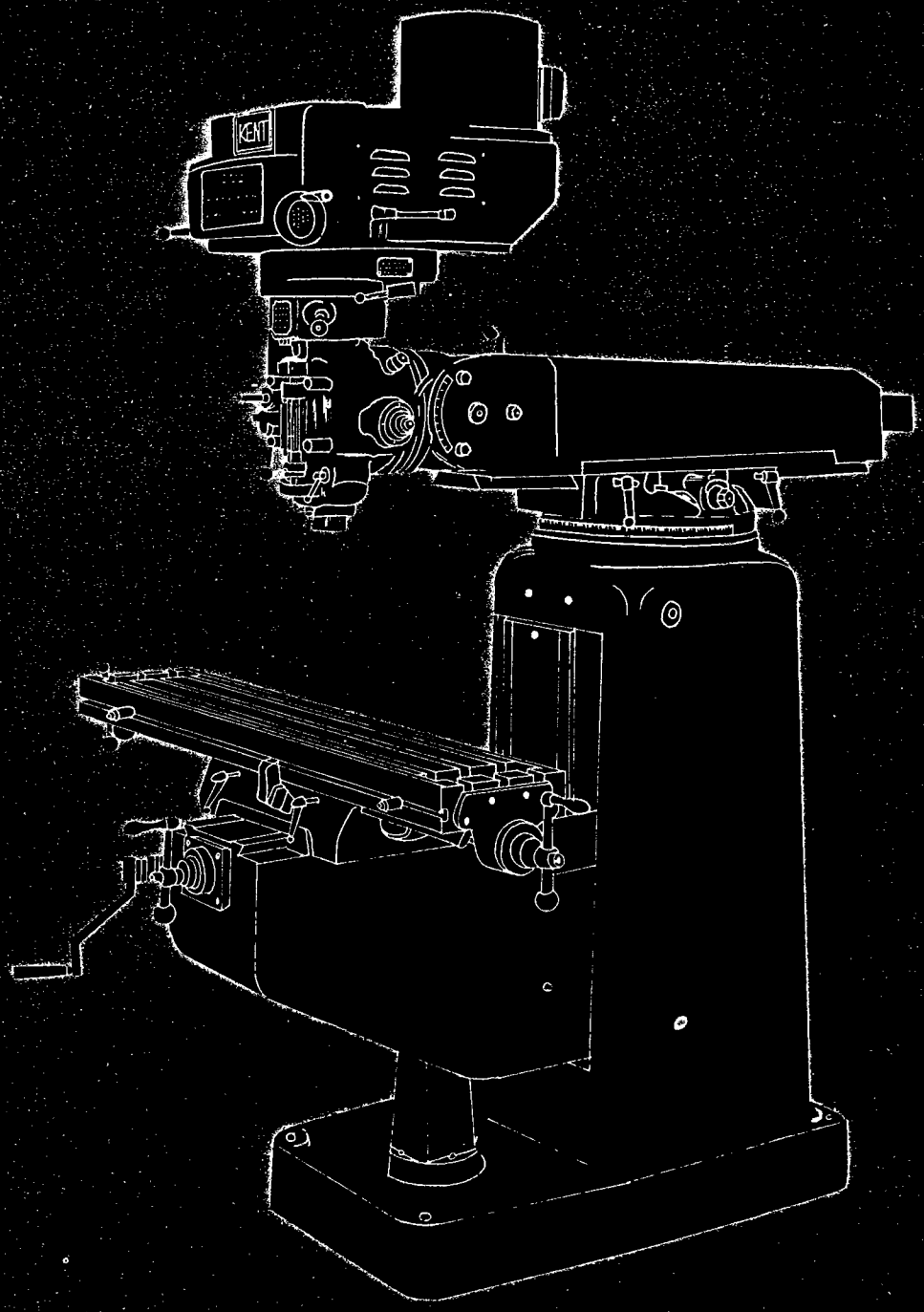
CREATIVITY KNOW-HOW RELIABILITY

KENT

TURRET MILLING MACHINE

SEP 23 1988

SERVICE AND INSTRUCTIONS MANUAL FOR MAINTENANCE AND PARTS LIST



KENT INDUSTRIAL CO., LTD.

9th Floor, Fortune Winner Bldg., 265 Sung Chiang Rd., Taipei, Taiwan, R. O. C.

Tel: (02) 5315115 (6 Lines) Cable: "KENTICO" TAIPEI Telex: 26362 KENTICO

Manufacturer of Surface Grinders, Tool & Cutter Grinders and Milling Machines

CONTENTS

MODEL
- KTM–380 1
- KTM–380V 2

SPECIFICATIONS
- KTM–380 BASIC MACHINE 3
- KTM–380V BASIC MACHINE 4
- KTM–380 MILLING HEAD 5
- KTM–380V MILLING HEAD 6

INSTALLATION
- INSTALLATION 7
- FOUNDATION, POWER SUPPLY 8
- FOUNDATION PLANE, FOUNDATION STRUCTURE & ANCHOR BOLT 10
- LEVELLING, ADJUSTING THE MILLING HEAD SQUARE TO THE TABLE 11

LEGEND
- KTM–380 LEGEND 12
- KTM–380V LEGEND 13
- KTM–380 MILLING HEAD 14
- KTM–380V VARIABLE SPEED MILLING HEAD 15

OPERATION
- STARTING, STOPPING 16
- CLAMPING THE SADDLE–KNEE SIDE, TABLE-SADDLE SIDE, KNEE–COLUMN 17
- SWIVEL TURRET, MOVE RAMSLIDE 18
- SWIVEL BELT HOUSING, SPINDLE BRAKE 19
- QUILL FEED 20
- SPINDLE SPEED, CHANGE SPINDLE SPEED 21
- OPERATION ON KTM–380V HEAD 22

LUBRICATION
- LUBRICATION FOR KTM–380 HEAD 23
- LUBRICATION FOR KTM–380V HEAD 24
- LUBRICATION FOR BODY 25

MAINTENANCE
- PREVENTIVE MAINTENANCE 26
- BELT REPLACEMENT 26
- BRAKE SHOE REPLACEMENT, REMOVE MOTOR FROM KTM–380V 27
- TIMING BELT REPLACEMENT FOR KTM–380V 28
- DRIVE BELT REPLACEMENT FOR KTM–380V 28
- REPLACEMENT FOR KTM–380V BRAKE SHOE 29
- QUILL REMOVAL 30
- BALANCE SPRING REPLACEMENT, FEED TRIP ADJUSTMENT 32
- COLLET ALIGNING SCREW REPLACEMENT FOR R–8 NOSE 33
- CROSSFEED SCREW BACKLASH ADJUSTMENT, LONGITUDINAL SCREW BACKLASH ADJUSTMENT 34
- GIB STRIP ADJUSTMENT 35

TROUBLE SHOOTING 36

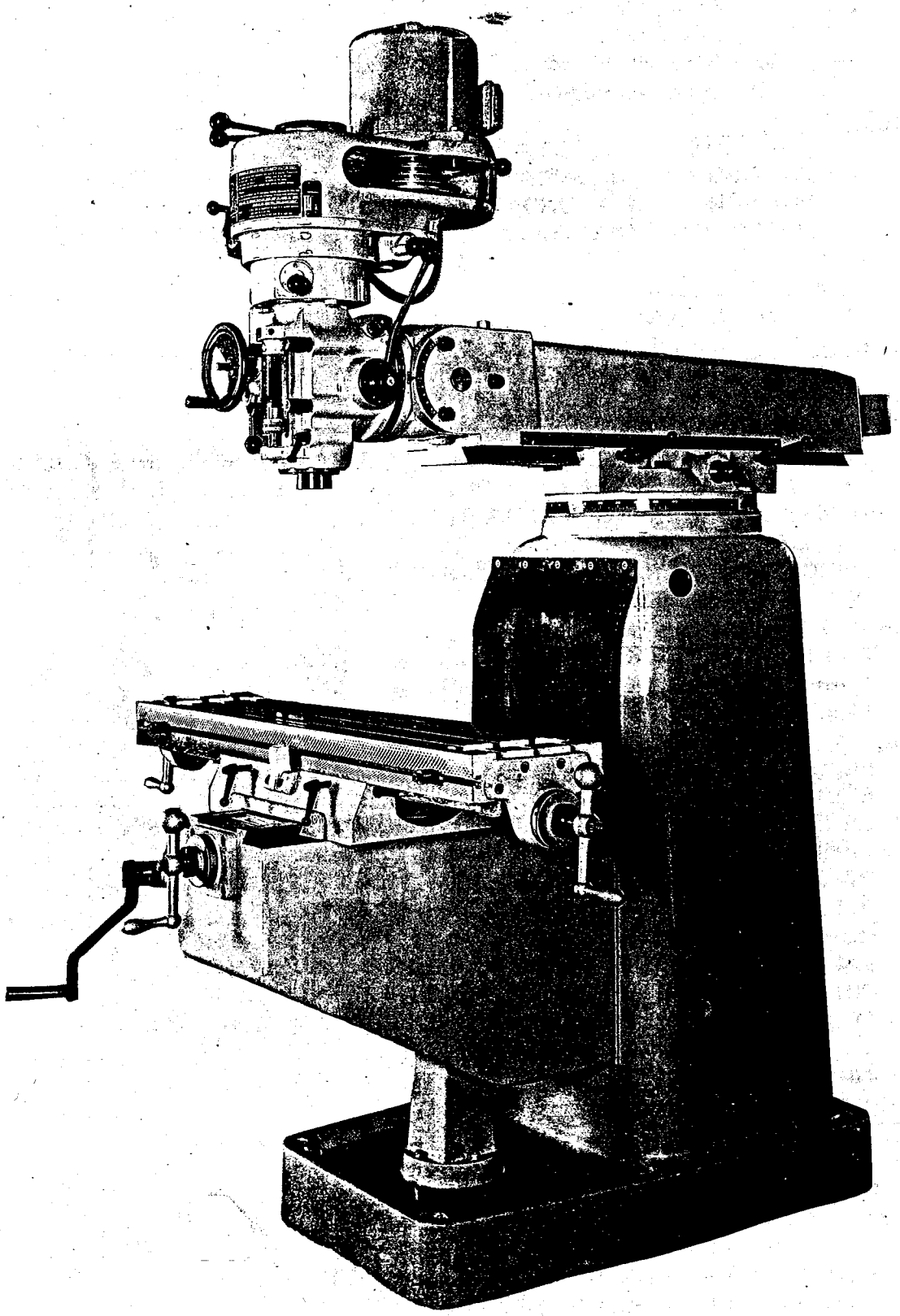
INSPECTION 37

ELECTRIC CIRCUIT DIAGRAM 40

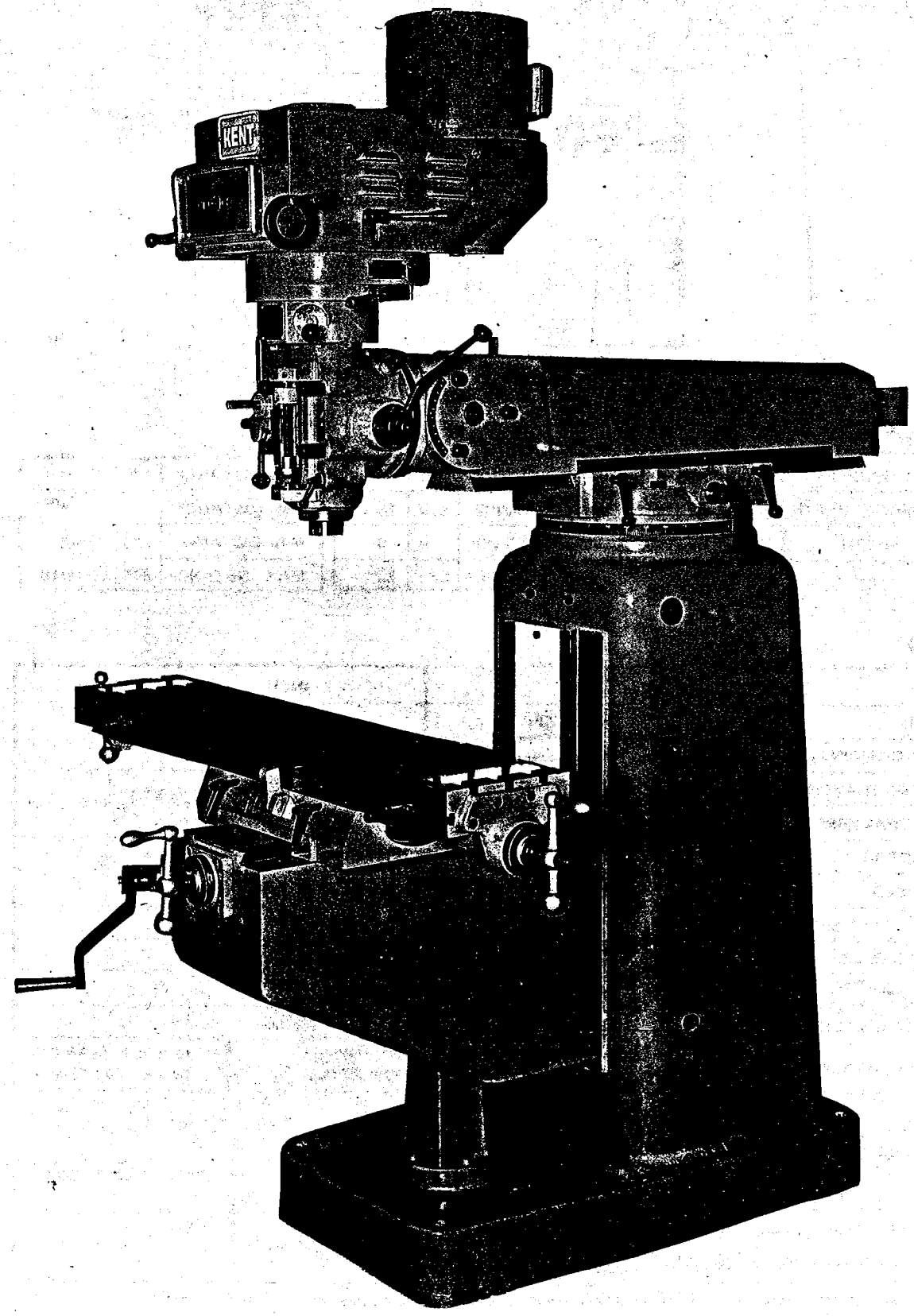
GENERAL DIMENSION DRAWING OF POWER FEED 41

COMPLETE KNOCK DOWN DRAWING
- KTM–380 HEAD TOP HOUSING & PARTS LIST 42
- KTM–380V HEAD TOP HOUSING & PARTS LIST 45
- KTM–380V HEAD BACK GEAR & PARTS LIST 48
- KTM–380, 380V HEAD ASSEMBLY & PARTS LIST 51
- KTM–380, 380V BASIC MACHINE 56
- KTM–380, 380V LEADSCREW ASSEMBLY 59

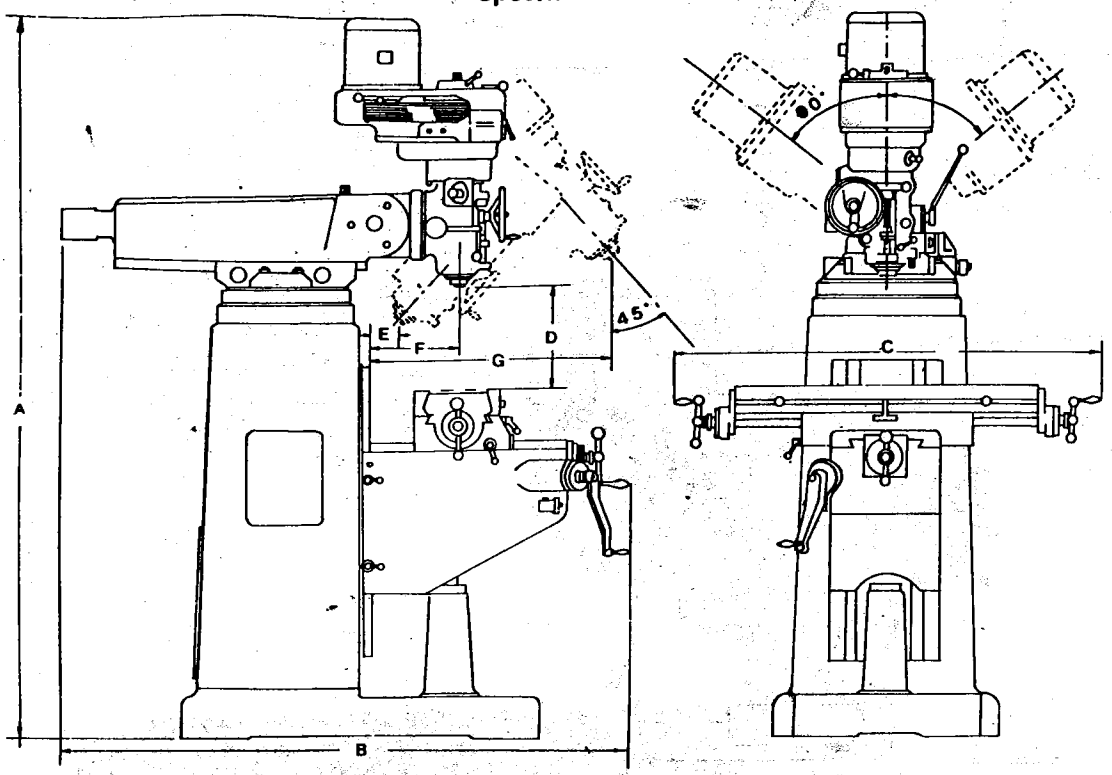
KTM-380



KTM-380V



Specifications KTM-380



SPECIFICATION: mm (inch)

A OVERALL HEIGHT	2100	82-5/8"
B MAX. OVERALL DEPTH	2000	78-3/4"
C OVERALL WIDTH	1520	59-13/16"

D	MIN. DISTANCE	0	0
	Max. DISTANCE	470	18-1/2"
E	MIN. DISTANCE	0	0
	MAX. DISTANCE	560	22"

F	MIN. DISTANCE	170	6-11/16"
	Max. DISTANCE	760	29-7/8"
G	MIN. DISTANCE	220	8-5/8"
	MAX. DISTANCE	805	31-11/16"

KTM-380

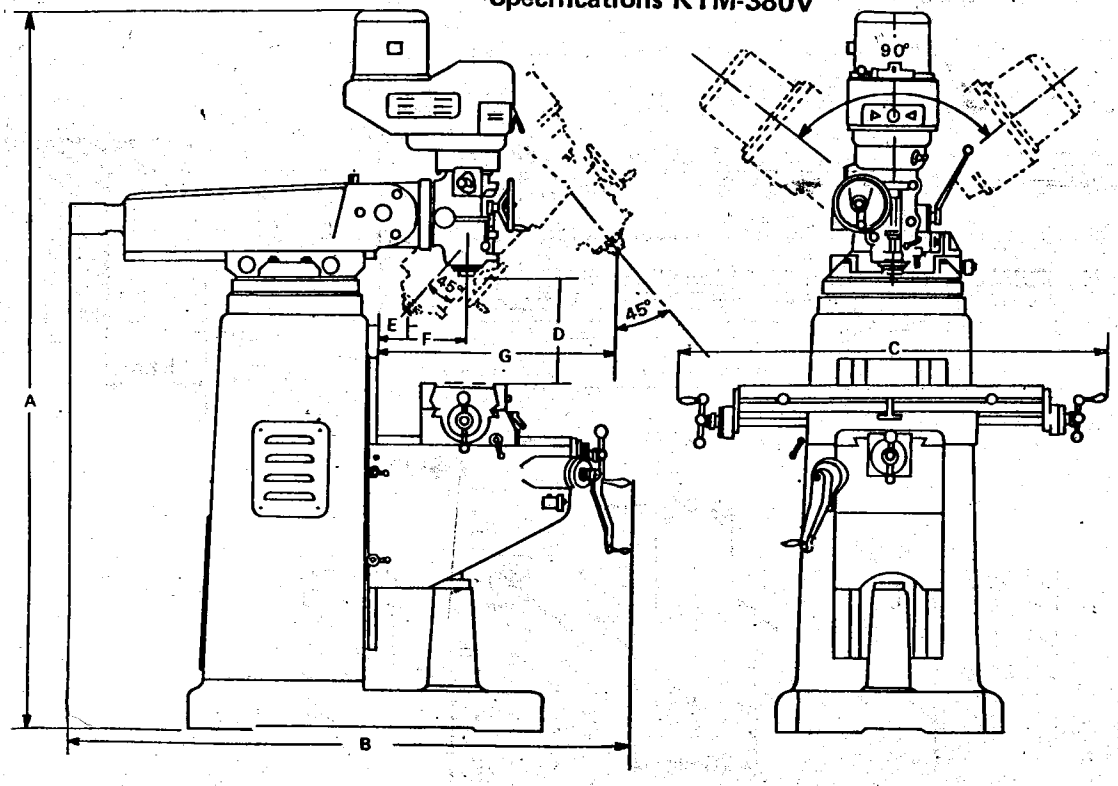
ITEMS	MM	INCH	
TABLE SIZE	1070 x 230	42-1/8 x 9	
TABLE LONGITUDINAL TRAVERSE	760	29-7/8	
TABLE CROSS TRAVERSE	380	14-15/16	
VERTICAL TRAVERSE OF KNEE	406	16	
SPINDLE MOTOR	2HP		
SPINDLE SPEED	65, 115, 200, 285, 615, 1100, 1910, 2700, RPM		
POWER FEEDS PER SPINDLE REVOLUTION	0.04. 0.07, 0.12	0.0015, 0.0028, 0.0049	
SPINDLE TRAVERSE	127	5	
SPINDLE TAPER	R8 or N.S.T. 30		
NET WEIGHT of MACHINE	1300 kg	2860 lb	
EXPORT CASE DIMENSION AND WEIGHT	1. 1Set/case 1500x1430x1830 1500kg 2. 2Sets/case 1700x1700x1830 2900kg		59 x 56 x 72 3300 lb. 67 x 67 x 72 6380 lb.

Longitudinal table power feed:

ITEMS		
AUTOMATIC FEED FOR LONGITUDINAL TRAVERSE	10 ~350 mm/min.	3/8 ~ 13-3/4"/min
TABLE LONGITUDINAL TRAVERSE FOR AUTOMATIC FEED	660 mm	26"

NOTE: The manufacturer reserves the right to modify the design, specifications, machanisms, etc. without notice.

Specifications KTM-380V



SPECIFICATION: mm (inch)

A OVERALL HEIGHT	2100	82-5/8"
B MAX. OVERALL DEPTH	2000	78-3/4"
C OVERALL WIDTH	1520	59-13/16"

D	MIN. DISTANCE	0	0
	Max. DISTANCE	470	18-1/2"
E	MIN. DISTANCE	0	0
	MAX. DISTANCE	560	22"

F	MIN. DISTANCE	170	6-11/16"
	Max. DISTANCE	760	29-7/8"
G	MIN. DISTANCE	220	8-5/8"
	MAX. DISTANCE	805	31-11/16"

KTM-380

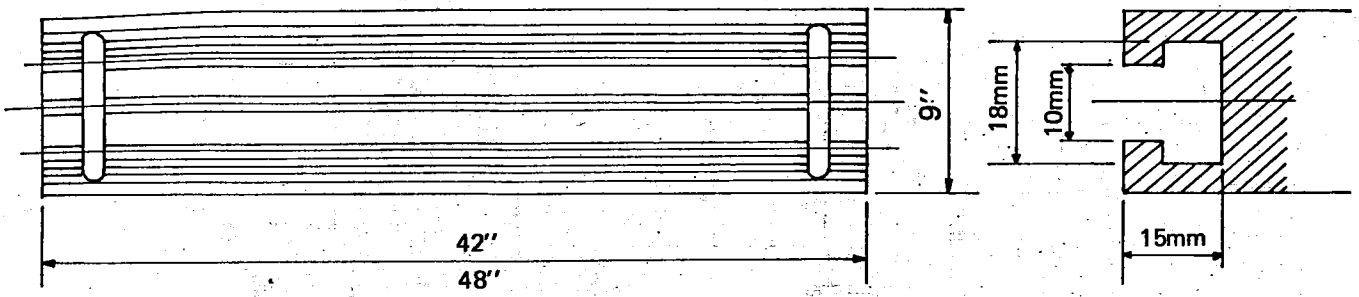
ITEMS	MM	INCH
TABLE SIZE	1070 x 230	42-1/8 x 9
TABLE LONGITUDINAL TRAVERSE	760	29-7/8
TABLE CROSS TRAVERSE	380	14-15/16
VERTICAL TRAVERSE OF KNEE	406	16
SPINDLE MOTOR	3HP	
SPINDLE SPEED	60 ~ 4200 RPM	
POWER FEEDS PER SPINDLE REVOLUTION	0.04. 0.07, 0.12	0.0015, 0.0028, 0.0049
SPINDLE TRAVERSE	127	5
SPINDLE TAPER	R8 or N.S.T. 30	
NET WEIGHT of MACHINE	1300 kg	2860 lbs
EXPORT CASE DIMENSION AND WEIGHT	1500x1430x1830 (1500kg)	60.5"x64.5"x72" (3300lbs)

Longitudinal table power feed:

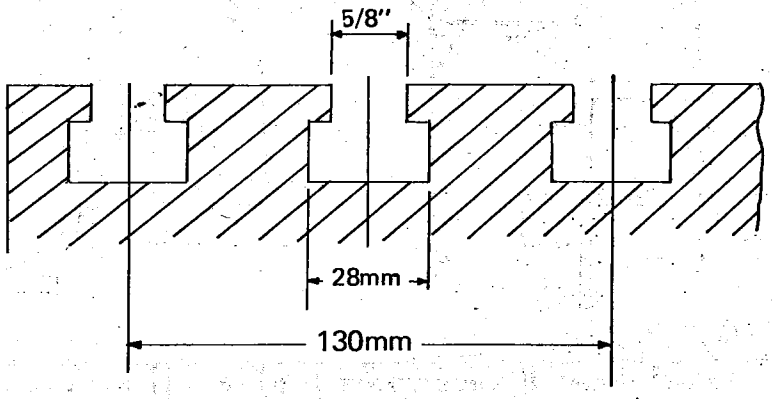
ITEMS		
AUTOMATIC FEED FOR LONGITUDINAL TRAVERSE	10 ~350 mm/min	3/8 ~ 13-3/4 m/min
TABLE LONGITUDINAL TRAVERSE FOR AUTOMATIC FEED	660 mm	26"

NOTE: The manufacturer reserves the right to modify the design, specifications, machanisms, etc , without notice.

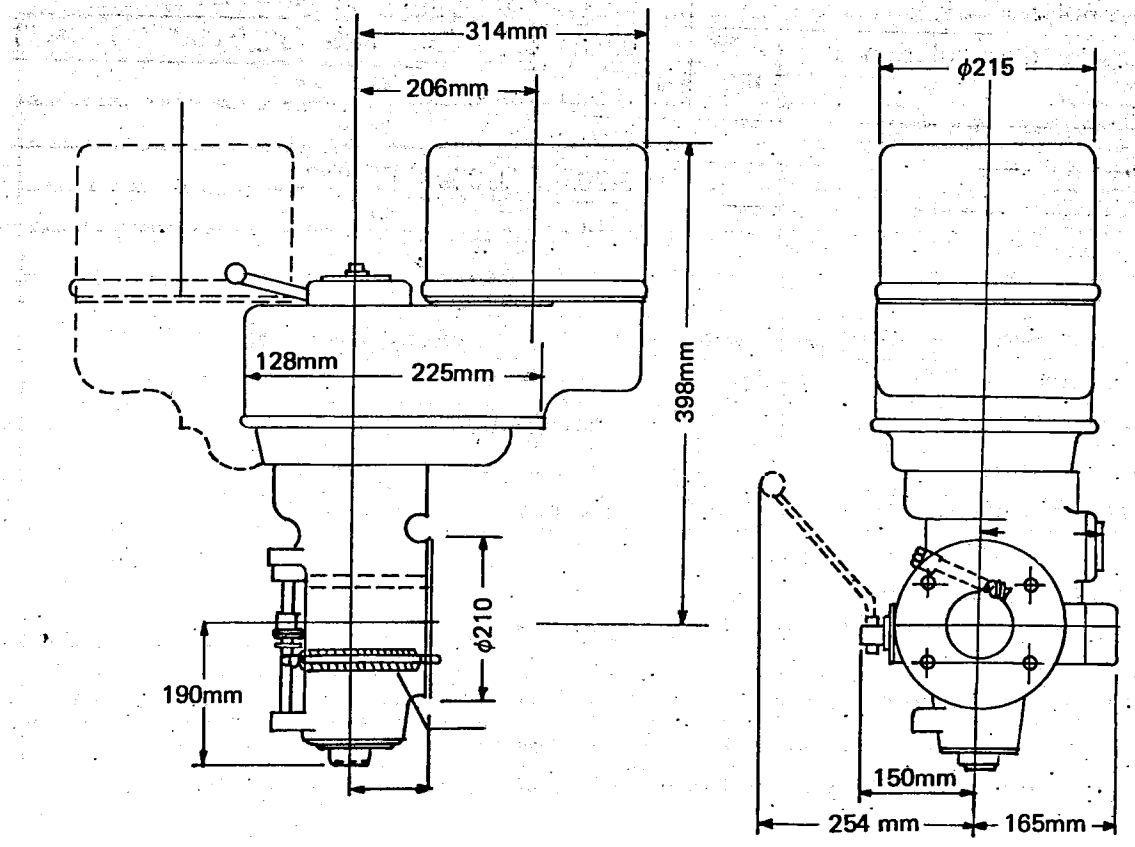
Table Dimensions



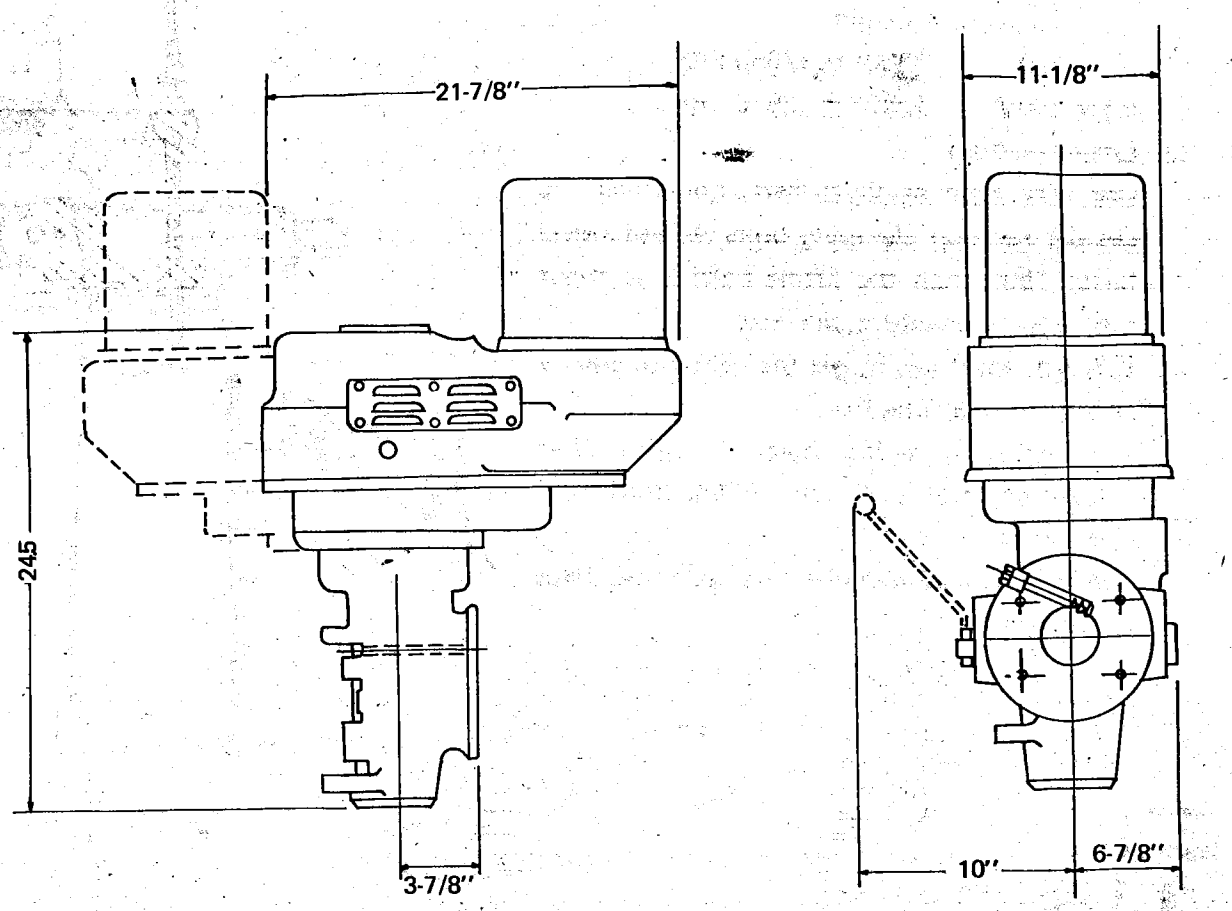
T-SLOT



KTM-380 Milling Head Dimension



KTM-380V Head Dimensions



Spindle speeds 60Hz	60-4200 RPM (infinitely variable)
Power feed per spindle revolution	0.04, 0.07, 0.12mm (0.0015", 0.0028", 0.0047")
Spindle taper	R-8 or N.S.T. 30
Quill traverse	127mm (5")
Collet capacity	3-20mm (1/8-3/4")
Spindle motor	3H.P.

Installation

I. Lifting

1) The approximate weight

KTm-380 1300Kgs (2860 lbs)

KTM-380V 1350Kgs (2970 lbs)

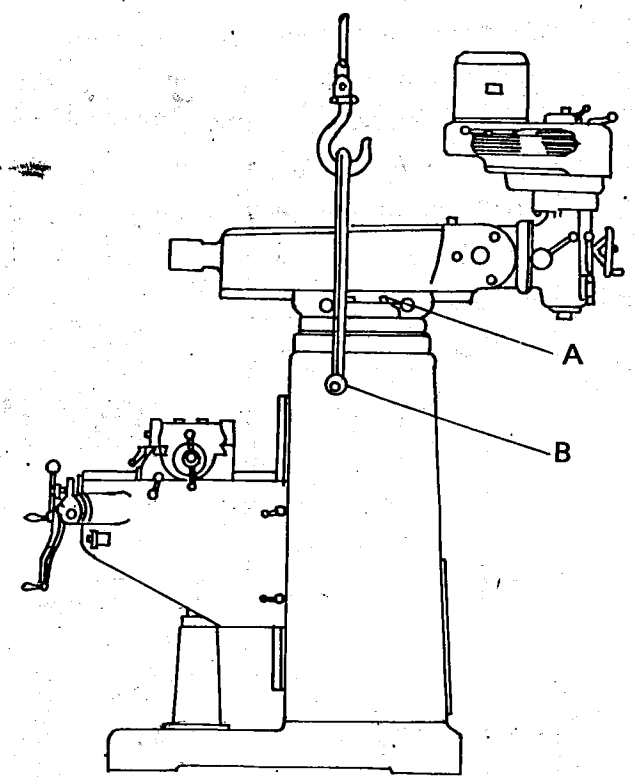
2) Lifting method

Use wire rope as illustrated. Loosening the circular rotation clamping bolts A, and swivel turret 180°, then the lifting bolts B is about the center of gravity of machine.

3) 1. When swivel turret, get the center of gravity balanced by adjusting Ram.

2. Fastening clamping bolts A again after swivelling turret, prevent milling head from slipping.

3. Wire rope endurence maintain 4000kgs (8800lbs).



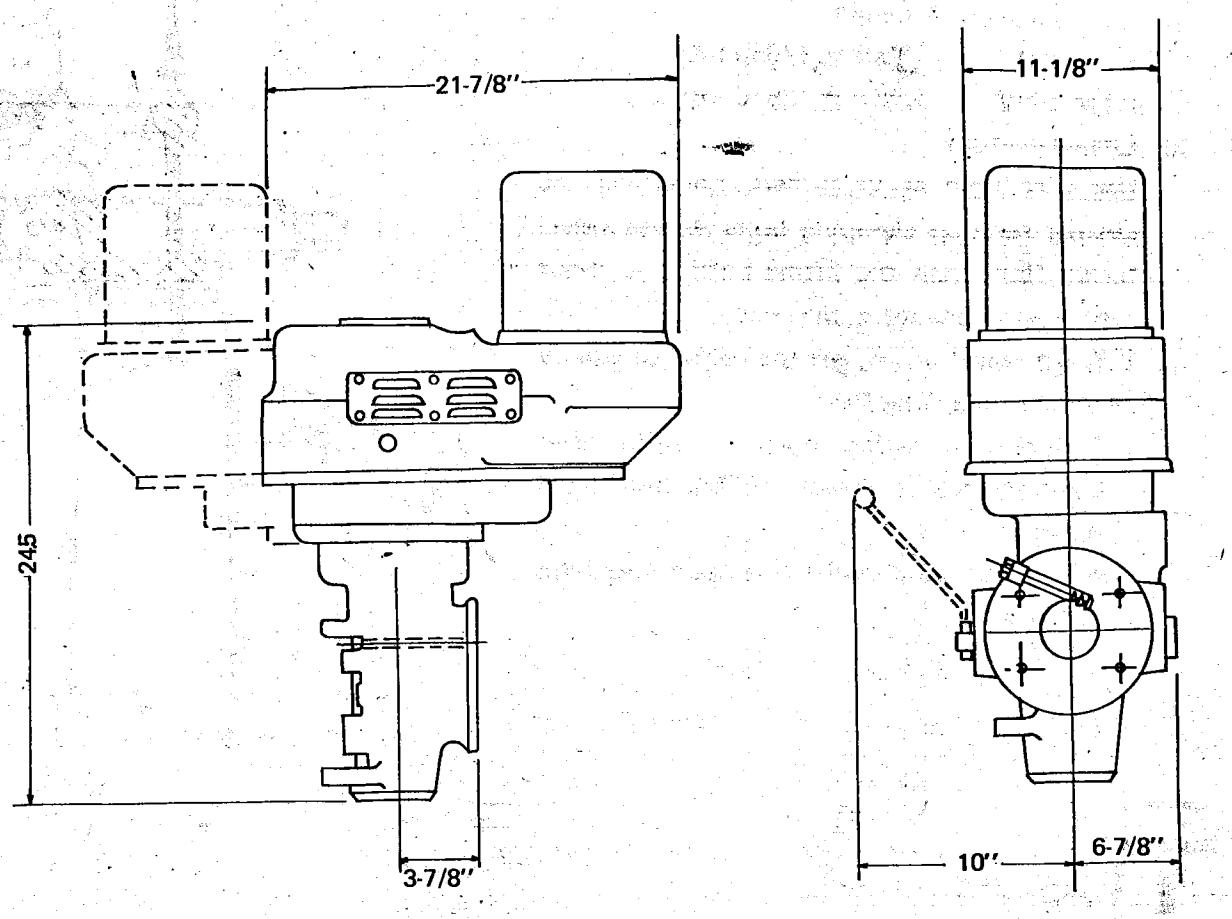
II. Preworks before machine installation

1) Remove rust preventative before moving any slide ways.

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.

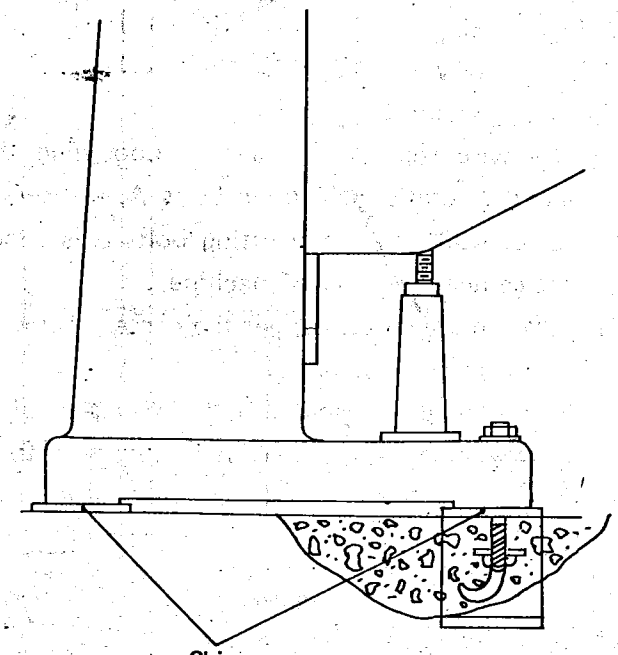
KTM-380V Head Dimensions



Spindle speeds 60Hz	60-4200 RPM (infinitely variable)
Power feed per spindle revolution	0.04, 0.07, 0.12mm (0.0015", 0.0028", 0.0047")
Spindle taper	R-8 or N.S.T. 30
Quill traverse	127mm (5")
Collet capacity	3-20mm (1/8-3/4")
Spindle motor	3H.P.

Foundation

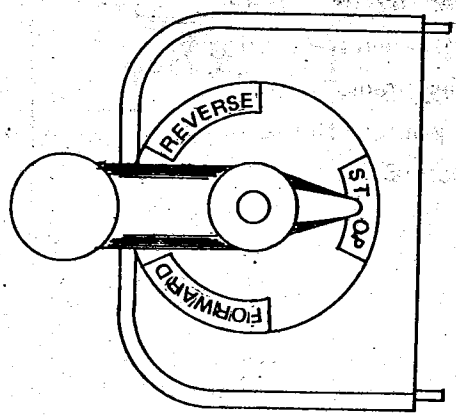
1. Bolting the machine onto a concrete foundation.
2. The machine should be placed on a solid level floor or anti-vibration pads to prevent any rocking move ment.



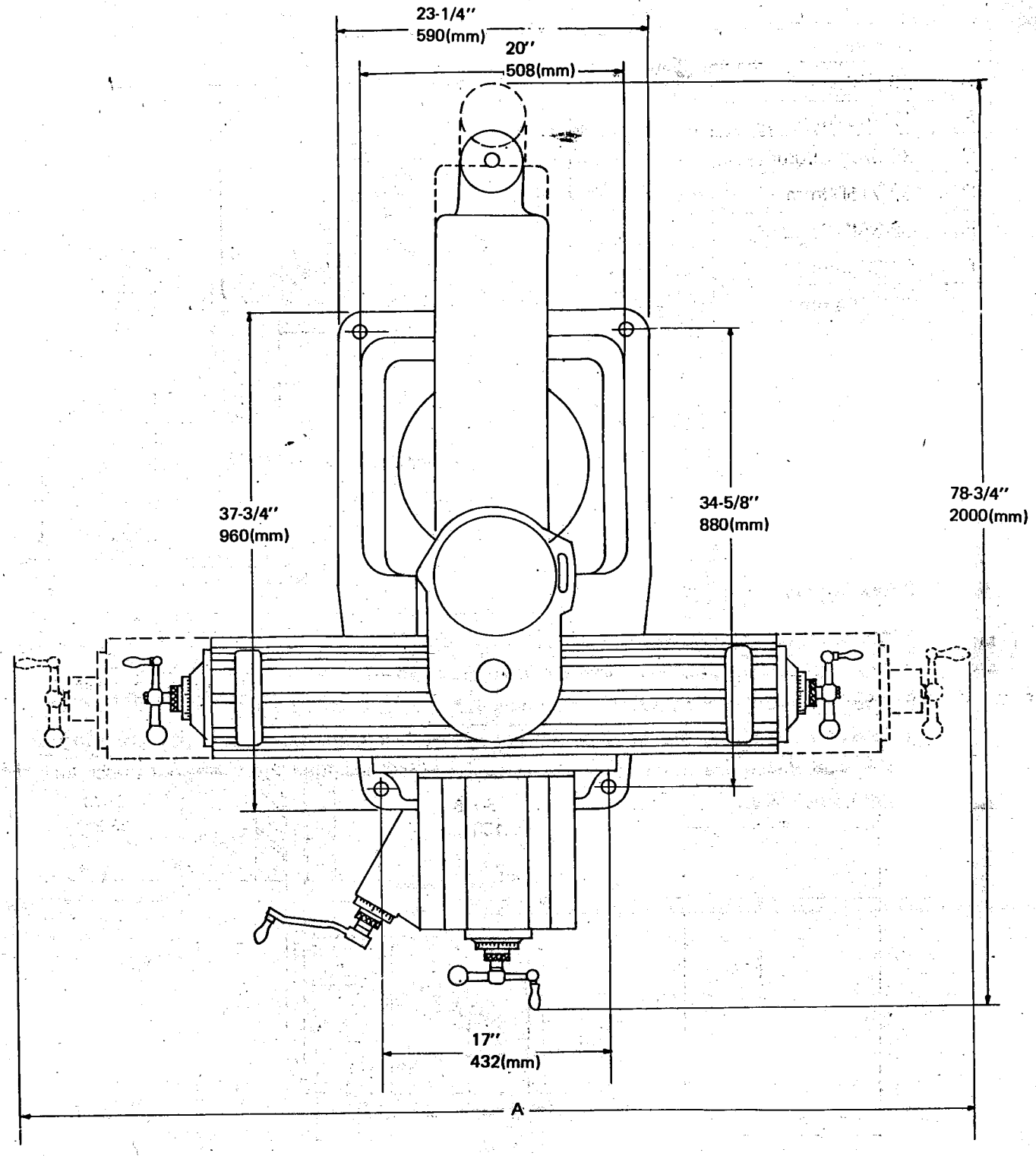
Shim

Power Supply

1. Check motor voltages against supply.
2. Check to prevent short-way between ground and power lines.
3. Ensure the supply is connected to comply with the local safety regulation.
4. Except KTM-380V, the head switch has no overload protection please pay attention to the load difference of motor while operation (This machine been checked under load before delivery.)

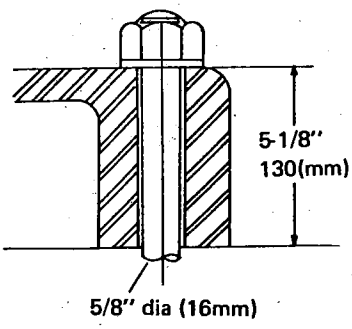


HEAD SWITCH



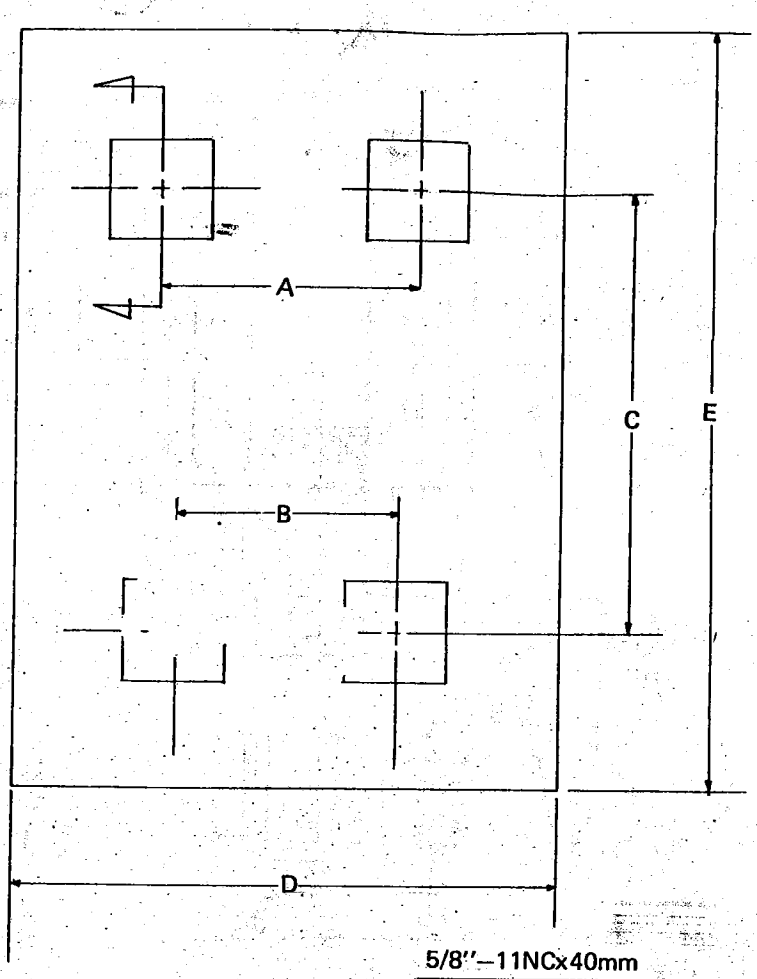
"A" DIMENSION

Table size	Plain machine
42-1/8"/1070mm	90"/2286mm
48-7/16"/1230mm	109-1/16"/2770mm

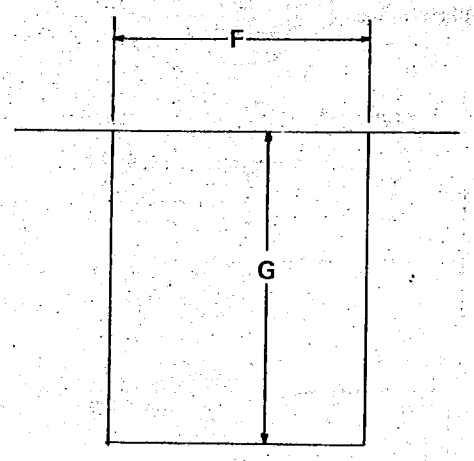


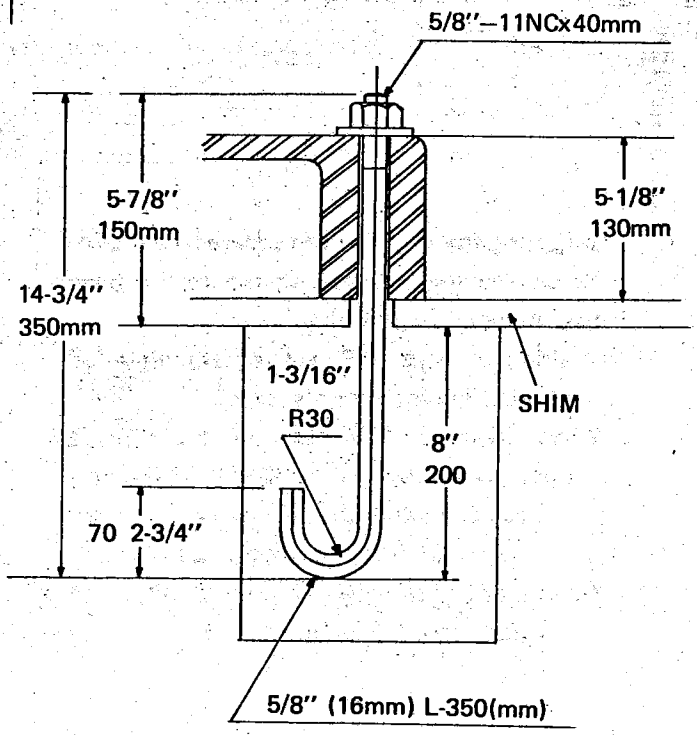
Foundation Plane.

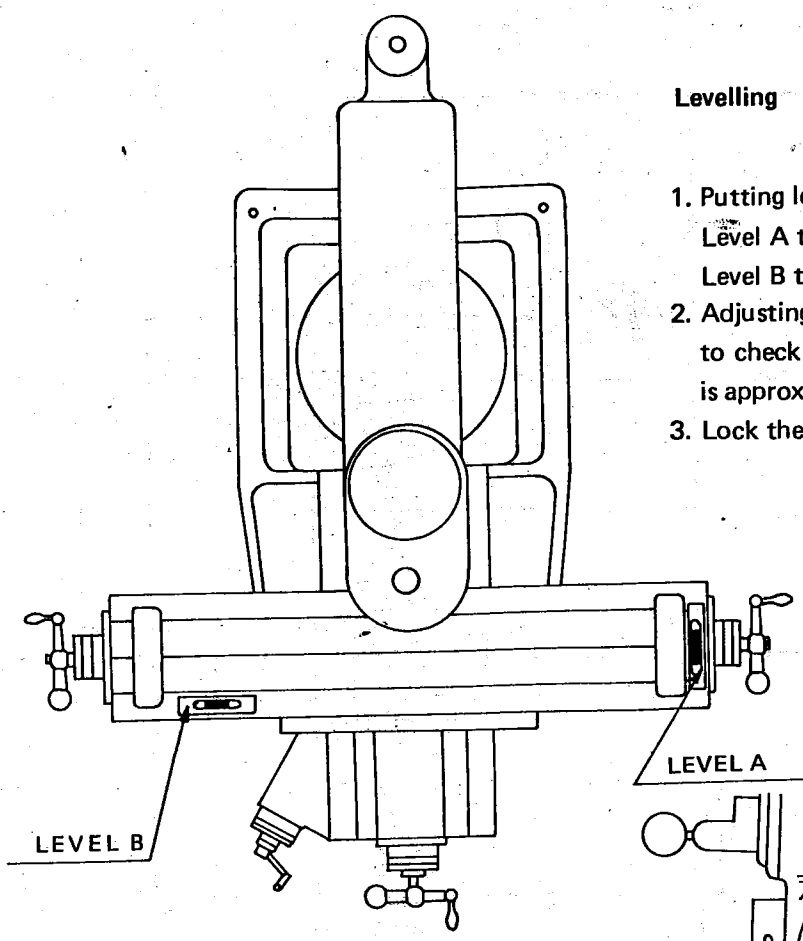
	Dimension
A	20"/508mm
B	17"/432mm
C	34-5/8"/880mm
D	59"/1500mm
E	78-3/4"/2000mm
F	8"/203mm
G	10"/254mm



Foundation Structure & Anchor Bolt.

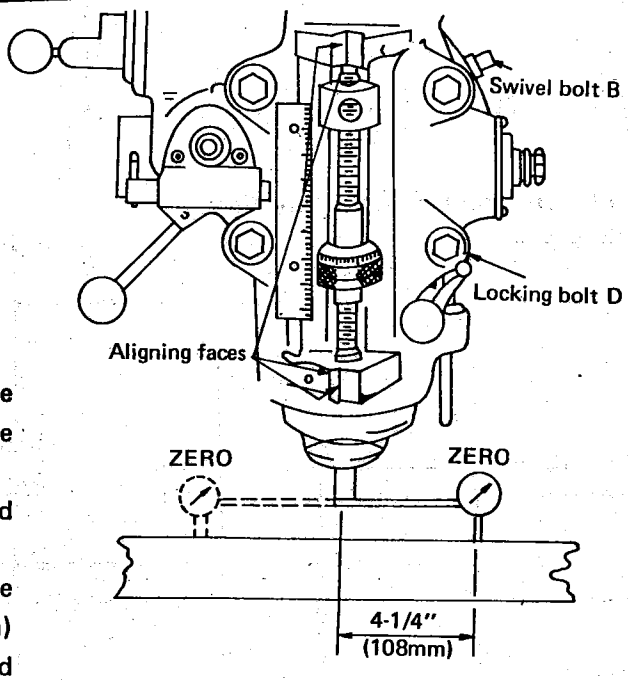






Levelling

1. Putting levels on table as illustrated
   Level A to check longitudinal level
   Level B to check cross level.
2. Adjusting foundation anchor bolt or shims to check the level A and B. The allowance is approximate 0.06mm/M
3. Lock the anchor bolt after adjustment

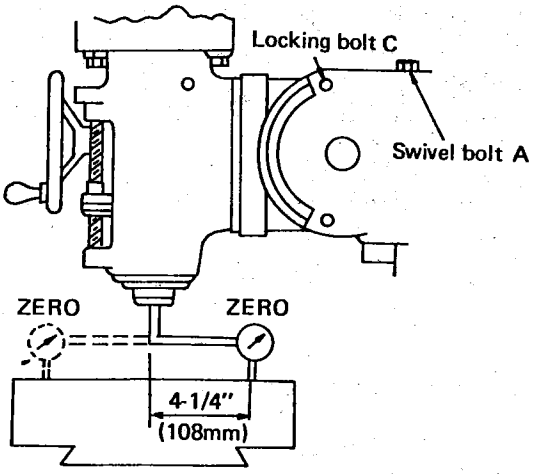


Adjusting the milling head square to the table

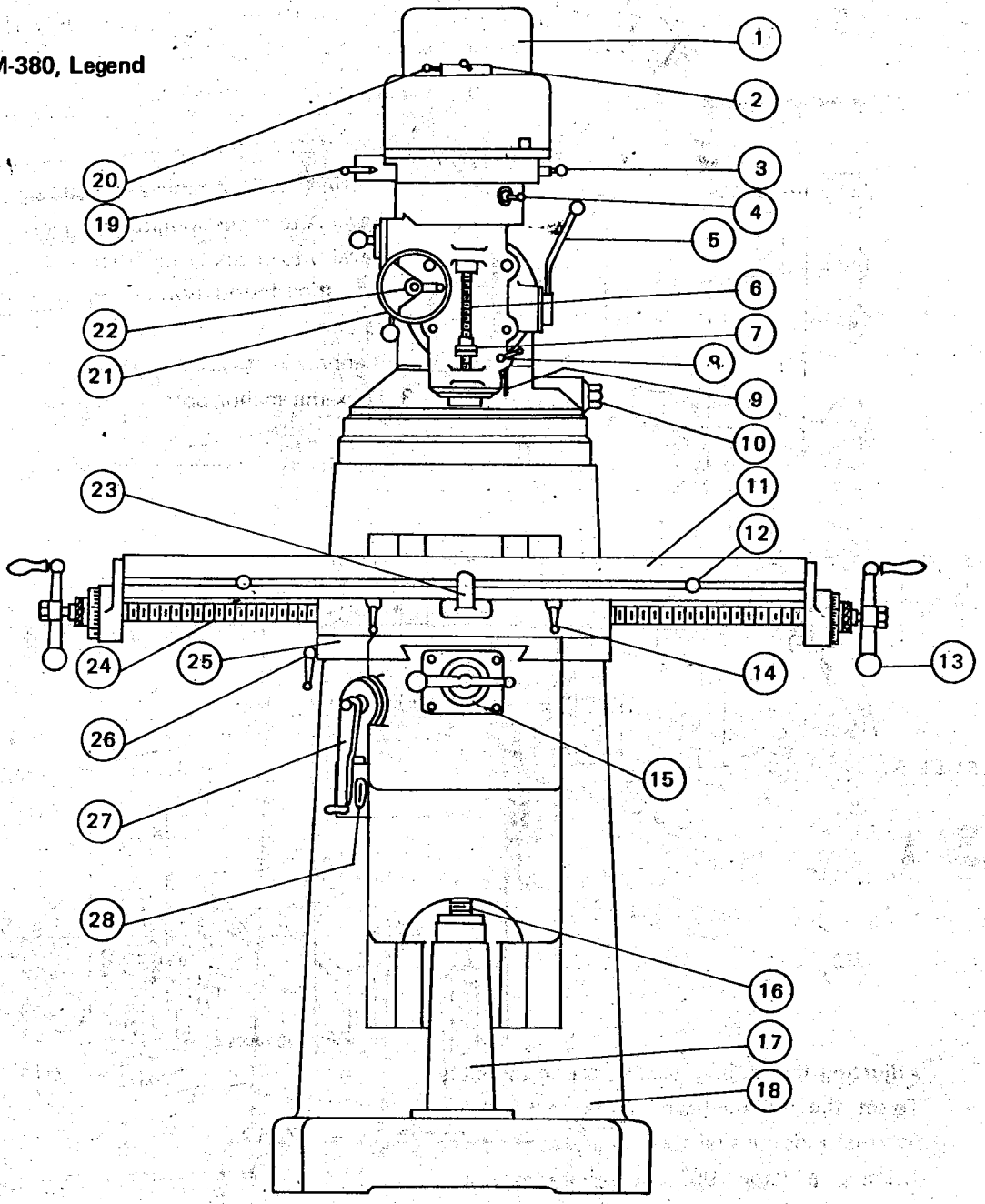
To set the milling head square to the table two methods are available:

1. Using a large 90° set square mounted on the align faces with square.
2. An indicator mounted in the spindle nose travelling in a 4-1/4" (108mm) radius. adjusting the swivel bolts A and B until the indicator indicates "Zero"

Note: Lock the bolts C (3pcs) and D (4 pcs) after adjustment.

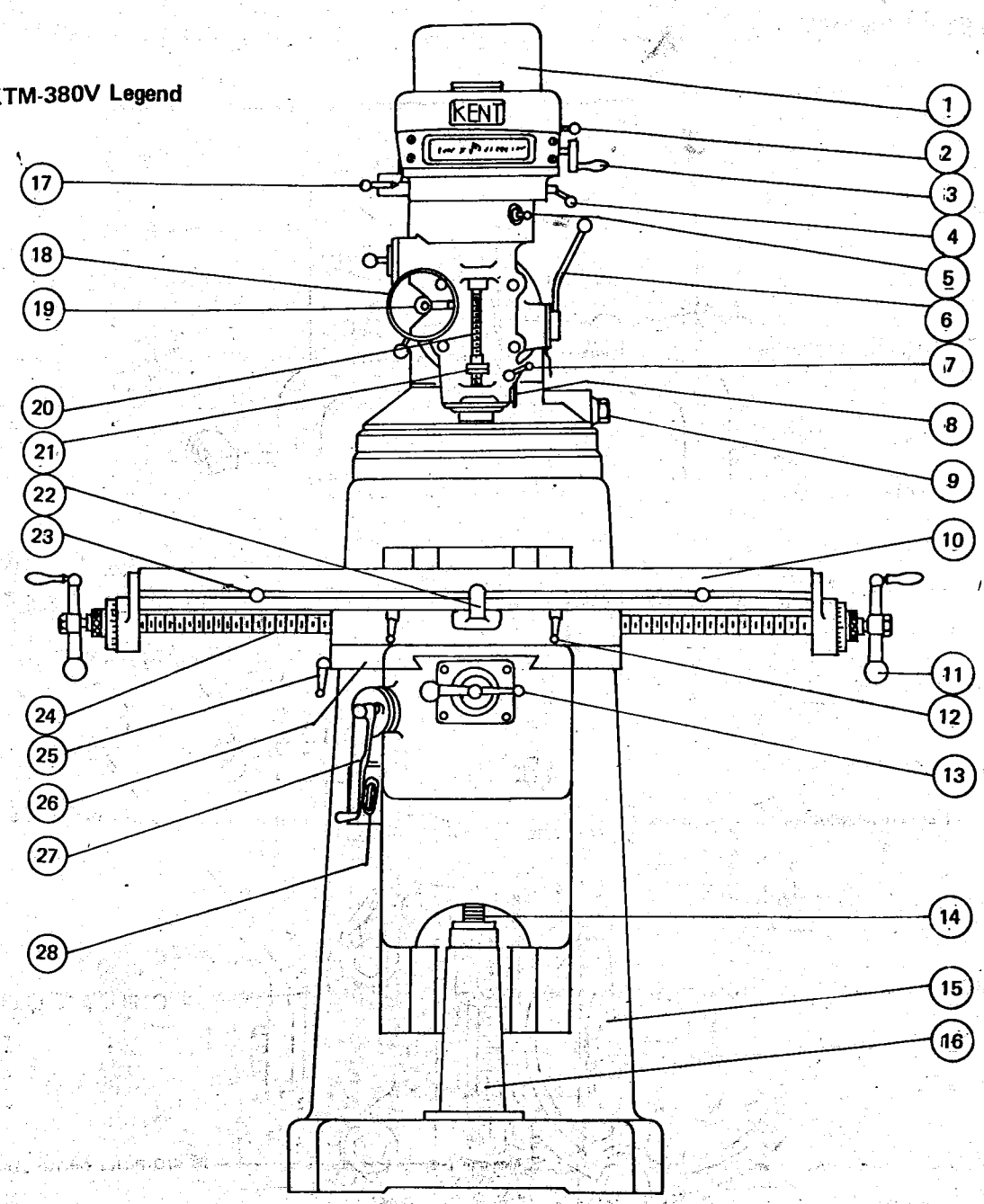


KTM-380, Legend



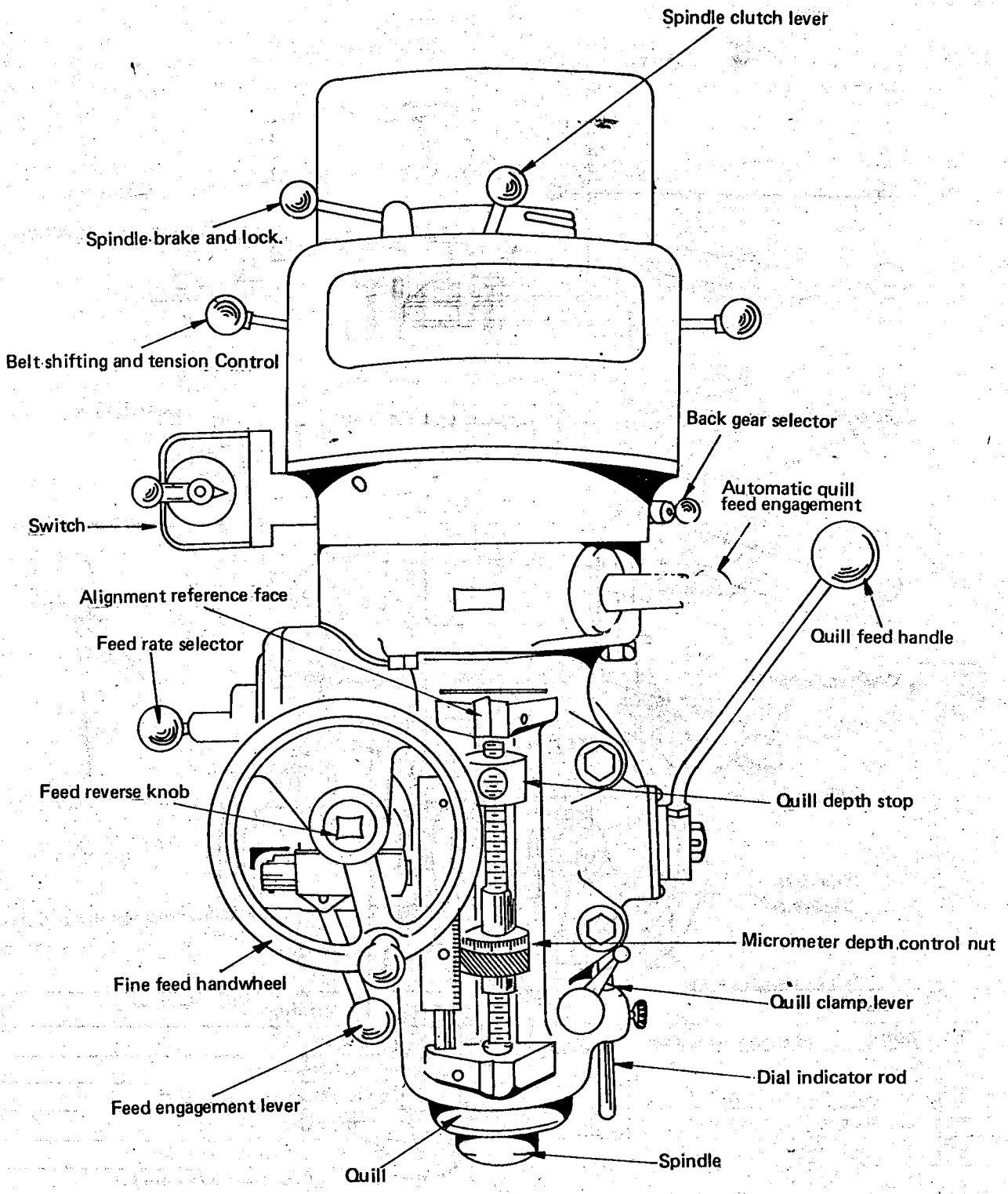
No.	DESCRIPTION	No.	DESCRIPTION
1	Motor	17	Elevating screw housing
2	Spindle clutch lever	18	Base
3	Back gear selector	19	Control switch
4	Auto quill feed engagement	20	Spindle brake and lever
5	Quill feed handle	21	Fine feed handwheel
6	Micrometer depth control screw	22	Feed reverse knob
7	Micrometer depth control nut	23	Longitudinal feed limit stopper
8	Quill clamp lever	24	Longitudinal feed screw
9	Dial indicator rod	25	Saddle
10	Ram adjustment handle	26	Saddle lock handle
11	Table	27	Elevating feed handle
12	Table stop	28	Oil feed lever
13	Longitudinal feed handwheel		
14	Table lock lever		
15	Cross feed handwheel		
16	Elevating screw		

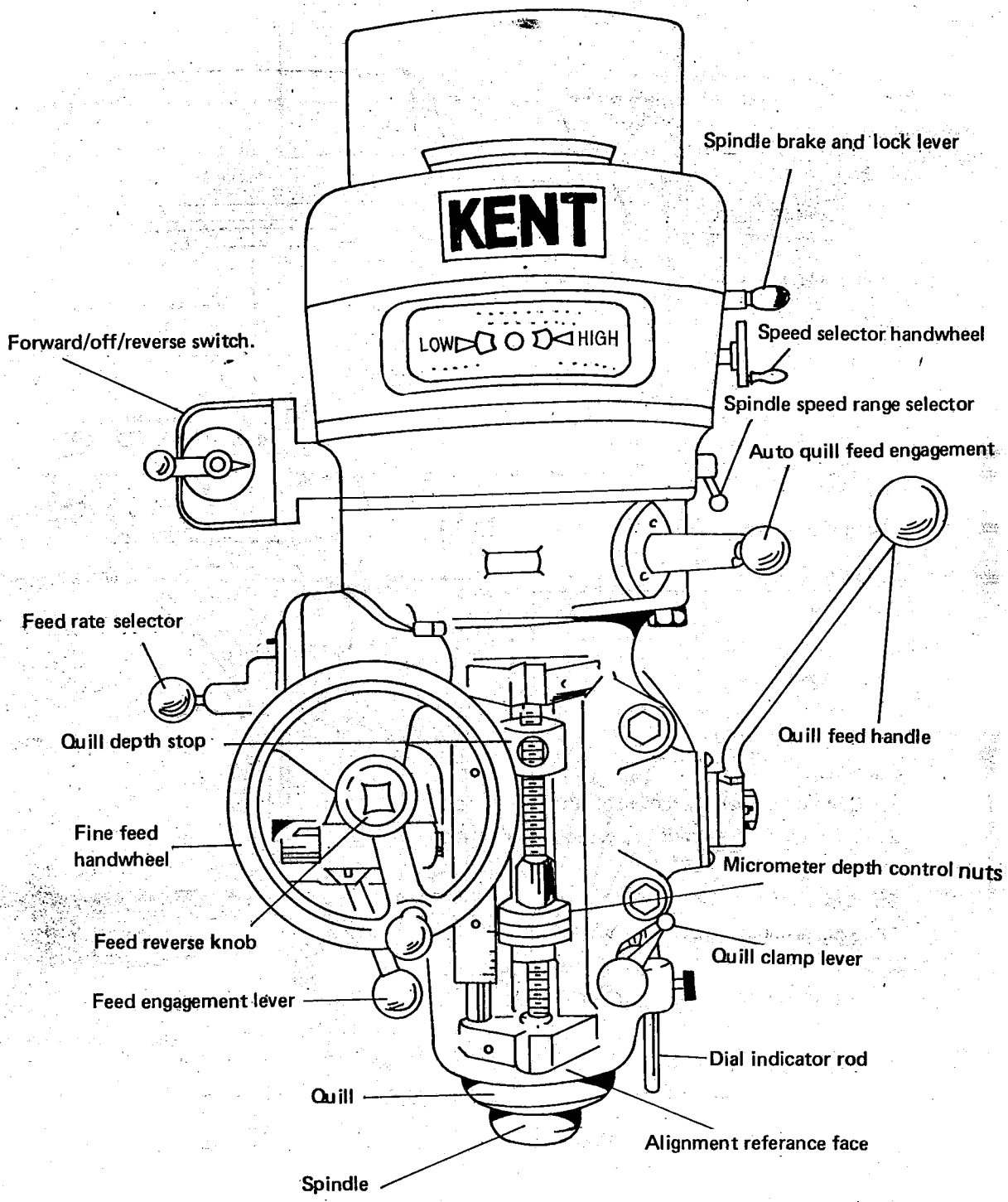
KTM-380V Legend



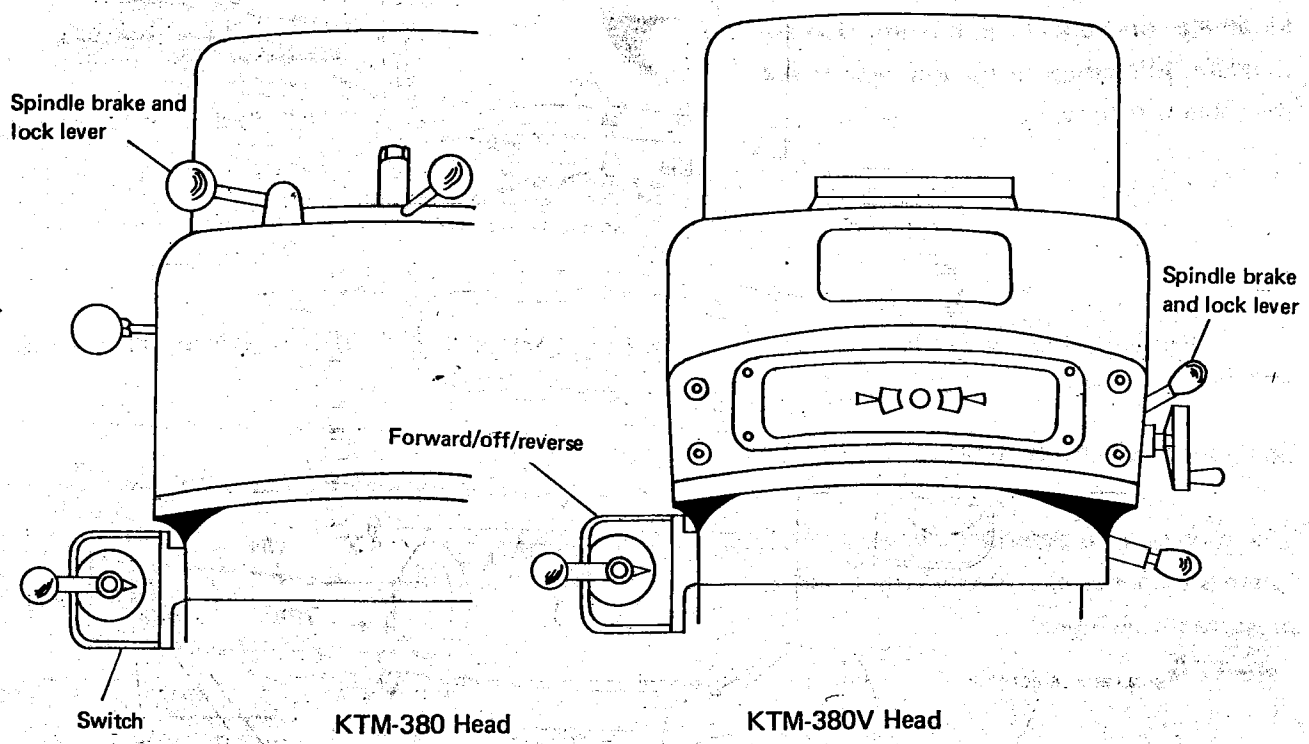
No.	Description	No.	Description
1	Motor	17	Control switch
2	Spindle brake and lock lever	18	Finefeed handwheel
3	Speed selector handwheel	19	Feed reverse knob
4	Spindle speed range selector	20	Micrometer depth control screw
5	Auto quill feed engagement	21	Micrometer depth control nut
6	Quill feed handle	22	Longitudinal feed limit stopper
7	Quill clamp lever	23	Table stop
8	Dial indicator rod	24	Longitudinal feed screw
9	Ram adjustment hondle	25	Saddle lock handle
10	Table	26	Saddle
11	Longitudinal feed handwheel	27	Elevating feed handle
12	Table lock lever	28	Oil feed lever
13	Cross feed handwheel		
14	Elevating screw		
15	Base		
16	Elevating screw housing		

KTM-380 Milling Head




KENT
LOW
HIGH
Spindle brake and lock lever
Speed selector handwheel
Forward/off/reverse switch.
Spindle speed range selector
Auto quill feed engagement
Feed rate selector
Quill feed handle
Quill depth stop
Fine feed handwheel
Micrometer depth control nuts
Feed reverse knob
Quill clamp lever
Feed engagement lever
Dial indicator rod
Quill
Alignment referance face
Spindle

Operation



KTM-380 Head KTM-380V Head

Starting:

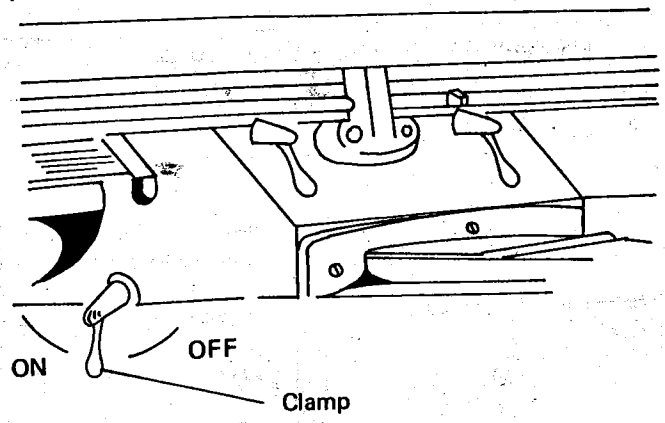
1. Connect power source according to the power voltage
2. Turn switch to required position (Forward or Reverse)

Stopping:

1. Stop feeding to release machine load.
2. Turn switch to "off" (neutral position)
3. Turn spindle brake lever to brake till spindle stops.

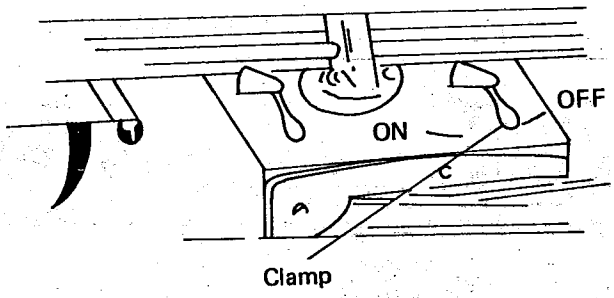
Clamping the saddle-knee slide.

1. Turn clamp clockwise "ON" counter-clockwise "OFF".
2. Moderate pressure is sufficient. Excess pressure will cause distortion and make the table stiff to wind.



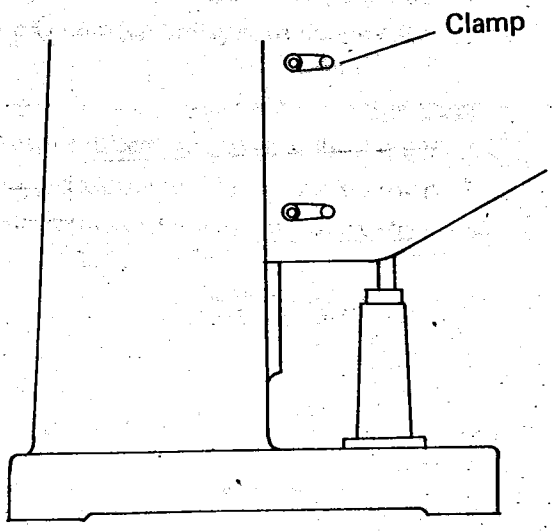
Clamping the table-saddle slide.

1. Clamping same as described above.
2. There are 2pcs clamp, please keep equal pressure on each one.



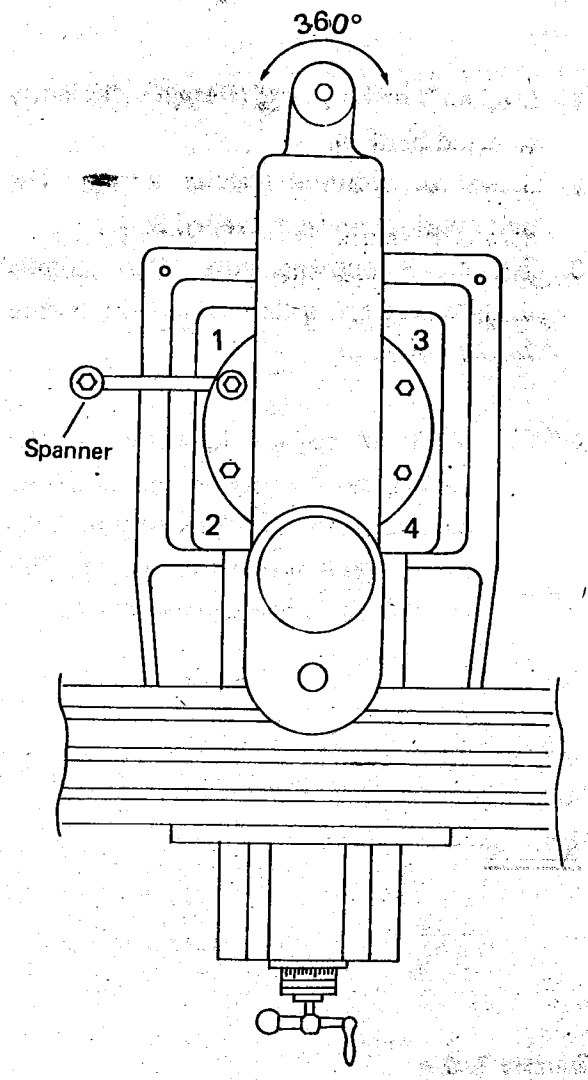
Clamping the knee-column slide

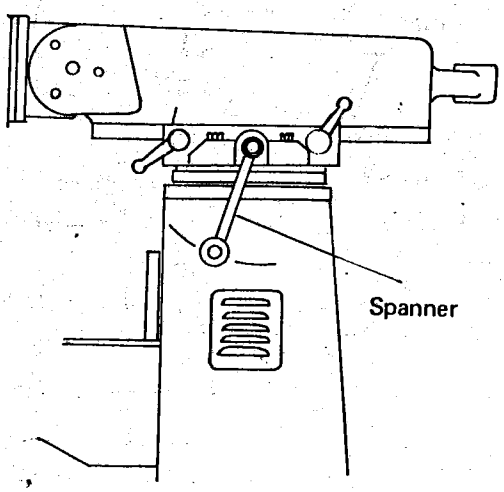
Clamping same as described above.



Swivel Turret

1. Use spanner to unlock the 4 bolts.
2. Swivel and index to required position
3. Lock the 4 bolts.





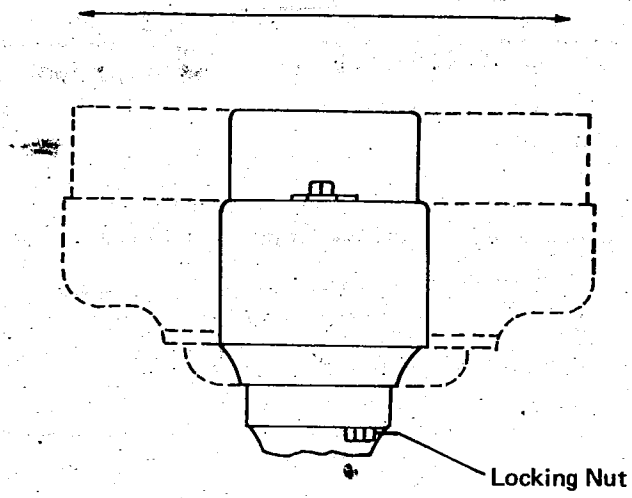
Move Ram Slide

1. Turn the 2 clamps counterclockwise to unlock ram from turret
2. Turn the spanner to move the ram slide to the desired position.
3. Lock the 2 clamps, tightening the rear one first.

Swivel Belt Housing

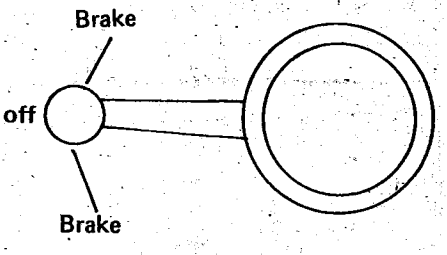
1. Slacken 3 locking nuts (Retain sufficiently to avoid binding)
2. Swivel to required angular setting (The belt housing can be swivelled 360°)
3. Tighten 3 Locking nuts (Run spindle to give correct spline alignment before finally securing)

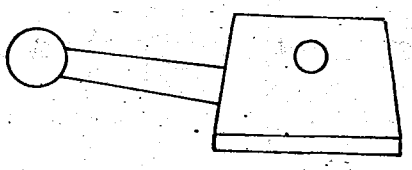
NOTE: Incorrect spline alignment can be caused by unequal tightening of the locking nuts caused varying stiffness of the quill feed which can be felt through the sensitive feed handle.

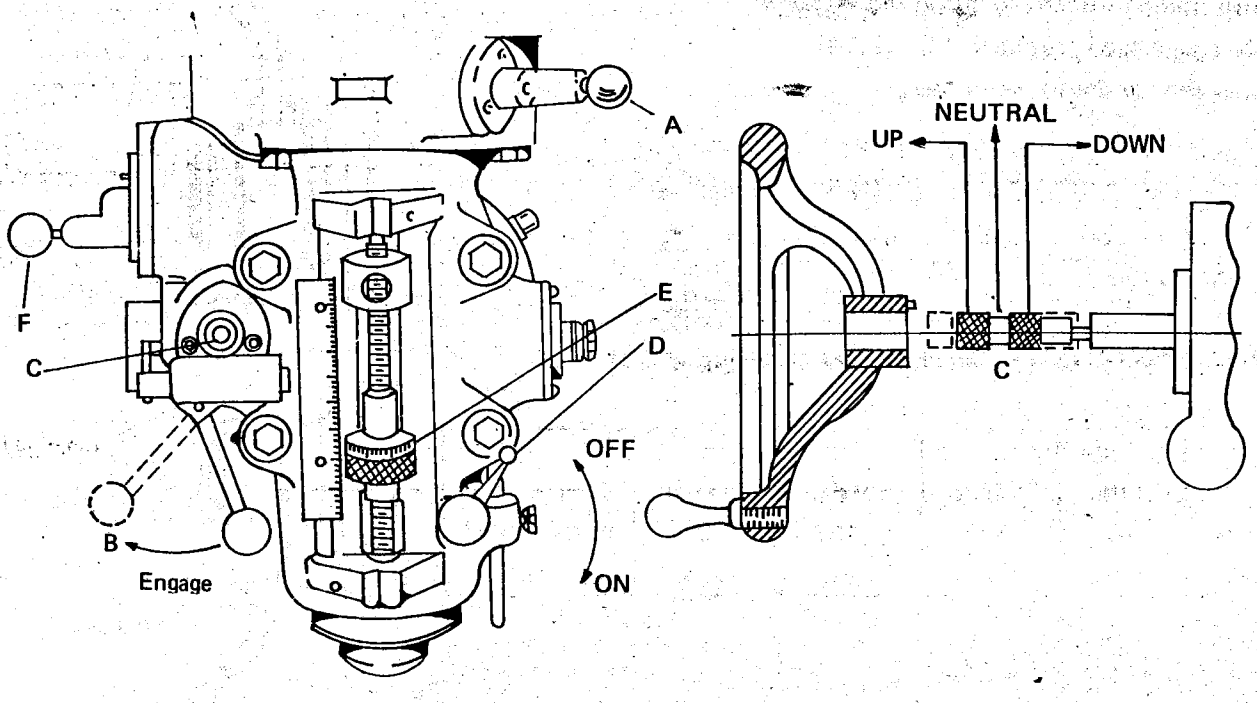


Spindle Brake

1. Spindle brake and lock lever is normally in "Off" position
2. Turn lever leftward or rightward to brake spindle to stop.







Quill Feed

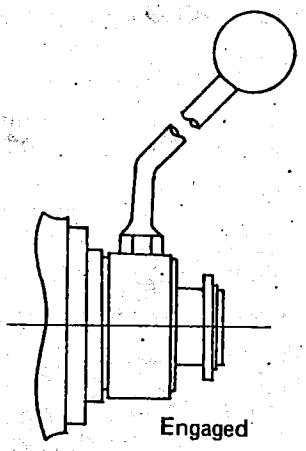
1. Fine Hand Feed.
   (1) Disengage auto quill feed A
   (2) Locate C in neutral position
   (3) Engage feed trip lever B
   (4) The quill is now under handwheel control.

2. Automatic Feed
   Maximum loading 3/8" (9.5mm) dia. for drilling S20C.
   (1) Ensure quill clamp D is off.
   (2) Set micrometer dial E to required depth.
   (3) Engage auto quill feed A (Be sure motor has stopped)
   (4) Select feed rate F
   (5) Select feed direction C
   (6) Engage feed trip lever B
   (7) The quill is now automatic feed

NOTE: Do not use automatic feed when spindle speed is over 2700RPM.

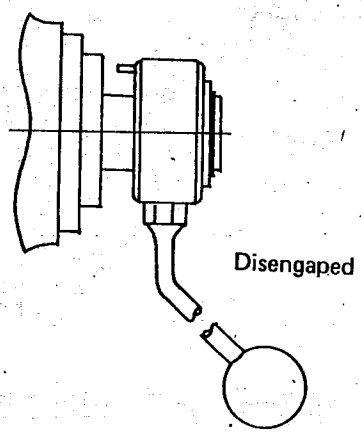
Quill Sensitive Hand Feed.

1. Select the most suitable position of the Handle.
2. Push home until the locating pin engages
3. Disengage feed trip lever B (P.24)
4. Turn the handle for quill feed.



SPINDLE SPEEDS (STOP Motor before changing speed)

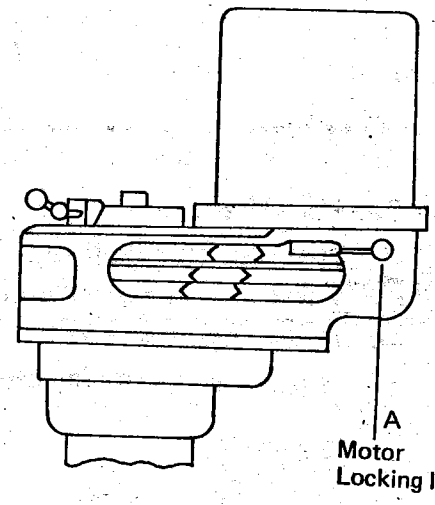
Steps / Range	1st step	2nd step	3rd step	4th step	Remark
Low speed	65	115	200	285	BACK GEAR
High speed	615	1100	1910	2700	DIRECT



CHANGE SPINDLE SPEED

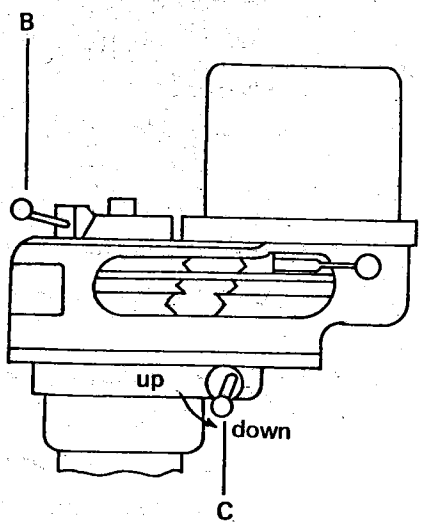
1. Change speed within range.

   (1) Isolate machine
   (2) Slacken 2 motor locking levers A
   (3) Slide motor forward to loosen belt
   (4) Position belt on proper pulleys
   (5) Slide motor to the rear to tension belt
   (6) Tighten 2 motor locking levers A



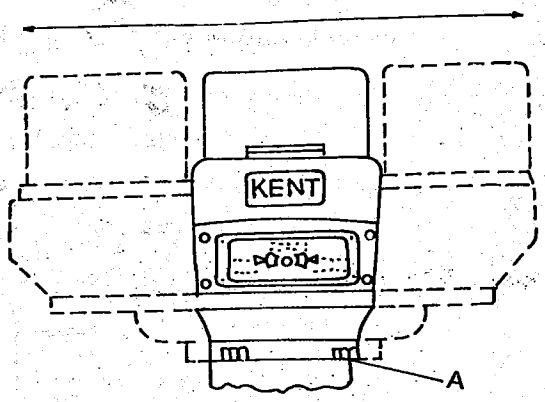
2. Change Range

   (1) From direct (high speed) to back gear (low speed)
      a. Move lever B to the right.
      b. Move knob C upward to "In" position.
      c. Now the spindle rotation been "Reversed", move motor Switch to reverse position to obtain original direction of spindle rotation.
   (2) From back gear to direct drive.
      a. Move lever B to the front position.
      b. Rotate Spindle by hand until the clutches are felt to engage.
      c. Move knob C downward to "Out" position.
      d. Correct spindle direction same as stated above.



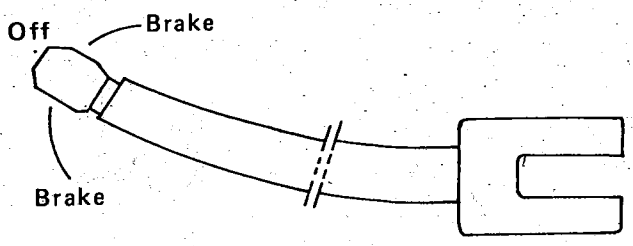
Operation on KTM-380V Head

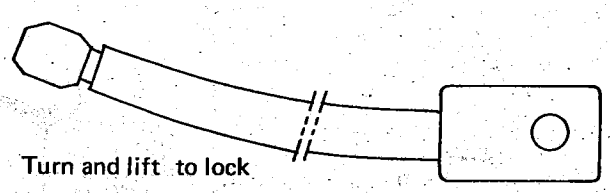
1. Swivel belt housing please refer to instruction on page-19.



2. Spindle Brake

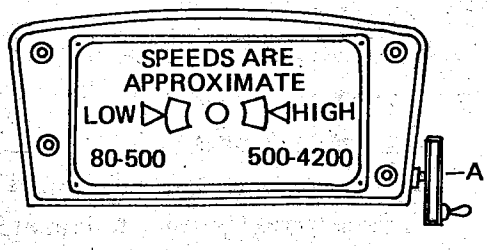
   (1) Brake lever as shown
   (2) Operation refer to instruction on page-19.





3. Spindle Speed (Change only when spindle is running)

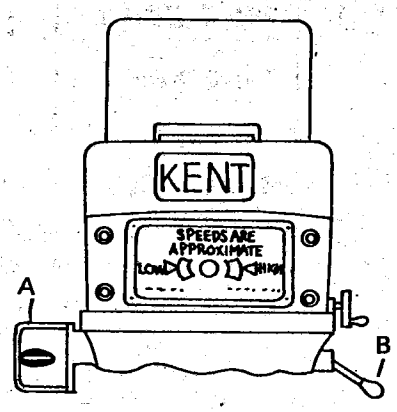
   (1) Change speed within range
      a) Start spindle
      b) Turn handwheel A to select required speed



DO NOT CHANGE SPEED
UNLESS SPINDLE IS RUNNING

   (2) From direct to back gear drive
      a) Switch A to off
      b) Turn lever B through neutral to low (This reverse the spindle rotation)

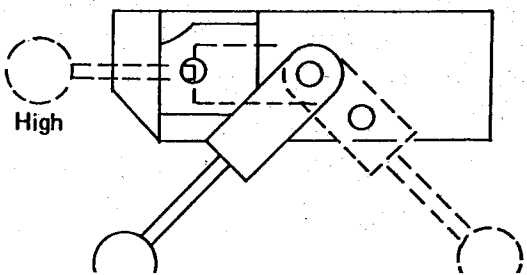
   Note: Do not change range whilst the spindle is running.



B Lever

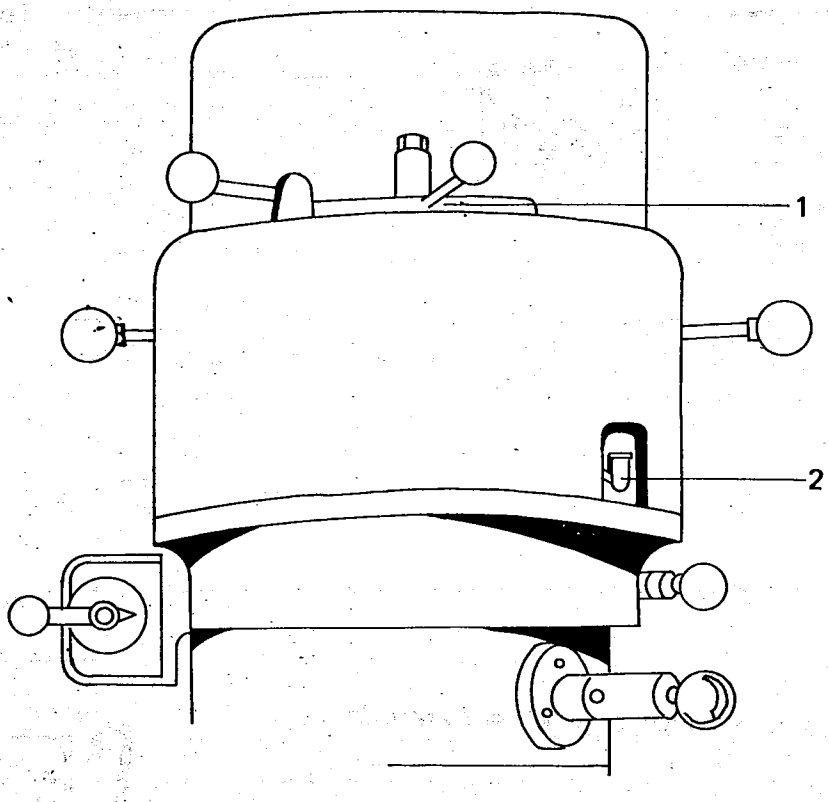
   (3) From Back Gear to Direct Drive.

      a) Switch B to off
      b) Turn lever B throught neutral to High
      c) Rotate spindle by hand until the clutches are felt to engage.



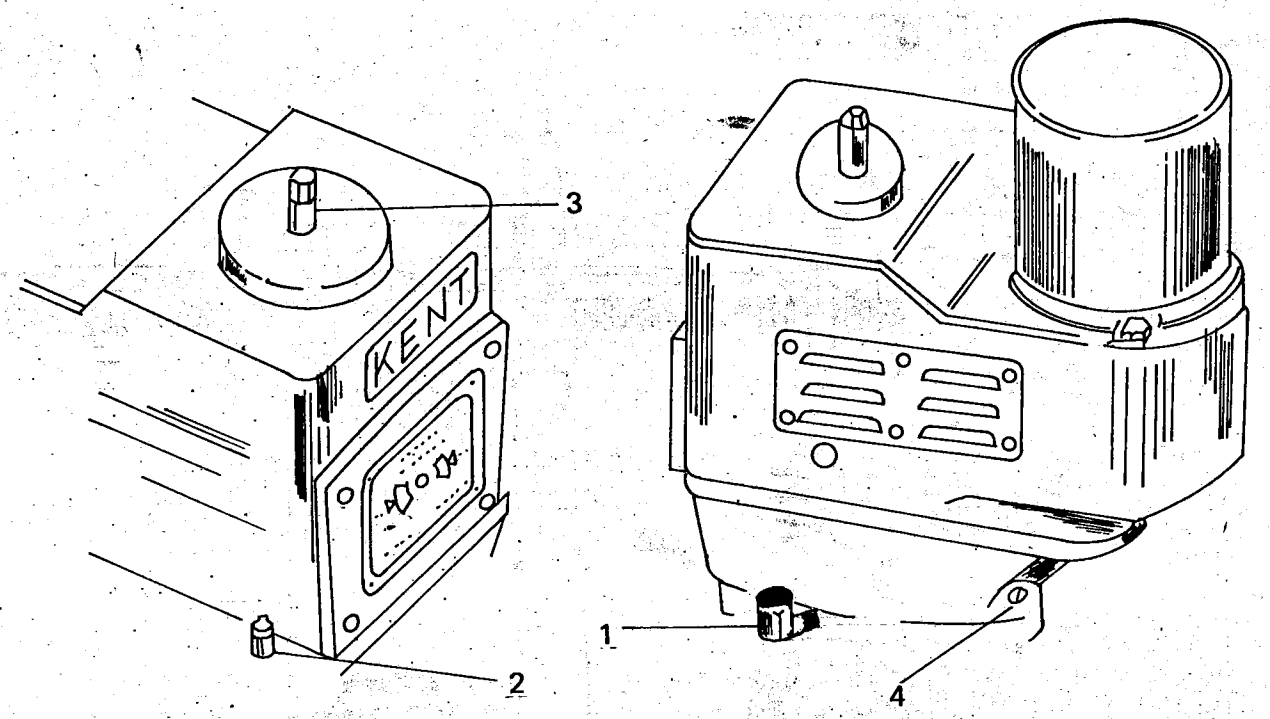
Lubrication

1. Lubrication For KTM-380 Head



FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	AT.
Twice Weekly	Pulley Cam	Vactra Heavy Medium SAE 10 or 10W Light	5 Drops	1
Twice Daily	Spindle Bearing Quill Feed	Vactra Heavy Medium SAE 10, or 10W Light	TOP-UP	2

2. Lubrication For KTM-380V Head

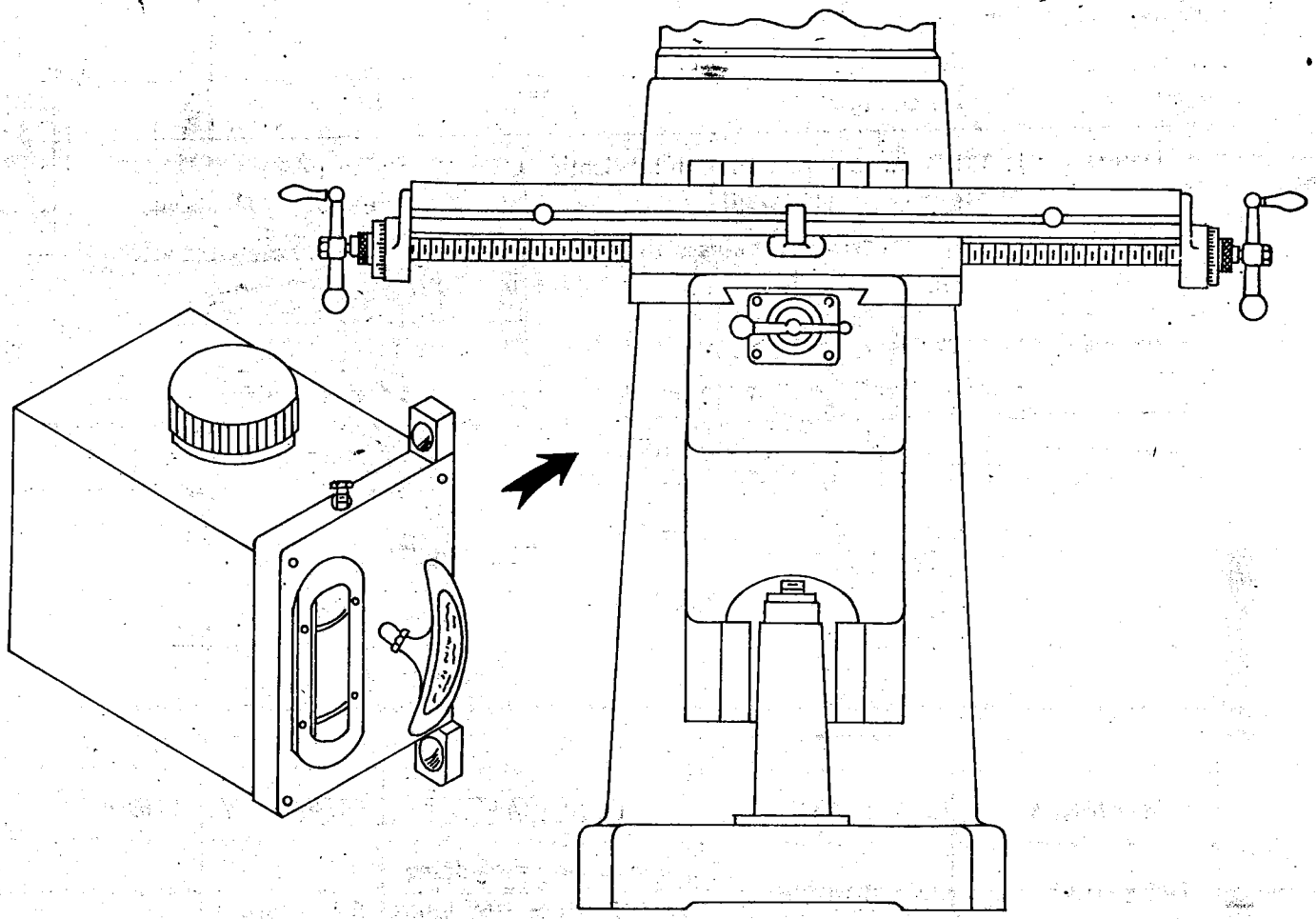


FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	LUB AT
Twice Daily	Quill Bearings	Vactra Heavy Medium S.A.E. 10 or 10W Light	5-10 drops	1
Twice Daily (When feed is in use)	Spindle Down Feed	Vactra Heavy Medium SAE 10 or 10W Light	Top-UP	2
Weekly	Drawbar Splines (move quill down 2")	Vactra Heary Medium SAE 10 or 10W Light	5 drops	3

NOTE: Failure to lubricate "Quill bearings" at 1 can result in tight quills and partial seizure of quill in housing.

FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	LUBRICATE AT.
Every 2 months (of normal use)	Back Gear	Grease	Equivalent of 1 teaspoonful	4.NOTE: Before greasing put gear lever back to "LO" & keep spindle stationary

3. Lubrication for Body



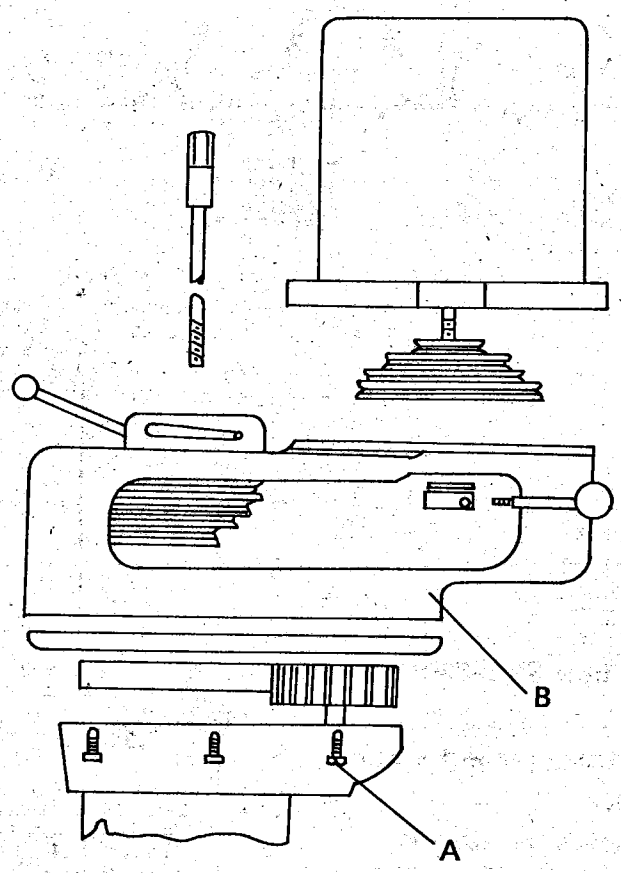
FREQUENCY	LUBERICATE	LUBRICANT	QUANTITY
Centraliced Lub Pump Daily Check Level Weekly	Lead Screw	Shell Cornea Oil 41 MOBIL x 2 Socony Gargoyle Vactra No. 2	One Pump
	Saddle-Table Ways	"Sunoco" Waylube #80 MOBIL x 2	One Pump
	Saddle-Knee Ways	"Sunoco" Waylube #80 MOBIL x 2	One Pump
	Knee Colum Ways	"Sunoco" Waylube #80 MOBIL x 2	One Pump
Twice Weekly	Elevating Screw	Shell Carnea Oil 41 MOBIL x 2 Socony Gargoyle Vactra No. 2	5 Shots (Oil Gun)

MAINTENANCE

Preventive Maintenance

For securing the accuracy and life of the machine, we offer the following preventive maintenance chart for operator's reference.

Frequency	Description
Daily	1. It's necessary to oil each lubrication point before operation. 2. Check the level of the oil lubricator and fill if necessary 3. It's necessary to release the clamps, clean and lubricate the table after operation.
Monthly	1. Check all the gibs and abjustif necessary. 2. Check all the backlash between screws and nuts and adjust if necessary.
Quarterly	1. Check and adjust the machine accuracy. (manual P. 37 to P. 39)



One. Belt Replacement

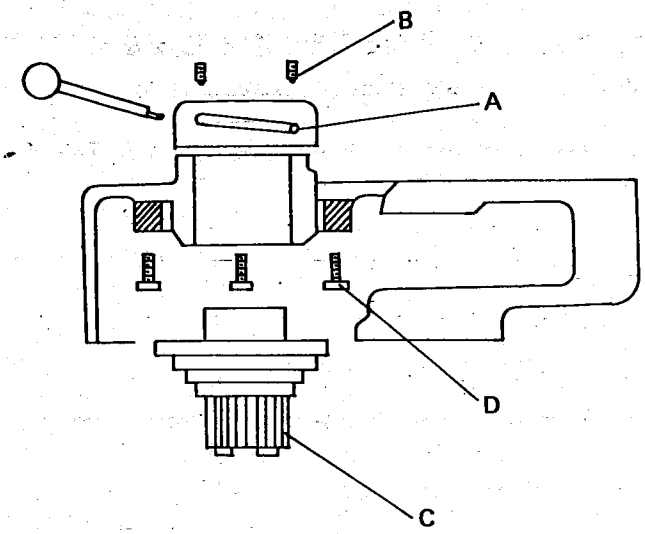
1. Isolate the machine
2. Remove drawbar C
3. Remove 2pcs bolt E and remove motor D
4. Fully extend quill
5. Remove 6pcs screws A
6. Remove belt housing B — tap to withdraw from dowels.
7. The belts now may be changed

Two. Brake shoe Replacement

Repeat the sequence 1 to 6 described on page. 26

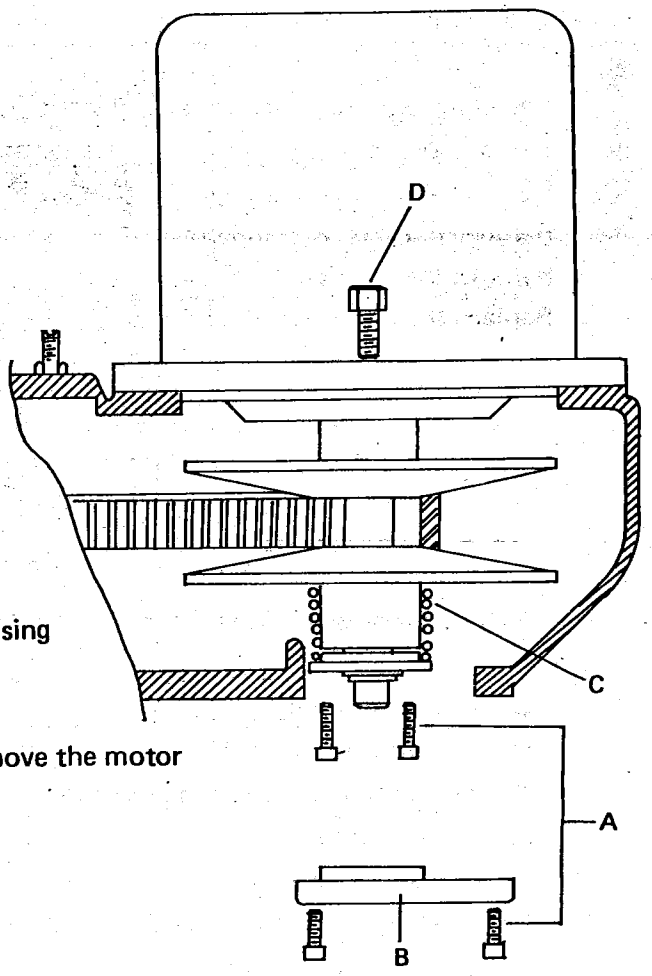
1. Turn handle A to release screw B
2. Remove 2pcs screws B
3. Push bearing hub C from housing
4. Remove 3pcs screw D
5. Replace brake shoe
6. Ensure screws D are fully tightened and lock with washers and nuts

NOTE: After locking screws D it should allow a little movement for shoe



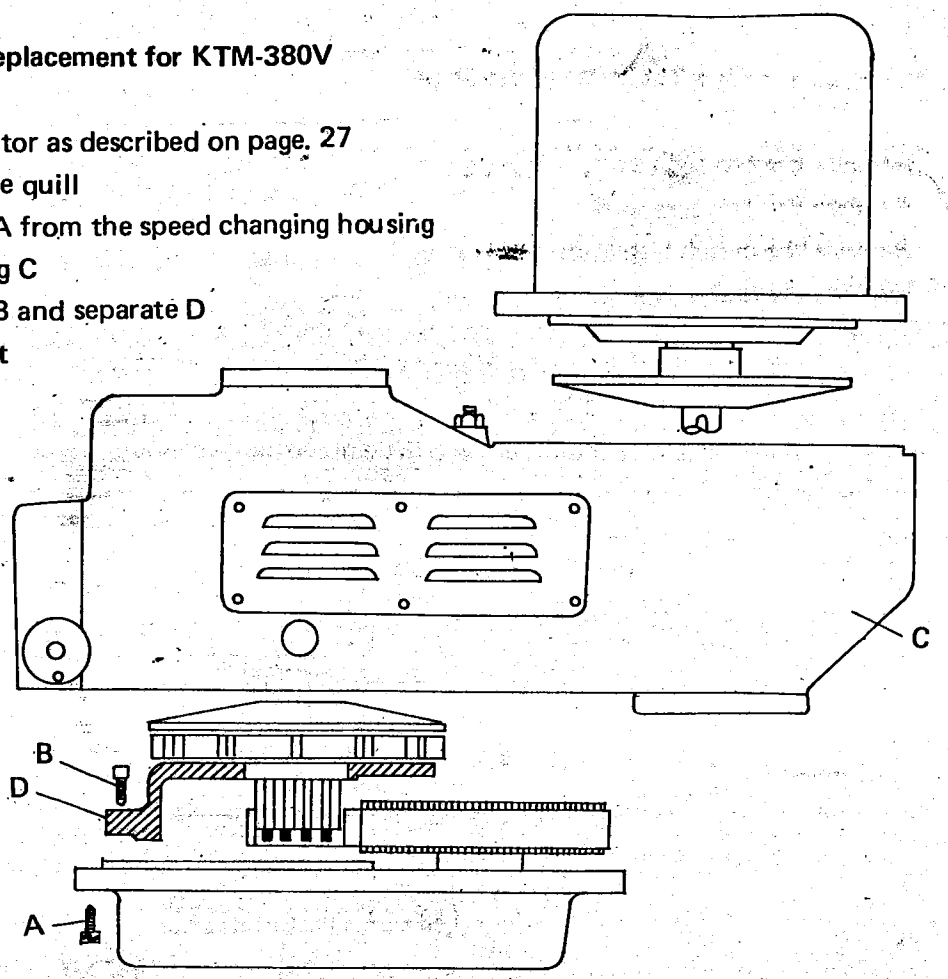
Three. Remove Motor from KTM-380V

1. Run spindle to adjust to lowest speed
2. Isolate the machine
3. Remove 3pcs screw A and cover B
4. Using 2pcs screw A to compress spring C
5. Rotate the speed changer to the highest speed
6. Remove the reversing switch from the belt housing
7. Remove 4pcs motor locking screw D
8. , Lift motor and place it on belt housing
9. Ease the belt over the lower drive disk and remove the motor



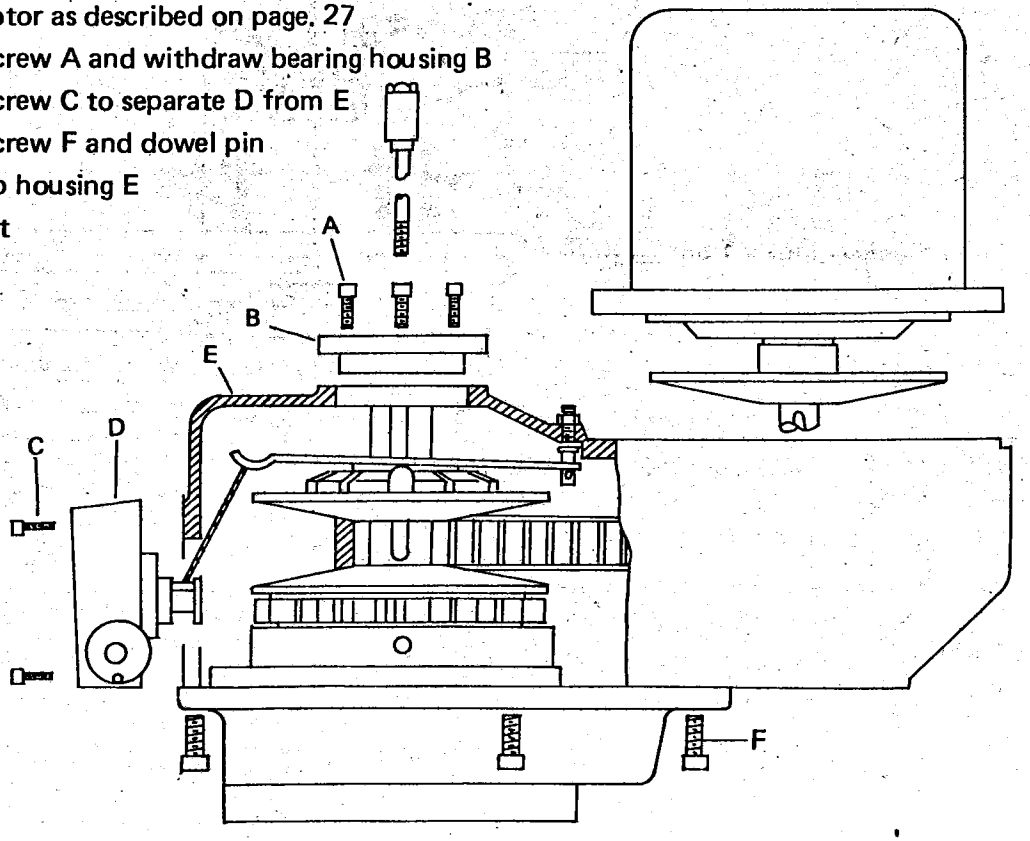
Four. Timing Belt Replacement for KTM-380V

1. Remove the motor as described on page. 27
2. Fully extend the quill
3. Remove screw A from the speed changing housing
4. Remove housing C
5. Remove screw B and separate D
6. Replace the belt



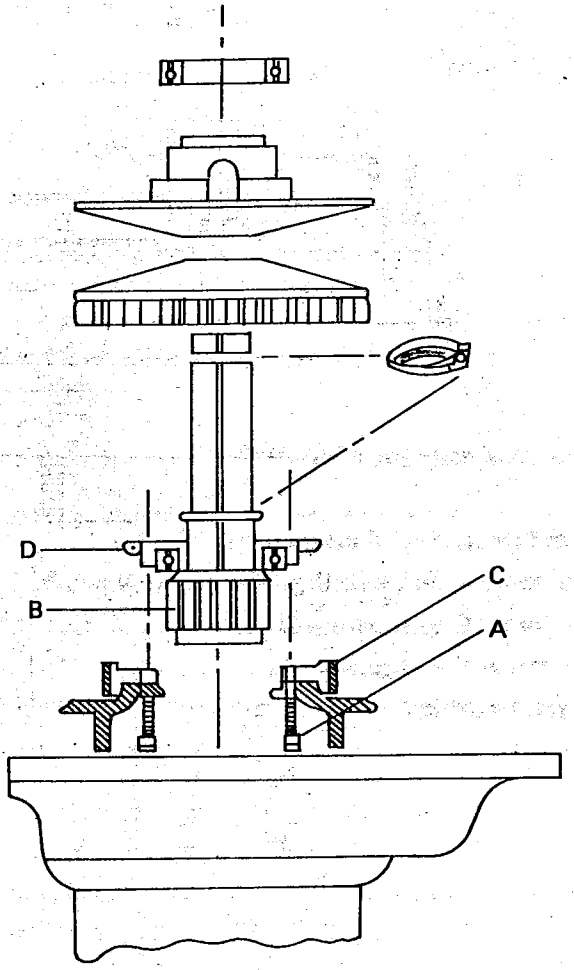
Five. Drive Belt Replacement for KTM-380V

1. Remove the motor as described on page. 27
2. Remove 3pcs screw A and withdraw bearing housing B
3. Remove 4pcs screw C to separate D from E
4. Remove 6pcs screw F and dowel pin
5. Remove the top housing E
6. Replace the belt



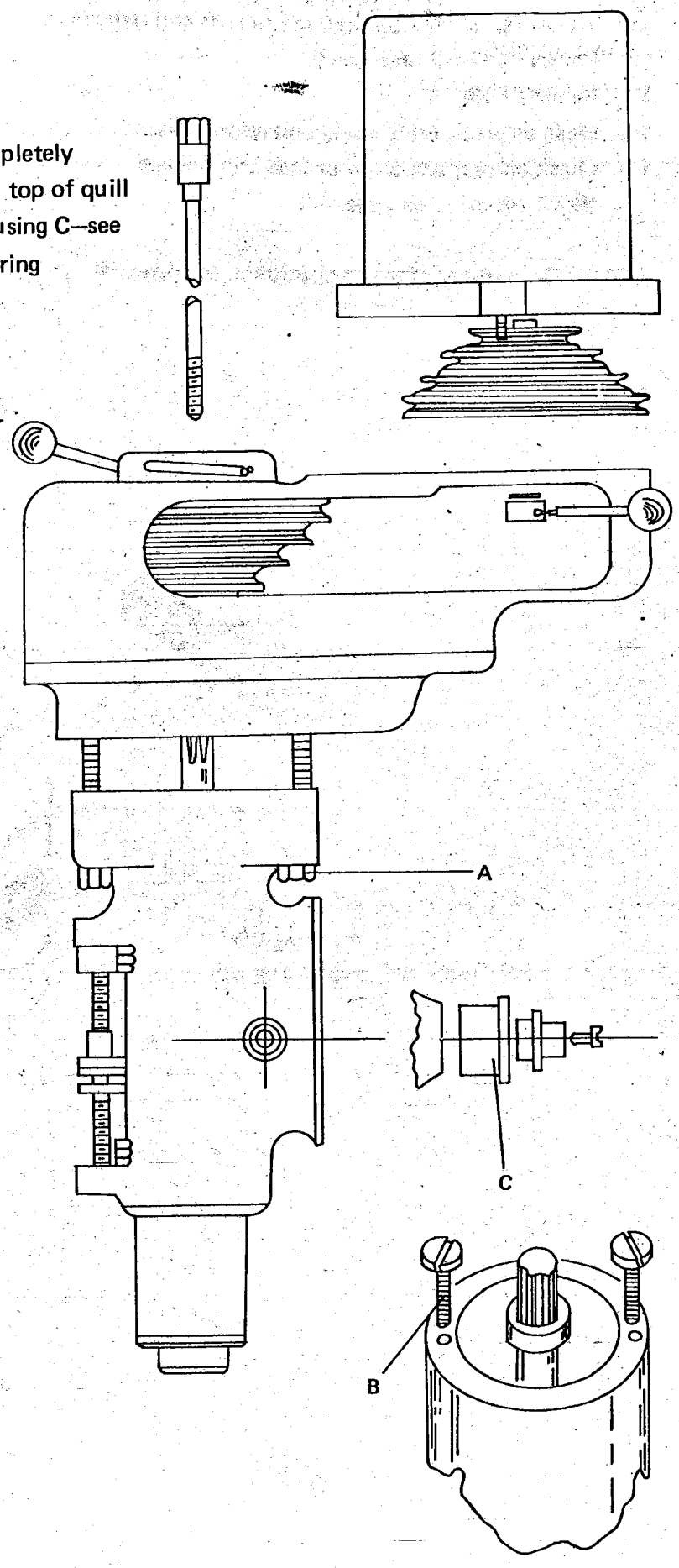
Six. Replacement for KTM-380V Brake Shoe

1. Remove the top section
2. Remove the two screws A
3. Remove the clutch hub assembly B and D
4. Replace the brake shoe C



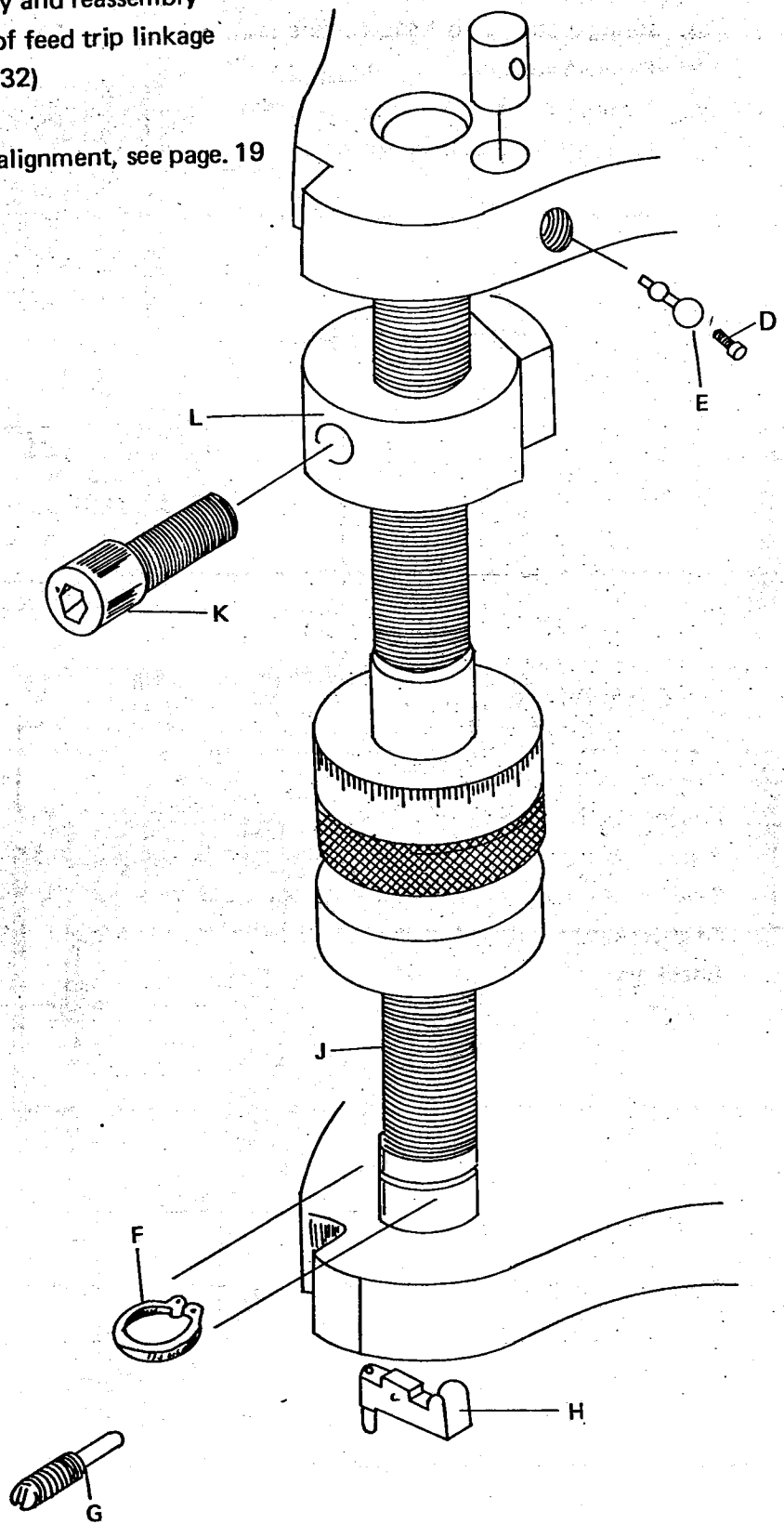
Seven. Quill Removal

1. Isolate machine
2. Remove motor
3. Remove drawbar
4. Fully extend quill
5. Remove 3 nuts A
6. Remove top section completely
7. Remove 2 screws B from top of quill
8. Remove clock spring housing C—see Page. 32 for replacing spring



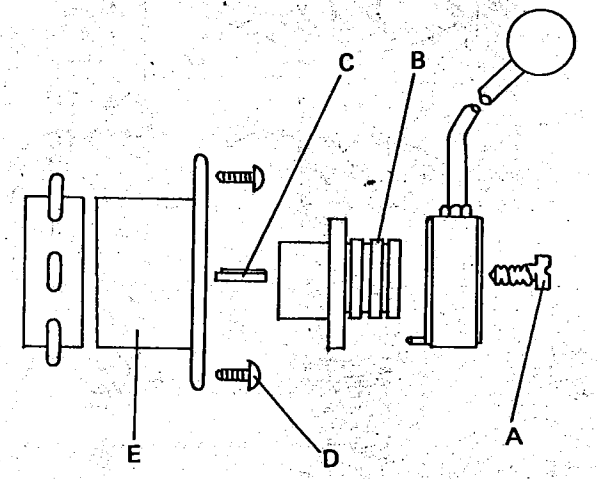
9. Remove screw D and ball reverse lever E
10. Remove cir. clip F, screw G and arm H
11. Thread out shaft J through micro nuts and remove
12. Remove screw K and stop L
13. Remove quill
14. Clean all areas, oil liberally and reassembly
15. Cheak correct operation of feed trip linkage
    (See instruction on page. 32)

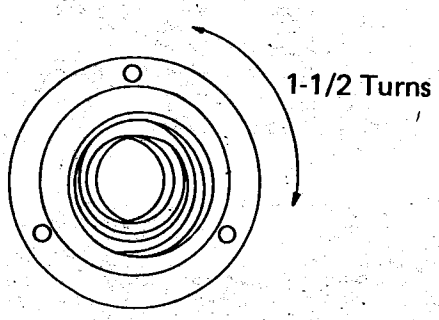
NOTE: Reassembly of spline alignment, see page. 19



Eight. Balance Spring Replacement

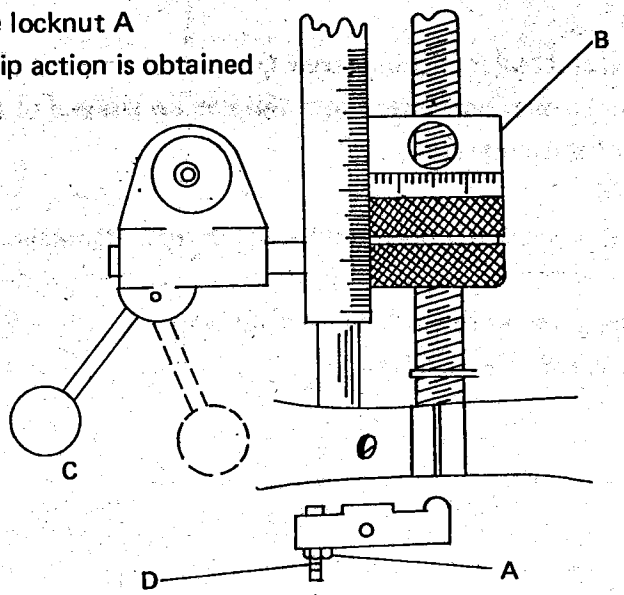
1. Apply quill at top of movement and lock it
2. Remove screw A, hub B and key C
3. Remove screw D, allowing slow rotation of housing E to release spring
4. Lift end of spring from peg on the pinion shaft
5. Replace spring housing E (spring been attached in housing)
6. Refit spring housing to head casting retainer and trun housing clockwise until spring locates on peg on the pinion shaft

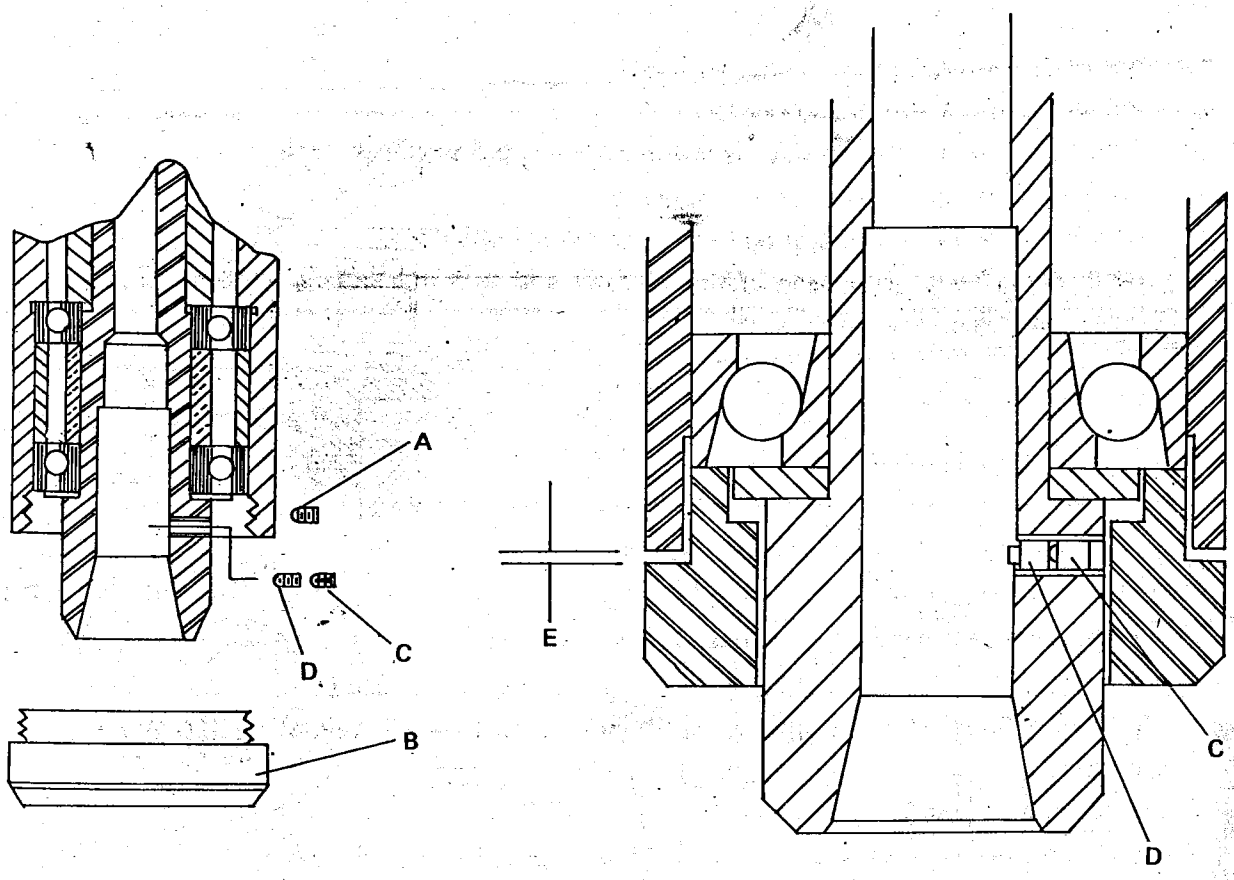




Nine. Feed Trip Adjustment

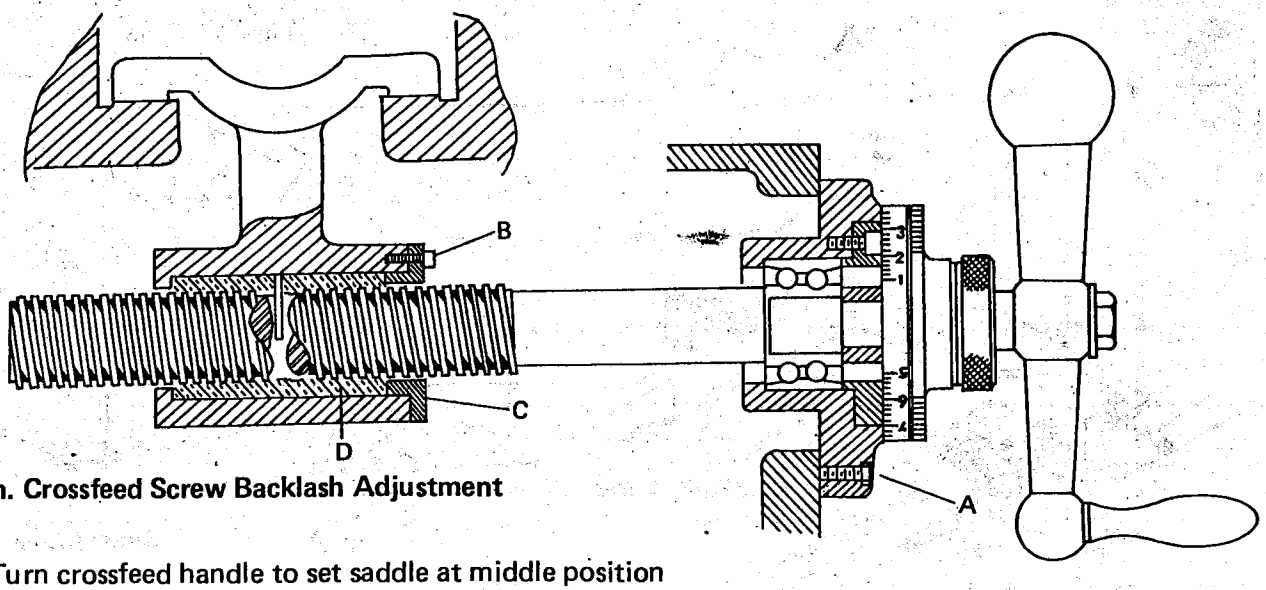
1. Release locknut A
2. Engage trip handle C
3. Adjust micro nuts E until against quill stop B
4. Slowly turn adjusting screw D until handle C trips
5. At this point secure locknut A
6. Check that smart trip action is obtained





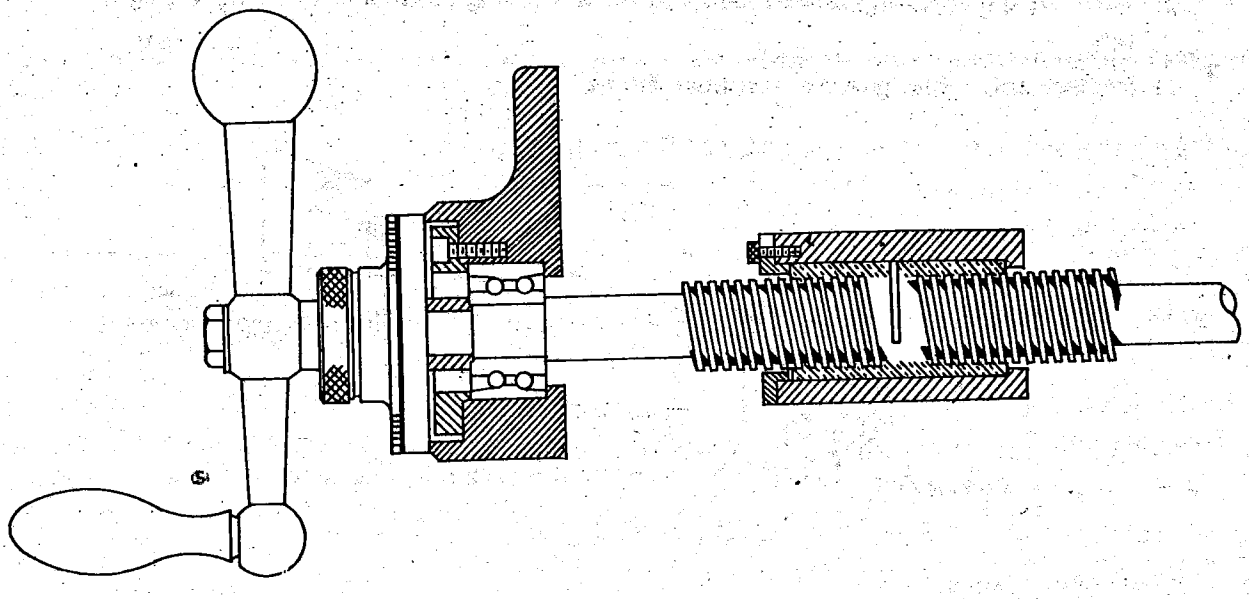
Ten. Collet Aligning Screw Replacement For R. 8 Nose

1. Mark a reference line on quill and nose cap B with felt pen
2. Remove set screw A
3. Unscrew nose cap B
4. Remove lock screw C and collet aligning screw D
5. Replace D; 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 and check felt pen marking for correct alignment
8. Replace set screw A
   Caution: do not overtighten as this will cause distortion
9. Check gap E at 0.02-0.003" (0.5-0.08mm)



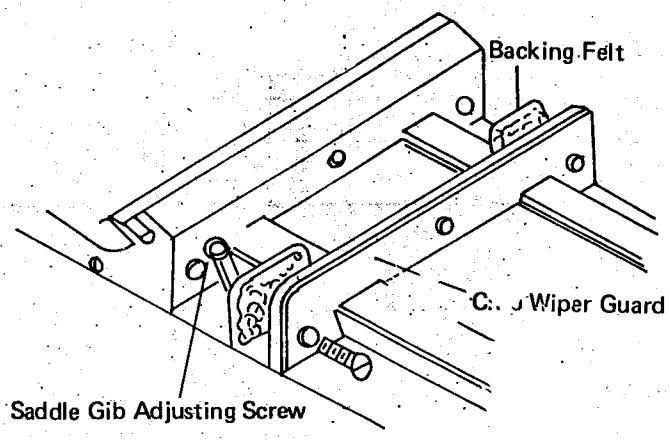
Eleven. Crossfeed Screw Backlash Adjustment

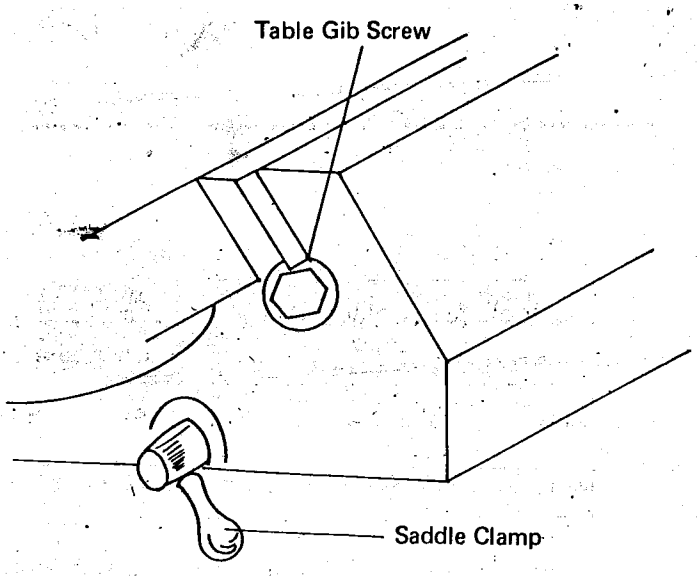
1. Turn crossfeed handle to set saddle at middle position
2. Withdraw 4 screws A
3. Pull the saddle forward to expose screw B and cover C
4. Adjust screw B to let cover C push the nut D for adjusting backlash
5. While adjusting screw B , slowly trun handle until backlash 0.004" or 0.005" is obtained
6. Lock srecw B
7. Finally crank the saddle to the front of the knee and replace 4 screws A



Twelve. Longitudinal Screw Backlash Adjustment

1. Crank the table to the left end
2. Adjusting backlash same manner as mentioned item 4, 5, 6, 7 for crossfeed screw

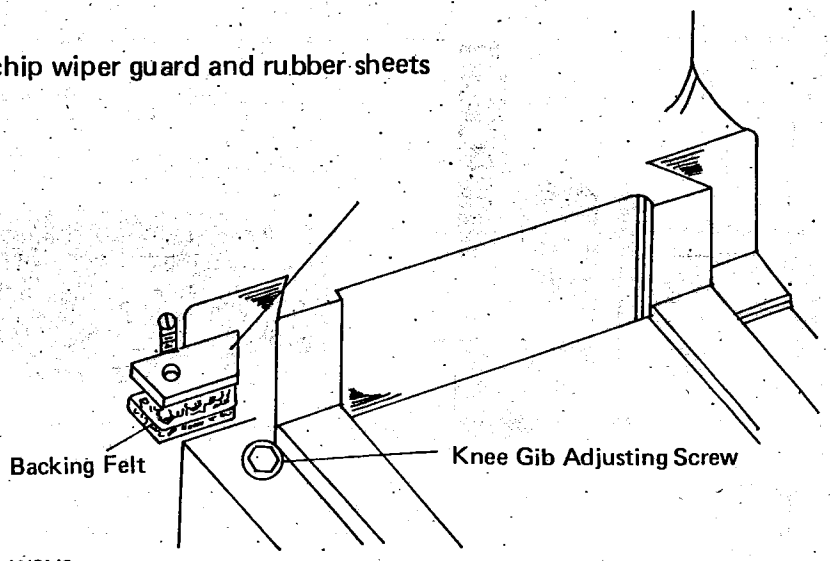




Thirteen, Gip Strip Adjustment

1. Table-saddle ways
   1) Remove all swarf from area
   2) Turn the table gib screw clockwise whilst moving the table until slight drag is felt

2. Saddle-knee ways
   1) Remove all swarf from area
   2) Remove chip wiper guard and rubber sheets
   3) Turn the gib adjusting screw clockwise whilst moving the saddle until slight drag is felt
   4) Replace chip wiper guard and rubber sheets



3. Knee-column ways
   1) Remove all swarf from area
   2) Remove the leftside chip wiper guard and rubber sheet
   3) Turn the knee gib adjusting screw clockwise whilst moving knee until slight drag is felt
   4) Replace chip wiper guard and rubber sheet

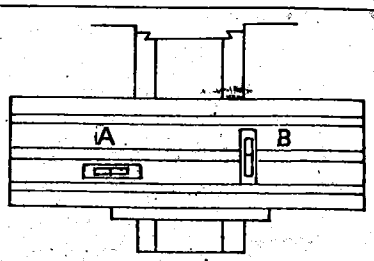
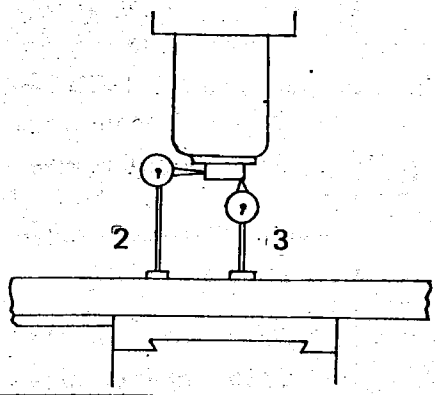
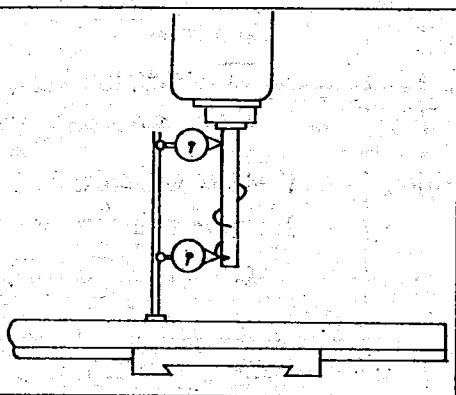
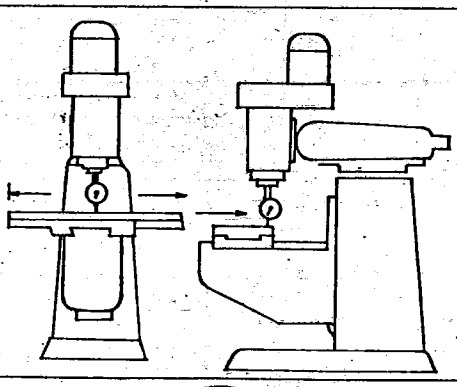
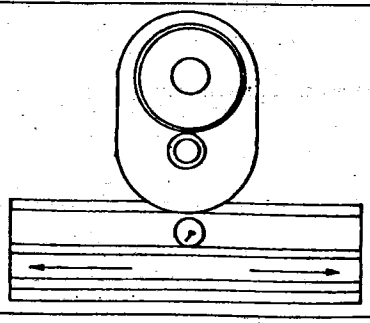
NOTE: For adjustment as mentioned above 1,2 and 3 ways, each gib has 2pcs adjusting screw (one in front, another rear), turn one clockwise whilst turning another one counterclockwise. After adjustment, check these 2pcs screw been tightened.

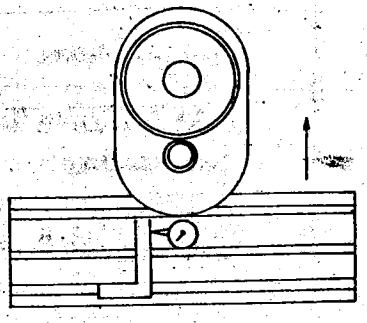
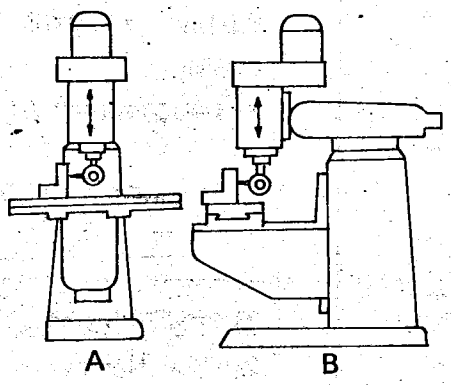
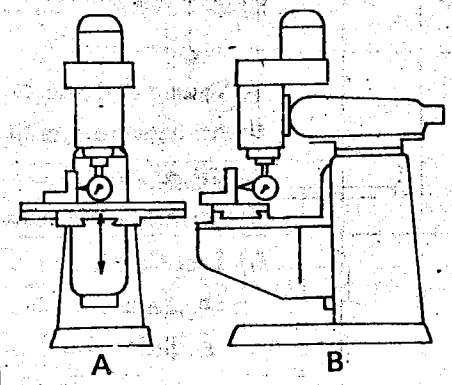
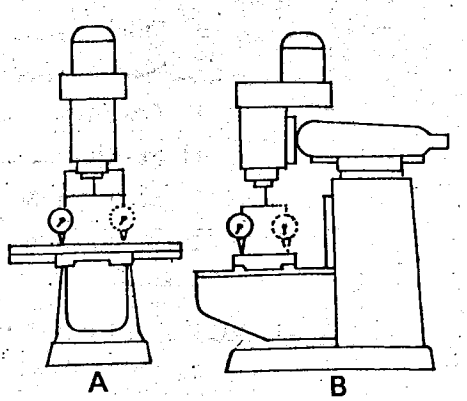
TROUBLE SHOOTING

The following chart contains some typical probable troubles in operation along with the possible cause and remadies for each

Phenomena	Possible causes	Remady
Spindle feed un-normal	Quill clamp lever unrelease	Release clamp lever
Spindle brake break-down	Brake shoe worn out	Replace new one
Spindle unrotate	1. Switch contact unsure 2. Drive belt too slack 3. Motor breaks down	1. Check the switch 2. Adjust or replace 3. Repair or renew
Incorrect rotation	The switch knob indicated at wrong position	Correct position
Unsmooth on table vertical, cross and longitudinal feed	1. Gib strip too tight 2. Unproper backlash on screws 3. Lubricaten not to lubrication point	1. Release 2. Adjust 3. Check lubrication
Vibrative when Machining	1. Machine unstable 2. Unsuitable cutting condition	1. Reclamp 2. Select proper cutting speed according to materials and cutter

Inspection Chart

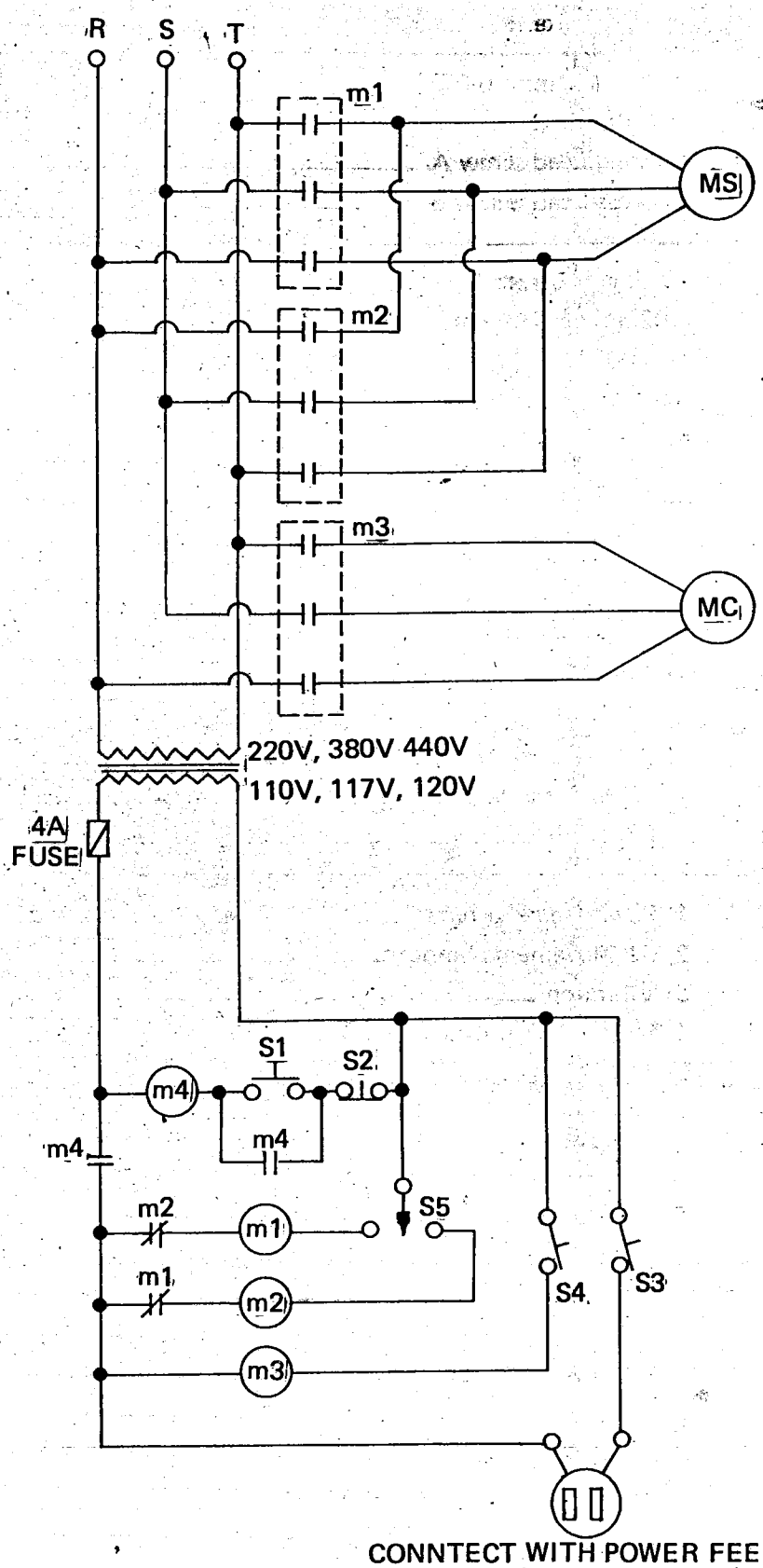
No.	Check taken	Illustration	Permissible Errors.	Errors Found
1	a) Level longitudinally (spirit level) b) Level across (spirit level)		a) 0.06 per 1000mm b) 0.06 per 1000mm	
2	Spindle Nose Run-Out		0.01	
3	Spindle for axial slip in machines		0.015	
4	Internal taper of spindle runs true: a) Nearest to spindle nose b) At a distance of 300mm		0.01 0.02	
5	Rise and fall of table in longitudinal traverse.		0.03 per 1000 mm	
6	Table surfare parallelity to its cross traverse.		0.02 per 300mm	
7	Parallelity of clamping slots to table traverse		0.03 per 1000mm	

8	Clamping slots at right angles to table cross traverse.		0.02 per 300mm.	
9	Vertical adjustment of Spindle slide square with work table a) Right and Left Direction b) Forward and Backward Direction		0.025 per 300mm. 0.025 per 300mm.	
10	Column ways for knee square with work table a) Right and Left Direction b) Forward and Backward Direction		0.02 per 300mm. 0.02 per 300mm.	
11	Work table square with spindle a) Right and Left Direction b) Forward and Backward Direction		0.02 per 300mm. 0.02 per 300mm.	

Inspection Chart

No.		Items
12	Backlash-Read on Dials	MAX 0.127mm (0.005") Test Readings: A. Long.Lead screw A. _____ B. Cross Lead Screw B. _____
13	Leadscrews:	Maximum Error: 0.02mm per 300mm or 0.008" per 12" 0.04mm or 0.0016" Total overall A. Longitudinal: At 300mm(12") _____ Overall _____ B. Transverse: At 300mm (12") _____ Overall _____
14	Manual	1) Gibs Adjusted _____ 2) Quill Tight _____ 3) Spindle Backlash _____ 4) All Movements Smooth _____ 5) Collet Fit _____
15	Power	1) Powerfeed kickouts _____ 2) All Movements Smooth _____ 3) Vibration _____ 4) Sound (73DB max.) _____ 5) Test Cuts _____ A. Face _____ B. Side _____
16	Visual	1) Finishes _____ A. Paint _____ B. Machined _____ C. Chrome _____ D. Plastic _____ E. Black Oxide _____ 2) Rust proofing _____
17	Electrical	Voltage for which Motors. _____ Connected _____ Head _____ Powerfeed _____ Coolant pump _____

ELECTRIC CIRCUIT DIAGRAM



CONNTECT WITH POWER FEED

MS : SPINDLE MOTOR
MC : COOLANT PUMP
M1, M2: CONTACTORS OF "MS"
M3 : CONTACTOR OF "MC"
M4 : CONTACTOR POWER SOURCE
S1, S2: PUSH-BUTTON "ON" "OFF" OF POWER SOURCE
S3 : SELECTOR SWITCH FOR CONTROLLING TABLE POWER FEED MOTOR
S4 : SELECTOR SWITCH FOR CONTROLLING "MC"
S5 : SELECTOR SWITCH FOR CONTROLLING "MS" DIRECTION

CONNECT WITH SERVO MOTOR PLEASE REFER TO DINENSION DRAWING