XYZ 2000

INSTRUCTION MANUAL

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⚠ IMPORTANT SAFETY NOTICE WARNING

The King Rich Milling Machine.

SAFE INSTALLATION

It is the customers responsibility to ensure the machine is installed in a safe operating position, with all service pipes and cables clear of the operation area so as not to cause a hazard. Access must be allowed for safe maintenance, swarf and oil disposal including safe stacking of machined and unmachined components.

MACHINE GUARDING

The Milling Machine is fitted with standard safety guards. In certain cases and tooling applications additional guarding may have to be provided by the user to ensure proper safety.

AUTHORISED PERSONAL AND TRAINING

Operating, service and maintenance engineers shall be authorised by the User Company, and properly trained in the use of the machine.

SAFE WORKING PRACTICES

Workholding devices, lifting equipment, tooling and their use shall be the responsibility of the user. It is the user's responsibility to protect against the hazards caused by swarf, leaking oil or coolant and their use.

Use of proprietory oil or coolant is the responsibility of the user. Special instructions from the suppliers concerning their use should be carefully read and understood before use.

To prevent bodily injury safe working practices should be employed when operating or servicing the machine.

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To prevent bodily injury safe working practices should be employed when operating or servicing the machine.

IMPORTANT

SAFETY INFORMATION

To prevent serious bodily injury, you should observe the following basic safety precautions when installing, operating or servicing your milling machine.

1. Follow all instructions in the machine instructions manual.

2. Wear approved industrial safety glasses and safety shoes.

3. Do not wear gloves, long sleeves, long hair, rings, watches, jewelry or other loose items that could become caught in moving parts.

4. Keep all parts of your body away from moving parts (belts, cutters, gears, etc.)

5. Use proper point of operation safeguarding.

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1. SAFE INSTRUCTION

1. DON'T run your machine until you have read and understood the KING RICH operator and maintenance manuals.
2. DON'T run your machine until you have read and understood all machine and control key signs
3. DON'T run your machine for the first time without a qualified instructor. ASK your supervisor for help when you need it.
4. PROTECT your eyes. Wear safety glasses with side shields at all times.
5. DON'T get caught in moving parts. Remove watches, rings, jewelry, neck-ties, and loose-fitting clothes.
6. PROTECT your head. Wear a safety helmet when working near overhead hazards.
7. KEEP your hair away from moving parts.
8. PROTECT your feet. Always wear safety shoes with steel toes and oil-resis-tance soles.
9. Gloves are easily caught in moving parts. TAKE THEM OFF before you turn on the machine.
10. Loose objects can become flying projectiles. REMOVE all loose items(wrenches, chuck keys, rags, etc.) from machine before starting.
11. NEVER operate a machine tool after taking strong medication, using non-prescription drugs or consuming alcoholic beverages.
12. SAFEGUARD the cutting gone("point of operation"). Use standard, general purpose safeguard where possible. Use special safeguards when required.
13. Protect your hands. STOP the spindle completely BEFORE changing tools.
14. Protect your hands. STOP the spindle completely BEFORE you load or unload a workpiece.
15. Protect your hands, STOP the spindle completely BEFORE you clear away chips or oil. Use brush or chip scraper. NEVER use your hands.
16. Protect your hands. STOP the spindle completely BEFORE you adjust the workpiece, fixture or coolant nozzle.
17. Protect your hands. STOP the spindle completely BEFORE you take measure-ments.
18. Protect your hands. STOP the spindle completely BEFORE you open safeguard or covers. Never reach around a safeguard.
19. Protect your hands. STOP the machine BEFORE you change or adjust belts, pulleys or gears.
20. PROTECT your hands. Keep hands and arms clear of spindle start switch when changing tools.
21. PROTECT your eyes Never use a compressed air hose to remove chips.

SAFE INSTRUCTION

22. KEEP work area well lighted. Ask for additional light lf needed.

23. DON'T slip. Keep your work area clean and dry .Remove chips, oli and obstacles.

24. NEVER lean on your machine. Stand away when the machine is running.

25. DON'T get trapped. Avoid pinch points caused by motion of table and head.

26. PREVENT objects from flying loose. Securely clamp and locate workpiece. Use stop blocks where necessary. KEEP clamps clear of cutter path.

27. PREVENT cutter breakage. Use correct table feed and spindle speed for the job. Reduce feed and speed if you notice unusual noise or vibration.

28. PREVENT cutter breakage. Rotate spindle in clockwise direction for right-hand tools, counterclockwise for left-hand tools. Use the correct tool for the job.

29. PREVENT workpiece and cutter damage. Never start the machine when the cutter is in contact with the workpiece.

30. Dull and damaged tools break easily. lnspect tools and tool holders. Keep tools sharp. Keep tool overhang short.

31. Keep rotating cranks and handwheels well-lubricated and maintained. Do not remove safety springs.

32. Certain materials, such as magnesium, are highly flammable in dust and chip form. See your supervisor before working with these materials.

33. PREVENT fire. Keep flammable liquids and materials away from work area and hot chips.

34. PREVENT machine from moving unexpectedly. Disengage power feed when not being used(manual machines only)

35. PREVENT machine from moving unexpectedly. Always start machine in manual mode.

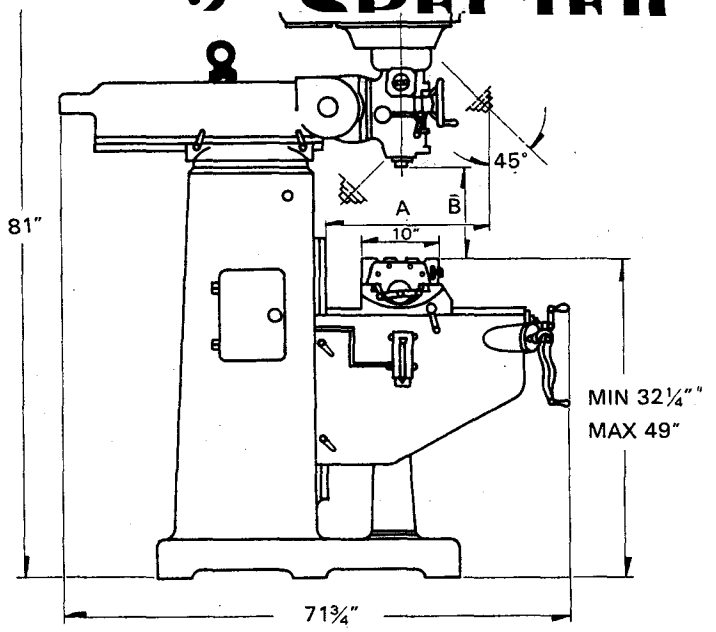
36. DON'T be used in a potentially explosive, dusty, atmosphere.

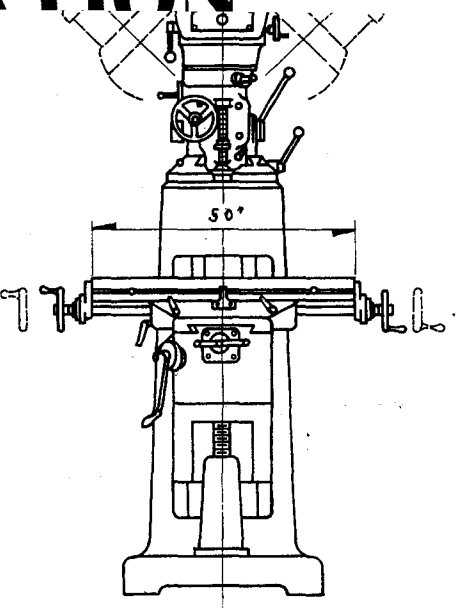
37. NON-METAL materials can not be used to work in this machine.

38. OPERATORS DON'T use gloves or necktie.

39. The machine must be grounded circuit, otherwise it will have electrical leakage conditions.

2 SPECIFICATION





TYPE	KR-V2000		KR-V2000	
SPECIFICATION	INCH SYSTEM		METRIC SYSTEM	
Table size	10" × 48"	10" × 50"	254 × 1220mm	254 × 1270mm
Tee slots(3)	5/8"		15.9mm	
Longitudinal travel(× Axis)	30"	32"	762mm	812mm
Cross travel	16"		406mm	
Knee vertical travel	16"		406mm	
Quill travel	5"		127mm	
Quill diameter	4 1/8"		105mm	
Quill feeds	.0015" .003" .006"		.038mm .076 .152mm	
Spindle motor	3HP			
Spindle speeds	Low:60-500 RPM High:500-4200RPM(60Hz)			
Spindle taper	R8/ISO 30			
Ram travel	17 3/4"		450mm	
Spindle nose to top of table	2"-18"		50-457mm	
Overarm Swivel on turret	360°			
Head tilt front to back	45°-0-45°			
Head tilt left to right	90°-0-90°			
Max. throat depth	24"		610mm	
Max. table load	770lbs		350kgs	
Approx. net weight	2750lbs		1250kgs	

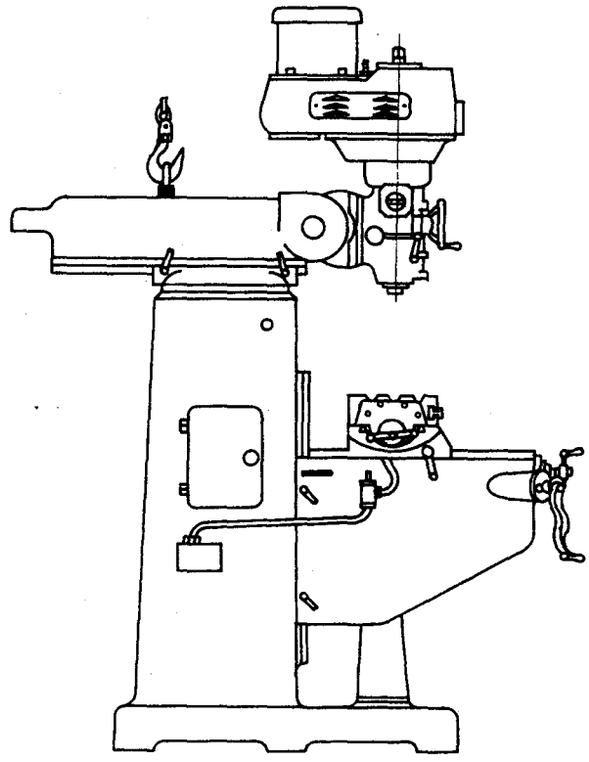
3. TRANSPORTATION

HANDLING WEIGHT

Basic machine approximately 2750 lb(1250kg)

(A) METHOD 1

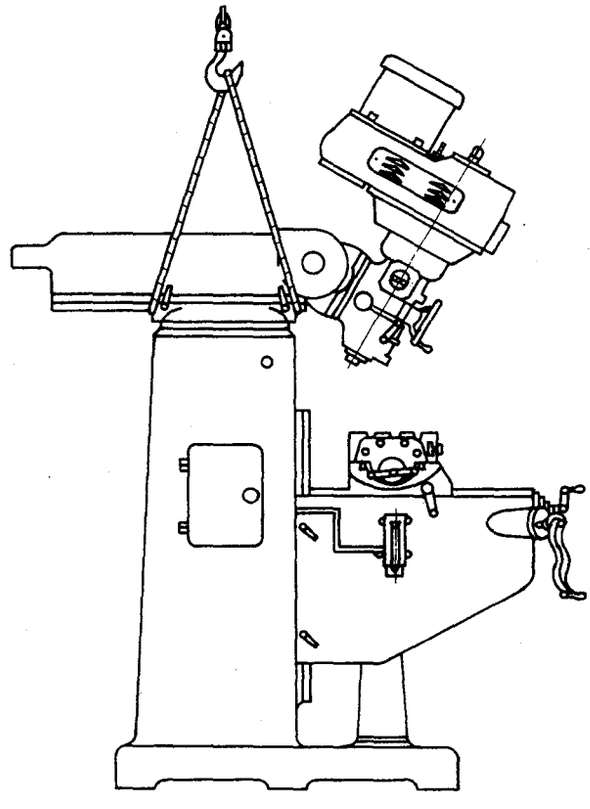
Insert 1" Whitworth eye bolt in tapped hole. Ensure bolt is fully secured before lifting It is advisable to swivel head before lifting machine.



Sketch #1

(B) METHOD 2

Use rope sling as illustarted. Insert pads of soft cloth between rope and machined edges. It is advisable to tilt the head before lifting machine.



Sketch #2

3. TRANSPORTATION

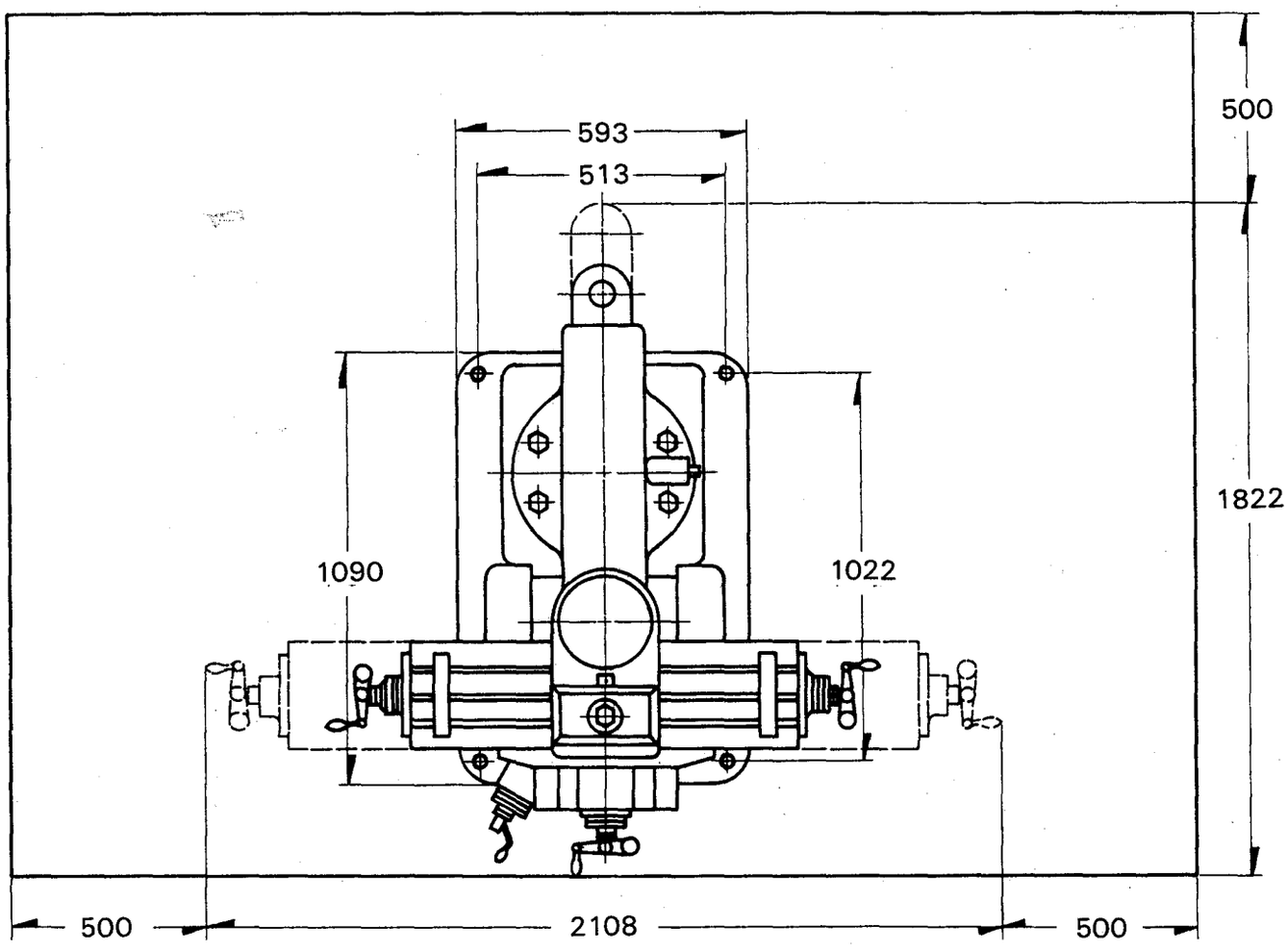
(C) METHOD 3

Using lift truck to transfer the package as picture.

Sketch #3

4. INSTALLATION

4-1 FLOOR PLAN



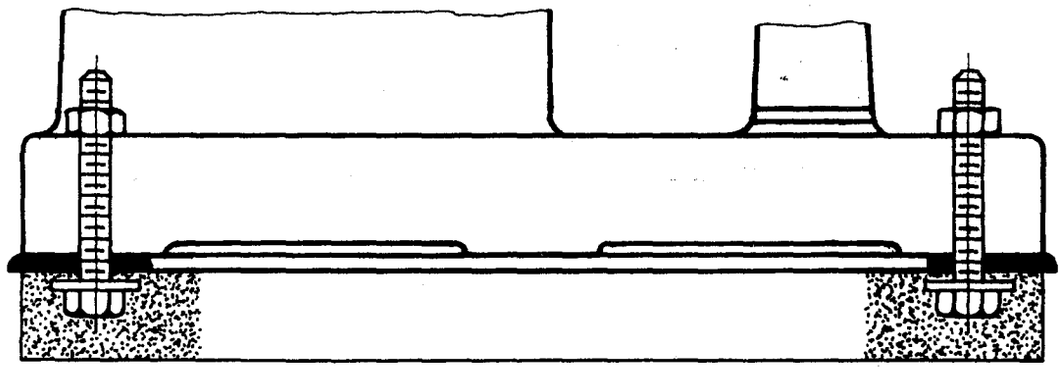
Sketch #4

4. INSTALLATION

4-2A FOUNDATION

Ideally all milling machines should be bolted to a concrete foundation.

The KING RICH however should be placed on a solid level floor or antivibration pads to pervent any rocking movement.



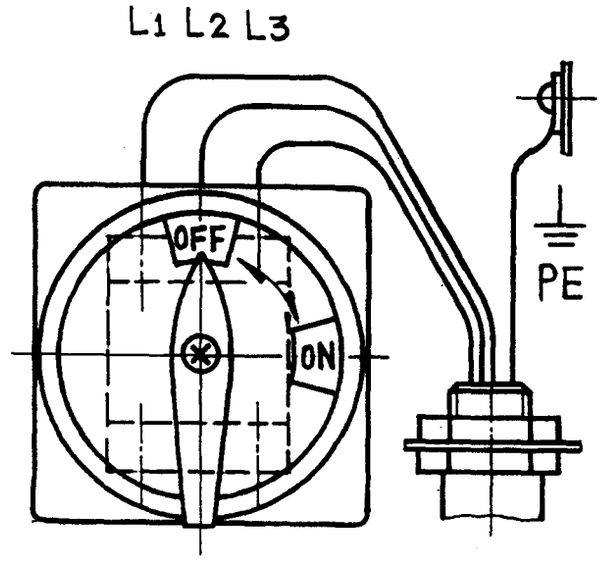
Sketch #5

4-2B POWER SUPPLY

a) Check the panel voltage against the main supply.

b) Connect the supply to the isolator (diagram).

C) Check for correct spindle rotation. (In the HIGH SPEED range the spindle should rotate clockwise when viewed from the top of the machine).



Sketch #6 ISOLATOR DIAGRAM

4. INSTALLATION

4-3 CLEANING

1. Remove rust preventative before moving any slideways.

2. The coating is best removed by using paraffin applied with a clean brush. when the coating has softened, remove with clean rags.

3. Oil or grease all lubrication points. Refer to the lubrication section of this manual(sketch #39)

4. Check all equipment against the delivery note. Any discrepancies should be reported IMMEDIATELY and confirmed in writing to the company at the address on the back cover of this manual, or to our appropriate overseas distributor.

4. INSTALLATION

4-4 INITIAL SETTING ANCILIARY EQUIPMENT

(1) If the machine was delivered in crate, the slideway handles will have been reversed. These should be fitted as illustrated on sketch #35, sketch #36.

(2) To prepare your machine if delivery is made with the milling head in an upside down position:

(a) Lower knee approximately 150mm(6").

(b) Slacken the four unit head mounting bolts.

(c) Support unit head manually and use a spanner on swivel bolt(fig.b)to wind into upright position.

(d) Tighten the four unit head mounting bolts.

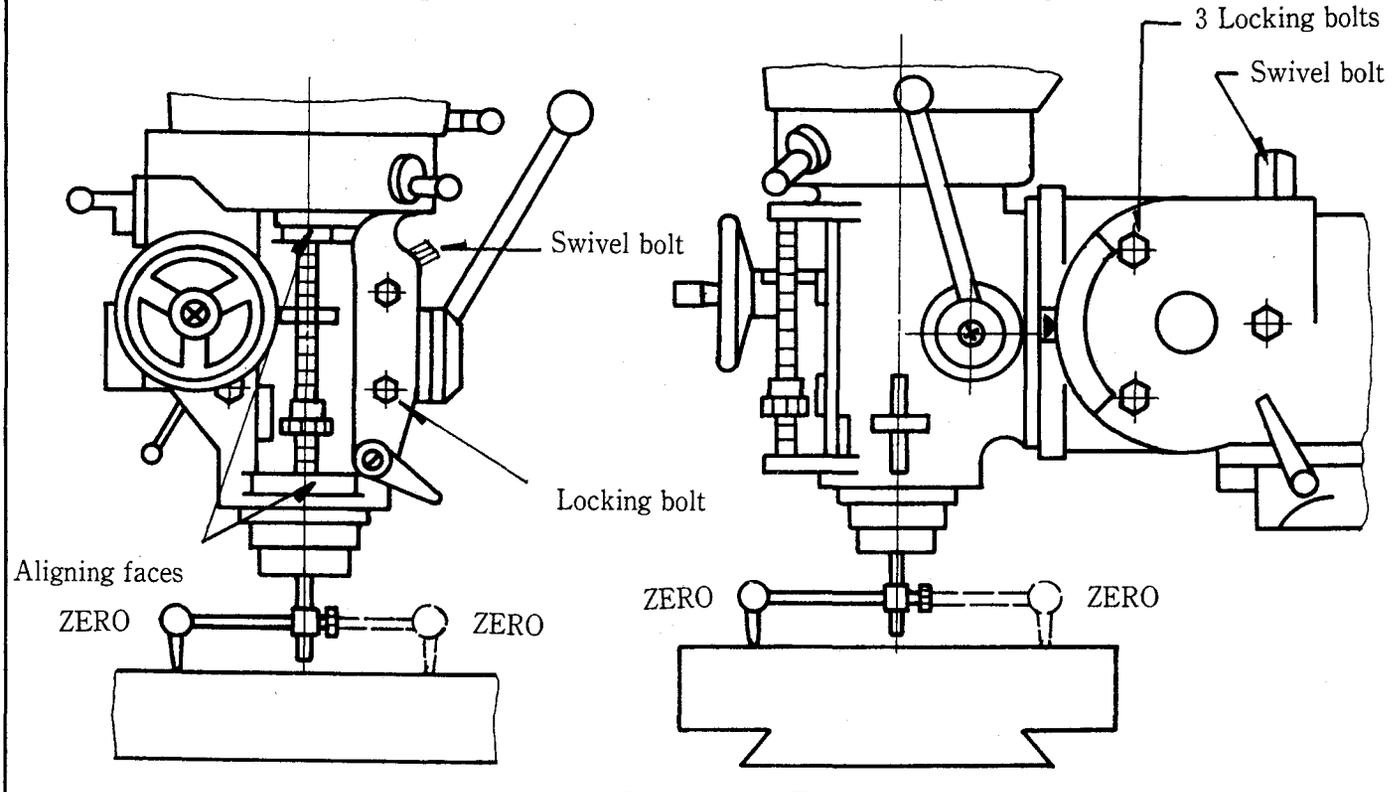
NOTE:

For continuous operation in the horizontal plane the head lubrication system must be modified(drawing supplied on request).

To set a milling head square to the table, two methods are available:

(A) Using a large 90° set square mounted on the table, align faces with square.

(B) An indicator mounted in the spindle nose travelling in a 115mm(4 1/2") radius. It is important that each axis is set separately and locked.



Sketch #7

5. PUTTING INTO SERVICE

CUTTING INFORMATION

5-1 CUTTING SPEED

The cutting speed of milling cutter can be expressed by

$$V=\frac{\pi Dn}{1000}$$

where:

V=cutting speed

D=diameter of cutter

n=revolution per minute of the spindle

Cutting speed varies between wide limits which are determined by the material being cut, the material used in the cutter, and other conditions which are determined by the specific operation to be performed. Consider the following whenever they are needed:

(1) Reducing cutting speed will increase cutter life.

(2) For roughing operations. use lower cutting speed and higher work feed. In finishing operations, higher cutting speed and lower work feed are recommended.

(3) Use cutting speed below averaged value in the beginning of an new operation and increase it during the operation.
Refer to Table 1. in the selection of cutting speed.

5. PUTTING INTO SERVICE

5-1A TABLE 1. RECOMMENDED CUTTING SPEED

Workpiece			Cutting speed			
Material		Brinell hardness HB	High speed steel cutter		Sintered carbide tipped cutter	
			m/min	ft/min	m/min	ft/min
Special alloy steel	hard tough annealed	300–400 220–300 180–220	13–15 15–23 23–35	38–45 45–70 70–110	30–50 50–75 75–108	90–150 150–225 225–325
Low carbon steel	ductile free cutting	152–197 150–180	28–46 35–46	35–140 110–140	90–130 108–130	270–400 325–400
Cast iron	hard medium soft	220–300 180–220 150–180	15–23 23–33 35–46	45–70 70–100 110–140	50–75 75–108 108–130	150–225 225–325 325–400
Brasses and bronzes	hard medium free cutting	150–250 100–150 80–100	21–46 46–83 83–116	64–140 140–250 250–350	63–130 130–200 200–330	190–400 400–600 600–1000
Magnesium and alloys				116–500	350–1500	
Aluminum and alloys				66–500	200–1500	
Plastics				66–500	200–1500	

5. PUTTING INTO SERVICE

5-2 FEED SPEED

Feed speed is determined by

$S=N \times s \times Z$

where:

S=table feed speed

N=revolution per minute of cutter

s=feed per tooth

Z=NO. of teeth of cutter

The feed per tooth is used in most cases. Table 2 gives suggested values of different types of milling cutters and kinds of work material in general conditions.

5. PUTTING INTO SERVICE

5-2A TABLE 2. RECOMMENDED FEED PER TOOTH FOR CUTTERS

Cutter	Workpiece			Feed per tooth(mm)					
	Material		Brinell hardnes Hb	Face mills	Helical mills	Slotting and side mills	End mills	Form relieved cutters	Circular saws
High speed steel	Special alloys	hard tough annealed	300-400 220-300 180-220	0.1 0.13 0.2	0.075 0.125 0.175	0.075 0.1 0.125	0.05 0.075 0.1	0.05 0.05 0.025	0.025 0.05 0.05
	Low carbon steel	ductile free cutting	152-197 150-180	0.25 0.3	0.2 0.25	0.13 0.175	0.125 0.13	0.075 0.1	0.075 0.035
	Cast iron	hard medium soft	200-300 150-250 150-180	0.27 0.325 0.4	0.2 0.25 0.325	0.13 0.175 0.225	0.13 0.175 0.2	0.1 0.1 0.125	0.075 0.075 0.1
	Brasses and bronzes	hard Medium free cutting	150-250 100-150 80-100	0.225 0.35 0.55	0.225 0.35 0.55	0.13 0.2 0.325	0.125 0.175 0.27	0.075 0.1 0.175	0.05 0.075 0.125
	Magnesium and alloys			0.55	0.45	0.325	0.27	0.175	0.125
	Aluminum and alloys			0.55	0.45	0.325	0.27	0.175	0.125
	plastics			0.375	0.3	0.225	0.175	0.125	0.1
Sintered carbide	Special alloys	hard tough annealed	300-400 220-300 180-220	0.25 0.3 0.35	0.2 0.25 0.27	0.13 0.175 0.2	0.125 0.13 0.175	0.075 0.1 0.1	0.075 0.075 0.1
	Low carbon steel	ductile free cutting	152-197 150-180	0.35 0.4	0.27 0.325	0.2 0.225	0.175 0.2	0.1 0.125	0.1 0.1
	Cast iron	hard medium soft	220-300 180-220 150-180	0.3 0.4 0.5	0.25 0.325 0.4	0.175 0.25 0.3	0.13 0.2 0.25	0.1 0.125 0.13	0.075 0.1 0.125
	Brasses and bronzes	hard Medium free cutting	150-250 160-150 30-100	0.25 0.3 0.5	0.2 0.25 0.4	0.13 0.175 0.3	0.125 0.13 0.25	0.075 0.1 0.13	0.075 0.057 0.125
	Magnesium and alloys			0.5	0.4	0.3	0.25	0.13	0.125
	Aluminum and alloys			0.5	0.3	0.3	0.25	0.13	0.125
	plastics			0.572	0.3	0.225	0.175	0.125	0.1

5. PUTTING INTO SERVICE

5-3 CUTTING DEPTH

The following table renders suggested cutting depth of different milling conditions.

Cutting depth of cutter

Machining type	Cutting depth
finishing	0.3~0.5
medium	0.4~1.4
rough	3~5

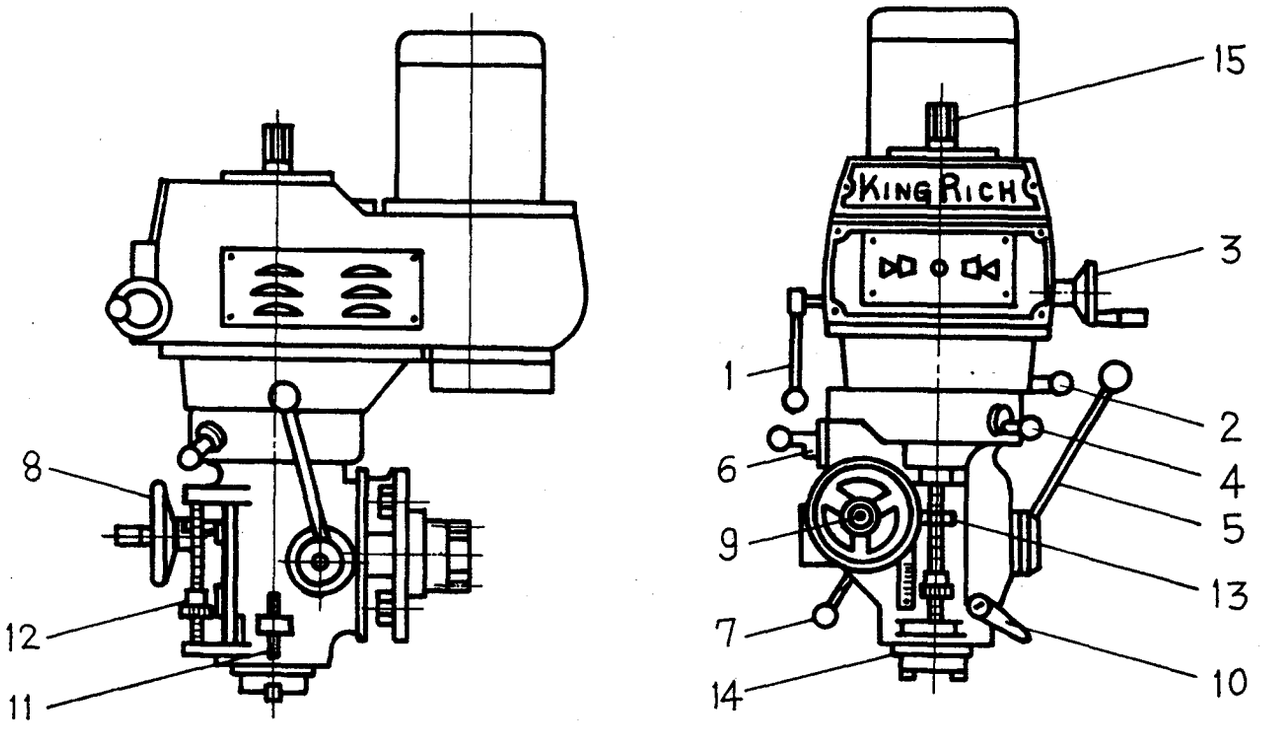
5. PUTTING INTO SERVICE

5-4 PROBLEM DIAGNOSTIC AND TROUBLESHOOTING OF MILLING

Problem		Diagnostics	Troubleshooting
(1)	Cutter misalignment during rotation	Misalignment in cutter it self	Porperly grinding of cutter and cutting edge
		Misalaignment while mou nting cutter	Reducing clearance between shank and hole
		Bending of shank	Grinding the shank properly, reducing tangential forces, and clearing debris
(2)	Vibration during milling	Workpiece moving up while up milling	Using oblique cutting and down milling
		Shank is long and small	Increasing rigidity of shank
		Large backlash of leadscrew	Adjusting the backlash
		Workpiece is not clamped well	Clamping workpiece firmly
		Heavy load in cutting	Reducing spindle speed, cutting depth, and feed rate
		The frequency of cutting force variation is close to machine natural frequency	Using cutter with less teeth
(3)	Loose of End milling cutter	Axial force acts toward the direction away from spindle	Selecting proper oblique and rotational direction to change the direction of axial force
(4)	Deformation of workpiece	Workpiece is not clamped properly	Change clamping style and do not put exessive clamping force during finishing cutting
		Damage on table surface	Smoothing the table surface
		residual stress in workpiece	Annealing workpiece thoroughly
(5)	Discontinuity occurred in plain milling	The center of spindle is not perpendicular to table or saddle	Modifying the sliding way and making it to be perpendicular to spindle
		Thermal deformation	Controlling the temperature rising of machine
(6)	Actual cutting de pth does not match the setting value	Shank deforms while milling	Increasing the rigidity of shank and reducing cutting force
		Workpiece deformed and was not fixed well	Fixing the workpiece properly

6. OPERATION

6-1 HEAD CONTROLS

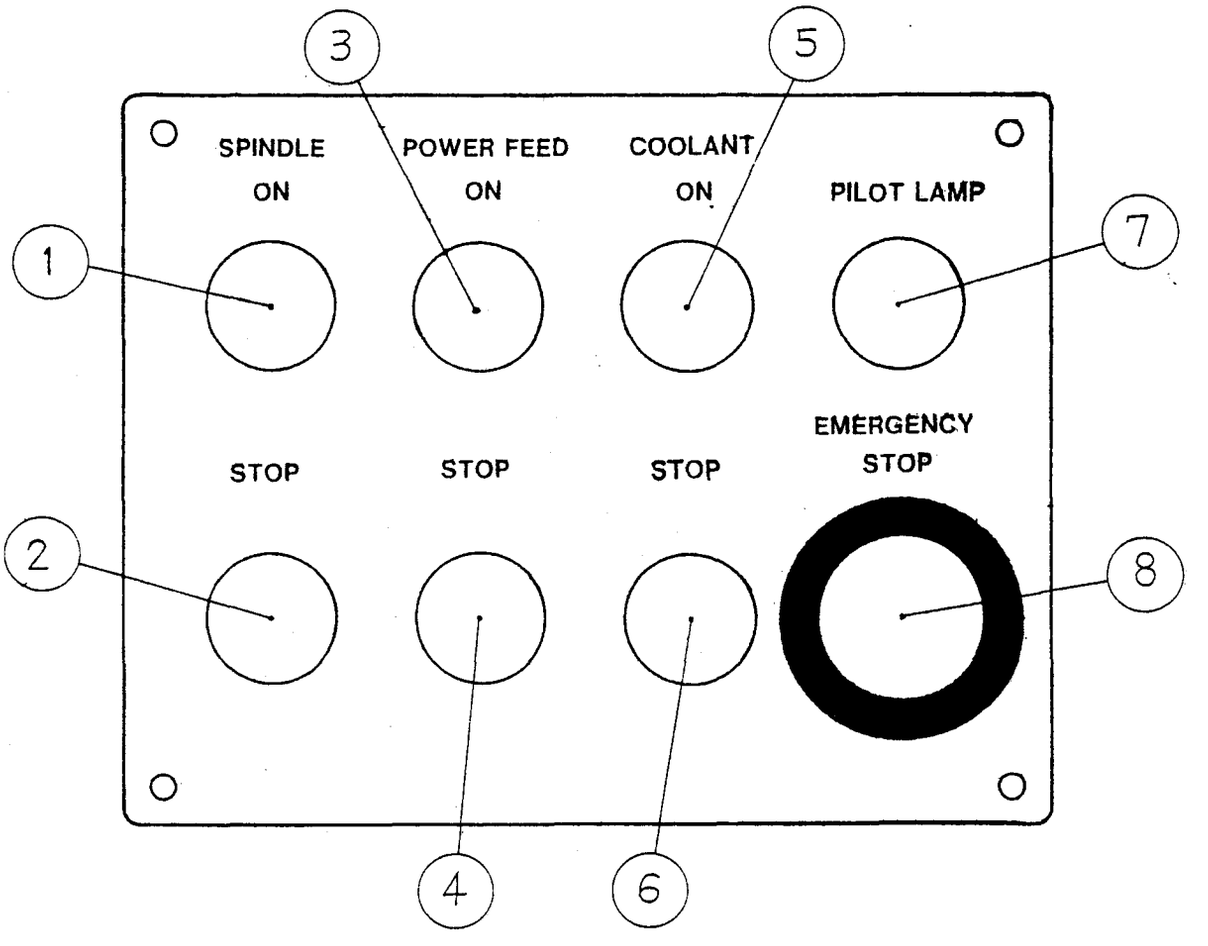


Sketch #8

1. Brake Control.
2. Speed Range Selection Lever.
3. Speed Selection Handwheel.
4. Power Feed Transmission Engagement Lever.
5. Quill Feed Handle.
6. Quill Feed Selector.
7. Quill Feed Control Lever
8. Handwheel for Manual Feed (by hand)of Quill.
9. Quill Feed reversing Knob.
10. Quill Lock
11. Indicator Mounting Rod.
12. Adjustable Micrometer Depth Stop.
13. Quill Stop
14. Quill
15. Draw Bar
16. SPINDLE FOR./REV. SWITCH

6. OPERATION

6-2 OPERATING PANEL



Sketch #9

1	SPINDLE ON	5	COOLANT ON
2	SPINDLE STOP	6	COOLANT STOP
3	POWER ON	7	PILOT LAMP
4	POWER STOP	8	EMERGENCY STOP

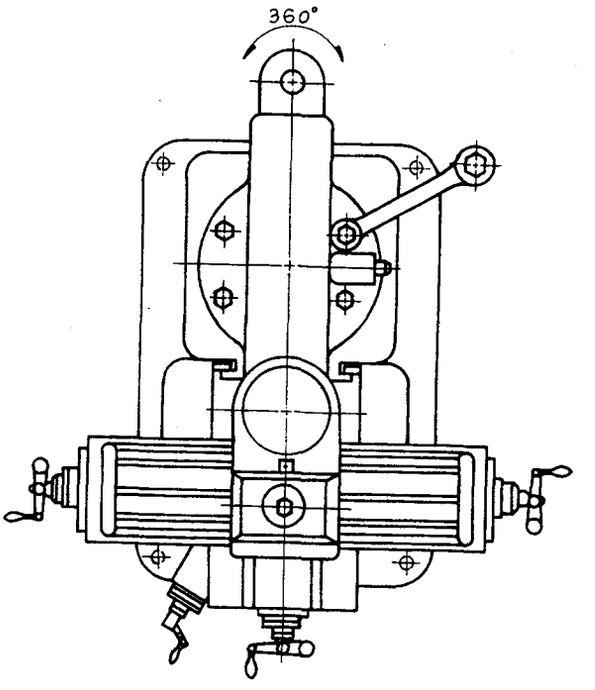
6. OPERATION

6-3A SWIVEL TURRET

(a) Use spanner and unlock the 4 bolts.

(b) Index to the required setting.

(c) Lock the 4 bolts.



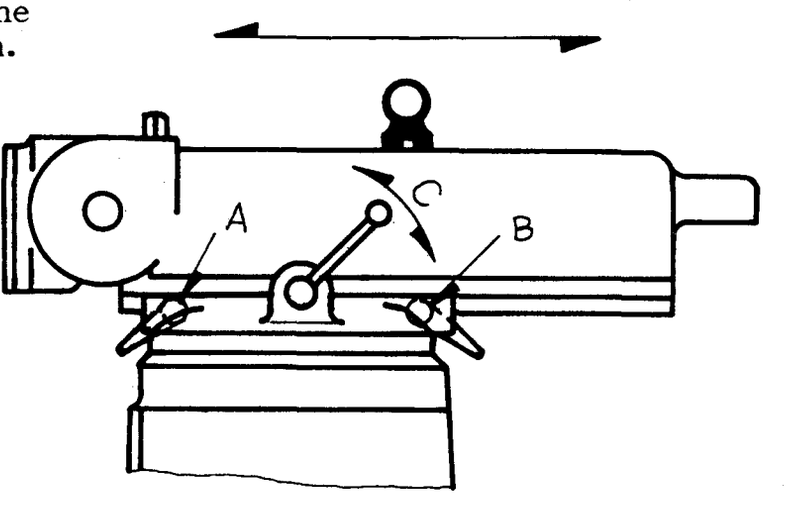
Sketch #10

6-3B MOVE RAM SLIDE

(a) Use Bridgeport spanner and unlock the two bolts.

(b) Turn the handle to move the slide to the desired position.

(c) Lock, tightening the rear bolt first.



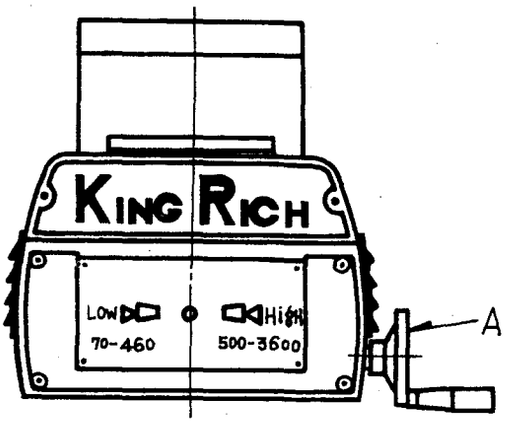
Sketch #11

6. OPERATION

6-4A SPINDLE SPEED(Change only when spindle is running)

Change Speed Within Range
(1) Start spindle.
(2) Turn handwheel 'A' to select required speed.

Change only when spindle is running.



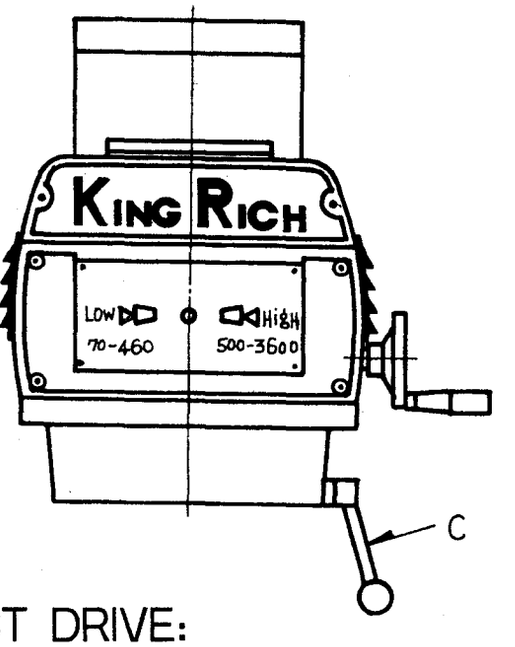
Sketch #12 DO NOT CHANGE SPEED WHEN SPINDLE IS STATIONARY

6-4B CHANGE RANGE

From direct to back gear drive:

(1) Switch Sketch #9 ② to OFF.

(2) Move lever "C" through neutral to LOW (this reverses the spindle rotation).

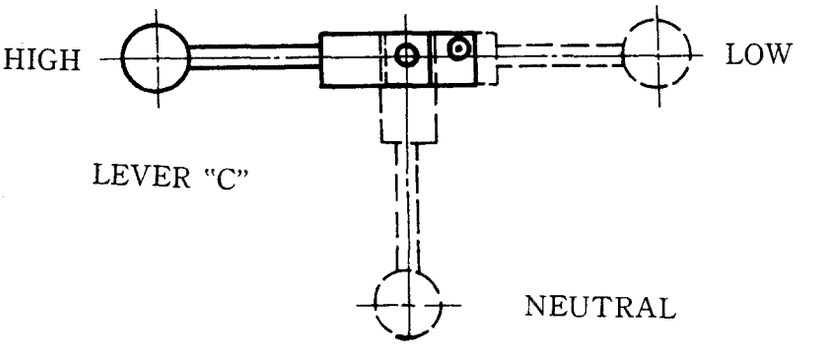


6-4C FROM BACK GEAR TO DIRECT DRIVE:

(1) Switch Sketch #9 ② to OFF.

(2) Move lever "C" through neutral to HIGH

(3) Rotate spindle by hand until the clutches are felt to engage.



Sketch #13 DO NOT CHANGE RANGE WHEN THE SPINDLE IS RUNNING

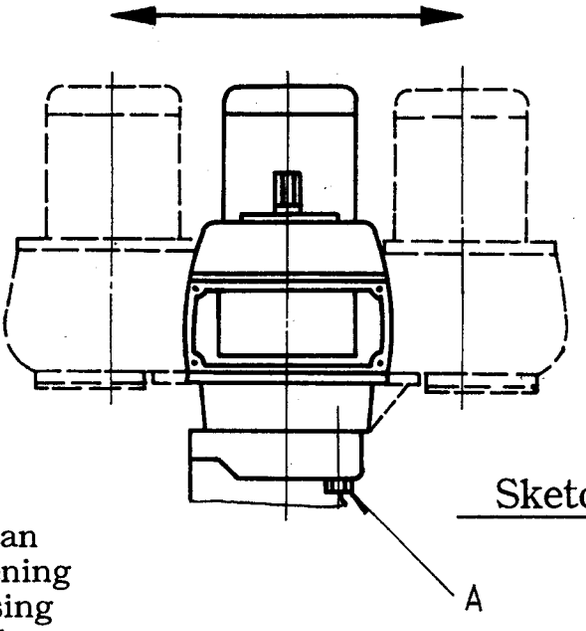
6. OPERATION

6-5A SWIVEL BELT HOUSING

(1) Slacken three Locking Nuts 'A'(Retain sufficiently to stop binding).

(2) Swivel to required angular setting.

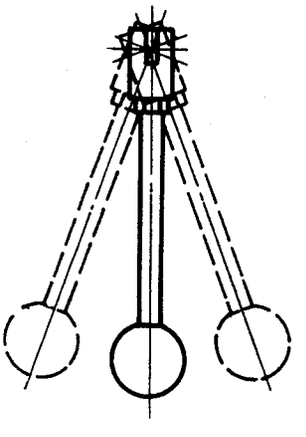
(3) Tighten three Locking Nuts; before finally securing, run spindle to give correct spline alignment.



Sketch #14

NOTE: Incorrect spline alignment can be caused by unequal tightening of the locking nuts 'A' causing varying stiffness of the quill feed which can be felt through the sensitive feed handle.

6-5B SPINDLE BRAKE



BRAKE OFF BRAKE

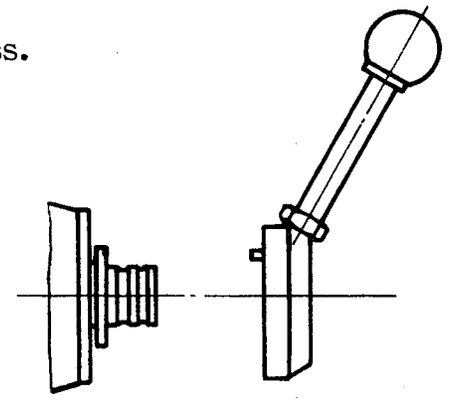
6-5C QUILL SENSITIVE HAND FEED

Sketch #15

(1) Place the handle on the boss.

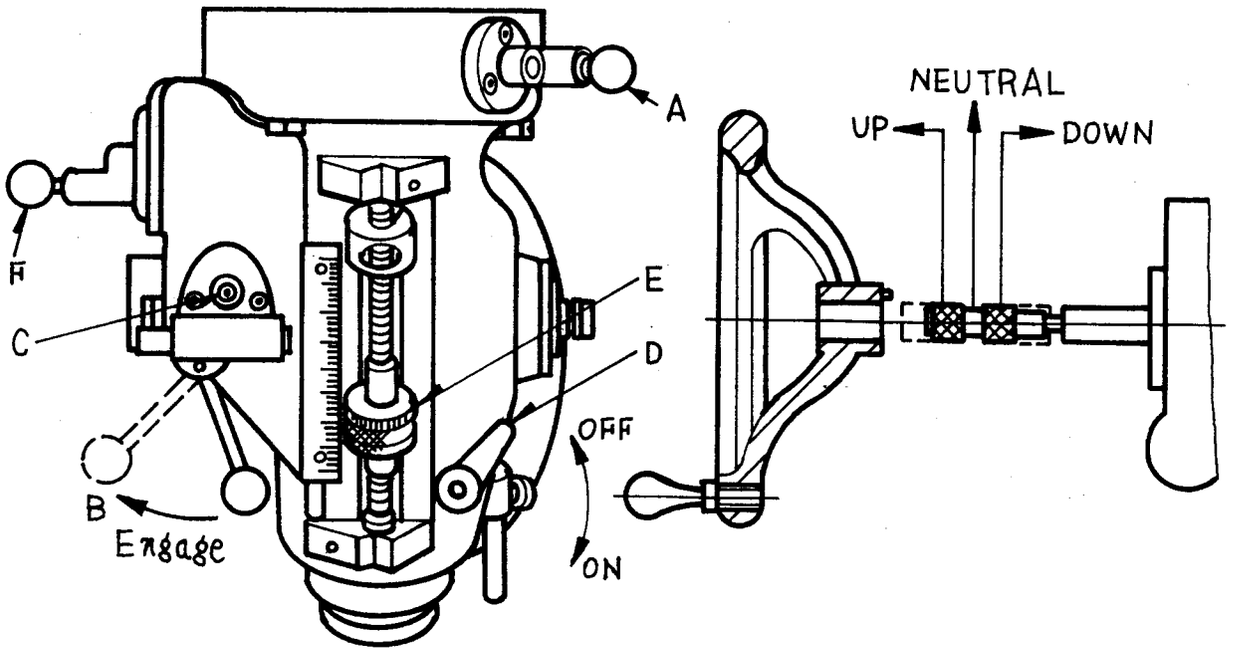
(2) Select the most suitable position.

(3) Push home until the locating pin engages.



Sketch #16

6. OPERATION



Sketch #17

6-6A FINE HAND FEED

(1) Disengage Auto Quill Feed 'A'

(2) Locate 'C' in mid (neutral) position

(3) Engage Feed Trip Lever 'B'

(4) The Quill is now under handwheel control.

6-6B AUTOMATIC FEED

Maximum loading 3/8"(9.5mm) dia. drill in steel

(1) Ensure quill lock is off 'D'

(2) Set micrometer dial to required depth 'E'

(3) Engage auto quill feed 'A' (when motor has stopped).

(4) Select feed rate 'F'

(5) Select feed direction 'C'

(6) Engage feed trip lever "B"

(7) The feed will automatically trip out at a depth within ± 010" (± .25mm).

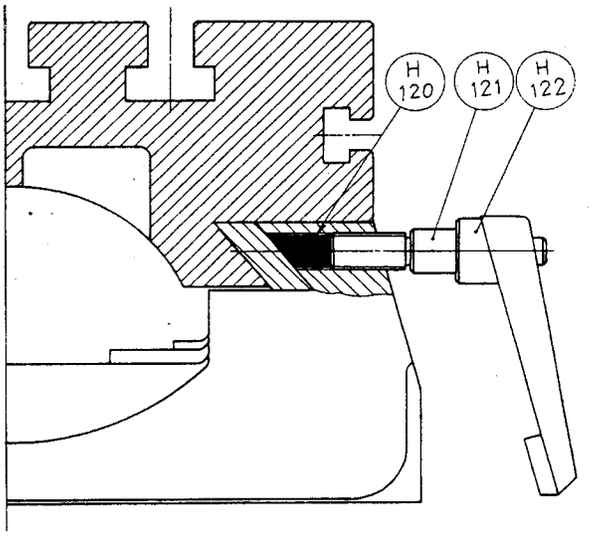
(8) Hand feed to dead stop for repeating accuracy ± 001" (± 0.25mm).

DO NOT ENGAGE QUILL FEED 'A' OVER 3,000 R.P.M.

6. OPERATION

6-7A CLAMPING THE TABLE SADDLE SLIDE

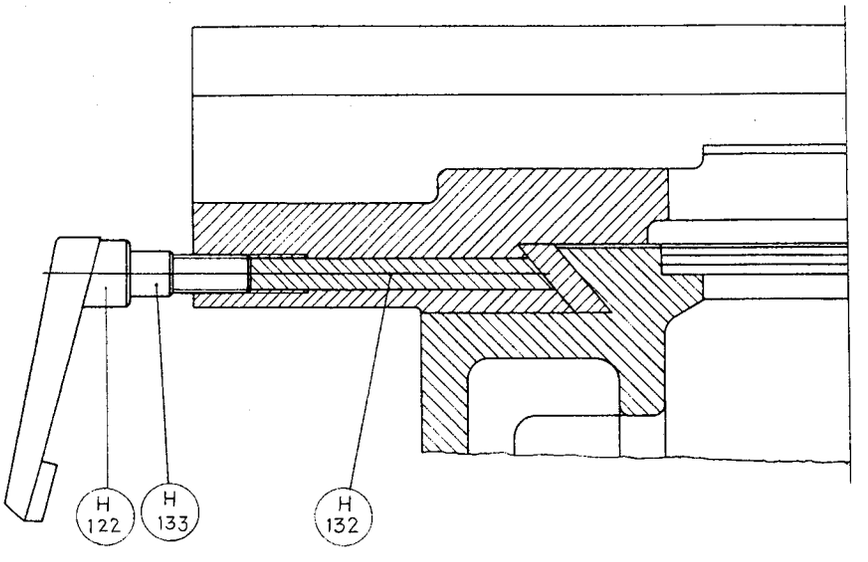
The table clamping lever is located on front of saddle and should always be clamped when longitudinal movement is not required.(Sketch #18)



Sketch #18

6-7B CLAMPING THE SADDLE KNEE SLIDE

When milling with longitudinal table feed only, it is advisable to clamp the knee to the colum and the saddle to the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left-hand side of saddle.(Sketch #19) Excessive pressure can cause slight table. Use moderate clamping pressure, as this will hold saddle sufficently.



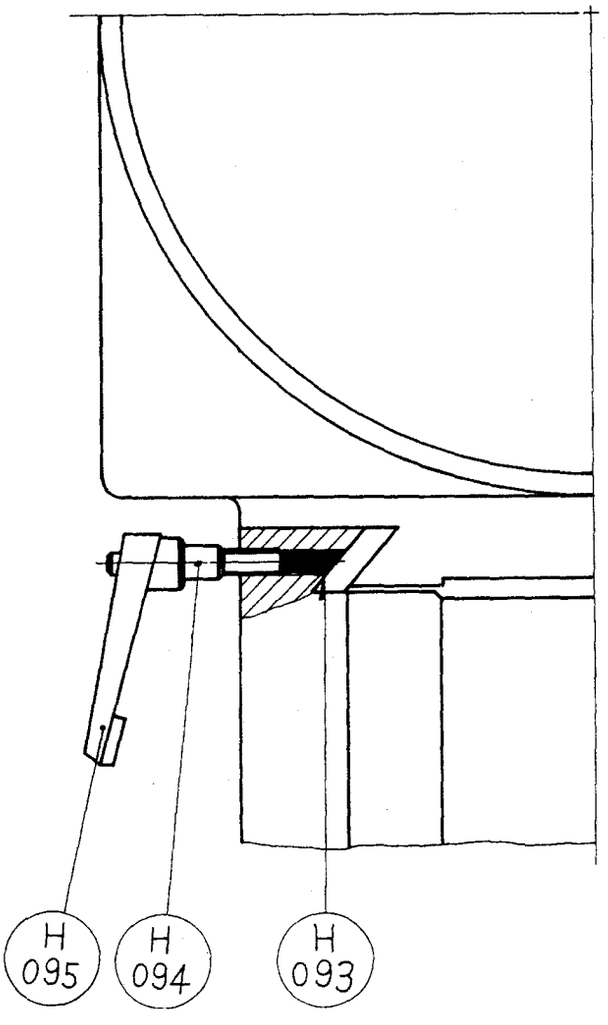
Sketch #19

6. OPERATION

6-7C CLAMPING THE KNEE COLUMN SLIDE

The knee clamping lever is at the left side of the knee and should be drawn downward to clamp the knee. This is only a tension brake and will lock the knee completely. Leave clamped at all times unless using knee in operatin.

IMPORTANT: Two clamps to lock the knee are located on the left side.



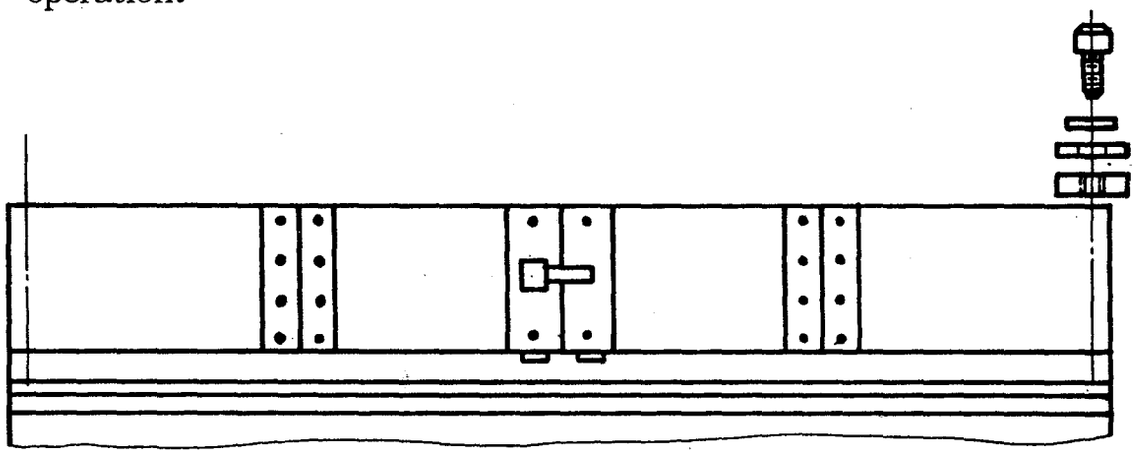
Sketch #20

6. OPERATION

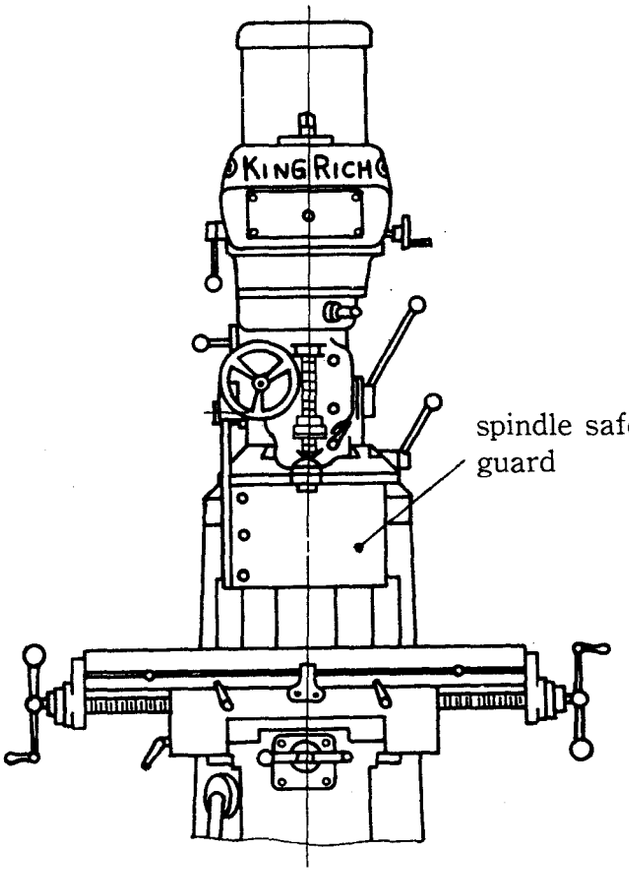
6-8A GUARD FOR SAFE USE

We use the spindle safety guard and table guard according to the size of workpiece.

We must adjust the guard for safe use. Operator must use the spindle safety guard and table guard in ordor to reduce the danger during operation.



Sketch #21 TABLE GUARD NO.1



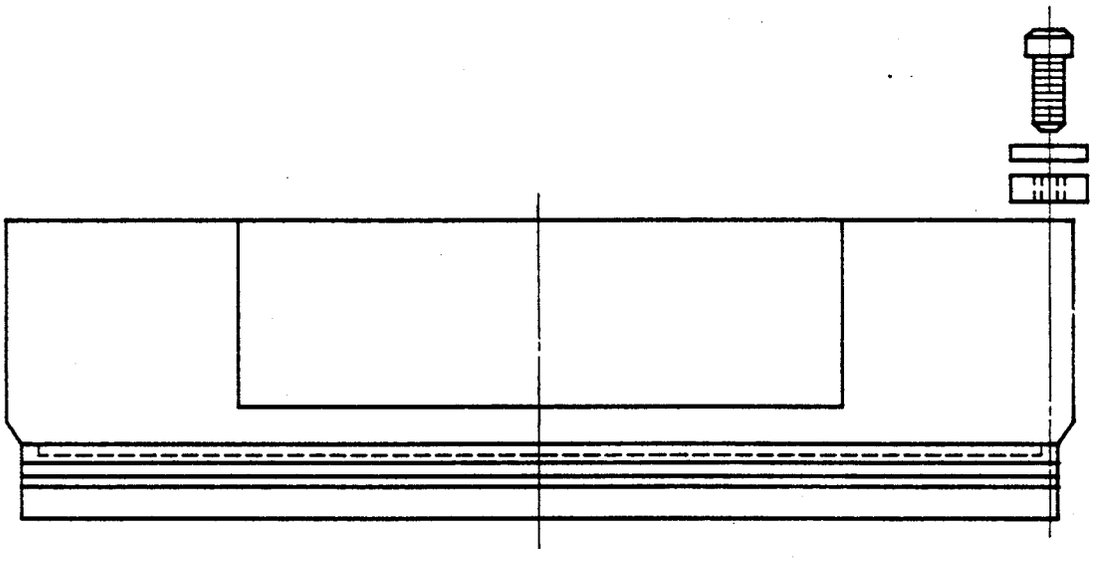
Sketch #22 SPINDLE SAFETY GUARD

6. OPERATION

6-8B GUARD FOR SAFE USE

We use the spindle safety guard and table guard according to the size of workpiece.

We must adjust the guard for safe use. Operator must use the spindle safety guard and table guard in ordor to reduce the danger during operation.

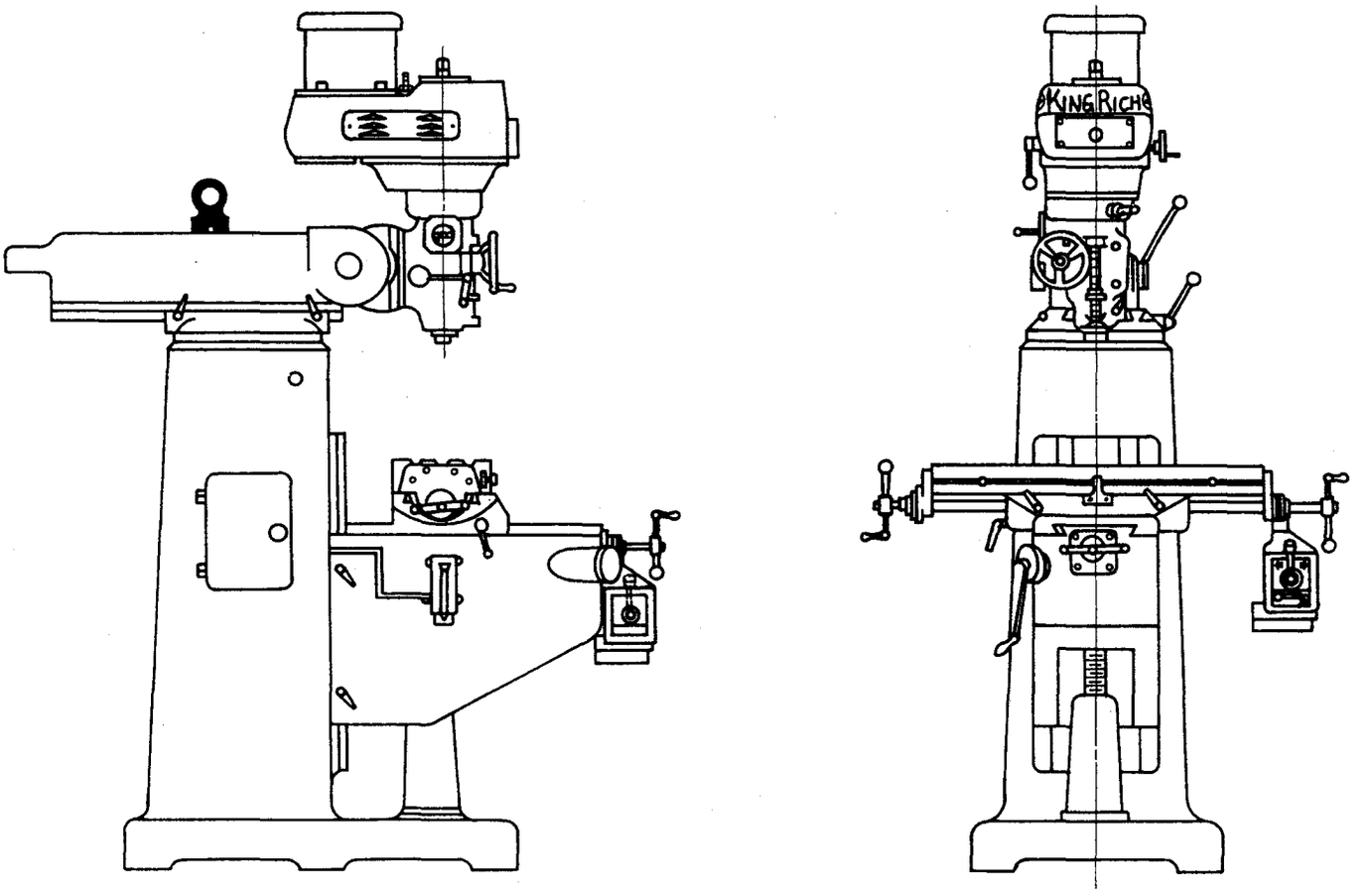


Sketch #23 TABLE GUARD NO.2
THE BUYER CAN CHOOSE THE
TABLE GUARD NO.1 OR NO.2

6. OPERATION

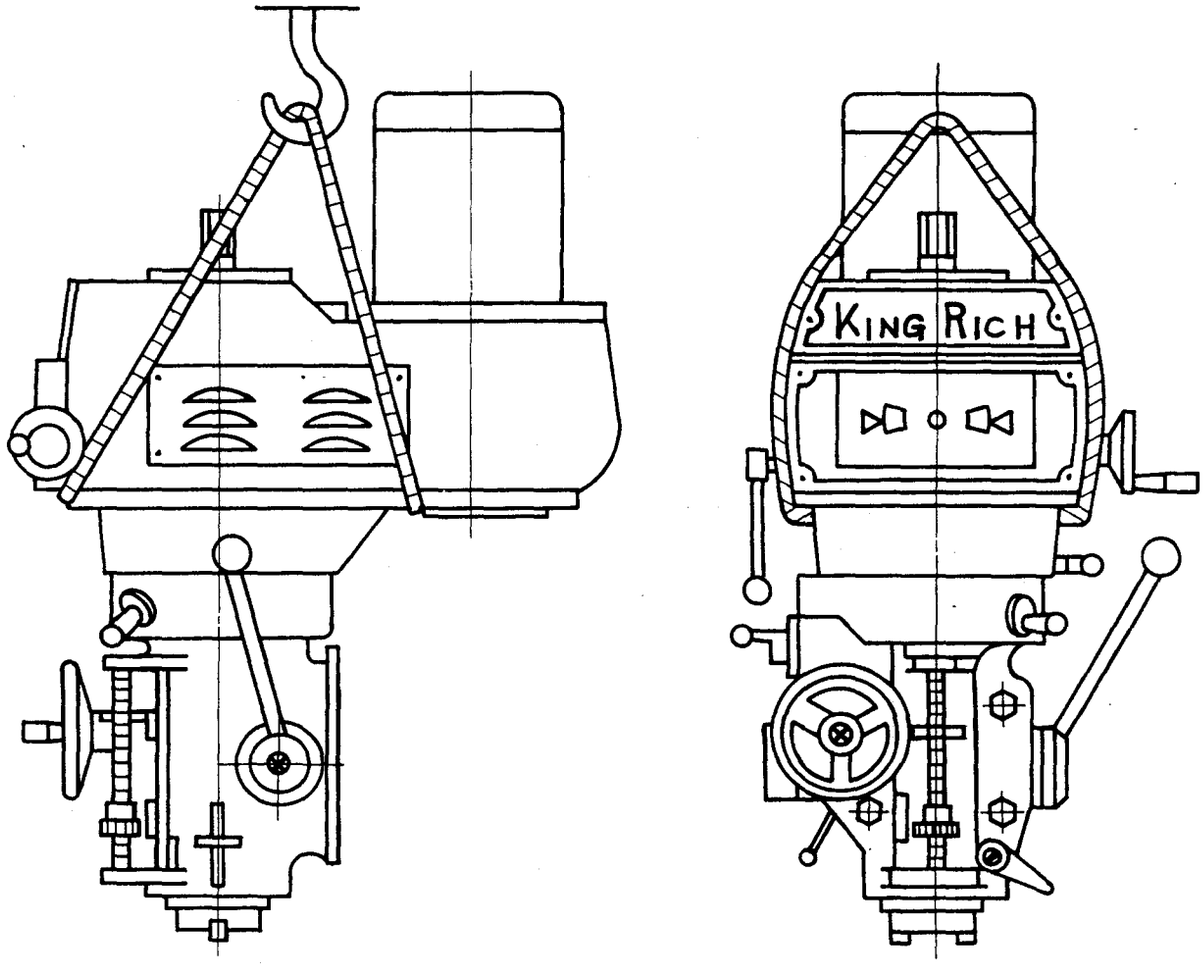
6-9 POWER FEED FOR SAFE USE

Before using this machine, you must conform the power feed position (sketch #24) and the exact installation
You have to study the instruction manual of "ALIGN"poewr table feed.



Sketch #24

7. MAINTENANCE



Sketch #25

7-1A TRANSPORTATION

We recommend to fit a rope becket for transporting variable speed head, as shown on Sketch #25

7-1B INSTALLATION

Fit screws Nos. 'A' into the four holes of head.
Then, make a previous tightening by means of four nuts corresponding to screws mentioned above. Finish fastening head with the same nuts.

CAUTION: A bad tightening of nuts could provoke a strain on sensitive parts of head.

7. MAINTENANCE

7-2 MOTOR REMOVAL

(1) Run head to adjust lowest speed.

(2) Remove 3 screws 'B'and cover 'A'

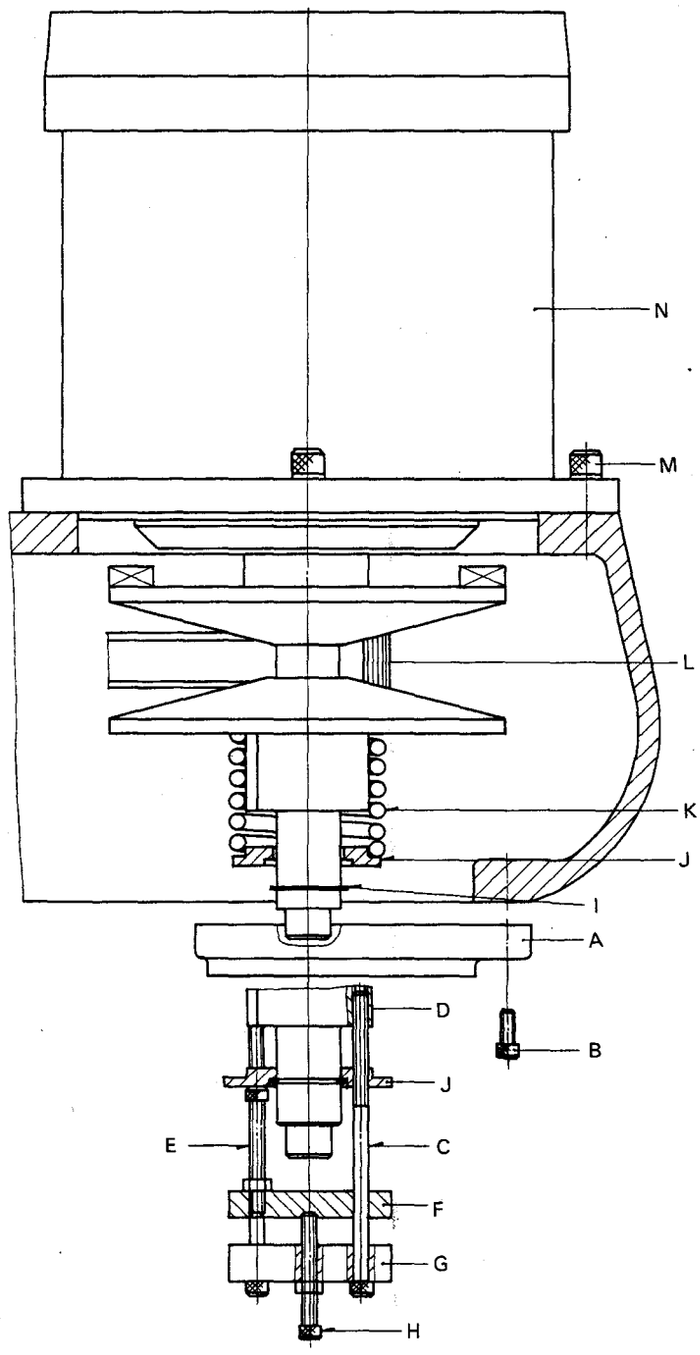
(3) Make a fixture comprised of 'C' 'E' 、'F' 、'G' 、'H'.

(4) Tighten 2 belts 'C' on pulley "D" and work with fixture. Rotate 'H' clockwise and move spring 'F' up by 10mm.

(5) Remove C-type retaining ring 'I' and fixture

(6) Remove pulley 'D' and 4 screws 'M'

(7) Remove motor 'N'



Sketch #26

7. MAINTENANCE

7-3 COLLECT ALIGNING SCREW REPLACEMENT

(1) Use felt pen, mark reference line on quill and nose cap 'B'

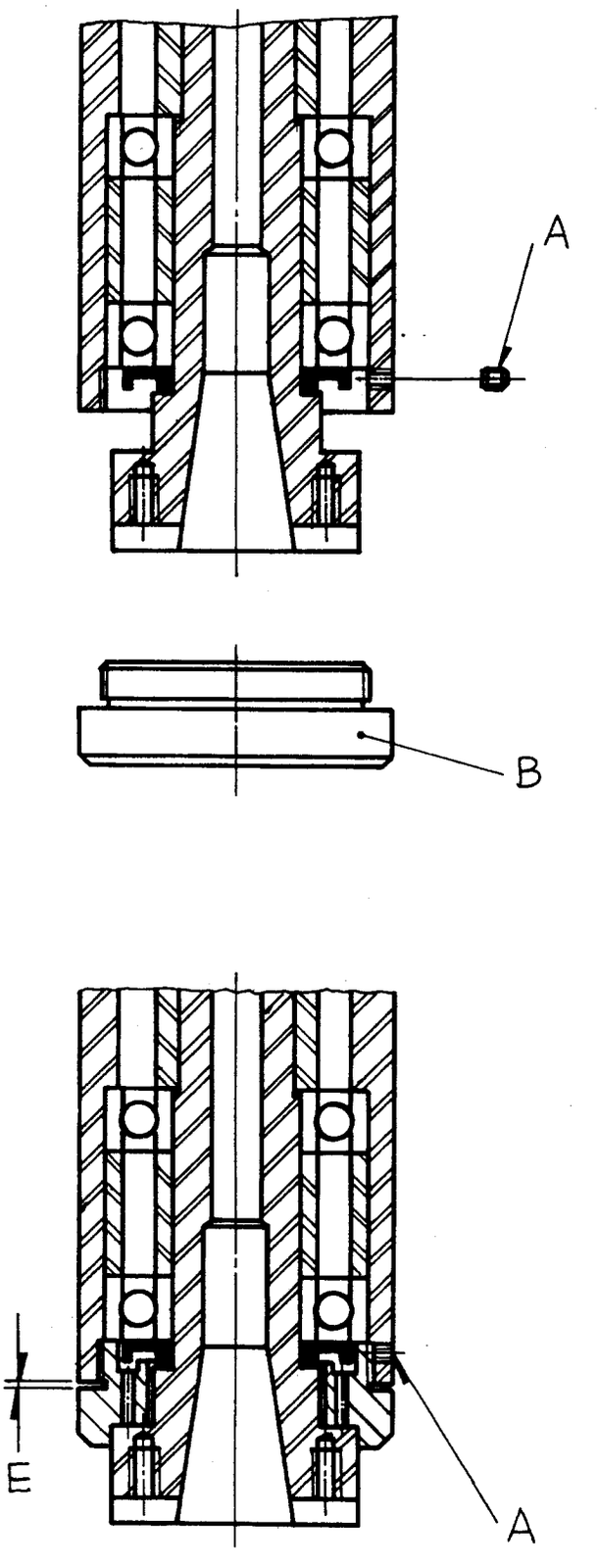
(2) Remove set screw 'A'

(3) Unscrew nose cap 'B'

(4) Replace nose cap 'B'; check felt pen markings for correct alignment.

(5) Replace set screw 'A' Caution do not overtighten as this will cause distortion

(6) Check gap 'E'. (.003=.08mm)



Sketch #27

7. MAINTENANCE

7-3A COLLECT ALIGNING SCREW REPLACEMENT

(1) Use felt pen, mark reference line on quill and nose cap 'B'.

(2) Remove set sctew 'A'.

(3) Unscrew nose cap 'B'.

(4) Remove lock screw 'C' and collet aligning screw

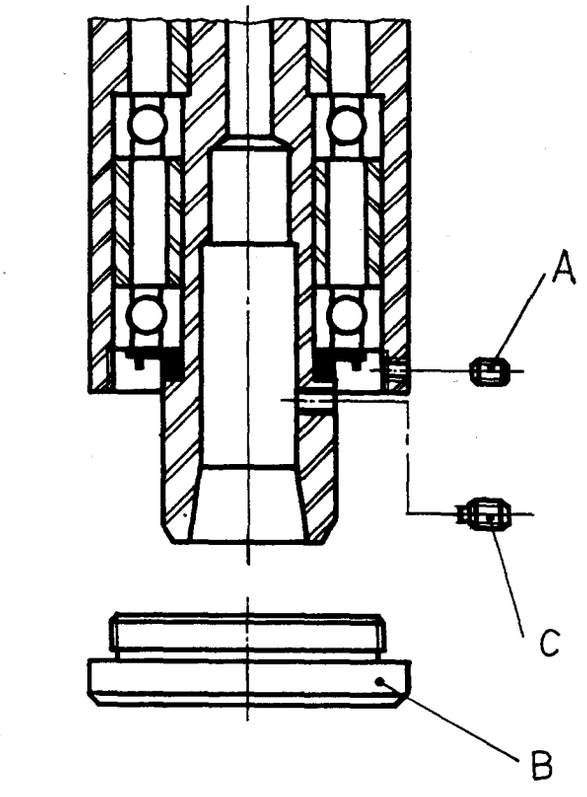
(5) Replace 'C'; insert R.8 collet and check that the dog on the end of the screw does not foul on the bottom of the guide slot.

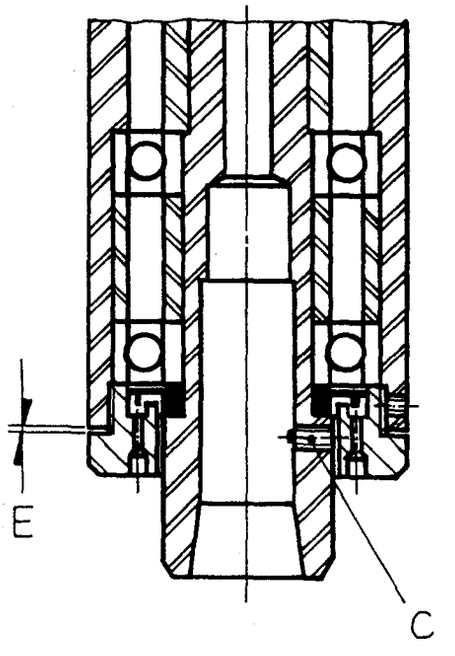
(6) Replace lock screw 'C'

(7) Replace nose cap 'B'; check felt pen markings for correct alignment.

(8) Replace set screw 'A'; Caution do not overtighten as this will cause distortion.

(9) Check gap 'E'





Sketch #28

7. MAINTENANCE

7-4A BALANCE SPRING REPLACEMENT

(1) With quill at top of movement apply quill lock.

(2) Remove screw 'A', hub 'B', and key 'C'

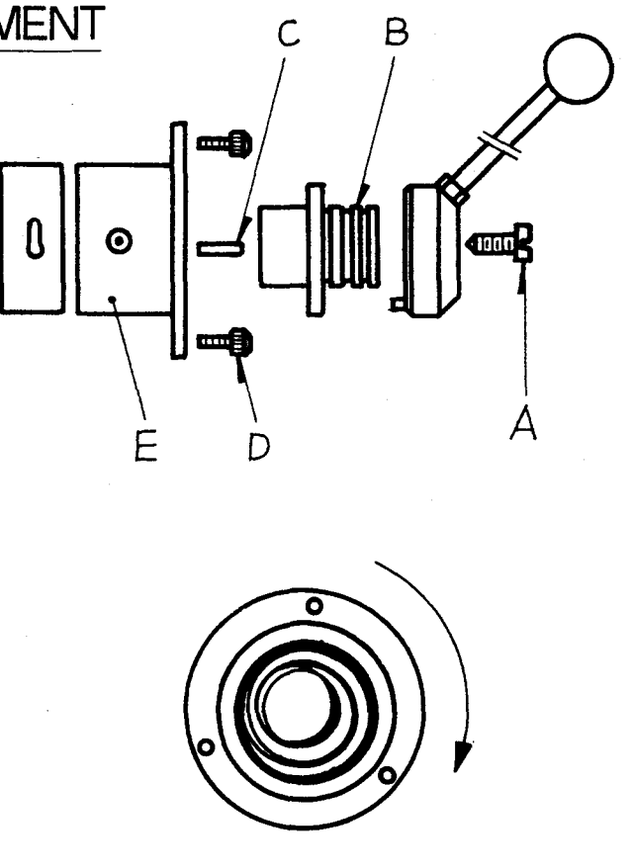
(3) Remove screws 'D', allowing housing to rotate slowly releasing spring tension.

(4) Lift end of spring from peg on the pinion shaft.

(5) Rotate housing 'E' anti-clockwise from head casting.

(6) Remove spring from housing and replace.

(7) Refit spring to main housing casting, turning housing clockwise until spring locates no peg in pinion shaft.



Sketch #29

7-4B FEED TRIP ADJUSTMENT

(1) Release locknut 'A'

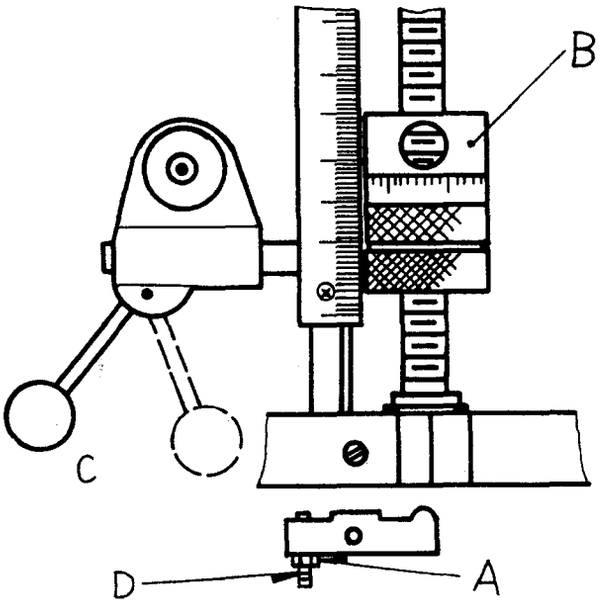
(2) Engage trip handle 'C'

(3) Adjust micro nuts against quill stop 'B'

(4) Slowly turn adjusting screw 'D' until lever 'C' trips.

(5) At this point secure locknut 'A'

(6) Check that smart trip action is obtained.



Sketch #30

7. MAINTENANCE

7-5 QUILL REMOVAL

(1) Remove screw 'D' and ball reverse lever 'E'.

(2) Remove cirlip 'F', screw 'G' and arm 'H'

(3) Thread shaft 'J' through micro nuts and remove.

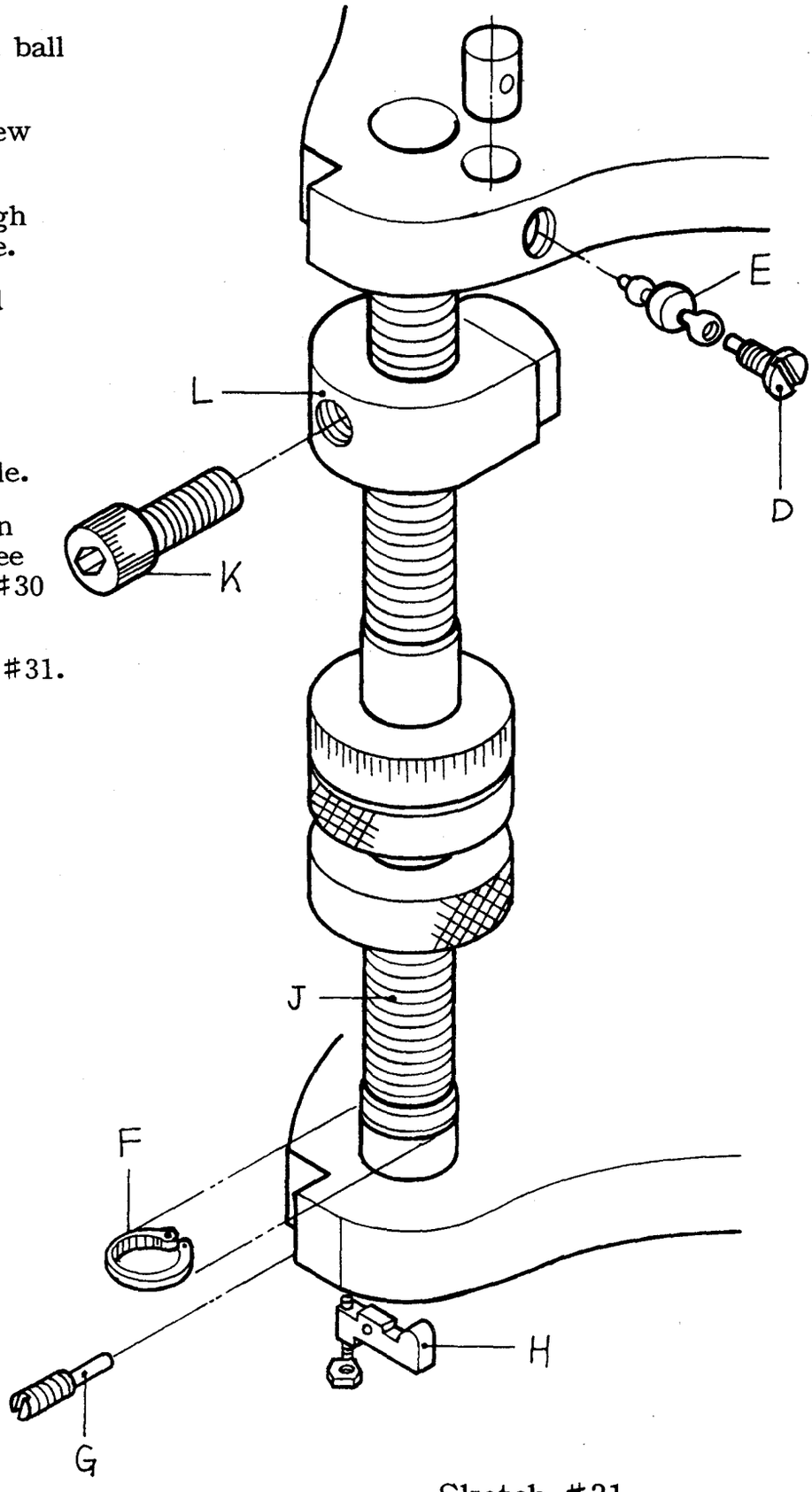
(4) Remove screw 'K' and stop 'L'.

(5) Remove quill.

(6) Clean all areas, oil liberally and reassemble.

(7) Check correct operation of feed trip linkage. See instruction on sketch #30

Re-assembly of spline alignment. see sketch #31.

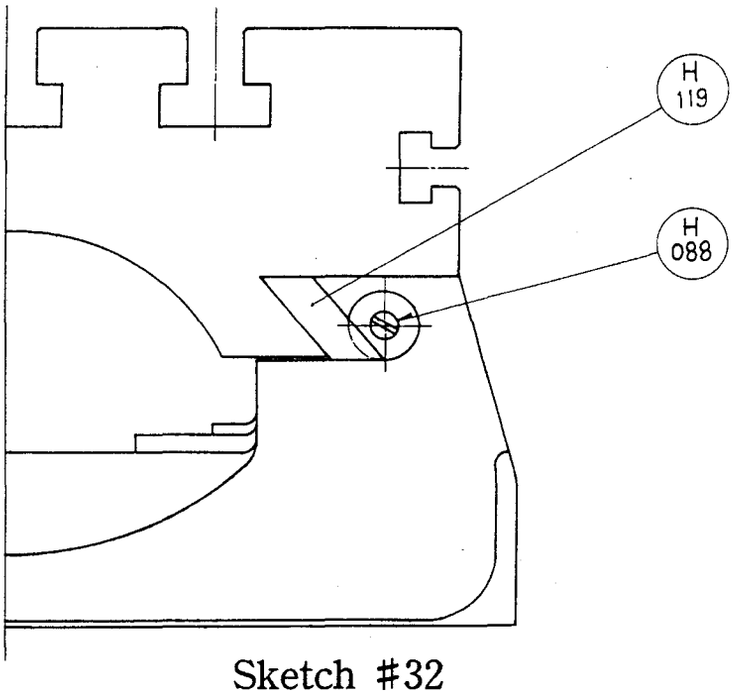


Sketch #31

7. MAINTENANCE

7-6A ADJUSTMENT OF TABLE GIB

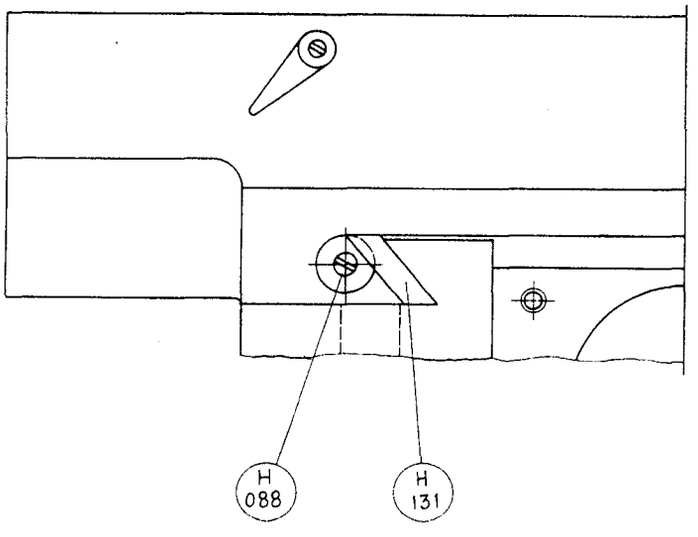
The table is provided with a full length tapered gib in the saddle, with an abjusting screw on the double side. To take up gib, tighten large screw slightly and repeat until a slight drag is felt when moving the table by hand.



Sketch #32

7-6B ADJUSTMENT OF SADDLE GIB

A tapered gib is used for adjusting the saddle smooth on the knee. This forms a guide for the saddle. To tighten gib same principal as described above is used; however, chip wiper has to be removed first.

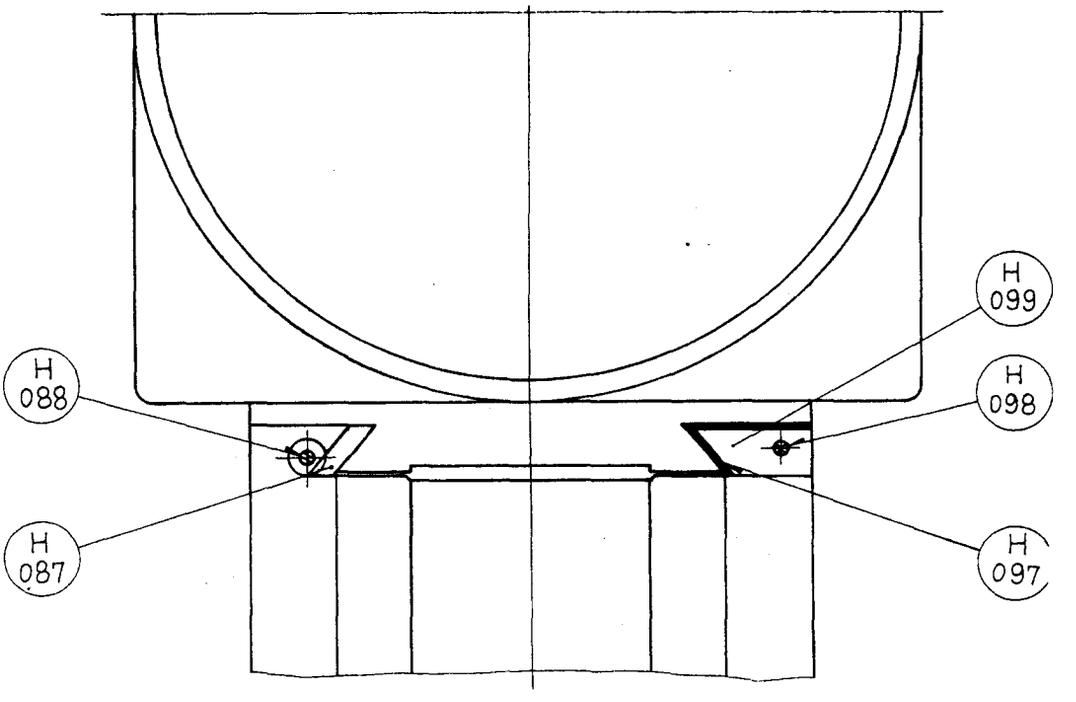


Sketch #33

7. MAINTENANCE

7-7 ADJUSTMENT OF KNEE GIB

Remove chip wiper and adjust screw until smooth movement is attained.



Sketch #34

7. MAINTENANCE

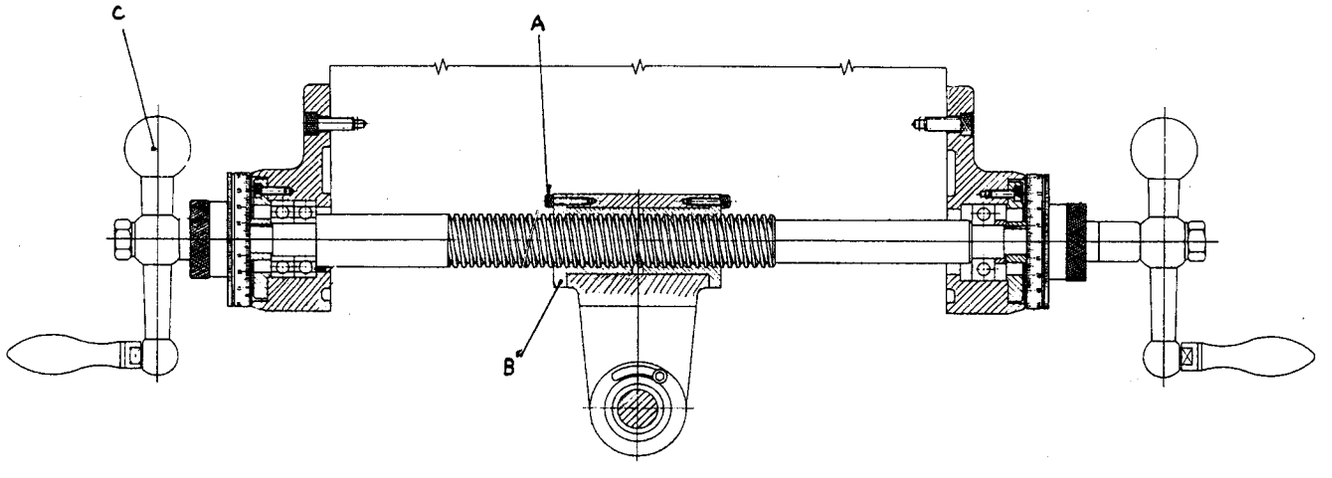
7-8 BACKLASH ADJUSTMENT

1. Crank the table to the left.

2. Withdraw screw 'A' 1/2 a turn.

3. Tighten screw 'B' whilst slowly turning handle 'C' until 0.1mm or 0.125mm is obtained.

4. Finally lock screw 'A' on to 'B'.



Sketch #35

7. MAINTENANCE

7-9 BACKLASH ADJUSTMENT

1. Crank the saddle to Mid position.

2. Withdraw 3 screws 'D'

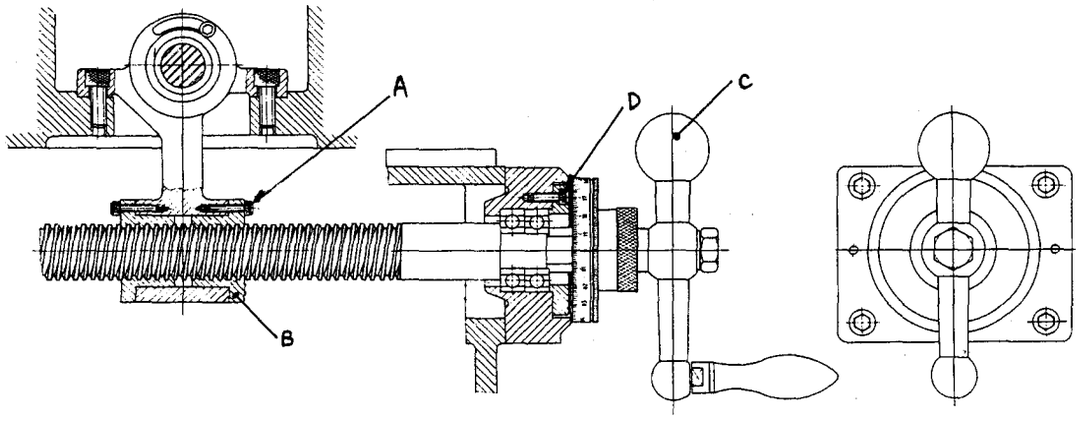
3. Pull the saddle forward to expose screws 'A' & 'B'.

4. Withdraw screw 'A', 1/2 a turn.

5. Whilst slowly turning handle 'C' tighten screw 'B' until 0.1mm or 0.125mm is obtained.

6. Lock screw 'A' onto 'B'

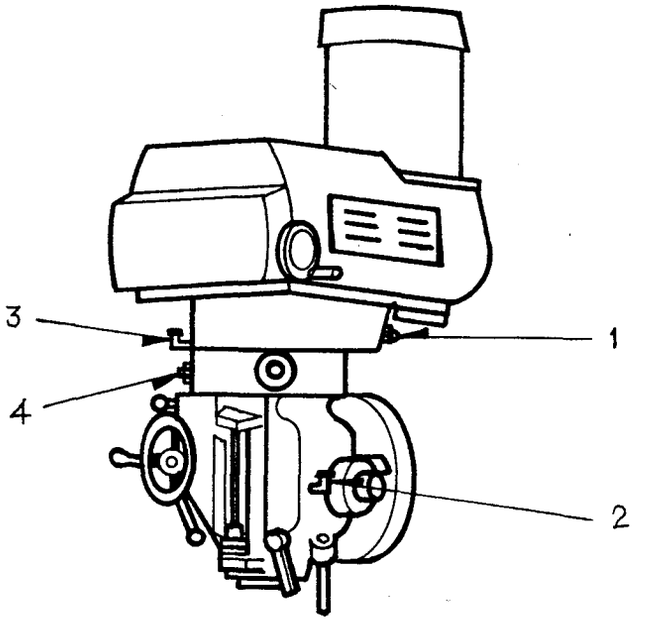
7. Finally crank the saddle to the front of the knee and replace 3 screws 'D'.



Sketch #36

8. LUBRICATION

8-1 VARIABLE SPEED DRIVE HEAD



Sketch #37

4 Remove grub screw, screw in tube and squeeze in required amount.

FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	LUB. AT
Twice Daily	Quill Down Feed	Light Oil	5-10 Drops	2
Once Daily	Bearing Block For Hi/Low Change	Light Oil	5-10 Drops	3

Failure to lubricate at 2 can result in tight quill and partial seizure of quill in housing.

FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	LUB. AT
Every 3 Months	Hi-Low Speed Gear Mechanism	Grease	Suitable Amount	1 , 4

8. LUBRICATION

8-2 AUTO OIL-FEED ADJUSTMENT

HIGH

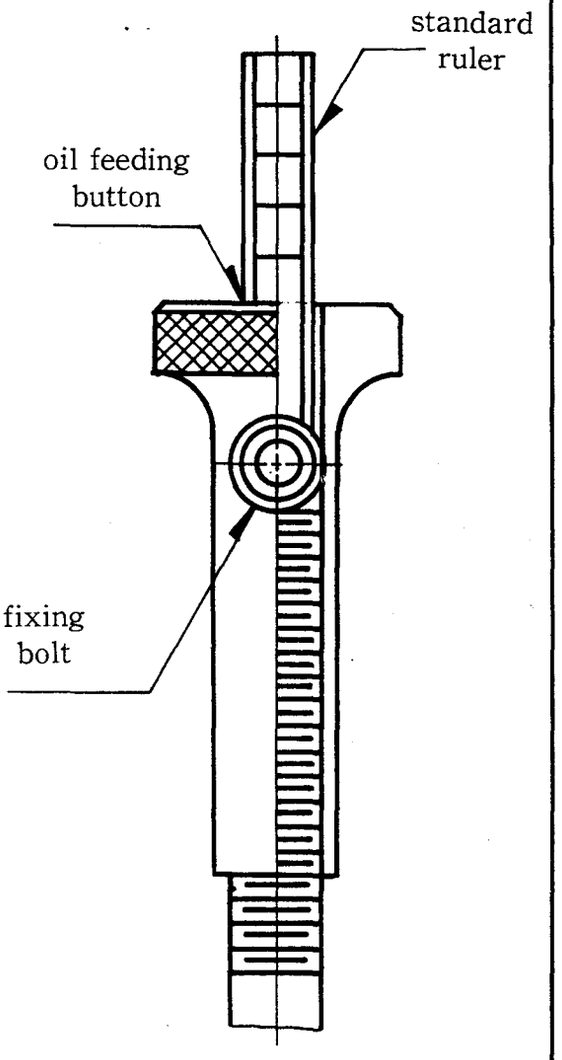
Instructions

1. Fill clean lubricant into the oil tank up to the top red line. Refill oil when the oil surface is below the bottom red ilne.
2. Pull open the oil feeding button to fill up the pipe.
3. Let the oil feeding button return to its original position by itself. Don't push it back.
4. Be sure to notice if the motor is running properly.
5. If any impurities remain in the oil tank. Please clean it at once and clean the oil absorbing net as well.

The adjustment of flow

Release the fixing bolt, adjust the movable part to the numbers indicating the amount of flow on the non-movable part. Tighten the fixing bolt at the desired flow amount.

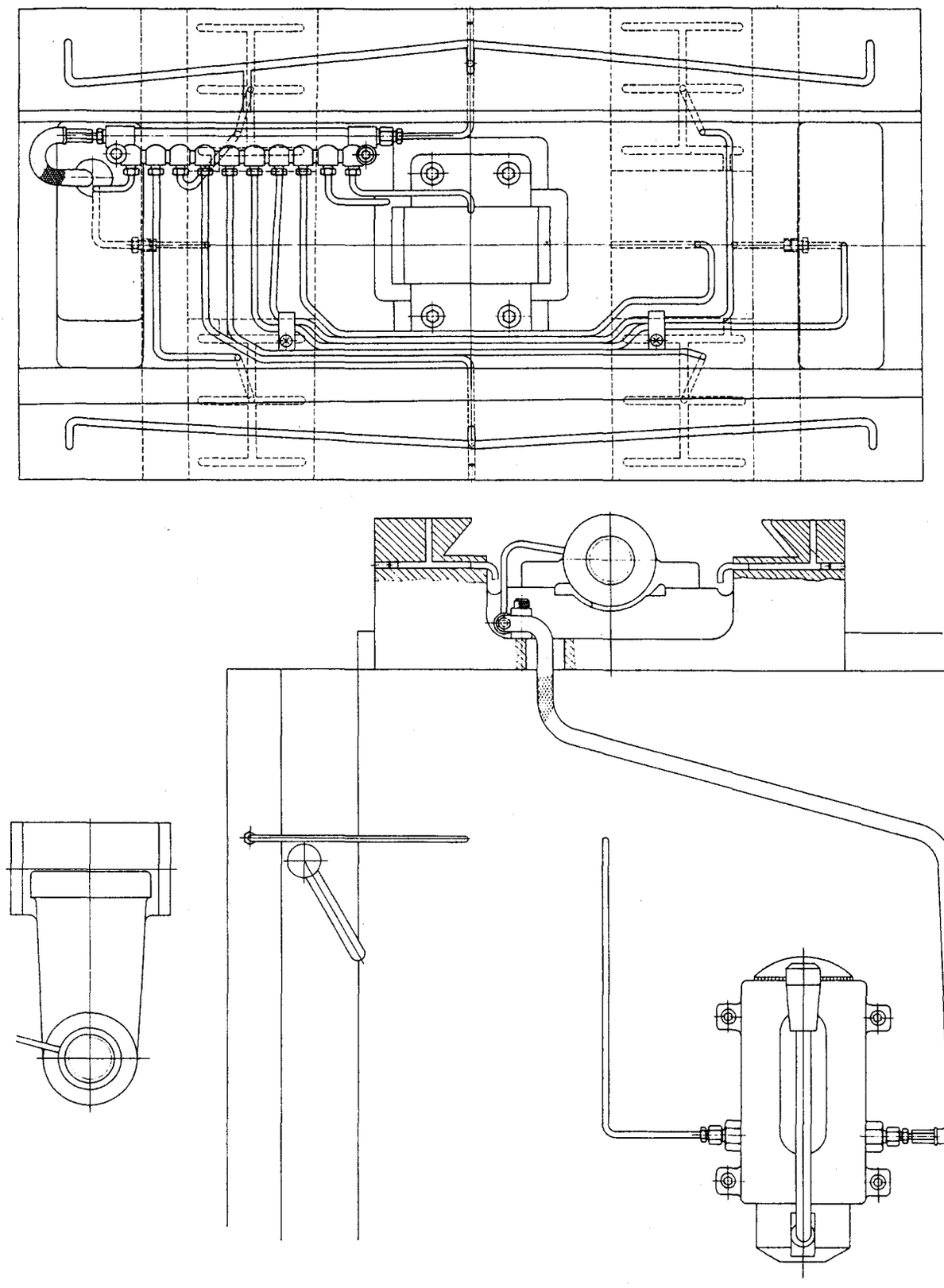
LOW



Sketch #38

8. LUBRICATION

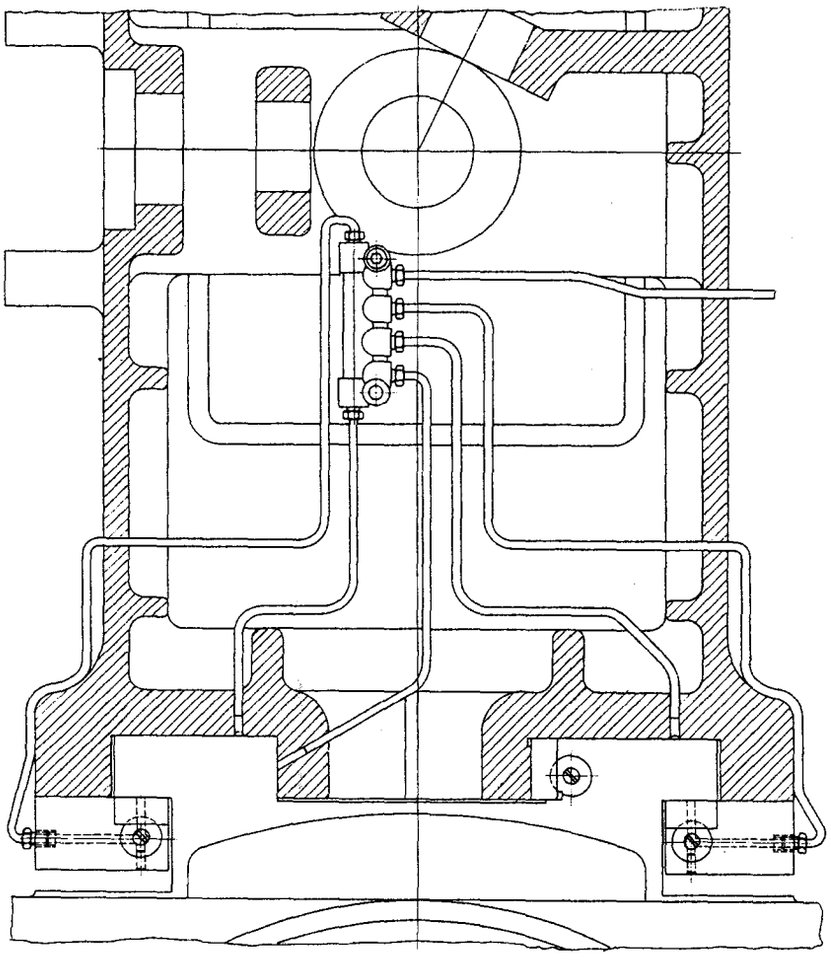
8-3 UP-DOWN OIL SYSTEM

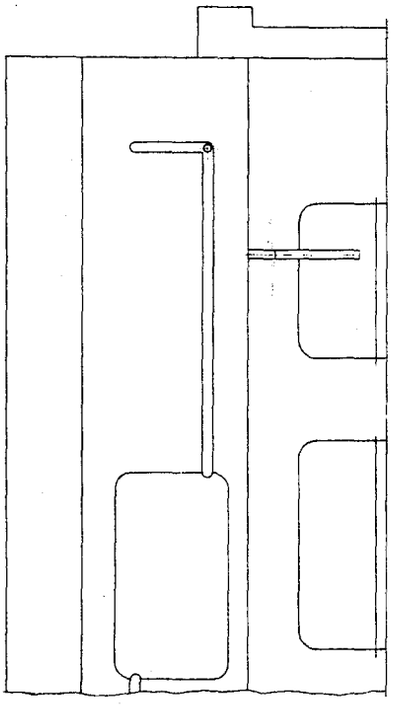


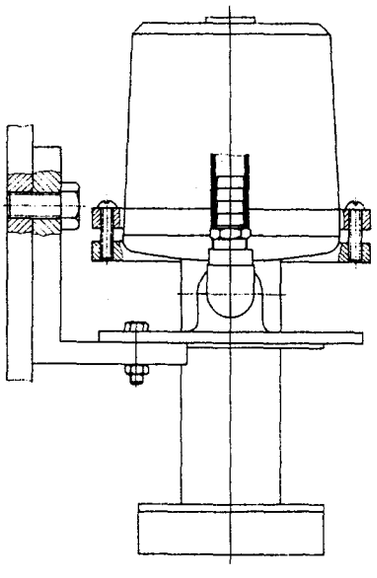
Sketch #39

8. LUBRICATION

8-4 SADDLE OIL SYSTEM







Sketch #40

8. LUBRICATION

8-5A COOLANT OIL

BRAND	SHELL	MOBIL	ESSO	B P	CASTROL
MODEL NO.	DROMUS BS & D	MOBILMET 220	KATWALL EP-66	CUTORA M2 & DIATSOL T-50	CLEAREDGE EP-284

8-5B SLIDE WAY OIL

BRAND	SHELL	MOBIL	ESSO	B P	CASTROL
MODEL NO.	TONNA T-68	VACTRA 2	FEBIS K-68	MACCURAT D-68	MAGNA BD-68

9. INSTRUCTION FOR DIAGRAM

A. CAUTION

DO NOT TURN
UNLESS
MOTOR IS ROTATING

B. DISENGAGE FEED GEAR

WHEN NOT IN USE

STOP MACHINE BEFORE

C. ← BRAKE →

D. SPEED SELECTION

HI N LO

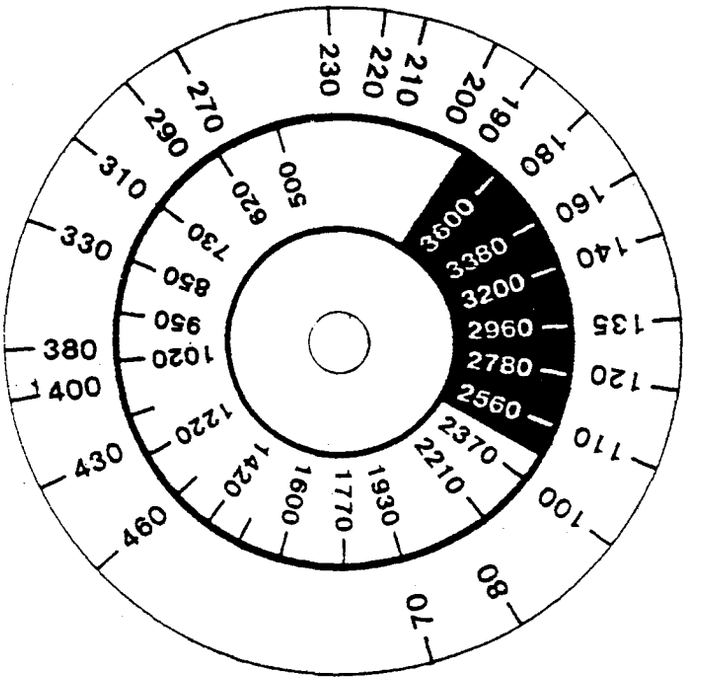
9. INSTRUCTION FOR DIAGRAM

E. CAUTION:

DO NOT CHANGE LEVERS.
WHILE THE SPINDLE IS
RUNNING

F. VARIABLE SPEED LIST

The high speed (2560–3600 rpm) is marked red color.
we must be careful to high speed operation.



). INSTRUCTION FOR DIAGRAM

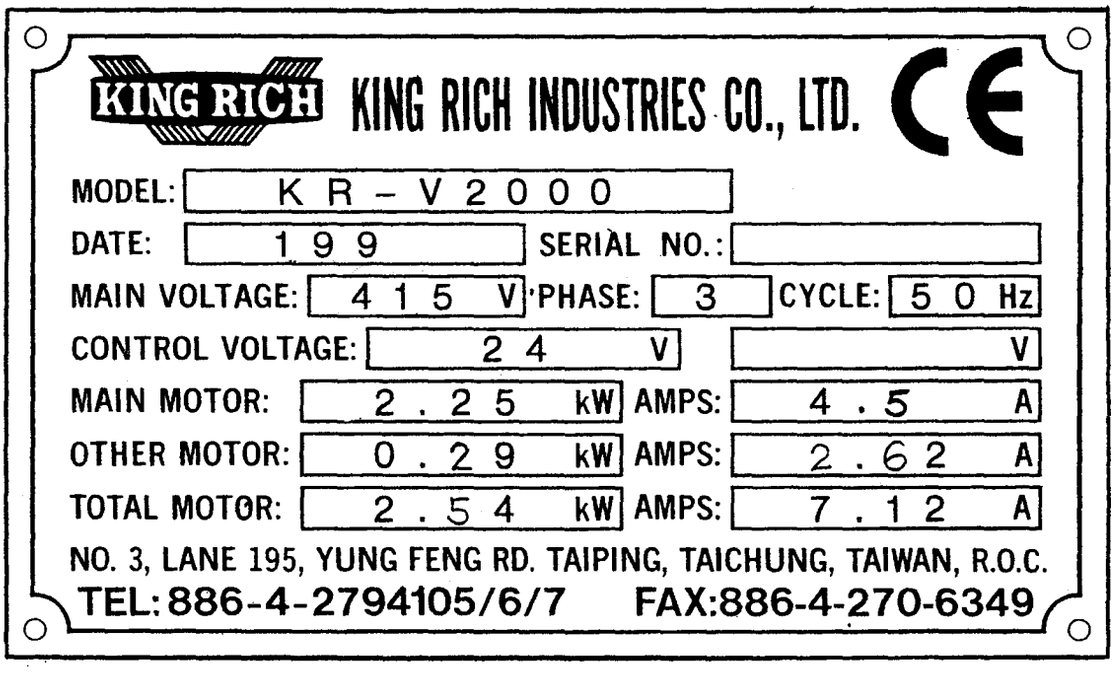
G. LIST OF RECOMMENDED OILS OR EQUAL

MOBIL VACTRA OIL NO. 2
SHELL TONNA OIL T68

H. PLEASE

ADD
LUBRICANT
BEFORE
USE

I. MACHINE NAMEPLATE



9. INSTRUCTION FOR DIAGRAM

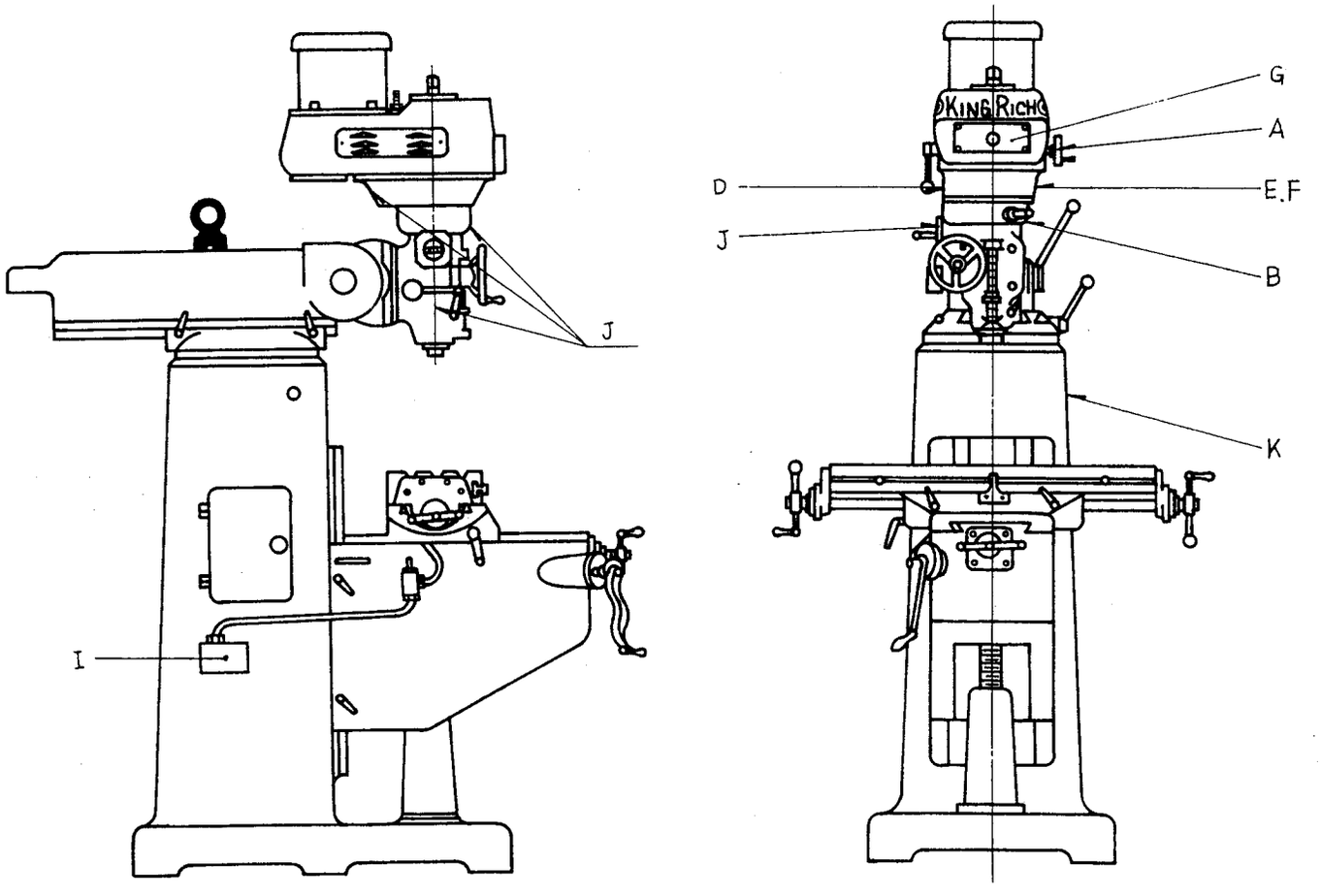
J.

DANGER

Hazardous voltages inside. Lockout power when maintenance.

9. INSTRUCTION FOR DIAGRAM

K. GENERAL DIAGRAM POSITION

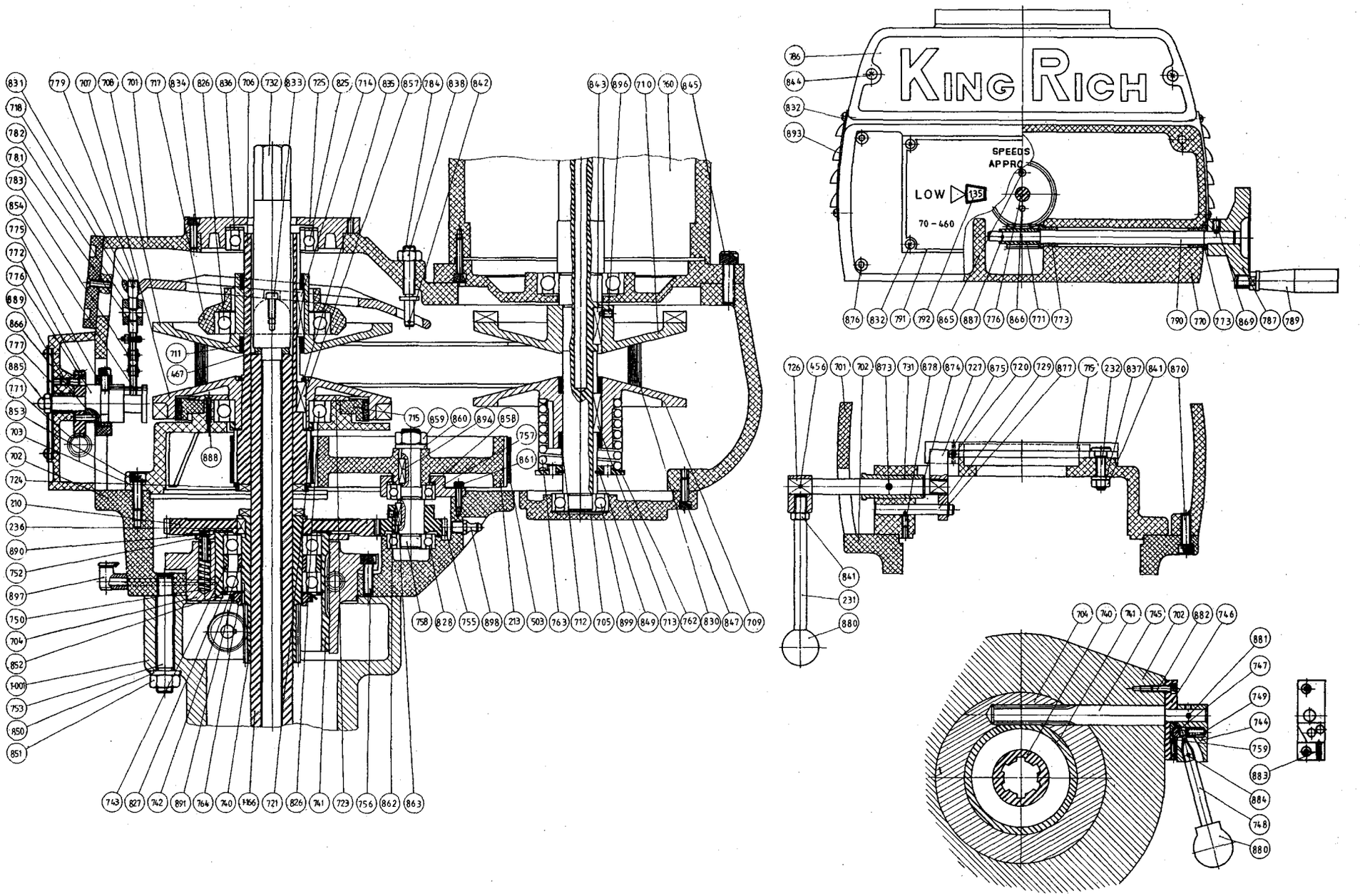


ANNEX A. PART DRAWING PARTS NAME & NUMBER

PART NO	DESCRIPTION	QTY
210	GEAR	1
213	TIMING BELT PULLEY	1
231	BRAKE LOCK HANDLE	1
232	BOLT	1
236	KEY	1
456	PIN	1
467	DRAWBAR WASHER	1
503	TIMING BELT 225L	1
701-1	ALUMINUM CASE	1
702-1	GEAR BOX	1
703	MAIN SPINDLE FIXED PULLEY	1
704	SUPPORT PLATE	1
705-1A	DOWN COVER	1
706-A	PULLEY SHAFT CLUTCH	1
707	MAIN SPINDLE FIXED PULLEY	1
708	MAIN SPINDLE SLIDING PULLEY	1
709	MOTOR SLIDING PULLEY	1
710	MOTOR FIXED PULLEY	1
711	SPINDLE SLIDING PULLEY BUSHING	2
712	MOTOR SLIDING PULLEY BUSHING	2
713	MOTOR PULLEY KEY	1
715	SPINDLE BRAKE	1
718	BALANCE BEAM	1
720	TRACTION SPRINGS	1
721	SLEVE	1
723	BEARING COVER	1
724	CLUTCH SLEVE	1
725	TOP COVER	1
726	BRAKE SHAFT	1
727	BRAKE CAMS	2
729	BRAKE SUPPORTER	1
731	BRAKE SHAFT SLEVE	1
732	DRAWBAR	1
740	THREE-ADMISSION CLUTCH	1
741	SLIDING BEARING BOX	1
742	SPACER(SMALL)	1
743	SPACER(LARGE)	1
744	HIGH-LOW SPEED HUB	1
745	TOOTH CHANGE SHAFT	1
746	ROTATION PLATE	1
747	LOCKING NOZZLE	1
748	HIGH-LOW SPEED LEVER	1
749	SPRING	1
750	SPRING	3
752	DRIVE RING	1
753	SCREW	3
755	DRIVE RING	1
756	SCREW	3
757	BEARING COVER	1
758	GEAR SHAFT	1
759	LOCKING SHAFT	1
760	MAIN MOTOR	1
762	SPRING REST	1
763	POERATING SCREW	1
764	LOCKING NUT	1
770-1	SPEED CHANGE BOX	1
771	WORM GEAR	1
772	GEAR	1
773	BUSHING	2
775	BUSHING	1
776	SPEED OPERATING SHAFT	1
777	BUSHING	1
779	ADJUSTING SCREW (R. T.)	1
781	ADJUSTING SCREW (L. T.)	2
782	REGULATING NUT	1
783	CHAIN	1
784	SPEED ADJUST SCREW	1
786	NAME PLATE	1
787	HANDWHEEL	1
789	HANDLE	1
790	OPERATING SHAFT	1
791	SPEED PLATE	1
792	SPEED DISK	1
825	BEARING 6007ZZ	1
826	BEARING 6210ZZ	2
827	BEARING 6908ZZ	2
828	BEARING 6203ZZ	2
830	VARIABLE SPEED BELT 875VC 3830	1
831	PIN	1
832	SCREW	12
833	SCREW	2
834	SCREW	3
835	RING	1
836	WAVE WASHER	1
837	SPRING WASHER	1
838	NUT	1
841	NUT	1
842	PIN	1
843	MOTOR FIXED PULLEY KEY	1
844	SCREW	2
845	SCREW	4
847	SCREW	3
849	RING	1
850	SPRING WASHER	3
851	NUT	3
852	RING	1
853	SCREW	4
854	PIN	1
857	SPINDLE FIXED PULLEY KEY	1
858	WAVE WASHER	1
859	NUT	1
860	SPRING WASHER	1
861	SCREW	3
862	SET SCREW	1
863	KET	1
865	SET SCREW	1
866	PIN	1
869	SET SCREW	1
870	SCREW	3
873	SET SCREW	1
874	RING	1
875	PIN	4
876	SCREW	4
877	RING	1
879	SET SCREW	1
880	PLASTIC BALL	2
881	PIN	1
882	SCREW	2
883	SET SCREW	1
884	PIN	1
885	NUT	1
887	PIN	1
888	SCREW	4
889	SET SCREW	2
890	SCREW	3
891	WASHER	1
893	SCREW	2
894	KEY	1
896	MOTOR FIXED PULLEY SET SCREW	1
897	OIL CUP	1
898	OIL NOZZLE	1
899	BEARING 6204ZZ	1

A. PART DRAWING

A1. VARIABLE HEAD DRAWING



ANNEX A. PART DRAWING PARTS NAME & NUMBER

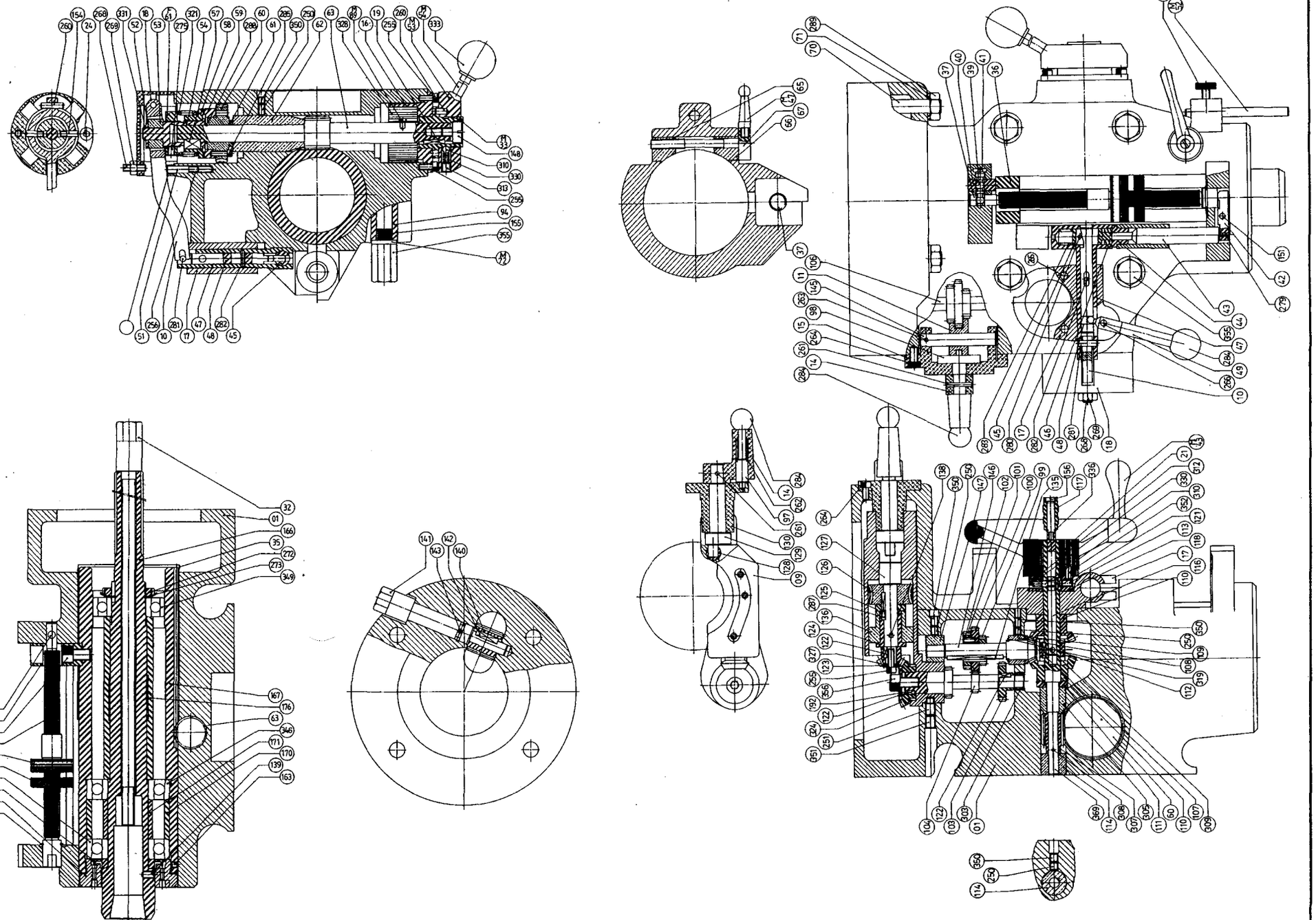
PART NO	DESCRIPTION	QTY
J-01	QUILL HOUSING	1
J-09	FEED GEAR CRADLE	1
J-10	OVERLOAD CLUTCH TRIP LEVER	1
J-11	FEED GEAR SHIFTER FORK	1
J-14	SHIFT CRANK	1
J-15	CLUSTER GEAR BOX	1
J-16	SPRING COVER	1
J-17	FEED TRIP BRACKET	1
J-18	CLUTCH ARM COVER	1
J-19	KEY	1
J-21	HANDWHEEL	1
J-24	MICRO SCREW JAM NUT	2
J-32	DRAWBAR KNOB	1
J-35	QUILL SKIRT	1
J-36	QUILL STOP KNOB	1
J-37	QUILL STOPO MICRO SCREW	1
J-38	MICROMETER NUT	1
J-39	REVERSE TRIP BALL LEVER	1
J-40	FEED REVERSE TRIP PLUNGER	1
J-41	SET SCREW	1
J-42	FEED TRIP LEVER	1
J-43	FEED TRIP PLUNGER	1
J-44	TRIP PLUNGER BUSHING	1
J-45	TRIP PLUNGER	1
J-46	FEED TRIP PLUNGER BUSHING	1
J-47	CAM ROD SLEEVE ASSEMBLY	1
J-48	CAM ROD	1
J-49	TRIP HANDLE	1
J-51	OVERLOAD CLUTCH LEVER SPRING PLUNGER	1
J-52	OVERLOAD CLUTCH WASHER	1
J-53	CLUTCH RING	1
J-54	OVERLOAD CLUTCH SLEEVE	1
J-57	OVERLOAD CLUTCH SLEEVE KEY	1
J-58	OVERLOAD CLUTCH	1
J-59	OVERLOAD CLUTCH RING	1
J-60	OVERLOAD CLUTCH WORM GEAR	1
J-61	PINION SHAFT WORM GEAR SPACER	1
J-62	QUILL PINION SHAFT BUSHING	1
J-63	QUILL PINION SHAFT	1
J-65	QUILL LOCK SLEEVE	1
J-66	QUILL LOCK SLEEVE	1
J-67	QUILL LOCK BOLT	1
J-70	SCREW	3
J-71	SPRING WASHER	3
J-94	LOWER CLAMPING BOLT SPACER	2
J-97	GEAR SHIFT PLUNGER	2
J-98	CLUSTER GEAR SHIFT CRANK	1
J-99	FEED DRIVE CLUSTER GEAR	1
J-100	FEED DRIVE CLUSTER GEAR	1
J-101	FEED DRIVE CLUSTER GEAR	1
J-102	SET PIN	1
J-103	FEED DRIVE GEAR	1
J-104	DRIVE GEAR SHAFT	1
J-106	CLUSTER GEAR SHAFT	1

PART NO	DESCRIPTION	QTY
J-107	KEY	1
J-108	DRIVE SHAFT BUSHING	1
J-109	SPACER	1
J-110	FEED REVERSE BEVEL GEAR	2
J-111	BEVEL GEAR WASHER	1
J-112	FEED REVERSE CLUTCH	1
J-113	SCREW	1
J-114	FEED WORM SHAFT BUSHING	1
J-116	REVERSE CLUTCH ROD	1
J-117	REVERSE KNOB	1
J-118	HANDWHEEL CLUTCH	1
J-121	WORM SHAFT KEY	2
J-122	KEY	4
J-123	BEVEL PINION WASHER	1
J-124	FEED WORM GEAR SHAFT SLEEVE	1
J-125	WORM GEAR SPACER	1
J-126	FEED DRIVE WORM GEAR	1
J-127	FEED DRIVE WORM GEAR SHAFT	1
J-128	FEED ENGAGE PIN	1
J-129	WORM GEAR CRADLE THROW OUT	1
J-130	SHIFT SLEEVE	1
J-135	CLUSTER GEAR KEY	1
J-136	WORM CRADLE BUSHING	1
J-138	PIN	1
J-139	COLLET ALIGNING SCREW	1
J-140	WORM GEAR	1
J-141	NUT	1
J-142	KEY	1
J-143	1/4"-20NC×3/8"L SOCKET SET SCREW	1
J-145	FEED SHIFT ROD	1
J-146	FEED REVERSE BEVEL GEAR PINION	1
J-147	SLEEVE	1
J-148	PINION SHAFT HUB SCREW	1
J-151	TRIP LEVEL PIN	1
J-154	CLUTCH RING PIN	2
J-155	1/2" T-BOLT	4
J-156	FEED REVERSE KNOB STUD	1
J-157	OUILL MICRO STOP NUT	1
J-163	SET SCREW	1
J-166	SPINDLE	1
J-167	QUILL(SERIAL AND UP)	1
J-169	SPINDLE DIRT SHIELD	1
J-170	BEARING SPACER LARGE FROM	1
J-171	BEARING SPACER (SMALL)	1
J-172	NOSEPIECE	1
J-176	SLEEVE FROM SER.	1
J-192	WHSHER	1
J-250	SOCKET SET SCREW	4
J-251	SOCKET SET CAP SCREW	1
J-255	R. HEAD SCREW	3
J-256	COMPRESSION SPRING	1
J-260	3/16"-24NC×1/2"L DOWEL PING	2
J-261	ROLL PIN	2
J-262	COMPRESSIVE SPRING	2
J-263	SET SCREW	1

PART NO	DESCRIPTION	QTY
J-264	CAP SCREW	3
J-265	CAP SCREW	1
J-266	ROLL PIN	1
J-268	SOCKET SET SCREW	1
J-269	NUT	1
J-272	LOCK NUT	1
J-273	LOCK MASHER	1
J-275	1/4"-20NC×1/4"L SOCKET SET SCREW	1
J-278	3/8"-24NC×5/8"L SCREW	1
J-279	SOCKET SET SCREW	1
J-280	ROLL PIN	1
J-281	PIN ϕ 5× 12 L	1
J-282	PIN	1
J-283	COMPRSSIVE SPRING	1
J-284	PLASTIC BALL 1/4"-20NC	3
J-285	5/32"-32NC×5/8"L HD. SCREW	3
J-287	KEY	1
J-288	KOHINOR SNAP RING	1
J-289	QUILL HANDLE LOCK NUT	3
J-303	NEEDLE BEARING	1
J-305	FEED WORM SHAFT BUSHING	1
J-307	WORM	1
J-308	PIN	1
J-309	PIN	1
J-310	STEEK BALL	2
J-312	SET SCREW	1
J-313	SCREW	1
J-319	SNAP RING	1
J-321	SAFETY CLUTCH SPRING	1
J-324	FEED REVERSE BEVEL GEAR	1
J-327	STEEL PINION	1
J-328	CLOCK SPRING	1
J-330	COMPRESSION SPRING	2
J-331	KNOHINOOR SNAP RING	1
J-333	BLACK PLASTIC BALL HANDLES	1
J-336	SNAP RING	1
J-346	SPINDLE BEARING "FAFANTR" "2MM207WIDUL"	2
J-349	BEARING FAG 6206ZZ	1
J-350	SCREW	4
J-351	SCREW	1
J-352	DOWEL PINS	1
J-355	HEX NUT	4
J-356	NUT	1
J-369	SHAFT	1
J-373	SPRING	1
M33	PINION SHAFT HUB SLEEVE	1
M43	HANDWHEEL HANDLE	1
M47	LOCK HANDLE	1
M51	INDICATOR ROD SCREW	1
M52	INDICATOR ROD	1
M53	PINION SHAFT HUB	1
M54	PINION SHAFT HUB HANDLE	1
M72	WASHER	4
M89	CLOCK SPRING STUD	1
F61	OVERLOAD CLUTCH LOCKNUT	1

A. PART DRAWING

A2. VERTICAL MILLING HEAD DRAWING



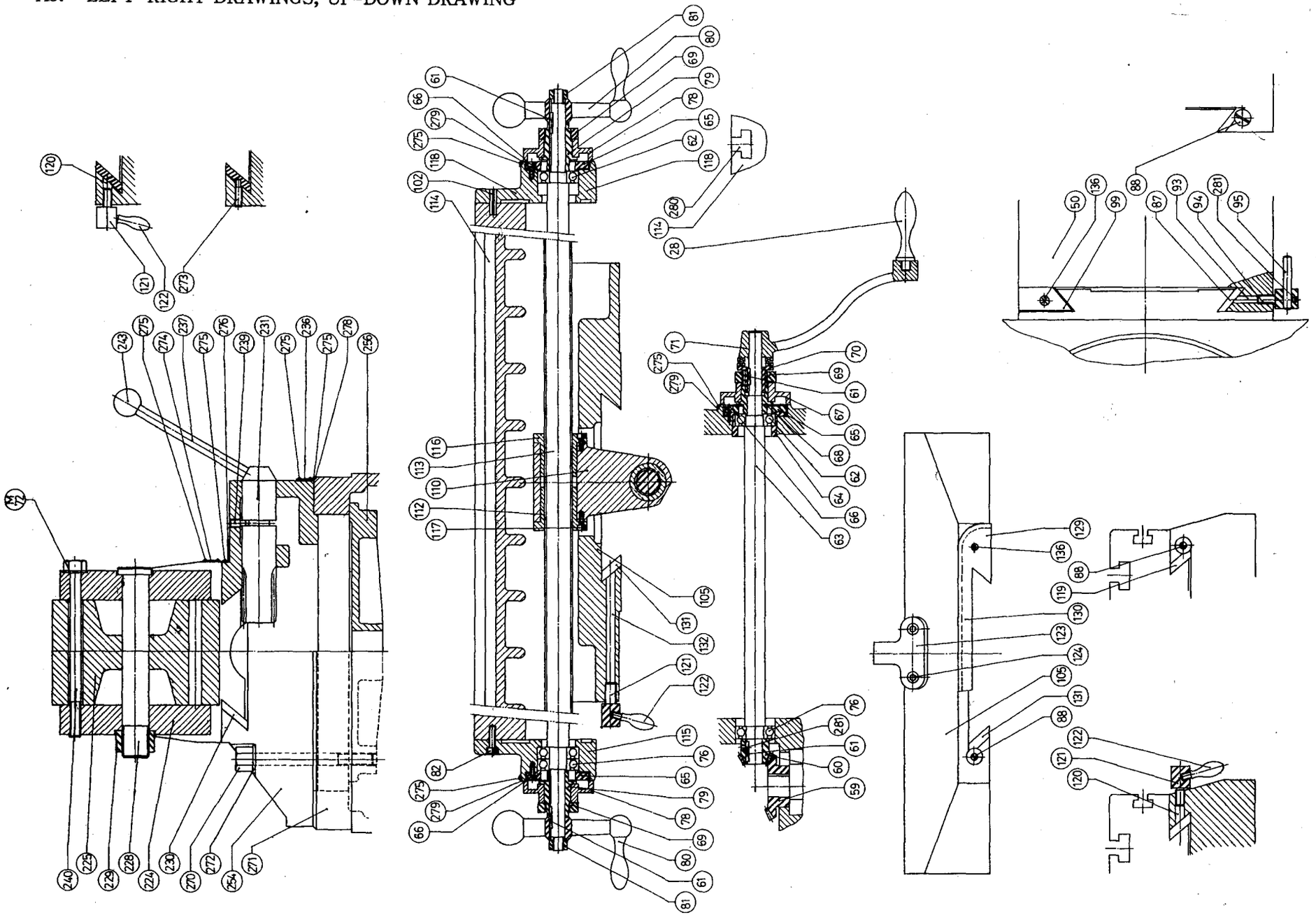
ANNEX A. PART DRAWING PARTS NAME & NUMBER

PART NO	DESCRIPTION	QTY
H-28	HANDLE	1
H-50	KNEE	1
H-59	BEVEL GEAR	1
H-60	BEVEL PINION	1
H-61	WOODRUFF KEY	4
H-62	6204ZZ GREASE. SEALED BALL BEARINGS	3
H-63	GEAT SHAFT	1
H-64	BEARING CUP	1
H-65	BEARING RETAINER RING	3
H-66	1/4"-20NC×3/4"L HOLLOW HEAD CAP SCREW	9
H-67	DIAL WITH 100 GRADUATIONS	1
H-68	DIAL HOLDER	1
H-69	DIAL WITH NUT	3
H-70	GEARSHAFT CLUTCH INSERT	1
H-71	ELEVATING CRANK	1
H-72	WASHER	3
H-76	6204Z GREASE-SEALED BALL BEARINGS	2
H-78	DIA WITH 200 GRADUATINOS	2
H-079	DIAL HOLDER	2
H-80	BALL CRANK HANDLE	2
H-81	1/2"-20NF JAM NUT	2
H-82	3/8"-16NC×1"L HOLLOW HEAR CAP SCREW	8
H-87	KNEE COLUMN GIB	1
H-088	ADJUSTING SCREW	3
H-088-1	SET SCREW	3
H-93+H-94+H-95	ELEVATING LOCK	2
H-097	ALUMINUM PLATE	4
H-099	FELT WIPER	1
H-102	PIN	4
H-105	SADDLE	1
H-110	FEED NUT BRACKET	1
H-112	LONGITUDINAL FEED NUT	1
H-113	LONGITUDINAL FEED SCREW	1
H-114	TABLE	1
H-115	LEFT BEARING BRACKET	1
H-116	LONGITUDINAL LEADSCREW ADJUSTING NUT	1
H-117	SCREW	4
H-118	RIGHT BEARING BRACKET	1
H-119	SADDLE TABLE GIB	1
H-120	TABLE LOCK PLUNGER	3
H-121	TABLE LOCK BOLT	3
H-122	TABLE LOCK BOLT HANDLE	2
H-123	TABLE STOP BRACKET	1
H-124	8×20L HOLLOW HEAD CAP SCREW	2
H-129	SADDLE KNEE WIPER PLATE	2
H-130	FELT WIPER	2
H-131	SADDLE KNEE GIB	1
H-132	SADDLE LOCK PLUNGER	1
H-136	8×20L OVER HEAD SCREW	10
H-224	RAM	1
H-225	RAM ADAPTER	1
H-228	ADAPTER PIVOT STUD	1
H-229	ADAPTER PIVOT STUD LOCKNUT	1
H-230	OVERARM GIB	1
H-231	RAM PINION	1
H-236	ANGLE PLATE	1

PART NO	DESCRIPTION	QTY
H-239	SET SCREW	1
H-240	ADAPTER LOCKING BOLT	3
H-243	3/8"-16NC BALL	1
H-254	TURRET	1
H-256	SPIDER	1
H-270	TURRET CLAMP BOLTS	4
H-271	COLUMN	1
H-272	WASHER	4
H-273	RAM GIB SET SCREW	2
H-274	SCALE	1
H-275	RIVET	16
H-276	REFERENCE POINT PLATE	1
H-278	REFERENCE POINT PLATE	1
H-279	REFERENCE POINT PLATE	3
H-280	RUBBER PLUNGER	6
H-281	SET SCREW	1
H-237	RAM PINION HANDLE	1

A. PART DRAWING

A3. LEFT-RIGHT DRAWINGS, UP-DOWN DRAWING

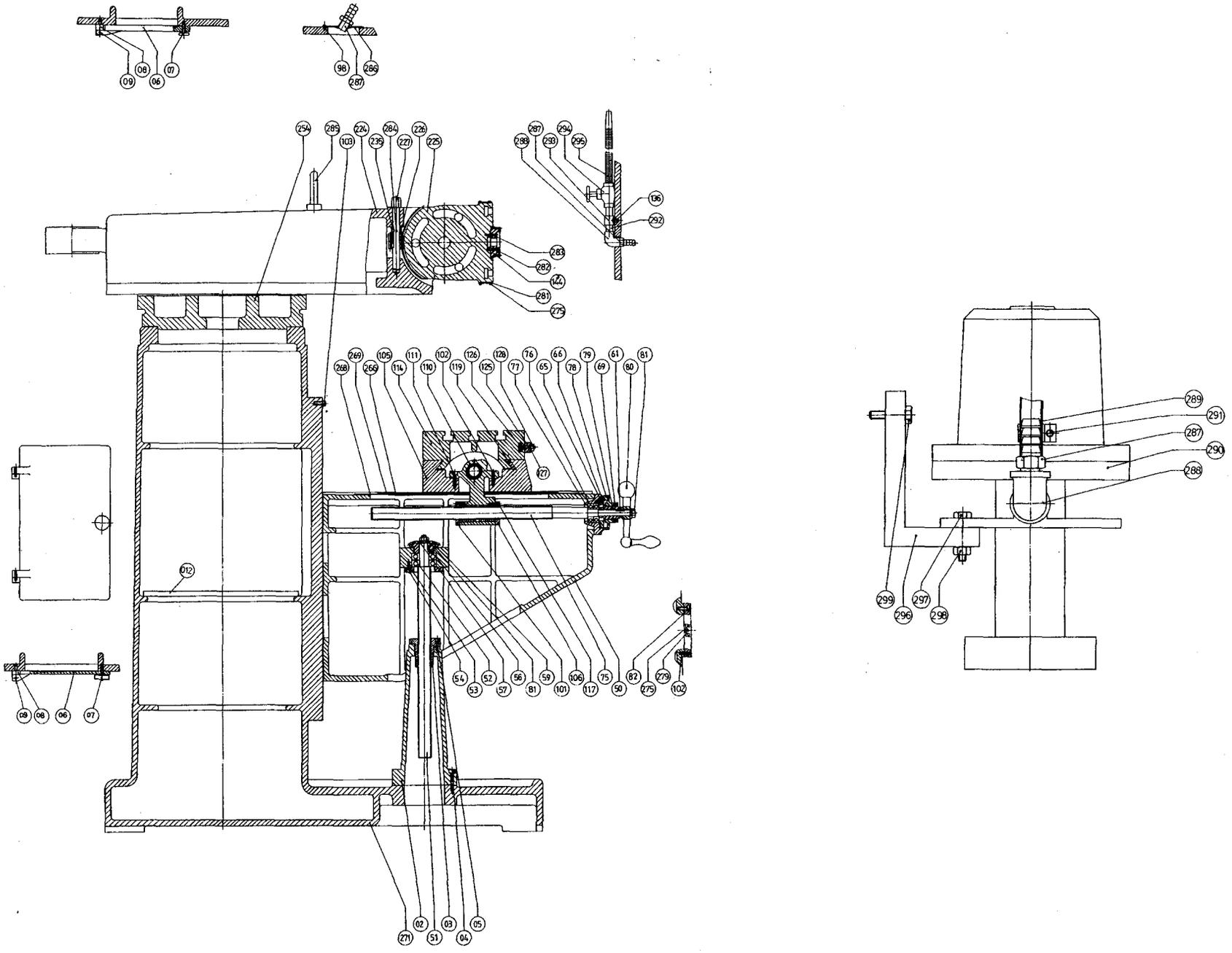


ANNEX A. PART DRAWING PARTS NAME & NUMBER

PART NO	DESCRIPTION	QTY
H-02	ELEVATING SCREW HOUSING	1
H-03	ELEVATING SCREW NUT	1
H-04	8×35L HOLLOW HEAD CAP SCREW	2
H-05	1/4"-20NC×5/8"L HOLLOW HEAD CAP SCREW	3
H-06	DOOR	1
H-07	6×16L HOLLOW HEAD CAP SCREW	1
H-08	SCREW	2
H-09	PIN	2
H-012	WOODEN SKID	1
H-50	KNEE	1
H-51	ELEVATING SCREW	1
H-52	6305Z CREASE-SEALED BALL BEARING	2
H-53	BEARING RETAINER RING	1
H-54	1/4"-20NC×5/8"L HOLLOW HEAD CAP SCREW	3
H-56	KEY	1
H-57	WASHER	1
H-59	BEVEL GEAR	1
H-61	WOODRUFF KEY	1
H-65	BEARING RETAINER RING	1
H-66	1/4"-24NC×3/4"L HOLLOW HEAD CAP SCREW	3
H-069	DIAL HOLDER	1
H-75	CROSS FEED SCREW	1
H-76	6204Z GREASE-SEALED BALL BEARINGS	2
H-77	CROSS FEED BEARING BRACKET	1
H-78	DIA WITH 200 GRADUATIONS	1
H-79	DIAL HOLDER	1
H-80	BALL CRANK HANDLE	1
H-81	1/2"-20NF JAM NUT	2
H-82	3/8"-16NC×1"L HOLLOW HEAR CAP SCREW	4
H-98	3/16"-24NC×1/2"L HOLLOW HEAD CAP SCREW	4
H-101	CROSS LEADSCREW FIXED NUT	1
H-102	PIN	4
H-103	3/8×1"L STOP SCREW	1
H-105	SADDLE	1
H-106	CROSS FEED NUT	1
H-110	FEED NUT BRACKET	1
H-111	8×25L HOLLOW HEAD CAP SCREW	4
H-114	TABLE	1
H-117	SCREW	4
H-119	RIGHT BEARING BRACKET	1
H-125	TABLE STOP PIECE	2
H-126	STOP PIECE T-BOLT	2
H-127	WASHER	2
H-128	3/8-16NC HEXAGON NUT	2
H-136	8×20L OVAL HEAD SCREW	2
H-224	RAM	1
H-225	RAM ADAPTER	1
H-226	VERTICAL ADJUSTING WORM	1
H-227	VERTICAL ADJUSTING WORM SHAFT	1
H-235	WORM KEY	1
H-254	TURRET	1
H-266+H-268+H269	CHIP GUARD COVER PLATES FOR 12" KNEE	1

PART NO	DESCRIPTION	QTY
H-271	COLUMN	11
H-275	RIVET	6
H-279	REFERENCE POINT PLATE	1
H-281	SET SCREW	1
H-282	SCREW	2
H-283	PIN	2
H-284	PIN	1
H-285	HOISTING RING	1
H-286	OIL NETWORK	2
H-287	CONNECTION PIPE	4
H-288	90° TUBE	2
H-289	HOSE	1
H-290	COLLANT PUMP	1
H-291	TUBE CLAMP	1
H-292	PIPE TUBE	1
H-293	CLIPER	1
H-294	VALVE	1
H-295	COOLANT NOZZLE	1
H-296	FIXED HOLDER OF COLLANT PUMP	1
H-297	SCREW	2
H-298	NUT	2
H-299	SCREW	2
J-144	GEAR	1

A4. FRONT-REAR DRAWING

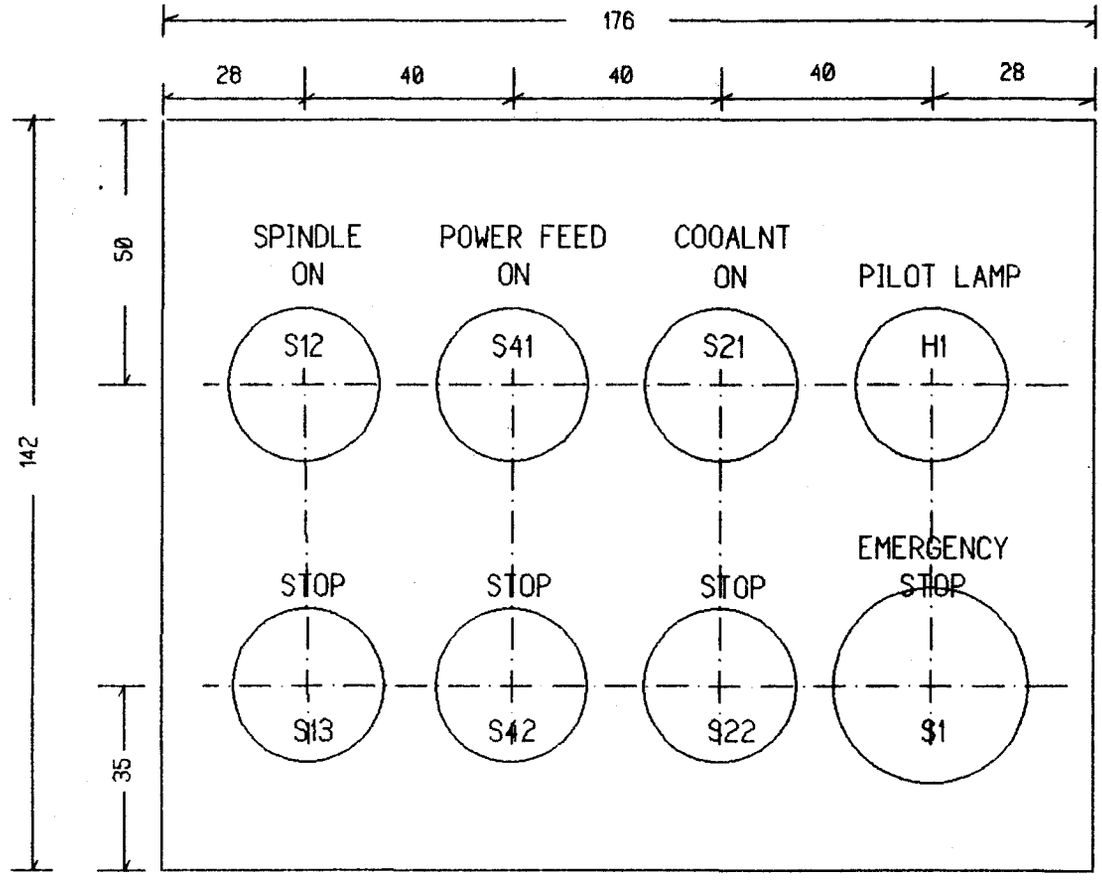


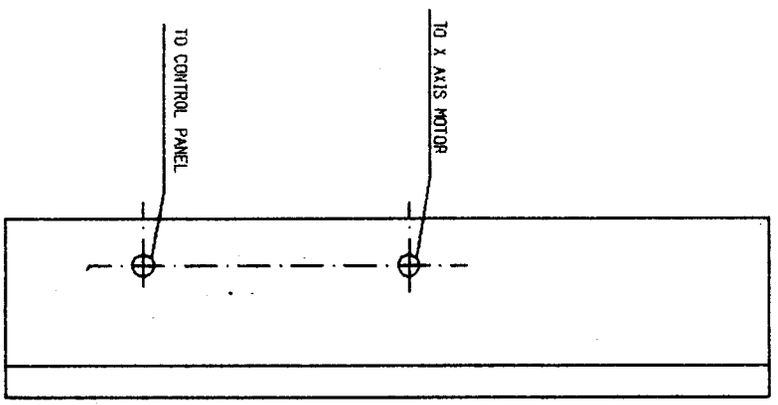
CONTROL SYSTEM DIAGRAM

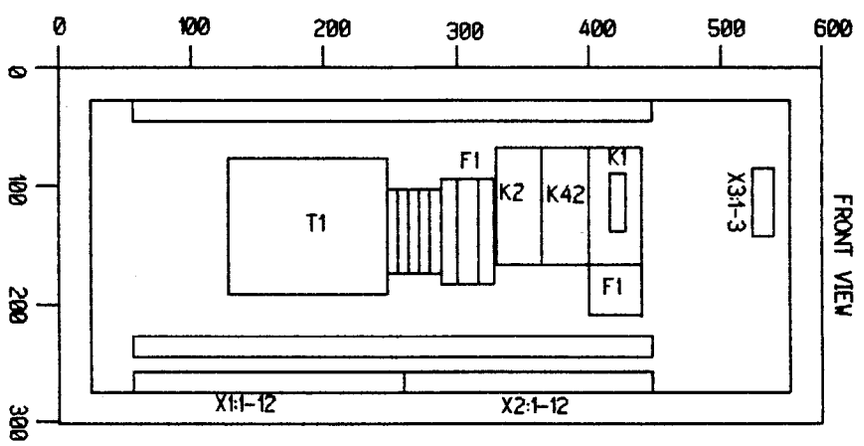
MODEL KR-V2000

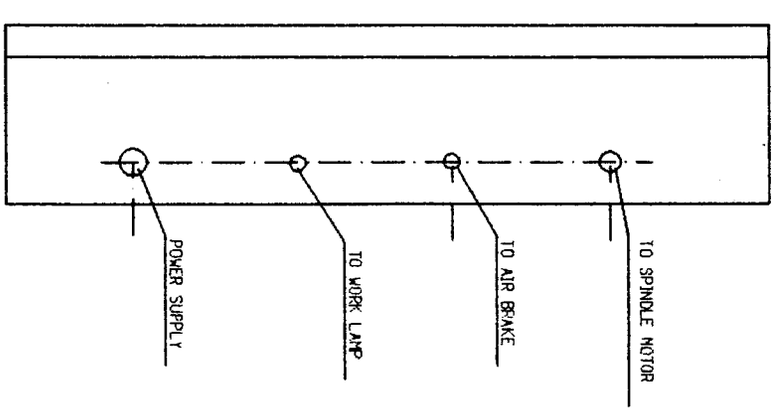
ITEM	DRAWING NO.	PAGE NO.
LIST OF CONTROL SYSTEM DIAGRAMS	KR-V2000-B1-1	1
B1. INSTALLATION DWRAWING	KR-V2000-B1-2	2
B2. LAY OUT OF CONTROL PANEL	KR-V2000-B2-1	3
B3. LAY OUT OF ELECTRICAL CABINET	KR-V2000-B3-1	4
B4. CIRCUIT DIAGRAM	KR-V2000-B4-1-5	11,12,13,14,15
B5. PARTS LIST	KR-V2000-B5-1-3	

SPINDLE FORWARD, STOP, REVERSE, SELECT SWITCH, SW
SPINDLE MOTOR
CONTROL PANEL
ELECTRICAL CABINET


176
28
40
40
40
28
142
50
35
SPINDLE ON
POWER FEED ON
COOALNT ON
PILOT LAMP
S12
S41
S21
H1
STOP
STOP
STOP
EMERGENCY STOP
S13
S42
S22
S1


TO CONTROL PANEL
TO X AXIS MOTOR


0
100
200
300
400
500
600
0
100
200
300
T1
F1
K2
K42
K1
F1
X3:1-3
X1:1-12
X2:1-12
FRONT VIEW


POWER SUPPLY
TO WORK LAMP
TO AIR BRAKE
TO SPINDLE MOTOR

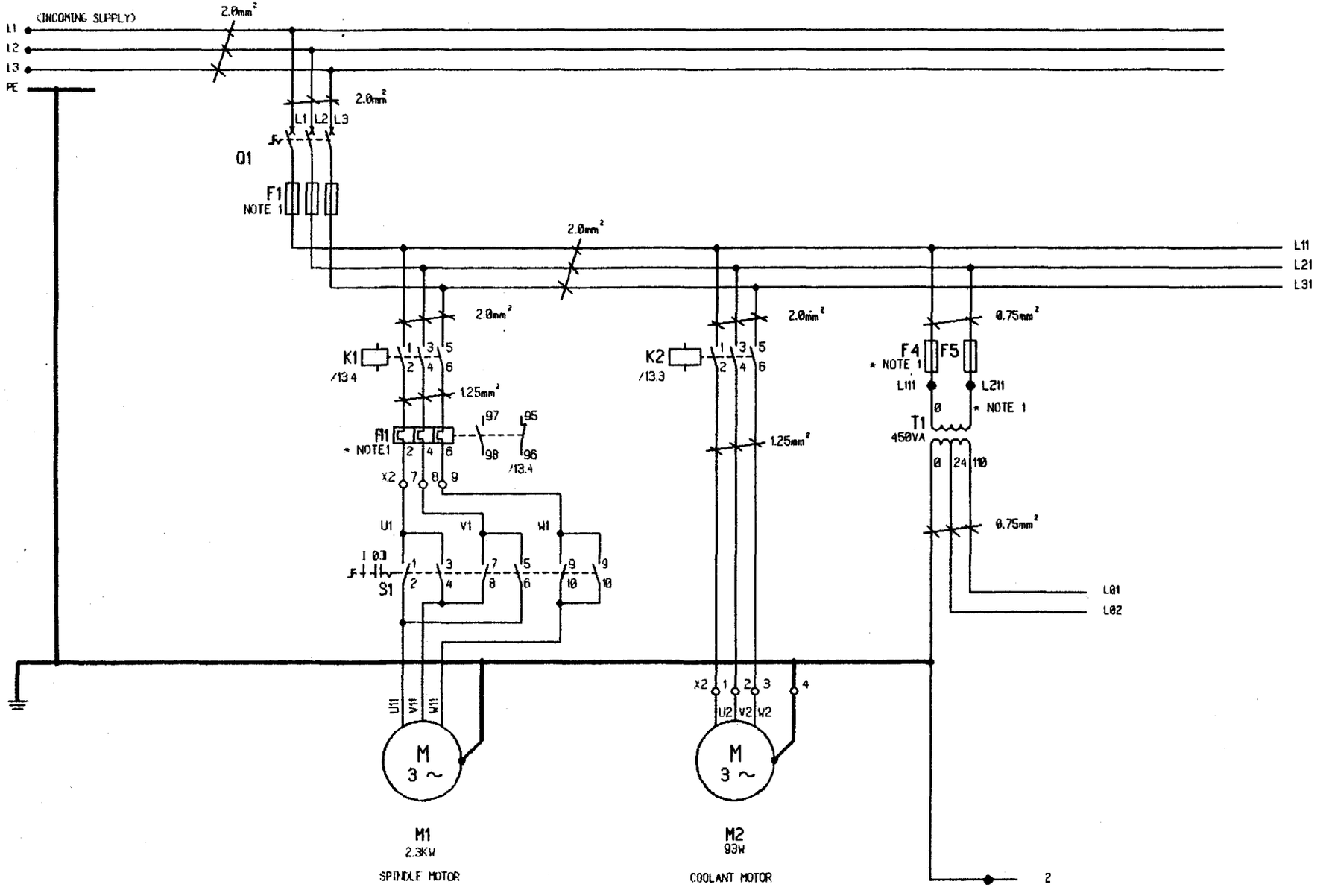
KING-RICH KR-V2000 MILLING MACHINE CIRCUIT DIAGRAM

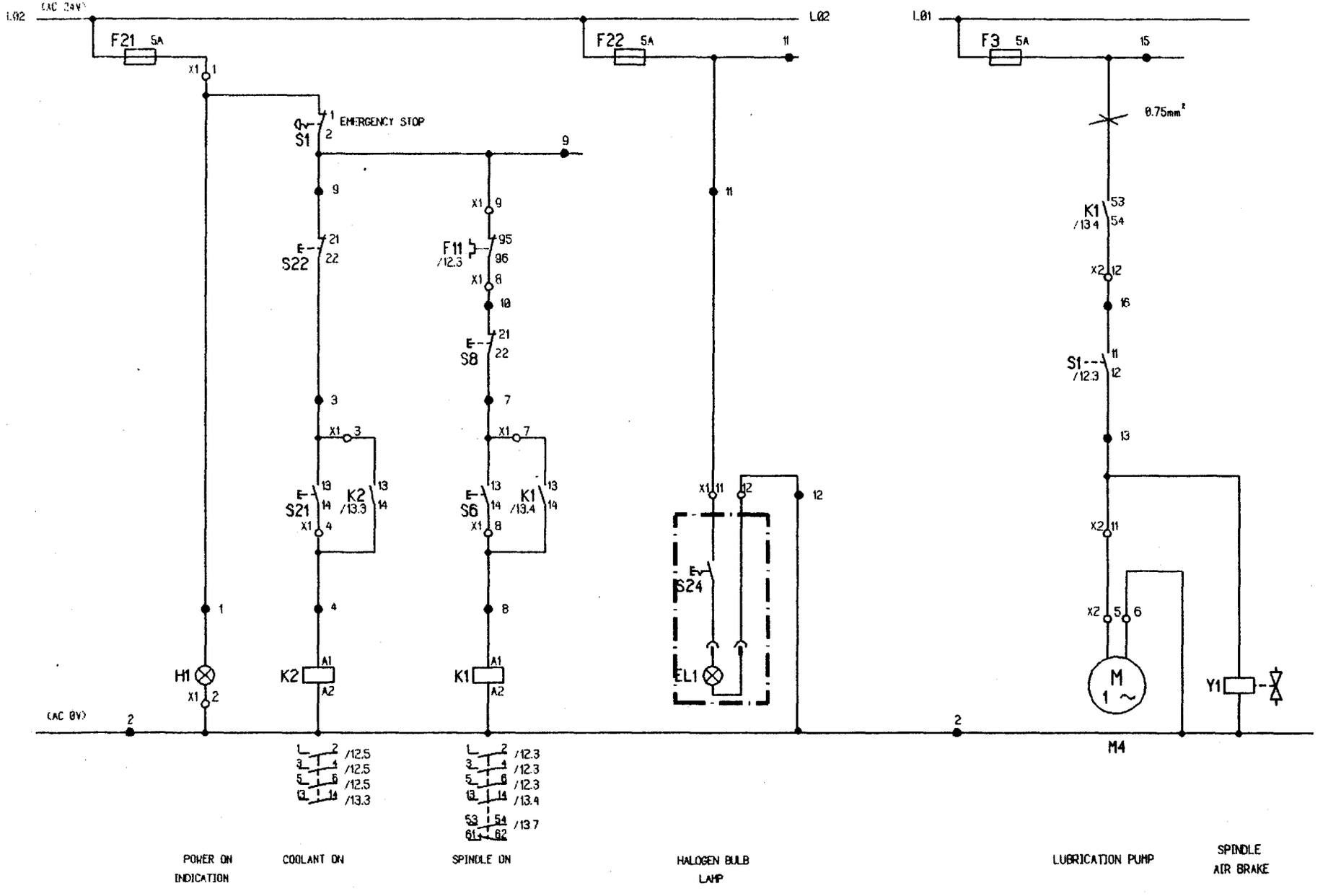
CONTENTS

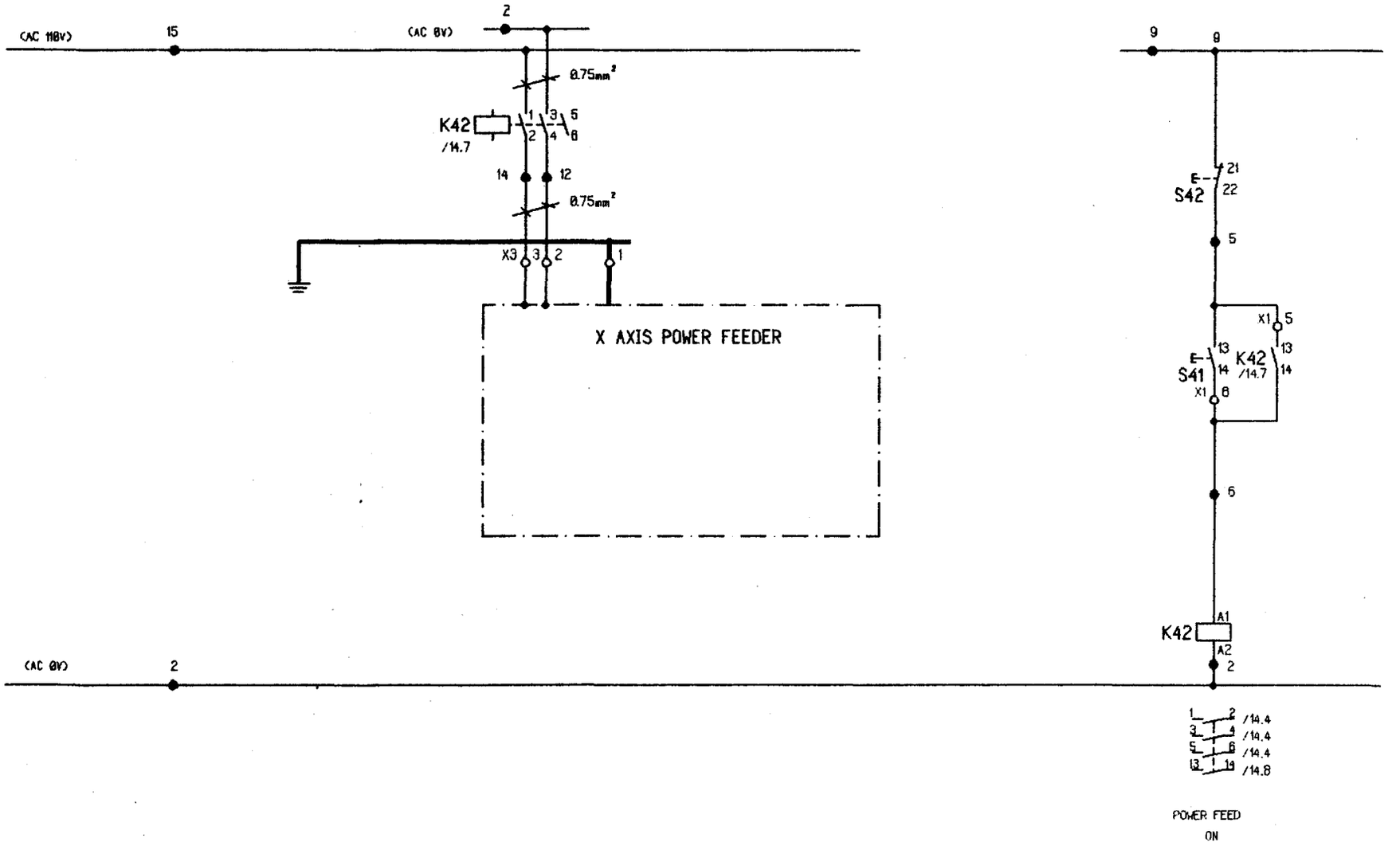
Sheet	Description	Reference No.
B4-1	Contents-Overview	KR-V2000-B4-1
B4-2	Basic control circuit 1	KR-V2000-B4-2
B4-3	Basic control circuit 2	KR-V2000-B4-3
B4-4	X/Y Axes feed control-1 : power feed with DC motor control	KR-V2000-B4-4
B4-5	X/Y Axes feed control-2 : Gear type table feed control- X axis	KR-V2000-B4-5

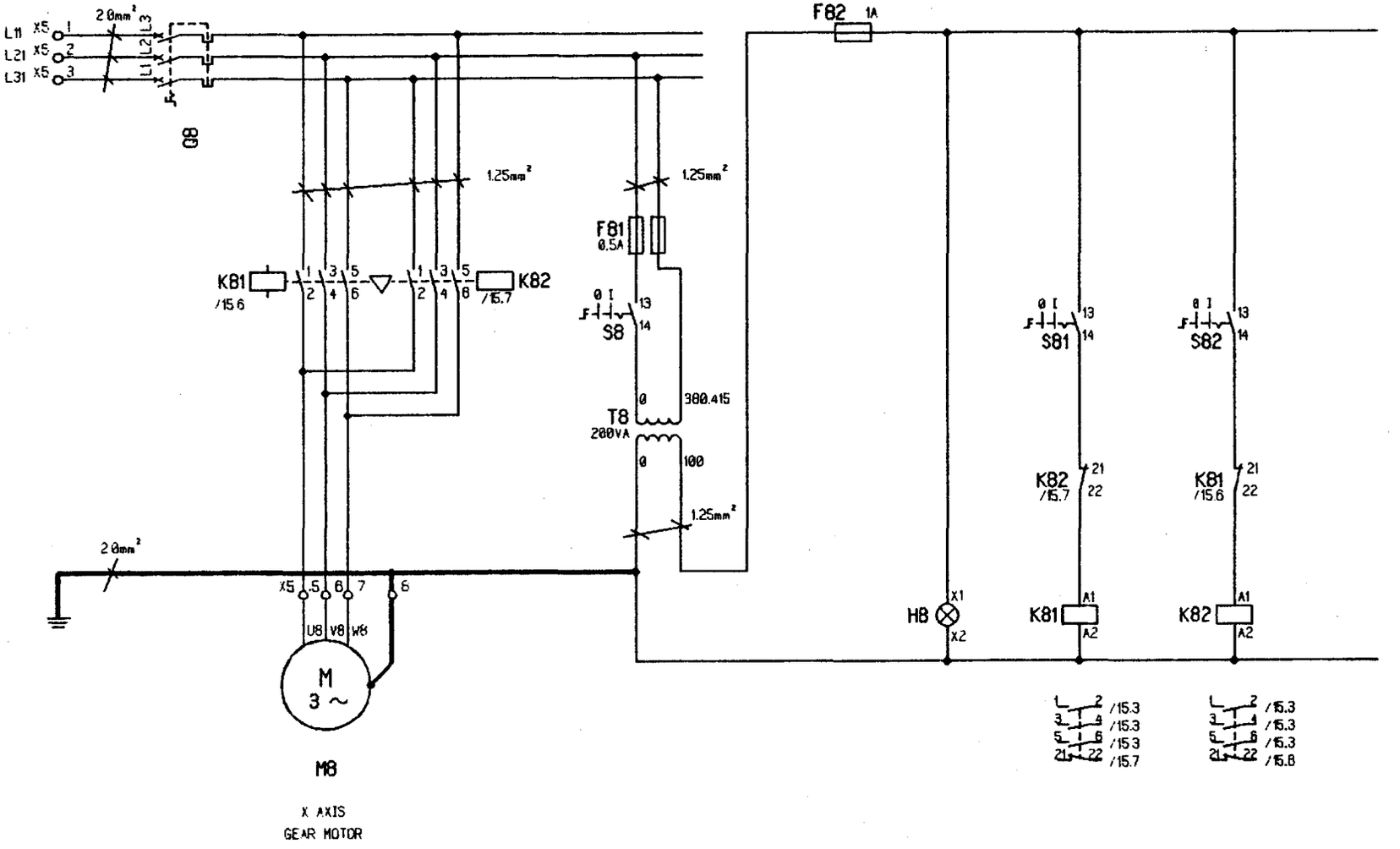
FUNCTIONS DESCRIPTION

CONSTRUCTION	OPTIONAL REQUIRMENT
Basic control circuit 1,2 +Spindle system + X axis system	1. Power feed with DC motor control 2. Gear type power table feed control- X axis


(INCOMING SUPPLY)
L1
L2
L3
PE
2.0mm²
Q1
F1
NOTE 1
K1
/13.4
K2
/13.3
A1
* NOTE1
97
95
98
96
/13.4
X2
7
8
9
U1
V1
W1
I 0.1
S1
F4
F5
* NOTE 1
L111
L211
T1
450VA
0
24
110
0.75mm²
1.25mm²
L11
L21
L31
L01
L02
U11
V11
W11
M
3 ~
M1
2.3KW
SPINDLE MOTOR
X2
1
2
3
4
U2
V2
W2
M2
93W
COOLANT MOTOR
2


L02
(AC 24V)
F21 5A
F22 5A
11
X1 1
S1
EMERGENCY STOP
2
9
S22
21
22
3
X1 3
S21
13
14
X1 4
K2
/13.3
4
H1
X1 2
A1
A2
(AC 0V)
2
/12.5
/12.5
/12.5
/13.3
X1 9
F11
/12.3
95
96
X1 8
10
S8
7
X1 7
S6
X1 8
K1
/13.4
8
/12.3
/12.3
/12.3
/13.4
53
54
/13.7
61
62
X1 11
12
S24
EL1
L01
F3 5A
15
0.75mm²
K1
/13.4
X2 12
16
S1
/12.3
13
X2 11
X2 5
6
M
1 ~
M4
Y1
POWER ON
INDICATION
COOLANT ON
SPINDLE ON
HALOGEN BULB
LAMP
LUBRICATION PUMP
SPINDLE
AIR BRAKE


(AC 110V)
15
(AC 0V)
2
0.75mm²
K42
/14.7
1
2
3
4
5
6
14
12
0.75mm²
X3
3
2
1
X AXIS POWER FEEDER
(AC 0V)
2
9
9
21
S42
22
5
X1
5
13
S41
14
X1
6
K42
/14.7
13
14
6
A1
K42
A2
2
1 2 /14.4
3 4 /14.4
5 6 /14.4
13 14 /14.8
POWER FEED
ON


L11 X5 1
L21 X5 2
L31 X5 3
20mm²
L1 L2 L3
Q8
1.25mm²
K81
/15.6
K82
/15.7
F81
0.5A
S8
T8
200VA
380.415
100
F82 1A
S81
S82
K82 /15.7
K81 /15.6
H8
X1
X2
A1
A2
X5 5 6 7 6
U8 V8 W8
M
3 ~
M8
X AXIS
GEAR MOTOR
/15.3
/15.3
/15.3
/15.7
/15.3
/15.3
/15.3
/15.8

KING RICH	Page : KR-V2000-B5- 1
175	Order parts list

To drawing no.:

Order number:

TAB: Engineer:FRANK LEE

Date:10.05.96

EIC	Cross-ref.	Type reference	Description	Supplier	Qty.
Q1	/12.3	KG32B	selector switch,	KRAUS & NAIMER	1
F1	/12.3	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
F11	/12.3	193BSB60	CURRENT RANGE : 4-6A AUXILIARY CONTACTOR : 1 NO + 1 NC	AB	1
S1	/12.3	T-16EF64D	select switch	YIEN KUANG	1
M1	/12.3	TF-300	MOTOR, 3.0HP 4POLES 415V 4AMP	TONG FA	1
X2	/12.5	2Y5			4
M2	/12.5	CW-	COOLANT MOTOR 1/8 HP, 2 POLE, 0.12AMP,RPM 2850/3450 50/60HZ, AC 415V	JOR WEI	1
F4	/12.6	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
T1	/12.6	SB-DTO	TRANSFORMER, 450VA 50/60HZ, PRI/SEC: 575,440,415,400, 380/0,24,100, 110V	SUN CHUAN	1
F5	/12.6	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
F21	/13.2	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
X1	/13.2	1.25Y4			8
H1	/13.2	PL-22N-1	FILAMENT BULB 24V , 1.2W LAMP HOLDER BA9S	YIAN KUANG	1
S1	/13.3	MTO	MUSHROOM EMERGENCY STOP BUTTON, IP65	SCHLEGEL	1

175 Order parts list

To drawing no.: | Order number:

TAB: Engineer:FRANK LEE
Date:10.05.96

EIC	Cross-ref.	Type reference	Description	Supplier	Qty.
S22	/13.3	YS-F1	PUSH BUTTON, MAX. DIELECTRIC VOLTAGE WITH STANDARD 600VAC, Max. continous current 10Amp.	YIAN KUANG	1
S21	/13.3	YS-F1	PUSH BUTTON, MAX. DIELECTRIC VOLTAGE WITH STANDARD 600VAC, Max. continous current 10Amp.	YIAN KUANG	1
K2	/13.3	100A09NKD3	CONTACTOR,3 POLE + 1 NO COIL : AC 24V	AB	1
S8	/13.4	YS-F1	PUSH BUTTON, MAX. DIELECTRIC VOLTAGE WITH STANDARD 600VAC, Max. continous current 10Amp.	YIAN KUANG	1
S6	/13.4	YS-F1	PUSH BUTTON, MAX. DIELECTRIC VOLTAGE WITH STANDARD 600VAC, Max. continous current 10Amp.	YIAN KUANG	1
K1	/13.4	100A09NKD3	CONTACTOR,3 POLE + 1 NO COIL : AC 24V	AB	1
K1	/13.4	195FA11	AUXILIARY CONTACTOR : 1 NO + 1NC	AB	1
F22	/13.4	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
X1	/13.5	2Y5			2
S24	/13.5	GE22-P/E02	HALOGEN BULB SWITCH,	EMENINT	1
S24	/13.5				1
EL1	/13.5	GE22-P/E05	HALOGEN BULB, 24V 70W	EMENINT	1
X1	/13.5				1

175 Order parts list

To drawing no.: | Order number:

TAB: Engineer:FRANK LEE
Date:05.05.96

EIC	Cross-ref.	Type reference	Description	Supplier	Qty.
F3	/13.6	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
X2	/13.7	1.25Y4			2
M4	/13.7	LF-18	Lubrication pump AC110V 50/60HZ 2/2.4RPM 4/3.5W	JIN YIN	1
X3	/14.4	2Y5			3
S42	/14.7	YS-F1	PUSH BUTTON, MAX. DIELECTRIC VOLTAGE WITH STANDARD 600VAC, Max. continous current 10Amp.	YIAN KUANG	1
K42	/14.7	100A09NKD3	CONTACTOR,3 POLE + 1 NO COIL : AC 24V	AB	1
F81	/15.4	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1
F82	/15.5	1KS15	FUSE, VDE 0110C 660V RL 300V	SCHLEGEL	1

ANNEX C. NOISE TEST

NOISE LEVEL

1. THE NOISE LEVEL UNDER 80 dB(A) IS CHECKED BEFORE THE MACHINES LEAVE OUR COMPANY.
2. LOCATION OF INSPECTION
   (1) INSPECTION POINT-1 M AWAY FROM THE MACHINE, AND 1.5M HIGHER THAN THE GROUND.
   (2) SCOPE OF INSPECTION-FRONT BACK, AND BOTH SIDES, FOUR PLACES OF THE MACHINE.