

Trust and Reliability

# FIRST

## OPERATOR'S MANUAL

### LC-1 1/2 SERIES

LONG CHANG MACHINERY CO., LTD.

2150-7713-100

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# ***1. Foreword***

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LONG CHANG LC-1½ VS and LC-1½ TM MILLING MACHINES are designed and manufactured to meet the demands by most of our customers. All parts and materials have been placed under strict quality control to ensure the machine quality superiority and permanent service life.

This manual shall give a detailed account of the structure, mechanism, methods of operation, maintenance, etc. of LC-1½ VS and LC-1½ TM millers. For permanent hi-precision and maximum efficiency of the models, the operators, maintenance and repair personnel are requested to study this manual thoroughly and follow the specific instructions in operations and maintenance exactly.

## ***2. Safety Rules and Regulations***

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- 1) Wearing of loose clothes by operators is not allowed.
- 2) Operators shall wear the goggles and safety boots.
- 3) Do not allow the body to get too close to the machine while it is in revolution.
- 4) Cautions must be exercised in machine handling in reference to the warnings in this manual.

### 3. LC-1 $\frac{1}{2}$ Variable Speed Milling Machine

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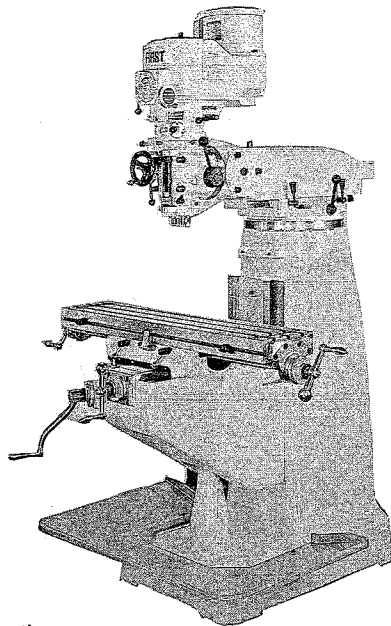


Figure 1

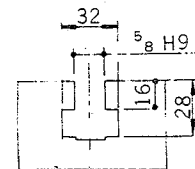
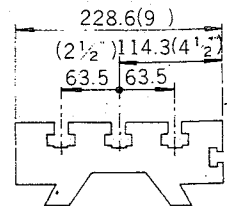


Figure 2

#### 1) Specifications:

STANDARD					
SPECIFICATIONS	INCH	MM	SPECIFICATION	INCH	MM
WORK TABLE			Spindle speed	50HZ	50 – 3750rpm
Working area of table	42 x 9	1067 x 230	R.P.M.	60HZ	60 – 4500rpm
Table travel (Hand)	30	762	Machine net weight	2,22Lb	1,010Kg
Saddle travel	12	305	A	56 $\frac{1}{2}$	1,435
Knee travel	16	406	B	42	1,067
HEAD			C	0 – 12	0 – 305
Motor	2HP. 3HP		D	0 – 18 $\frac{1}{2}$	0 – 469
Spindle taper	R8 or N.S.T #30		E	0 – 12	0 – 305
Quill travel	5	127	F	6 $\frac{3}{4}$ – 18 $\frac{3}{4}$	171 – 476
Feed rate (PER spindle revolution)	0.0015, 0.003, 0.006	0.04, 0.08, 0.15	G	8 $\frac{3}{4}$ – 20 $\frac{3}{4}$	222 – 527
OPTIONAL					
Working area of table	50 x 9	1270 x 230	Table travel (Hand)	37 $\frac{3}{4}$	960

#### 2) Capacity :

The model features the multi-performances as follows:

- (1) Drilling: Front and oblique drillings.
- (2) Milling: Front, oblique, end, side millings, etc.
- (3) Molding: Irregular curved and drast angle processing.
- (4) Polishing: Surface polish on surfaces of metallic parts.
- (5) Boring: Front and oblique borings by the boring tools installed.

3) Names of Machine Parts :

(1) Headstock:

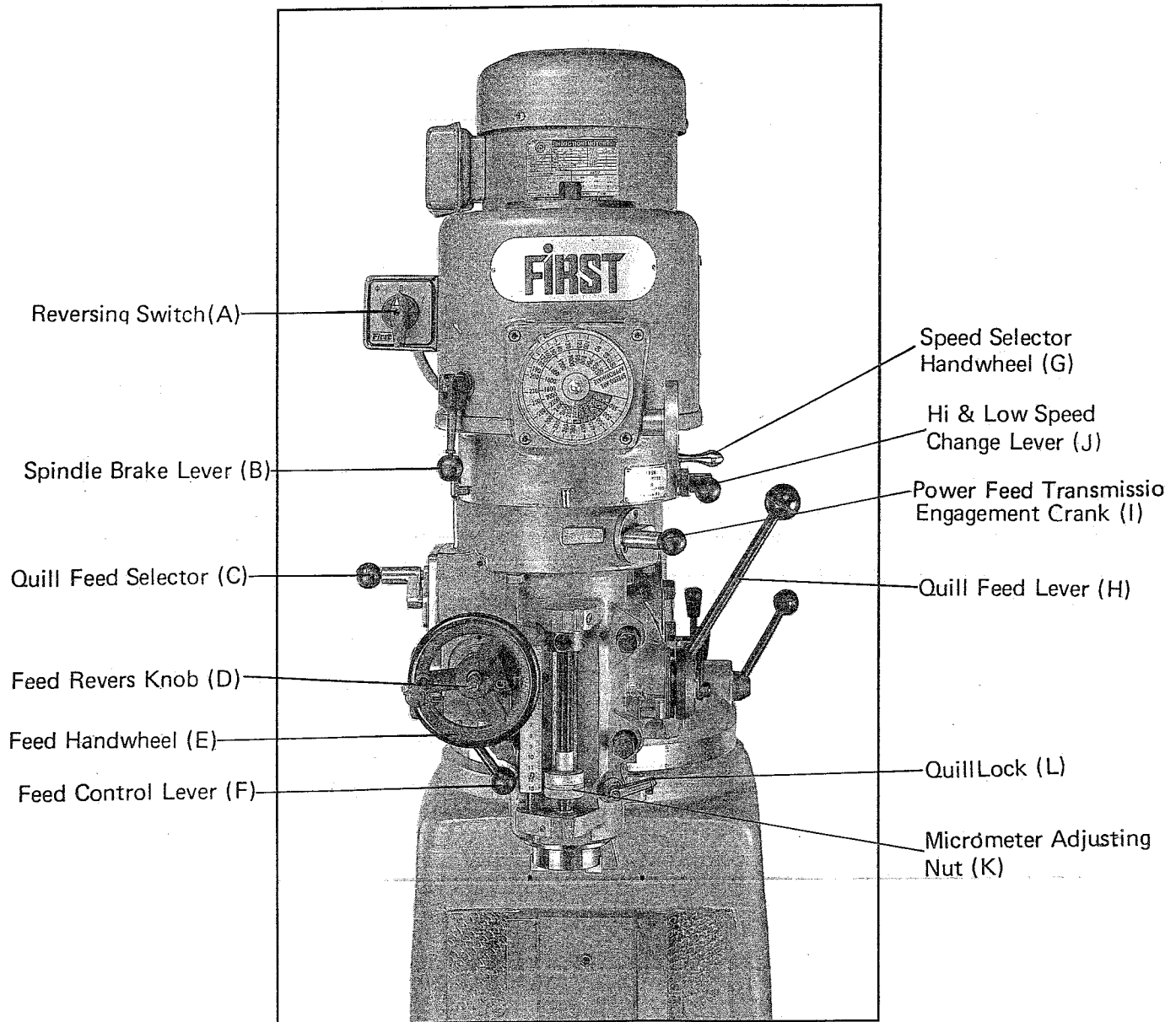


Figure 3

(2) Machine Body:

1) Column, Turret and Ram:

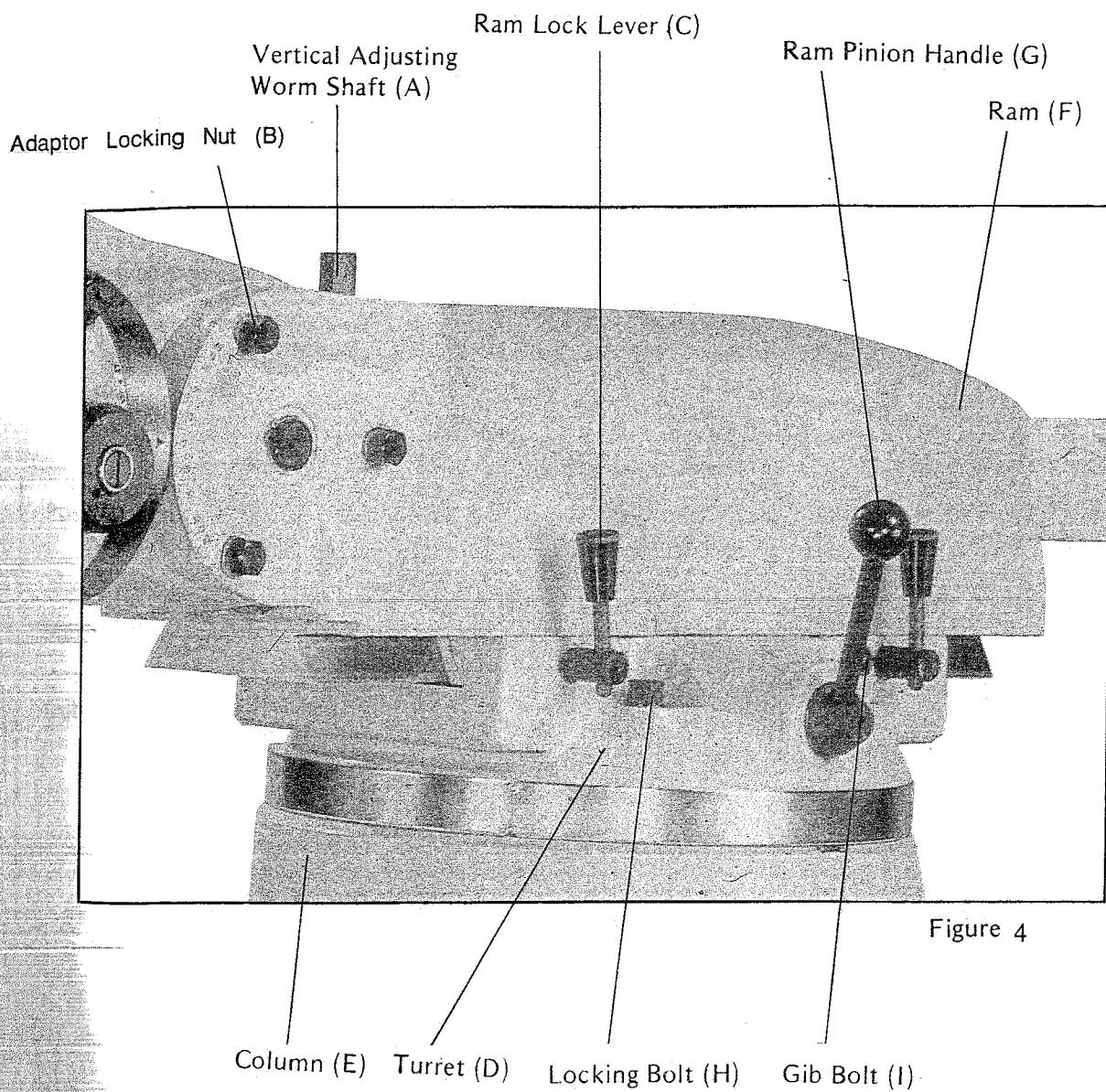
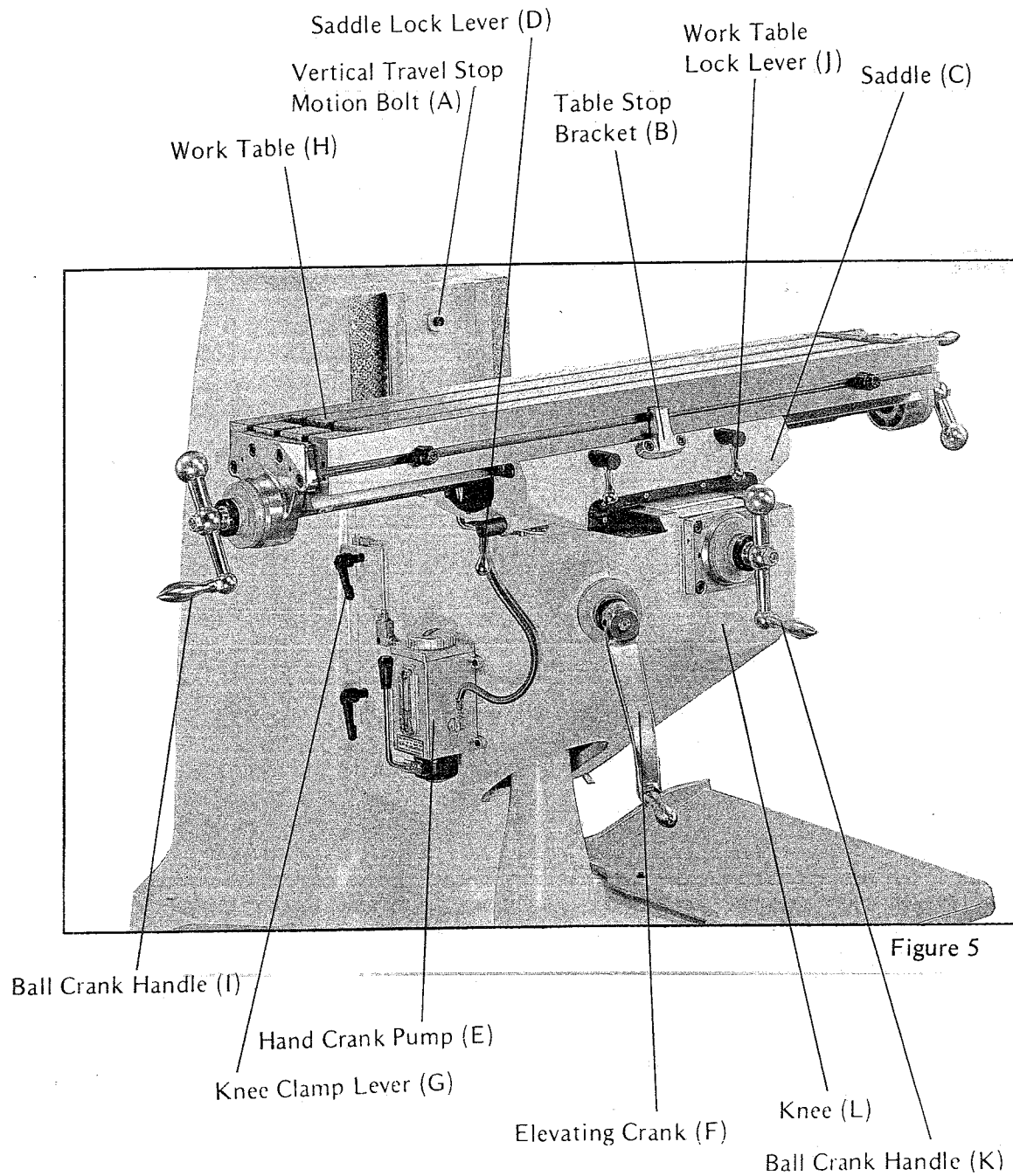


Figure 4

(ii) Work Table, Saddle and Knee:



4) Lubrication :  
(2) Machine Table Lubrication

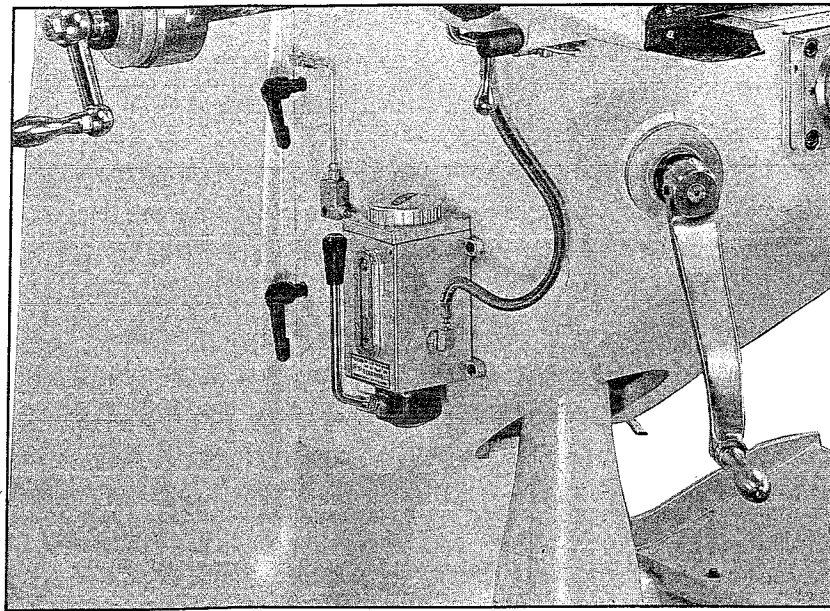


Figure 8

Position:	Lubrication of work table, saddle, knee, sliding surface and leadscrews may be effectuated by means of the hand crank pump on the left side of knee.
Method:	3 to 5 time daily by pulling twice each time.
Lubricant:	KUO KUANG R-68 GULFWAY 52 VACTRA 2 ESSO FBIS K-53 SHELL TONNA 33



5) Operations:

(2) Machine Body Operations:

(1) Ram Movement and Swiveling (See Figure 17):

A. Ram Movement:

- a. Loosen the two Ram lock levers (A).
- b. Swivel the Ram pinion handle (B), and the Ram can be moved.
- c. When it moves to the desired position, lock up (A).

B. Ram Swiveling:

Loosen the four locking bolts (C), and force the cross arm to turn until the desired angle is obtained. Lock up (C).

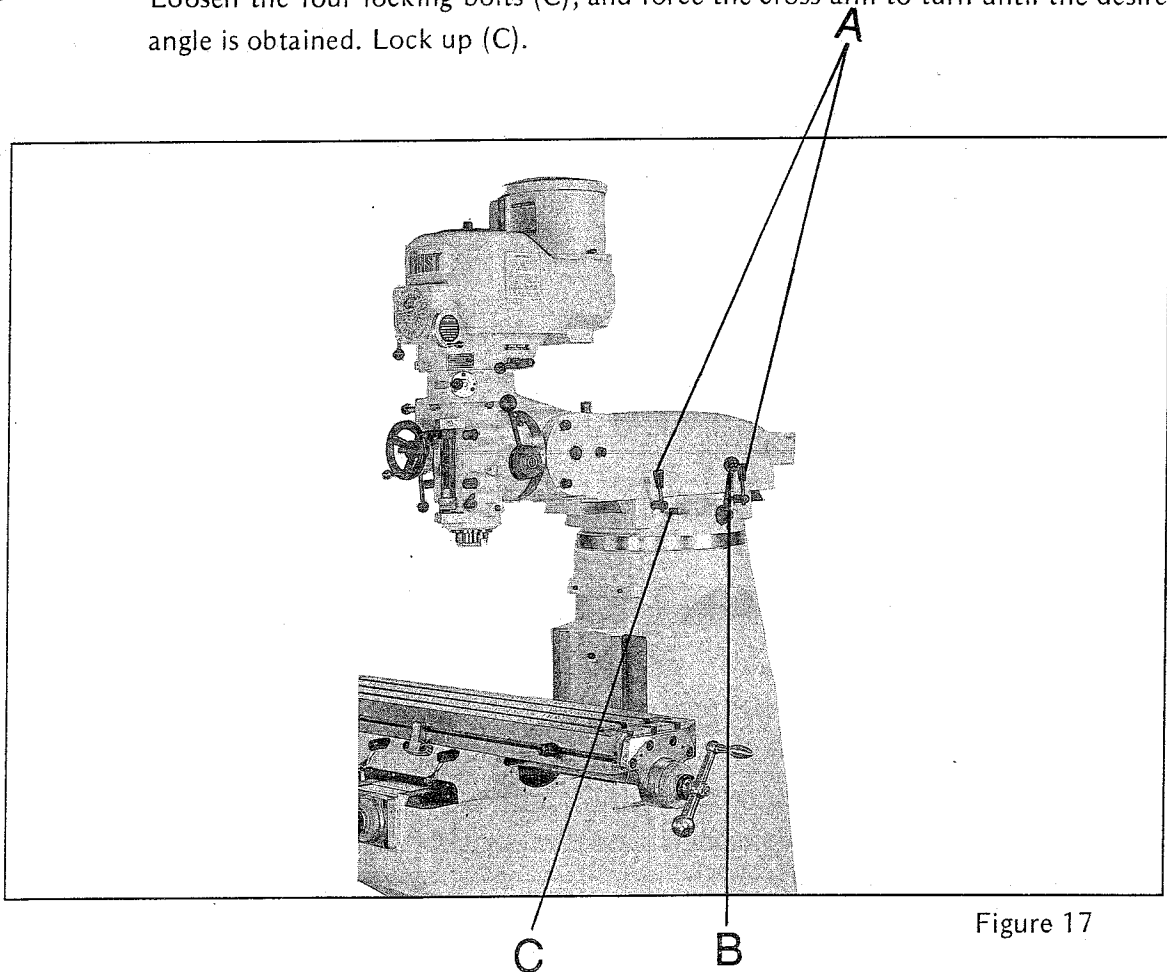


Figure 17

(2) Zero Positioning (as shown in Figure 18) of Dial Ring of Table Feed.

- a. Loosen the nut (D) of dial ring.
- b. Turn the dial right (E) to zero position.
- c. Lock the nut (D) of dial ring.

(3) Setting of Sliding Surfaces of Work Table, Saddle and Knee:

All non-feed sliding surfaces shall be secured and set to prevent slipping and increase machine body's rigidity. The sliding surface setting levers (as shown in Figure 19) are clockwise for setting and counterclockwise for release.

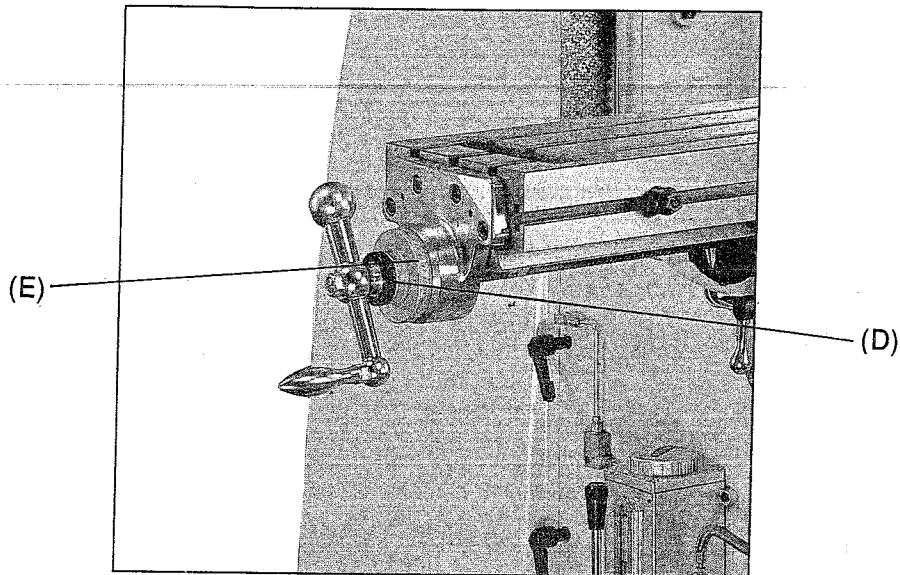


Figure 18

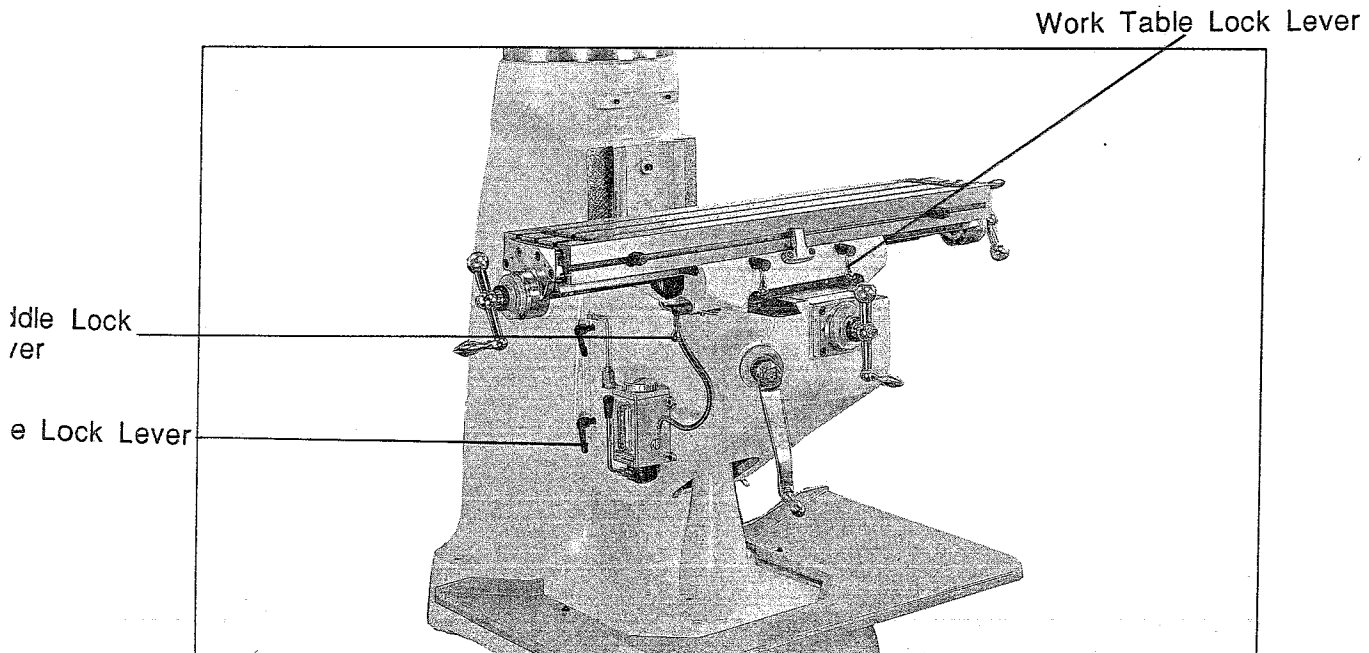


Figure 19

6) Transport, Unpacking and Floor Space :

a) Methods of Transport:

- (1) Prior to unpacking, transport may be made by using a forklift (Figure 20) and a reinforced cable (Figure 21).
- (2) After packing, transport may be made by hoisting with a reinforced cable (Figure 22) and the eye bolt (Figure 23).

**Remarks:**

- (1) When the machine is being hoisted, keep the personnel afar.
- (2) Hoisting by eye bolt should be used as less as possible.
- (3) To hoist the unpacked case by reinforced cable, the motion shall observe strictly the instruction appeared on the side of the wooden case.
- (4) Keep the work table and saddle in the proper positions so as to keep the machine balance.
- (5) Do not hoist the machine too high. The best position is to keep the machine base approximately 10cm from the ground.
- (6) Do not allow the machine to wobble in hoisting.
- (7) Only an authorized forklift or crane operator is allowed to transport the machine.

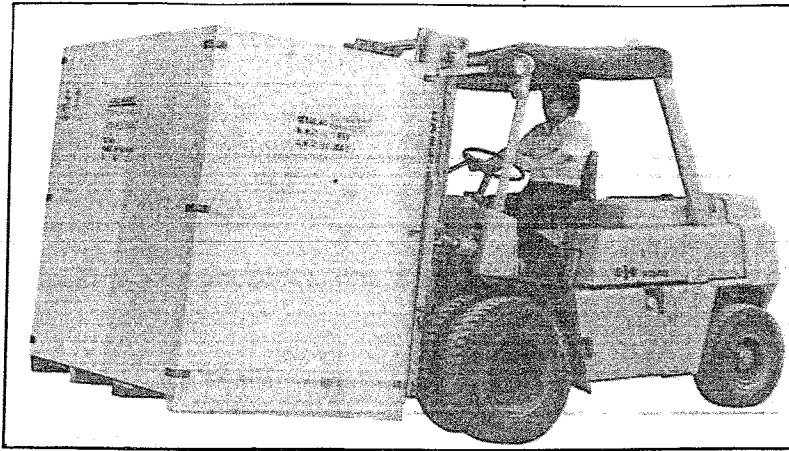


Figure 20

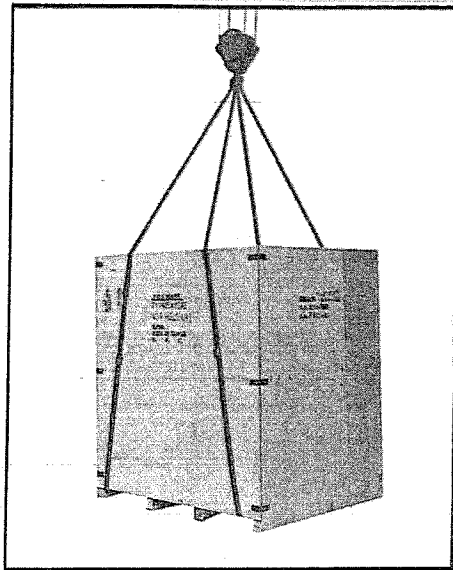


Figure 21

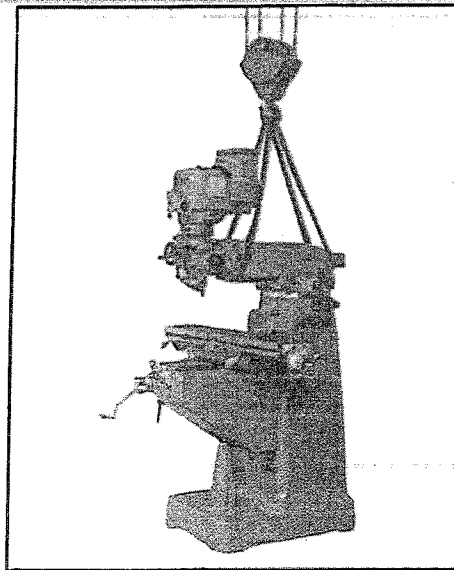


Figure 22

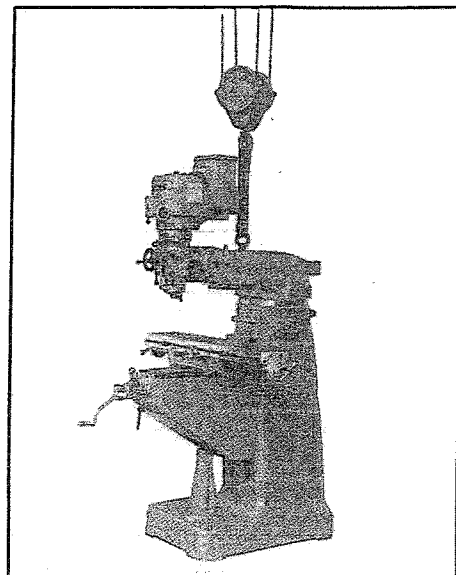


Figure 23

(B) Cautions for Unpacking:

- a. To transport the machine, it is necessary to support the machine with the crated case or pallet to avoid moisture. In case of damage by moistening, please contact our agent or the transporter.
- b. After unpacking, check and see if all tools and accessories are intact, otherwise, please contact our agent.
- c. Restore the headstock to its normal position after unpacking.
- d. After unpacking, do not move the sliding surfaces and work table as long as the rustproof oil on them are not cleaned off and followed with the lubrication.
- e. Before the cleaning starts, the sliding protective pieces must be dismantled, and all sliding surface setting levers, loosened. When the rustproof oil is removed, proper amount of lubricant should be injected onto various sliding surfaces. Then move the sliding surfaces for final cleansing and lubrication.
- f. Do not remove the oil brushes in the process of cleaning.
- g. Do not use gasoline or any other inflammable oil cleaner.

(C) Floor Space:

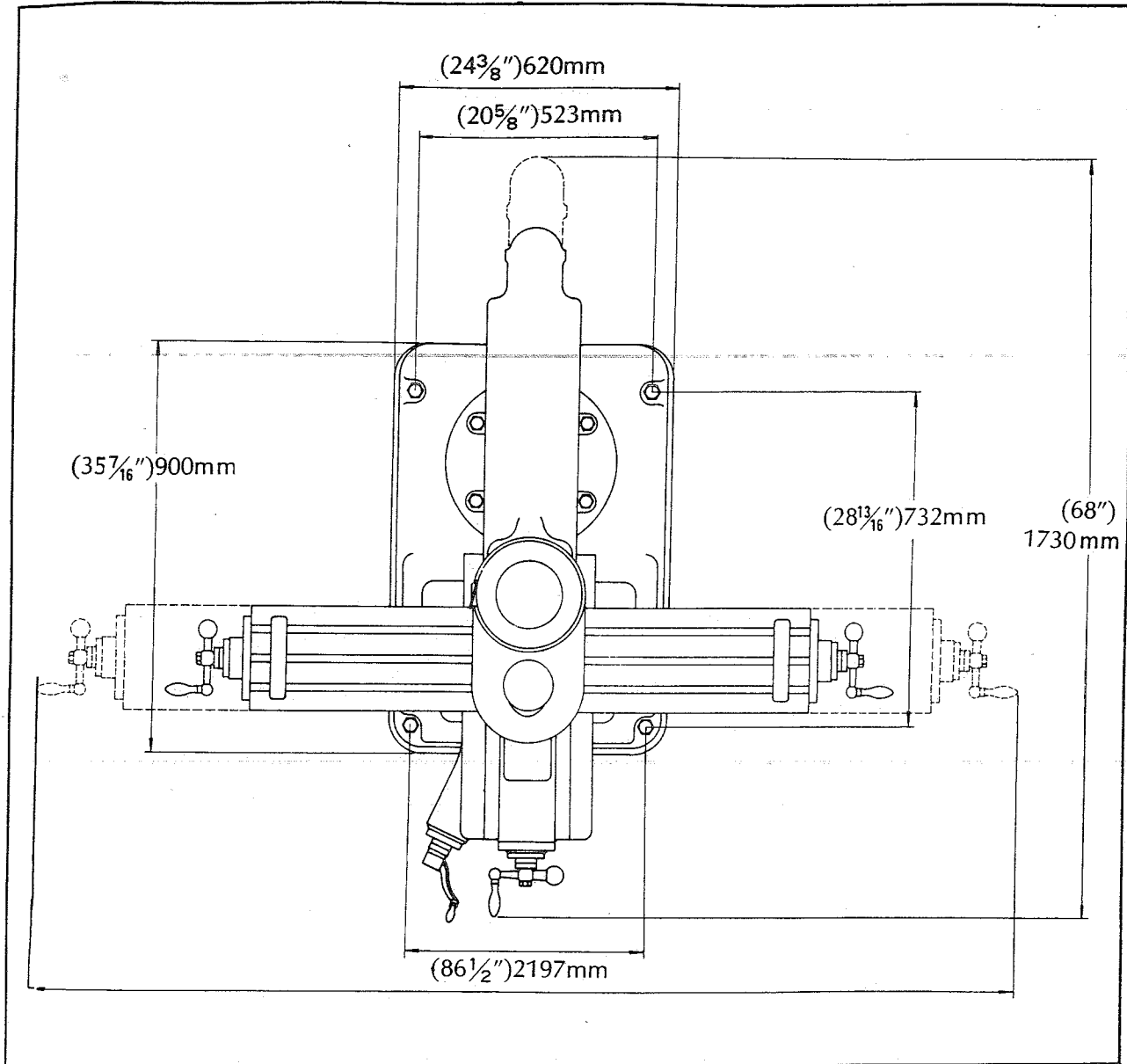


Figure 24

(D) Machine Height: 2070 (81½")

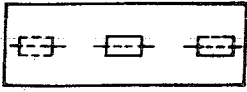
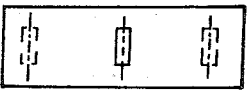
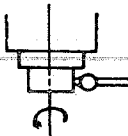
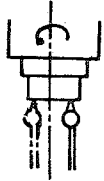
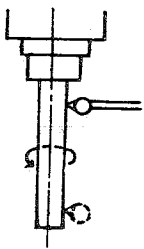
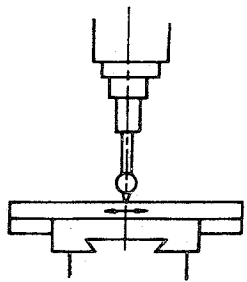
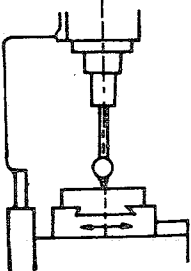
## 7) Precision Alignment :

Precision of a machine dominates the processing quality. To produce the quality workpiece, precision of each and every components is a top priority.

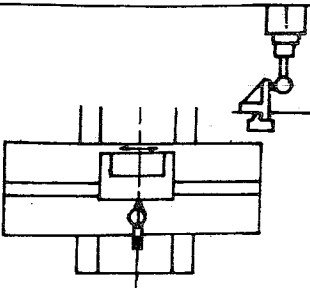
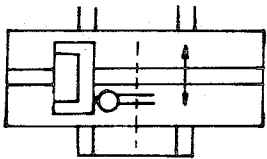
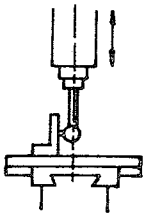
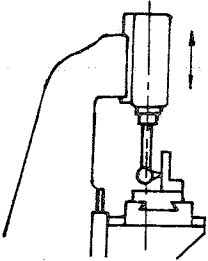
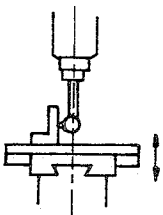
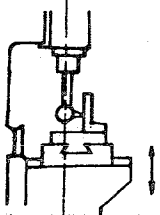
In order to maintain the primary machine precision following a long-term operation, regular precision alignment is indispensable to the upgrading of work quality. Beside, it may extend the machine service life. For details of components to be aligned and precision requirements, please vide the Table of Precision Inspection.

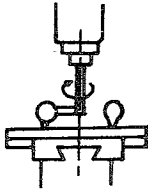
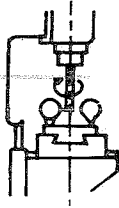
Note: To align the verticality of spindle to the table surface, it is necessary to loosen the three machine head bolts (Vide Figure 14(P), P. 13) and the four machine head nuts (Vide Figure15(R), P. 13). However, the bolts and nuts can not be loosened totally to prevent the components from a sudden tilting. Lock up (P) and (R) as soon as the alignment is performed.

# PRECISION TEST REPORT

No.	TEST ITEM	TEST ILLUSTRATION	Allowable Error (mm)	MEASURED mm
1	STRAIGHTNESS OF TABLE TOP		0.06/m	
	LONGITUDINAL DIRECTION		0.06/m	
2	SPINDLE NOSE RUN OUT		0.01	
3	CAM ACTION OF SPINDLE FLANGE		0.015	
4	SPINDLE HOLD RUN OUT AT END OF SPINDLE NOSE		0.01	
	AT END OF 300mm TEST BAR		0.02	
5	PARALLELISM OF LONGITUDINAL MOVEMENT OF TABLE WITH IT'S TOP		0.03	
6	PARALLELISM OF CROSS MOVEMENT OF TABLE WITH IT's TOP		0.02	



No.	TEST ITEM	TEST ILLUSTRATION	Allowable Error (mm)	MEASURED mm)
7	PARALLELISM OF LONGITUDINAL MOVEMENT OF TABLE WITH MIDDLE T-SLOT		0.03	
8	SQUARENESS OF CROSS MOVEMENT OF TABLE WITH MIDDLE T-SLOT		0.02	
9	SQUARENESS OF VERTICAL MOVEMENT OF SPINDLE HEAD WITH TABLE TOP LONGITUDINAL DIRECTION		0.025	
	CROSS DIRECTION HIGH AT FRONT OF TABLE		0.025	
10	SQUARENESS OF TABLE TOP WITH VERTICAL MOVEMENT OF KNEE LONGITUDINAL DIRECTION		0.02	
	CROSS DIRECTION HIGH AT FRONT OF TABLE		0.02	

No.	TEST ITEM	TEST ILLUSTRATION	Allowable Error (mm)	MEASURED mm
11	SQUARENESS OF TABLE TOP WITH SPINDLE LONGITUDINAL DIRECTION		0.02	
	CROSS DIRECTION HIGH AT FRONT OF		0.02	

## 8) Trouble-Shootings :

### (1) Adjustment of Backlash of Leadscrew:

After a certain period of time, a clearance is developed between the leadscrew and its nut due to frictions. Positioning accuracy will become impossible. Therefore, the nut must be adjusted so as to keep a proper tension between itself and the leadscrew.

#### A. Adjustment of cross leadscrew (Vide Figure 29):

- a. Turn counterclockwise the crank (F) and move the saddle seat to the foremost position of knee.
- b. Remove the two setting pins (H) of the front bearing bracket (G) and take off the four socket HD cap screw (I).
- c. Support the cross feed bearing bracket (G) and turn clockwise the crank (F) so that the bracket will be separated from the knee with a certain distance between them (as shown in Figure 30, the distance must be longer than the length of the adjusting tool).
- d. Insert the larger end of clearance adjusting tool into the knee and turn the locking nut (J) one round anticlockwise. Reverse the adjusting tool and insert the smaller end into the knee. Turn the nut (K) clockwise and lock it up.
- e. Turn clockwise and anticlockwise the crank (F) and measure a clearance of approximately 3-4 graduations (0.06mm-0.08mm or 0.003"-0.004") on the dial. Lock up (J) consequently.
- f. Turning counterclockwise the leadscrew into the knee until the front bearing bracket seat gets in contact with the knee. Insert the two setting pins (H) and lock up tightly the four cap screw (I) of the bearing bracket.

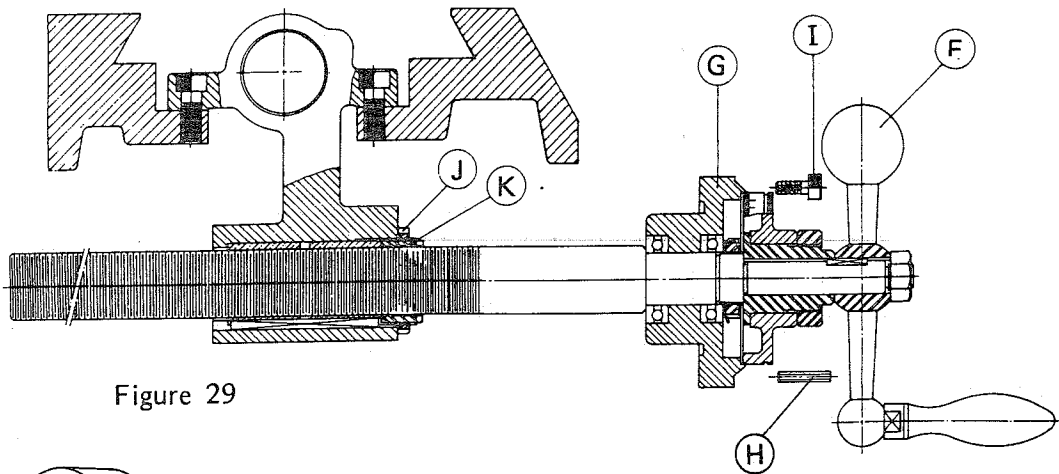


Figure 29

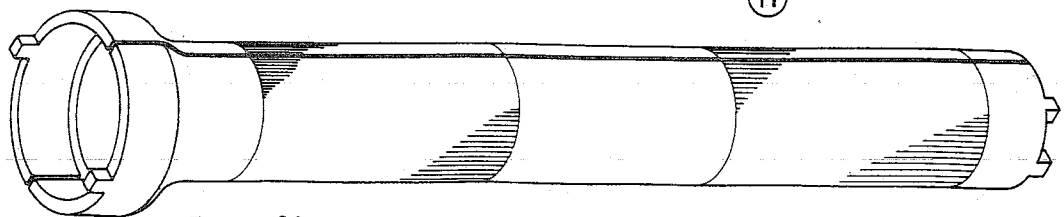


Figure 30

**B. Adjustment of Backlash of Longitudinal Leadscrew:**

- a. Move the work table to the center of saddle.
- b. Insert the large end of backlash adjustment tool into the left side of saddle. Turn the locking nut (J) counterclockwise one round. Reverse the end of adjustment tool and insert the small end into same position and turn the leadscrew adjusting nut (K) clockwise.
- c. Turn the crank (F) slightly clockwise and counterclockwise and measure a clearance of approximately 3 to 4 graduations on the dial (0.6-0.08mm or 0.003"-0.004"), before the nut is locked up tightly again.

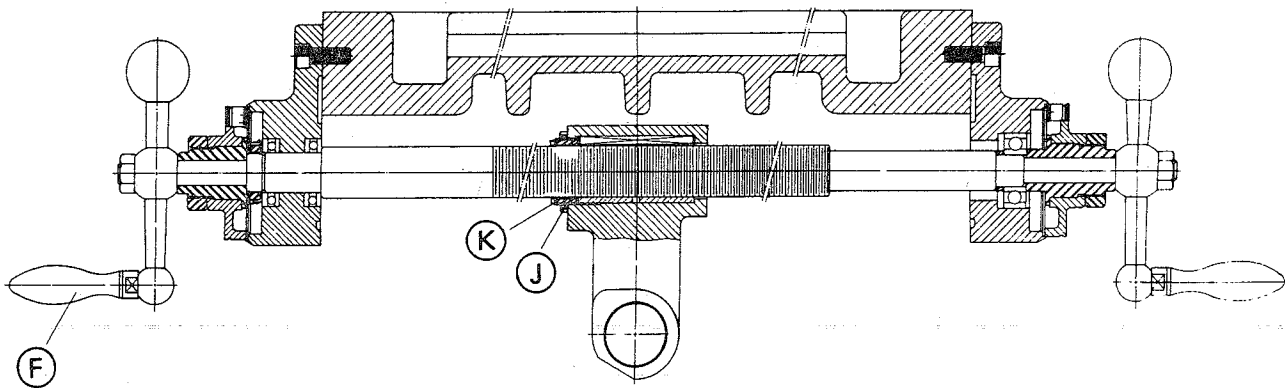


Figure 31

## (2) Adjustment of Play between Gibs:

As a result of long-term operation between the sliding surface and gibs, the worn-out gibs will create a clearance. Therefore the gibs must be adjusted to upkeep the precision of sliding surfaces.

### A. Adjustment of Work Table gibs (Vide Figure 32):

The gibs are attached onto between the saddle seat and work table dovetail.

- a. Loosen the lock lever (L).
- b. Clean the slideway and add the lubricant.
- c. Use a screwdriver and adjust the gib screw (M) on both sides of saddle seat.
- d. Adjusting skill: If the turning of crank (F) (Vide Figure 30, P. 30) is sensed too loose, loosen slightly the adjusting gib screw on the right side of saddle. Then, lock up the adjusting gib screw on the left side. Turn the crank again to see if it is in good tightness. Otherwise, loosen the left adjusting gib screw and lock the right one tightly. Repeat the same motion until the work table sliding is satisfactory.
- e. Replace the excessive worn-out gib whenever necessary.

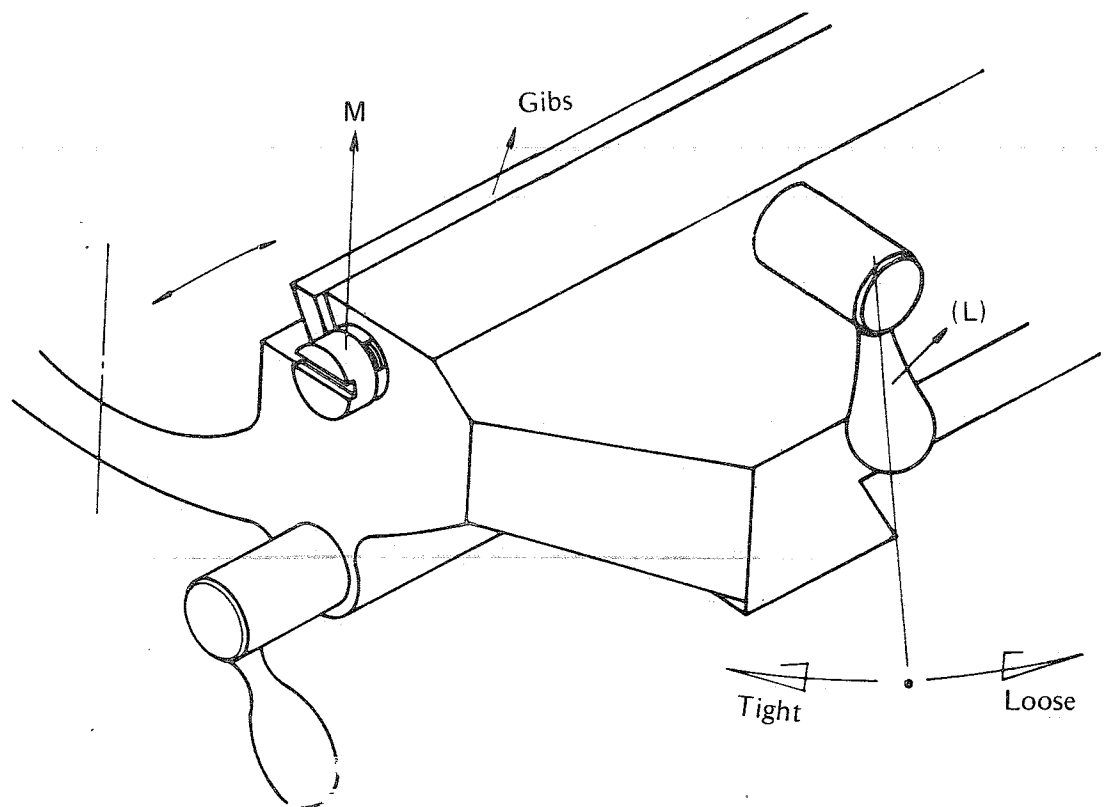


Figure 32

B. Adjustment of Saddle Gib (Vide Figure 33):

Saddle gib is attached to the position between the left side of saddle and knee dovetail. The adjustment can be performed as follows:

- a. Loosen the saddle lock bolt (A).
- b. Move the saddle to the front part of knee.
- c. Take off the wiper holder (B) of saddle.
- d. Clean the slideway and add the lubricant.
- e. Use a screw driver to adjust the gib screw (D) of the saddle.
- f. Employ the same methods to adjust the work table gib.
- g. Lock up the wiper holder (B) on the saddle.

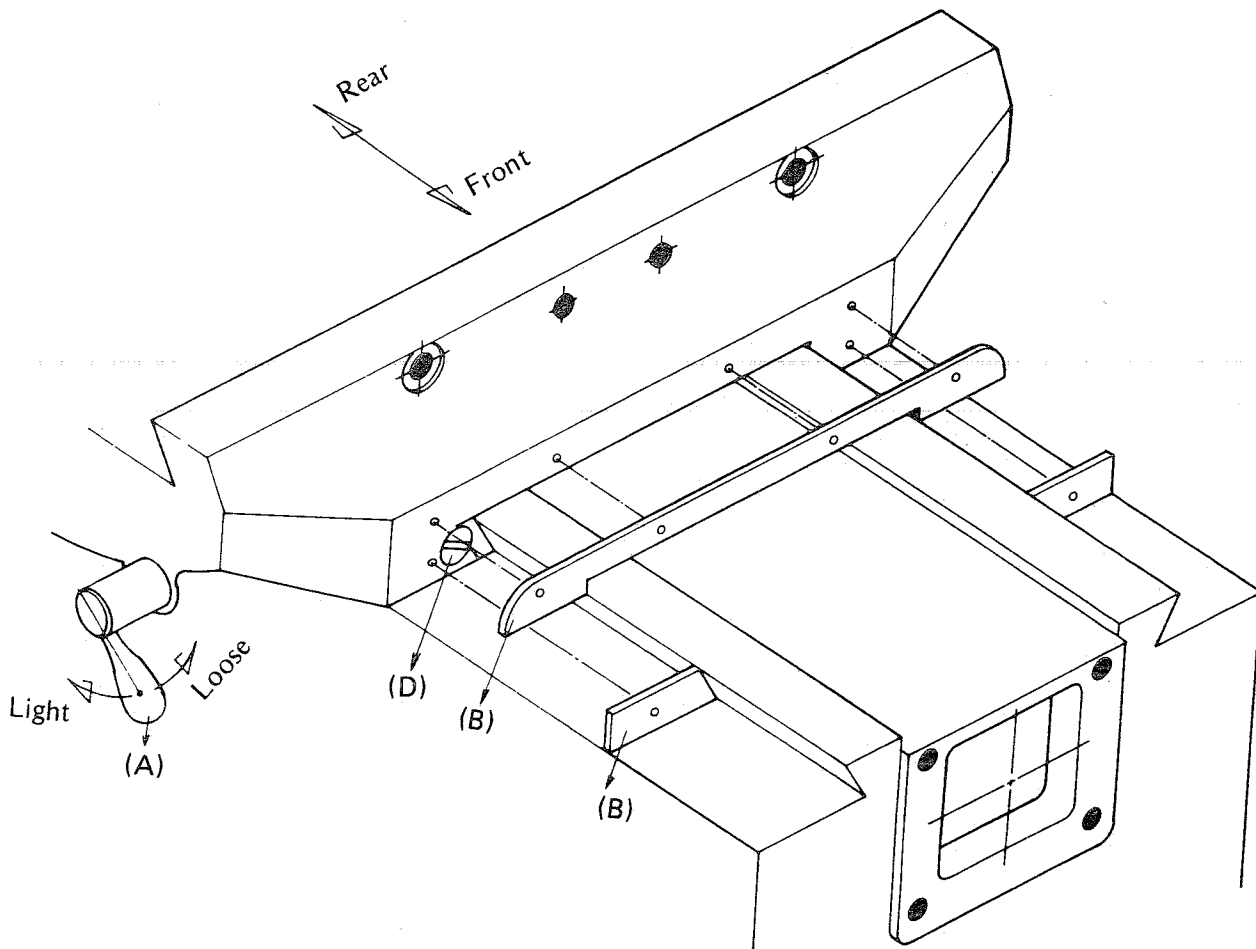


Figure 33

### C. Adjustment of Knee Gib (Vide Figure 34):

The knee gib is attached to the position between the left side of knee and column dovetail. The adjustment can be performed as follows:

- a. Loosen the knee clamp lever (G) (Vide Figure 5, P. 5).
- b. Take off the wiper holder (Q).
- c. Clean the slideway and add the lubricant.
- d. Raise the knee to its upmost position.
- e. Use a screw driver to adjust the gib screw (R) of the knee.
- f. Employ the same methods to adjust the work table gib.
- g. Restore and lock up the wiper holder (Q).

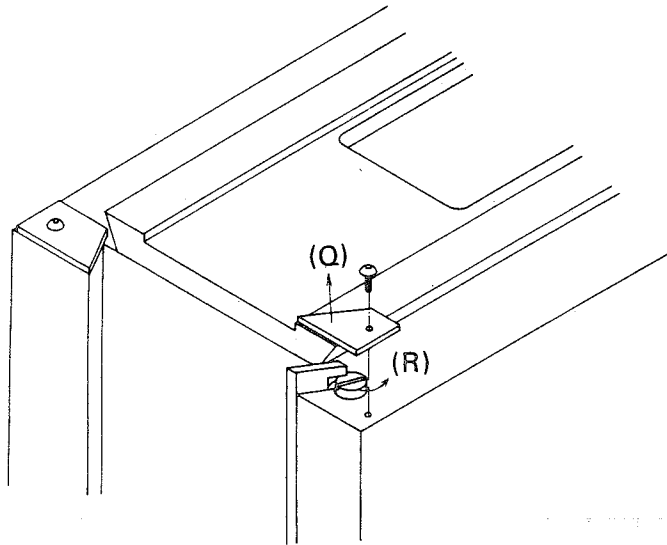


Figure 34

### D. Adjustment of Ram Gib:

The ram gib is attached between the ram and turret dovetail. When the ram sliding is too tight or loose, adjustment may be effectuated by means of the bolt as follows:

- a. Loosen ram lock lever (C).
- b. Clean the slideway and add the lubricant.
- c. Turn the nut on the bolts of gib (I).
- d. Use a screw driver to set or loosen gib bolt (I) until the ram moves smoothly.
- e. Lock up the nut tightly.

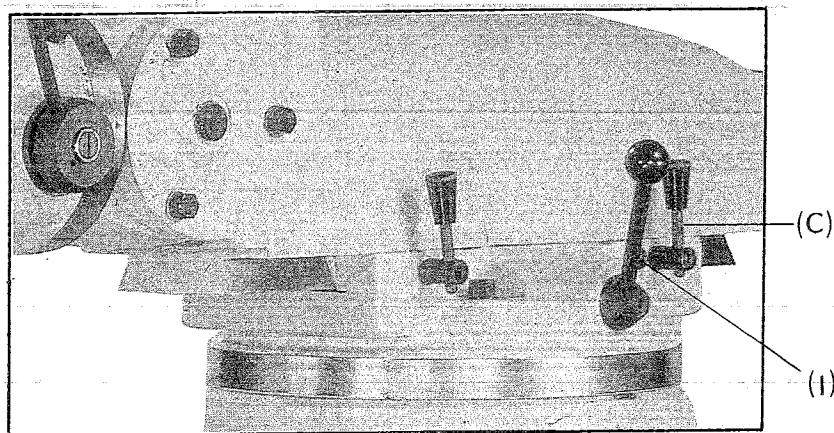


Figure 35

9) Maintenance :

“Maintenance is more important than repair; and repair is better than purchase”.

Under long-term operations, if the machine has not been properly maintained and operated, its service life shall be greatly reduced. The workpiece quality is therefore affected, and the efficiency, decreased. It is essential for an operator to know how to handle the machine and the concept of its maintenance and keep correctly.

Daily Maintenance:

- (1) Check and see if the oil level of hand crank pump is on the designated line.
- (2) The designated positions must be lubricated prior to operations (Vide Lubrication, P.8).
- (3) Keep the machine idling for three to five minutes daily prior to operations.
- (4) At the close of each day, work table shall be cleaned and the unfinished workpiece must be removed. A little bit of lubricant is recommended.
- (5) At the close of each day, all setting levers shall be loosened, and all sliding parts shall be moved to the proper position. The cutter must be dismantled.
- (6) At the close of each day, the headstock must be restored to its normal position if it is tilted.

Monthly Maintenance:

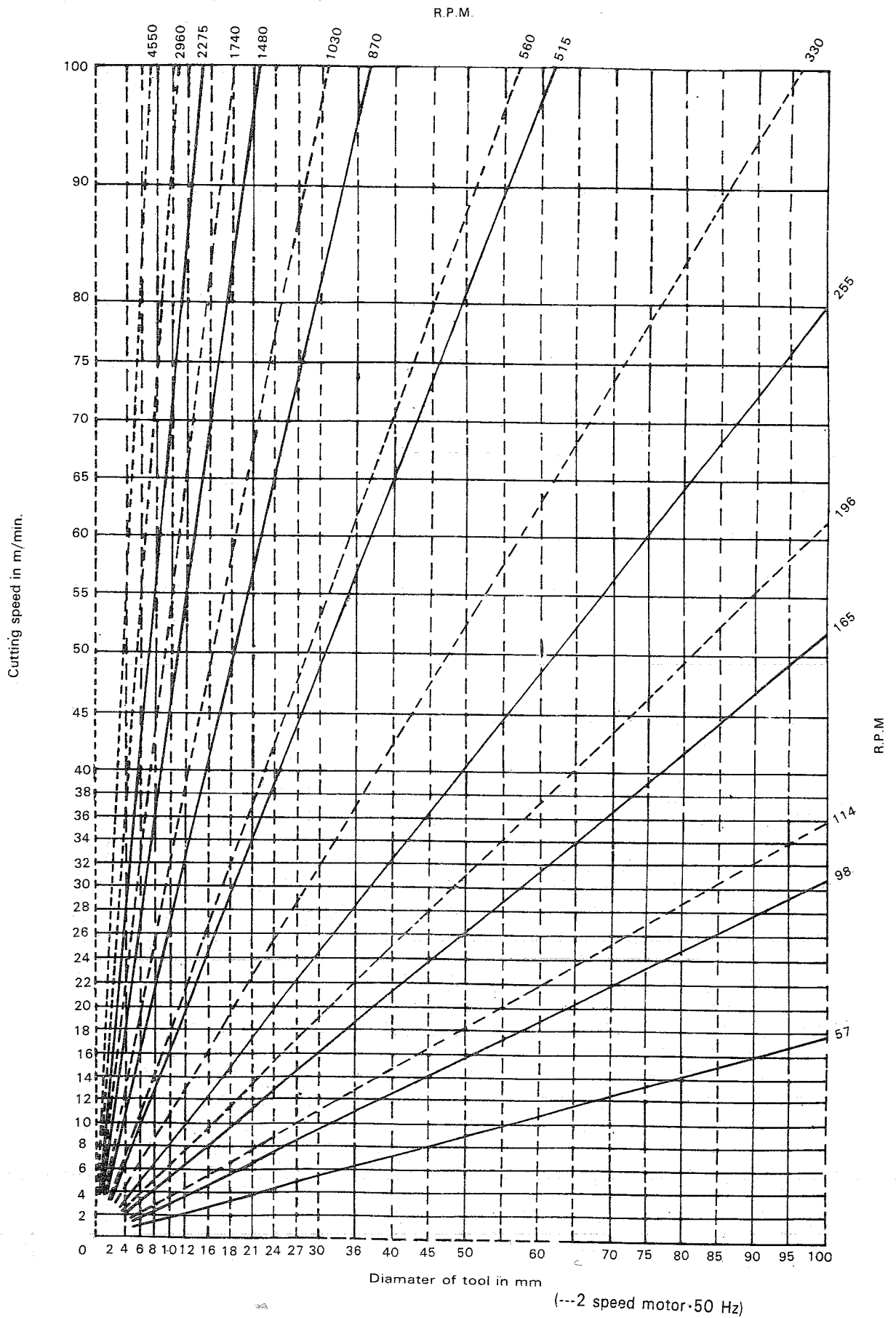
- (1) Check and see if all clamping rails of various sliding surfaces are normal.
- (2) Check and see if the backlash between leadscrew and its nut is normal.
- (3) Check and see if the quill lock and that of each and every sliding surface is normal.

Quarterly Maintenance:

- (1) Check and see if the brake functions and belt are normal.
- (2) Inspect the level of work table and erection status of headstock.
- (3) Test the machine again by the chart of test specs.
- (4) Replace whatever parts worn-out.



# SPEED DIAGRAM (Motor 50 Hz)



10) Cautions :

(1) Machine operations:

- a. Check and ensure if the machine's bottom and ground base are properly contacted before lock up the anchor bolts.
- b. The machine must be installed upon a solid base.
- c. Check and see if the motor voltage and power source voltage are conformed.
- d. Cutters shall be far away from the workpieces when the motor is started or stopped.
- e. Switched off the power source before gear change.

(2) Machine Operators:

- a. The machine is to be started or operated by an authorized operator only.
- b. Immediate stop and repair are needed in case of troubles in operations.
- c. In installation, the machine shall be connected to earth.
- d. In stop motion, the feed lever shall be placed in the neutral position.
- e. The machine should be stopped during the inspection on the workpieces.
- f. In clamping, check and ensure if the workpieces are firmly vised.
- g. The spindle must be kept clean and lubricated all the time.
- h. Do not place any tools on the work table to maintain its surface preciseness and smoothness.
- i. Prior to cutting, wait until the spindle is running steadily after the motor is started.
- j. Use a brush to clean off the iron fragments.

## 4. Remarks

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- 1) All LONG CHANG products, from parts to finished machines, have gone through different flows of process under strict QC Systems, with precision degrees in conformity with CNS (please vide charts of ex-factory inspection). To ensure the preciseness, service life and safety operations, it is highly advisable for the users to study the full details of this manual.
- 2) Suggestions for improvements of the machine structure and/or inquiries, including plant visitations, are cordially welcome.
- 3) In case of maintenance, servicing and parts changes, please contact our sales agencies or business department directly.
- 4) The manufacturer reserves the right to modify the design, operations, structure etc all of the machines without any advance notice.