL CODE NO.	P/N	SYMBOLIC DEFINITION DESCRIPTION
1	S0	C25-22R1B	Emergency stop button To stop all motors and functions.
2	S1	C20-161A1BG1	Spindle (wheel-head) start push button To start the spindle (wheel head).
3	S2	C20-161A1BR1	Spindle (wheel-head) stop push button To stop the spindle (wheel head).
4	S6E	C20-161B1BG1	Coolant pump start button To start the coolant system.
5	S7E	C20-161B1BR1	Coolant pump stop button To stop the coolant system.
6	R2	C79-VR105A	Variable step increment of crossfeed selector switch To select required step increment of crossfeed in auto mode.
7	S15E	C19-162A2BW1	Wheel-head slow up button (a) Slow up movement activated by button (7). (b) Rapid up movement activated by button (7) and (9) – Push the two buttons together. * Available only in manual surface/plunge modes selector switch (13).
8	S16E	C20-161A1BW1	Rapid inward crossfeed movement button (a) To move saddle inward, available only in manual surface mode (by switch (13)) and light of reset button (15) is on. (b) To toggle outward crossfeed movement to inward, available only in auto/manual surface modes and when light of start button (14) is on.
9	S17E	C19-162A2BW2	Rapid up/down confirm push button (a) Push (9) and (7) together to get rapid up movement, push (9) and (11)together to get rapid down movement. * Push (9) only will get no movement.
10	S4E	C19-162A2BW3	Rapid outward crossfeed movement push button (a) Available only in manual surface mode selected on (13) and light of reset push button (15)is on. Toggle inward movement to outward under auto/manual surface mode (available only when light of start push button (14) is on).

11	S5	C19-162A2BW4	Wheel-head slow down push button Push (11) to get slow down. Push (11) and (9) together to get rapid down movement. * Available only under manual surface/plunge modes (13).
12	S18E	C20-161A1B2	Downfeed jogging push button In metric, 0.001mm downfeed increment per push.
13	S8	C03-5SW-2	Grinding mode selector switch Five selector as follows A. Auto surface mode In this mode, automatic feeds in 3 axis, hydraulic feed, crossfeed, vertical feed are provided. (a) When light of buttons (15), (25) is on 1.Rapid in/out by (8), (10). 2.Wheel-head up/down movement by button (7), (9), (11). 3.Jogging by button (12). (b) When light of button (14) is on, automatic grinding cycle is activated, the wheel-head is raised and all motors are automatically stopped upon completion of grinding cycle. 1.Step increment of crossfeed by selector switch (6). 2.Jogging by button (12). 3.Crossfeed in/out direction control by button (8), (10). 4.Downfeed functions by selector switch (16), (17), (18), (19), (20) and (21). B. Manual surface mode: (a) When light of button (15) is on, below functions are available: 1.Rapid in/out by (8), (10). 2.Rapid/slow up/down is by (7), (9) and (11). Jogging is by (12). (b) When light of button (14) is on, start hydraulic table by turning table speed control, adjust selector switch (6) to get required step increment of crossfeed.

1.Crossfeed in/out direction control by button (8), (10).
2.Wheel-head up/down movement by button (7), (9), (11).

C. For hydraulic table turns to the middle position of switch (13).

D. Manual plunge mode:
In this mode, only manual wheelhead feed is on cross travel is available auto step feed, rapid in/out saddle motion are disable.
1.jogging by push-button (12)
2.rapid/slow, up/down by push-button (7), (9)and (11)

E. Auto plunge mode,
In this mode:

(a) When light of button (14), (25) is on, automatic grinding cycle is activated. The wheelhead downfeed will start when table motion is abled for grinding cycle.
1. Jogging by push-button (12).
2. Selector switch (16),(17),(18),(20),(21)and (22)

Note: When changing the position of the button, it will effect the auto cycle. The wheelhead is raised, and all motors are automatically stopped after completion of spark-out grinding.

(b) When light of push-button is on
1. Jogging by push-button (12).
2. Rapid up/down, rapid in/out not available.

14	S12E	C20-161A1BG2	Confirmation button for selector switch (13) To confirm the selection by select switch (13).
15	S13E	C20-161A1BR2	Function cancellation for selector switch To cancel the function selection by select switch (13).
16		DIS-16002	Total amount (downfeed increment) selector switch (in metric). Use selector switch (16) together with downfeed dial ring to set required downfeed amount. (Please refer to p.21) max. Auto downfeed amount=9 mm (in metric) push button (22) to confirm the total amount set

by selector switch (16).

17/18 DIS-16002 Rough grinding step increment selector switch (in metric).
Rough grinding step increment=0.001mm~0.04mm(at interval of 0.001mm).
Setting on (17)+setting on (18)=rough grinding step increment. (Maximum is 0.04mm)

19 DIS-16002 Finish grinding step increment selector switch (in metric).
Finish grinding step increment=0.001mm~0.009mm(at interval of 0.001mm).
Finish pass will start for the last 0.1mm of total amount.

* To reset this function, switch to zero position.

20 S14 C04-12SW-1 Spark-out selector switch
Spark-out 1~9 times, to ensure a fine finish of workpiece.

21 R3 C79-VR105A Variable elevation amount adjust switch
To preset rising amount for the wheelhead, The wheelhead is raised up on completion of grinding cycle.

22 C20-161A1B3 Set button (input confirmation button)
To confirm the settings on selector switch (16). The m/c will act according to new settings by pushing button (22).
Do nit use this button during the auto grinding cycle proceeding unless you want to change total downfeed setting.

Usage:

1. Before starting the grinding cycles, make the m/c to accept downfeed settings.
2. During grinder cycle, if a change of downfeed amount is needed. Rotate selector switch 16, and reconfirm witch push button 22.

23 C99-VR500KB Demagnetizing time adjust switch
To adjust demagnetizing time

Larger work-piece, and high carbon containing work-pieces like tool

steel,SKD,SKH,SKS,SCM,CNCM,ect.take longer time to demagnetize.

24 C99-VR50KB Magnetizing power adjust switch
To adjust magnetizing power,
Status of power shown on (D15)

25 C93-30SW2A1B Magnetize/demagnetize selector switch
(a) On-position is to magnetize. Use adjusting switch (24) to adjust power of magnetism.
(b) Middle-position is to stop chuck function and the hydraulic system.
(c) Off-position is to demagnetize. Use adjusting switch (23) to adjust time of demagnetizing.

26 S16 C20-161A1BG1 Hydraulic start push-button
To start hydraulic system for the table.

* Hydraulic system starts interlocked with chuck control and table parking.

* See Operation manual P.41

27 S15 C20-161A1BR1 Hydraulic stop push-button

28 C20-161A1BW3 Step increment jog push-button
* Jogging amount can be pre-set, range is from 0.001mm to 0.04mm. Please select the amount by changing rough grinding step increment selector switch (17) and (18).

This function is available while the light of push-button (14) is on. Increment amount is related to the setting on selector switch (17) and (18).

Operation method:

Hold push-button (28), then push (12).

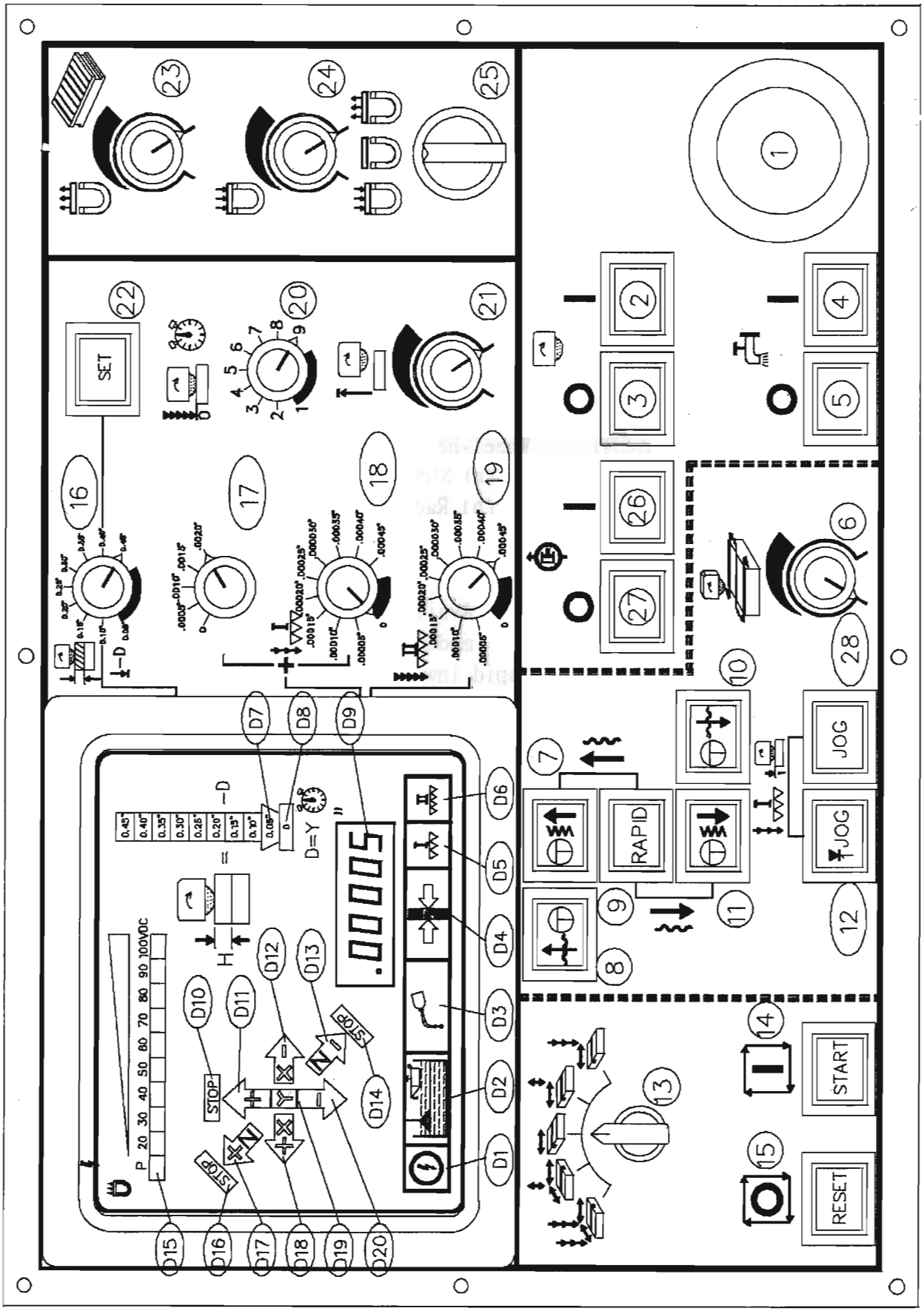
Description of DISPLAY SCREEN for AHD series (OPERATION INSTRUCTION)

D1	DIS-16002	Power indicator lamp Light on represents normal power supply.
D2	DIS-16002	Lubricant oil inadequacy indicator lamp Light on represents that lubricant oil is not enough, need to add more.
D3	DIS-16002	Lubricant performance status indicator lamp Light on represents normal lubricant oil supply (Lubricant pump is activated by starting hydraulic system.) Light not on could be caused by: 1.Lubricant pump did not start. 2.Oil filter is blocked. 3.Oil pressure is not enough. 4.Power supply for lubricant pump is off. 5.Lubricant pump is out of order.
D4	DIS-16002	Crossfeed locking indicator To indicate the crossfeed has been locked.
D5	DIS-16002	Rough grinding indicator lamp Light on represents that rough-grinding is proceeding. Step increment is relative to selector switch (17), (18).
D6	DIS-16002	Finish grinding indicator lamp Light on represents that finish-grinding is proceeding. Step increment is relative to selector switch (19). The procedure proceeds for the last 0.1mm of total downfeed amount.
D7	DIS-16002	Total downfeed amount indicator lamp(in metric) To indicate current total downfeed amount. Actual downfeed amount to be proceeded = (total downfeed amount indicated on D6)-(reading on downfeed dial ring.)
D8	DIS-16002	Spark-out indicator lamp Light on represents pre-set spark-out passes, relative to selector switch (20), are being taken. All motors are automatically stopped on completion of spark out passes.
D9	DIS-16002	Downfeed step increment (in metric). Display proceeding downfeed step increment in inches relative to selector switch (17), (18) or (19).

D10	DIS-16002	Upper limits indicator lamp Light on represents the upper limit of vertical travel is reached by the wheel-head, upward movement is automatically turned off.
D11	DIS-16002	Upward movement indicator lamp Light on represents wheel-head upward movement is proceeding.
D12	DIS-16002	Table rightward movement indicator lamp Light on represents table rightward movement is proceeding.
D13	DIS-16002	Saddle inward movement indicator lamp Light on represents the saddle inward movement is proceeding.
D14	DIS-16002	Saddle inner limit indicator lamp Light on represents the saddle inner limits is reached, inward movement is automatically turned off.
D15	DIS-16002	Magnetizing/demagnetizing indicator lamp 10 steps, to indicate magnetizing power, or demagnetizing time. Power supply output voltage range from 20V to 100V.
D16	DIS-16002	Saddle outer limits indicator lamp Light on represents the saddle outer limit is reached, outward movement is automatically turned off.
D17	DIS-16002	Saddle outward movement indicator lamp Light on represents saddle outward movement is proceeding.
D18	DIS-16002	Table leftward movement indicator lamp Light on represents table leftward movement is proceeding.
D19	DIS-16002	Upward/downfeed movement by stepping motor indicator lamp. Light on represents that stepping motor is being activated. 1. Slow upward feed is proceeding:(D11)and (D19) are lightd 2. Slow downfeed is proceeding:(D20)and(D19)are lighted. 3. Jog movement is preceeding:(D19)is lighted.
D20	DIS-16002	Downward movement indicator lamp Light on represent rapid/slow downward movement is proceeding.

Light of (D20) keeps on during auto grinding cycles.

6.2: CONTROL PANEL LAYOUT FOR AHD (in inches) SERIES.



6.2.1 Description of control panel for AHD series (Operation instruction)

NO.	ELECTRICAL CODE NO.	P/N	SYMBOLIC DEFINITION DESCRIPTION
1	S0	C25-22R1B	Emergency stop button To stop all motors and functions.
2	S1	C20-161A1BG1	Spindle (wheel-head) start push button To start the spindle (wheel head).
3	S2	C20-161A1BR1	Spindle (wheel-head) stop push button To stop the spindle (wheel head).
4	S6E	C20-161B1BG1	Coolant pump start button To start the coolant system.
5	S7E	C20-161B1BR1	Coolant pump stop button To stop the coolant system.
6	R2	C79-VR105A	Variable step increment of crossfeed selector switch To select required step increment of crossfeed in auto mode.
7	S15E	C19-162A2BW1	Wheel-head slow up button (a) Slow up movement activated by button (7). (b) Rapid up movement activated by button (7) and (9) – Push the two buttons together. * Available only in manual surface/plunge modes selector switch (13).
8	S16E	C20-161A1BW1	Rapid inward crossfeed movement button (a) To move saddle inward, available only in manual surface mode (by switch (13)) and light of reset button (15) is on. (b) To toggle outward crossfeed movement to inward, available only in auto/manual surface modes and when light of start button (14) is on.
9	S17E	C19-162A2BW2	Rapid up/down confirm push button (a) Push (9) and (7) together to get rapid up movement; push (9) and (11) together to get rapid down movement. * Push (9) only will get no movement.
10	S4E	C19-162A2BW3	Rapid outward crossfeed movement pushes button (a) Available only in manual surface mode selected on (13) and light of reset push button (15) is on. Toggle inward movement to outward under auto/manual surface mode (available only when light of start push button (14) is on).

11	S5	C19-162A2BW4	Wheel-head slow down push button Push (11) to get slow down. Push (11) and (9) together to get rapid down movement. * Available only under manual surface/plunge modes on (13).
12	S18E	C20-161A1B2	Downfeed jogging push button In inches, 0.00005" downfeed increment per push.
13	S8	C03-5SW-2	Grinding mode selector switch Five selections as follows A. Auto surface mode In this mode, automatic feeds in 3 axis, hydraulic feed, crossfeed, vertical feed are provided. (a) When light of buttons (15), (25) is on 1.Rapid in/out by (8), (10). 2.Wheel-head up/down movement by button (7), (9), (11). 3.Jogging by push button (12). (b) When light of button (14) is on, automatic grinding cycle is activated, the wheel-head is raised and all motors are automatically stopped upon completion of grinding cycle. 1.Step increment of crossfeed by selector switch (6). 2.Jogging by push button (12). 3.Crossfeed in/out direction toggle by button (8), (10). 4.Downfeed functions by selector switch (16), (17), (18), (19), (20) and (21). B. Manual surface mode: (a) When light of button (15) is on, below functions are available: 1.Rapid in/out by (8), (10). 2.Rapid/slow up/down is by (7), (9) and (11). Jogging is by (12). (b) When light of button (14) is on, start hydraulic table by turning table speed control, adjust selector switch (6) to get required step increment of crossfeed. 1.Crossfeed in/out direction controls by buttons (8), (10).

2.Wheel-head up/down movement by button (7), (9), (11).

C. For hydraulic table turns to the middle position of switch (13).

D. Manual plunge mode:
In this mode, only manual wheelhead feed is on, and cross travel is auto step feed are available.
Rapid in/out saddle motion are disabled.
1.Jogging by push-button (12)
2.Rapid/slow, up/down by push-button (7), (9) and (11).

E. Auto plunge mode,
In this mode:
(a) When light of button (14), (25) is on, automatic grinding cycle is activated. The wheelhead downfeed will start when table motion for grinding cycle.
1. Jogging by push-button (12).
2. Selector switch (16),(17),(18),(20),(21)and (22)
Note: When changing the position of the button, it will effect the auto cycle. The wheelhead is raised and all motors are automatically stopped after completion of spark-out cycle.
(b) When the light of push-button is on
1. Jogging by push-button (12).
2. Rapid up/down, rapid in/out are not available.

14	S12E	C20-161A1BG2	Confirmation button for selector switch (13) To confirm the selection by select switch (13).
15	S13E	C20-161A1BR2	Function cancellation for selector switch To cancel the function selection by select switch (13).
16		DIS-16002	Total amount (downfeed increment) selector switch (in inches) Use selector switch (16) together with downfeed dial ring to set the required downfeed amount. (Please refer to p.21) Max. Auto downfeed amount=0.45" (in inches) Pushing button (22) to confirm the total amount set by selector switch (16).
17/18		DIS-16002	Rough grinding step increment selector switch

			(in inches) Rough grinding step increment=0.00005"~0.002"(at interval of 0.00005"). Setting on (17)+setting on (18)=rough grinding step increment. (Maximum is 0.0020")
19		DIS-16002	Finish grinding step increment selector switch (in inches) Finish grinding step increment=0.00005"~0.00045"(at interval of 0.00005") Finish pass will start for the last 0.005" of total amount. * To reset this function, switch to zero position.
20	S14	C04-12SW-1	Spark-out selector switch Spark-out 1~9 times, to ensure a fine finish of workpiece.
21	R3		Variable elevation amount adjust switch To preset rising amount for the wheelhead. The wheelhead is raised up on the completion of grinding cycle.
22		C20-161A1B3	Set button (input confirmation button) To confirm the setting on selector switch (16). The m/c will act according to new settings by pushing button (22). Do not use this button during the auto grinding cycle unless you want to change the total downfeed setting. Usage: 1.Before starting the grinding cycle, make the m/c to accept downfeed setting. 2.After changing total downfeed amount on selector switch (16) during the grinding cycle.
23		C99-VR500KB	Demagnetizing time adjustment switch To adjust demagnetizing time for larger work-piece, and high carbon containing work-pieces, like tool steel,SKD,SKH,SKS,SCM,CNCM,etc. which take longer time to demagnetize.

24		C99-VR50KB	Magnetizing power adjustment switch To adjust magnetizing power, status of power has shown on (D15).
25		C93-30SW2A1B	Magnetize/demagnetize selector switch (a) On-position is to magnetize. Use adjusting switch (24) to adjust power of magnetism. (b) Middle-position is to stop chuck functions and the hydraulic system. (c) Off-position is to demagnetize. Use adjusting switch (23) to adjust time of demagnetizing.
26	S16	C20-161A1BG1	Hydraulic start push-button To start hydraulic system for the table. * Hydraulic starts interlocks with chuck control and table parking. * See Operation manual P.59
27	S15	C20-161A1BR1	Hydraulic stop push-button
28		C20-161A1BW3	Step increment jog push-button * Jogging amount can be pre-set, range is from 0.00005" to 0.0020". Please select by rough grinding step increment selector switch (17) and (18). This function is available while light of push-button (14) is on. Increment amount relates to the setting on selector switch (17) and (18). Operation method: Hold push-button (28), then push (12).

Description of DISPLAY SCREEN for AHD series (OPERATION INSTRUCTION)

D1	DIS-16002	Power indicator lamp Light on represents normal power supply.
D2	DIS-16002	Lubricant oil inadequacy indicator lamp Light on represents that lubricant oil is not enough, and needs to add more.
D3	DIS-16002	Lubricant performance status indicator lamp Light-on represents normal lubricant oil supply (Lubricant pump is activated by starting hydraulic system.) Light not on could be caused by: 1.Lubricant pump is not started. 2.Oil filter is blocked. 3.Oil pressure is not enough. 4.Power supply for lubricant pump is off. 5.Lubricant pump is out of order.
D4	DIS-16002	Crossfeed locking indicator To indicate the crossfeed has been locked.
D5	DIS-16002	Rough grinding indicator lamp Light on represents that rough-grinding is proceeding. Step increment is indicated by selector switch (17), (18).
D6	DIS-16002	Finish grinding indicator lamp Light on represents that finish-grinding pass is proceeding. Step increment is indicated by selector switch (19). This procedure proceeds for the last 0.005" of total downfeed amount.
D7	DIS-16002	Total downfeed amount indicator lamp (in inches) To indicate current total downfeed amount. Actual downfeed amount to be proceeded = (total downfeed amount indicated on D6)-(reading on downfeed dial ring).
D8	DIS-16002	Spark-out indicator lamp Light on represents pre-set spark-out cycle. It's relative to the position of selector switch (20). All motors are automatically stopped on completion of spark out cycle.
D9	DIS-16002	Downfeed step increment (in inches). Display proceeding downfeed step increment in inches. It is indicated by selector

switch (17), (18) or (19).

D10	DIS-16002	Upper limits indicator lamp Light on represents the upper limit of vertical travel is reached by the wheel-head. More upward movement is automatically turned off.
D11	DIS-16002	Upward movement indicator lamp Light on represents wheel-head upward movement is proceeding
D12	DIS-16002	Table rightward movement indicator lamp Light on represents table rightward movement is proceeding.
D13	DIS-16002	Saddle inward movement indicator lamp Light on represents the saddle inward movement is proceeding
D14	DIS-16002	Saddle inner limit indicator lamp Light on represents the saddle inner limits is reached. More inward movement is automatically turned off.
D15	DIS-16002	Magnetizing/demagnetizing indicator lamp 10 steps, to indicate magnetizing power, or demagnetizing time. Power supply output voltage ranges from 20V to 100V.
D16	DIS-16002	Saddle outer limits indicator lamp Light on represents the saddle outer limit is reached. More outward movement is automatically turned off.
D17	DIS-16002	Saddle outward movement indicator lamp Light on represents saddle outward movement is proceeding.
D18	DIS-16002	Table leftward movement indicator lamp Light on represents table leftward movement is proceeding.
D19	DIS-16002	Upward/downfeed movement by stepping motor indicator lamp Light on represents that stepping motor is being activated. 1.Slow upward feed is proceeding:(D11)and (D19) are lighted 2.Slow downfeed is proceeding:(D20)and(D19)are lighted. 3.Jog movement is preceeding:(D19)is lighted.
D20	DIS-16002	Downward movement indicator lamp

Light on represent rapid/slow downward movement is proceeding.
Light of (D20) keeps on during auto grinding cycles.

6.3 : The operation of grinding machine

It is the same for every kind of machine, you have to learn the steps of operation, and then you can start to use it safely. Usually there would be an operating manual for grinder; therefore, please follow the steps to operate the machine. In the meantime, it would be much easier to operate if you know every function of the machine.

6.3.1 :Operating safety precautions

Know how to stop the machine before starting it.

Stop the machine as soon as anything unexpected happens.

Never take depths of grinding beyond the machine's capacity.

Never attempt to touch the grinding wheel by hand when wheel is still running.

Do not use the wheel flange without checking their compatibility with ACER factory.

Keep all guards and covers in place and ensure cabinet doors are closed.

Do not reach over the moving or rotating parts of the machine.

Make the machine when it's running unattended.

Do not grind material for which the wheel is not designed for.

Note: Unintended use:

Under no circumstances, the machine is used to grind the following materials (as the process may generate highly toxic fumes or dust and potentially inflammable waste):

Carbon, Magnesium alloy, Plastics, Ceramic, Low flash point grinding fluid, Dry grinding process.

6.3.2 :Precautions for use of the machine

(1) Please turn off the power before assemble or disassemble the wheel from the spindle.

(2) Do not operate any grinder without wheel guard. Never open the wheel guard while operating.

(3) Never put your hand on the table or try to take the work piece when the wheel is still running.

(4) Make sure the work-piece is located firmly on the table.

(5) Do not try to use your hand to take or feed the work-piece.
(6) Make sure the width, length, and the weight of the work piece will not overload the capacity the machine.
(7) Use the correct condition and keep the wheel sharp during grinder.
(8) Please keep your hands and clothes away from machine while operation.
(9) Do not connect any power cord if you are not familiar with the electric equipment. This is to prevent electric shock. And it also might damage the machine immediately or cause any incorrect movement.
(10) Test the wheel for five minutes. Do not stand in the danger zone while testing. Use the wheel if the test is OK.
(11) DO not operate grinding dryly.
(12) Do not overpass the maximum allowance peripheral speed of the wheel.
(13) Confirm if the wheel guard door had really closed before running the wheel.
(14) Don't set the increment of in-feed too large, it might cause the motor to reduce the rotation speed, and the workpiece might get too hot.
(15) Remove the wheel from machine when you don't need to use it. And store the wheel safely to protect and prolong the life of wheels.
(16) Make sure the turning direction of wheel is the same direction as show on the wheel guard.
(17) Check every switches and buttons to see if they are all on the position of OFF before operation.
(18) Operators should always wear glasses during operation.
(19) Stop the longitudinal hydraulic movement, while adjusting the lenght of longitudinal travel.
(20) Turn off the spindle power after finishing jobs. Then start to clean the table and the machine.
(21) Don't dress the side of wheel. (except for form grinding).

6.4 : Rotation test of wheel

If you want to change a new wheel, you have to do the rotation test. The key of test is below:

(1) Confirm the status of wheel guard:

Make sure if the wheel guard is closed after the replacement of the wheel. Also it is very important to screw tight the fixing bolt of the wheel guard.

(2) Adjust and confirm the coolant nozzle:

Please confirm the position of coolant nozzle after the replacement of the wheel. Check to see if the coolant can splash the wheel correctly. Also check to see if the locating bolt of coolant nozzle had been tightened up to make sure that there is no danger during operation.

(3) Check before operation:

Use your hand to turn the grinding wheel before starting to see if there is any wabbling on the wheel.

(4) Make the rotation test of wheel:

Before turning on the spindle, please check where are the people stand. It is very dangerous to stand at the running direction of the wheel, since there is a possibility for a new wheel to break. Close and screw in the wheel guard, and turn on the switch of the spindle. However, please push the buttons of "ON" & "OFF" repetitiously for the grinding wheel, then slowly speed up the wheel. Let the wheel rotation more than 10 minutes; in the meantime, please check to see if the grinder has the situation of vibration, abnormal noise or wabbling on the wheel. And check if there are any abnormal sign of electric current or hydraulic pressure.

(5) Dressing the wheel

If everything's correct in the rotation test, then put the wheel dresser on the grinder to dress the wheel. Relative references will be found in the following chapters.

(6) Checking the wheel

After dressing, stop the wheel, and use your hand to turn the wheel to see if there's any damage or crack on the wheel. The rotation test above is what you must do. The safety of the wheel can be strictly checked by its appearance or sound test; however, it is necessary to check every steps above. Do not ignore them, or it might cause tremendous injury.

6.5 : Table movement (Longitudinal movement)

1. The table is driven by hydraulic system. The table moves stably and smoothly.
2. For safety reason there are two interlocks before hydraulic system starts:

   Interlock 1:

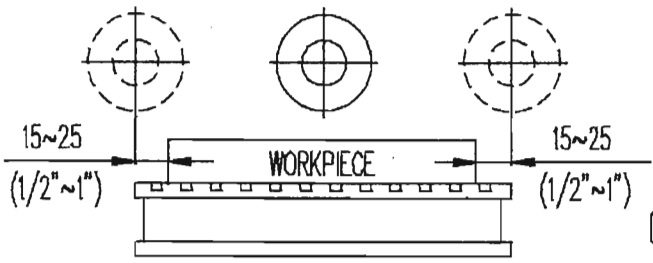
   To start hydraulic system, power control of the electric magnetic chuck must be switched to ON-position. Otherwise, to start hydraulic system is prohibited by interlock 1.

   This interlock can keep work-pieces from slipping off from magnetic chuck. Otherwise when grinding process starts, the operator might forget to set electr magnetic chuck power on before grinding.

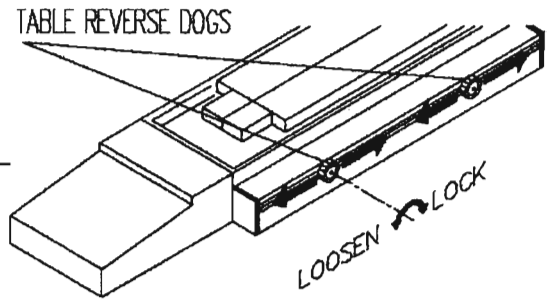
   Interlock 2:

   Turn hydraulic table speed control to OFF position, which makes hydraulic system to be ready for start.
3. The proper longitudinal travel for grinding process is limited within 15-25mm(1/2"-1") over workpiece by grinding wheel as shown fig. (a).

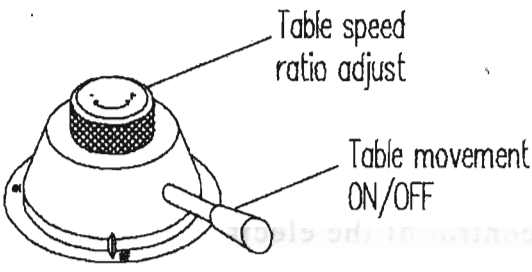
   Longitudinal travel relates to the position of the two table reverse dogs (fig. (b)).
4. To move the table by handwheel, pull out A and hold it. Then push in handwheel (fig. (d))to move it. To disengage handwheel, please pull out handwheel. Be sure to pull out hand wheel after moving table by hand.



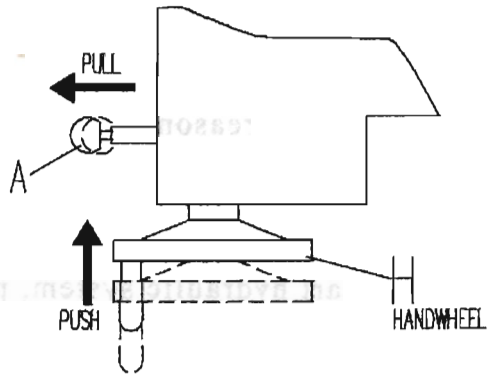
(a)



(b)



(c)



(d)

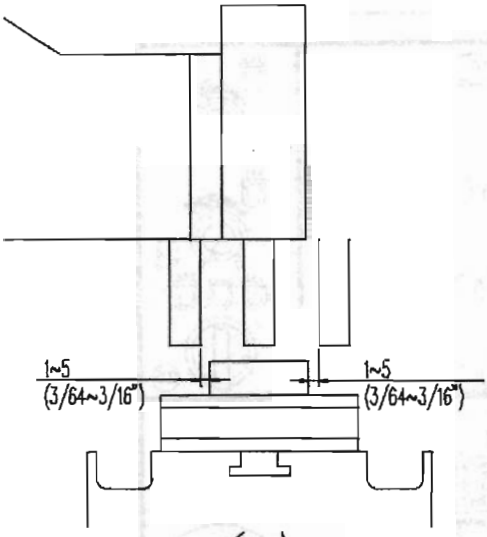
6.6 : SADDLE MOVEMENT (CROSS MOVEMENT)

1. Saddle movement is driven by ball screw and AC motor, and is controlled by a PC board. Manual operation and automatic model are available.

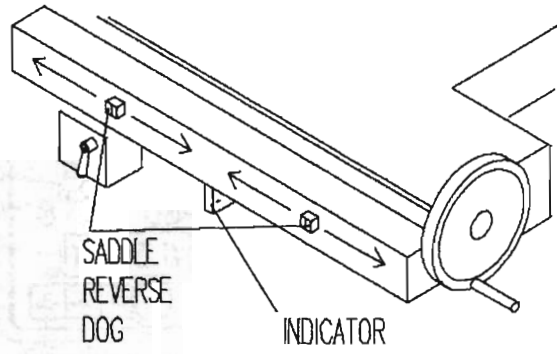
2.a. For a better finish (accuracy, flatness), it is essential for grinding wheel to grind over both ends of the workpiece on the cross movement. It's shown in fig (a). The proper extra distance is 1-5mm (3/64-3/16")for both ends.

2.b. The required cross feed travel is set up by moving the two saddle reverse dogs as shown in fig (b).

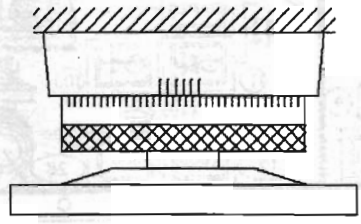
2.c. To operate cross feed manually, you must disable automatic feed first, then use the handwheel to feed the saddle (fig (c)). Automatic cross feed function is only available when hydraulic table is active.



(a)

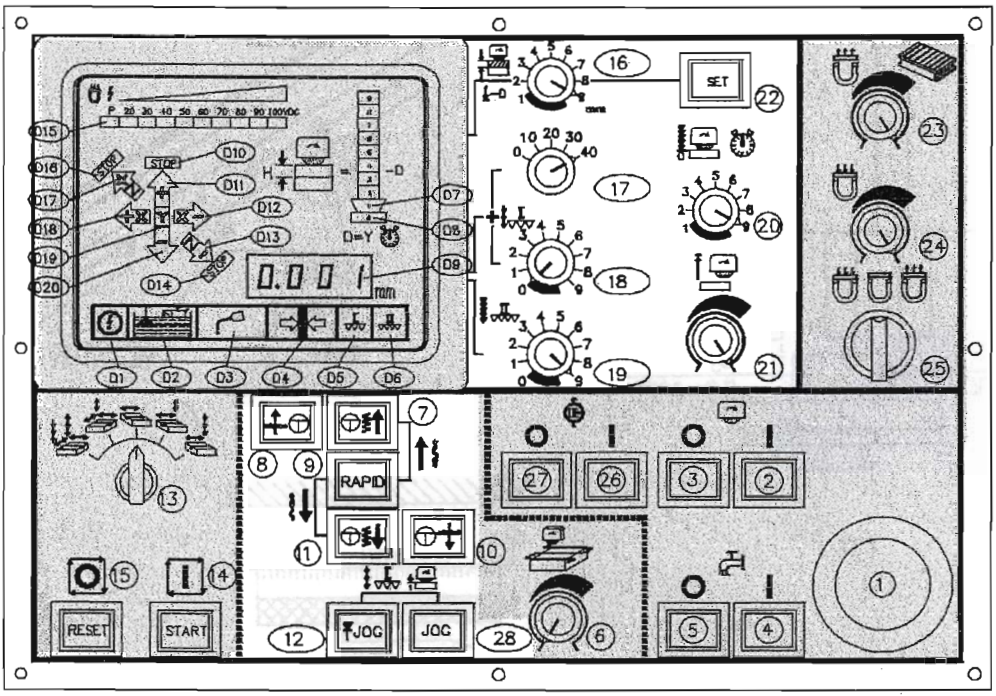


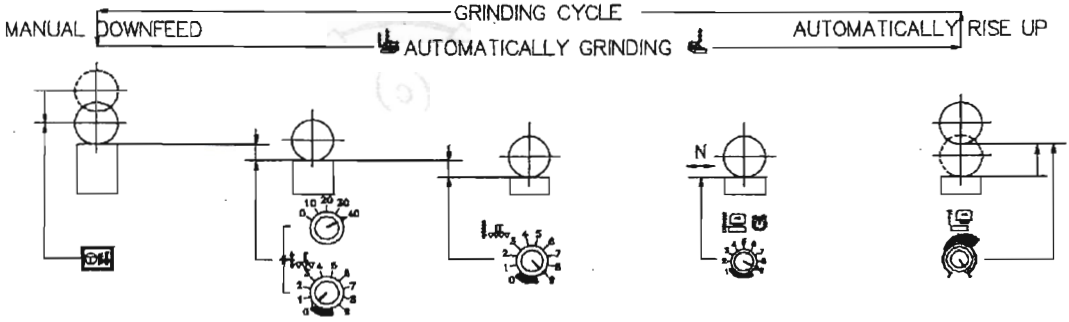
(b)



(c)

6.7.1 MODE SELECTING FOR AHD MODEL





(1) (2) (3) (4) (5)

(1)Manual slow downfeed to reach work-piece

1.If the distance is large, please push button(9)&(11) together for rapid downfeed.

* Grinding wheel will stop proceeding downfeed when the distance between wheel-head and work-piece is within 5mm(1/4").

2.If the distance is small, please push button(11)for slow downfeed.

You can also push (12)&(28) together while(14) button is lighted to get the downfeed value of D9 shown. Or you may push button(12) to get 0.001mm(0.00005")jogging movement.

(2)First section rough grinding downfeed increment .

Setting:0~40 μ m (0~0.0020") , is the value for (17)+(18). This is the downfeed increment for automatically grinding before starting finish grinding mode.

(3)Second section finish grinding downfeed increment setting:0~9 μ m(0~0.00045"). If you choose 0 position for (19), it will not activate finish grinding instead it will go rough

grinding only. The value for total finish grinding is not necessary to be set.
This function will activate when the value is 0.1mm(0.005") before spark-out.

(4)Spark-out for 1~9 times. When total increment is complete, lamp D8 will be lighted, and elevation dial ring will indicate for zero to zero. This is the time to start spark-out.

(5)Total cysle is complete and all functions stop, spindle rise up automatically(stepping motor rise up wheel head automatically, and you may adjust the time of rising up) after spark-out .

When cycle completed, table, grinding wheel, and coolant system will stop, and spindle will rise up automatically.

* At automatically surface grinding: Grinding wheel will stop at the forward or backward of the work-piece.
* At automatically plunge grinding: Grinding wheel will stop at the rightward or leftward of the work-piece.

6.7.2: VERTICAL FEED FOR AHD MODEL

1. Vertical feed is driven by stepping motor and AC motor. Stepping motor provides jog, slow feed, and auto downfeed functions, AC motor is for rapid up/down, and no stepping motor required.

2. Manual downfeed

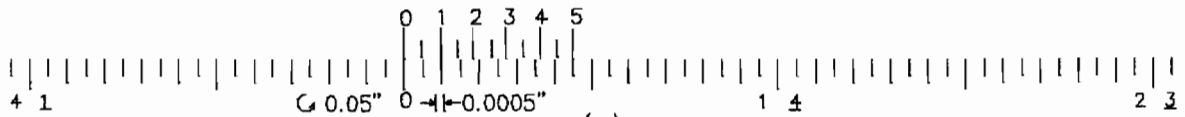
   a. To feed wheelhead by hand, push in handwheel and turn the handwheel to move wheelhead to the required position.

   b. Loosen locking wheel, and turn dial ring to zero-position as shown in fig(b). And lock locking wheel again. Then turn the handwheel to make zero-position of the indicator-ring points to required position. This is done to get downfeed increment.

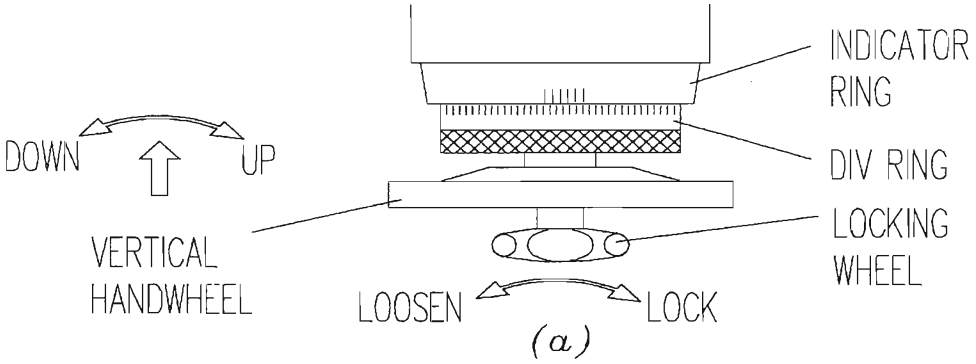
3. Auto downfeed

Mechanical zero-point cooperated with proximity switch, control gringing depth max 9mm(0.45").

(b)



(c)



EXAMPLE 1:

SET 0.45 mm(0.023") as the required grinding depth, you need to loosen locking wheel, and set grinding depth as shown in fig (b) & (c). Then turn clockwise to 0.45 mm(0.23") division(follow clockwisely ascendant reading sequence on dial ring), lock the locking wheel, and then select 1 mm on total downfeed increment by rotating selector switch(16) on AHD control panel, This is followed by pushing set (#22) push-button for confirmation.

EXAMPLE 2:

SET 1 mm(0.05")as required grinding depth. You need to follow the same procedures as mentioned in example 1, but turn the downfeed dial ring to zero-position, and select 1 mm(0.05")on the select button.

EXAMPLE 3:

SET 1.45 mm(0.73")as required grinding depth.You need to follow the same procedures as mentioned in example 1, but turn downfeed dial ring to zero-position, and turn anti-clockwise to 0.45 mm(0.023"), and then select 2mm(0.1') on select switch(16) on AHD control panel.

Required grinding depth	2mm(0.1")	2.45mm(0.12")	3mm(0.15")	3.45mm(0.17")	4.45mm(0.22")	5.45mm(0.27")	6.45mm(0.33")	7.45mm(0.37")	9mm(0.45")
Setting on dial ring	0	2.45mm(0.12")	0	0.45mm(0.023')	–	–	–	–	0
Setting on dial ring	2mm(0.1")	3mm(0.15")	3mm(0.15")	4mm(0.2")	5mm(0.25")	6mm(0.3")	7mm(0.35")	8mm(0.4")	9mm(0.45")

6.8 grinding wheel engaging/disengaging procedure

WARNING:

Isolate the machine before engaging or disengaging the wheel.

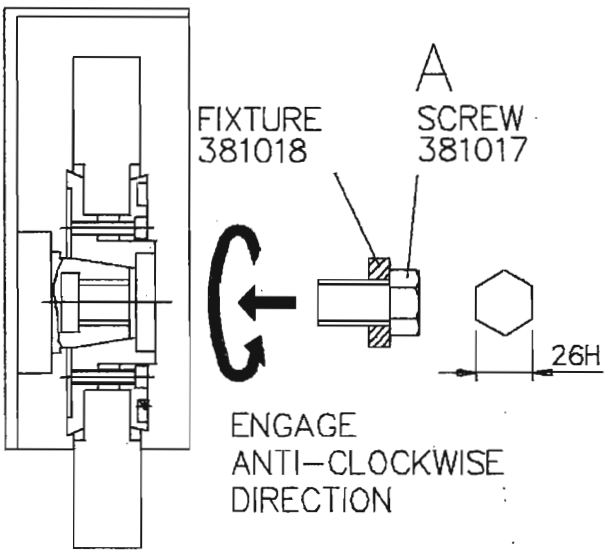
1. Engaging wheel and flange set

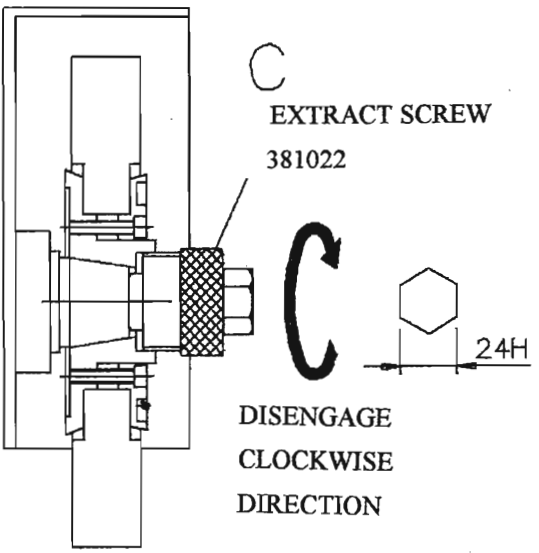
   Clean surface of spindle taper and inner taper of wheel flange, then put wheel & flange set on to spindle.

   Tighten up fixture screw A (anti-clockwise) to fasten wheel & flange on the spindle.

2. Disengaging wheel and flange set

   First, release fixture screw (A), then screw in extract screw (C) to draw out wheel & flange set from the spindle. Use open and wrench or hexagonal closed double head wrench or monkey wrench





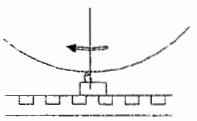
as tools.

6.9 : GRINDING WHEEL DRESSING PROCEDURE

a. Dress the wheel with diamond dresser when the wheel is loaded or when a poor surface finish is obtained.

b. The installation of a diamond dresser should be inclined it to an angle 5-10° from the wheel centerline. When the diamond bit becomes dull, you need to turn the diamond collar to the required angle, shown in the following drawing.

c. Due to the hardness or weakness of the diamond, please do not dress the wheel too deep at one time. The correct way to dress the wheel is to start dressing from the center of the wheel.



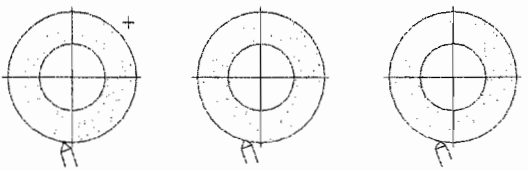
d. Recommended dressing speeds

F= d*N/2.5

F:crossfeed speed(mm/min)

D: grind diameter (4)

N: R.P.M.of the



grain size	10	12	14	16	20	-	24	30	36	46	54	60	70	80	90	100	120	-	150	180	220
grain diameter (mm)	2.0	1.7	1.4	1.2	1.0	0.8	0.7	0.6	0.5	0.3	0.3	0.25	0.2	0.17	0.14	0.12	0.10	0.08	0.07	0.06	0.05

Example: Grind wheel diameter 510 mm, grain size 60, velocity 2000mm/mm speed 124.8mm/min.(4.9 IPM)

d = 0.25 mm (grain size 60, refer to the table, d=0.25)

$N=1248 r.p.m (N=\frac{\text{velocity of wheel}}{3.1416 \times D})$

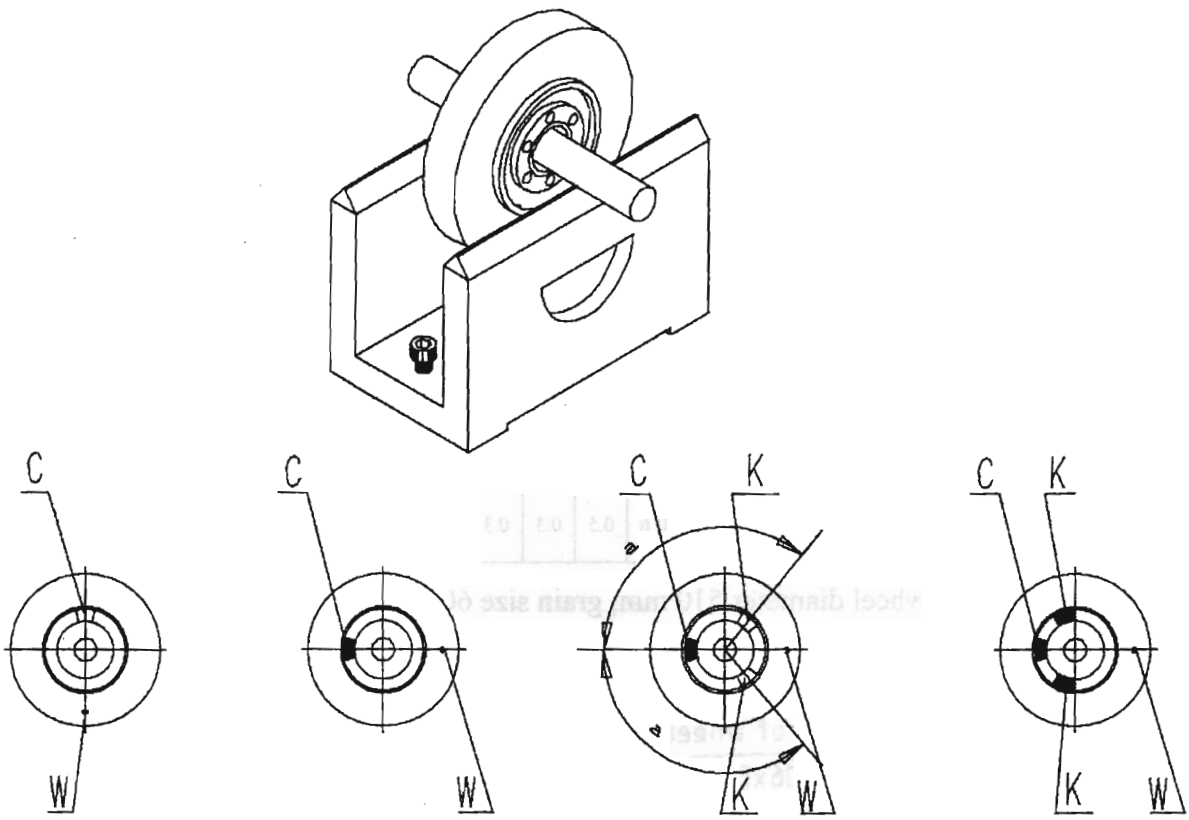
$(N=\frac{2000 \times 1000}{3.1416 \times 510})$

$F=\frac{dxn}{2.5}=\frac{0.25 \times 1248}{2.5}=124.8 mm/min (4.9 ipm)$

6.10 : BALANCING GRINDING WHEEL PROCEDURE

To obtain fine surface finish, the grinding wheel must be checked and rebalanced periodically. A standard and balanced grinding wheel is supplied with the grinder from the manufacturer. Please note the following procedures for balancing.

1. Let the wheel roll freely on the stand to find out where is it's gravity center "W" and mark it with a chalk.
2. Insert a balancing block on the opposite side "C" of "W", then rotate the wheel 90° to find out "W" or "C" position which one is heavier.
3. Insert additional balancing blocks on heavier side "K" which have the same argle from the "C" point.
4. Turn the wheel 90° to check the balance of the wheel. If it is still out of balance, re-adjust 2 blocks on "K" position until grinding wheel is really balanced. When grinding workpiece with different materials, change the wheel together with its flange to save time for balancing the wheel.



6.11 : Setting grinding wheel into flange.

(1) Choosing grinding wheel and using sound test.

To decide which grinding wheel is suitable for your production, please check the following:

a. Check to see if there's any crack, damage or notch in the wheel.

b. See if there's any label or paper on the wheel.

c. Check if there's anything between the flange and the wheel.

d. Check if the wheel had deformed.

To treat the wheel, if (b), (c) situations happen. Abandon the wheel if (a), (d) situations happen. Finally, the sound test, check to see if the wheel is good or not. Tap the wheel with wooden hammer, and listen there's any metal sound. Also rotate the wheel and tap it to listen if there's any different sound. Cracks within the wheel are revealed by the differece in sound.

(2) Wheel flange inspection

(a) Clean and check the flange.

Confirm the following points before using the flange.

a. Is the outer diameter of flange larger than the 1/3 outer diameter of wheel?

b. Is the material of flange made by steel alloy? Does it have been through the mechanical treatment? Is it balanced properly?

c. Is the outer diameter of flange the same as the inner diameter of the grinding wheel?

d. If you want to use other brand's flange, please confirm with us about the size and specification of the flange.

After confirming above conditions, please clean the flange as Fig 6.11.1. Check to see if there are parts such as balancing blocks, and locking bolts.

Confirm the pitch of locking bolt, bolt hole, contact area of flange, balancing slot, and taper hole. If there's any abnormal situation, please change the flange.

(b) Set the wheel into flange

Confirm if there are labels or papers on the wheels, and set the wheel into flange as Fig 6.11.2. Do not press the wheel into flange with too much force. Get rid of the burs on the wheel hole, so that you can put the wheel into flange smoothly.

(c) Set flange cover on top of the wheel.

Make sure not to damage the wheel while putting cover onto the flange. Confirm if you have aligned the position of bolts and bolt holes properly as FIG 6.11.3.

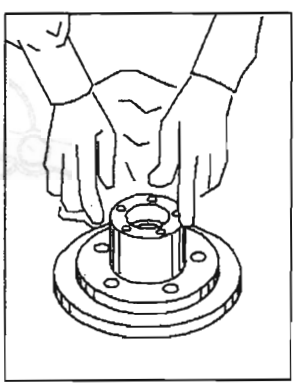


FIG 6.11.1

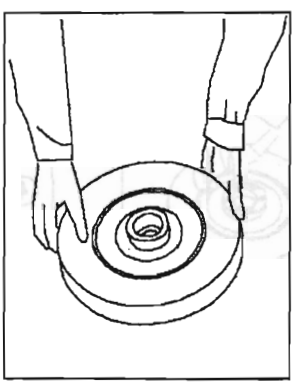


FIG 6.11.2

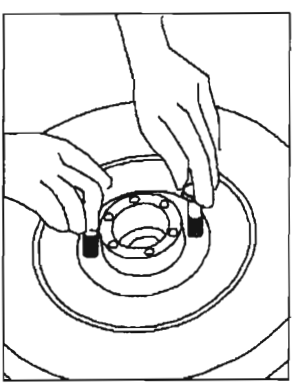


FIG 6.11.3

(d) Turn the sliding cover if holes are not aligned.

Please try to turn the flange cover (Drawing 6.11.4) to see if it can move smoothly. Also check if the cover is attached flatly, and if the clearance between cover and fixed flange is proper.

(e) Checking the gap between wheel and the flange.

Remove the flange cover, push the wheel to the side of the flange (FIG 6.11.5), and then use thickness gauge to test the gap between wheel and flange as shown on FIG 6.11.6.

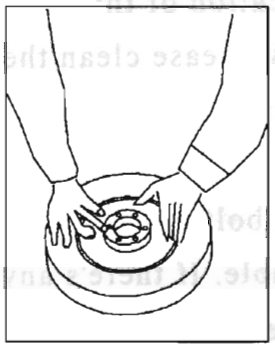


FIG.6.11.4

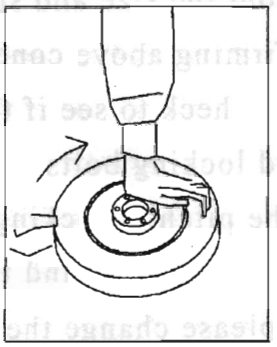


FIG.6.11.5

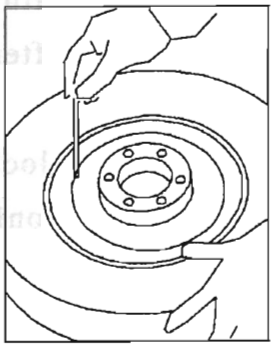


FIG.6.11.6

(f) Make sure the wheel and the flange have the same gap thickness at every angle.

Use ½ of the thickness gauge to correct install the position of the wheel. So that all the gaps between wheel and flange are the same. This will make the center of the wheel matches with the center the flange.

(g) lock the slightly in place.

Do as the FIG 6.11.7, install flange cover, put the locking bolts into the holes while they are algned. Then proceed as FIG6.11.8, use wrench to tighten the bolts a little bit. Please lock the bolts diagonally as shown on FIG 6.11.9.

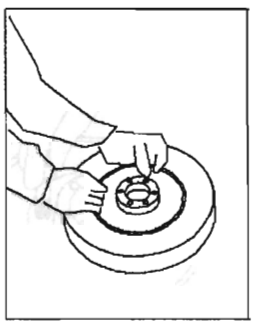


FIG.6.11.7

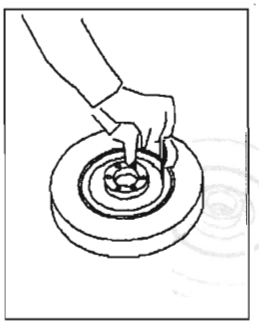


FIG.6.11.8

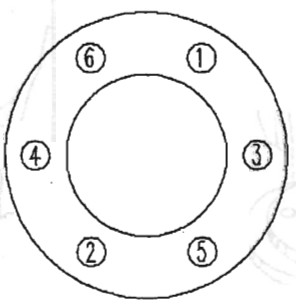


FIG.6.11.9

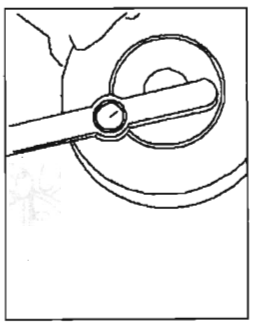


FIG.6.11.10

(h) Locking the bolts

Continue with FIG 6.11.10, use the torque wrench to lock the bolts tightly and evenly.

Lock the bolt to 2/3 tension in the first time, a little bit more in the second time, and finally lock them to the required tension in the third time.

The locking tension is calculated according to the bolt diameter, the bolt numbers, and the contact area between grinding wheel and flange $A_f(cm^2)$. Therefore, please calculate tension with the following formula:

$$Mo=\frac{0\cdot 2 \times d \times p \times A f}{n}$$

$P(Kg/cm^2)$ is the contact pressure between grinding wheel and flange. This will be changed according to the types, shapes, sizes of thewheel and the types of flange.

Wheel Size(D)	$P(Kg/cm^2)$
305 mm below	0.05 D
305 mm over	0.035D or 40 Kg/cm^2

We suggest the contact pressure on the chart or please contact the manufacturer to get the correct information .

The installation for wheel and wheel flange is complete now. Please practice it over and over again to be familiar with the procedure.

The key of this procedure is as follow:

1. Do not install flange in the wrong way as FIG 6.11.11.
2. Please check with chapter 6.11.(a) while the wheel is setting into the flange.
3. Usually there is a gap between wheel and wheel flange. While putting the wheel into flange, please adjust the gap circumferentially and make them even while locking the bolts.
4. Use lock torque wrench to lock the bolts to the tension step by step. Until finally the bolts are tighten evenly to the flange.

5. If the locking tension is too small, the wheel might slide when grinding. This will cause damage to the wheel.
6. If the locking tension is too big, as shown on FIG 6.11.12, the flange will deform, and making the wheel unable to be tightened. That is one of the reason to make the wheel broke.

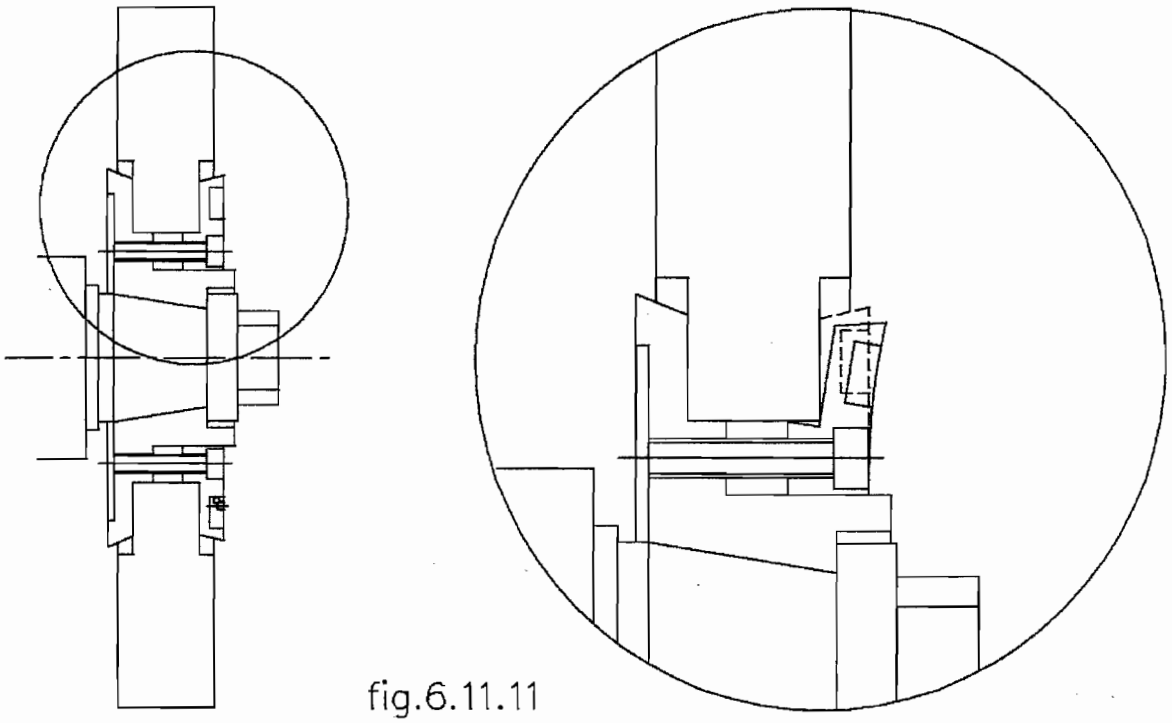


fig.6.11.11

7. The labels of wheels will become wet and loosen after pouring coolant for a period of time. So, please tighten the wheel again after 1-2 days of usage. If you don't do it, please remove the labels before wheel installation.

WARNING:

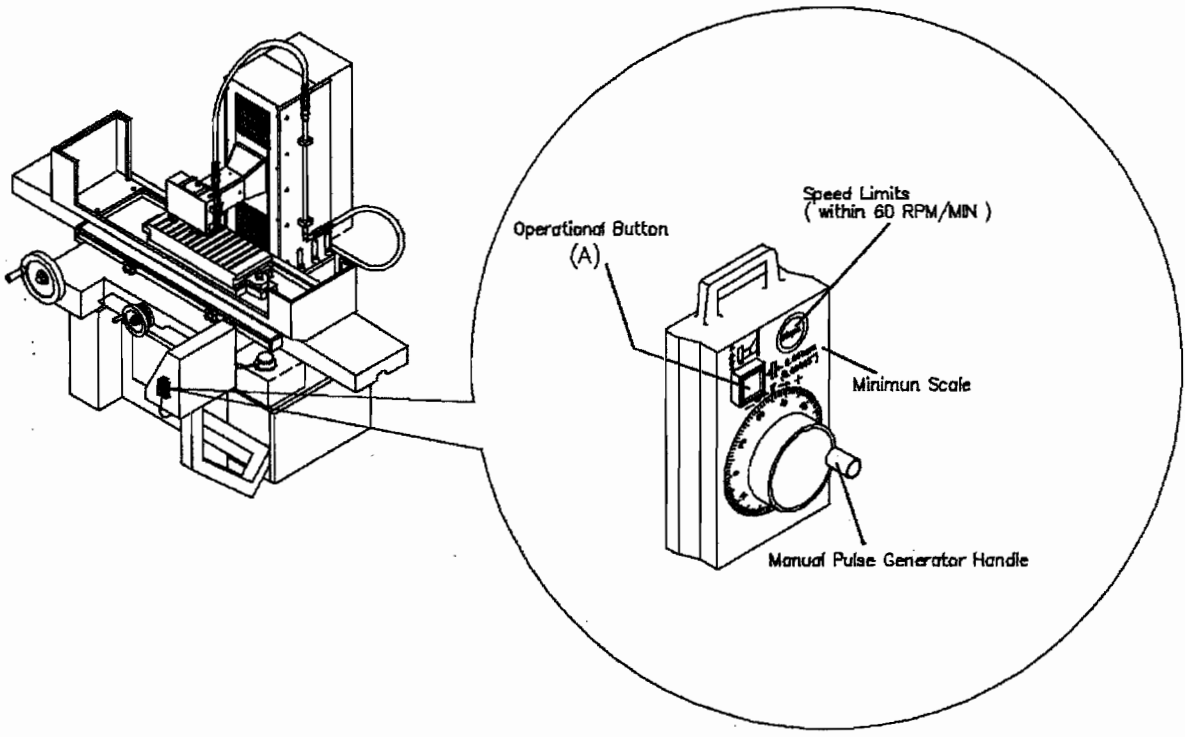
THE TWO SURFACES OF THE WHEEL HAVE TWO SHEETS OF ABSORBENT PAPER. THEY ARE USED AS A FLEXIBLE PAD BETWEEN THE WHEEL AND FLANGE.

6.12: MANUAL PULSE GENERATOR FOR VERTICAL MOVEMENT

(SPECIAL ACCESSORIES, FOR AHD SERIES)

Push "A" engage manual pulse generator. Wheel head will go up and down by turning manual pulse generator.

※ The maximun speed is 60 RPM/MIN.



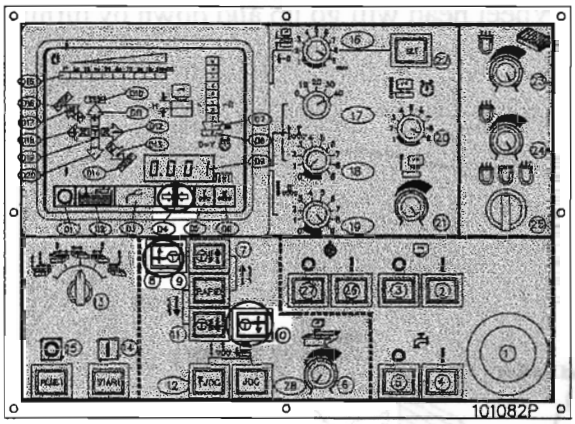
MANUAL PULSE GENERATOR :

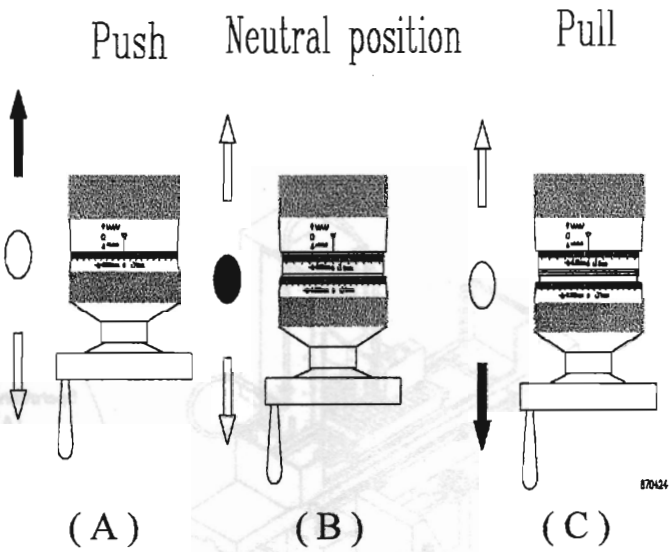
1. To turn clockwise, wheel head will go up.
2. To turn counterclockwise, wheel head will go down.
3. Every graduation is 0.001mm or 0.00005".

Note:Must be installed in factory !

6.13 MICRO CROSSFEED CONTROL

(SPECIAL ACCESSORIES FOR CROSSFEED SYSTEM)





HOW TO OPERATE THE MICRO CROSSFEED SYSTEM

When the light of (D4) is on, it represents crossfeed is in locked mode. At this time, it could be controlled manual .

When the light of (D4) is off, it represents crossfeed normal mode. At this time, it could function automatically or rapidly.

The three modes of micro crossfeed control.

(1) Push handwheel inward to engage (figure A). At this position, we can use manual micro crossfeed.

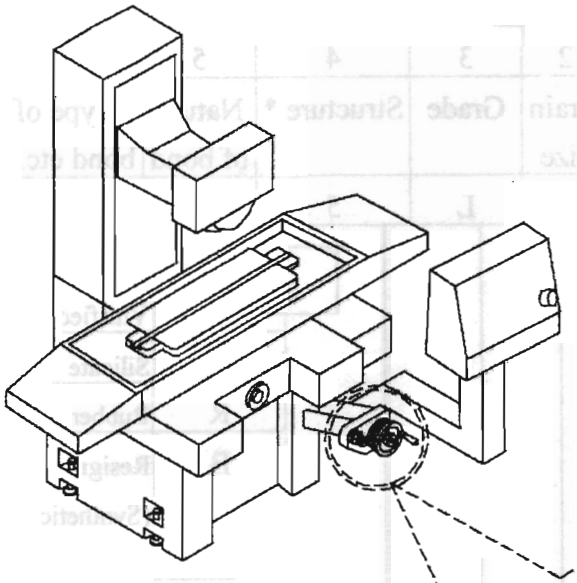
(2) Pull handwheel outward to neutral position (figuer B). At this position, we can use automatic or rapid movement.

(3) Pull handwheel outward to out-most position (figure C). At this position, we can do standard manual control .

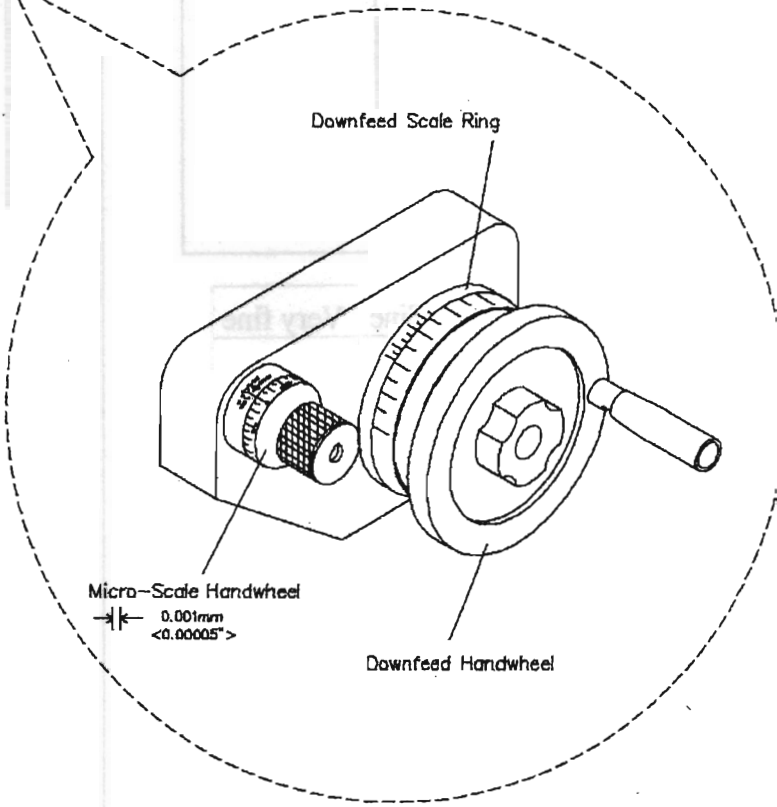
Note:Must be installed in factory!

6.14 HOW TO OPERATE THE MICRO DOWNFEED SYSTEM (SPECIAL ACCESSORIES, FOR DOWNFEED SYSTEM)

Note:Must be installed in factory



Micro Downfeed Device Contour



CHAPTER 7

CHOOSING AND STORING GRINDING WHEEL

.1 Standard wheel markings

Order of marking	0	1	2	3	4	5	6
	Type of abrasive *	Nature of abrasive	Grain size	Grade	Structure *	Nature of bond	Type of bond etc. *
Example	51	A	36	L	5	V	23

Aluminum abrasives	A
Silicon carbide abrasives	C

V	Vitrified
S	Silicate
R	Rubber
B	Resigned (Synthetic resins)
BF	Resigned (Synthetic resins) Reinforced
E	Shellac
Mg	Magnesia

Coarse	Medium	Fine	Very fine
8	30	70	220
10	36	80	240
12	46	90	280
14	54	100	320
16	60	120	400
20		150	500
24		180	600

Spacing from the closest to the most open	
0	8
1	9
2	10
3	11
4	12
5	13
6	14
7	Etc.

Soft												Medium												Hard	
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

* Optional symbols

The symbols 0 ~ 6 are the manufacture's own specification.

7.2 : Recommended list of grinding wheel

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

The above chart is only for your reference only. Please consult with the wheel producer to know the exact specification, which is more precise and true.

7.3 : Storing the grinding wheel:

1. The way to store the grinding wheels:

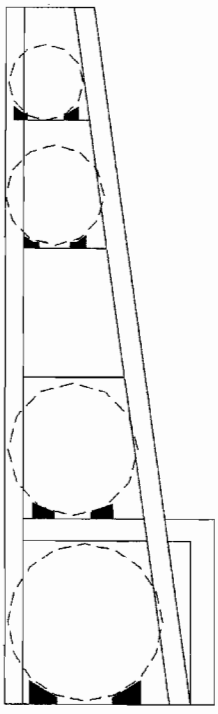
(a) Put the big, heavy wheel on the lower part of the wheel shelf, and the small, light ones on the higher part. Be careful not to let the wheel roll out of the shelf. Please put a block on the shelf to stop the wheels from rolling out.

(b) Use a board to block the wheels from falling down when putting the wheel vertically.

(c) Please confirm with the wheel company if you want to pile the wheel horizontally.

a) Put the absorbent paper between the wheels if you need to piling Them horizontally.

b) Confirm with the wheel manufacturer to see how high can the wheel be stacked.



2. The place to store the wheel

It is necessary that you put the wheels in the place where temperature changes very little, and not very humid. Meanwhile, please use up old wheels first to keep the storage not time short. It is essential to follow the rules below for storing the wheels.

*Do not roll the wheel.

*Do not throw the wheel.

*Do not hit the wheel.

7.4 Sound that test of wheel

The points you should notice about testing the wheel:

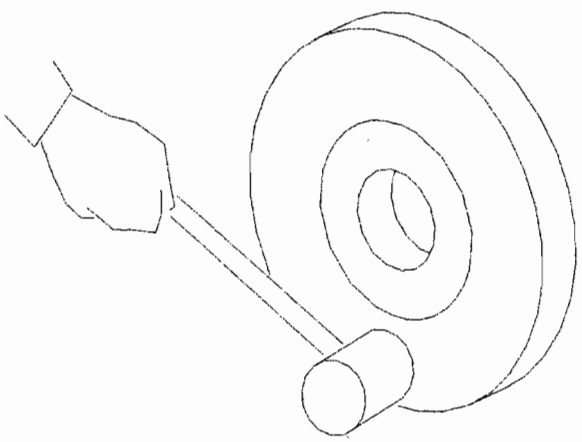
Sound test:

It is very important to check if there are any damages or cracks on the wheels. To do the test, please support the wheel with fingers or sticks, any you should use wooden hammer or handle of screw driver to tap the wheel.The area for tapping is from the outer diameter of the wheel in about 20mm to 50mm. It should be dull sound coming out of the wheel if there's any crack in it.

The key of sound test is as follow:

(1) Use wooden hammer or handle of screw driver as the tool.

(2) The hitting point should be the same as the drawing showed. They are located in the left and right declination 45° part, and 20 mm to 50 mm from the outer diameter of the grinding wheel.



(3) Please check all around the wheel about the cracks.

(4) The wheel should sound metallic if there's no cracks in the wheel. And it would sound very dull if there's cracks in the wheel.

(5) The resin type wheel would sound a little duller if there's cracks inside.

(6) There will be no difference in sound everywhere if there's no cracks inside.

(7) The wheel have abnormal sound if the inner sleeve is loosen or the wheel is damp.

(8) The wheel might become defective or damaged if you tap the wheel too hard. Therefore, please tap the wheel with your smallest force. After confirming there's no cracks in the wheel, you may put the wheels onto the wheel shelf. During the transportation of the wheels, please make sure not to drop or hit the wheel to keep the wheel from damaging. Also please don't roll the big wheel on the ground. You should use carriage to transport them. Since the wheels are easily damaged if they are piled; therefore, you are better off to add wavy thick papers between them and gather them vertically.

7.5 : Choosing the correct wheel by knowing the wheel speed (D: 355 mm)

Make sure the peripheral speed of wheel is bigger than the rotation speed of standard spindle (this machine is 1740 rpm/60 HZ) before choosing this grinding wheel.

$$S = \frac{\pi \times D(mm) \times rpm}{1000}$$

where: S: wheel peripheral

Take the specification of this machine for example, D = 355 mm, rotation speed = 1740 rpm (while 60 HZ), the wheel speed is:

$$S = \frac{\pi \times 355(mm) \times 1740}{1000} = 1940M/min$$

Wheel peripheral speed should be more than 2000m/min even with this machine (if 60 HZ).

WHEN	NO	POINTS	METHOD	MAINTENANCE METHOD
AFTER OPERATION	1	The lubrication oil level.	View	Above the lower limit of oil gauge.
	2	Position of every switches.	View	In the position of "off".
	3	Spindle wheel	View	No damages, 3 cm away from the workpiece.
	4	Hydraulic oil level	View	Above the lower limit indicator.
	5	Coolant water level .	View	Above the lower limit indicator.
	6	Clean every parts of the machine.	View	Turn off the power, clean the table --.
	7	Position of main power.	View	On the position of "off".

REMARK: If there's any abnormal signs during operation, please stop and check immediately.

8.2 Monthly maintenance

AREA	Key point	REMARKS
APPEA-RANCE	(1) Is the wheel balanced? (2) Is there any rust or damage on the spindle taper? (3) Is the electric wire complete? (4) Is there any rust or damage in the guide-way? (5) Is there any consumption or shortage for the oil seal or oil wiper sheet? (6) Is there any bending or loosen part on the cylinder and grinding wheel guard? (7) Is there any rust or damage on the flange?	If the wire protector (3) had broken, please check inside. Check if oil wiper sheet (5) had some spots? * Make sure (6) wheel guard isn't loosen. * If (8) had any bulgy part on table or chuck, please re-grind evenly.
	(8) Is there any bulgy part on the surface of the table or magnetic chuck?	
	(9) Are the warning labels or other labels clear?	

ELECTRIC PARTS	(1) Is the cover of switch complete? (2) Is there coolant water or dust inside the electric box? (3) Is the connectors of the switches damaged? (4) Are there specified fuses in the control box? (5) Is ground copper bar installed? (when the power line does not use PE line). (6) Is the insulation of motor or wire become degradated? (7) Are the connecting wires loosen? (including grounding wires). (8) Are there fuses burned out? (9) Are all the switches normal? Is limit switch normal? (10) Is every lamp normal? (11) Is there any abnormal sign with the electric current meter & volt meter? (12) Is there any abnormal sound or heat on motor? (13) Is the magnetic chuck normal? (14) Will the lamp be lighted?	* Please check item (1) to (8) with power off. * If item (3) damaged slightly, please grind gently. * Write down the capacity of fuses in the electric box while checking item (4). * Make sure the resistance of copper bar is under 100 ohms in item (5). * Every terminators in item (6) should take ohms value test to know the insulation value, which is usually over 1 M ohms . * The loosen connecting wires of item (7) are usually the reason for the machine to become exothermic. * Switches contain push bottons, limit switchs and proximity switches in item (9). * Check item (13) by the demagnetized device.

LUBRICATING OIL AND HYDRAULIC SYSTEM	(1) Does the lubrication oil tank contain enough oil? (2) Does lubrication oil become degraded? (3) Is the oil supply enough for the place that should be lubricated ? (4) Is the lubrication oil condition good for the slide-way and screws? (5) Is the oil inlet blocked? (6) Does the hydraulic oil tank contain enough oil? (7) Is the hydraulic oil changed regularly? (8) Is the pressure of hydraulic oil normal? (9) Is the needle pointer of pressure gauge vibrating abnormally? (10) Does the oil leak from the joinings of oil tubes ? (11) Does it block in the filter? (12) Does the oil leak from the hydraulic oil tank? (13) Does the solenoid have abnormal sound, or is vibrating, or is heated? (14) Do you change the coolant regularly? Does it degrade?	* Check the place of oil inlet in item (1), where there are suitable oil, designated volume of oil, & the time for replacement. Also please check the oil gauge. * Notice the oil color from oil tank. * Check the oil gauge to see if the lubrication oil is flowing normally? * Notice the decrement situation of item (5) from the lubrication oil inlet. Check item (6), (7) and write down suitable and volume of oil, also the time to replace. * Check if there is any strange sound or vibration near the pump.

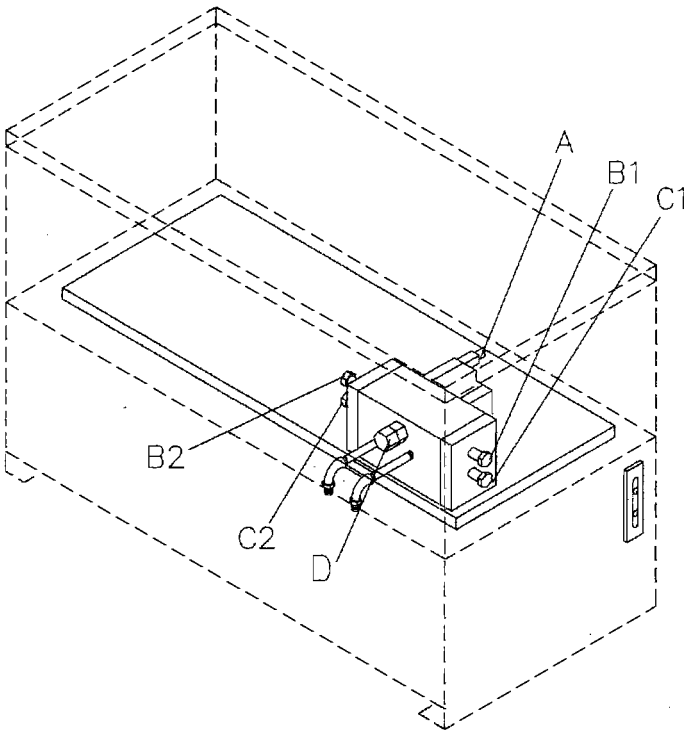
8.3 : HYDRAULIC OIL PRESSURE ADJUSTMENT

Parts Name:

A: Oil pressure adjusting valve

B1, B2: Table reversing pressure adjustment valve for single side (speed-up time).

C1, C2 : Valve to adjust the length of table transverse (braking distance).



D: Table reversing pressure adjustment valve (effect both sides together).

1. "A"valve is properly-adjusted before shipment. Unless it is necessary, please don't re-adjust this valve. To increase the pressure, screw in clockwise ;To decrease the pressure, screw counter clockwise.

   Table speed limit: 25 meters/per minute (power supply: 60 Hz)

   20 meters/per minute (power supply: 50Hz)

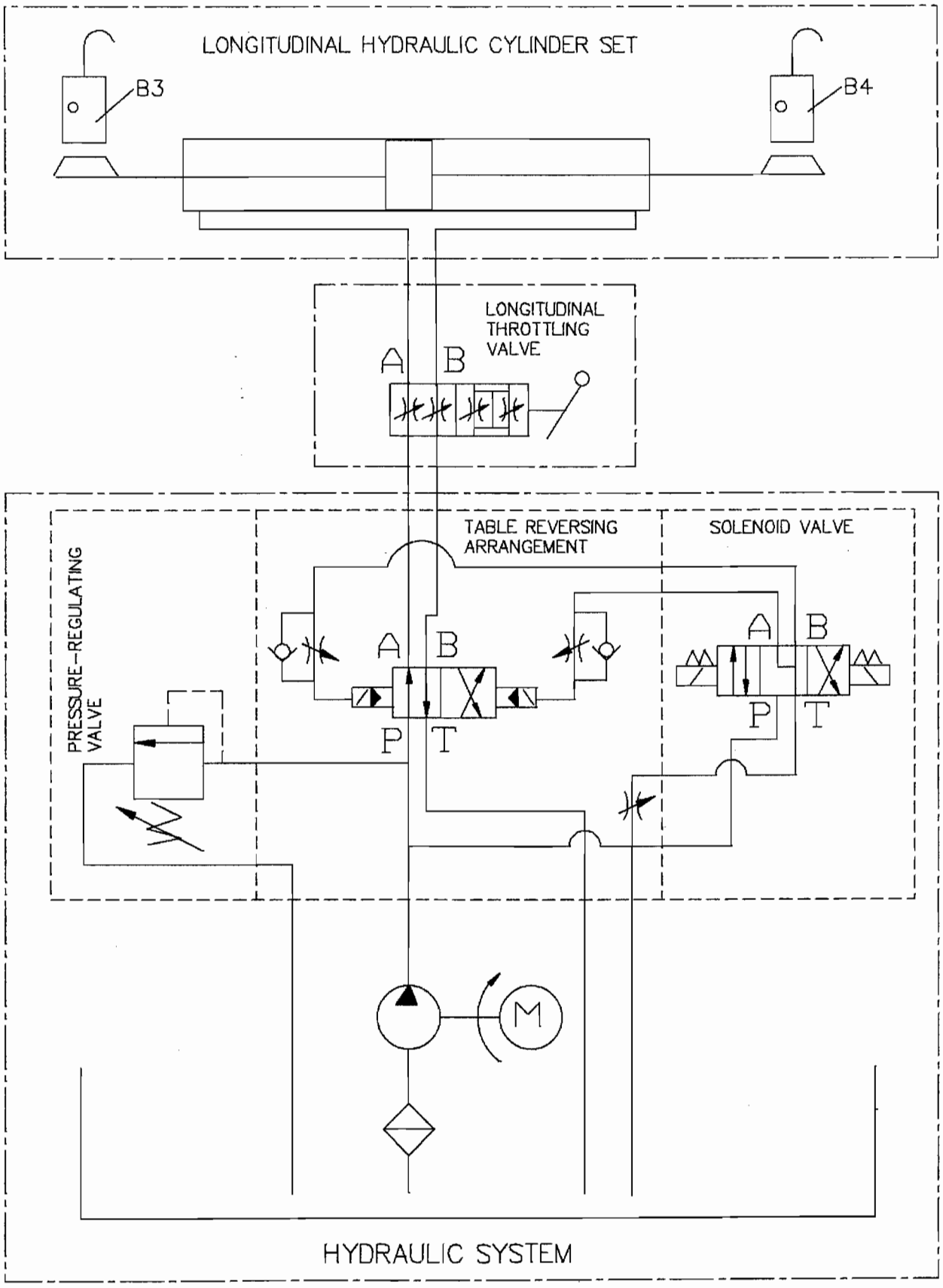
2. B1, B2 valve, use these valves to adjust the same reversing pressure at table-reversing action. This is to ensure smooth table movement. Please note that, not to adjust any of the two valves unless there is obvious difference occurs on reversing speed.

3. C1, C2 valves are the adjustment for braking length of table transverse. Only when the length of both sides are different, then it's necessary to adjust them. To adjust, clockwisely will shorten the distance; to adjust, counter-clockwisely will increase the distance. We've adjusted the distance within 35 ~ 65mm in factory.

4. D valve is to adjust the impulse force. This valve should only be adjusted when all other valves are adjusted . To adjust D valve,

clockwisely will make the impulse force smaller; to adjust counter-clockwisely will make the force larger. Please note, to adjust D valve will affect the impulse force immediately.

8.4 : PIPING OF HYDRAULIC SYSTEM



8.5 : TROUBLE SHOOTINGS WHEN GRINDING WORKPIECE

PROBLEM	CAUSE	REMEDY
Frequent wave on the surface of the work-piece	Vibration of the machine.	1. Check the level of the machine and the sturdiness of the floor. 2. Check the spindle.
	Grinding wheel is unbalanced.	1. Dress the wheel again. 2. Balance the wheel.
	Wheel is too hard.	1. Use a softer wheel. 2. Use a rougher wheel. 3. Reduce the feed rate.
Minor scratch on the surface	Improper operation	1. Dress the wheel. And make sure that the wheel is parallel with work piece. if not, adjust the parallel dresser. 2. Slow the crossfeed rate. 3. Block in the work piece to prevent from slipping.
	Improper dressing of the wheel.	1. Slow the dressing speed. 2. Tighten the dresser well. 3. Use the proper dressing speed. 4. Don't dress too deep at a time.
Burning spots and cracks	Improper operation	1. Reduce the feeding amount. 2. Use the proper crossfeed speed.
	Improper heat Treatment.	Re-heat treated
	Unsuitable grinding wheel	1.Dress the wheel finely and frequently. 2.Use a softer and rougher wheel.
Poor grinding ability, and wheel clogs and workpiece shown burn	Wheel is too hard	1. Increase the table speed and crossfeed speed. 2. Slow the wheel revolution speed, (reduce the wheel diameter or width). 3. Use a sharper diamond to dress the wheel. 4. Chose a rougher wheel.
Wheel dulls and the grit talks off	Wheel is too soft	1. Reduce the table speed and crossfeed speed. 2. Increase the wheel revolution speed. or enlarge the wheel diameter, if it's possible. 3. Dress the wheel grit and . Slow down the dressing speed.

CE. MACHINERY DIRECTIVE 89/392/EEC ELECTRICAL MANUAL

PRESERVE THIS MANUAL FOR FUTURE REFERENCE AND USE.

MACHINE NAME: HORIZONTAL SURFACE GRINDING MACHINE

MODEL: SUPRA-1428AHD

SUPRA-1632AHD

SUPRA-1640AHD

CHAPTER 1:

1.1:DESIGN REQUIREMENT OF ELECTRICAL SYSTEM

Requirement of the electricity

(1) Voltage: 3 Phases, AC voltage which is decided by customers,
rated voltage: 0.9--1.1.

(2) Frequency: 50/60 HZ, 0.99--1.01 rated frequency.

(3) Voltage for electromagnetic steel: MAX. DC 110V

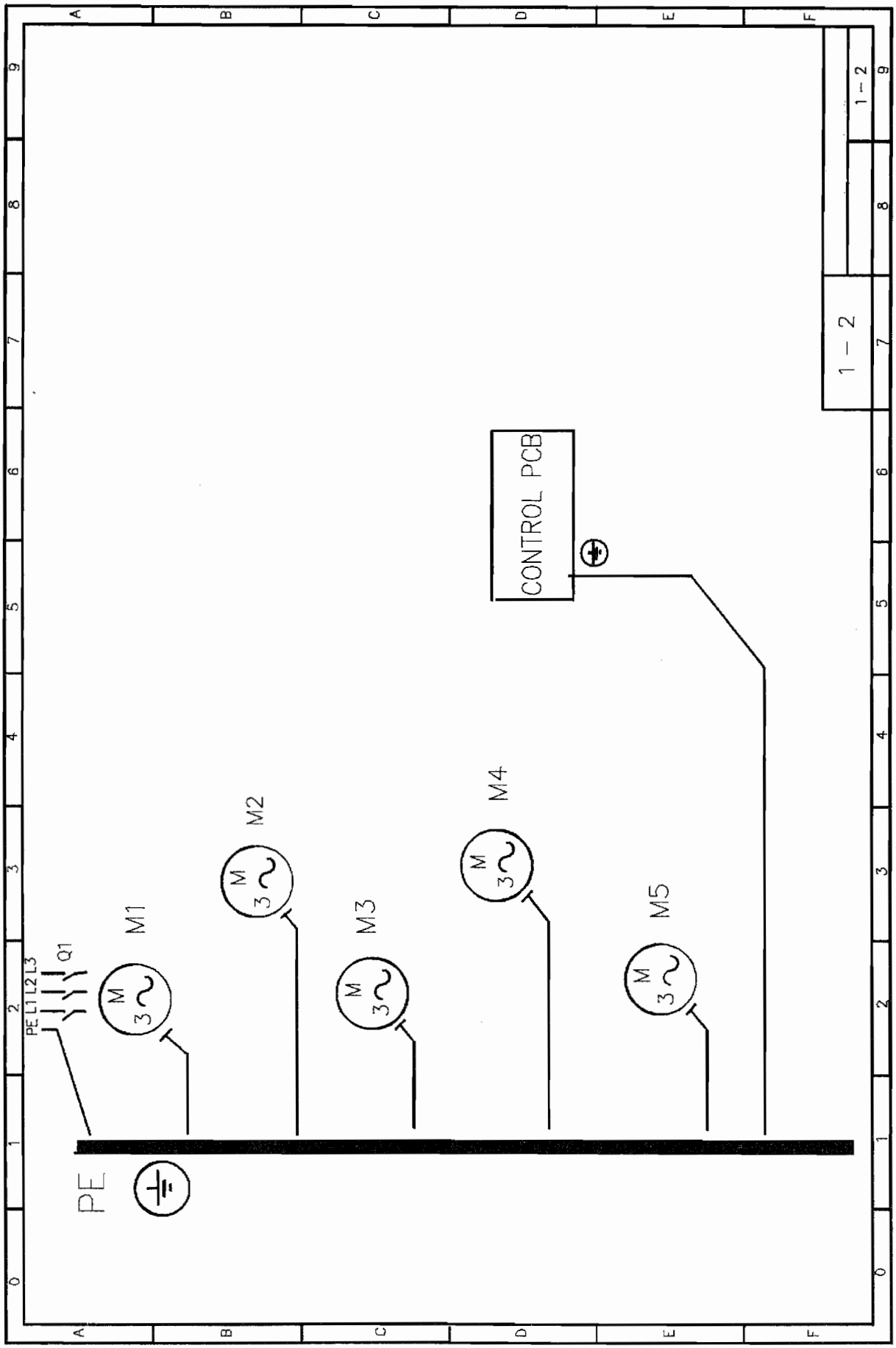
(4) Electricity consumption:10.5KVA

(5) Connected wire: 3.5㎜²(L1, L2, L3, PE).

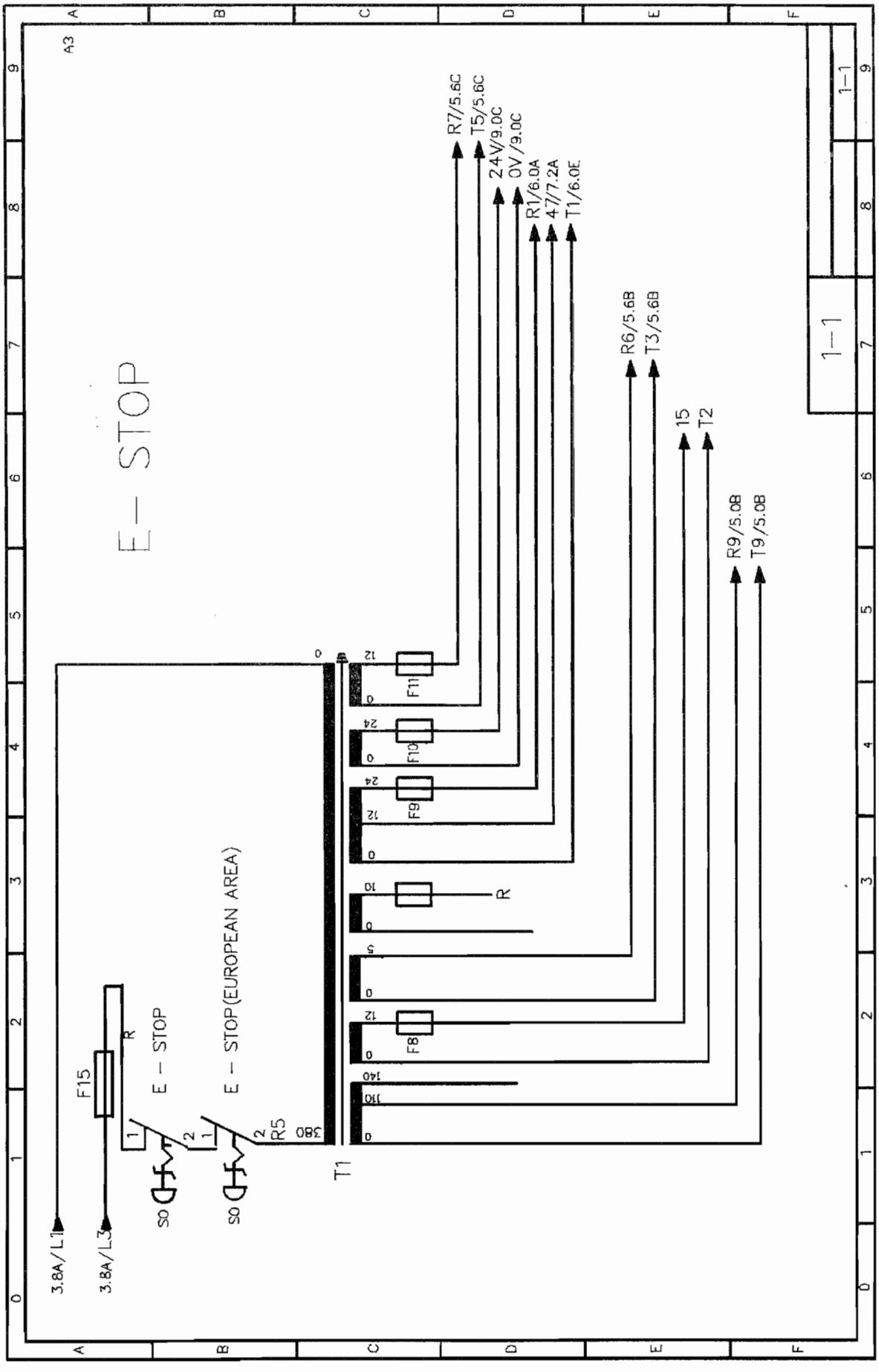
WARNING:

Please do not connect PE terminal if there's neutral line in the electric power line. If the power line have no PE line, please set another grounded copper bar, and the electric resistance should be lower than 100 OHMS .

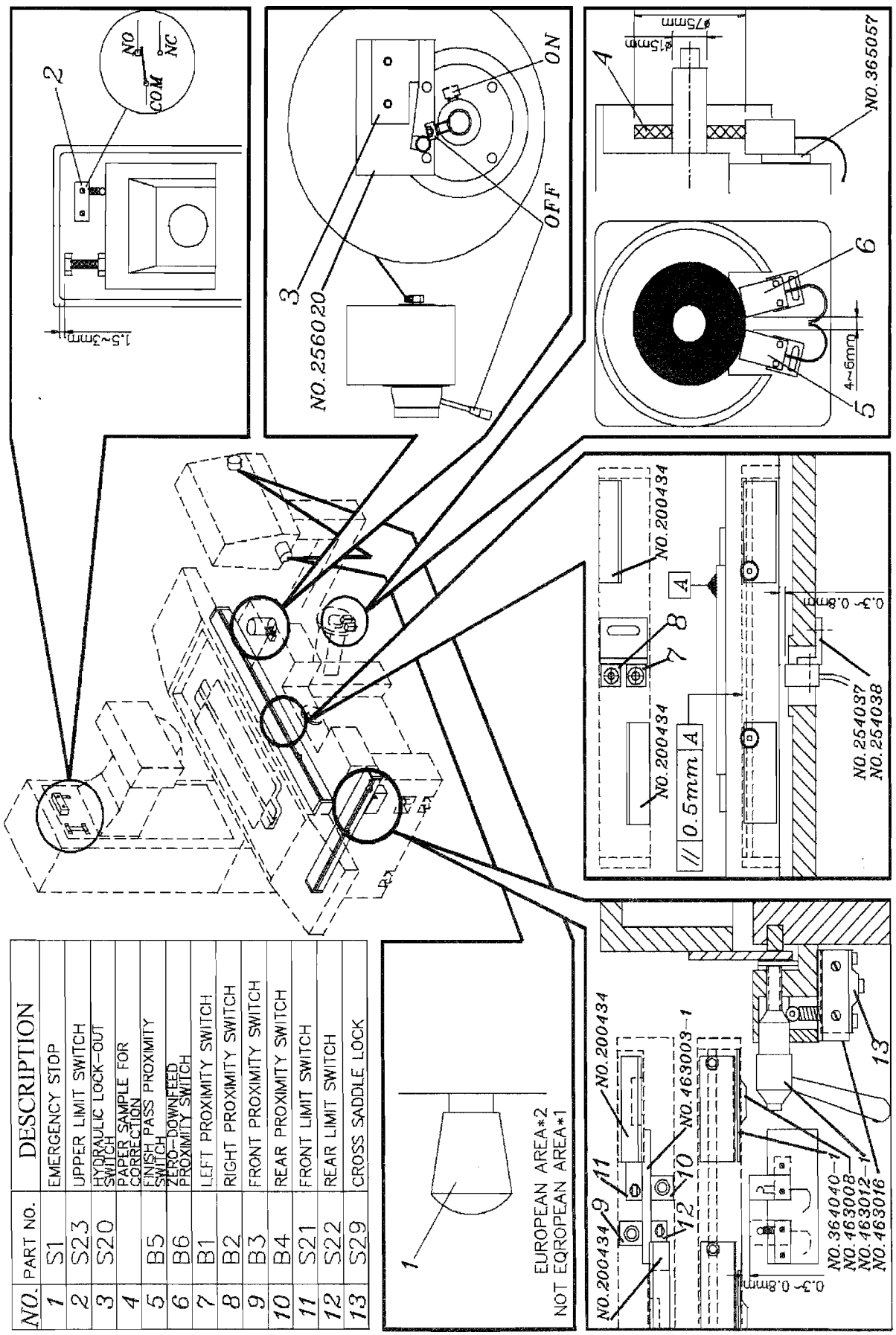
1.2: GROUNDING SYSTEM DIAGRAM.



1.3: EMERGENCY STOP DIAGRAM.



1.4: LIMIT (OR PROXIMITY) SWITCHES LAYOUT



NO.	PART NO.	DESCRIPTION
1	S1	EMERGENCY STOP
2	S23	UPPER LIMIT SWITCH
3	S20	HYDRAULIC LOCK-OUT SWITCH
4		PAPER SAMPLE FOR CORRECTION
5	B5	FINISH PASS PROXIMITY SWITCH
6	B6	ZERO-DOWNFEED PROXIMITY SWITCH
7	B1	LEFT PROXIMITY SWITCH
8	B2	RIGHT PROXIMITY SWITCH
9	B3	FRONT PROXIMITY SWITCH
10	B4	REAR PROXIMITY SWITCH
11	S21	FRONT LIMIT SWITCH
12	S22	REAR LIMIT SWITCH
13	S29	CROSS SADDLE LOCK

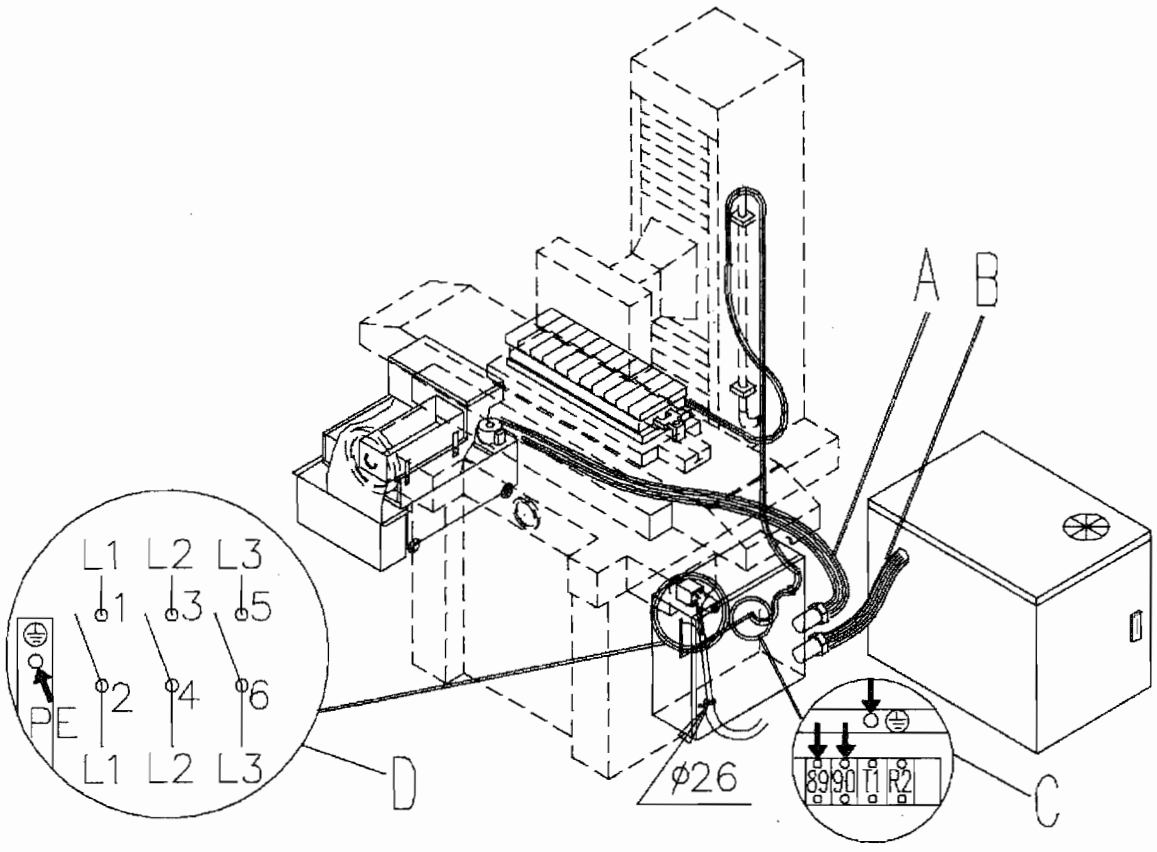
1.5:CONNECTING MAIN POWER SUPPLY

WHERE: A is a coolant system cable.

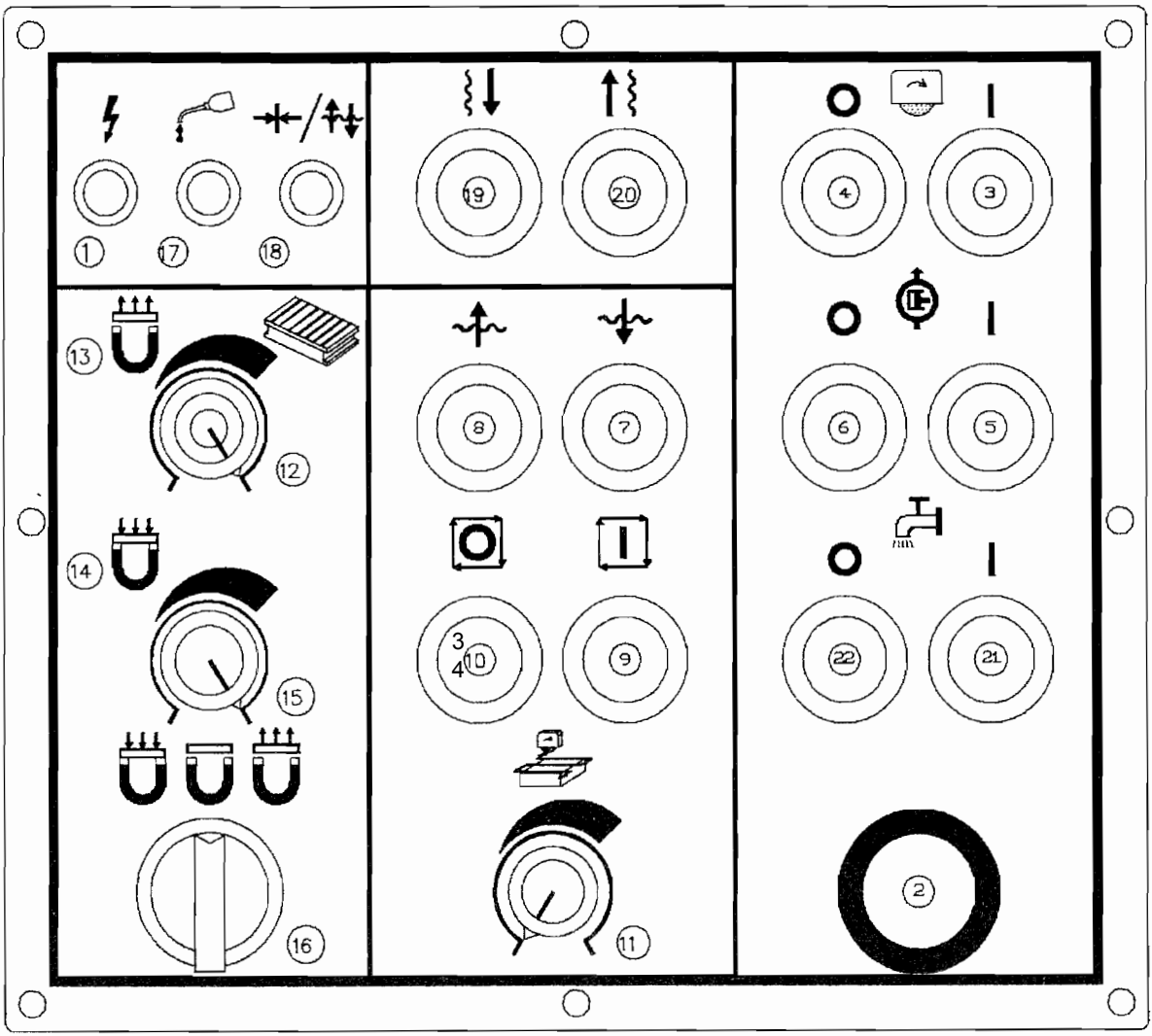
B is a hydraulic system cable.

C is a magnectic chuck terminal.

D is a power supply terminal.



1.6 :Control panel FOR 3A Series

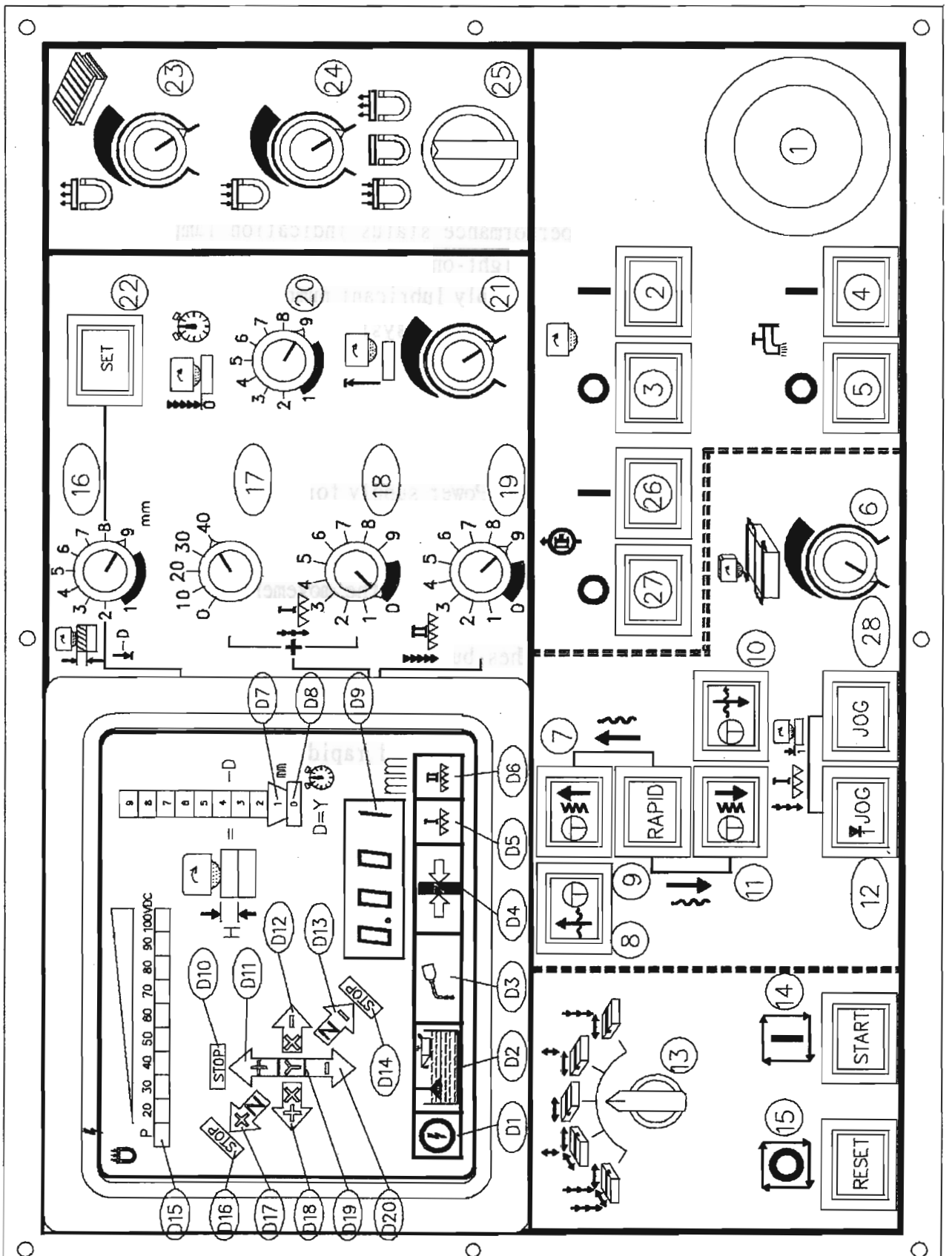


1.6.1:Description of 3A control panels (Operation instruction)

NO.	PART NO.	SYMBOLIC DEFINITION	DESCRIPTION
1.	C72-LED-R	Power Indication Lamp	To indicate power is on or off.
2.	C23-25R1B	Emergency stops button.	To stop all motors and functions.
3.	C36-G	Spindle (wheel-head)start button	To start the spindle.
4.	C36-R	Spindle (wheel-head) stops button	To stop the spindle
5.	C36-G	Hydraulic start button	To start the hydraulic system
6.	C36-250G24V	Hydraulic stops buttons	To stop the hydraulic system
7.	C101-PW2A	Rapid outward button	To change to the outward direction (available in auto crossfeed mode)
8.	C101-PW2A	Rapid inward button	To change to the inward direction (available in auto crossfeed mode)
9.	C30	Start button	To confirmed the working mode selection.
10.	C36-R	Reset button	To cancel the working mode selection confirmed by start button.
11.	C79-VR1A	Variable step increment of crossfeed selector switch	To select required step increment of crossfeed in auto mode.
12.	C99-VR500RB	Demagnetizing time adjust switch	To adjust demagnetizing time. Larger work-pieces, and high carbon containing work-pieces like tool steel,SKD,SKH,SKS,SCM,SNCM,etc.take longer time to demagnetizing.
13.	C72-LED-G	Demagnetizing indication lamp	To indicate the function of demagnetizing power adjust switch is working.
14.	C72-LED-R	Magnetizing indication lamp	To indicate the function of magnetizing power adjust switch is working.
15.	C99-VR50KB	Magnetizing power adjust switch	To adjust magnetizing power of chuck.

16. C93 Magnetizing/demagnetizing selector switch
    (a) On position: To magnetizing, use power-adjust-switch (14) to adjust power of magnetizing.
    (b) Middle position: To stop chuck functions and the hydraulic system.
    (c) OFF position: To demagnetize, use time-adjust-switch (12) to adjust time of demagnetizing.
17. C72-LED_G Lubricant performance status indication lamp
    Light-on represents normal lubricant oil supply lubricant pump is activated by starting hydraulic system)
    Light off could be caused by:
    1. Lubricant pump is not started.
    2. Oil filter is blocked.
    3. Oil pressure is not enough.
    4. Power supply for lubricant pump is cut off.
    5. Lubricant pump is out of order.
18. C72-LED-R Crossfeed locked indication lamp
    To indicate the movement of crossfeed is not able.
19. C101-PW2A Rapid down pushes button
    To go downward rapidly.
20. C010-PW2A Rapid up pushes button
    To go upward rapidly.
21. C36-G Coolant pump start button
    To start the coolant system.
22. C36-R Coolant pump stop button
    To stop the coolant system.

.7: CONTROL PANEL LAYOUT FOR AHD (in metric) SERIES



1.7.1 Description of control panel for AHD series (Operation instruction)

NO.	ELECTRICAL CODE NO.	P/N	SYMBOLIC DEFINITION DESCRIPTION
1	S0	C25-22R1B	Emergency stop button To stop all motors and functions.
2	S1	C20-161A1BG1	Spindle (wheel-head) start push button To start the spindle (wheel head).
3	S2	C20-161A1BR1	Spindle (wheel-head) stop push button To stop the spindle (wheel head).
4	S6E	C20-161B1BG1	Coolant pump start button To start the coolant system.
5	S7E	C20-161B1BR1	Coolant pump stop button To stop the coolant system.
6	R2	C79-VR105A	Variable step increment of crossfeed selector switch To select required step increment of crossfeed in auto mode.
7	S15E	C19-162A2BW1	Wheel-head slow up button (a) Slow up movement activated by button (7). (b) Rapid up movement activated by button (7) and (9) – Push the two buttons together. * Available only in manual surface/plunge modes selector switch (13).
8	S16E	C20-161A1BW1	Rapid inward crossfeed movement button (a) To move saddle inward, available only in manual surface mode (by switch (13)) and light of reset button (15) is on . (b) To toggle outward crossfeed movement to inward, available only in auto/manual surface modes and when light of start button (14) is on.
9	S17E	C19-162A2BW2	Rapid up/down confirm push button (a) Push (9) and (7) together to get rapid up movement, push (9) and (11)together to get rapid down movement. * Push (9) only will get no movement.
10	S4E	C19-162A2BW3	Rapid outward crossfeed movement push button (a) Available only in manual surface mode selected on (13) and light of reset push button (15)is on. Toggle inward movement to outward under auto/manual surface mode (available only when light of start push button (14) is on).

1	S5	C19-162A2BW4	Wheel-head slow down push button Push (11) to get slow down. Push (11) and (9) together to get rapid down movement. * Available only under manual surface/plunge modes (13).
2	S18E	C20-161A1B2	Downfeed jogging push button In metric, 0.001mm downfeed increment per push.
3	S8	C03-5SW-2	Grinding mode selector switch Five selector as follows A. Auto surface mode In this mode, automatic feeds in 3 axis, hydraulic feed, crossfeed, vertical feed are provided. (a) When light of buttons (15), (25) is on 1.Rapid in/out by (8), (10). 2.Wheel-head up/down movement by button (7), (9), (11). 3.Jogging by button (12). (b) When light of button (14) is on, automatic grinding cycle is activated, the wheel-head is raised and all motors are automatically stopped upon completion of grinding cycle. 1.Step increment of crossfeed by selector switch (6). 2.Jogging by button (12). 3.Crossfeed in/out direction control by button (8), (10). 4.Downfeed functions by selector switch (16), (17), (18), (19), (20) and (21). B. Manual surface mode: (a) When light of button (15) is on, below functions are available: 1.Rapid in/out by (8), (10). 2.Rapid/slow up/down is by (7), (9) and (11). Jogging is by (12). (b) When light of button (14) is on, start hydraulic table by turning table speed control, adjust selector switch (6) to get required step increment of crossfeed.

1.Crossfeed in/out direction control by button (8), (10).
2.Wheel-head up/down movement by button (7), (9), (11).

C. For hydraulic table turns to the middle position of switch (13).

D. Manual plunge mode:
In this mode, only manual wheelhead feed is on cross travel is available auto step feed, rapid in/out saddle motion are disable.
1.jogging by push-button (12)
2.rapid/slow, up/down by push-button (7), (9)and (11).

E. Auto plunge mode,
In this mode:

(a) When light of button (14),(25) is on, automatic grinding cycle is activated. The wheelhead downfeed will start when table motion is abled for grinding cycle.
1. Jogging by push-button (12).
2. Selector switch (16),(17),(18),(20),(21)and (22).

Note: When changing the position of the button, it will effect the auto cycle. The wheelhead is raised, and all motors are automatically stopped after completion of spark-out grinding.

(b) When light of push-button is on
1. Jogging by push-button (12).
2. Rapid up/down, rapid in/out not available.

14 S12E C20-161A1BG2 Confirmation button for selector switch (13)
To confirm the selection by select switch (13).

15 S13E C20-161A1BR2 Function cancellation for selector switch
To cancel the function selection by select switch (13).

16 DIS-16002 Total amount (downfeed increment) selector switch (in metric).
Use selector switch (16) together with downfeed dial ring to set required downfeed amount. (Please refer to p.21) max. Auto downfeed amount=9 mm (in metric) push button (22) to confirm the total amount set

			by selector switch (16).
17/18		DIS-16002	Rough grinding step increment selector switch (in metric) Rough grinding step increment=0.001mm~0.04mm(at interval of 0.001mm). Setting on (17)+setting on (18)=rough grinding step increment. (Maximum is 0.04mm)
19		DIS-16002	Finish grinding step increment selector switch (in metric) Finish grinding step increment=0.001mm~0.009mm(at interval of 0.001mm) Finish pass will start for the last 0.1mm of total amount. * To reset this function, switch to zero position.
20	S14	C04-12SW-1	Spark-out selector switch Spark-out 1~9 times, to ensure a fine finish of workpiece.
21	R3	C79-VR105A	Variable elevation amount adjust switch To preset rising amount for the wheelhead, The wheelhead is raised up on completion of grinding cycle.
22		C20-161A1B3	Set button (input confirmation button) To confirm the settings on selector switch (16). The m/c will act according to new settings by pushing button (22). Do nit use this button during the auto grinding cycle proceeding unless you want to change total downfeed setting. Usage: 1. Before starting the grinding cycles, make the m/c to accept downfeed settings. 2. During grinder cycle, if a change of downfeed amount is needed. Rotate selector switch 16, and reconfirm witch push button 22.
23		C99-VR500KB	Demagnetizing time adjust switch To adjust demagnetizing time. Larger work-piece, and high carbon containing work-pieces like tool

steel,SKD,SKH,SKS,SCM,CNCM,ect.take longer time to demagnetize.

24 C99-VR50KB Magnetizing power adjust switch
To adjust magnetizing power,
Status of power shown on (D15).

25 C93-30SW2A1B Magnetize/demagnetize selector switch
(a) On-position is to magnetize. Use adjusting switch (24) to adjust power of magnetism.
(b) Middle-position is to stop chuck function and the hydraulic system.
(c) Off-position is to demagnetize. Use adjusting switch (23) to adjust time of demagnetizing.

26 S16 C20-161A1BG1 Hydraulic start push-button
To start hydraulic system for the table.

* Hydraulic system starts interlocked with chuck control and table parking.

* See Operation manual P.41

27 S15 C20-161A1BR1 Hydraulic stop push-button

28 C20-161A1BW3 Step increment jog push-button
* Jogging amount can be pre-set, range is from 0.001mm to 0.04mm. Please select the amount by changing rough grinding step increment selector switch (17) and (18).

This function is available while the light of push-button (14) is on. Increment amount is related to the setting on selector switch (17) and (18).

Operation method:

Hold push-button (28), then push (12).

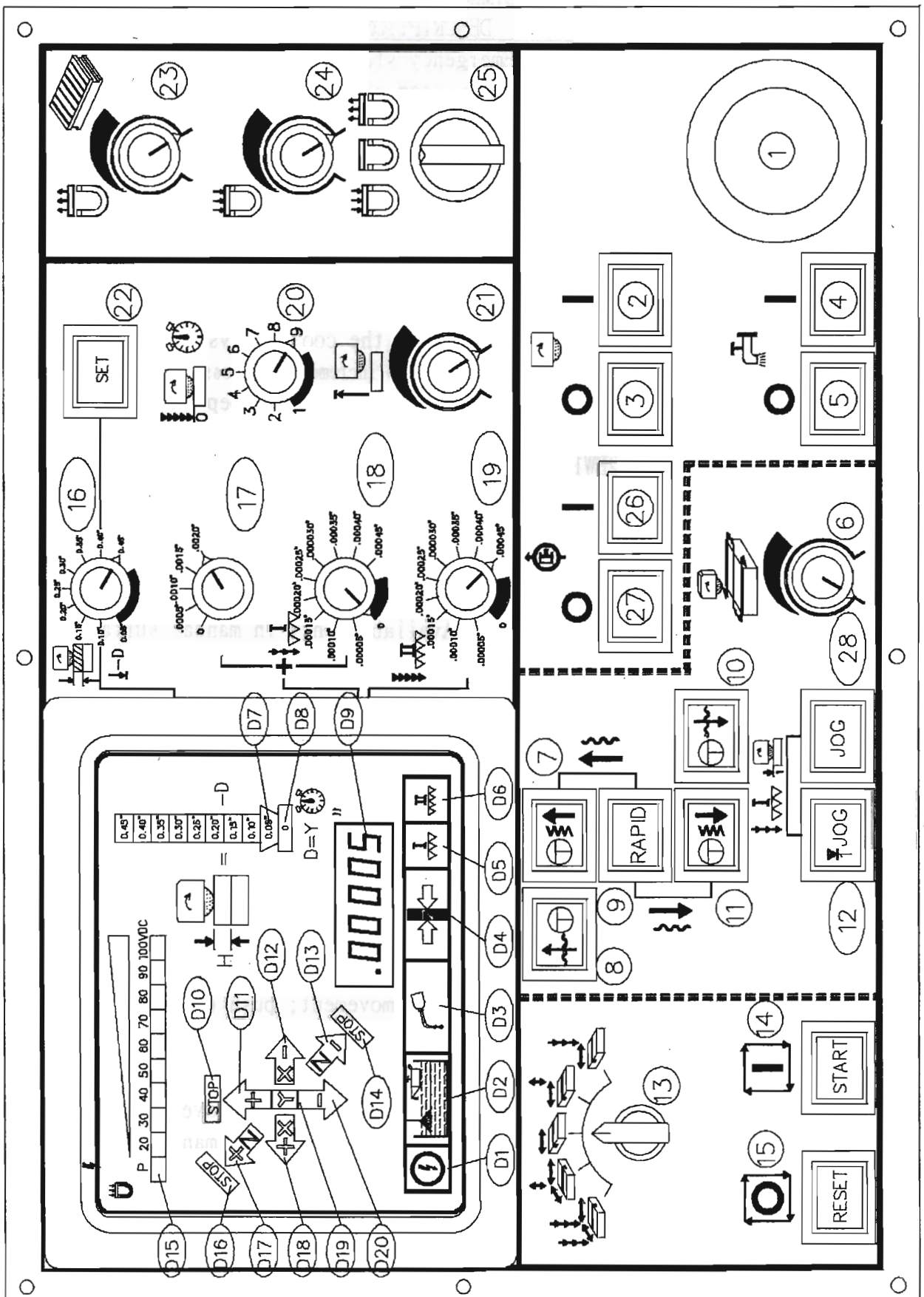
Description of DISPLAY SCREEN for AHD series (OPERATION INSTRUCTION)

D1	DIS-16002	Power indicator lamp Light on represents normal power supply.
D2	DIS-16002	Lubricant oil inadequacy indicator lamp Light on represents that lubricant oil is not enough, and needs to add more.
D3	DIS-16002	Lubricant performance status indicator lamp Light-on represents normal lubricant oil supply (Lubricant pump is activated by starting hydraulic system). Light not on could be caused by: 1.Lubricant pump is not started. 2.Oil filter is blocked. 3.Oil pressure is not enough. 4.Power supply for lubricant pump is off. 5.Lubricant pump is out of order.
D4	DIS-16002	Crossfeed locking indicator To indicate the crossfeed has been locked.
D5	DIS-16002	Rough grinding indicator lamp Light on represents that rough-grinding is proceeding. Step increment is indicated by selector switch (17), (18).
D6	DIS-16002	Finish grinding indicator lamp Light on represents that finish-grinding pass is proceeding. Step increment is indicated by selector switch (19). This procedure proceeds for the last 0.005" of total downfeed amount.
D7	DIS-16002	Total downfeed amount indicator lamp (in inches) To indicate current total downfeed amount. Actual downfeed amount to be proceeded = (total downfeed amount indicated on D6)-(reading on downfeed dial ring).
D8	DIS-16002	Spark-out indicator lamp Light on represents pre-set spark-out cycle. It's, relative to the position of selector switch (20). All motors are automatically stopped on completion of spark out cycle.
D9	DIS-16002	Downfeed step increment (in inches). Display proceeding downfeed step increment in inches. It is indicated by selector switch (17), (18) or (19).

D10	DIS-16002	Upper limits indicator lamp Light on represents the upper limit of vertical travel is reached by the wheel-head, upward movement is automatically turned off.
D11	DIS-16002	Upward movement indicator lamp Light on represents wheel-head upward movement is proceeding.
D12	DIS-16002	Table rightward movement indicator lamp Light on represents table rightward movement is proceeding.
D13	DIS-16002	Saddle inward movement indicator lamp Light on represents the saddle inward movement is proceeding.
D14	DIS-16002	Saddle inner limit indicator lamp Light on represents the saddle inner limits is reached, inward movement is automatically turned off.
D15	DIS-16002	Magnetizing/demagnetizing indicator lamp 10 steps, to indicate magnetizing power, or demagnetizing time. Power supply output voltage range from 20V to 100V.
D16	DIS-16002	Saddle outer limits indicator lamp Light on represents the saddle outer limit is reached, outward movement is automatically turned off.
D17	DIS-16002	Saddle outward movement indicator lamp Light on represents saddle outward movement is proceeding.
D18	DIS-16002	Table leftward movement indicator lamp Light on represents table leftward movement is proceeding.
D19	DIS-16002	Upward/downfeed movement by stepping motor indicator lamp. Light on represents that stepping motor is being activated. 1. Slow upward feed is proceeding:(D11)and (D19) are lightd. 2. Slow downfeed is proceeding:(D20)and(D19)are lighted. 3. Jog movement is preceeding:(D19)is lighted.
D20	DIS-16002	Downward movement indicator lamp Light on represent rapid/slow downward movement is proceeding.

Light of (D20) keeps on during auto grinding cycles.

1.8: CONTROL PANEL LAYOUT FOR AHD (in inches) SERIES



1.8.1 Description of control panel for AHD series (Operation instruction)

NO.	ELECTRICAL CODE NO.	P/N	SYMBOLIC DEFINITION DESCRIPTION
1	S0	C25-22R1B	Emergency stop button To stop all motors and functions.
2	S1	C20-161A1BG1	Spindle (wheel-head) start push button To start the spindle (wheel head).
3	S2	C20-161A1BR1	Spindle (wheel-head) stop push button To stop the spindle (wheel head).
4	S6E	C20-161B1BG1	Coolant pump start button To start the coolant system.
5	S7E	C20-161B1BR1	Coolant pump stop button To stop the coolant system.
6	R2	C79-VR105A	Variable step increment of crossfeed selector switch To select required step increment of crossfeed in auto mode.
7	S15E	C19-162A2BW1	Wheel-head slow up button (a) Slow up movement activated by button (7). (b) Rapid up movement activated by button (7) and (9) – Push the two buttons together. * Available only in manual surface/plunge modes selector switch (13).
8	S16E	C20-161A1BW1	Rapid inward crossfeed movement button (a) To move saddle inward, available only in manual surface mode (by switch (13)) and light of reset button (15) is on. (b) To toggle outward crossfeed movement to inward, available only in auto/manual surface modes and when light of start button (14) is on.
9	S17E	C19-162A2BW2	Rapid up/down confirm push button (a) Push (9) and (7) together to get rapid up movement; push (9) and (11) together to get rapid down movement. * Push (9) only will get no movement.
10	S4E	C19-162A2BW3	Rapid outward crossfeed movement push button (a) Available only in manual surface mode selected on (13) and light of reset push button (15) is on. Toggle inward movement to outward under auto/manual surface mode (available only when light of start push button (14) is on).

11	S5	C19-162A2BW4	Wheel-head slow down push button Push (11) to get slow down. Push (11) and (9)together to get rapid down movement. * Available only under manual surface/plunge modes on (13).
12	S18E	C20-161A1B2	Downfeed jogging push button In inches, 0.00005" downfeed increment per push.
13	S8	C03-5SW-2	Grinding mode selector switch Five selections as follows

A. Auto surface mode.
In this mode, automatic feeds in 3 axis, hydraulic feed, crossfeed, vertical feed are provided.
(a) When light of buttons (15), (25) is on
1.Rapid in/out by (8), (10).
2.Wheel-head up/down movement by button (7), (9), (11).
3.Jogging by push button (12).
(b) When light of button (14) is on, automatic grinding cycle is activated, the wheel-head is raised and all motors are automatically stopped upon completion of grinding cycle.
1. Step increment of crossfeed by selector switch (6).
2. Jogging by push button (12).
3. Crossfeed in/out direction toggle by button (8), (10).
4. Downfeed functions by selector switch (16), (17), (18), (19), (20) and (21).

B. Manual surface mode:
(a) When light of button (15) is on, below functions are available:
1. Rapid in/out by (8), (10).
2. Rapid/slow, up/down is by (7), (9) and (11). Jogging is by (12).
(b) When light of button (14) is on, start hydraulic table by turning table speed control, adjust selector switch (6) to get required step increment of crossfeed.
1. Crossfeed in/out direction controls by buttons (8), (10).

2.Wheel-head up/down movement by button (7), (9), (11).

C. For hydraulic table turns to the middle position of switch (13).

D. Manual plunge mode:
In this mode, only manual wheelhead feed is on, and cross travel's auto step feed are not available.
Rapid in/out saddle motion are disabled.
1.Jogging by push-button (12)
2.Rapid/slow, up/down by push-button (7), (9) and (11).

E. Auto plunge mode,
In this mode:
(a) When light of button (14), (25) is on, automatic grinding cycle is activated. The wheelhead downfeed will start when table motion for grinding cycle.
1. Jogging by push-button (12).
2. Selector switch (16),(17),(18),(20),(21)and (22)
Note: When changing the position of the button, it will effect the auto cycle. The wheelhead is raised and all motors are automatically stopped after completion of spark-out cycle.
(b) When the light of push-button is on
1. Jogging by push-button (12).
2. Rapid up/down, rapid in/out are not available.

14 S12E C20-161A1BG2 Confirmation button for selector switch (13)
To confirm the selection by select switch (13).

15 S13E C20-161A1BR2 Function cancellation for selector switch
To cancel the function selection by select switch (13).

16 DIS-16002 Total amount (downfeed increment) selector switch (in inches)
Use selector switch (16) together with downfeed dial ring to set the required downfeed amount. (Please refer to p.21) Max. Auto downfeed amount=0.45" (in inches)
Pushing button (22) to confirm the total amount set by selector switch (16).

17/18 DIS-16002 Rough grinding step increment selector switch

			(in inches) Rough grinding step increment=0.00005"~0.002"(at interval of 0.00005"). Setting on (17)+setting on (18)=rough grinding step increment. (Maximum is 0.0020")
19		DIS-16002	Finish grinding step increment selector switch (in inches) Finish grinding step increment=0.00005"~0.00045"(at interval of 0.00005") Finish pass will start for the last 0.005" of total amount. * To reset this function, switch to zero position.
20	S14	C04-12SW-1	Spark-out selector switch Spark-out 1~9 times, to ensure a fine finish of workpiece.
21	R3		Variable elevation amount adjustment switch To preset rising amount for the wheelhead. The wheelhead is raised up on the completion of grinding cycle.
22		C20-161A1B3	Set button (input confirmation button) To confirm the setting on selector switch (16). The m/c will act according to new settings by pushing button (22). Do not use this button during the auto grinding cycle unless you want to change the total downfeed setting. Usage: 1.Before starting the grinding cycle, make the m/c to accept downfeed setting 2.After changing total downfeed amount on selector switch (16) during the grinding cycle.
23		C99-VR500KB	Demagnetizing time adjustment switch To adjust demagnetizing time for larger work-piece, and high carbon containing work-pieces, like tool steel,SKD,SKH,SKS,SCM,CNCM,etc. which take longer time to demagnetize.

24		C99-VR50KB	Magnetizing power adjustment switch To adjust magnetizing power, status of power has shown on (D15).
25		C93-30SW2A1B	Magnetize/demagnetize selector switch (a) On-position is to magnetize. Use adjusting switch (24) to adjust power of magnetism. (b) Middle-position is to stop chuck functions and the hydraulic system. (c) Off-position is to demagnetize. Use adjusting switch (23) to adjust time of demagnetizing.
26	S16	C20-161A1BG1	Hydraulic start push-button To start hydraulic system for the table. * Hydraulic starts interlocks with chuck control and table parking. * See Operation manual P.41
27	S15	C20-161A1BR1	Hydraulic stop push-button
28		C20-161A1BW3	Step increment jog push-button * Jogging amount can be pre-set, range is from 0.00005" to 0.0020". Please select by rough grinding step increment selector switch (17) and (18). This function is available while light of push-button (14) is on. Increment amount relates to the setting on selector switch (17) and (18). Operation method: Hold push-button (28), then push (12).

Description of DISPLAY SCREEN for AHD series (OPERATION INSTRUCTION)

D1	DIS-16002	Power indicator lamp Light on represents normal power supply.
D2	DIS-16002	Lubricant oil inadequacy indicator lamp Light on represents that lubricant oil is not enough, and needs to add more.
D3	DIS-16002	Lubricant performance status indicator lamp Light-on represents normal lubricant oil supply (Lubricant pump is activated by starting hydraulic system.) Light not on could be caused by: 1.Lubricant pump is not started. 2.Oil filter is blocked. 3.Oil pressure is not enough. 4.Power supply for lubricant pump is off. 5.Lubricant pump is out of order.
D4	DIS-16002	Crossfeed locking indicator To indicate the crossfeed has been locked.
D5	DIS-16002	Rough grinding indicator lamp Light on represents that rough-grinding is proceeding. Step increment is indicated by selector switch (17), (18).
D6	DIS-16002	Finish grinding indicator lamp Light on represents that finish-grinding pass is proceeding. Step increment is indicated by selector switch (19). This procedure proceeds for the last 0.005" of total downfeed amount.
D7	DIS-16002	Total downfeed amount indicator lamp (in inches) To indicate current total downfeed amount. Actual downfeed amount to be proceeded = (total downfeed amount indicated on D6)-(reading on downfeed dial ring).
D8	DIS-16002	Spark-out indicator lamp Light on represents pre-set spark-out cycle. It's relative to the position of selector switch (20). All motors are automatically stopped on completion of spark out cycle.
D9	DIS-16002	Downfeed step increment (in inches). Display proceeding downfeed step increment in inches. It is indicated by selector

switch (17), (18) or (19).

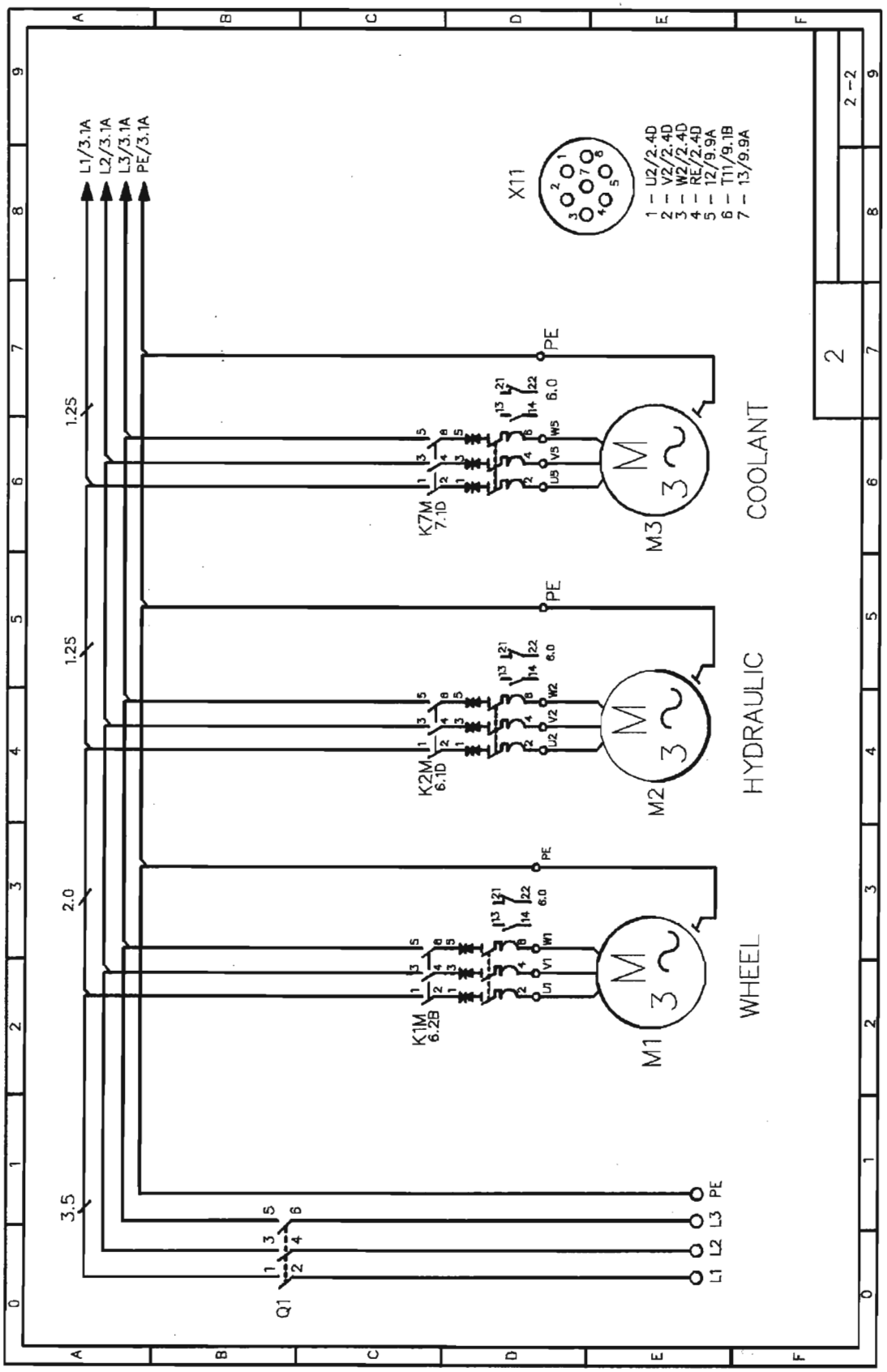
D10	DIS-16002	Upper limits indicator lamp Light on represents the upper limit of vertical travel is reached by the wheel-head. More upward movement is automatically turned off.
D11	DIS-16002	Upward movement indicator lamp Light on represents wheel-head upward movement is proceeding
D12	DIS-16002	Table rightward movement indicator lamp Light on represents table rightward movement is proceeding.
D13	DIS-16002	Saddle inward movement indicator lamp Light on represents the saddle inward movement is proceeding
D14	DIS-16002	Saddle inner limit indicator lamp Light on represents the saddle inner limits is reached. More inward movement is automatically turned off.
D15	DIS-16002	Magnetizing/demagnetizing indicator lamp 10 steps, to indicate magnetizing power, or demagnetizing time. Power supply output voltage ranges from 20V to 100V.
D16	DIS-16002	Saddle outer limits indicator lamp Light on represents the saddle outer limit is reached. More outward movement is automatically turned off.
D17	DIS-16002	Saddle outward movement indicator lamp Light on represents saddle outward movement is proceeding.
D18	DIS-16002	Table leftward movement indicator lamp Light on represents table leftward movement is proceeding.
D19	DIS-16002	Upward/downfeed movement by stepping motor indicator lamp Light on represents that stepping motor is being activated. 1.Slow upward feed is proceeding:(D11)and (D19) are lighted 2.Slow downfeed is proceeding:(D20)and(D19)are lighted. 3.Jog movement is preceeding:(D19)is lighted.
D20	DIS-16002	Downward movement indicator lamp

Light on represent rapid/slow downward movement is proceeding.
Light of (D20) keeps on during auto grinding cycles.

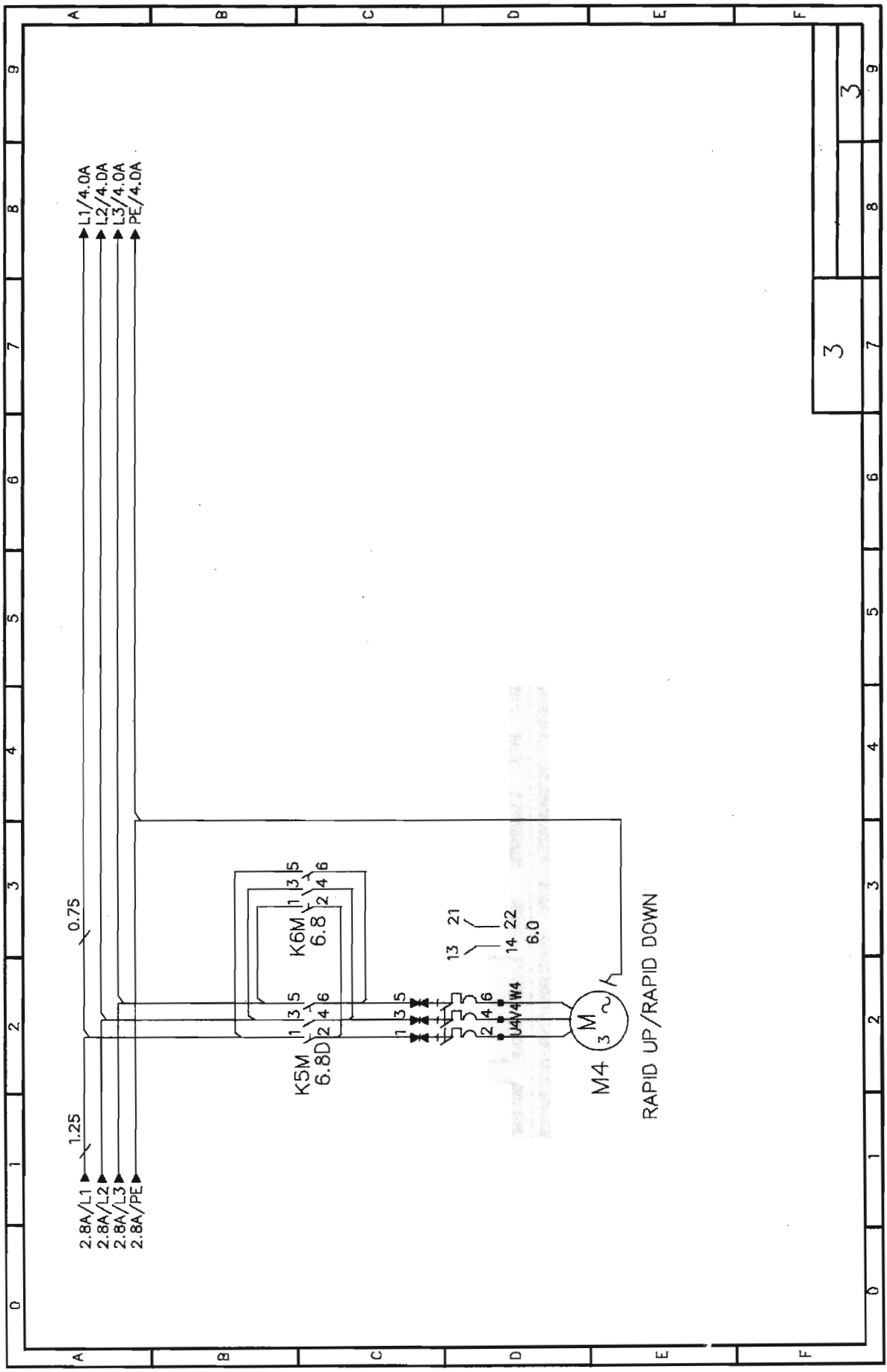
CHAPTER 2

ELECTRIC CIRCUIT DIAGAGRAM

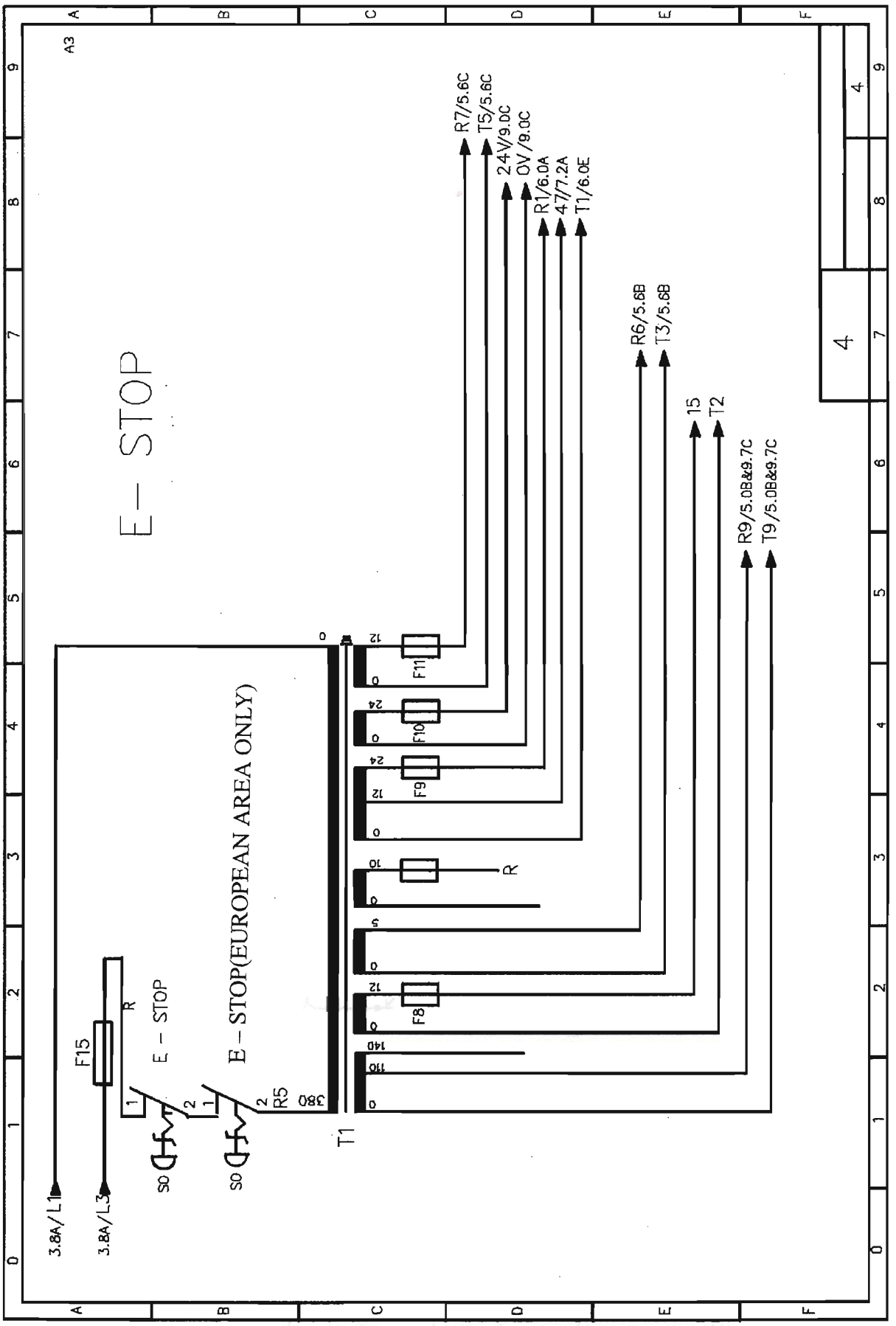
2.1:MOTORS CONTROL



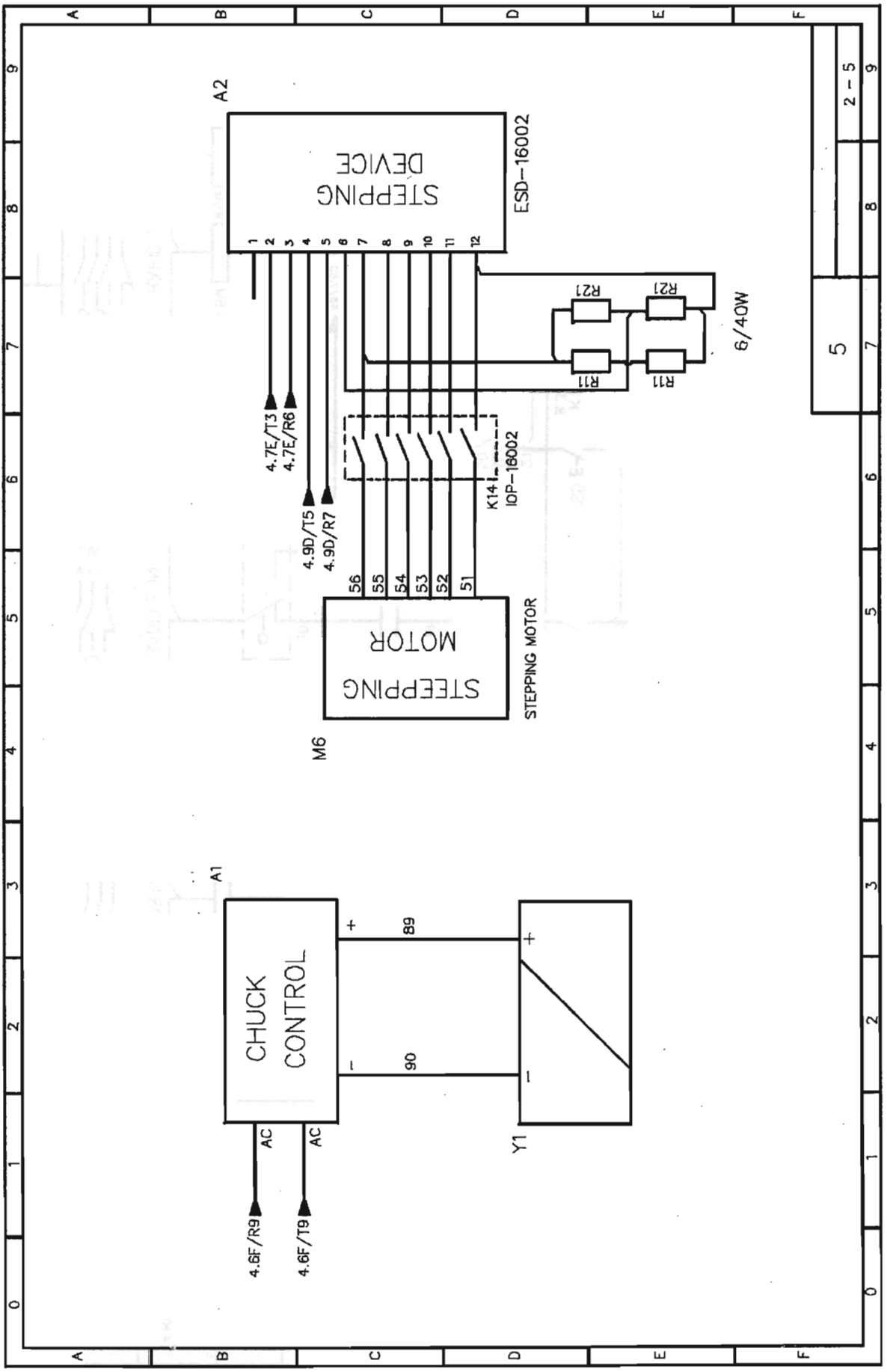
2.2:MOTORS CONTROL



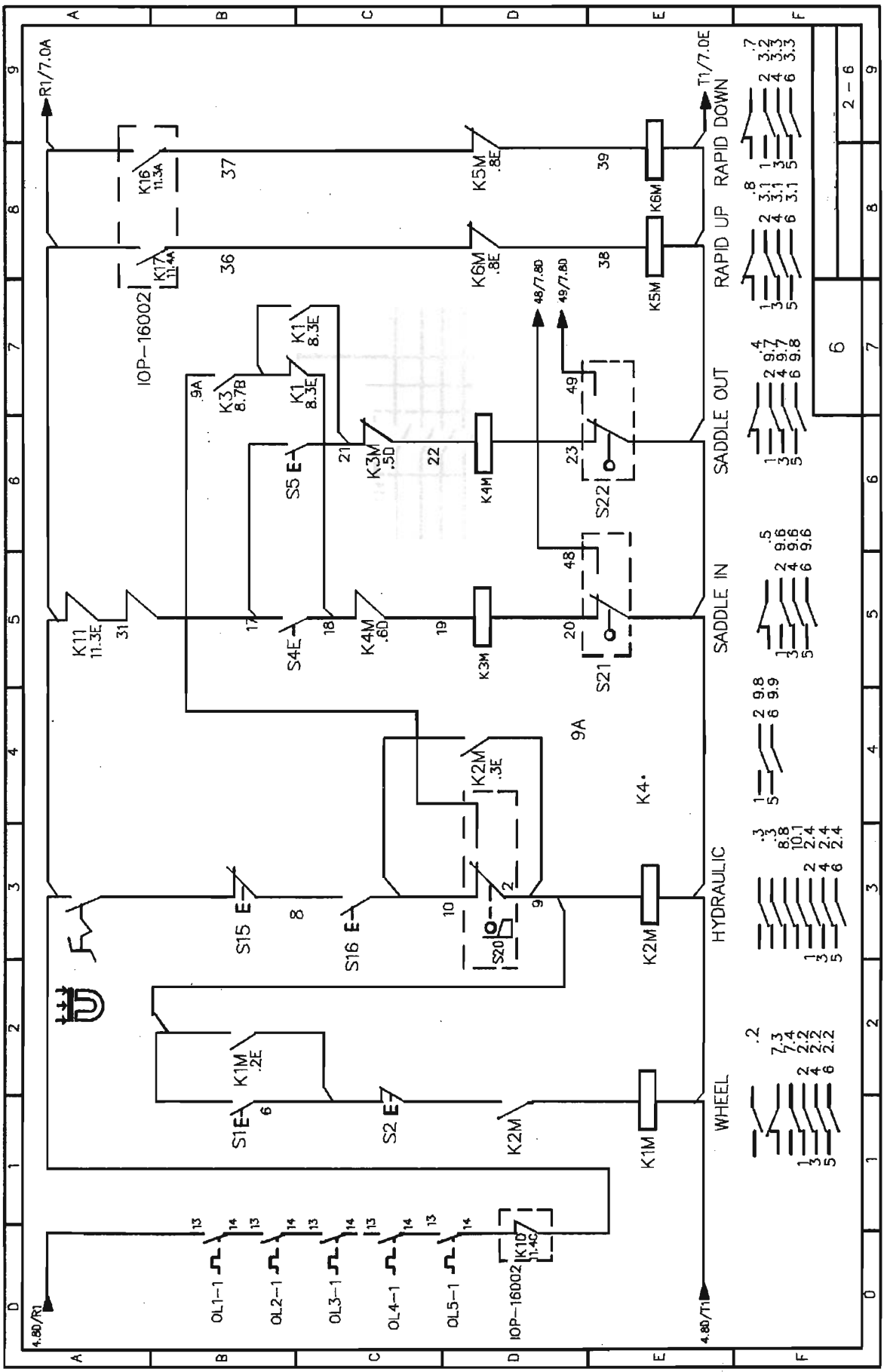
2.3: E- STOP CONTROL AND POWER SUPPLY



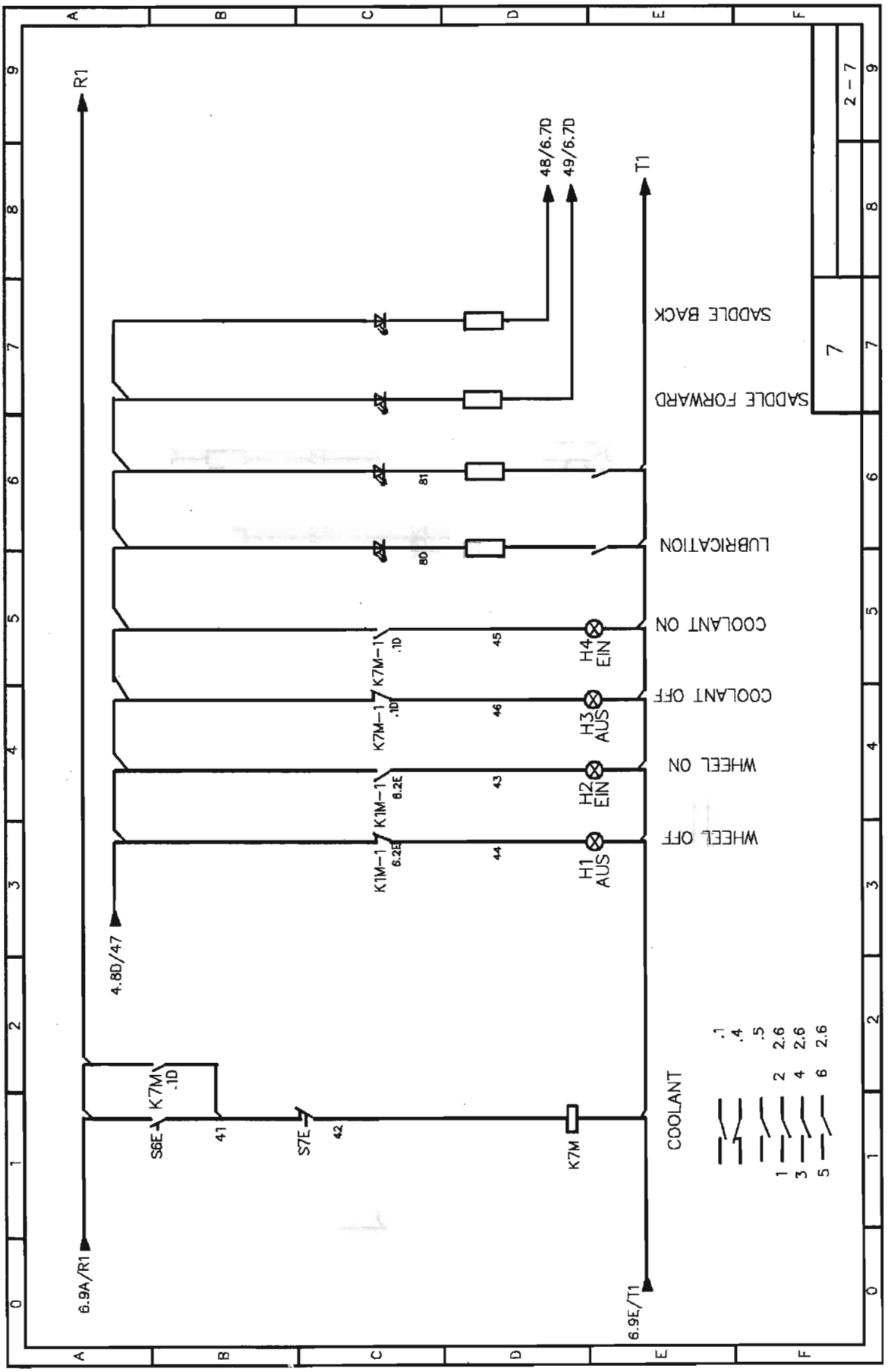
2.4: STEPPING DEVICE AND CHUCK CONTROL



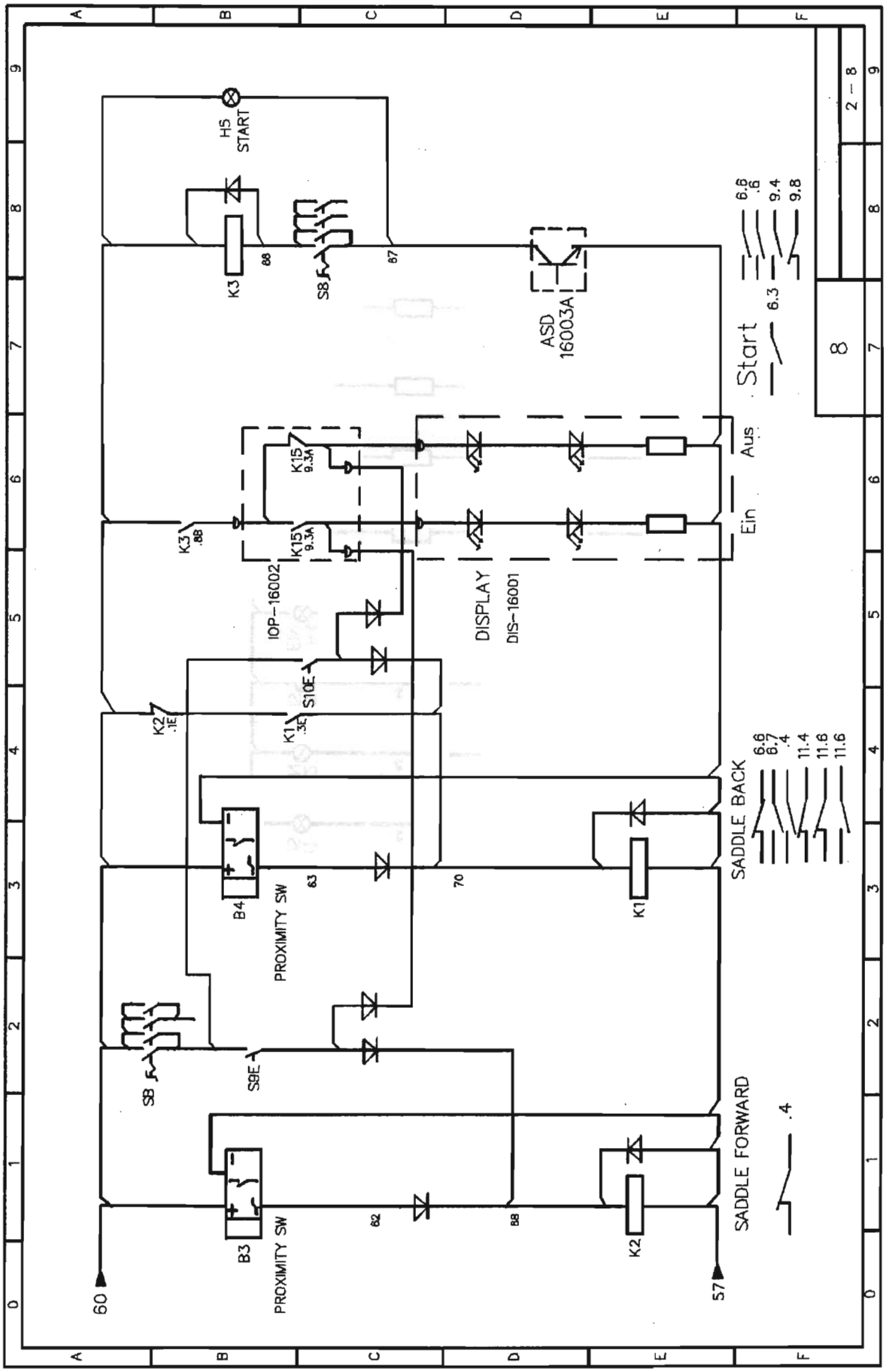
2.5:CONTROL CIRCUIT



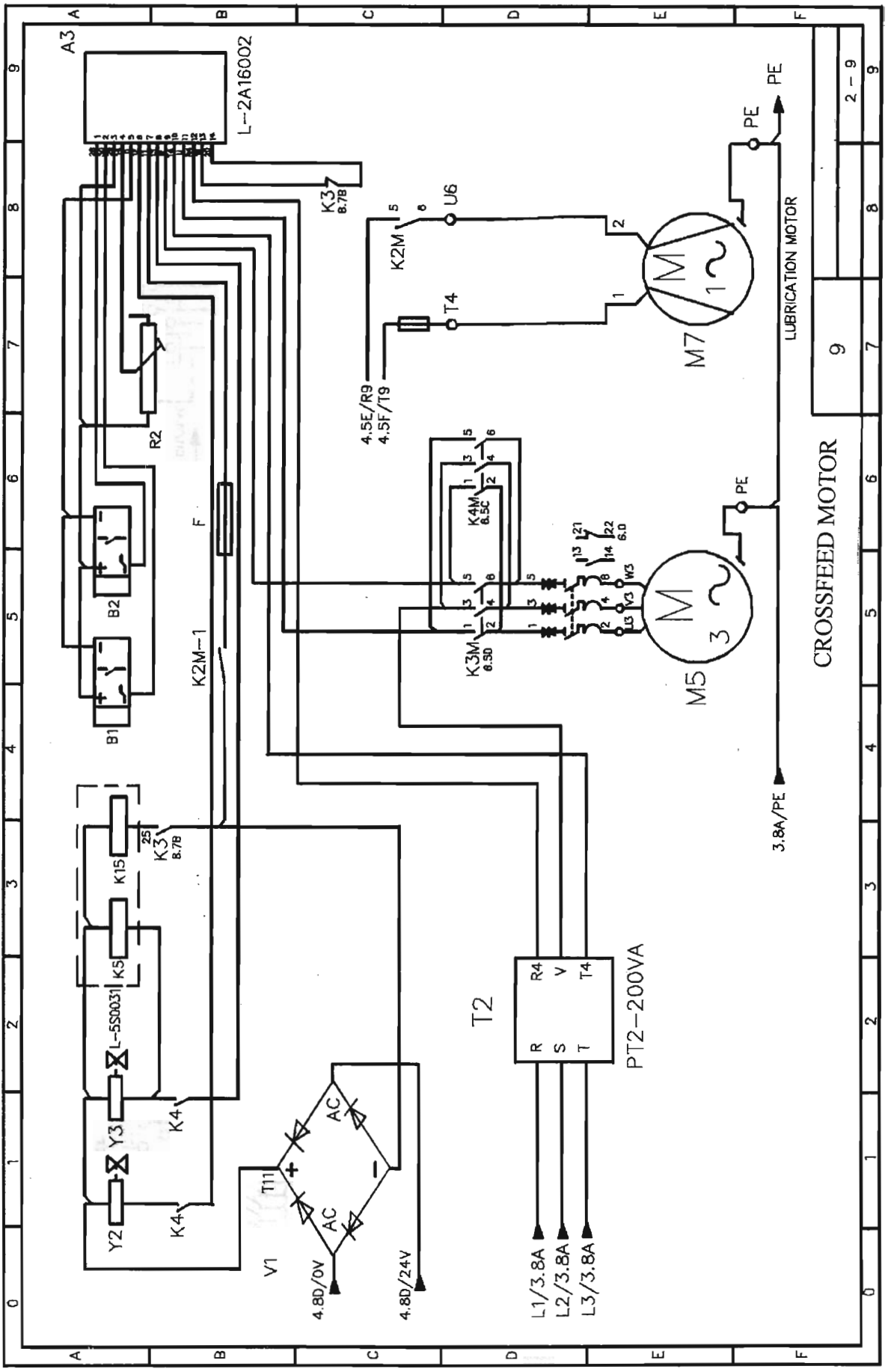
2.6: CONTROL CIRCUIT AND LAMP CIRCUIT



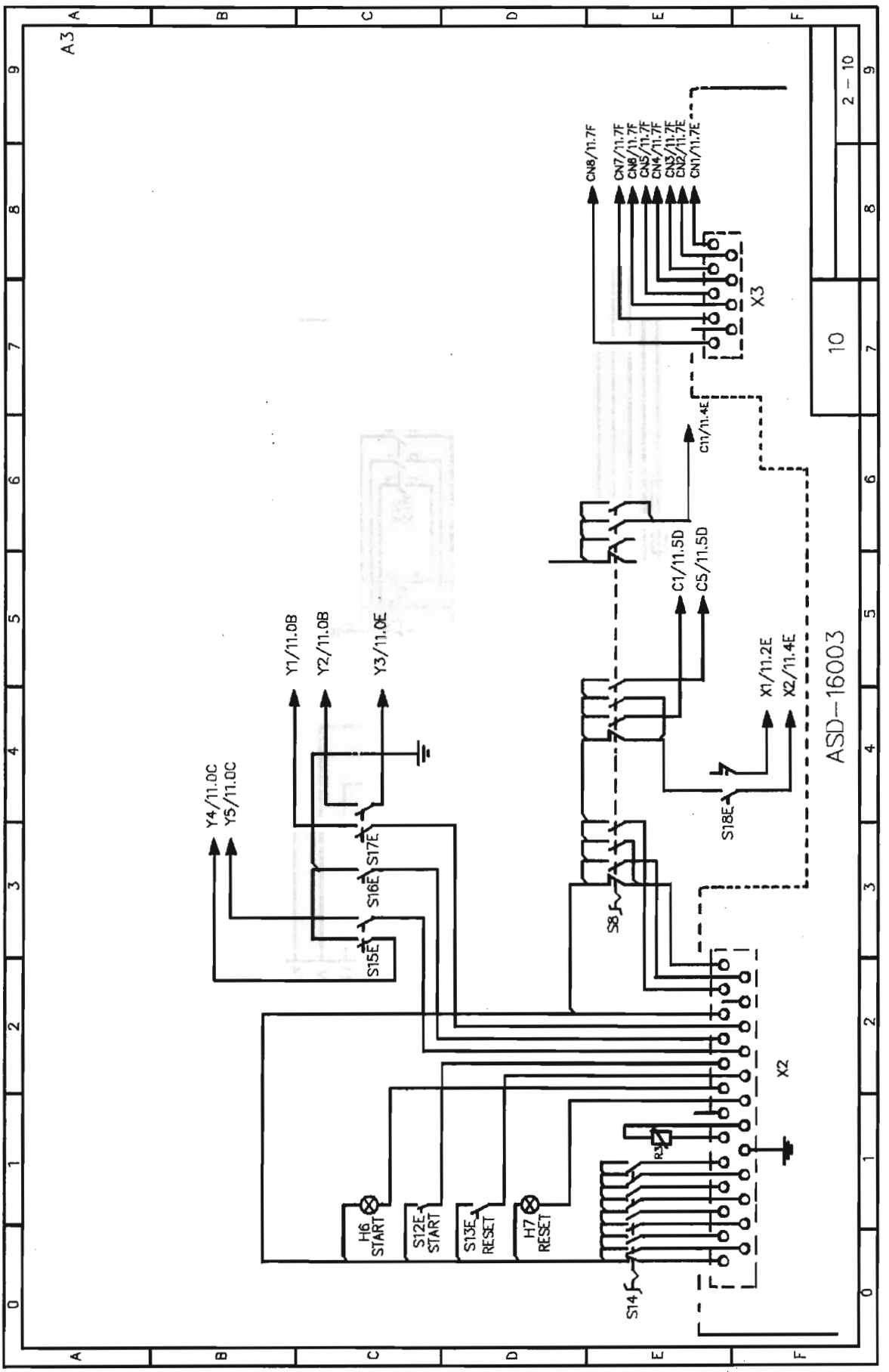
2.7: CROSSFEED CONTROL (REAR AND FRONT)



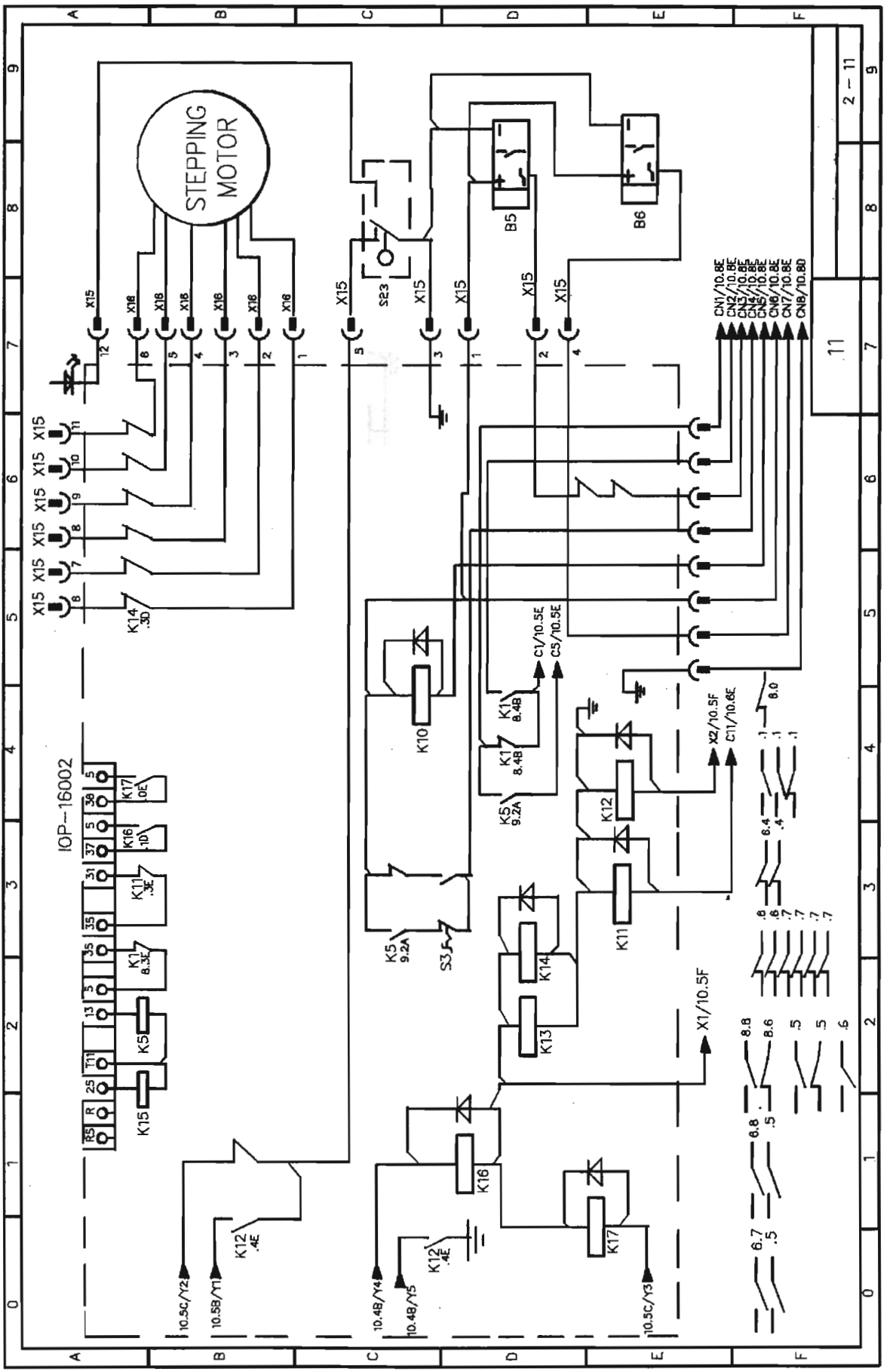
2.8: TABLE CONTROL AND CROSSFEED MOTOR CONTROL



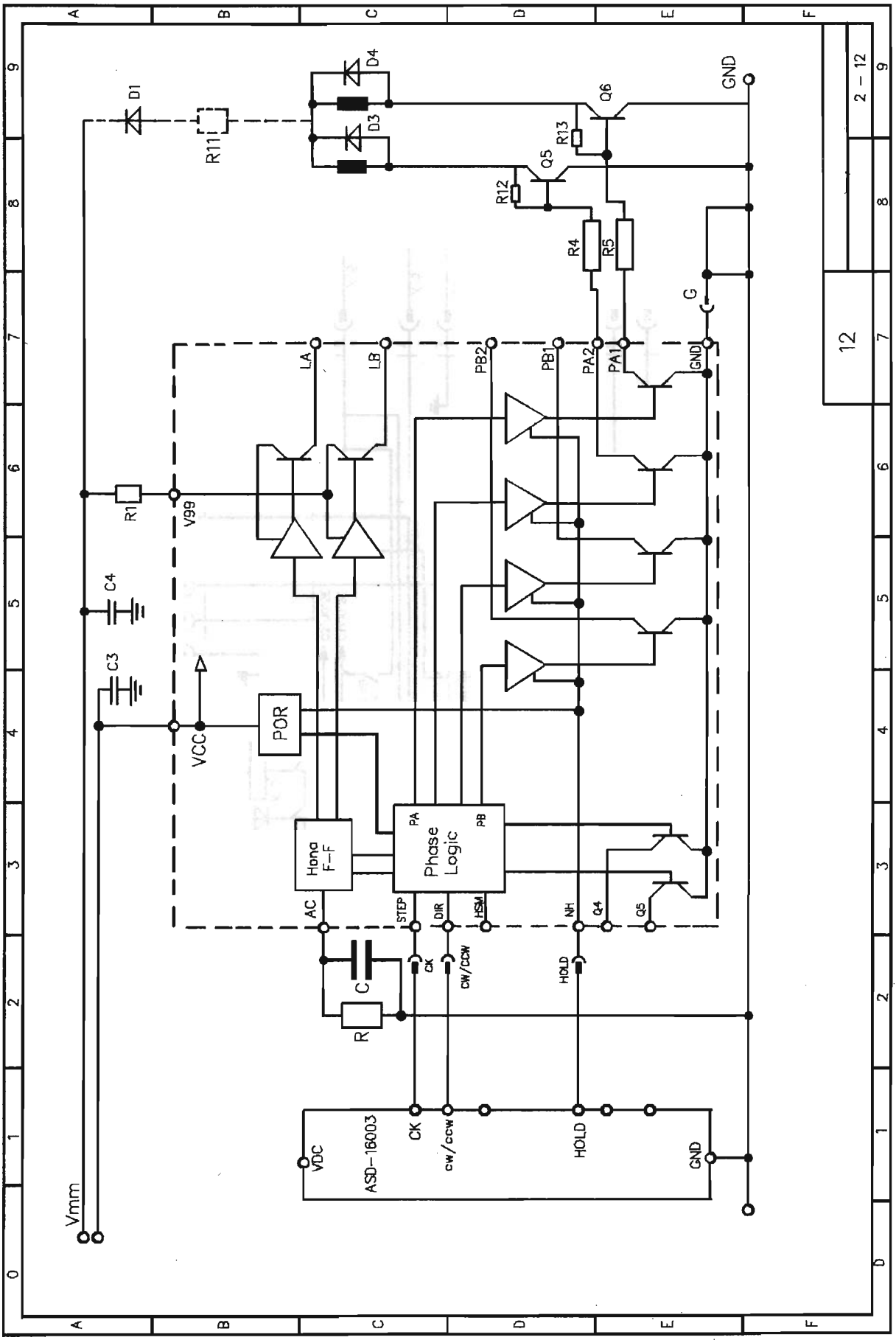
2.9: OPERATION SWITCH CIRCUIT



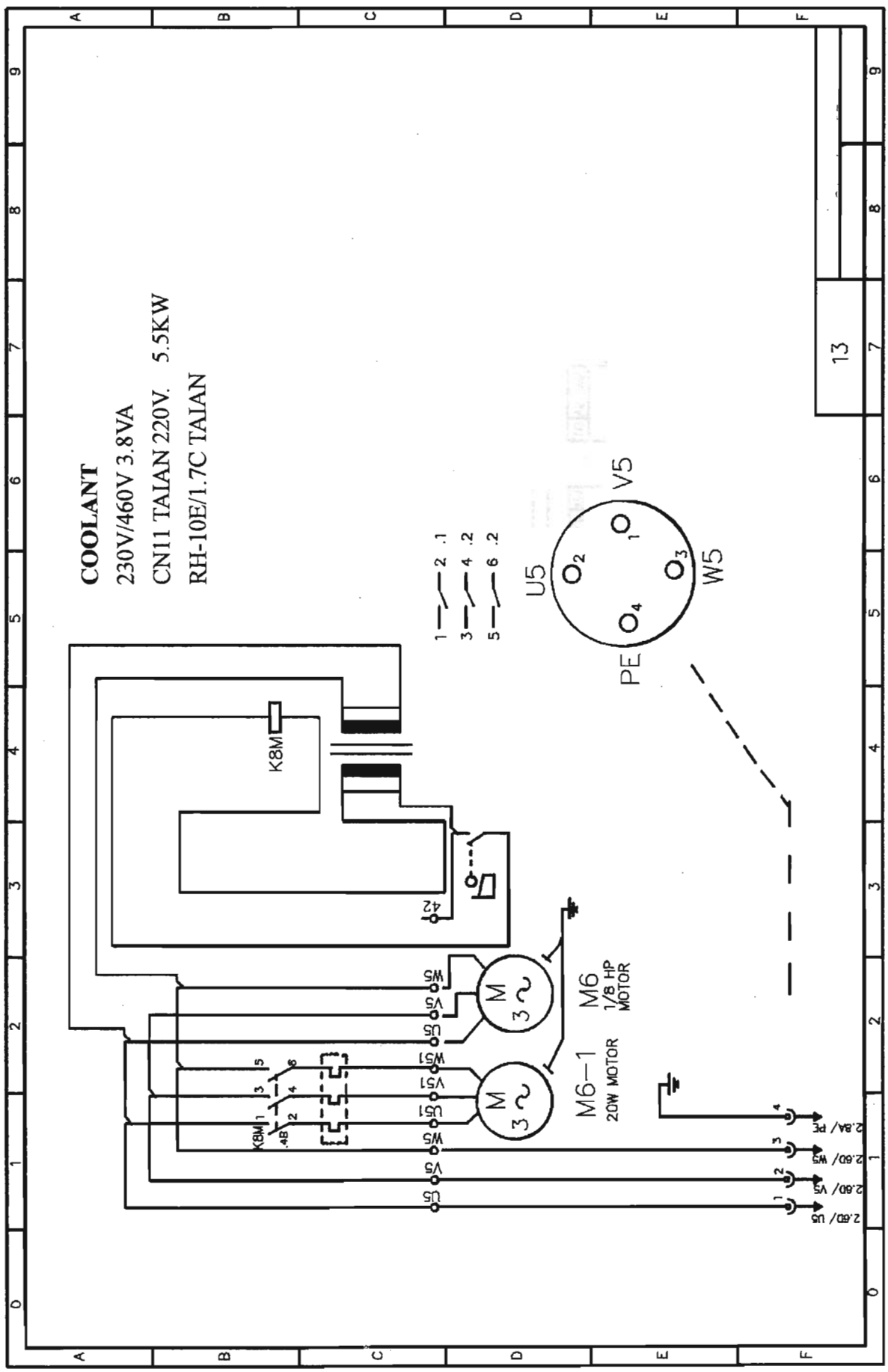
2.10: PCB I/O CARD



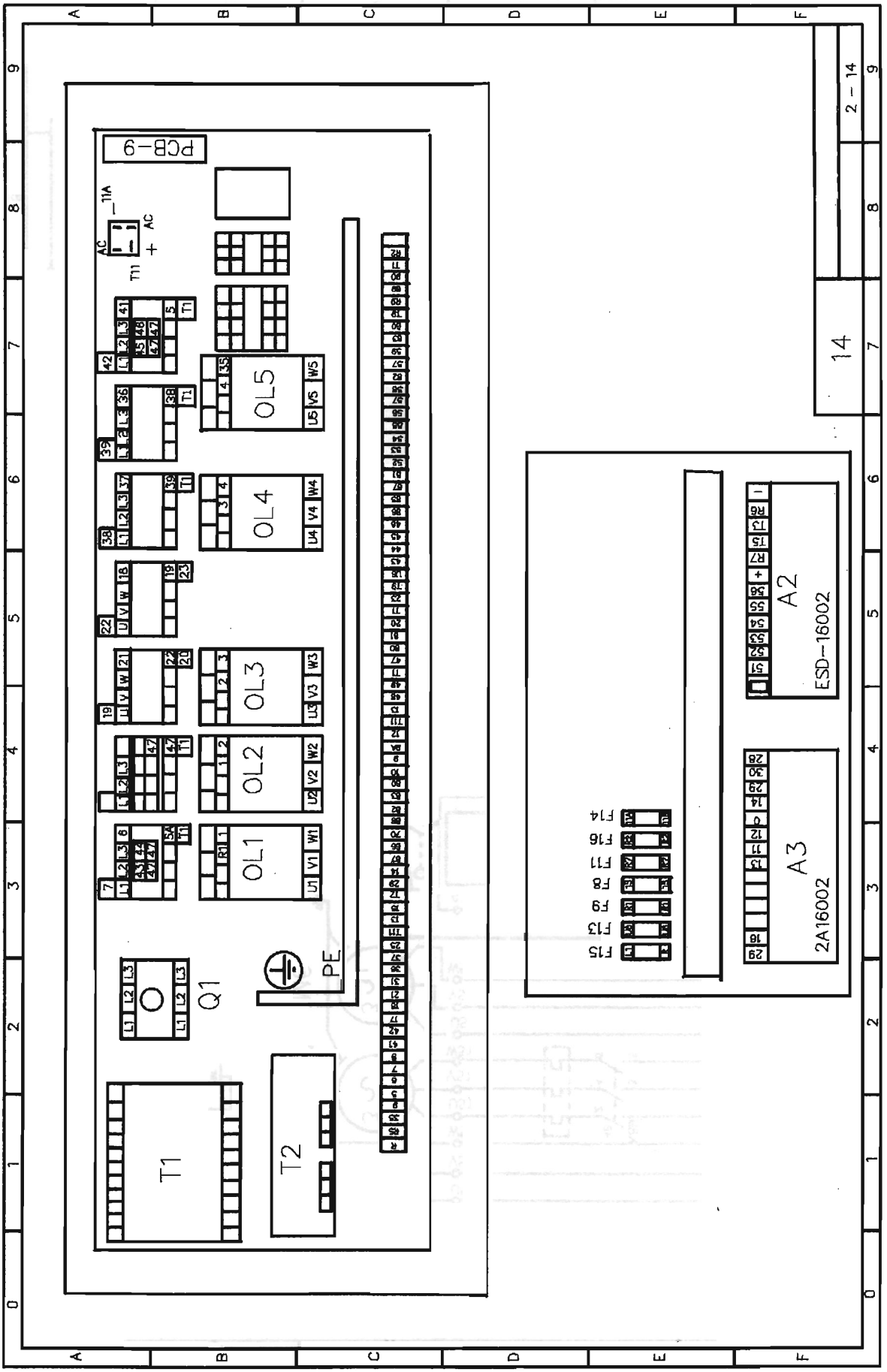
2.11: STEPPING DEVICE PCB BOX (ESD-16002)



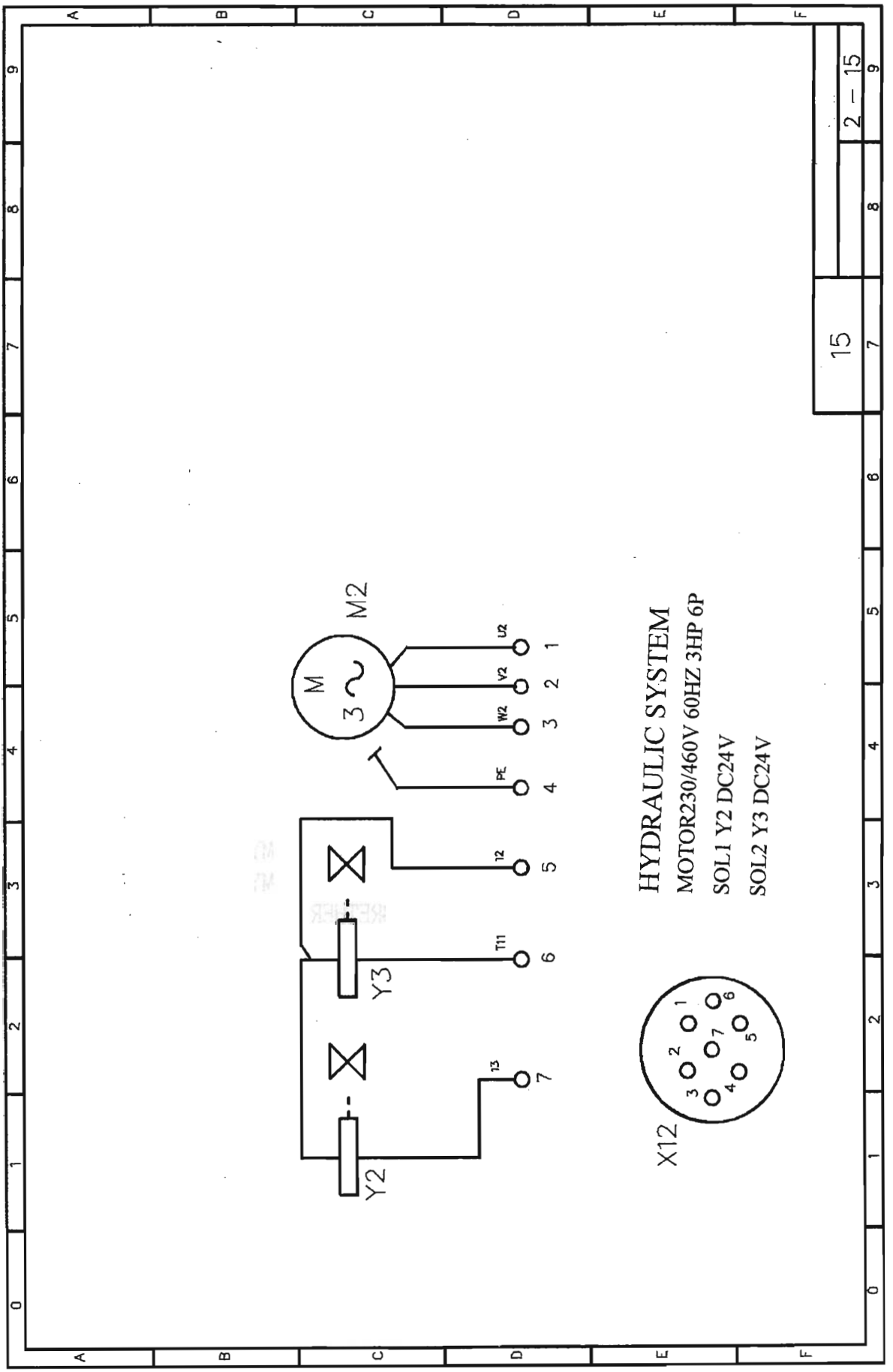
2.12: COOLANT CONTROL



2.13: ELECTRICAL BOX LAYOUT



2.14: HYDRAULIC CONTROL CIRCUIT



CHAPTER 3:ELECTRICL PARTS LIST

3.1: PARTS OF CONTROL SYSTEM

ELECTRICAL CODE.NO	PART NO.	SYMBOLIC DEFINITION	SUPPLIER	SUPPLIER'S REFERENCE	Remark
K1M	C109-D12004B7	24VAC	T E	LC1-12004B7	UL, VDE, CE
K2M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K3M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K4M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K5M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K6M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K7M	C26-D0901B7	24VAC	T E	LC1-D0901B7	UL, VDE, CE
K1M-1	C110-DN11		T E	LA1-DN11A65	UL, VDE, CE
K2M-1	C76-DN40		T E	LA1-DN40A65	UL, VDE, CE
K7M-1	C110-DN11		T E	LA1-DN11A65	UL, VDE, CE
OL1	C115-RS20	13-18 A	T E	GV2-RS20	UL, VDE, CE
OL2	C114-RS14	6-10 A	T E	GV2-RS14	UL, VDE, CE
OL3	C111-RS06	1-1.6 A	T E	GV2-RS06	UL, VDE, CE
OL4	C112-RS07	1.6-2.5 A	T E	GV2-RS07	UL, VDE, CE
OL5	C113-RS08	2.5-4 A	T E	GV2-RS08	UL, VDE, CE
OL1-1	C116-AM11		T E	GV2-AM11	VDE
OL2-1	C116-AM11		T E	GV2-AM11	VDE
OL3-1	C116-AM11		T E	GV2-AM11	VDE
OL4-1	C116-AM11		T E	GV2-AM11	VDE
OL5-1	C116-AM11		T E	GV2-AM11	VDE
K1	C33-MY4-12V		OMRON	MY4-DC12V	UL, CSA
K2	C31-MY2-12V		OMRON	MY2-DC12V	UL, CSA
K3	C31-MY2-12V		OMRON	MY4-DC12V	UL, CSA
Q1		3P SW 32A 600V	BRETHER	15KW AC23	
A1	C1002	135VAC 5A		CHUCK CONTROL 110VDC	
A2	ESD-16002	MOTOR CONTROL		ESD-16002	
A3	2A16003	CROSSFEED CONTROL		2A16002(DC24V)	
T1	C104-550VA1PH			550VA/1PH	
T2	C09-250VA3PH			250VA/3PH	

3.2: PARTS OF OPERATION PANEL

OPERATION NO.	ELECTRICAL CODE.NO	PART NO.	SUPPLIER	SUPPLIER'S REFERENCE	Remark
1.(CE)	S0	C25-22R1B	MOELLER	RPV +K01	UL, VDE
1.	S0	C23-25R1B	TEND		
2.	S1	C20-161A1BG1	FUJI	AH164-TL	UL, VDE
3.	S2	C20-161A1BR1	FUJI	AH164-TL	UL, VDE
4.	S6E	C20-161A1BG1	FUJI	AH164-TL	UL, VDE
5.	S7E	C20-161A1BR1	FUJI	AH164-TL	UL, VDE
6.	R2	C79-VR105A	COSMOS	RV24YN	CE
7.	S15E	C19-162A2BW1	FUJI	AH164-TL	UL, VDE
8.	S16E	C20-161A1BW1	FUJI	AH164-TL	UL, VDE
9.	S17E	C19-162A2BW2	FUJI	AH164-TL	UL, VDE
10.	S4E	C19-162A2BW3	FUJI	AH164-TL	UL, VDE
11.	S5	C19-162A2BW4	FUJI	AH164-TL	UL, VDE
12.	S18E	C20-161A1BW2	FUJI	AH164-TL	UL, VDE
13.	S8	C03-5SW-2			
14.	S12E	C20-161A1BG2	FUJI	AH164-TL	UL, VDE
15.	S13E	C20-161A1BR2	FUJI	AH164-TL	UL, VDE
16.		DIS-16002		DIS-16002	
17.		DIS-16002		DIS-16002	
18.		DIS-16002			
19.		DIS-16002			
20.	S14	C04-12SW-1			
22.		C20-161A1BW3	FUJI	AH164-TL	UL, VDE
23.		C99-VR500KB			
24.		C99-VR50KB			
25.		C93-30SW2A1B	FUJI	AH30-3P	UL, VDE
26.	S16	C20-161A1BG1	FUJI	AH164-TL	UL, VDE
27.	S15	C20-161A1BR1	FUJI	AH164-TL	UL, VDE
28.		C20-161A1BW3	FUJI	AH164-TL	UL, VDE

3.3: PART OF LIMIT (OR PROXIMITY) SWITCHES

PART NO.	TECHNICAL DATA	SUPPLIER	SUPPLIER'S REFERENCE	SPECS	Remark
S20	15A 125VAC	OMRON		1NO, 1NC	UL, CSA
S21	15A 125VAC	OMRON	Z15G1308	1NO, 1NC	UL, CSA
S22	15A 125VAC	OMRON	Z15G1308	1NO, 1NC	UL, CSA
B3	12-24VDC 100mA	F.T.C	PL-5P (PROXIMITY)	PnP	
B4	12-24VDC 100mA	F.T.C	PL-5P (PROXIMITY)	PnP	
B1	12-24VDC 100mA	F.T.C	PL-5P (PROXIMITY)	PnP	
B2	12-24VDC 100mA	F.T.C	PL-5P (PROXIMITY)	PnP	
S23	15A 125VAC	OMRON	Z15G1308	1NO, 1NC	UL, CSA
B6	12-24VDC 100mA	F.T.C	PL-4P (PROXIMITY)	PnP	
B5	12-24VDC 100mA	F.T.C	PL-4P (PROXIMITY)	PnP	
S29	15A 125VAC	OMRON	Z15G1308	1NO, 1NC	UL, CSA
S31	15A 125VAC	OMRON		1NO, 1NC	UL, CSA

3.4: PART OF MOTOR

PART NO.	TECHNICAL DATA	SUPPLIER	SPECS	Remark
M2	3HP 230/460(60HZ) 6P	JIA-CHENG		
M1	5HP 230/460(60HZ) 6P	ADLEE		
M5	80W 220V 6P	ADLEE		
M4	1/4 HP 230/460(60HZ) 6P	TATUNG CO.		
M6	DC 2A	VEXTA	PK299-01A	
M7	110V PUMP	CHIBA	110V PUMP	3 PCS
Y2	DC24V SOL	NORTHMAN	D24 (DC24V)	
Y3	DC24V SOL	NORTHMAN	D24 (DC24V)	OPTIONAL
M1	10HP 230/460 60HZ 6P	ADLEE		OPTIONAL

3.5 Inspection and Maintenance

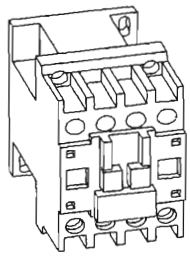
1. Visual Check of Magnetic Contactor Actions

<Checking procedure>

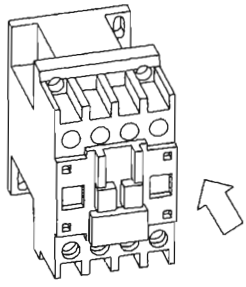
1) Visual check

<Magnet not activated>

When the magnetic contactor is not activated, the movable contact spring support and the contactor body is the same height.



<Magnetic contactor activated>



When the magnetic contactor is activated, the moveable spring support is extracted approximately 4 mm from the contactor body.

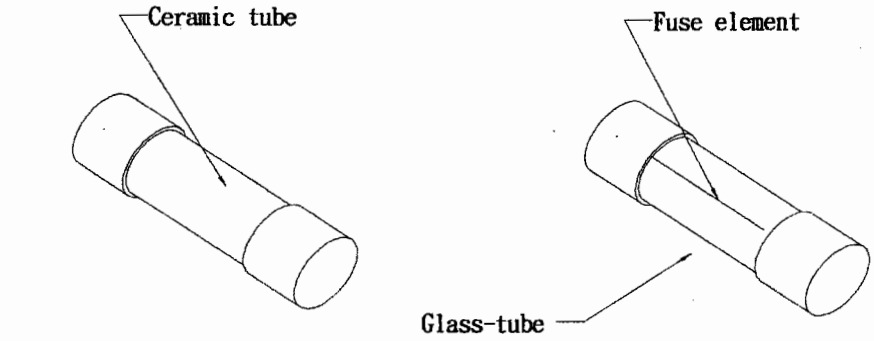
NOTE: There may be cases when the contact sticks and the spring support remains extracted even though the magnetic contactor is not activated.

Dust or other foreign matter entering between the contacts or in the moving parts may cause poor contact.

Magnetic contactor state (spring support extraction or projection condition) will vary according to different magnetic contactors. However, whether or not a particular magnetic contactor has been activated, can be easily determined by comparing it with other magnetic contactor.

2. Fuse Testing and Inspection

<Cartridge fuse>



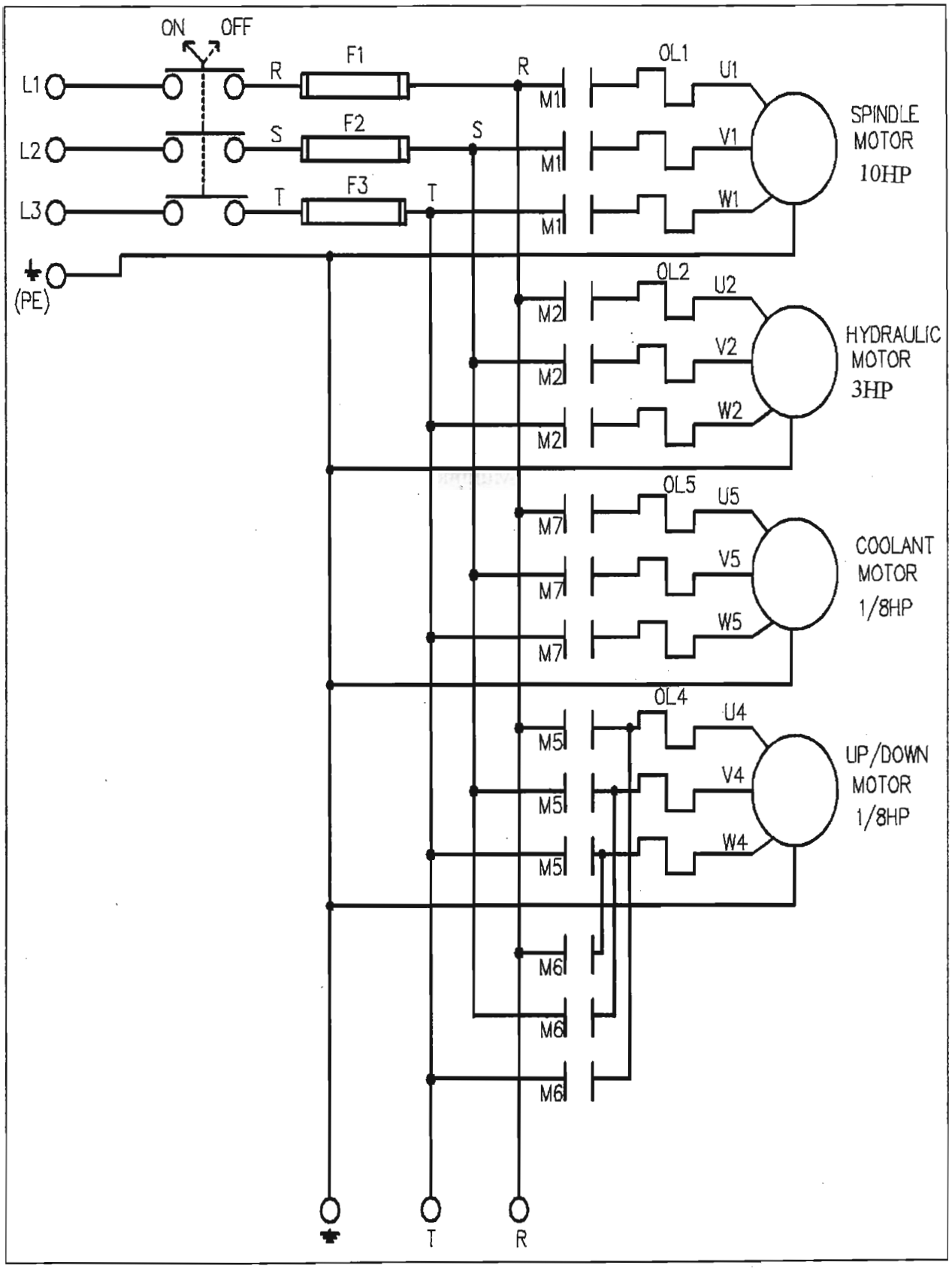
Fuse10x35

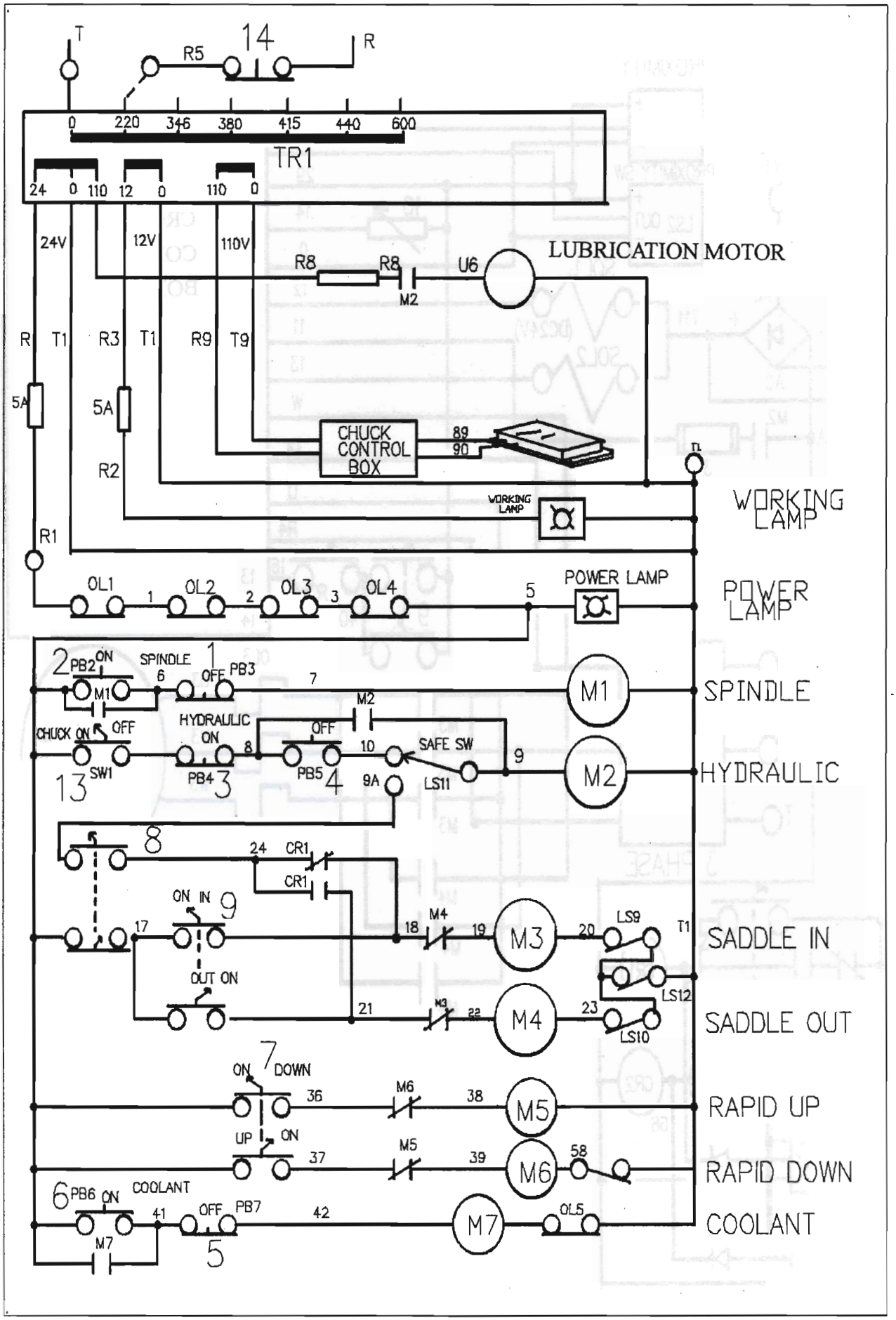
A cartridge fuse contains its fuse element in a transparent glass-type ceramic tube. If the fuse element is not visible, check whether or not the fuse is blown with a Multimeter.

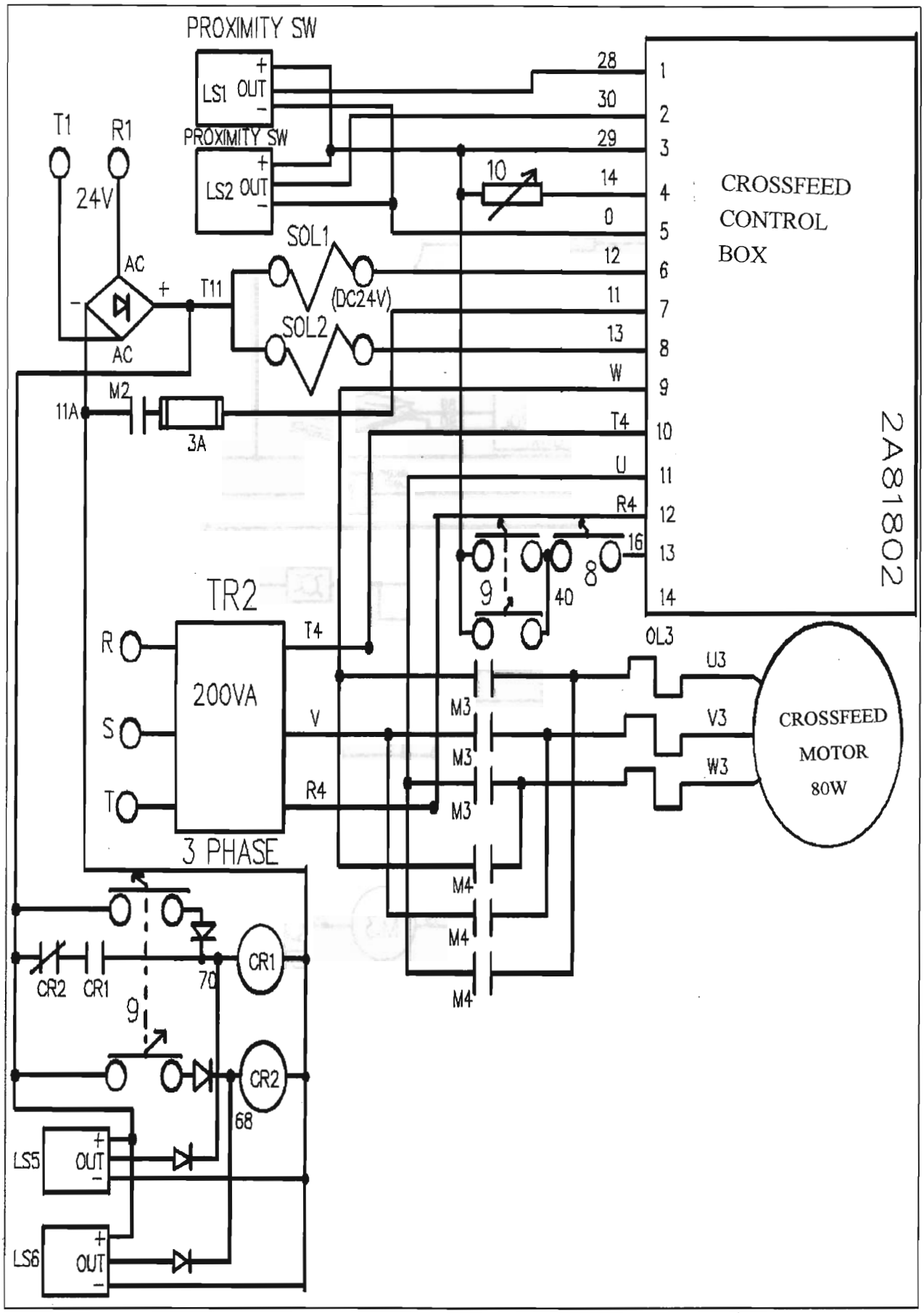
Glass-tube fuse; when the fuse element is Blown, it is easily visible.

CHAPTER 4

ELECTRIC CIRCUIT DIAGRAM




T
R5
14
R
0 220 346 380 415 440 600
TR1
24 0 110 12 0 110 0
24V
12V
110V
LUBRICATION MOTOR
R8
R8
U6
M2
R T1 R3 T1 R9 T9
5A
5A
R2
CHUCK CONTROL BOX
89
90
T1
WORKING LAMP
WORKING LAMP
R1
OL1 1 OL2 2 OL3 3 OL4
5
POWER LAMP
POWER LAMP
2 PB2 ON
SPINDLE
6
OFF PB3
7
M1
SPINDLE
M2
CHUCK ON OFF
SW1
13
HYDRAULIC ON
PB4 3
8
OFF
PB5 4
10
SAFE SW
LS11
9
9A
M2
HYDRAULIC
8
24 CR1
CR1
ON IN 9
17
18 M4
19
M3
20 LS9
T1
SADDLE IN
OUT ON
21
M4
22
23
LS10
LS12
SADDLE OUT
7 ON DOWN
36
M6
38
M5
RAPID UP
UP ON
37
M5
39
M6
58
RAPID DOWN
6 PB6 ON
COOLANT
41
OFF PB7
5
42
M7
M7
OL5
COOLANT


PROXIMITY SW
LS1 OUT
PROXIMITY SW
LS2 OUT
T1
R1
24V
AC
AC
T11
SOL1
(DC24V)
SOL2
M2
11A
3A
10
28
30
29
14
0
12
11
13
W
T4
U
R4
16
8
9
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CROSSFEED
CONTROL
BOX
2A81802
TR2
R
S
T
200VA
T4
V
R4
3 PHASE
OL3
U3
V3
W3
CROSSFEED
MOTOR
80W
M3
M3
M3
M4
M4
M4
CR2
CR1
70
9
CR1
CR2
68
LS5
OUT
LS6
OUT

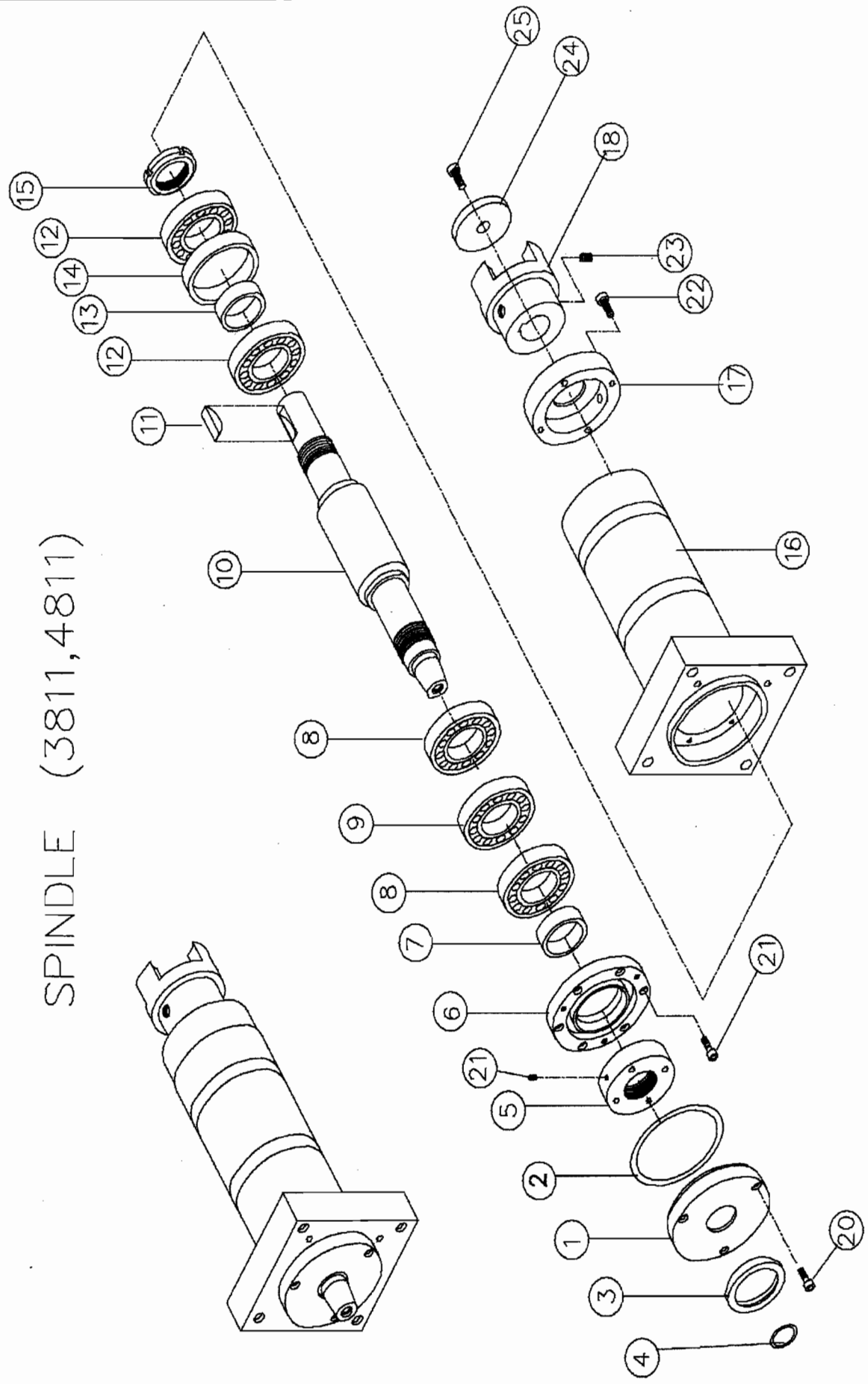
CE. MACHINERY DIRECTIVE 89/392/EEC
PARTS LIST

PRESERVE THIS MANUAL FOR FUTURE REFERENCE AND USE.

MACHINE NAME: HORIZONTAL SURFACE GRINDING MACHINE

MODEL: SUPRA-1428AHD
SUPRA-1632AHD
SUPRA-1640AHD

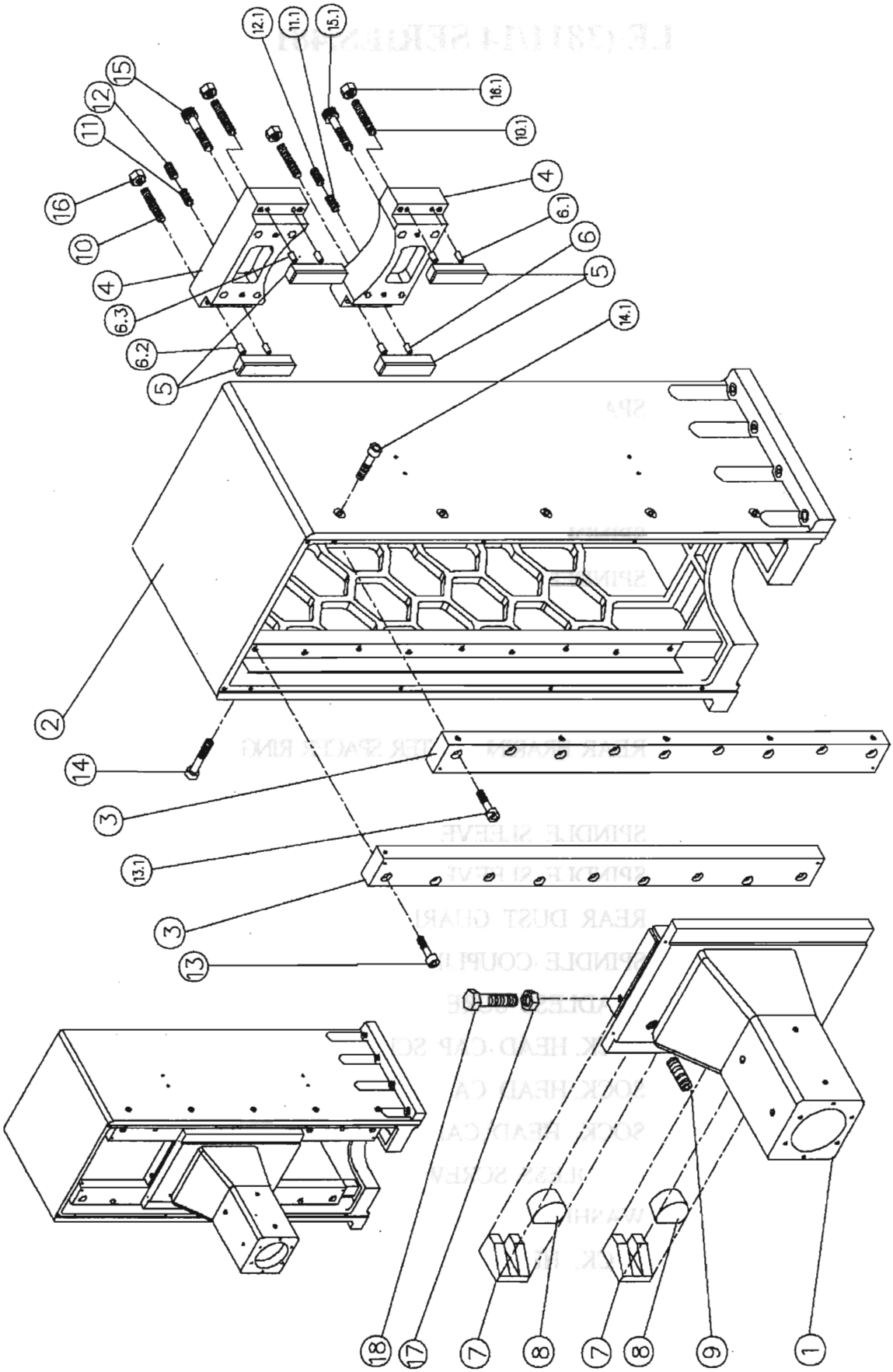
SPINDLE (3811,4811)



SPINDLE (3811/14 SERIES,4811/16 SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	381004-1	FRONT DUST GUARD	1	
2.		O-RING	1	P120
3	381039		1	
4		O-RING	1	P45
5.	381005	SPINDLE FRONT NUT	1	
6.	381006-1	FRONT BEARING PRESSING PLATE	1	
7.	381042	SPACER RING	1	
8.		BEARING	2	7210
9.		BEARING	1	NN21OWP6
10	381003	SPINDLE	1	12 SERIES
10	481003	SPINDLE	1	16 SERIES
11.		SETTING KEY	2	R16x10L
12.		BEARING	2	7210
13	381007	INNER SPACER RING	1	
14.	381008	REAR BRARING OUTER SPACER RING	1	
15.	381009	SPINDLE REAR NUT	2	AN16
16.	381002	SPINDLE SLEEVE	1	12 SERIES
16	481002	SPINDLE SLEEVE	1	16 SERIES
17.	381010	REAR DUST GUARD	1	
18.	381011	SPINDLE COUPLING	1	
19.		HEADLESS SCREW	2	M6x8L
20.		SOCK. HEAD CAP SCREW	4	M6x25L
21.		SOCK. HEAD CAP SCREW	6	M6x25L
22.		SOCK. HEAD CAP SCREW	4	M6x30L
23.		HEADLESS SCREW	2	M8x10L
24.	381014	WASHER	1	
25.		SOCK. HEAD CAP SCREW	1	M12x30L

COLUMN (3821,3821H,4821,4821H)



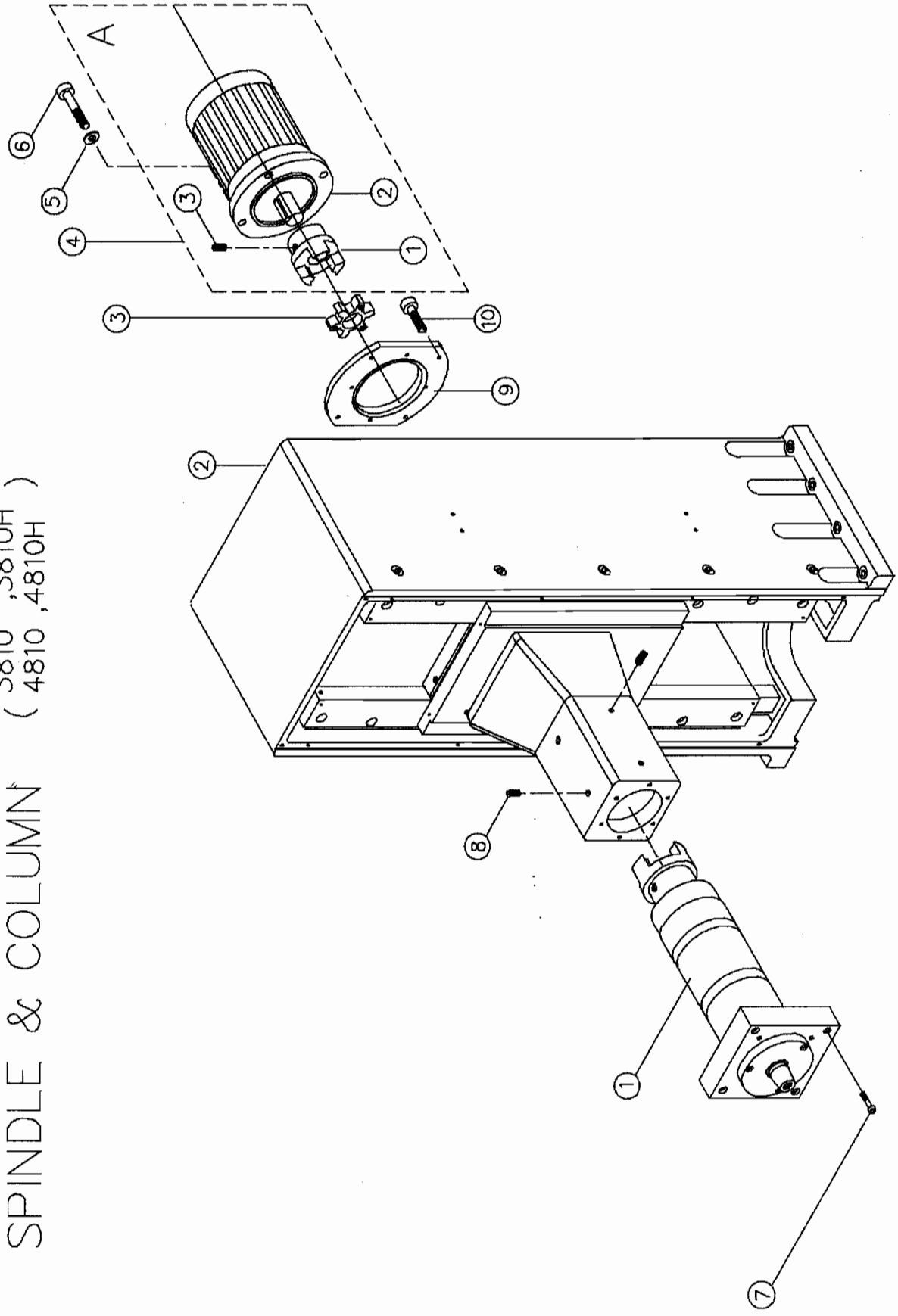
COLUMN (3821,3821H/14SERIES,4821,4821H/16SERIES)

(3821,4821,STANDARD COLUMN/3821H,4821H,HIGH COLUMN)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	381001-1	SPINDLE SEAT	1	14 SERIES
1	481001-1	SPINDLE SEAT	1	16 SERIES
2.	382001A	STANDARD COLUMN	1	3821,4821
	382001B	HIGH COLUMN	1	3821H,4821H
3.	382003A	STANDARD COLUMN RAIL	2	3821,4821
	382002B	HIGH COLUMN RAIL	2	3821H,4821H
4.	382002-2	SPINDLE SEAT 'S PRESSING PLATE	2	
5.	252013	VERTICAL BACK SLIDE PLATE	4	
6.		DOWEL PIN	2	D8x20L
6.1		DOWEL PIN	2	D8x20L
6.2		DOWEL PIN	2	D8x20L
6.3		DOWEL PIN	2	D8x20L
7.	382015	VERTICAL SLIDE PLATE	2	
8.	252012	VERTICAL SLIDE PLATE ADJUSTING BLOCK	2	
9.		HEADLESS SCREW	1	M12x25L
10.		HEADLESS SCREW	4	M10x70L
10.1		HEADLESS SCREW	4	M10x70L
11.		HEADLESS SCREW	1	M10x30L
11.1		HEADLESS SCREW	1	M10x30L
12.		HEADLESS SCREW	1	M10x10L
12.1		HEADLESS SCREW	1	M10x10L
13.		SOCK. HEAD CAP SCREW	11	M10x60L(3821,4821)
13.		SOCK. HEAD CAP SCREW	12	M10x60L(4821H,4821H)
13.1.		SOCK. HEAD CAP SCREW	11	M10x60L(3821,4821)
13.1.		SOCK. HEAD CAP SCREW	12	M10x40L(3821H,4821H)
14.		SOCK. HEAD CAP SCREW	6	M10x40L(3821,4821)
14.		SOCK. HEAD CAP SCREW	6	M10x40L(3821H,4821H)
14.1.		SOCK. HEAD CAP SCREW	6	M10x40L(3821,4821)
14.1.		SOCK. HEAD CAP SCREW	7	M10x40L(3821H,4821H)
15.		SOCK. HEAD CAP SCREW	4	M12x100L

15.1	SOCK. HEAD CAP SCREW	4	M12x100L
16	NUT	4	M10
16.1	NUT	4	M10
17.	NUT	1	M12
18.	HEX SOCKET SCREW	1	M12*70L

SPINDLE & COLUMN (3810 ,3810H 4810 ,4810H)



SPINDLE&COLUMN

(3810,3810H/14 SERIES,4810,4810H/16 SERIES)

(3810/4810 STANDARD COLUMN,3810H/4810H HIGH COLUMN)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	3811	SPINDLE	1	14 SERIES
1	4811	SPINDLE.1	1	16 SERIES
2	3821(4821)	STANDARD COLUMN	1	PL-02
2	3821H(4821H)	HIGH COLUMN	1	PL-02
3.	382012	RUBBER COUPLING	1	
4.	A	SPINDLE MOTOR	1	
5.		SPRING WASHER	4	ϕ 12
6.		SOCK. HEAD CAP SCREW	4	M12x40L
7.		SOCK. HEAD CAP SCREW	4	M12x40L
8.		HEADLESS SCREW	8	M10x10L
9.	381037	MOTOR LENGTHENING PLATE	1	(7.5HP/10HP MOTOR USE)
10		SOCK. HEAD CAP SCREW	4	M6x25L(7.5HP/10HP MOTOR USE)

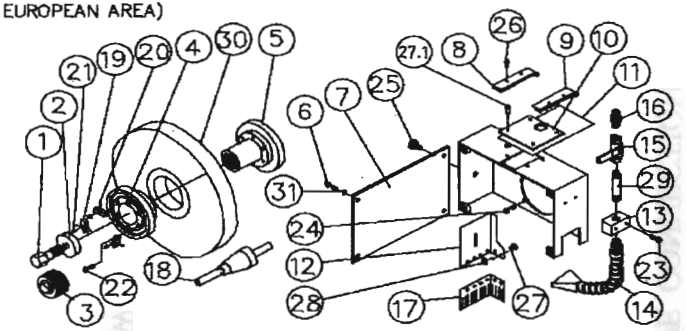
A. SPINDLE MOTOR

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	381013A	MOTOR COUPLING	1	
2	7.5HP4PXXX/XXXV	SPINDLE MOTOR	1	7.5HP
2	10HP4PXXX/XXXV	SPINDLE MOTOR	1	10HP
3.		HEADLESS SCREW	2	M8*10L

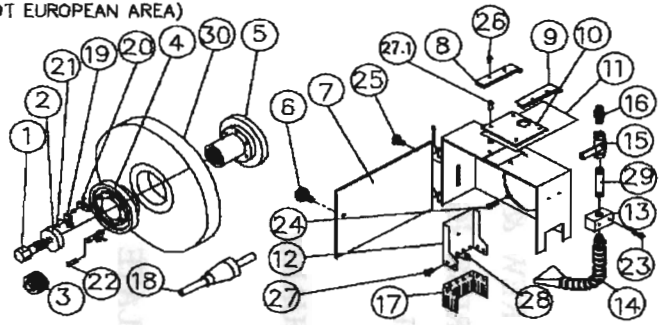
GRINDING WHEEL & COLUMN (3812 ,3813 ,3822,3822H,2512A 3823,3823H,3824,3813E,3813AE)

A GRINDING WHEEL & WHEEL GUARD

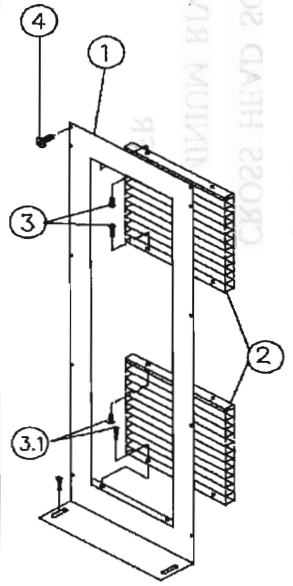
A.1 (FOR EUROPEAN AREA)

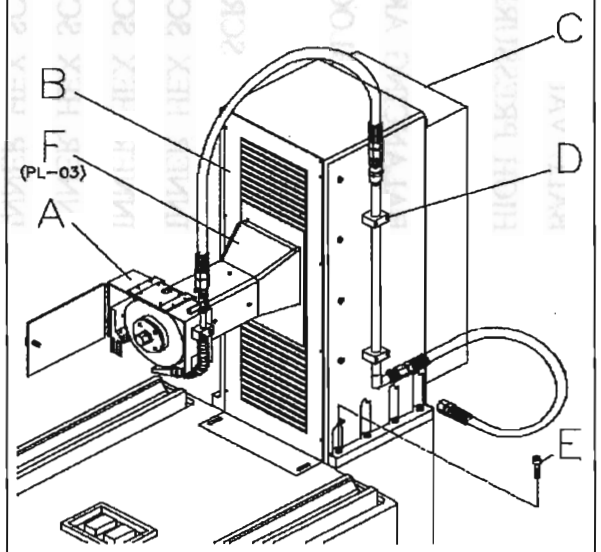


A.2 (NOT EUROPEAN AREA)

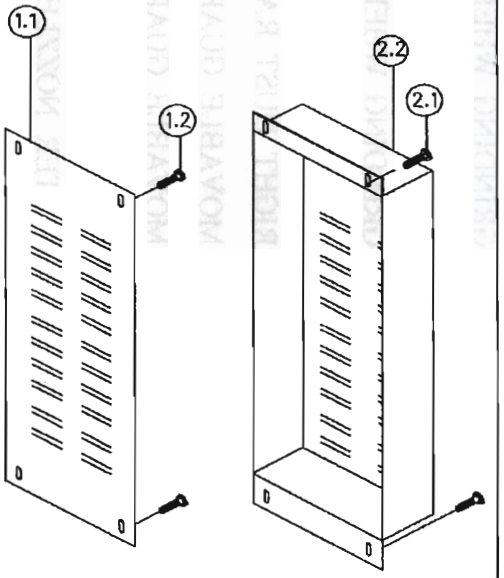


B

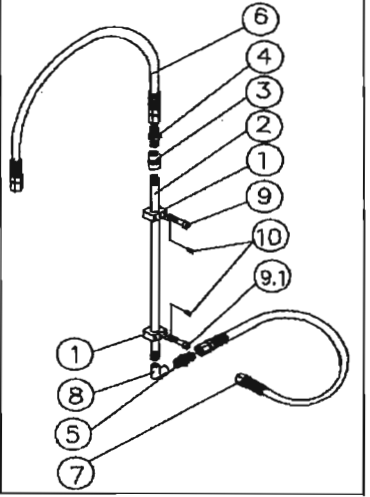




C



D



A.1 GRINDING WHEEL & WHEEL GUARD (3812E, 3813E)
(FOR EUROPEAN AREA)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	381017	LOCK BOLT	1	
2.	381018	WASHER	1	
3.	381022	WHEEL EXTRACT SCREW & NUT	1	
4.	381020	GRINDING WHEEL PRESSING PLATE	1	
5.	381019-1	GRINDING WHEEL HUB	1	
6.		CROSS HEAD SCREW	4	M8x14L
7.	381028E(381040E)	GRINDING WHEEL GUARD	1	
8.	381031	LEFT DUST RAIL	2	
9.	381032	RIGHT DUST RAIL	1	
10.	381029	MOVABLE GUARD PLATE	1	
11.	381030	MOVABLE GUARD SHEET	1	
12.	381033E	SPLASH GUARD	1	
13.	381025	WATER NOZZLE SEAT	1	
14.		WATER NOZZLE	1	1/2PT
15.		BALL VALVE	1	1/2PT
16.		HIGH PRESSURE PIPE CONNECTION	1	1/2PTx3/8PH
17.	381034	DUST RUBBER PIECE	1	
18.	381035	BALANCING ARBOR	1	
19.	381021	BALANCE BLOCK	3	
20.		STEEL BALL	3	D4
21.		HEADLESS SCREW	3	M5x5L
22.		INNER HEX SCREW	6	M6x50L
23.		INNER HEX SCREW	2	M6x12L
24.		INNER HEX SCREW	4	M8x20L
25.		INNER HEX SCREW	1	M6x14L
26.		CROSS HEAD SCREW	4	M6x10L
27.		ALUMINIUM RIVET	8	D3x5L
28.		WASHER	8	M3
29.		WATER PIPE	1	1/2PTx2"L
30.		12" GRINDING WHEEL	1	355x127x50MM

A .2 GRINDING WHEEL & WHEEL GUARD (3812, 3813)

(NOT EUROPEAN AREA)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	381017	LOCK BOLT	1	
2.	381018	WASHER	1	
3.	381022	WHEEL EXTRACT SCREW & NUT	1	
4.	381020	GRINDING WHEEL PRESSING PLATE	1	
5.	381019-1	GRINDING WHEEL HUB	1	
6.	381024	GRINDING WHEEL GUARD BOLT	1	
7.	381028-1	GRINDING WHEEL GUARD	1	
8.	381031	LEFT DUST RAIL	2	
9.	381032	RIGHT DUST RAIL	1	
10.	381029	MOVABLE GUARD PLATE	1	
11.	381030	MOVABLE GUARD SHEET	1	
12.	381033	SPLASH GUARD	1	
13.	381025	WATER NOZZLE SEAT	1	
14.		WATER NOZZLE	1	1/2PT
15.		BALL VALVE	1	1/2PT
16.		HIGH PRESSURE PIPE CONNECTION	1	1/2PTx1/2PH
17.	381034	DUST RUBBER PIECE	1	
18.	381035	BALANCING ARBOR	1	
19.	381021	BALANCE BLOCK	3	
20.		STEEL BALL	3	D4
21.		HEADLESS SCREW	3	M5x5L
22.		INNER HEX SCREW	6	M6x50L
23.		INNER HEX SCREW	2	M6x12L
24.		INNER HEX SCREW	4	M8x20L
25.		INNER HEX SCREW	1	M6x14L
26.		CROSS HEAD SCREW	4	M6x10L
27.		ALUMINIUM RIVET	8	D3x5L
28.		WASHER	8	M3
29.		WATER PIPE	1	1/2PTx2"L
30.		12" GRINDING WHEEL	1	355x50x127MM

B. COLUMN FRONT DUST FENDER (3822,3822H/HIGH COLUMN)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	382014A	STANDARD COLUMN FRONT FENDER	1	3822
1.	382014B	STANDARD COLUMN FRONT FENDER	1	3822H
2.	382005	COLUMN FRONT DUST SHEET	2	
3.		CROSS HEAD SCREW	4	M4x10L
3.1		CROSS HEAD SCREW	4	M4x10L
4.		CROSS HEAD SCREW	12	M6x8L

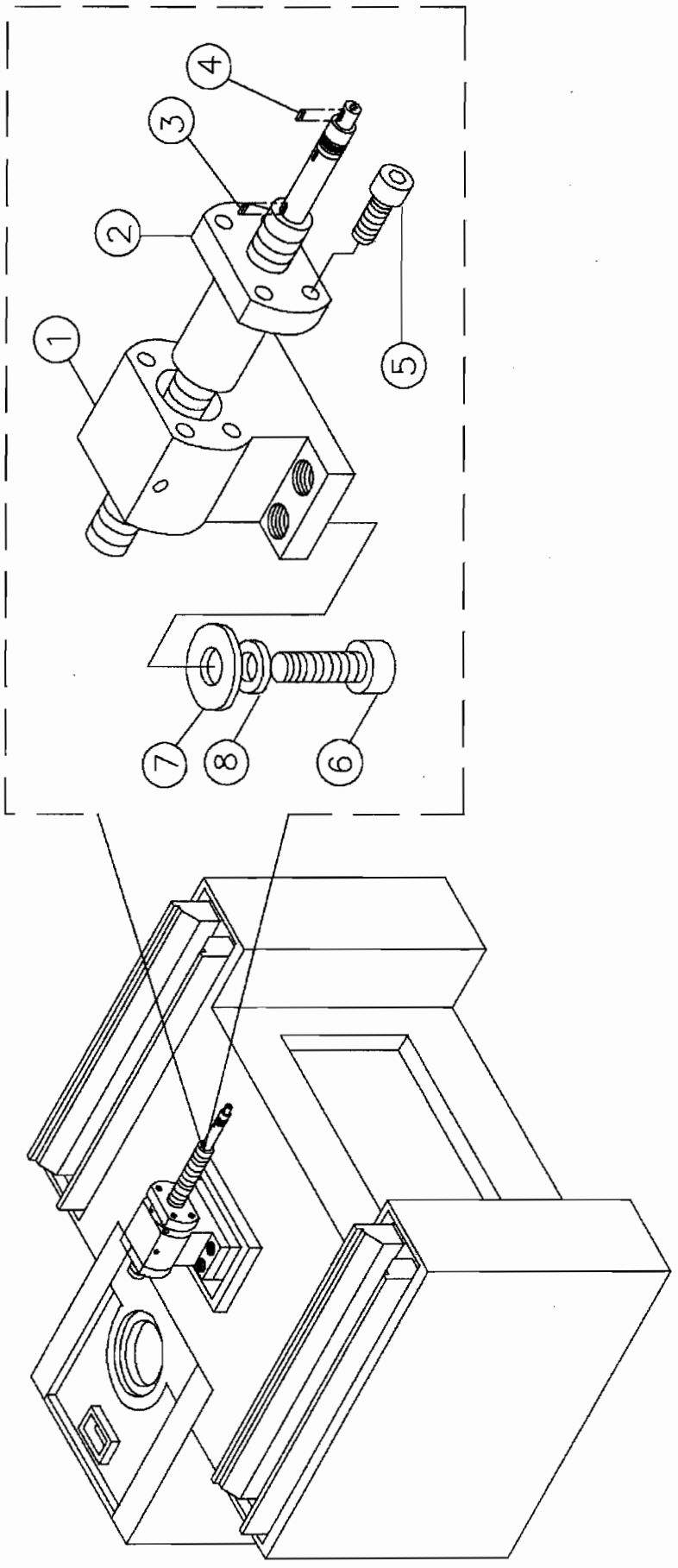
C. COLUMN REAR DUST FENDER (3823L)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
2.1	382009C-1	COLUMN REAR DUST FENDER (3823L)	1	FOR7.5/10HPMOTOR
2.2		CROSS HEAD SCREW	4	M6x10L

D. WATER PIPE (3824)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	382011	WATER PIPE'S FIXING BLOCK	2	
2.	382012	WATER PIPE	1	
3.		INSIDE THREAD STRAIGHT CONNECTION	2	1/2PT
4.		HIGH PRESSURE PIPE CONNECTION	1	1/2PTx1/2PH
5.		HIGH PRESSURE PIPE CONNECTION	1	1/2PTx1/2PH
6.		HIGH PRESSURE PIPE	1	1/2PTx1310L
7.		HIGH PRESSURE PIPE	1	1/2PHx1000L
8.		INSIDE THREAD 90° CONNECTION	1	1/2PT
9.		INNER HEX SCREW	4	M6x55L
10.		INNER HEX HEADLESS SCREW	2	M6x6L

CROSSWISE SCREW SET (3631,3631N)
4631,4631N



CROSSWISE SCREW SET (3631,3631N): BALL SCREW (OPTIONAL)

(FOR14 SERIES)

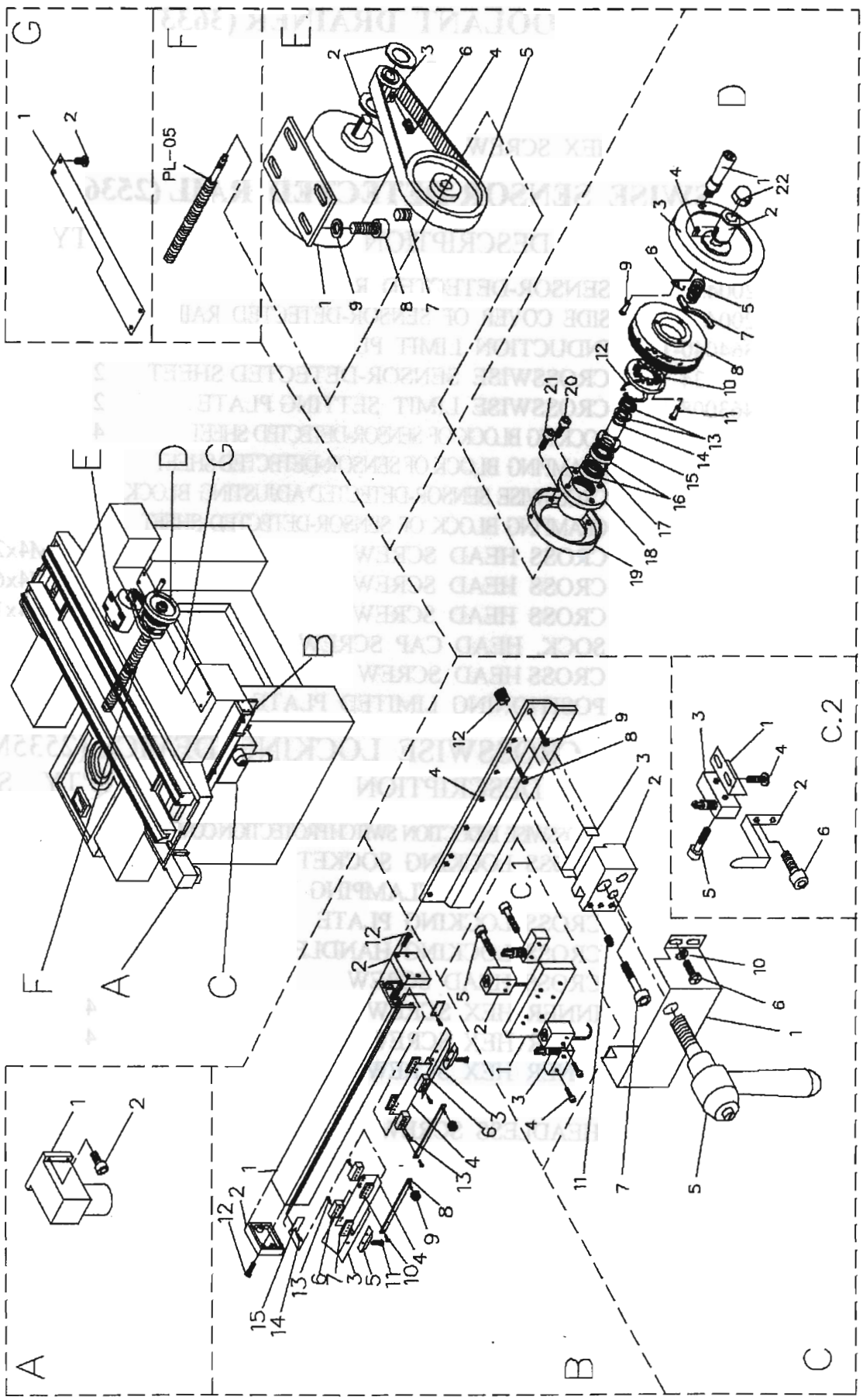
NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	363006-1	NUT SEAT	1	
2.	363002G	CROSSWISE BALL SCREW	1	MM (3631)
2	363002H	CROSSWISE BALL SCREW	1	INCH (3631N)
3.		SETTING KEY	1	5x5x20L
4.		SETTING KEY	1	5x5x10L
5.		SOCKET SCREW	4	M6x16L
6.		SOCKET SCREW	4	M12x35L
7.		WASHER	4	ϕ 12
8.		SPRING WASHER	4	ϕ 12

CROSSWISE SCREW SET (4631,4631N): BALL SCREW (OPTIONAL)

(FOR 16 SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	363006-1	NUT SEAT	1	
2.	463002G2	CROSSWISE BALL SCREW	1	MM (4631)
2	463002H2	CROSSWISE BALL SCREW	1	INCH (4631N)
3.		SETTING KEY	1	5x5x20L
4.		SETTING KEY	1	5x5x12L
5.		SOCKET SCREW	4	M6x16L
6.		SOCKET SCREW	4	M12x35L
7.		WASHER	4	ϕ 12
8.		SPRING WASHER	4	ϕ 12

SADDLE CROSSWISE DRIVE (2532,2532N,3634,2536 / 3637,3633,3639)



A. COOLANT DRAINER (3633)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	364026	COOLANT DRAINER	1	
2.		HEX SCREW	4	M6x16L

B. CROSSWISE SENSOR-DETECTED RAIL (2536)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	200430	SENSOR-DETECTED RAIL	1	
2.	200431	SIDE COVER OF SENSOR-DETECTED RAIL	2	
3.	364040-1	INDUCTION LIMIT PLATE	2	
4.	200434	CROSSWISE SENSOR-DETECTED SHEET	2	
5.	463008	CROSSWISE LIMIT SETTING PLATE	2	
6.	200432	LOCKING BLOCK OF SENSOR-DETECTED SHEET	4	
7.	200427	CLAMPING BLOCK OF SENSOR-DETECTED SHEET	4	
8.	463011-1	CROSSWISE SENSOR-DETECTED ADJUSTING BLOCK	1	
9.	200427	CLAMPING BLOCK OF SENSOR-DETECTED SHEET	2	
10.		CROSS HEAD SCREW	4	M4x20L
11.		CROSS HEAD SCREW	4	M4x6L
12.		CROSS HEAD SCREW	8	M4x16L
13.		SOCK. HEAD CAP SCREW	8	M4x14L
14.		CROSS HEAD SCREW	2	M4x6L
15.	200437	POSITIONING LIMITED PLATE	2	

C. CROSSWISE LOCKING DEVICE (2535M)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	463004-1	CROSSWISE INDUCTION SWITCH PROTECTION COVER	1	
2.	463015	CROSS LOCKING SOCKET	1	
3.	463017	CROSS LOCK CLAMPING PLATE	1	
4.	463013-1	CROSS LOCKING PLATE	1	
5.	463012-1	CROSS LOCKING HANDLE	1	
6.		CROSS HEAD SCREW	4	M5x8L
7.		INNER HEX SCREW	4	M8x65L
8.		INNER HEX SCREW	4	M6x16L
9.		INNER HEX SCREW	5	M4x10L
10.		WASHER	4	D5
11.		HEADLESS SCREW	3	M6x8L
12.	463014	FRICTION SCREW	1	M12x15L

C.1 CROSSWISE PROXIMITY SWITCH(2535A1)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	463003-1	CROSS PROXIMITY SWITCH SOCKET	1	17x17x28
2.		PROXIMITY SWITCH	2	PNP5MM PL-Q5P
3.		LIMIT SWITCH	2	Z-15GQ22-B
4.		SOCK. HEAD CAP SCREW	4	M4x25L
5.		CROSS HEAD SCREW	4	M3x25L

C.2 CROSSWISE SAFETY SWITCH(2535A2)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	463016	SAFETY SWITCH FIXED PLATE	1	
2.	253025	CROSS TRAVEL INDICATOR	1	
3.		LIMIT SWITCH	1	Z-15GQ22-B
4.		SOCK. HEAD CAP SCREW	2	M5x10L
5.		SOCK. HEAD CAP SCREW	2	M4x25L
6.		SOCK. HEAD CAP SCREW	2	M5x10L

D CROSSWISE SCALE RING & HAND WHEEL (2532 B2, 2532M A2)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	100237	FOLDING HANDLE	1	
2.	363051	HANDWHEEL WASHER	1	
3.	363009-2	HAND WHEEL	1	
4.		SETTING KEY	1	6x6x10L
5.	363053	DISK COMPRESSION SPRING	1	
6.	363052	SPRING	1	
7.	363050	SAFE POSITIONING PLATE	1	
8.	363010A1	FEEDING SCALE RING	1	MM (2532 B2)
8	363010E1	FEEDING SCALE RING	1	INCH (2532 A2)
9.		GIB HEADED PIN	1	d6xD9x25L
10.	363011-1	FIXED DISK GEAR	1	
11.		SOCK. HEAD CAP SCREW	1	M5x16L
12.		C-RETAINING RING	1	Cd26
13.	253011	REAR LOCKING NUT	2	
14.	253010	BEARING BUSH	1	
15.	253008	BEARING LOCKING NUT	1	
16.		BEARING	2	
17.	253026	BEARING SPACER	1	
18.	253007	BEARING SEAT	1	
19.	363014A	SCALE INDICATING PLATE	1	MM(2532 B2)
19.	363014E	SCALE INDICATING PLATE	1	INCH (2532 A2)
20.		SOCK. HEAD CAP SCREW	1	M6x20L
21.		SOCK. HEAD CAP SCREW	1	M6x16L
22.		CUP NUT	1	M12

E. CROSSWISE MOTOR SET (2534)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	363018	CROSS MOVEMENT MOTOR	1	
2.	200211	RING WASHER	2	
3.	363016	MOTOR PULLEY	1	
4.		TIMING BELT-G	1	200xLx20MM
5.	253015-1	BIG PULLEY	1	
6.		HEADLESS SCREW	2	M5x6L
7.		HEADLESS SCREW	2	M6x10L
8.		SOCK. HEAD CAP SCREW	4	M10x16L
9.		WASHER	4	ϕ 10

G. CROSSWISE PROTECTION SET

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	363019	PROTECTION PLATE	1	1428/1632
1	413002	PROTECTION PLATE	1	1640
2.		CROSS HEAD SCREW	6	M5x8L

TABLE LONGITUDINAL DRIVE

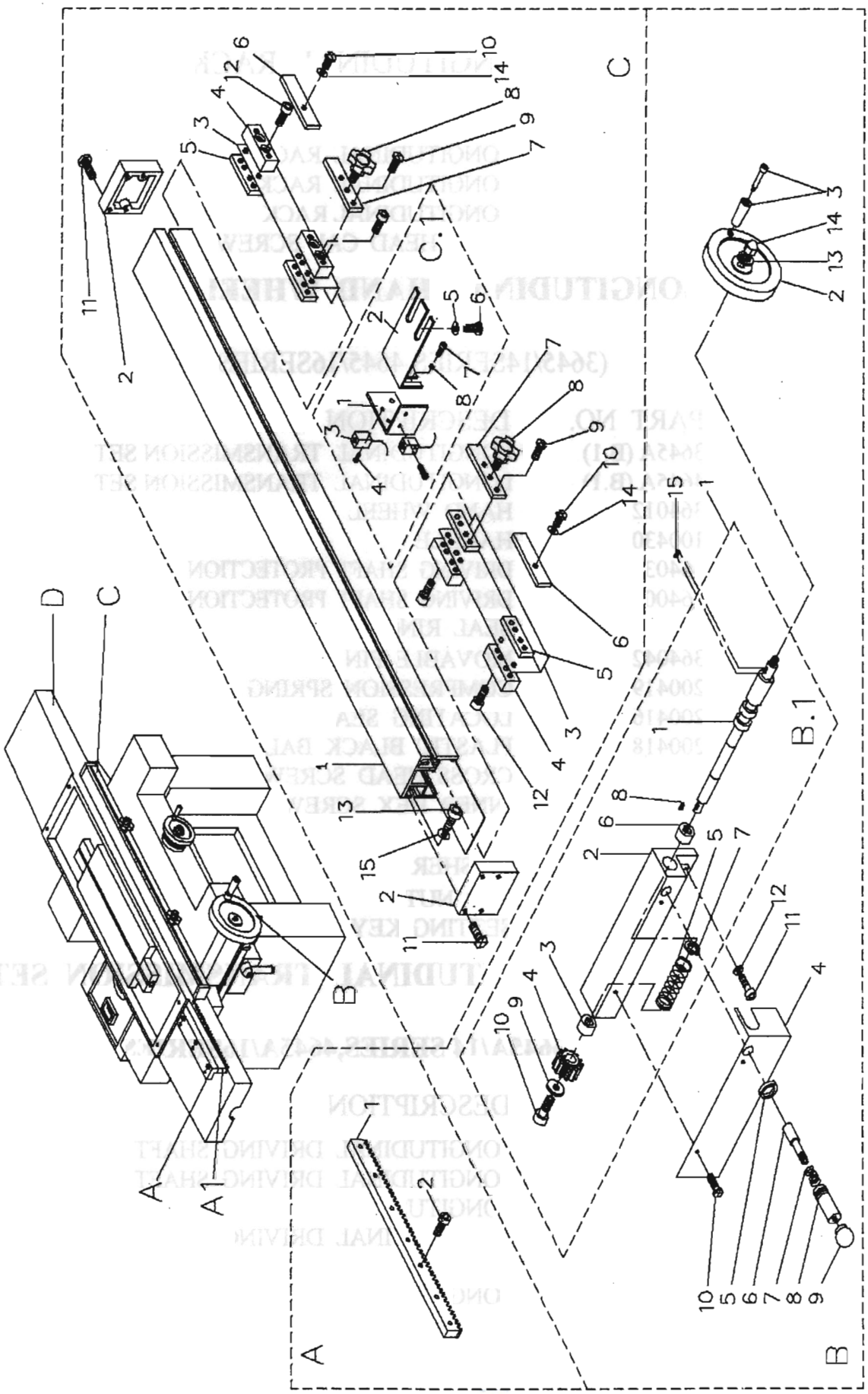


TABLE LONGITUDINAL DRIVE

A. LONGITUDINAL RACK SET

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	373003	LONGITUDINAL RACK	1	1428
1.	384007	LONGITUDINAL RACK	1	1632
1.	414004	LONGITUDINAL RACK	1	1640
2.		SOCK HEAD CAP SCREW	7	M6x20L

B. LONGITUDINAL HAND WHEEL SET

(3645/14SERIES,4645/16SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	3645A (B.1)	LONGITUDINAL TRANSMISSION SET	1	14 SERIES
1.	4645A (B.1)	LONGITUDINAL TRANSMISSION SET	1	16 SERIES
2.	364012	HAND WHEEL	1	
3.	100430	HANDLE	1	
4.	364035	DRIVING SHAFT PROTECTION COVER	1	14 SERIES
4.	464005	DRIVING SHAFT PROTECTION COVER	1	16 SERIES
5.		SEAL RING	1	ϕ 12x ϕ 15x3L
6.	364042	MOVABLE PIN	1	
7.	200419	COMPRESSION SPRING	1	
8.	200416	LOCATING SEAT	1	
9.	200418	PLASTIC BLACK BALL	1	
10.		CROSS HEAD SCREW	2	M6x8L
11.		INNER HEX SCREW	2	M8x20L
12.		WASHER	2	ϕ 8
13.		WASHER	2	ϕ 12
14.		CUP NUT	5	5x12L
15.		SETTING KEY	1	

B.1 LONGITUDINAL TRANSMISSION SET

(3645A/14 SERIES,4645A/16SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	364010	LONGITUDINAL DRIVING SHAFT	1	14 SERIES
2.	464004	LONGITUDINAL DRIVING SHAFT	1	16 SERIES
2.	364011	LONGITUDINAL DRIVING SEAT	1	14 SERIES
2.	464006	LONGITUDINAL DRIVING SEAT	1	16 SERIES
3.		NEEDLE BEARING	1	RLM1416
4.	200405	LONGITUDINAL DRIVING GEAR	1	
5.		COMPRESSION SPRING	1	1.8x21x150L
6.		NEEDLE BEARING	1	FJ-1712
7.		C-SHAPE RING	1	C17

8.		SETTING KEY	1	4x12L
9.	200406	GEAR FIXING WASHER	1	
10.		SOCK. HEAD CAP SCREW	1	M5x14L

C. LONGITUDINAL SENSOR-DETECTED SET

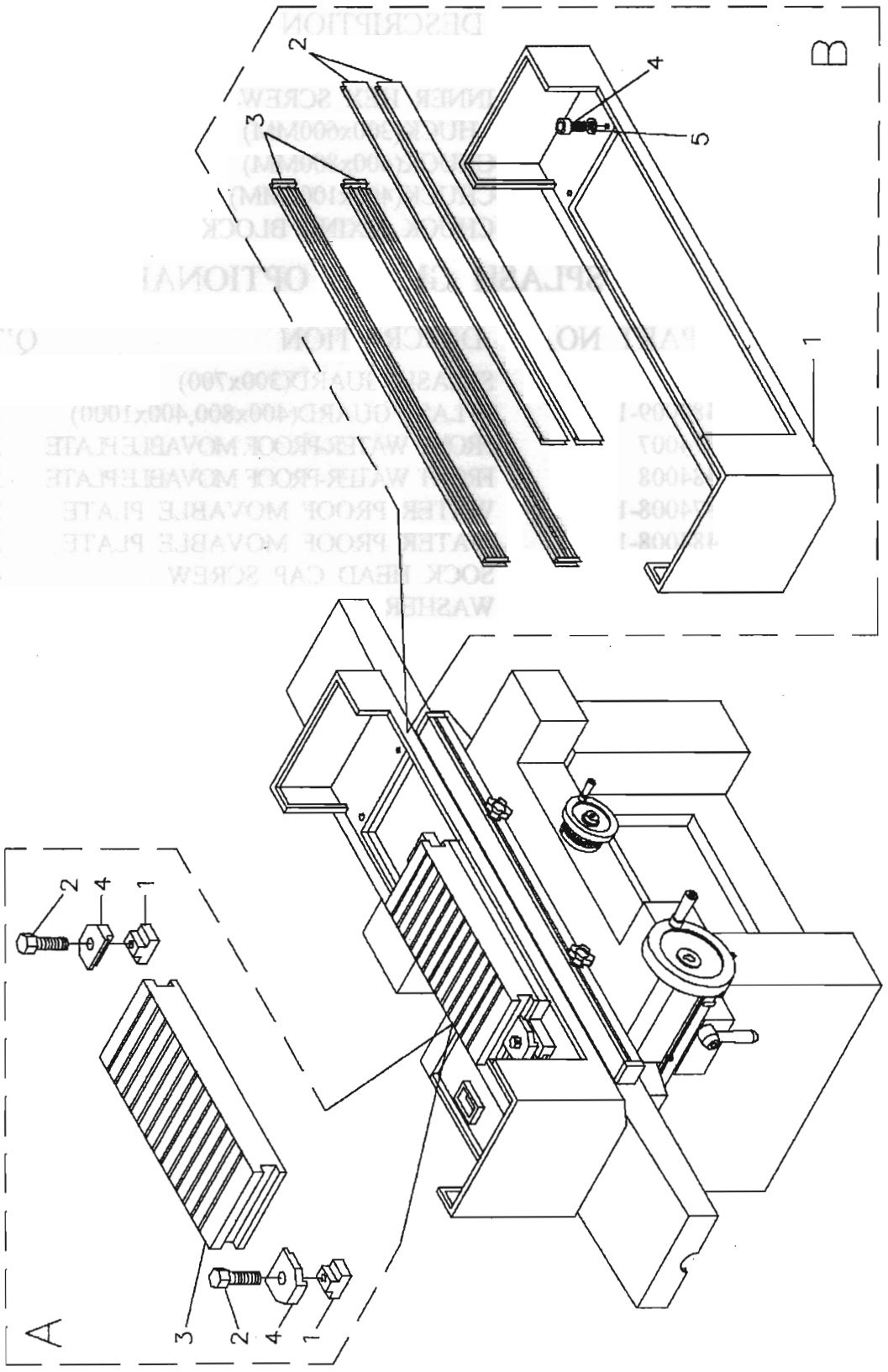
(2544 A1/14 SERIES,3844/16 SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	364004	LONGITUDINAL INDUCTION RAIL	1	1428
1	384003	LONGITUDINAL INDUCTION RAIL	1	1632,1640
2.	200431	SIDE COVER OF INDUCTION RAIL	2	
3.	200434	LONGITUDINAL SENSOR-DETECTED SHEET	2	
4.	200432	LOCKING BLOCK OF SENSOR-DETECTED SHEET	4	
5.	200427	CLAMPING BLOCK OF SENSOR-DETECTED SHEET	4	
6.	200437	LONGITUDINAL LIMIT BLOCK	2	
7.	200428-1	LONGITUDINAL SENSOR ADJUSTING BLOCK	2	
8.	200436	LOBE KNOB	2	
9.		CROSS HEAD SCREW	4	M4x20L
10.		CROSS HEAD SCREW	2	M4x8L
11.		CROSS HEAD SCREW	8	M4x16L
12.		SOCK. HEAD CAP SCREW	8	M5x14L
13.		SOCK. HEAD CAP SCREW	2	M6x16L
14.		SOCK. HEAD PLATE WASHER	2	ϕ4
15.		SOCK.HEAD PLATE WASHER	2	ϕ6

C.1 PROXIMITY SWITCH (2544A2)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	254038	FIXING PLATE	1	
2.	254037	ADJUSTING PLATE	1	
3.		PROXIMITY SWITCH	2	PNP 5MM(17*17*28MM)
4.		CROSS HEAD SCREW	4	M4x10
5.		WASHER	2	ϕ5
6.		CROSS HEAD SCREW	2	M5x10L
7.		CROSS HEAD SCREW	2	M4x6L
8.		WASHER	2	ϕ4

CHUCK & SPLASH GUARD (2548,3646,4746)



CHUCK & SPLASH GUARD

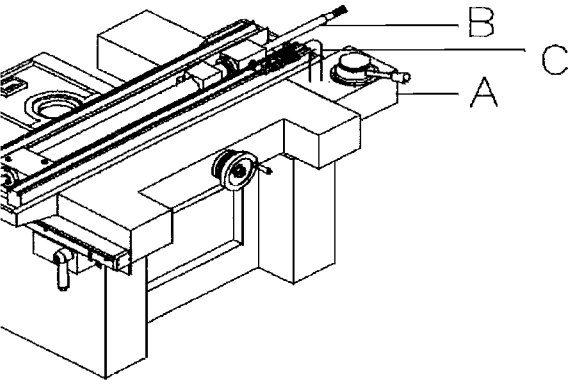
A. CHUCK OPTIONAL

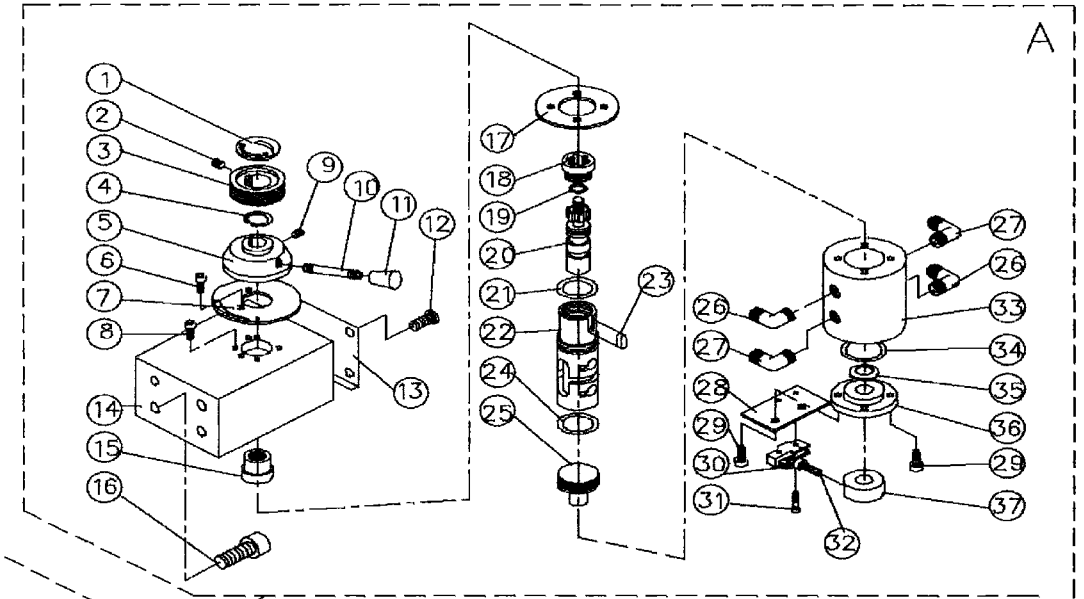
NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	364034-1	T-NUT	2	
2.		INNER HEX SCREW	2	M12x55L
3.		CHUCK(300x600MM)	1	1428 AHD
3.		CHUCK(400x800MM)	1	1632AHD
3.		CHUCK(400x1000MM)	1	1640AHD
4.		CHUCK FIXING BLOCK	2	

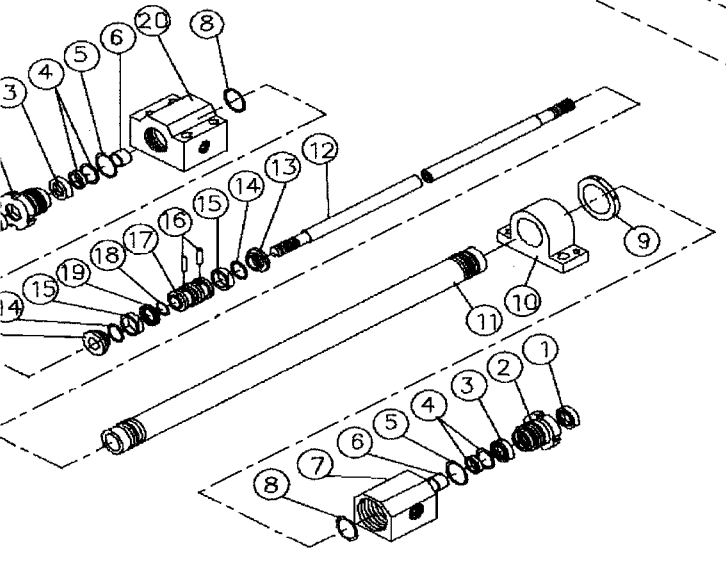
B SPLASH GUARD OPTIONAL

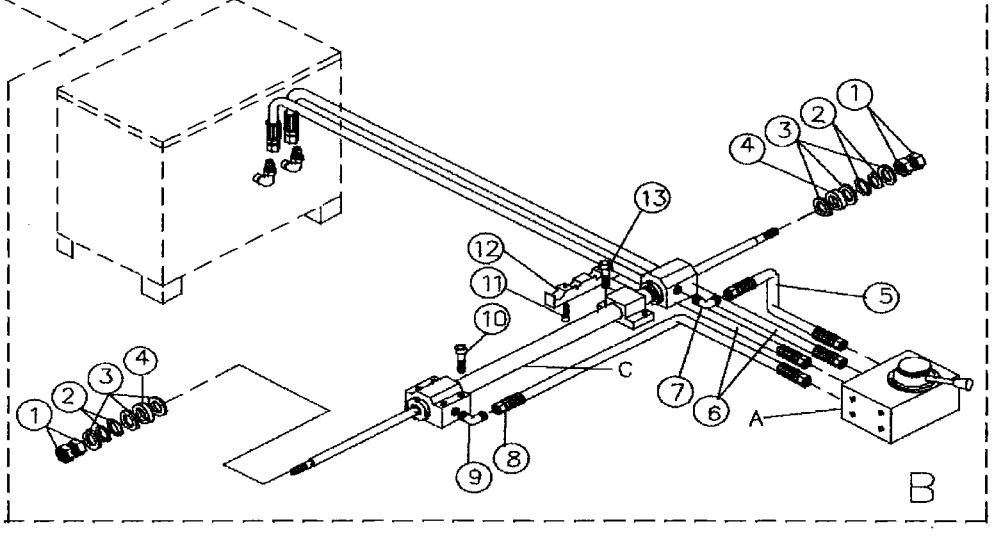
NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	374013-1	SPLASH GUARD(300x700)	1	1428
1.	484009-1	SPLASH GUARD(400x800,400x1000)	1	1632,1640
2.	374007	FRONT WATER-PROOF MOVABLE PLATE	2	1428
2.	484008	FRONT WATER-PROOF MOVABLE PLATE	2	1632,1640
3.	374008-1	WATER PROOF MOVABLE PLATE	2	1428
3.	484008-1	WATER PROOF MOVABLE PLATE	2	1632,1640
4.		SOCK HEAD CAP SCREW	4	M8x20L
5.		WASHER	4	ϕ 8

LONGITUDINAL HYDRAULIC SYSTEM









SUPRA1428AHD
SUPRA1632AHD
SUPRA1640AHD

LONGITUDINAL HYDRAULIC SYSTEM

A. LONGITUDINAL THROTTLING VALVE(3643)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	101063	FLOW CONTROL NAME PLATE	1	
2.		HEADLESS SCREW	1	M6x6L
3.	366023	FLOW CONTROL KNOB	1	
4.		INNER RETAINING RING	1	ϕ 42
5.	366021	FLOW SWITCH	1	
6.		SOCK. HEAD CAP SCREW	3	M6x12L
7.	101062A	THROTTLING VALVE PANEL	4	
8.		SOCK. HEAD CAP SCREW	4	M6x20L
9.		HEADLESS SCREW	1	M6x6L
10.	366023	THROTTLING HANDLE BAR	1	
11.	200612	THROTTLING HANDLE HEAD	1	
12.		CROSS HEAD SCREW	4	M5x12L
13.	366027	THROTTLING SEAT REAR COVER	1	
14.	366004	THROTTLING VALVE SEAT	1	
15.			1	
16.		SOCK. HEAD CAP SCREW	4	M8x20L
17.	366016	UPPER COVER PLATE OF THROTTLING SEAR	1	
18.	200321-1	INSIDE HEXAGONAL SHAFT SLEEVE	1	
19		O-RING	1	P22
20.	366020	THROTTLING ARBOR	1	
21.		O-RING	1	P42
22.	366018-1	THROTTLING VALVE SHAFT	1	
23.		DOUBLE HEAD FLAT KEY	2	6x6x10L
24.		O-RING	1	P26
25.	366019	SWITCH SHAFT OF THROTTLING VALVE	1	
26		HIGH PRESSURE PIPE 90° CONNECTION	2	1/2PTx3/4H
27.		HIGH PRESSURE PIPE 90° CONNECTION	2	1/2PTx1/2H
28.	256020	SAFETY SWITCH SEAT	1	
29.		SOCK. HEAD CAP SCREW	2	
30.		SAFETY SWITCH	1	Z-15GW2-B
31.		CROSS HEAD SCREW	2	M4x25L
32.		SOCK. HEAD CAP SCREW	1	M6x10L
33.	256015	THROTTLING VALVE BODY	1	
34.		O-RING	1	P48
35.		O-RING	1	
36.	366017	THROTTLING VALVE REAR COVER	1	
37	200317	CROSSWISE SETTING BLOCK	1	

B. HYDRAULIC PIPING

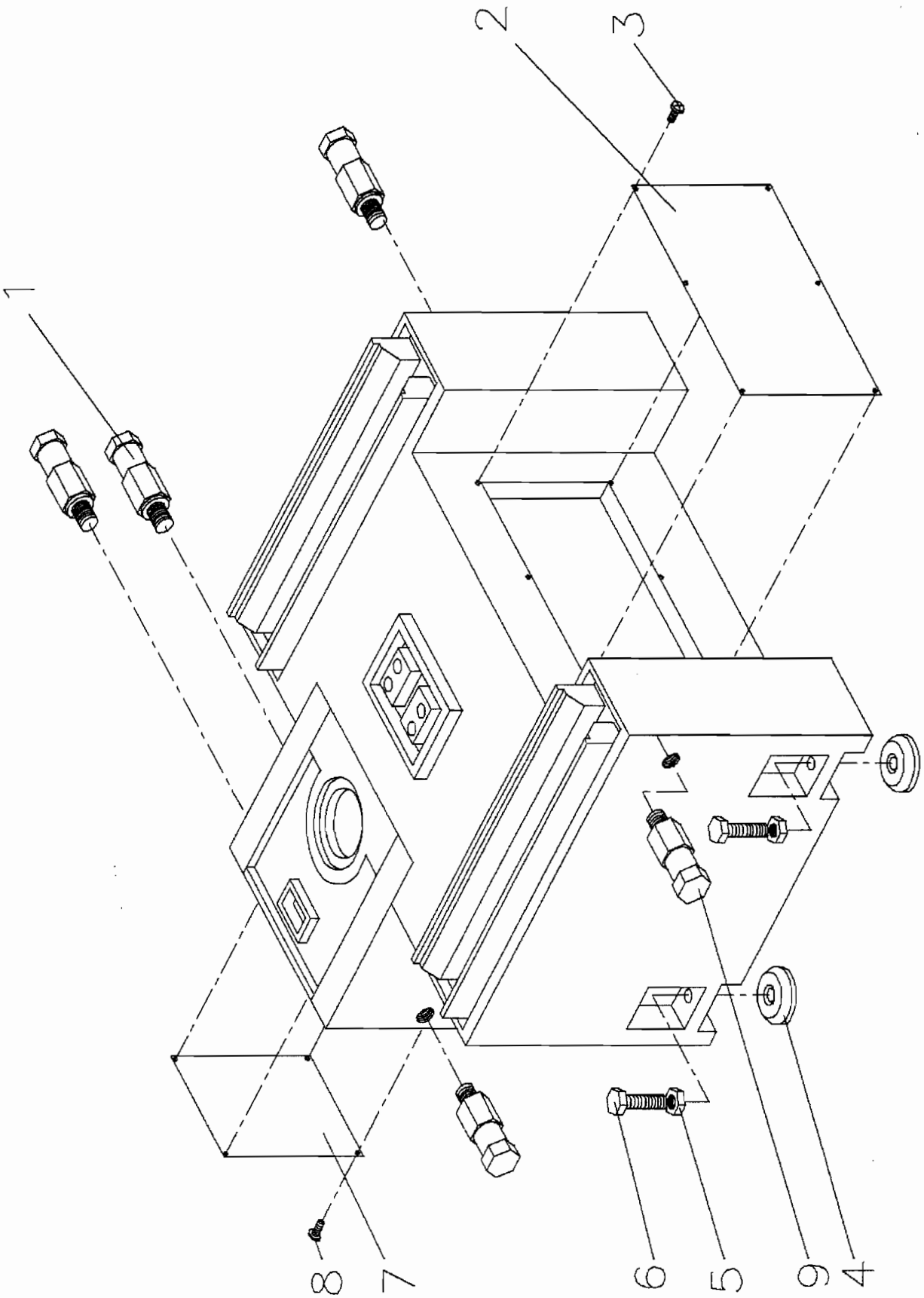
NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.		HEX SOCKET NUT	4	M16
2.		DISC WASHER	4	D16xD32x1.5T
3.	364023	RECOIL CUSHION	6	
4.	364022	WASHER	2	
5.		HIGH PRESSURE PIPE(1/2"PHx510L)	1	1428
5.		HIGH PRESSURE PIPE(1/2"PHx520L)	1	1632
5.		HIGH PRESSURE PIPE(1/2"PHx550L)	1	1640
6.		HIGH PRESSURE PIPE(3/4"PHx1750L)	2	1428
6.		HIGH PRESSURE PIPE(3/4"PHx1830L)	2	1632,1640
7.		HIGH PRESSURE PIPE 90° CONNECTION	1	1/2"PTx1/2"PH
8.		HIGH PRESSURE PIPE(1/2"PHx1400L)	1	1428
8.		HIGH PRESSURE PIPE(1/2"PHx1490L)	1	1632
8.		HIGH PRESSURE PIPE(1/2"PHx1750L)	1	1640
9.		HIGH PRESSURE PIPE 90° CONNECTION	1	1/2"PTx1/2"PH
10.		SOCKET SCREW	4	M8x55L
11.		SOCKET SCREW	2	M6x30L
12.	366032	HIGH PRESSURE PIPE CONNECTION	1	
13.		SOCKET SCREW	2	M8x35L

C. LONGITUDINAL HYDRAULIC CYLINDER SET (3741/1428 SERIES ,3841/1632SERIES ,4141/1640 SERIES)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.		DUST RING	2	DH22.4
2.	364020	OIL SEAL SEAT	2	
3.		OIL SEAL	2	UHS 22.4
4.		OIL SEAL	2	GSW22.4x30x5
5.		O-RING	2	P-42
6.		ANTI-FRICTION RING	2	ϕ 22.4x6x2.5
7.	364016	RIGHT HYDRAULIC CYLINDER TOP HEAD	1	
8.		O-RING	2	P50
9.	364021	LOCK NUT	1	
10.	364017	FIXING RING OF HYDRAULIC CYLINDER	1	
11.	374005	HYDRAULIC PIPE	1	1428 (3741)
11.	384008	HYDRAULIC PIPE	1	1632 (3841)
11.	414005	HYDRAULIC PIPE	1	1640 (4141)
12.	374006	PISTON ROD	1	1428 (3741)
12.	384009	PISTON ROD	1	1632 (3841)
12.	414006	PISTON ROD	1	1640 (4141)
13.	364019	ANTI-COLLISION SLEEVE	2	
14.		O-RING	2	P30
15.		ANTI-FRICTION RING	2	ϕ 40x9.5x2.5
16.		TAPER PIN	2	#5x38L
17.	364018	PISTON	1	
18.		O-RING	1	P22.4
19		OIL SEAL	1	GSP45x35x4

				SUPRA1428AHD SUPRA1632AHD SUPRA1640AHD
19		OIL SEAL	1	GSP45x35x4
20	364015	LEFT HYDRAULIC CYLINDER TOP HEAD	1	

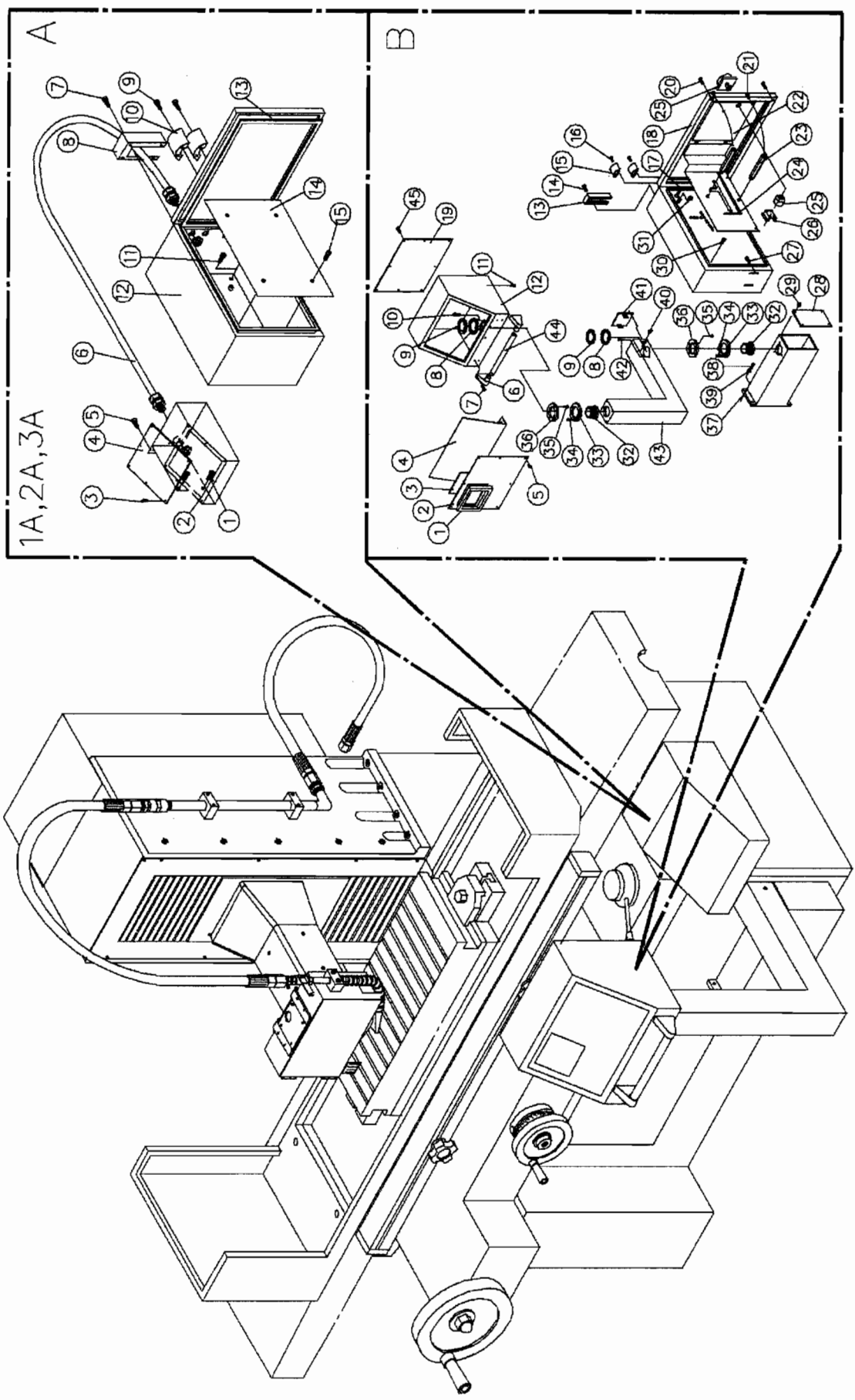
LIFTING STRUCTURE



LIFTING STRUCTURE

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	365045	HANGING SCREW	4	H41x145L
2.	365042	BASE FRONT SEALED COVER	1	
3.		SOCKET SCREW	8	M6x10L
4.	100506-1	CROSS HEAD SCREW	5	
5.		HEX NUT	5	M22
6.	100505-1	FLAT-REGULATING SCREW	5	M22xP2.5x105L
7.	365043	BASE REAR SEALED SCREW	1	
8.		CROSS HEAD SCREW	4	M6x10L
9.	365046	HANGING SCREW	1	H41x195L

ELECTRICAL AND CONTROL BOX



A ELECTRICAL AND CONTROL BOX

(3A3695, FOR 3A SERIES)

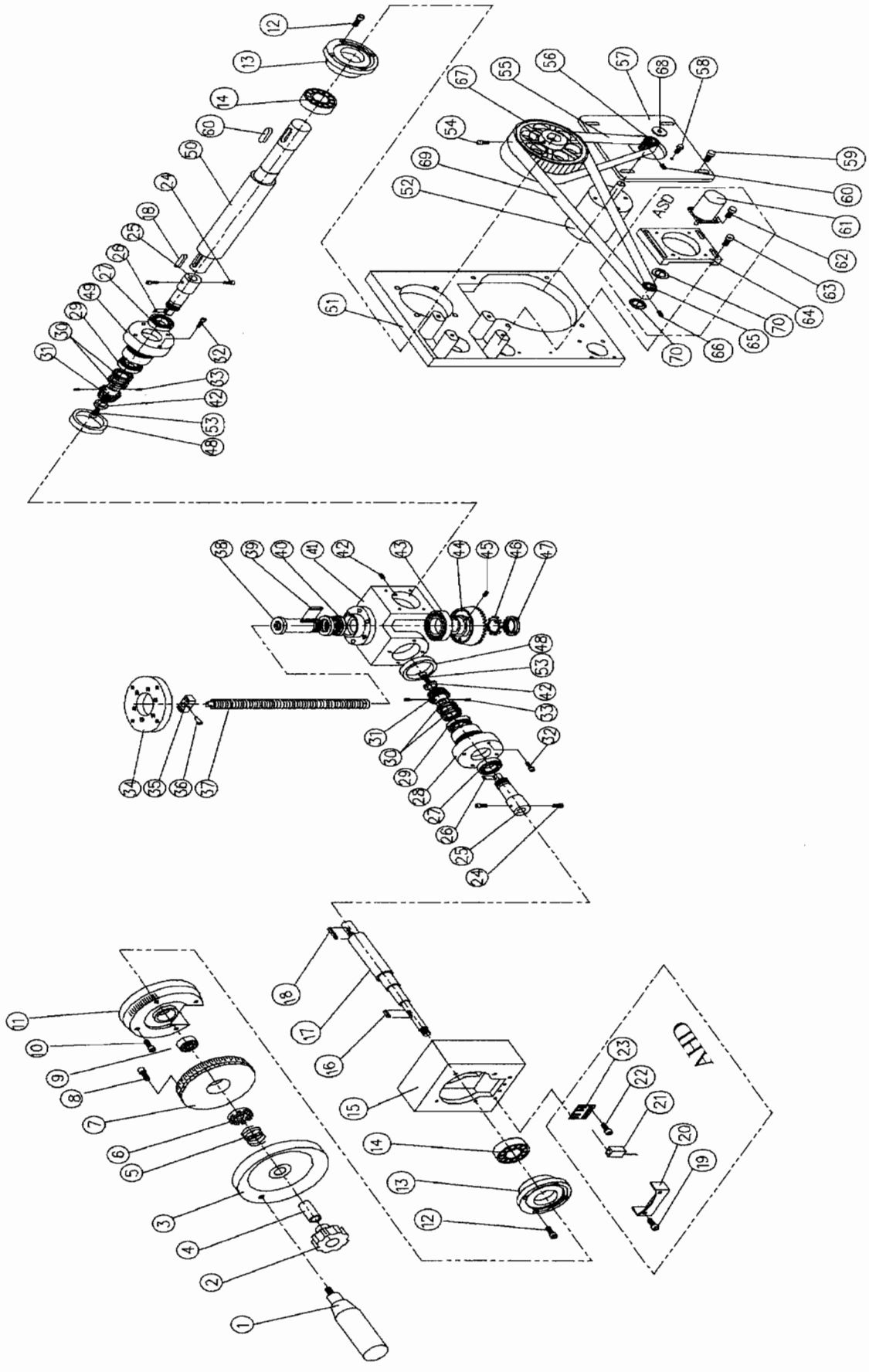
NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.		SOCK. HEAD SCREW	2	M5x20L
2.	389015-2	CONTROL BOX	1	
3.		CROSS HEAD SCREW	8	M4x10L
4.	101088	CONTROL PANEL	1	
5.		SOCK. HEAD SCREW	2	M8x15L
6.		CONVEY FLEXIBLE CONDUIT	1	
7.		SOCK. HEAD CAP SCREW	4	M4x15L
8.	389026-1	SPLASH COVER	1	
9.		SOCK. HEAD CAP SCREW	2	M4x15L
10.	200907	SPLASH COVER	2	
11.		SOCK. HEAD CAP SCREW	1	M8x12L
12.	389001-1	ELECTRICAL BOX	1	
13.		RUBBER	1	
14.	389002-1	ELECTRICAL FIXING PLATE	1	
15.		SOCK. HEAD CAP SCREW	4	M8x12L

B ELECTRICAL AND CONTROL BOX FOR AHD (3695A) SERIES

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1	389012	DISPLAY WINDOW	1	
2.	101082E	CONTROL PANEL	1	
3	389013	DISPLAY MIRROR	1	
4.	389016	FIXING STAND OF PC BOARD	1	
4	389016E-1	FIXING STAND OF PC BOARD	1	CE
5.		CROSS HEAD SCREW	8	M5x10L
6.	389009	HANDLE FIXING SEAT	2	
7.		SOCK. HEAD CAP SCREW	4	M6x14L
8.		WASHER	2	MB12
9.	389006	FIXING NUT	2	(AN12)
10.		HEADLESS SCREW	2	M6x6L
11.		SOCK. HEAD CAP SCREW	2	M6x14L
12.	389011	CONTROL BOX	1	
12	389011E-1	CONTROL BOX	1	CE
13.	389026-1	SPLASH COVER	1	
14.		SOCK. HEAD CAP SCREW	4	M4xP0.7
15.	200907	SPLASH COVER	2	
16.		SOCK. HEAD CAP SCREW	4	M4xP0.7
17.		SOCK. HEAD CAP SCREW	4	M8x12L
18.	389001E	ELECTRICAL BOX	1	
19.	381031E	COVER	1	CE
20.		SOCK. HEAD CAP SCREW	2	M6x25L
21.		SOCK. HEAD CAP SCREW	2	M6x25L

22.	389002E	ELECTRICAL FIXING PLATE	1	
23.	389030E	COPPER BAR	2	
24.	259010	ELECTRIC BOX GROUND STRAP	1	
25.		DOOR LOCK	1	
26.	389019E	BACK-UP PLATE	1	
27.		SOCK. HEAD CAP SCREW	1	M10x30L
28.	389017	SIDE SEALED COVER OF SUPPORT ARM	1	
29.		CROSS HEAD SCREW	4	M4x10L
30.		SOCK. HEAD CAP SCREW	4	M8x16L
31.		WASHER	4	ϕ 8
32.	389005	TURNING SHAFT OF CONTROL BOX	2	
33.	389004	HOLDING-DOWN PLATE OF TURNING SHAFT	2	
34.		SOCK. HEAD CAP SCREW	3	M6x14L
35.		CROSS FLATE HEAD SCREW	3	M5x8L
36.	389007	FIXING PLATE OF TURNING SHAFT	2	
37.	389003E-1	FIXING PLATE OF SUPPORT ARM	1	
38.		SOCK. HEAD CAP SCREW	4	M8x30L
39.		WASHER	4	ϕ 8
40.		CROSS HEAD SCREW	2	M6x10L
41.	389014	SIDE SEALED COVER OF SUPPORT ARM	1	
42.		SOCK. HEAD CAP SCREW	3	M6x14L
43.	389008	CONTROL BOX SUPPORT ARM	1	
44.	389010	HANDLE OF CONTROL BOX	1	
45.		CROSS HEAD SCREW	8	M5x8L(CE)

VERTICAL FEED

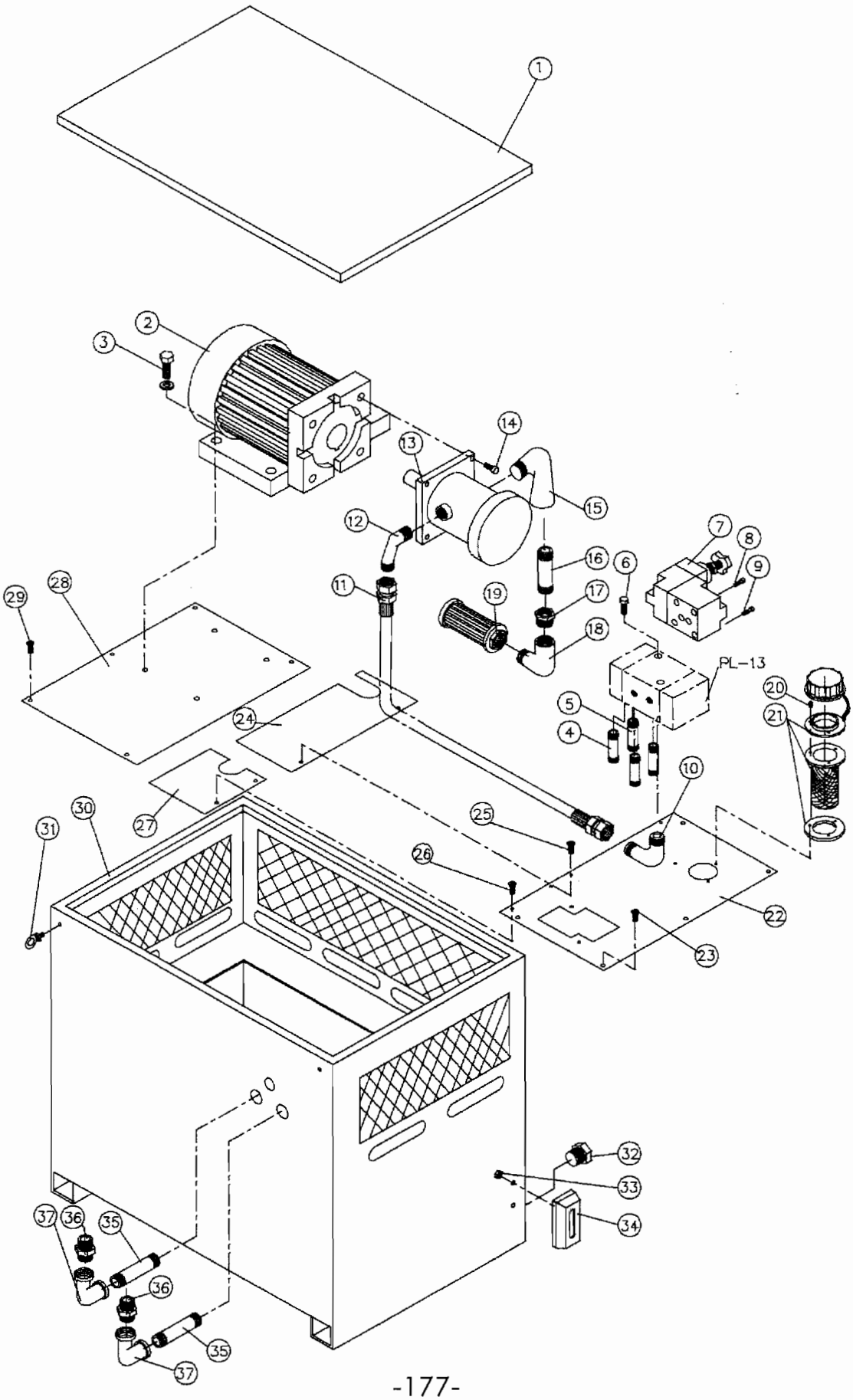


VERTICAL FEED

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	100237	HANDLE	1	
2.	365035	ELEVATING HANDLE	1	
3.	365036	ELEVATING HANDWHEEL	1	
4.	365034	LOCKING SHAFT SLEEVE	1	
5.	365012	COMPRESSION SPRING	1	
6.	363011	FIXING DISK GEAR	1	
7.	365032A1	ELEVATING SCALE RING	1	MM
7.	365032E1	ELEVATING SCALE RING	1	INCH
8.		SOCK. HEAD CAP SCREW	1	M6x12L
9.		BEARING	1	6202
10.		SOCK. HEAD CAP SCREW	4	M6x20L
11.	365031A1	ELEVATING SCALE INDICATING PLATE	1	MM
11.	365031E1	ELEVATING SCALE INDICATING PLATE	1	INCH
12.		SOCK. HEAD CAP SCREW	4	M6x30L
13.	255008	REAR BEARING SEAT	1	
14.		BEARING	1	6205
15.	365029-1	BEARING BOX	1	
16.		DOUBLE HEAD FLATE KEY	1	5x5x25L
17.	365012-4	DRIVING SHAFT	1	14 SERIES
17.	465002-3	DRIVING SHAFT	1	1632
17.	415002-1	DRIVING SHAFT	1	1640
18.		DOUBLE HEAD FLATE KEY	1	6x6x25L
19.		SOCK. HEAD CAP SCREW	2	M5X30L
20.	365058	COVER	1	
21.		SENSOR SWITCH	1	PNP17x17x28
22.		SOCK. HEAD CAP SCREW	2	M6x10L
23.	365057	FIXED PLATE	1	
24.		HEADLESS SCREW	2	M6x12L
25.	255005	PINION DRIVING SHAFT	2	
26.		DOUBLE HEAD FLATE KEY	2	6x6x25L
27.		BEARING	2	6202

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
28.	255003	BEARING SEAT	1	
29.		BEARING	2	6202
30.	255004	NUT	2	AN04
31.	365009A	LEFT SPIRAL PINION	2	MM
31.	365009E	LEFT SPRING PINION	2	INCH
32.		SOCK. HEAD CAP SCREW	8	M6x50L
33.		HEADLESS SCREW	4	M6x8L
34.	365041	FIXING PLATE OF ELEVATING NUT	1	
35.	365004	FIXING SEAT OF SCREW SLEEVE	1	
36.		TAPER PIN	1	#4x30L
37.	365005A	STANDARD ELEVATING SCREW	1	MM
37.	255007E	STANDARD ELEVATING SCREW	1	INCH
38.	365006A	ELEVATING NUT	1	MM
38.	365006E	ELEVATING NUT	1	INCH
39.		DOUBLE HEAD FLATE KEY	1	8x7x30L
40.	255008	THRUST BEARING	1	51109
41.	255002	FIXING SEAT OF ELEVATING GEAR	1	
43.		BEARING	1	6212
44.	365008A	RIGHT SPIRAL BIG GEAR	1	MM
44.	365008E	RIGHT SPRING BIG GEAR	1	INCH
45.		HEADLESS SCREW	2	M6x10L
46.		OUTER RING	1	
47.	365007	LOCKING NUT	1	AN09
48.	365014	REGULATING NUT	2	
49.	365015-1	BEARING SEAT	1	
50.	365065	DRIVING SHAFT	1	1428,1632
50.	415006	DRIVING SHAFT	1	1640
51.	365016-4	MOTOR FIXING PLATE	1	
52.	365026	AC MOTOR	1	1/4PH6P
53.		SOCK. HEAD CAP SCREW	2	M8x30L
54.		SOCK. HEAD CAP SCREW	2	M6x15L
55.	255017	PLASTIC STEEL WIRE TOOTH-FORM BELT	1	T5x144Tx25mm

HYDRAULIC SYSTEM (366)



NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
57.	365062	MOTOR FIXING PLATE	1	
58.		SOCK. HEAD CAP SCREW	4	M8x25L
59.		SOCK. HEAD CAP SCREW	4	M8x25L
60.		DOUBLE HEAD FLATE KEY	2	6x6x25L
.61.	365027	STEPPING MOTOR(PK299-01A)	1	
62.		SOCK. HEAD CAP SCREW	4	M5x18L
63.		SOCK. HEAD CAP SCREW	4	M6x30L
64.	200208-1	MOTOR FIXED PLATE	1	
65.	255015	ELEVATING RAPID DRIVING PULLEY	2	
66.		CROSS HEAD CAP SCREW	2	M5x5L
67.	255012	DRIVER PULLEY	1	
68.	200211	WASHER	2	
69.	255018	PLASTIC STEEL WIRE TOOTH-FORM BELT	1	(T5x112Tx18mm)
70.	200211	WASHER	2	

TABLE REVERSING ARRANGEMENT (3661)

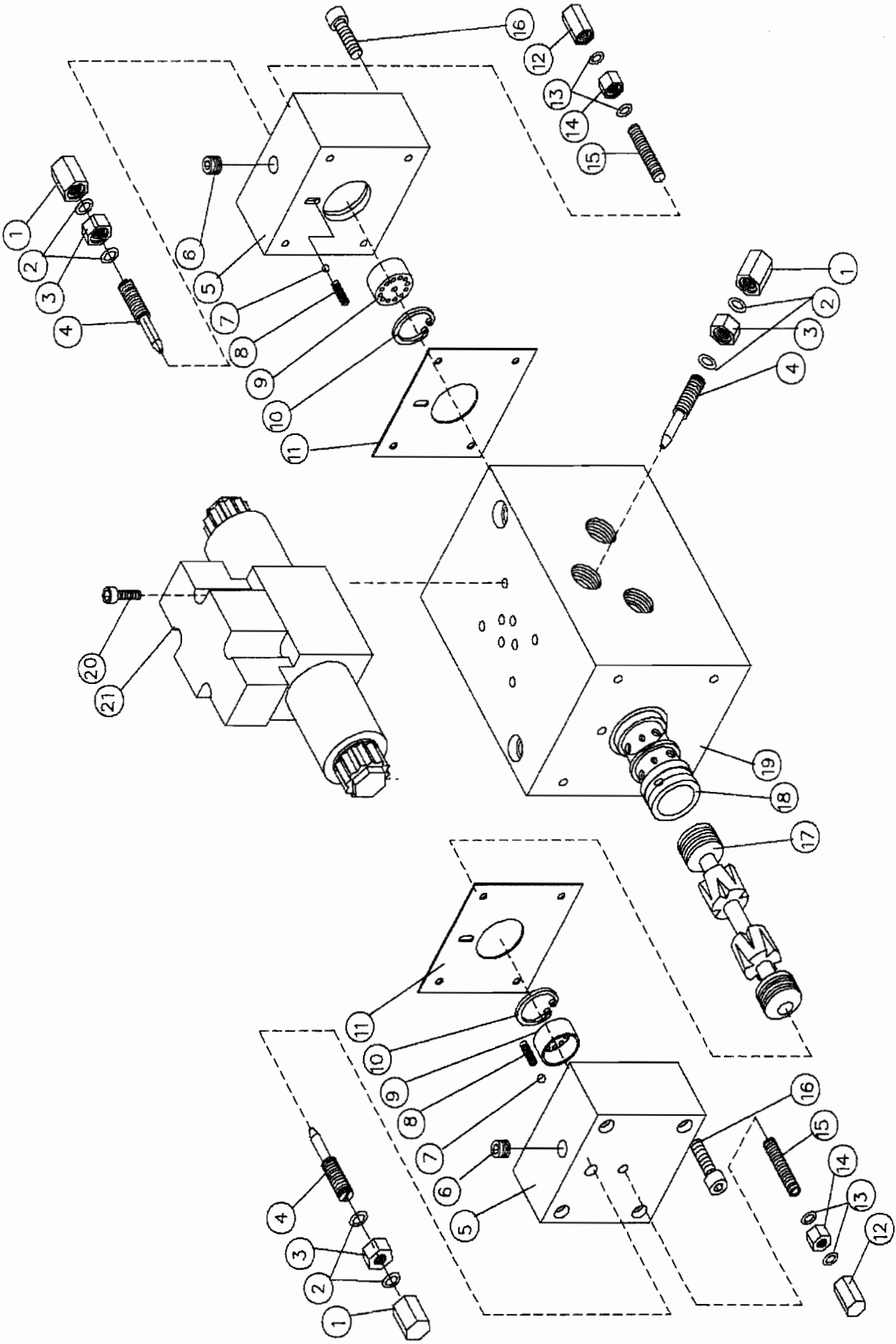
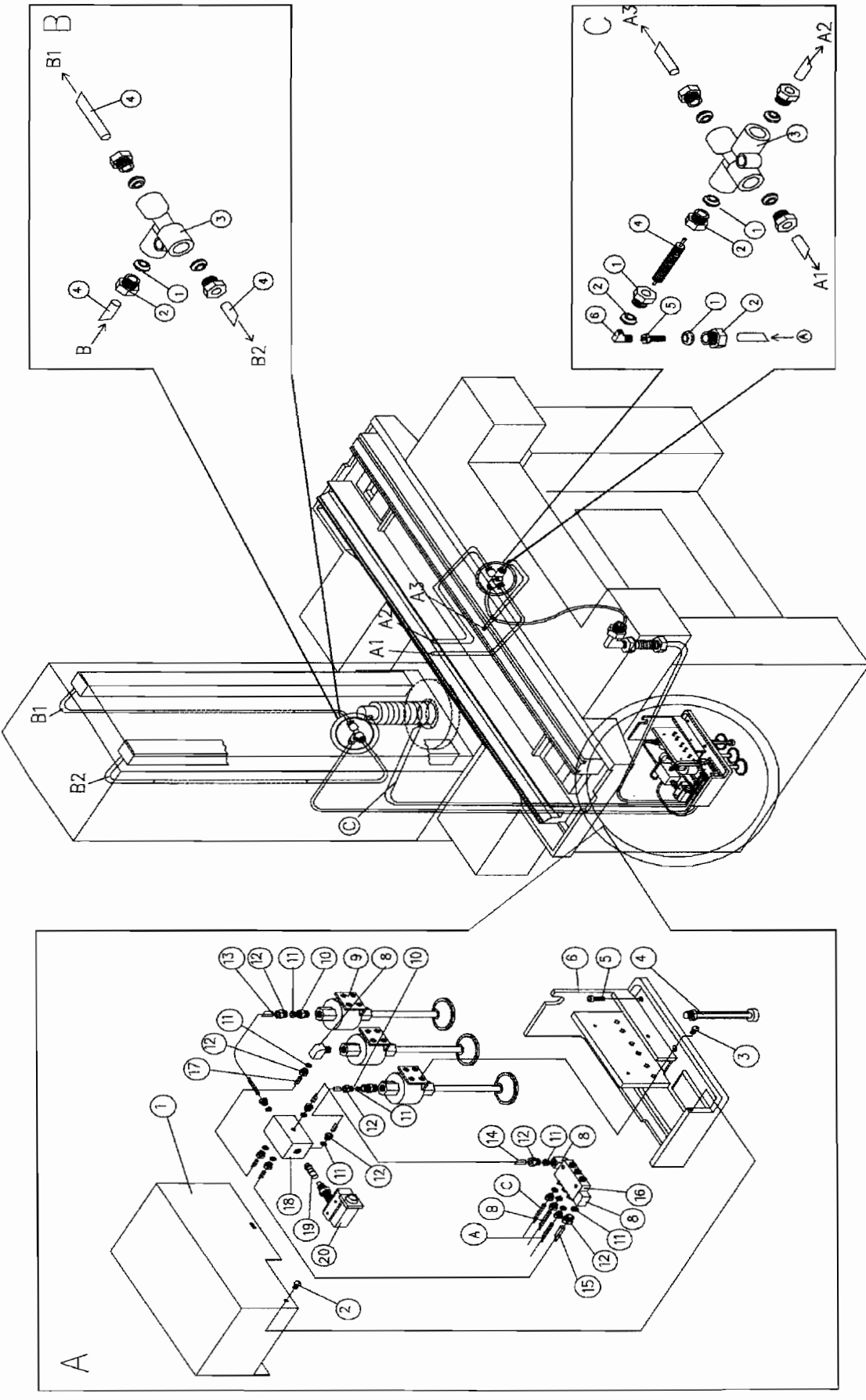


TABLE REVERSING ARRANGEMENT (3661)

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	366012	LEAK-PROOF NUT	3	
2.		O-RING	6	P10
3.	366011	FIXING NUT	3	
4.	366010	SMALL THROTTING SHAFT	3	
5.	366008	SIDE COVER OF REVERSING BODY	2	
6.		HOLE PLUG	2	1/8PT
7.		STEEL BALL	2	ϕ 5
8.	366028	SPRING	2	
9.	366009	TOP BLOCK OF REVERSING SHAFT	2	
10.		INNER RETAINING RING	2	ϕ 28
11.		ASBESTOS GASKET	1	95x90x1
12.	366014	LEAK-PROOF NUT	2	
13		O-RING	4	P8
14.	366013	FIXING NUT	2	
15.		HEADLESS SCREW	2	M8x35L
16.		SOCK. HEAD CAP SCREW	8	M6x45L
17.	366007	REVERSING SHAFT	1	
18.	366006	REVERSING SHAFT SLEEVE	1	
19.	366005-1	REVERSING BODY	1	
20.		SOCK. HEAD CAP SCREW	4	M5x45L
21.		SOLENOID VALVE	1	DV24V

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
29.		CROSS HEAD SCREW	5	M6x15L
30.	366001-1	OIL TANK	1	
31.		HANGING RING	4	5/16"W
32.		HOLE PLUG	2	1/2"PT
33.		NUT	2	
34.		OIL LEVEL GAUGE	1	3"
35.		STRAIGHT CONNECTION PIPE	2	1/2PTx3.5"L
36.		HIGH PRESSURE PIPE CONNECTION	2	1/2PTx3/4PF
37.		PIPE ELBOW	2	1/2"PT

LUBRICATION SYSTEM (368)



NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
29.		CROSS HEAD SCREW	5	M6x15L
30.	366001-1	OIL TANK	1	
31.		HANGING RING	4	5/16"W
32.		HOLE PLUG	2	1/2"PT
33.		NUT	2	
34.		OIL LEVEL GAUGE	1	3"
35.		STRAIGHT CONNECTION PIPE	2	1/2PTx3.5"L
36.		HIGH PRESSURE PIPE CONNECTION	2	1/2PTx3/4PF
37.		PIPE ELBOW	2	1/2"PT

LUBRICATION SYSTEM (368)

A:

NO.	PART NO.	DESCRIPTION	Q'TY	SPEC.
1.	368006	COVER	1	
2.		SOCK. HEAD CAP SCREW	2	M5x8L
3.		SOCK. HEAD CAP SCREW	6	M6x15L
4.		OIL LEVEL SWITCH	1	FS-8102
5.		SOCK. HEAD CAP SCREW	2	M6x20L
6.	368005	PUMP FIXED STAND	1	
8.		ELBOW CONNECTOR 90°	3	PH-602
9.		PUMP(AC110V)	3	
10.		STRAIGHT ADAPTER	2	PD602
11.		COMPRESSION SLEEVE	10	PB-6
12.		COMPRESSION SLEEVE	10	PA-6
13.		ALUMINIUM TUBING	1	ϕ6
14.		ALUMINIUM TUBING	1	ϕ6
15.		ALUMINIUM TUBING	1	ϕ6
16.		AB TYPE OIL REGULATING MANIFOLD	1	B-3
17.		ALUMINIUM TUBING	2	ϕ6
18.	258002	SENSOR FIXED SUPPORT	1	
19	258003	SENSOR SLIDING STEM	1	
20.		SENSOR	1	TZ-7310

B:

1.		COMPRESSION SLEEVE	3	PB-6
2.		COMPRESSION BUSHING	3	PA-6
3.		JUNCTION 3-WAY	1	PKD-6
4.		ALUMINIUM TUBING	3	ϕ6

C:

1.		COMPRESSION SLEEVE	10	PB-4
2.		COMPRESSION BUSHING	10	PA-4

	SUPRA1428AHD	
	SUPRA1632AHD	
	SUPRA1640AHD	
JUNCTION 4-WAY	1	PJD-6
HOSE ASSEMBLY	1	ϕ 4x400L
PROLONGED CONNECTOR	1	PM-104
ELBOW CONNECTOR 90°	1	PH-408