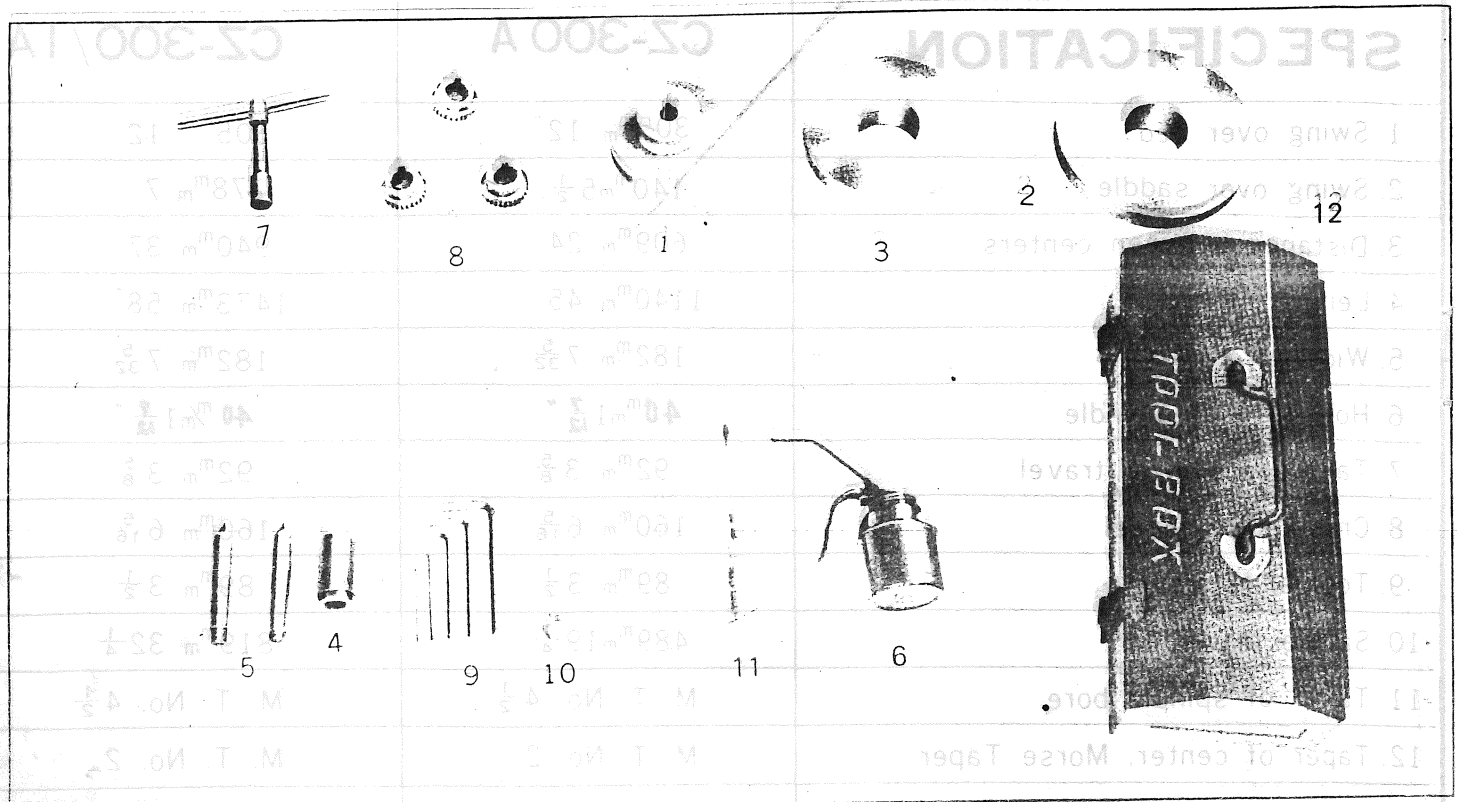


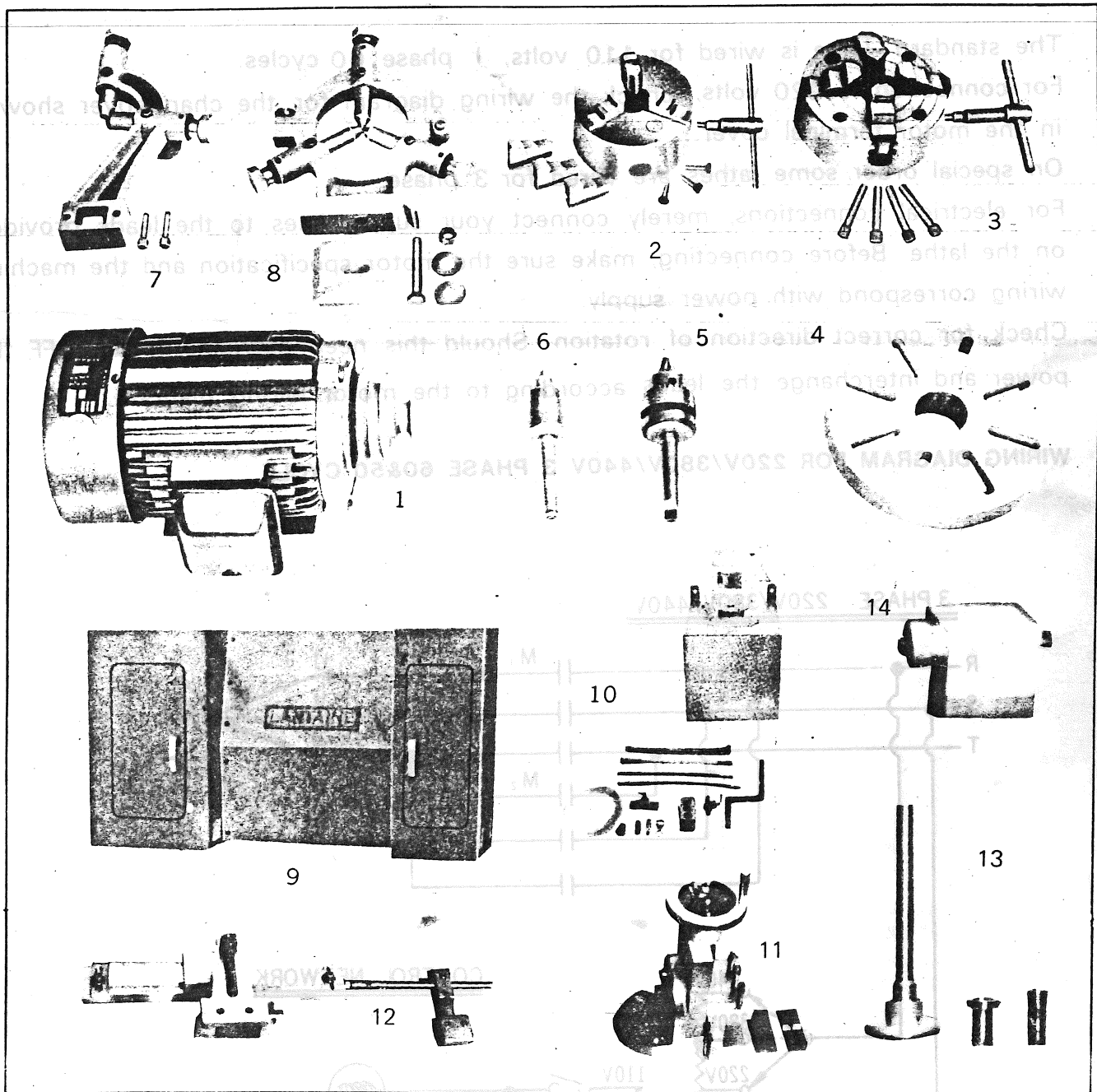
SPECIFICATION	CZ-300 A	CZ-300/1A
1. Swing over bed	305 <sup>m</sup> 12"	305 12"
2. Swing over saddle	140 <sup>m</sup> 5 $\frac{1}{2}$ "	178 <sup>m</sup> 7"
3. Distance between centers	609 <sup>m</sup> 24"	940 <sup>m</sup> 37"
4. Length of bed	1140 <sup>m</sup> 45"	1473 <sup>m</sup> 58"
5. Width of bed	182 <sup>m</sup> 7 $\frac{5}{32}$ "	182 <sup>m</sup> 7 $\frac{5}{32}$ "
6. Hole through spindle	40 <sup>m</sup> 1 $\frac{7}{16}$ "	40 <sup>m</sup> 1 $\frac{7}{16}$ "
7. Tailstock spindle travel	92 <sup>m</sup> 3 $\frac{5}{8}$ "	92 <sup>m</sup> 3 $\frac{5}{8}$ "
8. Cross slide travel	160 <sup>m</sup> 6 $\frac{5}{16}$ "	160 <sup>m</sup> 6 $\frac{5}{16}$ "
9. Tool slide travel	89 <sup>m</sup> 3 $\frac{1}{2}$ "	89 <sup>m</sup> 3 $\frac{1}{2}$ "
10. Saddle travel	489 <sup>m</sup> 19 $\frac{1}{4}$ "	819 <sup>m</sup> 32 $\frac{1}{4}$ "
11. Taper of spindle bore	M. T. No. 4 $\frac{1}{2}$	M. T. No. 4 $\frac{1}{2}$
12. Taper of center, Morse Taper	M. T. No. 2	M. T. No. 2
13. Range of spindle speeds	60 ~ 12 Changes, 50-1200 R. P. M.	60 ~ 12 Changes, 50-1200 R. P. M.
14. Lead screw diameter	19 <sup>m</sup> $\frac{3}{4}$ "	22 <sup>m</sup> $\frac{7}{8}$ "
15. Feed Rod diameter	16 <sup>m</sup> $\frac{5}{8}$ "	19 <sup>m</sup> $\frac{3}{4}$ "
16. Threads per inch of lead screw	8 T. P. I.	8 T. P. I.
17. Thread can be cut	<sup>m</sup> 24Kinds 0.5-15 inch 50 Kinds 4-112T:P.I.	<sup>m</sup> 24Kinds 0.5-15 inch 50 Kinds 4-112T:P.I.
18. Motor horse power	1HP	1HP
19. Net weight without attached stand (approx)	573.3 260 Kg x 2.205	APT 595.35 280 Kg
20. Net weight with attached floor stand (approx)	350 Kg	APT 595.35 370 Kg
21. Packing size (without attached stand)	56" × 36" × 32"	70" × 36" × 32"
22. Packing size (with attached floor stand) approx	56" × 36" × 56"	70" × 36" × 56"

# STANDARD ACCESSORIES



1. Motor pulley	1Pc
2. Back plate 6 $\frac{1}{2}$ "	1Pc
3. Back plate 5 $\frac{1}{2}$ "	1Pc
4. Center sleeve (M.T. 4 $\frac{1}{2}$ " #)	1Pc
5. Center (M.T. 2")	2Pc
6. Oil gun	1Pc
7. Toolpost wrench	1Pc
8. Change gear (30, 32, 46)	3Pc
9. Allen wrench	1Set
10. Wrench opening	1Set
11. Screw drivers	1Pc
12. Tool-Box	1Pc

# SPECIAL ACCESSORIES



- 1. Motor 1HP 1ph . . . . . 1pc
- Motor 1HP 3ph . . . . . 1pc
- 2. 3-Jaw chuck 5" . . . . . 1pc
- 3-Jaw chuck 6" . . . . . 1pc
- 3. 4-Jaw chuck 6" . . . . . 1pc
- 4-Jaw chuck 8" . . . . . 1pc
- 4. Face Plate 8" . . . . . 1pc
- Face Plate 10" . . . . . 1pc
- 5. Drilling chuck 1/2" . . . . . 1pc
- 6. Rolling center M.T.No.2. . . . . 1pc

- 7. Follow rest . . . . . 1pc
- 8. Steady rest . . . . . 1pc
- 9. Floor stand 26" . . . . . 1pc
- Floor stand 30" . . . . . 1pc
- 10. Cooling pump system . . . . . 1pc
- 11. Milling attachment . . . . . 1set
- 12. Taper attachment . . . . . 1set
- 13. 5C collet chuck . . . . . 1set
- 14. Micro-stop . . . . . 1set

# ELECTRICAL

The standard lathe is wired for 110 volts, 1 phase 60 cycles.

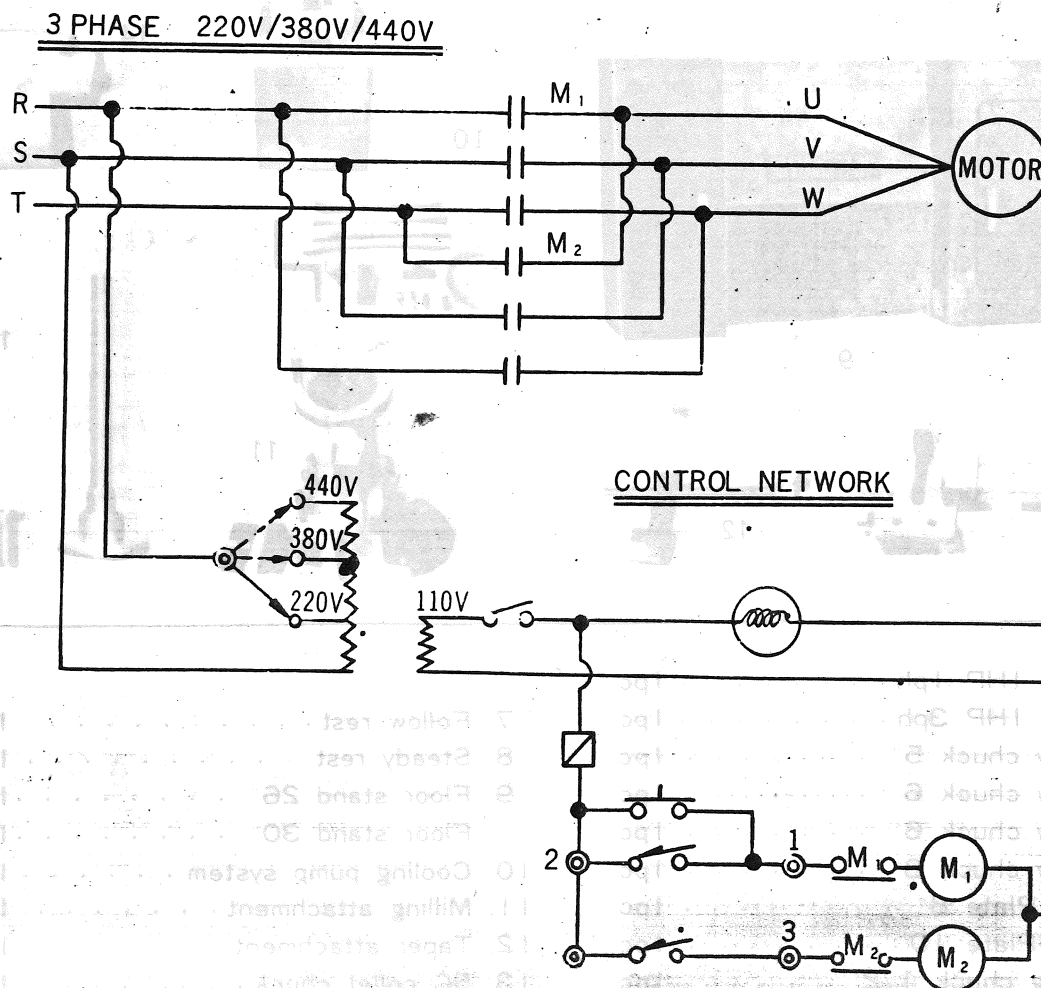
For connection to 220 volts, check the wiring diagram for the changeover shown in the motor terminal cover.

On special order, some lathes are wired for 3 phase.

For electrical connections, merely connect your supply lines to the leads provided on the lathe. Before connecting, make sure the motor specification and the machine wiring correspond with power supply.

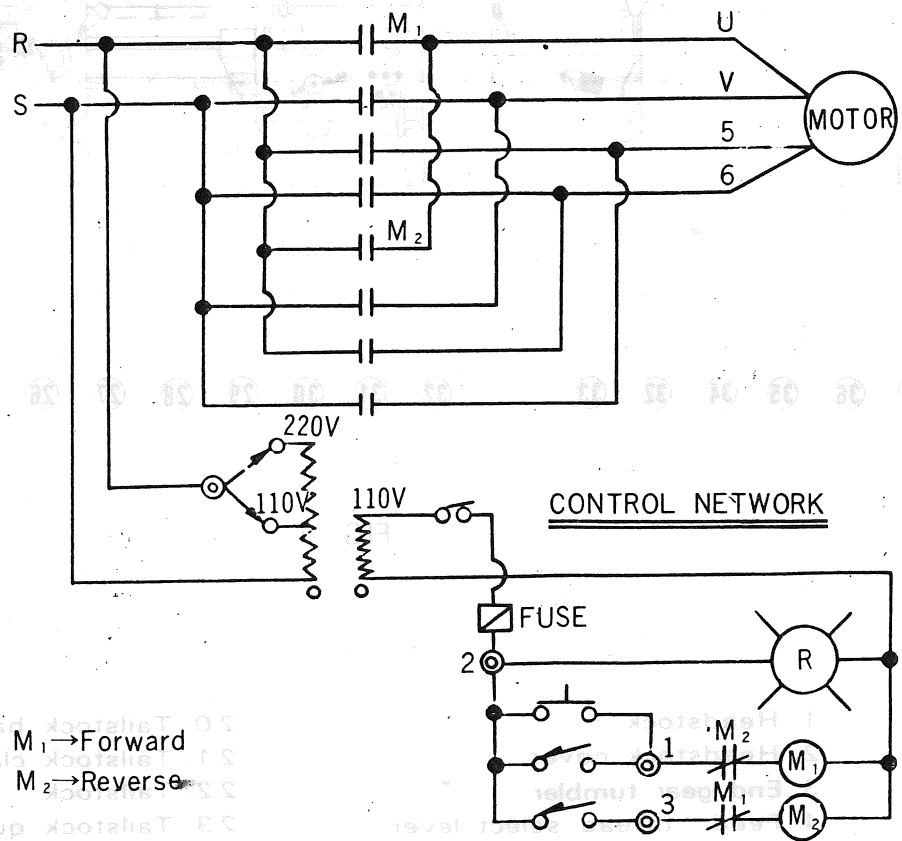
Check for correct direction of rotation. Should this need correction, turn OFF the power and interchange the leads according to the motor wiring diagram.

## WIRING DIAGRAM FOR 220V/380V/440V 3 PHASE 60&50 CYCLE



# WIRING DIAGRAM FOR 110V/220V 1 PHASE 60&50 CYCLE

1PHASE 110V/220V



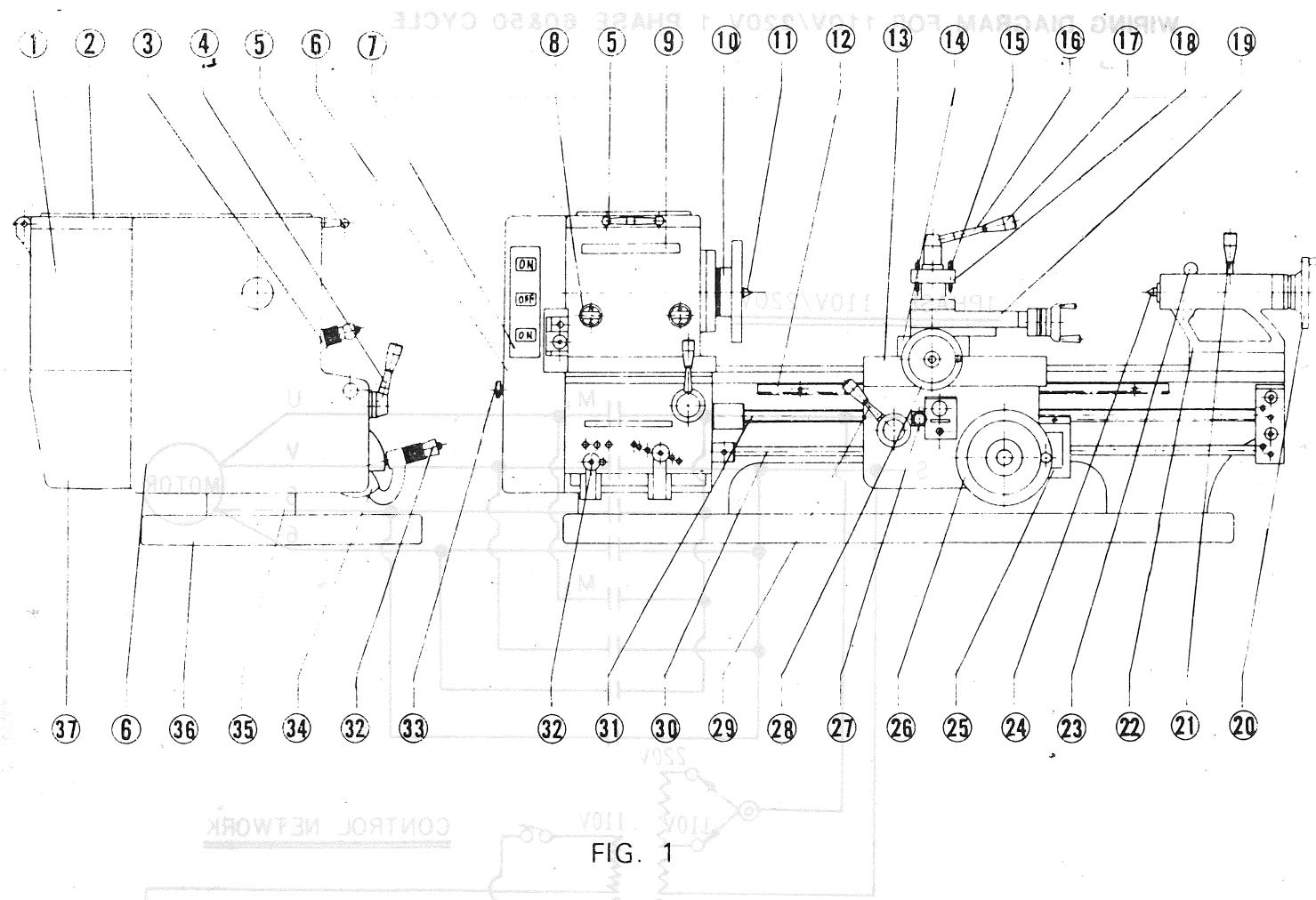


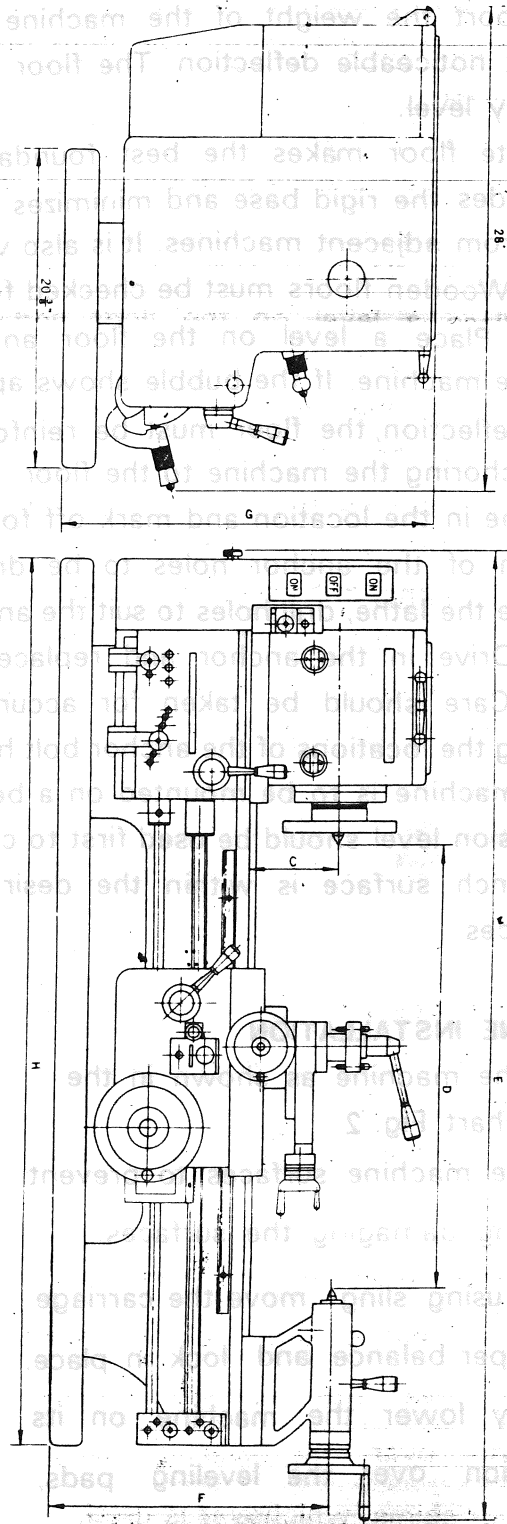
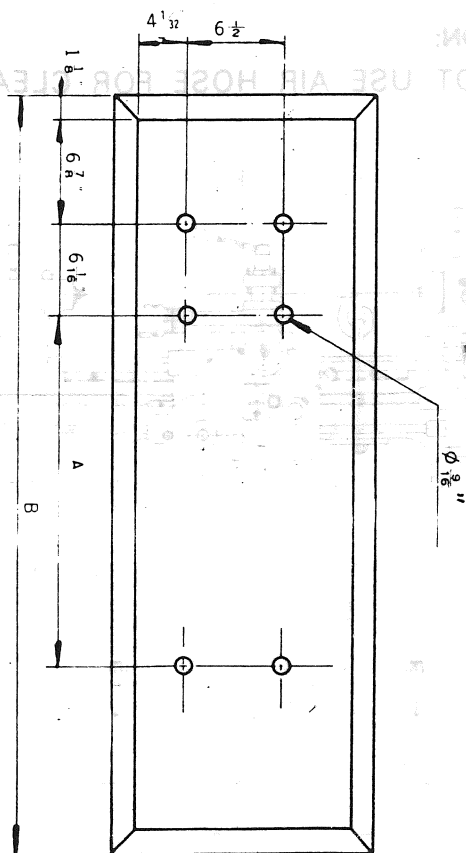
FIG. 1

1. Headstock
2. Headstock cover
3. End gear tumbler
4. Feed thread select lever
5. Headstock cover lever
6. End cover
7. Switch
8. Oil sight glass
9. Name plate
10. Face plate
11. Center
12. Rack
13. Saddle
14. Cross slide
15. Locking bolt
16. Toolpost clamping lever
17. Toolpost clamping lever of knob
18. Tool post
19. Compound slide

20. Tailstock handwheel
21. Tailstock clamping lever
22. Tailstock
23. Tailstock quill lock lever
24. Center
25. Threading DIAL
26. Carriage handwheel
27. Cross longitudinal feed lever
28. Cross slide handwheel
29. Half nut lever
30. Feed rod
31. Leadscrew
32. Tumbler lever
33. Knob
34. Gripper seat
35. Bed
36. Chip pan
37. Motor cover

# GENERAL DIMENSIONS

	CZ 300A	CZ300/1A
A	28 $\frac{3}{16}$ "	39 $\frac{1}{2}$ "
B	51 $\frac{3}{4}$ "	63"
C	5"	6"
D	24"	37"
E	53 $\frac{1}{8}$ "	66 $\frac{1}{4}$ "
F	15 $\frac{5}{8}$ "	16 $\frac{5}{8}$ "
G	22 $\frac{1}{2}$ "	23 $\frac{1}{2}$ "
H	51 $\frac{3}{4}$ "	64 $\frac{7}{8}$ "



# INSTALLATION

## FOUNDATION

The foundation must be solid and heavy enough to support the weight of the machine and without noticeable deflection. The floor must be fairly level.

Concrete floor makes the best foundation. It provides the rigid base and minimizes vibration from adjacent machines. It is also very stable. Wooden floors must be checked for strength. Place a level on the floor and lower the machine. If the bubble shows appreciable deflection, the floor must be reinforced. For anchoring the machine to the floor, place the lathe in the location and mark off for the location of the anchor holes to be drilled. Remove the lathe, drill holes to suit the anchor bolts. Drive in the anchor and replace the lathe. Care should be taken for accurately marking the locations of the anchor bolt holes. If the machine is to be mounted on a bench, a precision level should be used first to check the bench surface is within the desirable tolerances.

## MACHINE INSTALLATION

Sling the machine as shown in the sling chart Fig. 2

Pad the machine surfaces to prevent the sling damaging the surfaces.

When using sling move the carriage for proper balance and lock in place. Carefully lower the machine on its foundation over the leveling pads, wedges, or shims, whichever is used.

## CLEANING

Prior to shipment all machined and finished surfaces are coated to prevent rusting. Before moving the carriage or tailstock, use clean solvent to remove the rust preventive coating. For cleaning the leadscrew, rack, feedrod, etc., use brush and solvent. After thorough cleaning, lubricate the ways with way lube. Move the carriage and tailstock in any one direction approximately 1 inch, clean the ways for any residue of rust preventive coating. Move the other way approximately the same distance and repeat the process. Such care in the cleaning will ensure the removal of any foreign particles and prevent the ways from scoring.

## CAUTION:

DO NOT USE AIR HOSE FOR CLEANING.

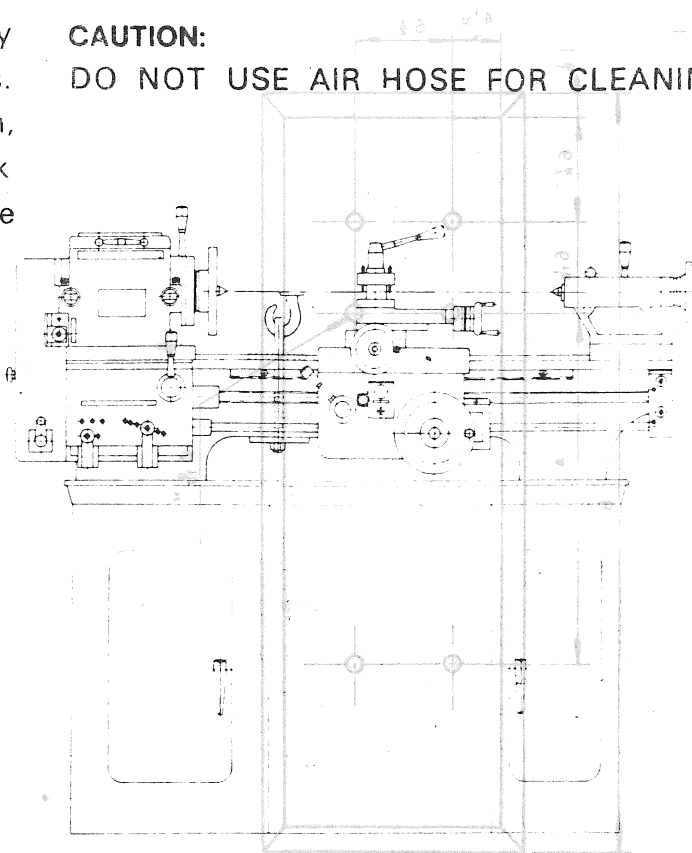


FIG 2

# LEVELING

## LEVELING OF THE LATHE

The lathe should be kept perfectly level at all times.

### Leveling Procedure

Clean the bedways thoroughly and make sure the bedways are dry after cleaning. Back off all leveling screws so the base is sitting on the floor.

Place a 6" precision machinist spirit level over a parallel if the level used has a V-base. Now place the level with the base on the front flat way. If the base of the level is flat, it can then be directly placed on the flat way.

Place the level lengthwise at the headstock end and level for a zero reading.

Move the level to the tailstock end and adjust the outer end leveling screws to obtain same reading as on the headstock end.

Now place the level over a bridge across at the headstock end, take a reading and move the level to the tailstock end. The reading at this end must be exactly the same as the other end. No twist is permissible.

Make adjustments to get the same reading at both ends.

It will be necessary to repeat this procedure several times, making necessary adjustments. You will find that the adjustments at one end will affect the reading of the other. After the end leveling screw adjustments are complete, turn down the center leveling screws at the headstock end until they rest under slight tension. The tension should be such that it does not change the level reading.

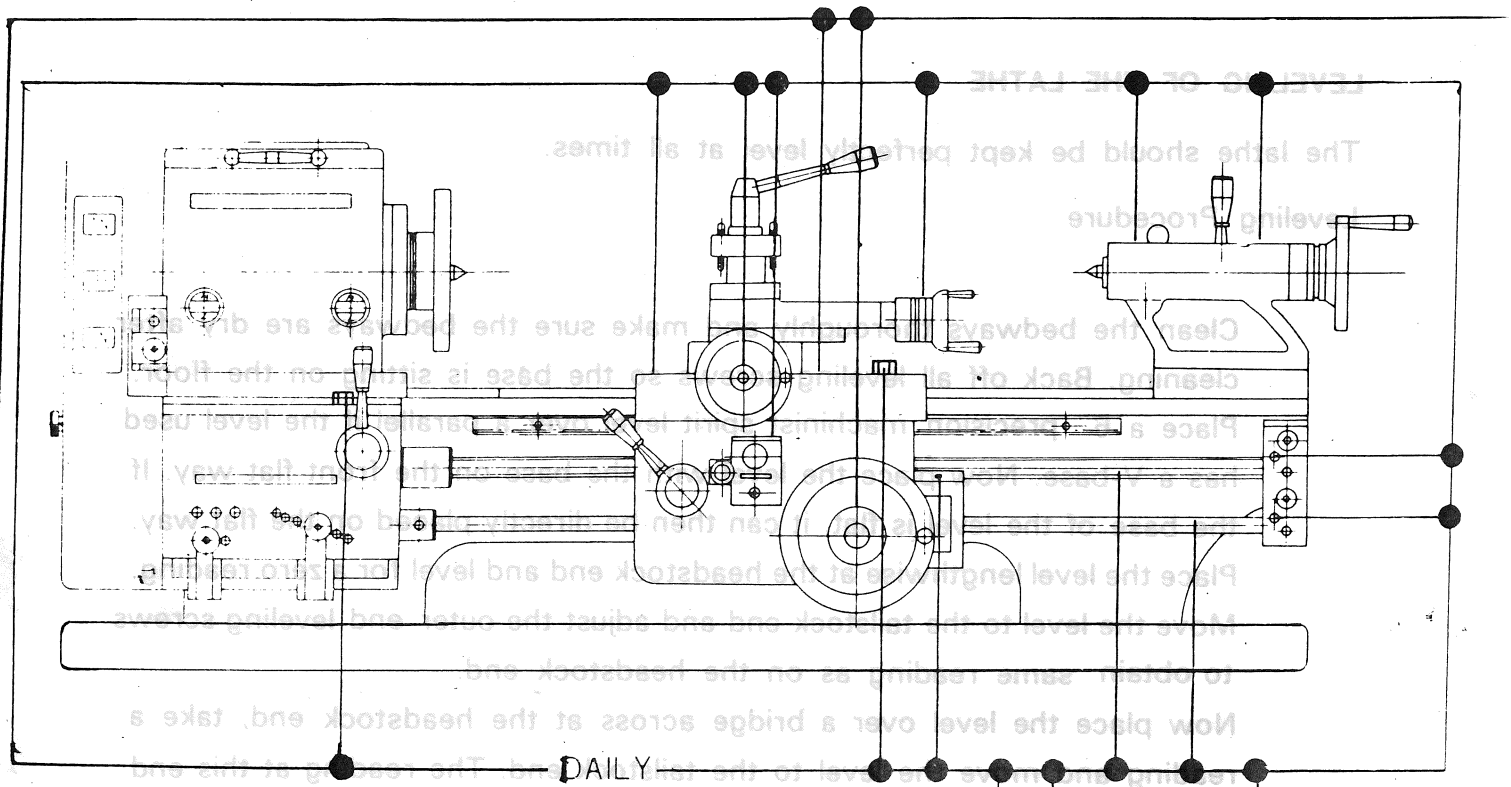
Recheck level at this time and make only minor adjustment, if necessary.

After the machine has been put to use for a period of time, check level to observe if the original condition exists. Make adjustments if necessary.

(MARK ONE END OF THE LEVEL WITH A ERASABLE MARKER SO THAT THE LEVEL POINTS IN THE SAME DIRECTION FOR EVERY READING.)

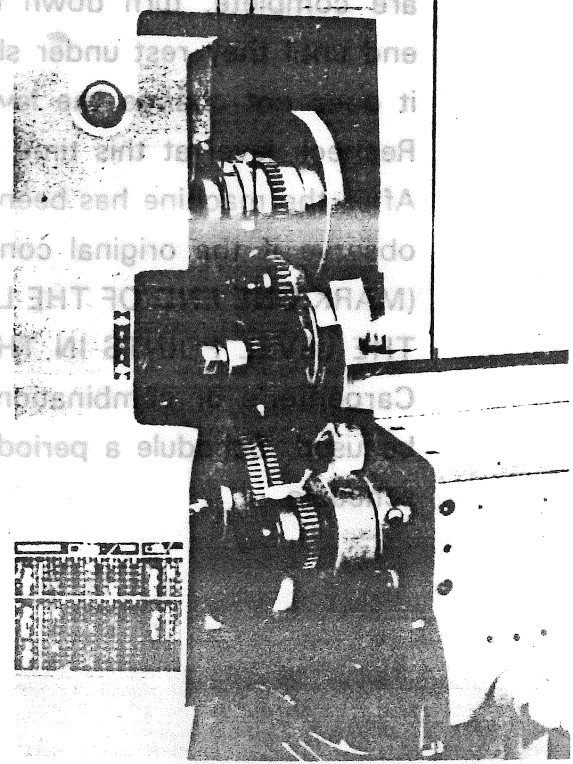
Carpenter's or combination square level are not accurate and must not be used. Schedule a periodic level check as a part of your maintenance schedule.

# LUBRICATION CHART



DAILY

WEEKLY



# OPERATING INSTRUCTIONS

MAIN SPINDLE ROTATION

Do not operate the lathe until you are thoroughly familiar with all the controls and their functions.

Check oil levels and lubricate all sliding and rotating parts. See lubrication chart for grade of oil to be used and the lubrication.

## HEADSTOCK

The machine is equipped with a belt from the motor to the spindle pulley. The tension of the belt has been factory adjusted. It is advisable to check the tension before starting machine. The belt should depress about 1/2 inch by normal finger pressure. Tight belt will ruin the bearings. Adjust the tension, if necessary.

The bearings are lubricated by grease. The spindle and the gears are lubricated by splash. It is important that sufficient level of oil in the headstock is maintained at all times.

FIG. 4

The headstock is constructed by gears, provided speeds from 64 to 1200

R.P.M. as shown in Fig. 2.

Caution: speed changing can be made only when motor is completely stopped.

Fig. 2

△△△	△△△	△△△	△△△	△△△	△△△	△△△	△△△	△△△
64	130	210	280	400	500	640	1200	1500

# OPERATING INSTRUCTIONS

## MAIN SPINDLE ROTATION

Starting and stopping of spindle can be made merely by the starting lever (a). Move the starting lever (a) up the spindle will be forward rotation, starting lever (a) down the spindle will be reverse rotation as shown in Fig. 4.

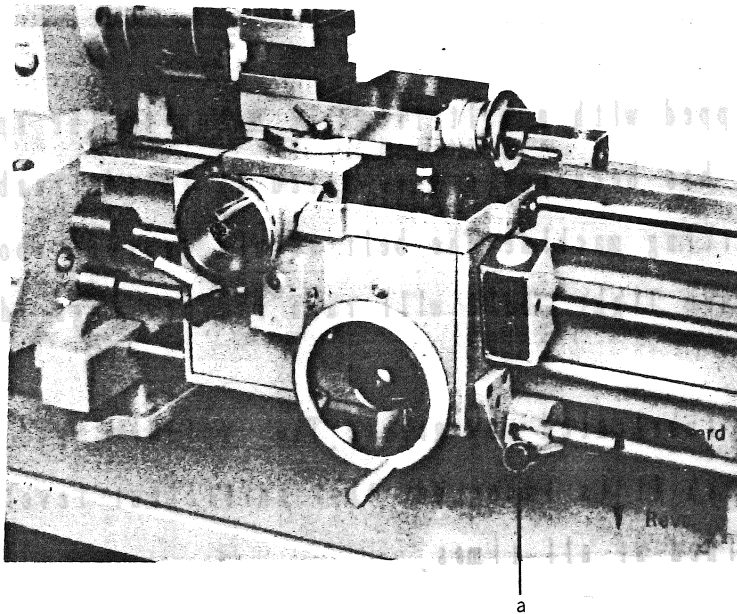


FIG. 4

The headstock is constructed by gears, provided 9 speeds from 64 to 1500 R.P.M. as shown in Fig. 5.

Caution: speed changing can be made only when motor is completely stopped.

Fig. 5

△ △	△ △	▷ △	▷ △	△ △	△ △	△ ▷	▷ ▷	△ ▷
1500	1300	940	790	460	380	210	130	64

## QUICK CHANGE GEAR BOX (FIG. 5)

The quick change gear mechanism determines the rate of rotation of the lead screw and the feedrod in relation to the spindle speeds for threading, turning and facing operations. This quick change gear box is controlled by moving the two tumbler levers. Lever "A" has five positions, while lever "B" eight positions as shown in Fig. 6

When cutting inch threads, move the two tumbler levers to the desired position according to the inch thread cutting chart on the name plate. See Fig. 7

If you want cutting ( $5 \frac{3}{4}$ ,  $11 \frac{1}{2}$ , 23, 46, 92,  $3 \frac{3}{4}$ ,  $7 \frac{1}{2}$ , 15, 30, 60.) threads move the two tumbler levers to the desired position according to the m/m thread cutting chart on the name plate see Fig. 10

WHEN CUTTING METRIC THREADS, CONSULT THE METRIC THREAD CUTTING CHART OUTSIDE OF HEADSTOCK END COVER. THE HALF-NUTS MUST REMAIN ENGAGED WITH THE LEADSCREW UNTIL THE THREAD CUTTING PROCESS IS COMPLETE. THE TOOL IS WITHDRAWN FROM THE WORK AT THE END OF THE CUT AND THE MOTOR IS REVERSED, BRINGING THE TOOL BACK TO THE START FOR SUCCESSIVE CUTS.

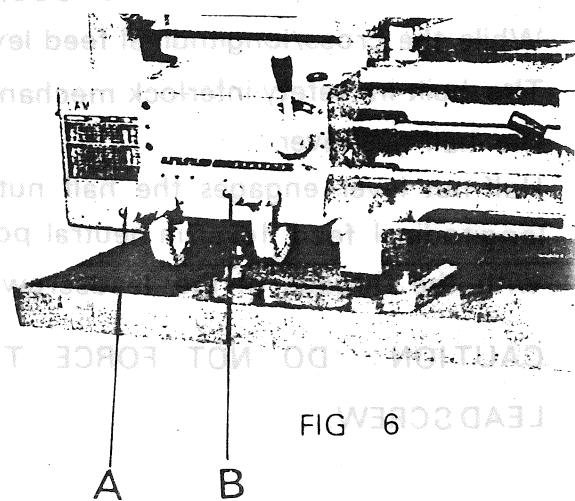


FIG. 6

THREADING	INCH								40T 127T
	1	2	3	4	5	6	7	8	
A	4	4½	4¾	5	5½	6	6½	7	
B	8	9	9½	10	11	12	13	14	
C	16	18	19	20	22	24	26	28	
D	32	36	38	40	44	48	52	56	120T
E	64	72	76	80	88	96	104	112	40T

Feed Rod 2 - Hand Wheel On The Left

Feeding	INCHES							
	1	2	3	4	5	6	7	8
A	0.1321	0.1175	0.1031	0.0886	0.0740	0.0612	0.0544	0.0475
B	0.0660	0.0588	0.0515	0.0442	0.0370	0.0300	0.0234	0.0168
C	0.0330	0.0294	0.0257	0.0221	0.0184	0.0150	0.0117	0.0084
D	0.0165	0.0147	0.0129	0.0110	0.0092	0.0075	0.0059	0.0042
E	0.0082	0.0074	0.0064	0.0055	0.0046	0.0038	0.0030	0.0021

Feed Rod 2 - Hand Wheel On The Right

Feeding	INCHES							
	1	2	3	4	5	6	7	8
A	0.0822	0.0730	0.0642	0.0558	0.0474	0.0390	0.0312	0.0234
B	0.0411	0.0365	0.0321	0.0279	0.0234	0.0190	0.0153	0.0117
C	0.0205	0.0183	0.0161	0.0140	0.0117	0.0095	0.0074	0.0059
D	0.0103	0.0091	0.0081	0.0070	0.0059	0.0049	0.0039	0.0030
E	0.0051	0.0046	0.0040	0.0035	0.0030	0.0025	0.0020	0.0015

Feeding	INCHES							
	1	2	3	4	5	6	7	8
A	0.1181	0.1050	0.0923	0.0794	0.0669	0.0544	0.0426	0.0304
B	0.0590	0.0525	0.0461	0.0397	0.0333	0.0269	0.0205	0.0141
C	0.0295	0.0262	0.0228	0.0194	0.0160	0.0126	0.0092	0.0059
D	0.0148	0.0131	0.0112	0.0095	0.0078	0.0063	0.0049	0.0034
E	0.0074	0.0066	0.0056	0.0047	0.0039	0.0031	0.0024	0.0017

Feeding	INCHES							
	1	2	3	4	5	6	7	8
A	0.0919	0.0816	0.0713	0.0617	0.0521	0.0426	0.0333	0.0234
B	0.0459	0.0408	0.0357	0.0306	0.0255	0.0205	0.0153	0.0103
C	0.0229	0.0204	0.0179	0.0153	0.0126	0.0103	0.0074	0.0051
D	0.0115	0.0102	0.0089	0.0076	0.0063	0.0051	0.0039	0.0028
E	0.0057	0.0051	0.0044	0.0038	0.0031	0.0025	0.0019	0.0014

FIG. 7

CAUTION: "DO NOT CHANGE GEARS WHEN THE SPINDLE IS RUNNING"

## CARRIAGE

The function of the carriage is to rigidly support the cutting tool and move it along or across the bed for turning, facing, boring or threading operations.

## POWER FEED

For Longitudinal power feed pull up the cross/longitudinal feed lever.

The direction of the carriage traverse is selected from the headstock.

For cross feed push down CROSS/LONGITUDINAL feed lever.

While the cross/longitudinal feed lever is in position, the half-nut lever cannot be engaged

The built-in safety interlock mechanism will prevent simultaneous engagement of this lever and the half-nut lever

Half-nut lever engages the half nuts with the lead screw for threading. To engage, put cross/longitudinal feed lever in neutral position and engage the half-nut lever downwards in mesh with the threads of the leadscrew.

**CAUTION: DO NOT FORCE THE HALF-NUT LEVER WHILE ENGAGING WITH THE LEADSCREW.**

## THREADING DIAL

The threading dial is located on the right side of the apron. It performs the important function of indicating the proper time to engage the half-nut lever so that the tool will enter the same

groove of the thread on each successive cut. The dial is marked with lines numbered 1, 2, 3, 4, and in between are lines with no numbers. These are half lines and are called unnumbered lines. The dial when engaged with the leadscrew will cause the rotation of the dial. A single line is marked on the housing of the threading dial (fixed line).

The instruction plate riveted on the threading dial shows the selection and sequence of matching the revolving lines with the fixed line. (Fig.8)

For thread cutting engage the half-nuts at the appropriate numbers shown on the scale column of the threading dial plate. 1-4 on the scale means, the half-nuts can be engaged on any of the numbered lines 1-2-3-4 for each successive cut.

If the numbered lines are used for the first cut, for successive cuts only numbered lines must be used.

1-3 on the scale means the half-nuts can be engaged on 1 and 3 or 2 and 4 for successive cuts.

1-8 on the scale means the half-nuts can be engaged on any line, numbered or unnumbered.

## THREAD DIAL PLATE

INDICATOR TABLE					
T.P.I.	SCALE	T.P.I.	SCALE	T.P.I.	SCALE
4	1-4	12	1-4	38	$\frac{13}{24}$
4 $\frac{1}{2}$	/	13	1	40	1-8
4 $\frac{2}{3}$	/	14	$\frac{11}{24}$	44	1-4
5	1	16	1-8	48	1-8
5 $\frac{1}{2}$	/	18	$\frac{13}{24}$	52	1-4
6	$\frac{13}{24}$	19	1	56	1-8
6 $\frac{1}{2}$	/	20	1-4	64	1-8
7	1-4	22	$\frac{11}{24}$	72	1-8
8	1-8	24	1-8	76	1-4
9	1	26	$\frac{13}{24}$	80	1-8
9 $\frac{1}{2}$	/	28	1-4	96	1-8
10	$\frac{13}{24}$	32	1-8	104	1-8
11	1	36	$\frac{13}{24}$	112	1-8

FIG. 8

FOUR POSITION TOOL POST

By turning the tool post lock handle counter clockwise, the tool can be rapidly indexed and locked in position.

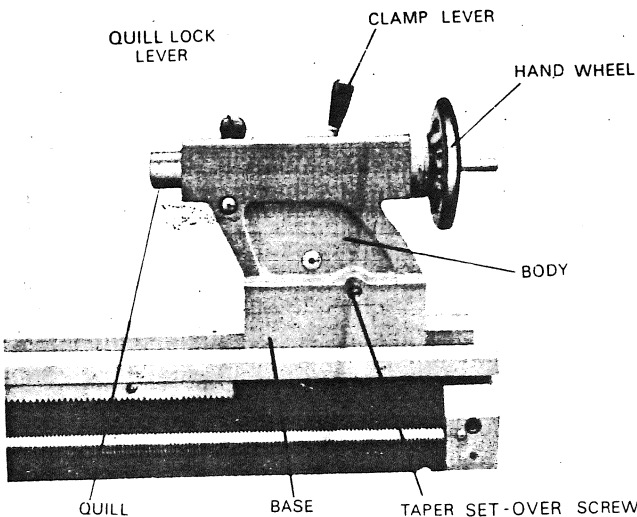



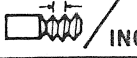
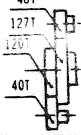
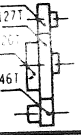
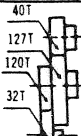
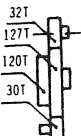
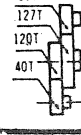
FIG. 9

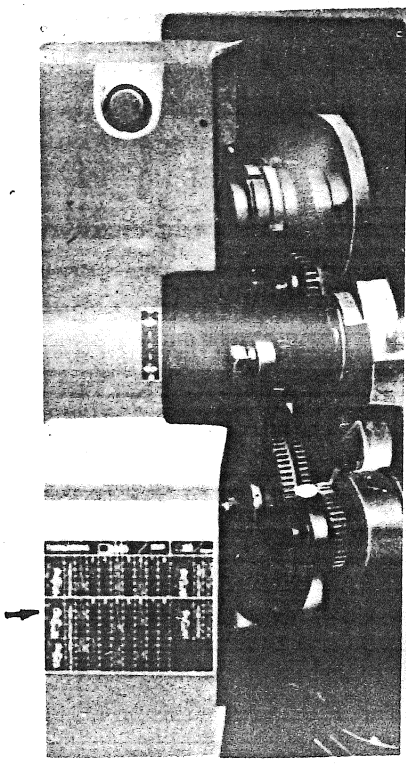
TAILSTOCK

The tailstock slides along the bedways and may be anchored in any position by moving the clamp lever.

To slide the quill, rotate the tailstock handwheel. The quill can be locked by the quill lock lever. For small tapers, the tailstock can be set over by loosening the clamp lever and adjusting the SET OVER SCREWS on the front of and the rear of the tailstock base.

Table of thread cutting  
(screw pitch in m/m)

THREADING  / mm										 / INCH				
		1	2	3	4	5	6	7	8					1
	A	6			4.8		4				A	5 <sup>3</sup> / <sub>4</sub>		
	B	3			2.4		2				B	11 <sup>1</sup> / <sub>2</sub>		
	C	1.5			1.2		1				C	23		
	D	0.75			0.6		0.5				D	46		
	E				0.3		0.25				E	92		
	A	7.5			6		5				A	3 <sup>1</sup> / <sub>4</sub>		
	B	3.75			3		2.5				B	7 <sup>1</sup> / <sub>2</sub>		
	C	1.5			1.5		1.25				C	15		
	D				0.75						D	30		
	E										E	60		
	A	4.5	4				3							
	B	2.25	2		1.8		1.5							
	C		1		0.9		0.75							
	D		0.5		0.45									
	E		0.25											



\* The new operating manuals are ready for making.

FIG. 10

By turning the tool post lock handle counter clockwise, the tool can be rapidly indexed and locked in position.

#### FOUR POSITION TOOL POST

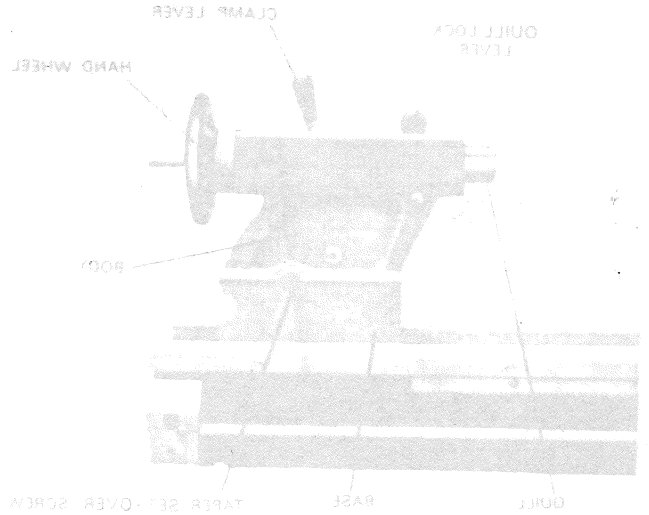




FIG. 9

#### TAILSTOCK

The tailstock slides along the bedways and may be anchored in any position by moving the clamp lever.

To slide the quill, rotate the tailstock handwheel. The quill can be locked by the quill lock lever. For small tapers, the tailstock can be set over by loosening the clamp lever and adjusting the SET OVER SCREWS on the front of and the rear of the tailstock base.

Table of thread cutting  
(screw pitch in m/m)

THREADING											
mm						INCH					
											
1	2	3	4	5	6	7	8	1	2	3	4
A 1.5	B 2.0	C 2.5	D 3.0	E 3.5				A 1.5	B 2.0	C 2.5	D 3.0
1.5	2.0	2.5	3.0	3.5				1.5	2.0	2.5	3.0
2.0	2.5	3.0	3.5	4.0				2.0	2.5	3.0	3.5
2.5	3.0	3.5	4.0	4.5				2.5	3.0	3.5	4.0
3.0	3.5	4.0	4.5	5.0				3.0	3.5	4.0	4.5
3.5	4.0	4.5	5.0	5.5				3.5	4.0	4.5	5.0
4.0	4.5	5.0	5.5	6.0				4.0	4.5	5.0	5.5
4.5	5.0	5.5	6.0	6.5				4.5	5.0	5.5	6.0
5.0	5.5	6.0	6.5	7.0				5.0	5.5	6.0	6.5
5.5	6.0	6.5	7.0	7.5				5.5	6.0	6.5	7.0
6.0	6.5	7.0	7.5	8.0				6.0	6.5	7.0	7.5
6.5	7.0	7.5	8.0	8.5				6.5	7.0	7.5	8.0
7.0	7.5	8.0	8.5	9.0				7.0	7.5	8.0	8.5
7.5	8.0	8.5	9.0	9.5				7.5	8.0	8.5	9.0
8.0	8.5	9.0	9.5	10.0				8.0	8.5	9.0	9.5
8.5	9.0	9.5	10.0	10.5				8.5	9.0	9.5	10.0
9.0	9.5	10.0	10.5	11.0				9.0	9.5	10.0	10.5
9.5	10.0	10.5	11.0	11.5				9.5	10.0	10.5	11.0
10.0	10.5	11.0	11.5	12.0				10.0	10.5	11.0	11.5
10.5	11.0	11.5	12.0	12.5				10.5	11.0	11.5	12.0
11.0	11.5	12.0	12.5	13.0				11.0	11.5	12.0	12.5
11.5	12.0	12.5	13.0	13.5				11.5	12.0	12.5	13.0
12.0	12.5	13.0	13.5	14.0				12.0	12.5	13.0	13.5
12.5	13.0	13.5	14.0	14.5				12.5	13.0	13.5	14.0
13.0	13.5	14.0	14.5	15.0				13.0	13.5	14.0	14.5
13.5	14.0	14.5	15.0	15.5				13.5	14.0	14.5	15.0
14.0	14.5	15.0	15.5	16.0				14.0	14.5	15.0	15.5
14.5	15.0	15.5	16.0	16.5				14.5	15.0	15.5	16.0
15.0	15.5	16.0	16.5	17.0				15.0	15.5	16.0	16.5
15.5	16.0	16.5	17.0	17.5				15.5	16.0	16.5	17.0
16.0	16.5	17.0	17.5	18.0				16.0	16.5	17.0	17.5
16.5	17.0	17.5	18.0	18.5				16.5	17.0	17.5	18.0
17.0	17.5	18.0	18.5	19.0				17.0	17.5	18.0	18.5
17.5	18.0	18.5	19.0	19.5				17.5	18.0	18.5	19.0
18.0	18.5	19.0	19.5	20.0				18.0	18.5	19.0	19.5
18.5	19.0	19.5	20.0	20.5				18.5	19.0	19.5	20.0
19.0	19.5	20.0	20.5	21.0				19.0	19.5	20.0	20.5
19.5	20.0	20.5	21.0	21.5				19.5	20.0	20.5	21.0
20.0	20.5	21.0	21.5	22.0				20.0	20.5	21.0	21.5
20.5	21.0	21.5	22.0	22.5				20.5	21.0	21.5	22.0
21.0	21.5	22.0	22.5	23.0				21.0	21.5	22.0	22.5
21.5	22.0	22.5	23.0	23.5				21.5	22.0	22.5	23.0
22.0	22.5	23.0	23.5	24.0				22.0	22.5	23.0	23.5
22.5	23.0	23.5	24.0	24.5				22.5	23.0	23.5	24.0
23.0	23.5	24.0	24.5	25.0				23.0	23.5	24.0	24.5
23.5	24.0	24.5	25.0	25.5				23.5	24.0	24.5	25.0
24.0	24.5	25.0	25.5	26.0				24.0	24.5	25.0	25.5
24.5	25.0	25.5	26.0	26.5				24.5	25.0	25.5	26.0
25.0	25.5	26.0	26.5	27.0				25.0	25.5	26.0	26.5
25.5	26.0	26.5	27.0	27.5				25.5	26.0	26.5	27.0
26.0	26.5	27.0	27.5	28.0				26.0	26.5	27.0	27.5
26.5	27.0	27.5	28.0	28.5				26.5	27.0	27.5	28.0
27.0	27.5	28.0	28.5	29.0				27.0	27.5	28.0	28.5
27.5	28.0	28.5	29.0	29.5				27.5	28.0	28.5	29.0
28.0	28.5	29.0	29.5	30.0				28.0	28.5	29.0	29.5
28.5	29.0	29.5	30.0	30.5				28.5	29.0	29.5	30.0
29.0	29.5	30.0	30.5	31.0				29.0	29.5	30.0	30.5
29.5	30.0	30.5	31.0	31.5				29.5	30.0	30.5	31.0
30.0	30.5	31.0	31.5	32.0				30.0	30.5	31.0	31.5
30.5	31.0	31.5	32.0	32.5				30.5	31.0	31.5	32.0
31.0	31.5	32.0	32.5	33.0				31.0	31.5	32.0	32.5
31.5	32.0	32.5	33.0	33.5				31.5	32.0	32.5	33.0
32.0	32.5	33.0	33.5	34.0				32.0	32.5	33.0	33.5
32.5	33.0	33.5	34.0	34.5				32.5	33.0	33.5	34.0
33.0	33.5	34.0	34.5	35.0				33.0	33.5	34.0	34.5
33.5	34.0	34.5	35.0	35.5				33.5	34.0	34.5	35.0
34.0	34.5	35.0	35.5	36.0				34.0	34.5	35.0	35.5
34.5	35.0	35.5	36.0	36.5				34.5	35.0	35.5	36.0
35.0	35.5	36.0	36.5	37.0				35.0	35.5	36.0	36.5
35.5	36.0	36.5	37.0	37.5				35.5	36.0	36.5	37.0
36.0	36.5	37.0	37.5	38.0				36.0	36.5	37.0	37.5
36.5	37.0	37.5	38.0	38.5				36.5	37.0	37.5	38.0
37.0	37.5	38.0	38.5	39.0				37.0	37.5	38.0	38.5
37.5	38.0	38.5	39.0	39.5				37.5	38.0	38.5	39.0
38.0	38.5	39.0	39.5	40.0				38.0	38.5	39.0	39.5
38.5	39.0	39.5	40.0	40.5				38.5	39.0	39.5	40.0
39.0	39.5	40.0	40.5	41.0				39.0	39.5	40.0	40.5
39.5	40.0	40.5	41.0	41.5				39.5	40.0	40.5	41.0
40.0	40.5	41.0	41.5	42.0				40.0	40.5	41.0	41.5
40.5	41.0	41.5	42.0	42.5				40.5	41.0	41.5	42.0
41.0	41.5	42.0	42.5	43.0				41.0	41.5	42.0	42.5
41.5	42.0	42.5	43.0	43.5				41.5	42.0	42.5	43.0
42.0	42.5	43.0	43.5	44.0				42.0	42.5	43.0	43.5
42.5	43.0	43.5	44.0	44.5				42.5	43.0	43.5	44.0
43.0	43.5	44.0	44.5	45.0				43.0	43.5	44.0	44.5
43.5	44.0	44.5	45.0	45.5				43.5	44.0	44.5	45.0
44.0	44.5	45.0	45.5	46.0				44.0	44.5	45.0	45.5
44.5	45.0	45.5	46.0	46.5				44.5	45.0	45.5	46.0
45.0	45.5	46.0	46.5	47.0				45.0	45.5	46.0	46.5
45.5	46.0	46.5	47.0	47.5				45.5	46.0	46.5	47.0
46.0	46.5	47.0	47.5	48.0				46.0	46.5	47.0	47.5
46.5	47.0	47.5	48.0	48.5				46.5	47.0	47.5	48.0
47.0	47.5	48.0	48.5	49.0				47.0	47.5	48.0	48.5
47.5	48.0	48.5	49.0	49.5				47.5	48.0	48.5	49.0
48.0	48.5	49.0	49.5	50.0				48.0	48.5	49.0	49.5
48.5	49.0	49.5	50.0	50.5				48.5	49.0	49.5	50.0
49.0	49.5	50.0	50.5	51.0				49.0	49.5	50.0	50.5
49.5	50.0	50.5	51.0	51.5				49.5	50.0	50.5	51.0
50.0	50.5	51.0	51.5	52.0				50.0	50.5	51.0	51.5
50.5	51.0	51.5	52.0	52.5				50.5	51.0	51.5	52.0
51.0	51.5	52.0	52.5	53.0				51.0	51.5	52.0	52.5
51.5	52.0	52.5	53.0	53.5				51.5	52.0	52.5	53.0
52.0	52.5	53.0	53.5	54.0				52.0	52.5	53.0	53.5
52.5	53.0	53.5	54.0	54.5				52.5	53.0	53.5	54.0
53.0	53.5	54.0	54.5	55.0				53.0	53.5	54.0	54.5
53.5	54.0	54.5	55.0	55.5				53.5	54.0	54.5	55.0
54.0	54.5	55.0	55.5	56.0				54.0	54.5	55.0	55.5
54.5	55.0	55.5	56.0	56.5				54.5	55.0	55.5	56.0
55.0	55.5	56.0	56.5	57.0				55.0	55.5	56.0	56.5
55.5	56.0	56.5	57.0	57.5				55.5	56.0	56.5	57.0
56.0	56.5	57.0	57.5	58.0				56.0	56.5	57.0	57.5
56.5	57.0	57.5	58.0	58.5				56.5	57.0	57.5	58.0
57.0	57.5	58.0	58.5	59.0				57.0	57.5	58.0	58.5
57.5	58.0	58.5	59.0	59.5				57.5	58.0	58.5	59.0
58.0	58.5	59.0	59.5	60.0				58.0	58.5	59.0	59.5
58.5	59.0	59.5	60.0	60.5				58.5	59.0	59.5	60.0
59.0	59.5	60.0	60.5	61.0				59.0	59.5	60.0	60.5
59.5	60.0	60.5	61.0	61.5				59.5	60.0	60.5	61.0
60.0	60.5	61.0	61.5	62.0				60.0	60.5	61.0	61.5
60.5	61.0	61.5	62.0	62.5				60.5	61.0	61.5	62.0
61.0	61.5	62.0	62.5	63.0				61.0	61.5	62.0	62.5
61.5	62.0	62.5	63.0	63.5				61.5	62.0	62.5	63.0
62.0	62.5	63.0	63.5	64.0				62.0	62.5	63.0	63.5
62.5	63.0	63.5	64.0	64.5				62.5	63.0	63.5	64.0
63.0	63.5	64.0	64.5	65.0				63.0	63.5	64.0	64.5
63.5	64.0	64.5	65.0	65.5				63.5	64.0	64.5	65.0
64.0	64.5	65.0	65.5	66.0				64.0	64.5	65.0	65.5</