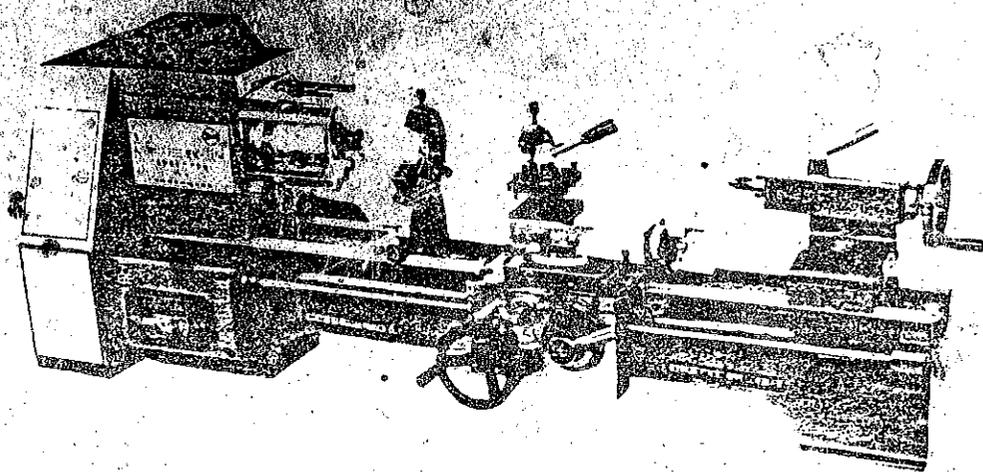




BENCH CUTTING MACHINE

MODEL BV20

OPERATION INSTRUCTION



BENCH CUTTING MACHINE

MODEL BV20

OPERATION INSTRUCTION

MAIN SPECIFICATIONS

| | |
|---|--------------------------------|
| Height of centers over bed | 105mm |
| Distance between centers | |
| Max. swing diameter over bed | 200mm |
| Max. workpiece diameter | 115mm |
| Max. length of workpiece | 20mm |
| Spindle hole diameter | |
| Spindle taper bore | No. 3 Morse |
| Spindle speeds | 6 steps |
| Range of spindle speeds | Forward 120—2000rpm Reverse |
| Number of metric threads | 11 kind |
| Range of metric threads | 0. 04—0. 3mm |
| Longitudinal speeds | 11 steps |
| Range of carriage longitudinal feeds per revolution of spindle | 0. 4—3mm |
| Ver-tical distance between spindle central line and bottom surface of square head fixing he cutter | 15mm |
| Max. turning angle or compound rest slide | $\pm 45^\circ$ |
| Travel of every screw scale division of cross slide | 0. 04mm |
| Travel of evey scale division of compound rest slide | 0. 04mm |
| Max. travel of compound rest slide | 70mm |
| Max. transversal travel of carriage | 115mm |
| Max. longitudinal travel of saddle(manual) | 350mm |
| Taper bore of tailstock barrel | No. 2 Morse |
| Max. travel of tailstock barrel | 20mm |
| Power of motor | 0. 37kW |
| Voltage of motor | 220V |
| Height of centers over bed | $4 \frac{5}{16}$ |
| Diltance between centers | 16" |
| Max. swing diameter over bed | 8" |

| | | |
|--|--------------------|--------------------------------|
| Max. workpiece diameter | | $4 \frac{5}{16}$ |
| Max. length of workpiece | | 16" |
| Spindle hole diameter | | $3/4$ " |
| Spindle taper bore | | No. 3 Morse |
| Spindle speeds | | 6 steps |
| Range of spindle speeds | Forward Reverse | 120—2000rpm |
| Whitworth thread cutting | | 13 kind |
| Threads per inch of whitworth | | 3—56 tpi |
| Longitudinal speeds | | 12 steps |
| Range of carriage longitudinal feeds per revolution of spindle | | 0.0018"—0.0125" |
| Vertical distance between spindle central line and bottom surface of square head fixing the cutter | | $5/8$ " |
| Max. turning angle compound rest slide | | $\pm 45^\circ$ |
| Travel of every screw scale division of cross slide | | 0.002" |
| Travel of every screw scale division of compound rest slide | | 0.002" |
| Max. travel of compound rest slide | | $2 \frac{3}{4}$ " |
| Max. transversal travel of carriage | | $4 \frac{1}{2}$ " |
| Max. longitudinal travel of saddle(manual) | | 14" |
| Taper bore of tailstock barrel | | No. 2 morse |
| Max. travel of tailstock barrel | | $\frac{3}{4}$ " |
| Power of motor | | $0.55KW(\frac{3}{4}H \cdot P)$ |
| Voltage of motor | | 110 V, 60Hz |
| * In the area where the power supplied is not 220V and 50Hz, the machine tool with the motor of particular specifications are available. | | |
| Overall dimension(L × W × H) | | 1080 × 610 × 380mm |
| Net weight of machine | | 110kg |

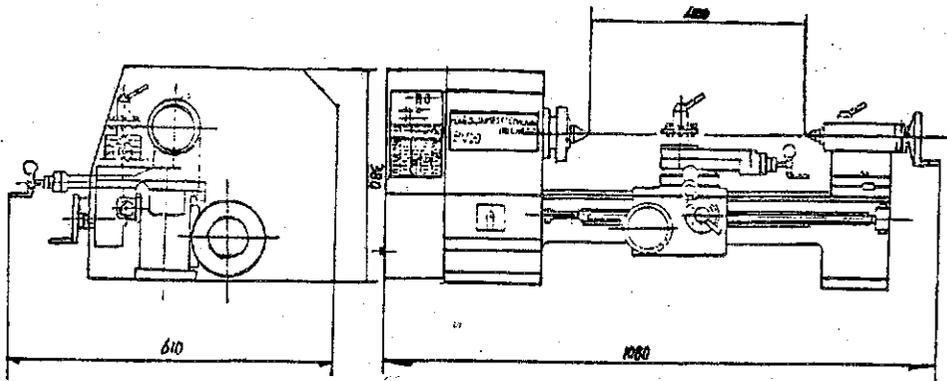
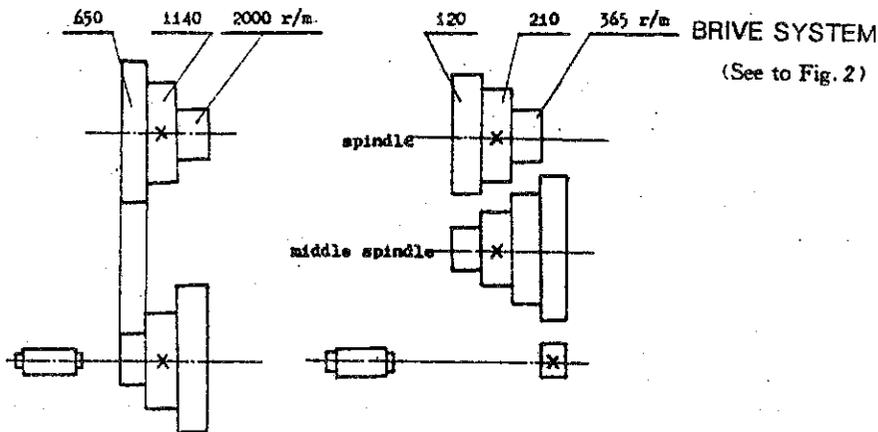


Fig. 1 Outline of the machine tool



2. Feed system and thread-cutting drive system
 Output wheel of threading: 10 Output wheel of feeding: 9

| SCREW PITCH | FEEDS | NUMBER OF TOOTH OF GEAR CHANGE | | |
|-------------|-------|--------------------------------|-----|-----|
| | | A | B | C |
| 0.4 | 0.04 | 70 | | 105 |
| 0.5 | 0.05 | 70 | | 84 |
| 0.7 | 0.07 | 70 | 98 | 84 |
| 0.8 | 0.08 | 105 | 84 | 42 |
| 1.0 | 0.10 | 98 | | 42 |
| 1.25 | 0.125 | 84 | 105 | 42 |
| 1.5 | 0.15 | 105 | | 28 |
| 1.75 | 0.175 | 84 | 98 | 28 |
| 2 | 0.2 | 49 | 98 | 42 |
| 2.5 | 0.25 | 63 | 105 | 28 |
| 3 | 0.3 | 49 | 105 | 30 |

GEAR SCREW & NUT (See to Fig. 2)

| Part | Ser. No. in Fig. | Item | No. ofteety/ No. of helix | Model/ screw pitch | width of tooth/ length of thread |
|--------------|------------------|-----------|------------------------------|---------------------------|-------------------------------------|
| Spindle box | 1 | Gear | 51 | 1 | 8 |
| | 2 | | 68 | | |
| | 3 | | 25 | | |
| | 4 | | 75 | | |
| | 5 | | 76 | | |
| | 6 | | 24 | | |
| | 7 | | 24 | | |
| | 8 | | 76 | | |
| | 9 | | 56 | | |
| | 10 | | 56 | | |
| Gear charge | 11 | 30 | 1 | 9 | |
| | 12 | | 42 | | |
| | 13 | | 49 | | |
| | 14 | | 28 | | |
| | 15 | | 63 | | |
| | 16 | | 70 | | |
| | 17 | | 84 | | |
| | 18 | | 98 | | |
| | 19 | Gear | 105 | | |
| Saddle apron | 20 | gear | 17 | 1 | 8 |
| | 21 | | 51 | | |
| | 22 | Gear rack | | 2 | 425 |
| | 23 | Gear | 17 | | 8 |
| | 24 | Nut | S | 3 | 30 |
| | 25 | Screw | I | | 425 |
| | 26 | Nut | N | 2 (Left hand rotation) | 30 |
| | 27 | Screw | G | | 148 |
| | 28 | Nut | L | 2 | 25 |
| | 29 | Screw | I | | 102 |
| | 30 | Nut | N | 2 | 27 |
| 31 | Screw | E | | 50 | |

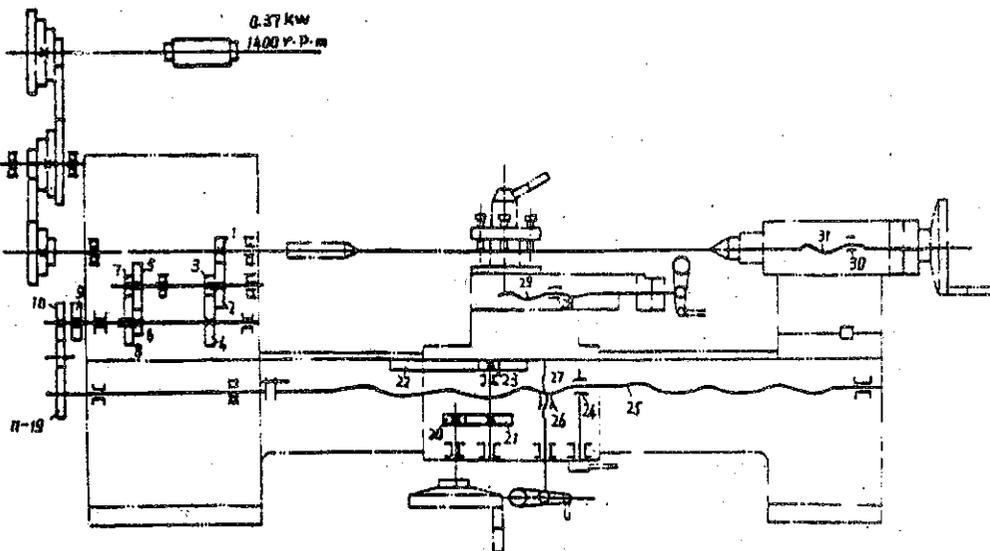


Fig. 2 Drive system

INSTALLATION & TEST—RUN

1. Having unpacked the box, you should, first of all, check the accessories against the packing list to see whether all the accessories are complete there.
2. The machine tool must be installed on a rigid bed plate made of wood or iron, and fixed with screw and nut. The dimension of the bed plate can be selected according to that of the machine (See Fig. 3). It is never allowed to install the machine on the wood bed plate which is not so rigid and solid so as to prevent the machine from vibrating when it starts running, and this will have an effect on the accuracy of its operation. During the transportation, the saddle must be close to the tailstock and clamped.
3. Please use a leveller to level off the machine while installing it.
4. The sliding surface and the unpainted parts of the machine are all coated with rust preventer. You can clean them with kerosene or coal oil when you make the installation of the machine.
5. The spindle box must be cleaned with gasoline or coal oil first and then filled up with the filtered lube of No. 7 or No. 10.
6. Fully fill up the lubricating holes and the lubricating surfaces at different parts of the machine with lube, check all the operating handles to see whether the tightness is proper of the longitudinal travel of saddle and the transverse movements of carriage, otherwise making an adjustment with pressure plates and plug iron.
7. Before the start-up of the machine tool, you must make a thorough check over all the electric parts of the motor so as to avoid the current leakage and any other accidents because of the damage of electric circuit during the transportation.
8. On the first starting of test—run, you should select the lowest step of running speed and start the machine tool to run for 20 minutes to see if there is any unusual phenomenon with it; if there is not, you can increase the running speed gradually.
9. Never be allowed to change the spindle speed and the feeds unless the machine tool comes to dead stop.
10. Before operating the machine tool, the operator must be carefully and thoroughly read the operation instruction to know very well all about the operation, lubrication and maintenance of the machine tool so as to assure that the machine tool can be normally used for a long time.

OPERATION & MAINTENANCE

1. Operation (See to Fig. 4)

Spindle box:

Turn the switch lever (1); open the cover. Switch the belt pulley according to the speed change diagram of spindle, and you will be offered with 6 kinds of spindle speeds.

Feed gear box:

Tumble lever (2) is used for the start-up, stop forward motion and reverse motion of the spindle. When it is set at the position "1" on the indicating plate, the spindle runs forwardly; when it is set at the position "0" the spindle stops its running; and when it is set at the position "2", the spindle runs reversely.

Apron:

Turn the hand wheel (3) to make the apron and the saddle move longitudinally. When the hand wheel is turned in reverse hour, the apron and the saddle make a left hand motion; when the wheel is turned in clock wise sense, the apron and the saddle make a right hand motion.

Lever (4) is the lever for engaging half nut of leadscrew. To turn metric threads and to make the longitudinal flexible speed, lever (4) is to be set at the position "Close" before turning the hand wheel (3), the lever (4) must be set at the position "open".

Tailstock:

(5) is of hexagonal nut, and used for clamping the tailstock onto the machine bed. Turn the hand wheel (6) to adjust the tailstock barrel.

When the hand wheel is turned in clock wise sense, the tailstock barrel goes forwardly; and when the hand wheel is turned in inverted hour, the tailstock barrel goes backward.

Lever (7) is of tailstock barrel clamp lever. Before operating the hand wheel (6), the lever must be set loose, and when the tailstock barrel moves into the required position, the clamp lever should be fastened again by hand.

Lever (8) is for the travel of compound rest slide. When the lever is turned in clock wise sense, the compound rest slide goes forwardly, and when the lever is turned in inverse hour, it goes backward.

Lever (9) is used to fasten the square head. After the lever is set loose,

the square head is able to turn, and when the lever is fastened, it can not turn.

Lever (10) is of transverse feed lever, which is turned in clock wise sense, the cross slide, carrying the slide together, goes forwardly.

When the lever is turned in inverted hour, the cross slide goes backwardly.

(ii) in Fig. 4 is a hexagon head screw, which is used for fixing the saddle when the operation of the end face takes place.

2. Maintenance

In use, the machine tool should be taken care of with preventive maintenance so as to assure that it can keep on high accuracy of its performance and that it can be extended for its use life.

(1) After the machine tool is put into normal operation for 10 days, it is necessary to change the lube in the headstock and to wash it with gasoline or coal oil. From then on, the headstock will need clearing and the lube inside the headstock will need changing after a certain period of time.

(2) Everyday, before setting to work, you should lubricate the machine according to the requirements of lubrication of the machine. The oil level in the spindle box should be often checked.

(3) In use, the chip falling onto all the sliding surfaces should be cleaned out in time, and you need to check from time to time if there is any iron powder coming in between the saddle and the guideway surface of the machine bed, and check that the asphalt felt does not work. The asphalt felt should be washed at regular intervals.

(4) After having done the work each day, you must clean out the chip and wipe all the parts of the machine tool, and coat it with machine oil in order to prevent the machine from rusting.

(5) In order to keep the machine tool with high accuracy, the centers, the surfaces of spindle carriage stop and the guideway should be taken care of to avoid the damage and the early wear of the machine because of the unreasonable use.

(6) If the machine tool is found damaged, it must be examined and repaired at once.

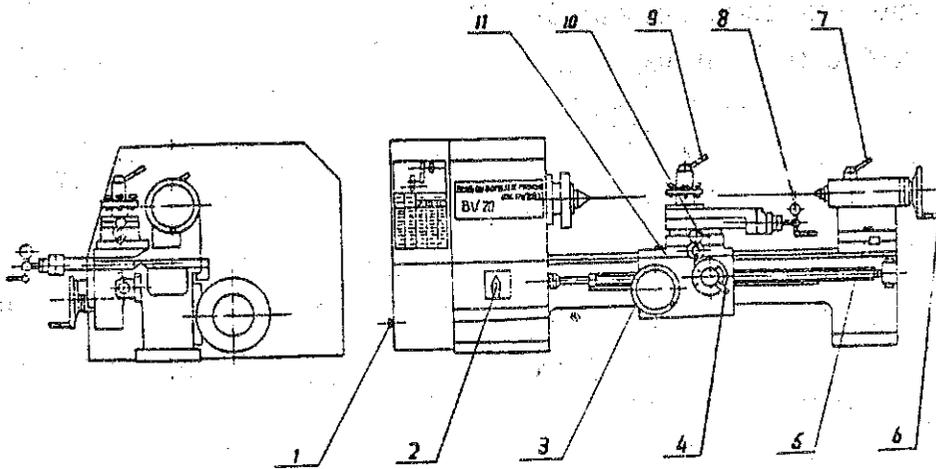


Fig. 3 Operation system

LUBRICATION (See to Fig. 5)

Lubrication Chart

| Ser. No. in Fig. | Part | Lubricating point | method | kind | Period |
|---------------------|---------------------|----------------------------------|---------|-------------|--|
| 1 | Spindle box | Gear, bearing | Spray | Machine oil | 10 days after the start-up; 20 days after the 1st lube; from then on, every 60 days. |
| 2 | Saddle | Longitudinal guideways of saddle | oil gun | machine oil | Every day |
| 3 | Tool slide | Leadscrew | Oil gun | Machine oil | Every day |
| 4 | Tailstock | Screw, tailstock barrel | Oil gun | Machine oil | Every day |
| 5 | Leadscrew supporter | Screw | Oil gun | Machine oil | every day |
| 6 | Cross slide | Screw | Oil gun | Machine oil | Every day |

Before and after the operation, the lubricated surfaces of the machine tool should be lubricated each time.

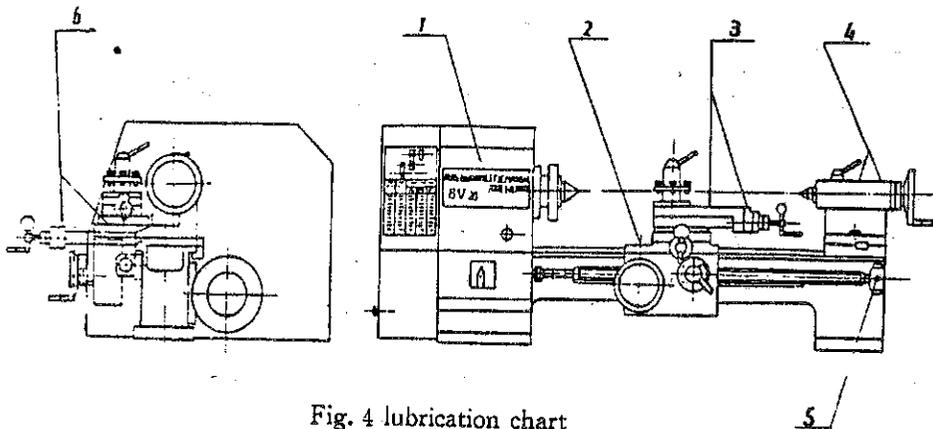


Fig. 4 lubrication chart

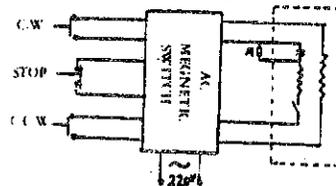
THE INTRODUCTION OF HF-2AC MAGNETIC SWITCH

USES:

HF-2 AC magnetic switch has three functions, STOP, CLOCKWISE, COUNTER-CLOCK WISE.

It is suitable for all kinds of mini family machine tool, and can protect electrical machinery from power-stop, or low-power-voltage.

PRINCIPLE:



PARAMETER:

- a) power voltage: 220V $\begin{matrix} +10\% \\ -20\% \end{matrix}$, 50Hz
- b) Attraction voltage: $\leq 180V$
- c) Release voltage: $\geq 70V$
- d) Maximum current in resistance: 10A
- e) Insulation resistance: $\geq 100M\Omega$
- f) Anti-power intensity: 1000V, 50Hz (60 sec)
- g) Mechanical limit: 5×10^7 times
Electrical limit: 5×10^5 times

CAUTION IN OPERATION:

- a) "o" indicates STOP, "⌚" shows CLOSKWISE, "⌚" shows COUNTER-CLOCKWISE.
- b) Before the electrical machinery operates, it is forbidden for "⌚" and "⌚" to be keyed in the same time, or, the electrical machinery will be damaged.
- c) With in 10 secents after electrical machinery operates, it is not suitable to stop.
- d) In the closkwise operation, if you want to counter-clockwise, you must key STOP firstly. The same is the counter-closkwise.
- e) Alter operation ends, CUT THE POWER.

ELECTRIC EQUIPMENT

(See to Fig. 7)

The electric equipment of the machine tool includes a single-phase induction motor with electric-capacity starting, Model JY7134, and a Type LWX-N $\frac{1}{2}$. 2switch.

The voltage of main power is 220V. The forward motion, reverse motion and stop of spindle is controlled by the switch.

When making the installation of the operation of the electric equipment, user must check each part of the equipment according to the technical safety regulations.

A set of plug-in device is attached to the machine tool so that user can install it at the proper part of the bed plate by himself.

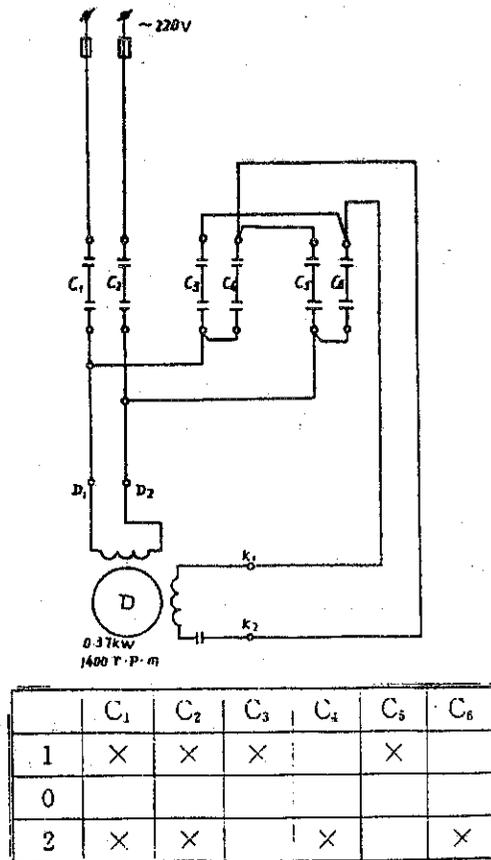


Fig. 5 Electric diagram

STANDARD ACCESSORIES

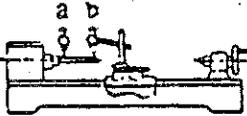
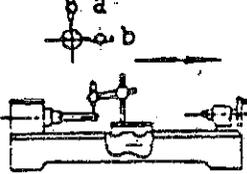
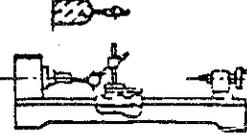
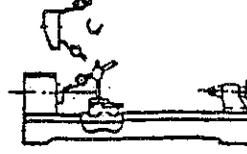
LIST OF STANDARD ACCESSORIES

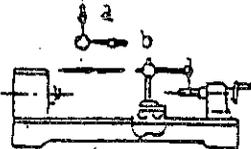
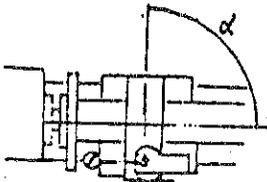
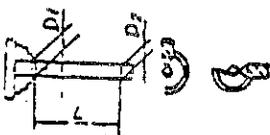
| Serial no. | Item | Size | Pieces |
|------------|-----------------------------------|--------------|--------|
| 1 | Three-jaw chuck | Ø100 | 1 |
| 2 | V-belt | 0-710 | 1 |
| 3 | V-belt | 0-800 | 1 |
| 4 | V-belt | 0-900 | 1 |
| 5 | Center | No. 3 Morse | 1 |
| 6 | Center | No. 2 Morse | 1 |
| 7 | Hexagon socket wrench | 17 | 1 |
| 8 | Hexagon nut | M8 | 1 |
| 9 | Washer | 8 | 1 |
| 10 | Round head inner-hexagon screw | MX35 | 3 |
| 11 | Safety pin | | 2 |
| 12 | Spanner for chuck | 6 | 1 |
| 13 | Single head spanner | 10 | 1 |
| 14 | Single head spanner | 14 | 1 |
| 15 | Single head spanner | 19 | 1 |
| 16 | Plug for main power | Single-phase | 1 |

X. LIST OF DAMAGEABLE PARTS

| Ser. No. | Item | No. of Fig. /code | Material | pcs. | Remarks |
|----------|-----------------------------|----------------------|------------|------|--------------------|
| 1 | Clasp nut | 03—03 | ZQSn-6-6-3 | 1 | |
| 2 | Nut of cross leadscrew | 04— | ZQSn6-6-3 | 1 | |
| 3 | Safety pin | GBii9—76 | 45 | 1 | |
| 4 | Tailstock center | C25-4No. 2 Morse | T10A | 1 | For center C62. |
| 5 | Square head fixing screw | GB83—76 | 35 | 8 | M8x30 C35. |

ACCURACY INSPECTION SHEET

| Item | Inspection object | Sketch | Accuracy $\left(\frac{\text{mm}}{\text{in}}\right)$ | |
|------|---|---|--|-------------------|
| | | | permissible error | Ascertained error |
| G1. | Straightness of carriage movement in vertical plane. |  | guideway 0.04 (0.0016 in) (convex only) | 0.020 |
| G2. | Straightness of carriage movement in horizontal plane |  | guideway 0.04 (0.0016 in) | 0.013 |
| G3. | Taper hole of spindle runs true |  | a. nearest spindle nose 0.02 (0.0008 in) b. At a distance of 100mm: 0.04 (4:0.0016in) | 0.005 0.015 |
| G4. | Movement of carriage parallel with axis of spindle |  | a. In vertical plane 0.04 (0.0016 in) b. In horizontal plane 0/03 (0.0012in) | 0.023 0.015 |
| G5. | Axial slip of spindle |  | 0.02 (0.0008 in) | 0.010 |
| G6. | End face run-out in shoulder of spindle |  | 0.03 (0.0012in) | 0.010 |

| Item | Inspection object | Sketch | Accuracy $\left(\frac{\text{mm}}{\text{in}}\right)$ | |
|------|---|---|--|-------------------------------------|
| | | | permissible error | Ascertain error |
| G7. | Diameter run-out. in shoulder of spindle |  | 0.03 (0.0012in) | 0.010 |
| G8. | Movement of carriage parallel with axis of taper hole in tailstock sleeve |  | a. In vertical plane 0.05/100 (0.0020/4in) b. In horizontal plane 0.05/100 (0.0020/4in) | 0.040 0.030 |
| G9. | Axis of taper hole of spindle and axis of taper hole of tailstock sleeve at same height with movement of carriage |  | 0.08(0.0032in) (Tailstock side higher only) | 0.060 |
| G10. | Straightness of movement of movement of cross slide to axis of spindle |  | 0.04/100(0.0016/4in)($\alpha \geq 90^\circ$) | 0.035/100 $\alpha \geq 90^\circ$ |
| G11. | Accuracy of extengal turning |  | a. Roundness 0.02 (0.0008 in) B. Cylindricity 0.03/100 (0.0012/4in) | 0.005 0.01/100 |

