SHARP
PRECISION MACHINE TOOLS

## HIGH SPEED PRECISION LATHE

# OPERATOR'S
# & SPARE PARTS
# MANUAL

16" & 18" Series

**For Models : 1640L, 1660L, 1860L, 1880L**

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# PREFACE

Thank you for choosing Sharp as your choice for a high precision lathe. We at Sharp take pride in the workmanship, durability and precision of our machines.

Read this manual in its entirety in order to get the best possible results from the machine and prolong its life, and become familiar with its operation, safety features and recommended maintenance.

The 1 year warranty would be void if the machine was damaged due to improper use or disregard to any operational instruction contained in this manual.

Some precautions to be taken not listed later in this manual are:

1. Do **NOT** install the machine in direct sunlight or directly in front of any cooling system blowers.
2. Use only recommended lubricants.
3. Always keep machine clean.
4. Should the ways become damaged do not move the carriage until they have been repaired.

**Read the following instructions before operating the machine**.

- Only authorized personnel should work on this machine. Untrained personnel present a hazard to themselves and the machine, and improper operation will void the warranty.

- Check for damaged parts and tools before operating the machine. Any part or tool that is damaged should be properly repaired or replaced by authorized personnel. Do not operate the machine if any component does not appear to be functioning correctly.

- Use appropriate eye and ear protection while operating the machine. ANSI-approved impact safety goggles and OSHA-approved ear protection are recommended to reduce the risks of sight damage and hearing loss.

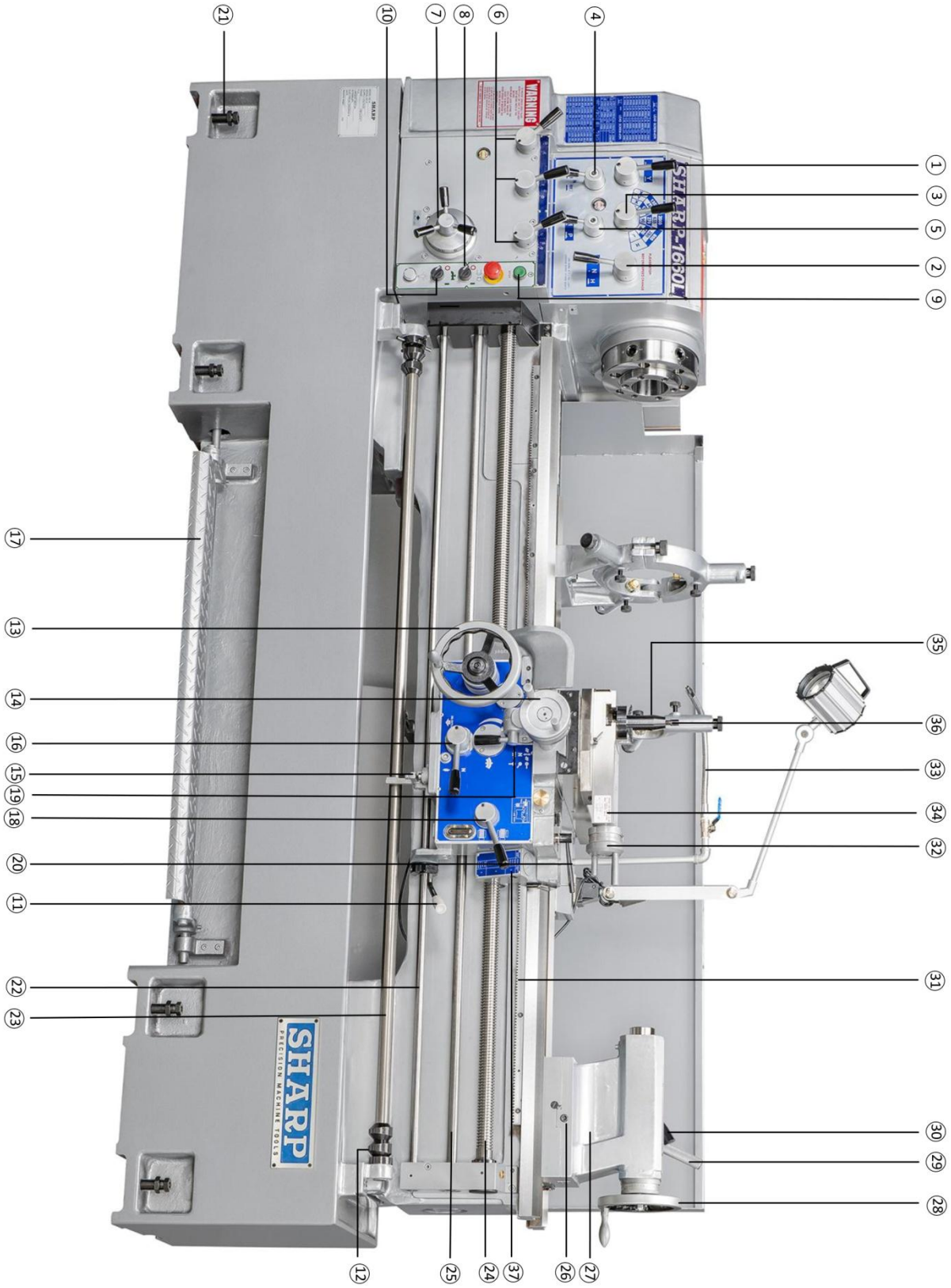
- The Emergency Stop button is the large, circular red switch located on the Control Panel. Pressing the Emergency Stop button will instantly stop all motion of the machine.

- The electrical panel should be closed and the key and latches on the electrical cabinet should be secured at all times except during installation and service. At those times, only qualified electricians should have access to the panel. When the main circuit breaker is on, there is high voltage throughout the electrical panel. Once the machine is installed, the electrical cabinet must be locked and the key available only to qualified service personnel.

- DO NOT modify or alter this equipment in any way. If modifications are necessary, all such requests must be handled by SHARP INDUSTRIES, INC. Any unauthorized modification or alteration of any sharp MACHINES could lead to personal injury and/or mechanical damage and will void your warranty

# 1. SHARP HIGH SPEED PRECISION LATHE

## 1-1 Machine Assembly



| ITEM | DESCRIPTION | ITEM | DESCRIPTION |
|---|---|---|---|
| 1 | Spindle speed shifting lever | 20 | Carriage clamping lever |
| 2 | Spindle speed H/L shifting lever | 21 | Foundation adjusting bolt |
| 3 | Spindle speed shifting selection lever | 22 | Spindle operation control rod |
| 4 | Forward/Reverse Shifting lever | 23 | 4 position automatic feed stop selection rod |
| 5 | Thread/Feed Selection lever | 24 | Leadscrew |
| 6 | Thread/Feed Shifting lever | 25 | Auto-feed rod |
| 7 | 10-step feed selection dial | 26 | Tailstock set over adjusting Screw |
| 8 | Power source switch (Main switch) | 27 | Tailstock body |
| 9 | Intermittent button | 28 | Tailstock handwheel |
| 10 | Coolant supply button | 29 | Tailstock body Clamping lever |
| 11 | Spindle operation control lever | 30 | Tailstock spindle locking lever |
| 12 | Adjustable trip dog | 31 | Rack |
| 13 | Longitudinal feed hand wheel | 32 | Compound rest handle |
| 14 | Cross slide handle | 33 | Coolant control valve |
| 15 | Trip plunger | 34 | Compound rest |
| 16 | Auto feeding engaged lever | 35 | American tool post |
| 17 | Foot brake pedal | 36 | Tool post clamping lever |
| 18 | Half nut engaged lever | 37 | Thread dial indicator |
| 19 | Feed axis selector | | |

## 2. UNPACKING & MACHINE INSTALLATION

### 2-1 Unpacking

When the machine is arrived, first, check if the wooden case is damaged or not, secondly, open the case and inspect the machine for any damage or short supply of parts. If so, please contact our company or insurance company immediately in order to get the best solution or refund; otherwise our company or the insurance company will not be in the position to compensate for the damage.

### 2-2 Lifting

Please refer to figure 2-2 for machine unloading from the truck.

The steps of lifting the lathes are:

1. Clamp the bedways with a special made hanger, which consists of a clamp and an iron chain.
2. Raise the lathe a little bit with crane, then check if the lathe is balanced. If not, move apron and cross slide back or forth to make the machine is balanced.
3. While the machine arrives at the location, put down the machine slowly to avoid any inaccuracy of the machine caused by bumps or crash.
4. For adjusting the electrical cabinet, the machine should be located allowing sufficient area, min. over 600mm from wall at back and tailstock end.

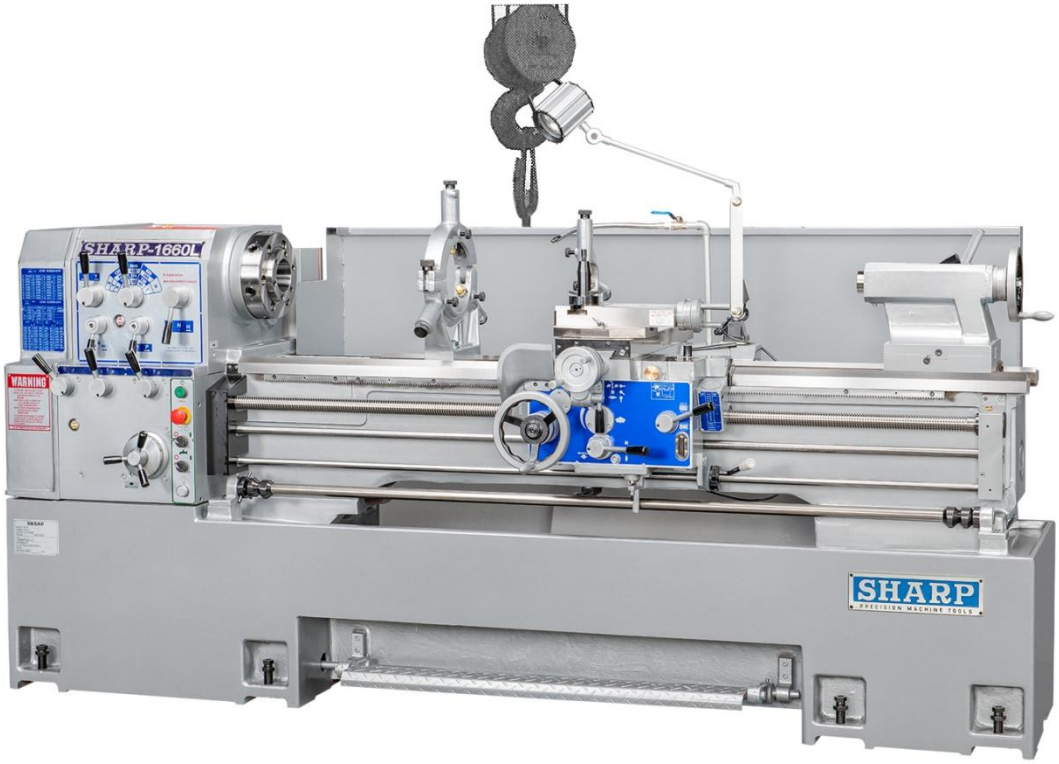
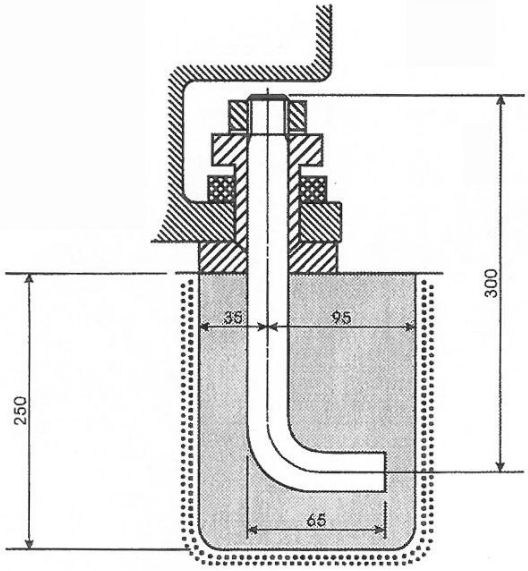



Fig.2-2

## 2-3 Basic Foundation

With the common usage of tungsten carbide cutting tools nowadays, heavy cutting and quicker spindle speed are therefore reinforced. This may cause the vibration easily. In order to keep the best cutting condition it is necessary to build a sound & good floor basis. (Please refer to figure 2-3 for basic structure.)




UNIT-mm Fig.2-3

## 2-4 Cleaning

The machine is protected with a special anti-rust agent before delivery. Before operating the machine, clean all parts, especially the slideways, leadscrew, rack and all bright surfaces with soft brush/cloth soaked with cleaning solvent or kerosene. Do NOT use gasoline or cellulose solvent to avoid dangers or fire or explosion. After removing the anti-agent, keep the machine properly lubricated. Then turn the moving mechanism like tool post, tailstock by hand back & forth within their moving areas.

## 2-5 Leveling Adjustment

Once the set screw and concrete are completely dried and fixed. It is time to adjust the level of the bedway. A machinist's level (accuracy 0.02mm/1000mm) should be placed on the slideways of bed. Adjust the set screw for longitudinal direction of bed level. For transverse direction of bed level, tight the nuts until the accuracy is within 0.04mm/1000mm. Then check again. If the deviation is resulted from the nuts, it is necessary to make another adjustment. (See Figure 2-5)

Fig.2-5

## 3. ELECTRICAL CIRCUIT CONTROL

### 3-1 Electrical Wiring

The electrical control box can be found by opening its cover at the back side of bed. Connect the power source wire with the connecting points (R.S.T).

The wire between the power source and the connecting points must be over sectional area 8mm$^2$ (5.5 mm$^2$ for 460 or 18" series).

The main switch between machine and power source should be equipped with safety fuse. Besides, the machine must have a earth wire.

Fig.3-1

### 3-2 Electrical Equipment

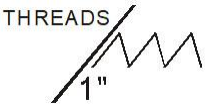
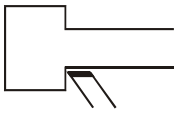
1. The electrical control box is also equipped with overload circuit breaker and electric magnetic contactor to protect motor from burning out by overload.
2. The main switch is connected with a micro switch.
3. The foot brake is connected with micro switch. Stepping the footbrake is quicker to stop the lathe than turning off the switch. The spindle can only revolute again by re-operating the spindle operation control lever using the foot brake.
4. The spindle will rotate continuously as long as the intermittent switch on the top of the electrical panel is pressed.

### 3-3 Electrical Cautions

After wiring, check the rotation of the spindle. Turn the main switch "ON" and make sure the safety of spindle. Then push intermittent button Ⓣ momentarily. The correction direction of the spindle rotation is counter clockwise. (looking from tailstock for a downward movement of the spindle operation control lever.) Wrong direction of rotation can be rectified by interchanging any two of the three phase lines (R.S.T.) in the power source.

## 4. TESTING & OPERATION

### 4-1 Operation Symbols

| | | | | | |
|---|---|---|---|---|---|
| 1 | HIGH | High speed revolution | 11 |  | Variable adjustment (pressure) **Clockwise:** pressure increase **Counterclockwise:** pressure decrease |
| 2 | LOW | Low speed revolution | 12 |  | Electrical control box |
| 3 |  | Forward revolution | 13 |   | Imperial threads |
| 4 | N | Neutral gear | 14 |   | Metric threads |
| 5 |  | Reverse revolution | 15 |   | Auto feeding Rate per revolution |
| 6 |  | Feeding | 16 |  | Pump |
| 7 | T | Intermittent button | 17 |   | Power switch-ON |
| 8 |  | Cross feeding | 18 |   | Power switch-OFF |
| 9 |  | Longitudinal feeding | 19 | OIL | Oil inlet (hole) |
| 10 |  | Cone clutch | | | |

**4-2 Transmission & Stop of Spindle**

After the procedure described previously in this manual have been done, it is time to test the machine.

Position the spindle H/L shifting lever ② to "L", the spindle speed shifting selection lever ③ to the very left side, and forward/reverse shifting lever ④ to "N" position. Lift the spindle operation control lever (⑪ of item 1-1), the spindle will rotate forward, press down the lever, the spindle will rotate reverse; in 'Neutral' position, the spindle will stop. For normal forward & reverse revolution, always operate the spindle operation control lever. For emergency stop, step on the foot brake, the spindle operation control lever should push back to 'Neutral' position after stepping the foot brake. Afterward, start the spindle.

Turn the coolant supply button (⑩ of item 1-1). Adjust the adjusting valve for the required coolant flow.

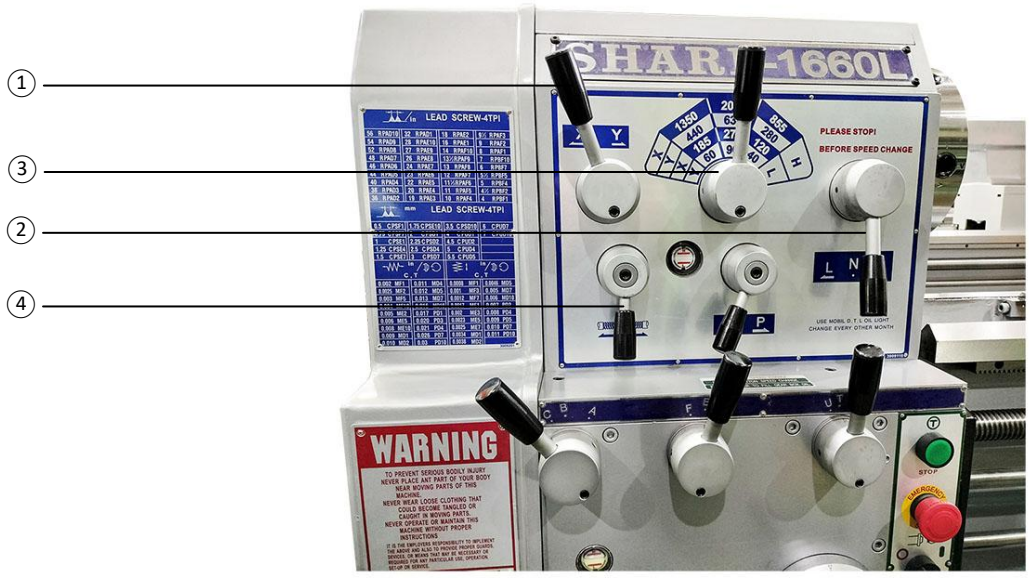



Fig.4-2

**4-3 Spindle Speed Selection**

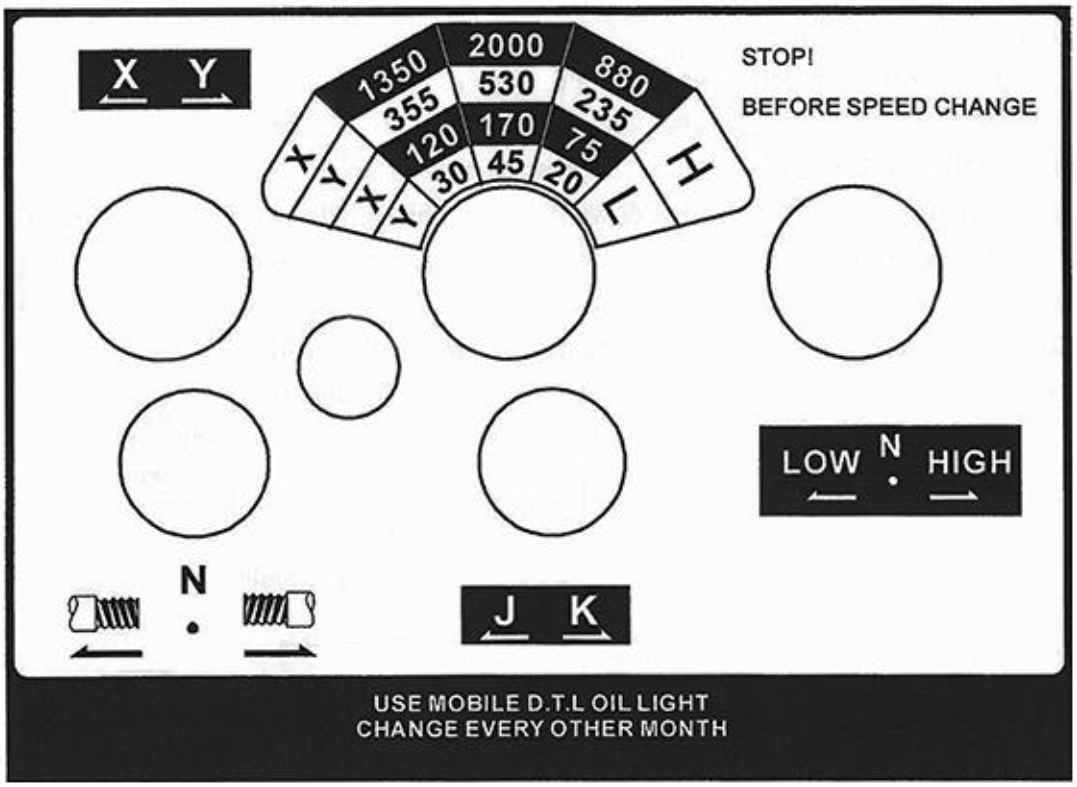
Spindle speed shift is made up of three speed shifting levers:

1. Spindle speed shifting lever
2. Spindle speed H/L shifting lever
3. Spindle speed shifting selection lever for total of 12 spindle speed numbers

Put the spindle speed H/L shifting lever to 'neutral' gear between 'H' and 'L' rotate the spindle by hand.

For safety and protecting the gears from damage, only change speeds when the motor is completely stopped. If the gears are not easily engaged, press intermittent button and handle the speed shifting levers to change the speeds.

**Caution:** Do not shift gears while spindle is turning. Be certain gears are properly engaged before starting.



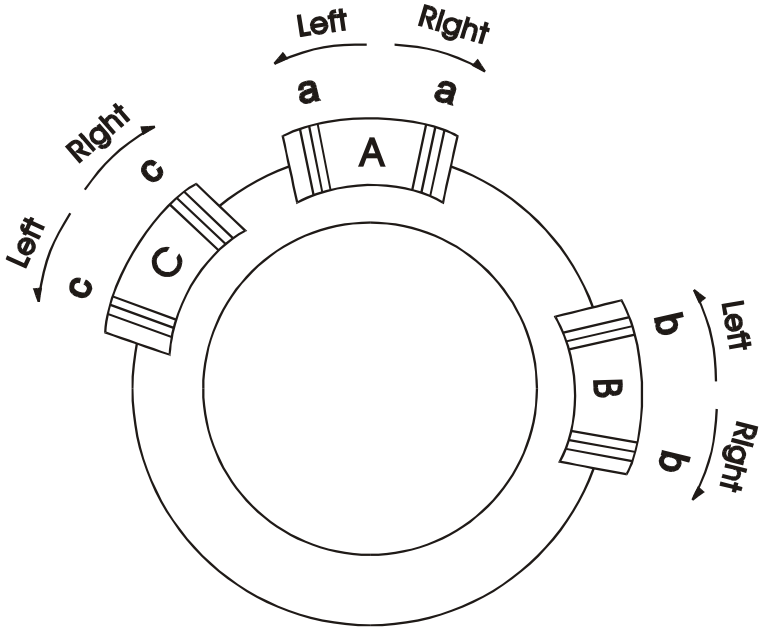

## 4-4 Intermittent (Inching) Operation of Spindle

For the convenience spindle speed shifting, feeding rate recognition and work piece center line and adjustment, press the intermittent button ⑨ located on the right side of the gear box, and the spindle will rotate forward. The spindle will rotate as long as the intermittent switch is pressed. The intermittent switch cannot rotate reverse.


Fig.4-4

**4-5 The Importance and Methods of Spindle Leveling Adjustment**

1. A lathe without proper leveling adjustment is likely to chatter. As a consequence, this will influence the cutting accuracy of work piece and result in poor roundness accuracy and finish. It is necessary to pay attention to the spindle leveling from time to time in order to have the best cutting condition of the lathe. Belt, 3-jaw chuck and the accumulative tolerances of parts on headstock, all such factors, can make the lathe chatter. To get rid of those problems, our lathe is especially designed to be equipped with leveling blocks mounted on the locking nut at the rear side of the spindle. The leveling blocks can be properly adjusted according to different condition. Please refer to following description & figure for proper adjustment.
2. First, set up the spindle speed at 1350 rpm. Put the palm on left hand of the headstock cover and press the switch by left hand. Then switch on the lathe to make the spindle turn. Move the leveling block “A & C” left or right by hand feeling until obtain the best leveling position. Then also move the leveling block “B” left or right till the best position with same way. Adjust repeatedly till your hand feels no chattering. Afterwards, change the spindle speed to 2000rpm or 880rpm and check the leveling in the same way as we did at 1350rpm. Finally, for the leveling block set screw a, a’, b.b. c.c. securely.



**4-6 Transmission & Stop of Gear Box**

Open the end cover to find the gear train transmitting from headstock to gear box, position the forward/reverse shifting lever (④ of item 1-1) to right side, the spindle will rotate forward; to right; reverse; to Neutral, stop. Do not change the gears while turning.

**4-7 Gear Box Operation**

1. **Threading:**
   With the special design, there is no need to re-arrange the back gears for threading. Please refer to the 'threading & feeding table' and handle the thread/feed selection lever (⑤ of item 1-1), thread, feed shifting lever (⑥ of item 1-1) and 10-step feed selection dial (⑦ of item 1-1) accordingly.
2. **Auto feeding:**
   Also select the appropriate auto feeding rate by positioning the thread, feed selection lever (⑤ of item 1-1), thread, feed shifting lever (⑥ of item 1-1) and 10-step feed selection dial (⑦ of item 1-1) as indicated on the 'threading and feeding table'.

**4-8 Manual Operation**

First, position both the halt nut engage lever ⑱, and forward and reverse shifting lever (④ of item 1-1) to 'N' position to operate the apron handwheel ⑬ cross slide handle ⑭, and compound rest handle ㉜ easily.

It feeds 17mm per revolution of apron handwheel. The dials on cross slide and compound rest is graduated 0.02mm per calibration, and feeds 4mm per revolution.

The tool post can be rotated clockwise after loosing the tool post clamping lever (㊱ of item 1-1). Then position and tighten the clamping lever. For fixing the apron, just handle the saddle clamping lever ⑳. For cross slide and compound rest, screw tightly the set screws beside the taper pin.

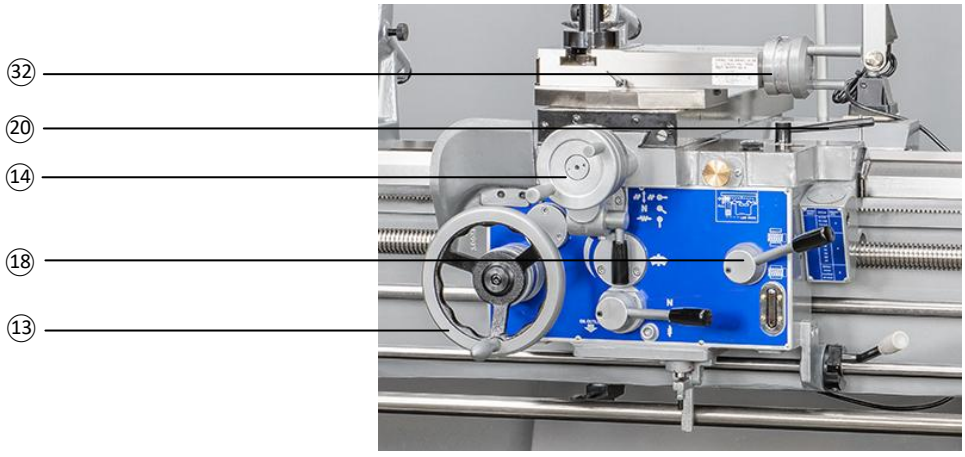



Fig.4-8

**4-9 Automatic Feeding Operation**

1. Position the thread/reverse shifting lever (④ of item 1-1) for obtaining the required feeding position.
2. Shift the thread, feed selection lever (⑤ of item 1-1), thread, feed selection lever (⑥ of item 1-1), 10-step feed selection lever to select the appropriate feeding rate.
3. For threading, push the half nut engaged lever (⑱ of item 1-1) downward till fully engaged.
4. For cross feeding, push the feed axis selector (⑲ of item 1-1) downward till fully engaged.
5. For longitudinal feeding, pull the feed axis selector.

**4-10 Automatic Feeding Stop Operation**

The apron is equipped with automatic stop device. Tighten the screw on the top of the adjustable trip dog ⑫, and then fix it to the required position. Be careful that the top tip of the adjustable trip dog can be set onto the required position for forward and backward feeding. To avoid danger or damage to work piece, always have a test before starting.

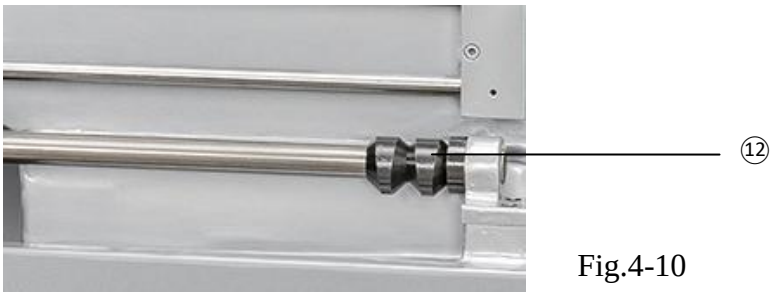



Fig.4-10

**4-11 4-position Automatic Feeding Stop Operation**

To process certain length or step type of work piece, can use the 4-position Automatic feeding stop for length set cutting.

1. Rotate the adjustable trip dog (⑫ of item 1-1) to the required setting position and make the top tip of the adjustable trip dog face outward. Try to test the auto feeding and adjust the front and back position of the adjustable trip dog if required, in order to ascertain the position setting accuracy.
2. Secondly, operate the 4-position automatic feed stop selection lever to the second adjustable trip dog by hand and fix the adjustable trip dog according to above procedure.
3. Same procedure for the third and fourth adjustable trip dog.
4. While the apron is auto-feeding, only the top tip of adjustable trip dog, which faces outward can touch the trip plunger (⑮ of item 1-1). After stopping the auto feeding of apron, the other three adjustable trip dog can pass freely without any function.

**4-12 Tailstock Operation**

1. The tailstock handwheel dial is divided in 0.02mm per graduation. The tailstock moves forward 5mm per clockwise revolution of handwheel.When revoluting clockwise, the quill will retract and, to the last, the center will release automatically.
2. Push the tailstock quill locking lever ㉚ forward to fix the tailstock quill. For fixing the tailstock onto the bedway, push tailstock body clamping lever ㉙ forward.
3. Adjust the centerline of the tailstock by loosing the tailstock set-over adjusting screw ㉖ on the side firstly, then adjust the screw on the other side. After adjustment, tighten the screw on both sides.

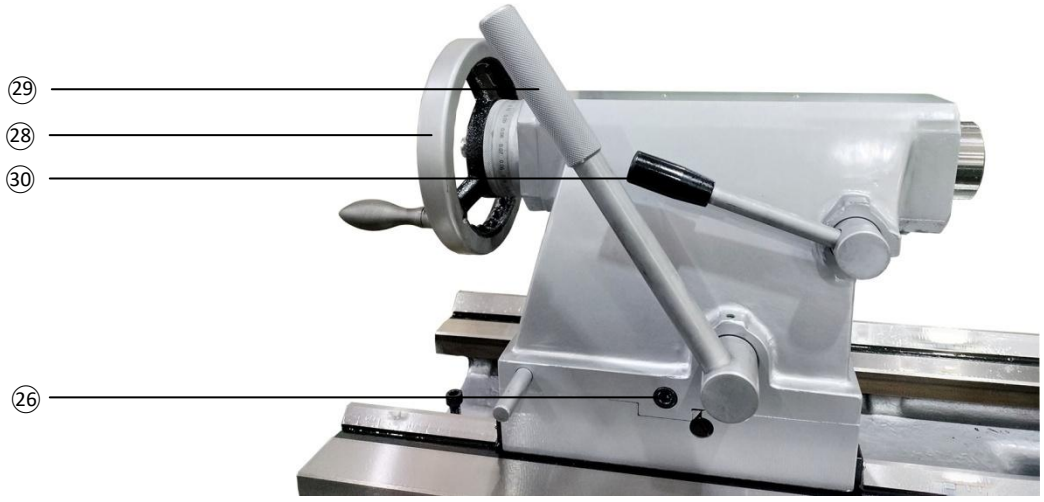



Fig.4-12

## 5. THREADING

### 5-1 Leadscrew Drive.

Move the forward/reverse lever (④ of item 1-1) to the right will cause the leadscrew to rotate backwards, moving the lever to the left the leadscrew will rotate forward and when lever is in neutral the leadscrew will stop.

### 5-2 Threading

1. After selecting the thread to be cut, set the following levers to the appropriate position: ⑤, ⑥ & ⑦ of item 1-1. (Example 18 t.p.i. PAE2)
2. Turn of the lathe.
3. Engage the half nut by pushing ⑱ of item 1-1 down, making sure it is fully engaged.

### 5-3 Thread Dial Indicator

1. Thread dial indicator for Imperial leadscrew

   To cut even number threads the leadscrew can be engaged on any number of line. For odd number threads the leadscrew can be engaged on any number. Fractional threads (1/2, 1/4 etc.), leadscrew can only be engaged on the same number or line.

   **Note:** When cutting metric threads on a lathe with an Imperial leadscrew be sure the half nut is engaged at all times. (If not, the thread will not repeat).

2. Thread dial indicator for Metric leadscrew cutting metric threads.

There are two dials, 2&7 division and 3&5 division for Metric leadscrew while using Metric thread dial indicator. Use 3&5 division dial for cutting pitches 1.25, 2.5, 5.0, 2.25, 4.5; for the rest threads use 2&7 division dial.

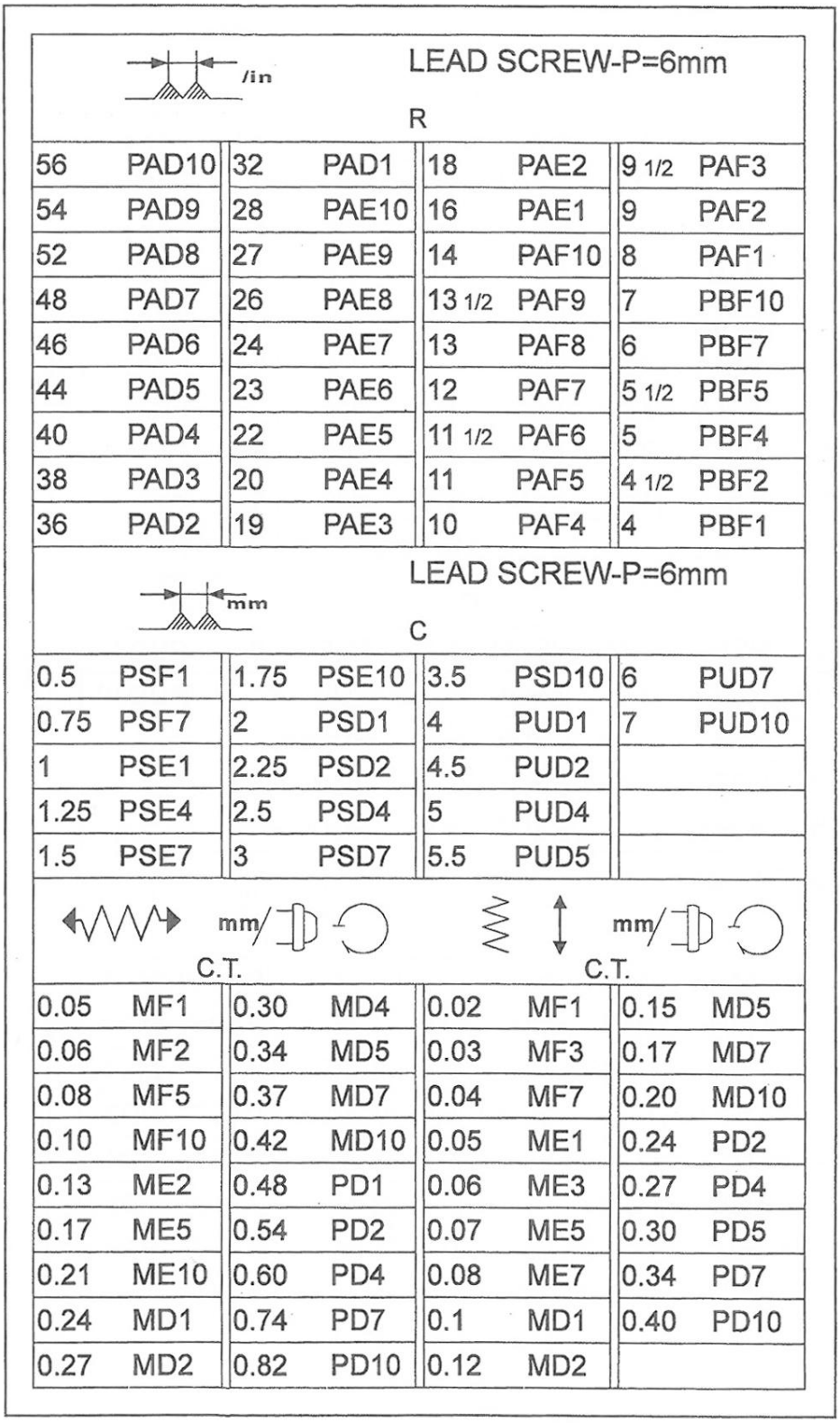
**Example 1 :** For cutting pitches 0.5, 0.75, 1.0, 1.5, 2.0, 3.0, 4.0, 6.0, use 14T worm gear and the 2&7 division dial. The dial numbers at which the leadscrew nuts may be engaged are 7, that is, every division can be engaged by leadscrew nuts.

**Example 2 :** For cutting pitches 1.75, 3.5, 7.0 also use the same 14T worm gear and 2&7 division dial. But the dial numbers at which the leadscrew nuts may be engaged on 2; number 1 and 2.

<table>
<tr><th>Gear teeth</th><th colspan="2">Pitch</th><th>Dial division</th><th>Half nuts engaged number</th></tr>
<tr><td>11T</td><td>2.75</td><td>5.5</td><td>2</td><td>1</td></tr>
<tr><td>13T</td><td>3.25</td><td>6.5</td><td>2</td><td>1</td></tr>
<tr><td rowspan="7">14T</td><td>1.75</td><td>3.5</td><td rowspan="2">2</td><td rowspan="2">1,2</td></tr>
<tr><td>7</td><td></td></tr>
<tr><td>0.5</td><td>0.75</td><td rowspan="4">7</td><td rowspan="4">1,2,3,4,5,6,7</td></tr>
<tr><td>1</td><td>1.5</td></tr>
<tr><td>2</td><td>3</td></tr>
<tr><td>4</td><td>6</td></tr>
<tr><td rowspan="3">15T</td><td>1.25</td><td>2.5</td><td rowspan="2">3</td><td rowspan="2">1,2,3</td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>2.25</td><td>4.5</td><td>5</td><td>1,2,3</td></tr>
<tr><td>18T</td><td>6.75</td><td></td><td>2</td><td>1,2</td></tr>
</table>

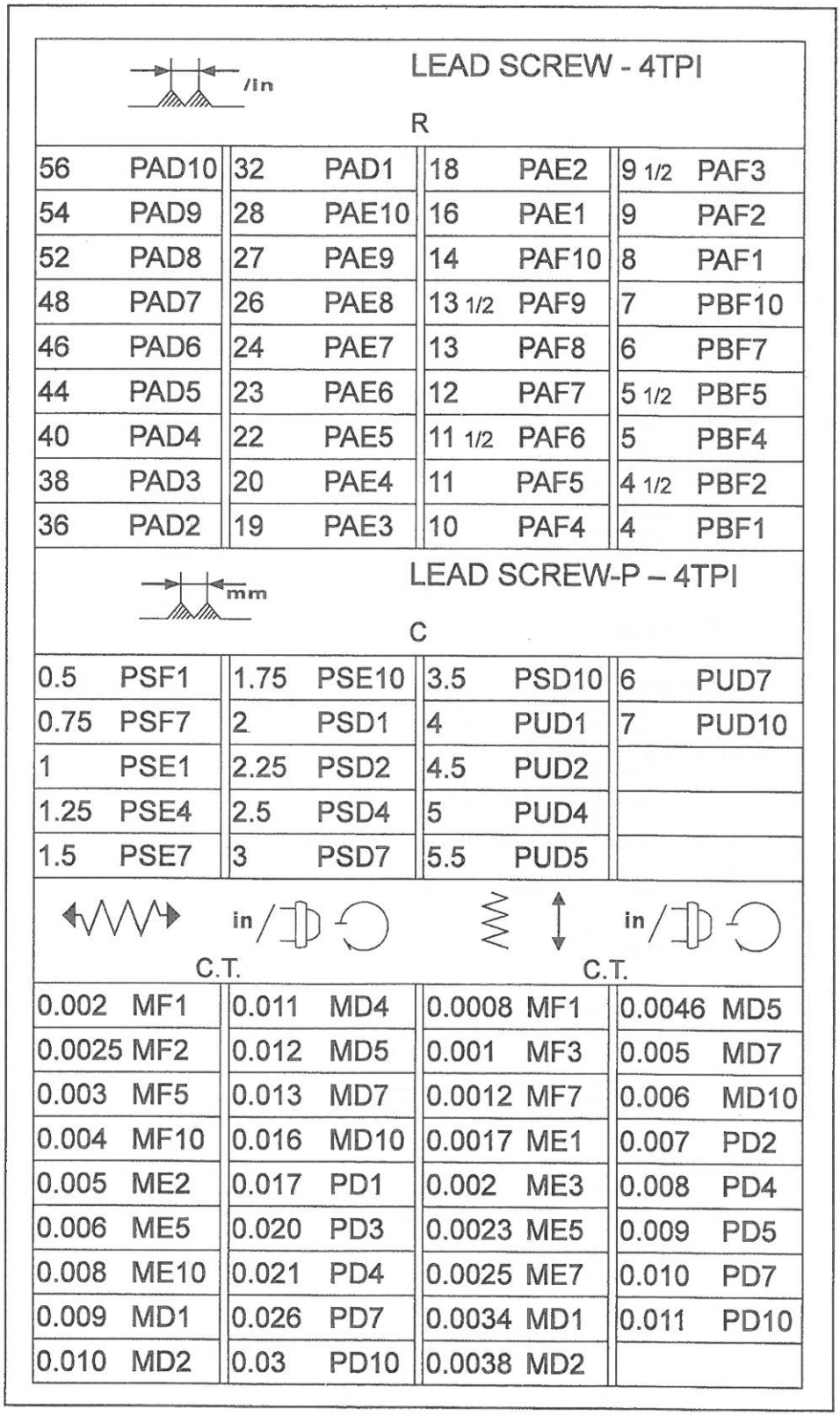
**5-4 Thread & Feed Chart**

For Swing 16”, 18”(410mm, 460mm) Series while Metric Leadscrew & Metric Feed.



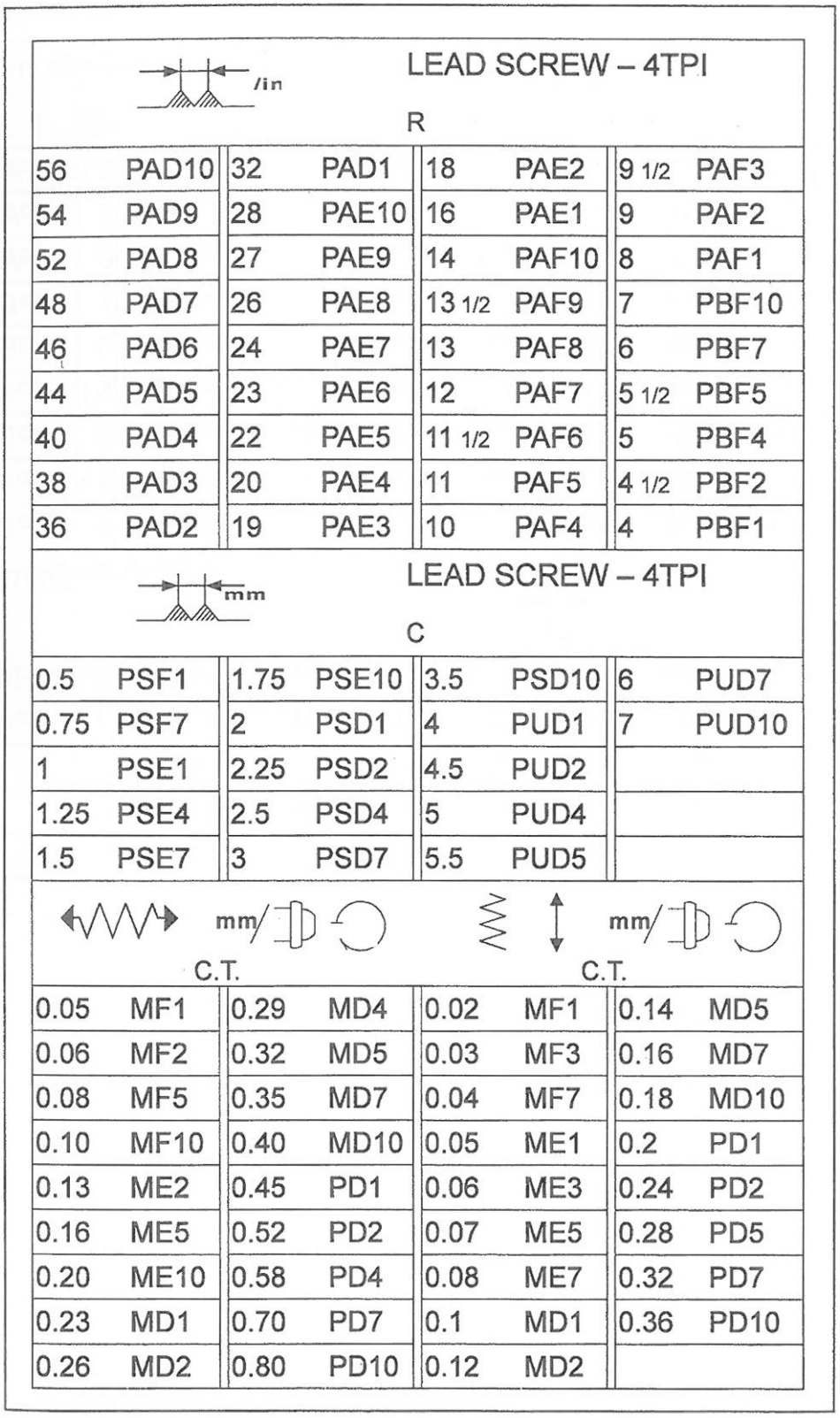
| /in | | | | | | | |
|---|---|---|---|---|---|---|---|
| LEAD SCREW-P=6mm R | | | | | | | |
| 56 | PAD10 | 32 | PAD1 | 18 | PAE2 | 9 1/2 | PAF3 |
| 54 | PAD9 | 28 | PAE10 | 16 | PAE1 | 9 | PAF2 |
| 52 | PAD8 | 27 | PAE9 | 14 | PAF10 | 8 | PAF1 |
| 48 | PAD7 | 26 | PAE8 | 13 1/2 | PAF9 | 7 | PBF10 |
| 46 | PAD6 | 24 | PAE7 | 13 | PAF8 | 6 | PBF7 |
| 44 | PAD5 | 23 | PAE6 | 12 | PAF7 | 5 1/2 | PBF5 |
| 40 | PAD4 | 22 | PAE5 | 11 1/2 | PAF6 | 5 | PBF4 |
| 38 | PAD3 | 20 | PAE4 | 11 | PAF5 | 4 1/2 | PBF2 |
| 36 | PAD2 | 19 | PAE3 | 10 | PAF4 | 4 | PBF1 |
| mm | | | | | | | |
| LEAD SCREW-P=6mm C | | | | | | | |
| 0.5 | PSF1 | 1.75 | PSE10 | 3.5 | PSD10 | 6 | PUD7 |
| 0.75 | PSF7 | 2 | PSD1 | 4 | PUD1 | 7 | PUD10 |
| 1 | PSE1 | 2.25 | PSD2 | 4.5 | PUD2 | | |
| 1.25 | PSE4 | 2.5 | PSD4 | 5 | PUD4 | | |
| 1.5 | PSE7 | 3 | PSD7 | 5.5 | PUD5 | | |
| mm/ C.T. | | | | mm/ C.T. | | | |
| 0.05 | MF1 | 0.30 | MD4 | 0.02 | MF1 | 0.15 | MD5 |
| 0.06 | MF2 | 0.34 | MD5 | 0.03 | MF3 | 0.17 | MD7 |
| 0.08 | MF5 | 0.37 | MD7 | 0.04 | MF7 | 0.20 | MD10 |
| 0.10 | MF10 | 0.42 | MD10 | 0.05 | ME1 | 0.24 | PD2 |
| 0.13 | ME2 | 0.48 | PD1 | 0.06 | ME3 | 0.27 | PD4 |
| 0.17 | ME5 | 0.54 | PD2 | 0.07 | ME5 | 0.30 | PD5 |
| 0.21 | ME10 | 0.60 | PD4 | 0.08 | ME7 | 0.34 | PD7 |
| 0.24 | MD1 | 0.74 | PD7 | 0.1 | MD1 | 0.40 | PD10 |
| 0.27 | MD2 | 0.82 | PD10 | 0.12 | MD2 | | |

For Swing 16”, 18” (410mm, 460mm) Series while Imperial Leadscrew & Imperial Feed.



| /in | | | | LEAD SCREW - 4TPI | | | |
|---|---|---|---|---|---|---|---|
| | | | | R | | | |
| 56 | PAD10 | 32 | PAD1 | 18 | PAE2 | 9 1/2 | PAF3 |
| 54 | PAD9 | 28 | PAE10 | 16 | PAE1 | 9 | PAF2 |
| 52 | PAD8 | 27 | PAE9 | 14 | PAF10 | 8 | PAF1 |
| 48 | PAD7 | 26 | PAE8 | 13 1/2 | PAF9 | 7 | PBF10 |
| 46 | PAD6 | 24 | PAE7 | 13 | PAF8 | 6 | PBF7 |
| 44 | PAD5 | 23 | PAE6 | 12 | PAF7 | 5 1/2 | PBF5 |
| 40 | PAD4 | 22 | PAE5 | 11 1/2 | PAF6 | 5 | PBF4 |
| 38 | PAD3 | 20 | PAE4 | 11 | PAF5 | 4 1/2 | PBF2 |
| 36 | PAD2 | 19 | PAE3 | 10 | PAF4 | 4 | PBF1 |
| mm | | | | LEAD SCREW-P – 4TPI | | | |
| | | | | C | | | |
| 0.5 | PSF1 | 1.75 | PSE10 | 3.5 | PSD10 | 6 | PUD7 |
| 0.75 | PSF7 | 2 | PSD1 | 4 | PUD1 | 7 | PUD10 |
| 1 | PSE1 | 2.25 | PSD2 | 4.5 | PUD2 | | |
| 1.25 | PSE4 | 2.5 | PSD4 | 5 | PUD4 | | |
| 1.5 | PSE7 | 3 | PSD7 | 5.5 | PUD5 | | |
| in | | | | in | | | |
| C.T. | | | | C.T. | | | |
| 0.002 | MF1 | 0.011 | MD4 | 0.0008 | MF1 | 0.0046 | MD5 |
| 0.0025 | MF2 | 0.012 | MD5 | 0.001 | MF3 | 0.005 | MD7 |
| 0.003 | MF5 | 0.013 | MD7 | 0.0012 | MF7 | 0.006 | MD10 |
| 0.004 | MF10 | 0.016 | MD10 | 0.0017 | ME1 | 0.007 | PD2 |
| 0.005 | ME2 | 0.017 | PD1 | 0.002 | ME3 | 0.008 | PD4 |
| 0.006 | ME5 | 0.020 | PD3 | 0.0023 | ME5 | 0.009 | PD5 |
| 0.008 | ME10 | 0.021 | PD4 | 0.0025 | ME7 | 0.010 | PD7 |
| 0.009 | MD1 | 0.026 | PD7 | 0.0034 | MD1 | 0.011 | PD10 |
| 0.010 | MD2 | 0.03 | PD10 | 0.0038 | MD2 | | |

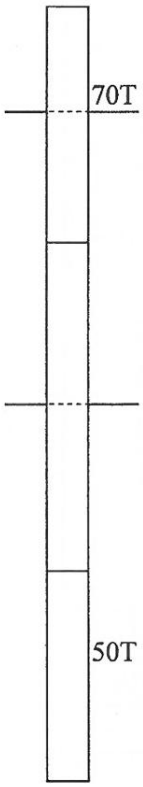
For Swing 16”, 18”(410mm, 460mm) Series while Imperial Leadscrew but Metric Feed.



| /in | | | | LEAD SCREW – 4TPI R | | | |
|---|---|---|---|---|---|---|---|
| 56 | PAD10 | 32 | PAD1 | 18 | PAE2 | 9 1/2 | PAF3 |
| 54 | PAD9 | 28 | PAE10 | 16 | PAE1 | 9 | PAF2 |
| 52 | PAD8 | 27 | PAE9 | 14 | PAF10 | 8 | PAF1 |
| 48 | PAD7 | 26 | PAE8 | 13 1/2 | PAF9 | 7 | PBF10 |
| 46 | PAD6 | 24 | PAE7 | 13 | PAF8 | 6 | PBF7 |
| 44 | PAD5 | 23 | PAE6 | 12 | PAF7 | 5 1/2 | PBF5 |
| 40 | PAD4 | 22 | PAE5 | 11 1/2 | PAF6 | 5 | PBF4 |
| 38 | PAD3 | 20 | PAE4 | 11 | PAF5 | 4 1/2 | PBF2 |
| 36 | PAD2 | 19 | PAE3 | 10 | PAF4 | 4 | PBF1 |
| mm | | | | LEAD SCREW – 4TPI C | | | |
| 0.5 | PSF1 | 1.75 | PSE10 | 3.5 | PSD10 | 6 | PUD7 |
| 0.75 | PSF7 | 2 | PSD1 | 4 | PUD1 | 7 | PUD10 |
| 1 | PSE1 | 2.25 | PSD2 | 4.5 | PUD2 | | |
| 1.25 | PSE4 | 2.5 | PSD4 | 5 | PUD4 | | |
| 1.5 | PSE7 | 3 | PSD7 | 5.5 | PUD5 | | |
| mm/ C.T. | | | | mm/ C.T. | | | |
| 0.05 | MF1 | 0.29 | MD4 | 0.02 | MF1 | 0.14 | MD5 |
| 0.06 | MF2 | 0.32 | MD5 | 0.03 | MF3 | 0.16 | MD7 |
| 0.08 | MF5 | 0.35 | MD7 | 0.04 | MF7 | 0.18 | MD10 |
| 0.10 | MF10 | 0.40 | MD10 | 0.05 | ME1 | 0.2 | PD1 |
| 0.13 | ME2 | 0.45 | PD1 | 0.06 | ME3 | 0.24 | PD2 |
| 0.16 | ME5 | 0.52 | PD2 | 0.07 | ME5 | 0.28 | PD5 |
| 0.20 | ME10 | 0.58 | PD4 | 0.08 | ME7 | 0.32 | PD7 |
| 0.23 | MD1 | 0.70 | PD7 | 0.1 | MD1 | 0.36 | PD10 |
| 0.26 | MD2 | 0.80 | PD10 | 0.12 | MD2 | | |

**5-5 Module & D.P Thread Chart**

For Swing 16”, 18”(410mm, 460mm) Series while Metric Leadscrew.




LEAD SCREW-P=6mm

π /1"

R

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 56 | PAD10 | 32 | PAD1 | 18 | PAE2 | 9 1/2 | PAF3 |
| 54 | PAD9 | 28 | PAE10 | 16 | PAE1 | 9 | PAF2 |
| 52 | PAD8 | 27 | PAE9 | 14 | PAF10 | 8 | PAF1 |
| 48 | PAD7 | 26 | PAE8 | 13 1/2 | PAF9 | 7 | PBF10 |
| 46 | PAD6 | 24 | PAE7 | 13 | PAF8 | 6 | PBF7 |
| 44 | PAD5 | 23 | PAE6 | 12 | PAF7 | 5 1/2 | PBF5 |
| 40 | PAD4 | 22 | PAE5 | 11 1/2 | PAF6 | 5 | PBF4 |
| 38 | PAD3 | 20 | PAE4 | 11 | PAF5 | 4 1/2 | PBF2 |
| 36 | PAD2 | 19 | PAE3 | 10 | PAF4 | 4 | PBF1 |

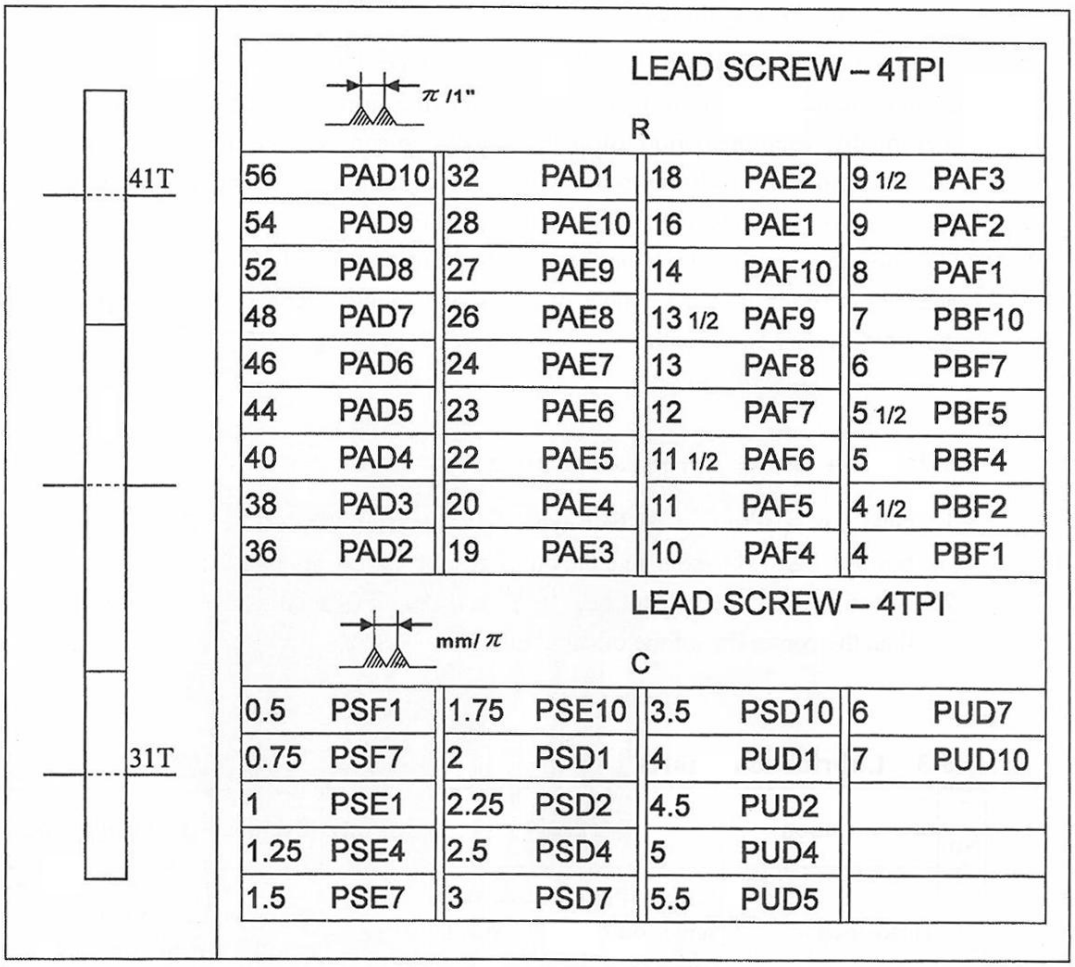
LEAD SCREW-P=6mm

mm/ π

C

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.5 | PSF1 | 1.75 | PSE10 | 3.5 | PSD10 | 6 | PUD7 |
| 0.75 | PSF7 | 2 | PSD1 | 4 | PUD1 | 7 | PUD10 |
| 1 | PSE1 | 2.25 | PSD2 | 4.5 | PUD2 | | |
| 1.25 | PSE4 | 2.5 | PSD4 | 5 | PUD4 | | |
| 1.5 | PSE7 | 3 | PSD7 | 5.5 | PUD5 | | |

For Swing 16”, 18”(410mm, 460mm) Series while Imperial Leadscrew.




| LEAD SCREW – 4TPI π /1" R | | | | | | | |
|---|---|---|---|---|---|---|---|
| 56 | PAD10 | 32 | PAD1 | 18 | PAE2 | 9 1/2 | PAF3 |
| 54 | PAD9 | 28 | PAE10 | 16 | PAE1 | 9 | PAF2 |
| 52 | PAD8 | 27 | PAE9 | 14 | PAF10 | 8 | PAF1 |
| 48 | PAD7 | 26 | PAE8 | 13 1/2 | PAF9 | 7 | PBF10 |
| 46 | PAD6 | 24 | PAE7 | 13 | PAF8 | 6 | PBF7 |
| 44 | PAD5 | 23 | PAE6 | 12 | PAF7 | 5 1/2 | PBF5 |
| 40 | PAD4 | 22 | PAE5 | 11 1/2 | PAF6 | 5 | PBF4 |
| 38 | PAD3 | 20 | PAE4 | 11 | PAF5 | 4 1/2 | PBF2 |
| 36 | PAD2 | 19 | PAE3 | 10 | PAF4 | 4 | PBF1 |

| LEAD SCREW – 4TPI mm/ π C | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.5 | PSF1 | 1.75 | PSE10 | 3.5 | PSD10 | 6 | PUD7 |
| 0.75 | PSF7 | 2 | PSD1 | 4 | PUD1 | 7 | PUD10 |
| 1 | PSE1 | 2.25 | PSD2 | 4.5 | PUD2 | | |
| 1.25 | PSE4 | 2.5 | PSD4 | 5 | PUD4 | | |
| 1.5 | PSE7 | 3 | PSD7 | 5.5 | PUD5 | | |

## 6. LUBRICATION

### 6-1 Headstock Lubrication

Headstock lubrication is splash injection type. Oil grooves are equipped around the headstock to provide lubricant flowing from oil grooves to spindle, then finally reach the bottom of the headstock. To add oil, take off the oil plug on the top of the headstock cover, fill to the centerline of oil sight glass. Oil drain hole is located on the right bottom side of the headstock.

Before operating the lathe, be sure the headstock is filled with oil. If not, add Shell Tellus #32. Exchange oil after one month use for the first time. Thereafter every two months.

### 6-2 Gear Box & Apron Lubrication

1. Gear box is a reservoir oil bath type. To ensure the long service life of gear box and bedways, exchange the oil of gear box every six months.
2. Apron is also a reservoir oil bath type. Add the oil as soon as the oil is lower than the center line of the sight glass.

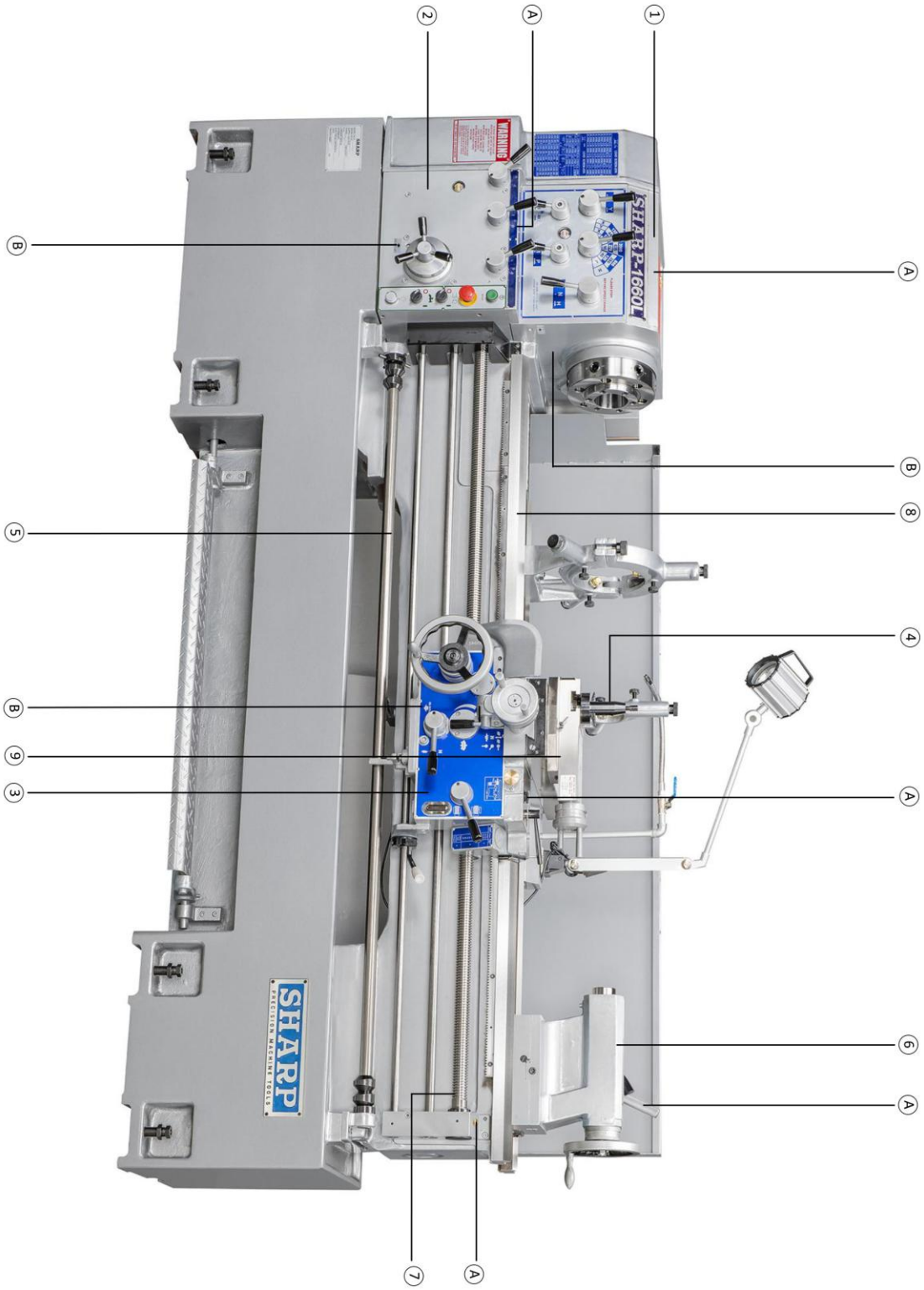
### 6-3 Lubrication Charts

| No. | Location | Methods | Quantity | Oil time | Exchange time |
|---|---|---|---|---|---|
| 1 | Headstock | Loosen the oil input hole screw on the left top side of the headstock cover | L | Once per month | One month at the beginning, thereafter once two months. |
| 2 | Gear Box | Open the top cover and loosen the oil input hole screw | L | Once per month | Every six month |
| 3 | Apron | Loosen the oil input hole screw | L | Once per day | |
| 4 | Compound rest | Add oil with oil can | As required | Once per day | |
| 5 | Auto Feeding rod | Add oil with oil can | As required | Once per day | |
| 6 | Tailstock | Add oil with oil can | As required | Once per day | |
| 7 | Leadscrew | Add oil with oil can | As required | Once per day | |
| 8 | Bedway | Press the manual oil pump | As required | Once per day | |

## 6-4 Lubrication Location

A: Oil input hole

B: Oil drain hole

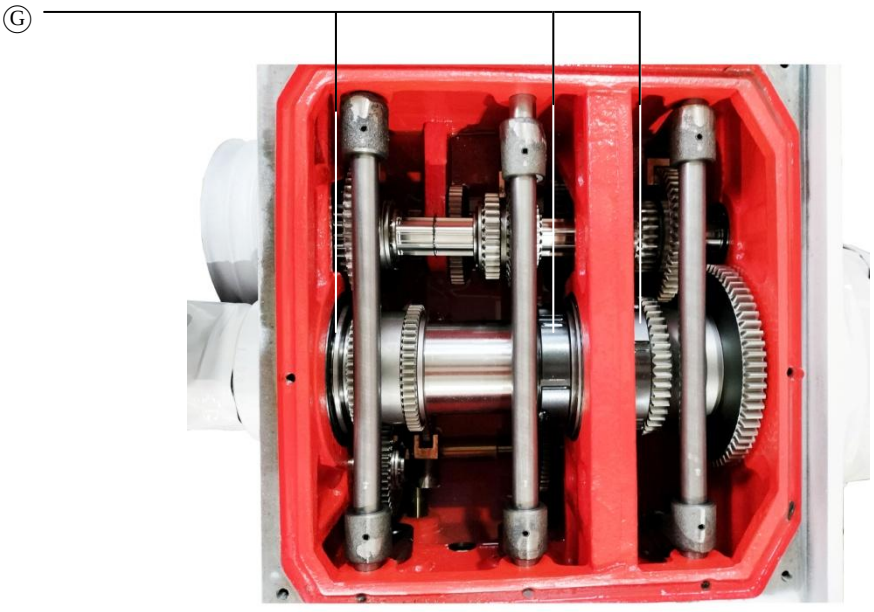


## 7. MAINTENANCE & ADJUSTMENT

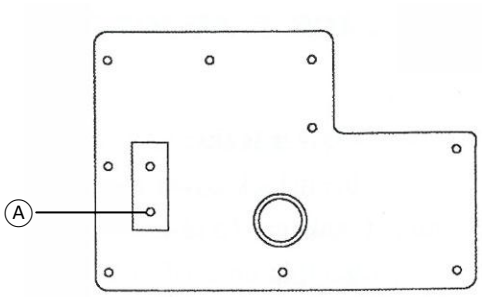
Please refer to following items for machine problem solution and maintenance for obtaining the best function and the long service life of the lathe.

### 7-1 Headstock

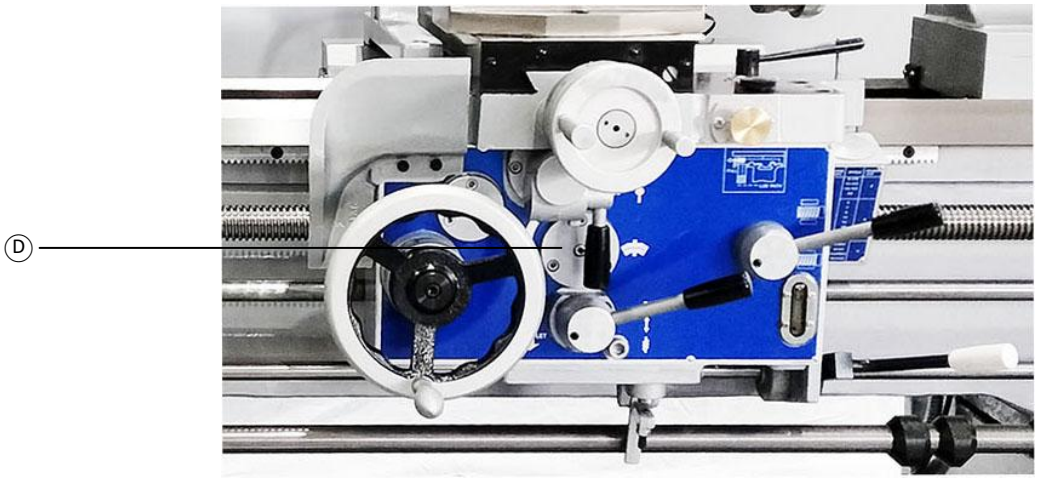
1. To avoid the headstock cover oil leaking: Once the headstock cover is opened, use cloth to clean the connecting surface and apply some grease, then can close the cover and tighten the set screw.
2. To avoid the returning oil route being blocked: There are two reasons which cause the oil leaking from headstock front cover; one is over oiled; the other is that the returning oil route is blocked. It should take off the headstock cover. Then blow air to the small hole, which is on the top of the front bearing, by air gun several times. And rotate the spindle at the same time to clean up the blocked returning oil route.
3. Spindle bearing adjustment: The front and middle bearings of the spindle is precision taper roller type. It requires to adjust the bearings to have suitable preload for maintaining the high accuracy and the best rotating functions. After long use the locking nut G may be loose a little bit and result in uneven cutting surface. For adjustment, loosen the setscrew by hexagon wrench. Then tighten the locking nut G to obtain the suitable preload. Do not over-tighten as over-preload will make the bearings hot, damage the rotating surface of the bearings and lower down the bearing motion functions. After adjustment, be sure to tighten the locking screw completely.



## 7-2 Apron & Saddle




1. Apron lubrication location: on the right top side of the saddle base. The oil inlet is plugged and marked “OIL” is the oil hole.
2. Apron drain hole located on the bottom cover of the apron as show on the right figure, the drain plug marked Ⓐ (also see chart on the front bottom side of the apron).
3. Oil brand and oil exchange time: Use Shell Tellus No. 220 and exchange the oil half a year.
4. To adjust the half nut engaged lever: After long use, the lever may be loosened and needed to be adjusted. First, take off the thread dial indicator and find the 4 gib strip adjusting screws. Second, while pressing the lever, also adjust the 4 gib strip adjusting screws until they are properly tightened. Afterwards, replace the thread dial indicator.
5. To clear up and repair the manual pump being blocked or small oil flow: If no oil oozes out after pushing the manual pump several times, the pump is blocked. Take off the 4 setscrews of the pump body and loosen the plug lever to dismantle the set nut. Use air gun to clean up the inside of the blocked pump. If the oil flow is too small, it must be the O-ring worn out, replace another new and O-ring and assemble back the dismantled parts accordingly.
6. Adjustment for the longitudinal & cross auto feeding overload: The cone clutch on the center of the apron is an overload device. The safety overload weight limitation is 12 Kg. Overload weight can be adjusted by means of the Hexagon screw on the center of the apron; tighten clockwise, the overload will increase; tighten anticlockwise, the overload will then decrease. When auto-feeding, press the handwheel by hand, it should automatically slip out if the overload is over 12Kg. If not, adjust again.



**7-3 Gear Box**

1. The oil inlet for the gearbox is located under the cover on top of the gearbox. (See Fig. 7-3Ⓐ).
2. Drain hole: On the left bottom side of the 10-step feed selection dial. The screw with hexagon nut is the oil drain hole as arrow Ⓑ shown on figure 7-3.
3. Oil brand and oil exchange time: Use Shell Tellus No. 220 and exchange the oil half a year.


Fig.7-3

**7-4 Tailstock Center Line Adjustment**

First, unclamp the tailstock body clamping lever Ⓐ, and then loosen the 2 hexagon head screw on both right and left sides which lock the tailstock body and base together. Determine the direction and amount of the misalignment for adjustment by positioning a test bar between two dead centers. Slacken the rear ‘location screw’ (say one half turn). Then alternatively slacken one set-over screw and tighten the other until the required setting is achieved, (correct alignment). Carefully retighten the rear ‘location screw’ and the set over screw which was slackened before and recheck alignment. Retighten the two hexagon head screw carefully and re-clamp the tailstock (Fig. 7-4).

If still can not operate the handwheel easily after the tailstock quill is fixed, it is caused by the reason that the clamping block can not be loosened. To solve it, just push the tailstock body clamping lever forward one time for recovering.


Fig.7-4

**7-5 Belt Tension Adjustment**

After long use, the belt will stretch and require periodic tension adjustment.

1. Take off the cover on the left back side of the lathe.
2. Loosen adjusting nut Ⓐ and lower down the suitable height until the desired belt tension is achieved.
3. After adjustment, be sure to tighten the adjusting nut securely.

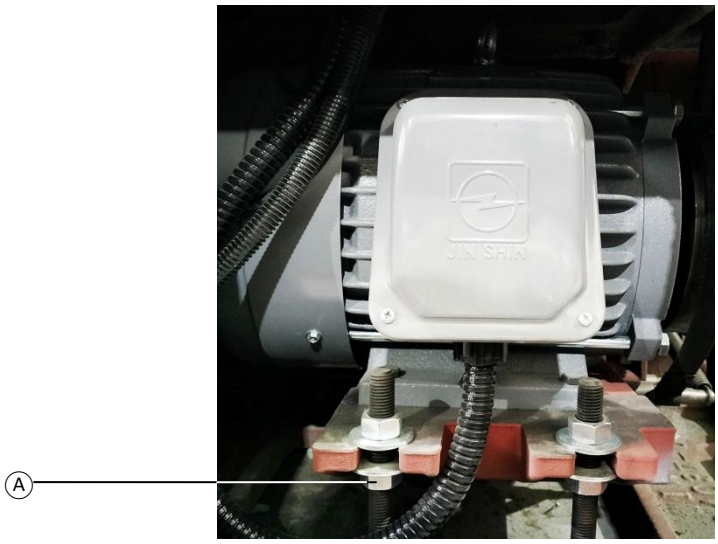



Fig.7-5

**7-6 Brake Belt Adjustment**

If the brake belt is worn out and cause the brake band tool loosen, it is time to adjust the nut Ⓗ of the brake band. Remove the side rear cover, loosen the nuts on the top firstly and tighten the nuts on the bottom to the appropriate height. Then tighten the nuts on the top to complete the adjustment. After adjustment, replace the side rear cover.

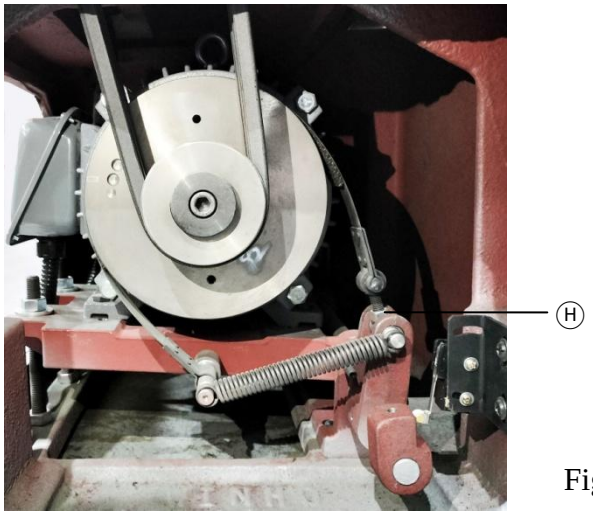



Fig.7-6

### 7-7 Brake & Micro Switch Adjustment

The foot brake is connected with the micro switch. It should have 0-1 mm end play between the brake arm and the touching, head of the micro switch. The correct brake action should cut off the electricity first, then brake avoid the brake belt being worn out. After stepping the foot brake, needs to re-operate the spindle operation control lever to make the spindle revolute again.

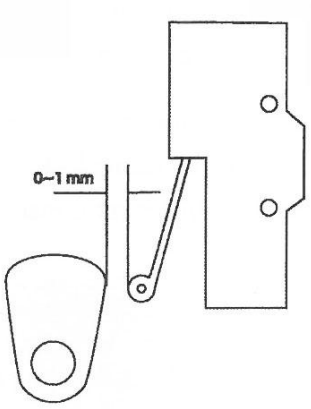



Fig. 7-7

### 7-8 Leadscrew Backlash Adjustment

If multiple cutting is happened while threading, it is caused by the leadscrew backlash. To adjust the leadscrew half nut properly, open the plastic cover of the leadscrew bracket and loosen nut Ⓐ. Then tighten the left side nut Ⓑ until there is no backlash. (For testing, press down the half nut by hand, turn the apron handwheel forward and reverse and grasp the connecting section of the gear box and leadscrew till no backlash happened.) Afterwards, replace the nut Ⓐ to the leadscrew bracket.

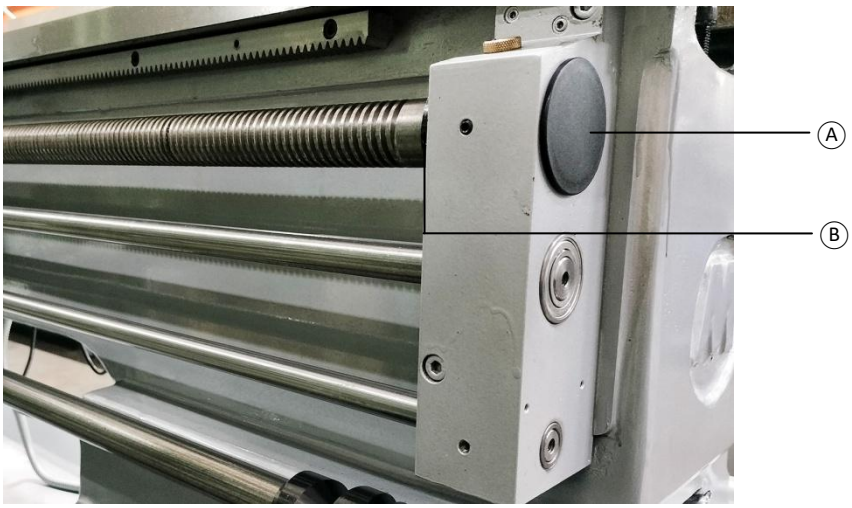



Fig. 7-8

### 7-9 Cutting Coolant Repair

If there is no coolant coming out after the pump switch is turned on, check the pump motor is working or not. If yes, check and see if the coolant in the tank is over the pump or not, If not, add the coolant, then turn on the switch. If there is still no coolant, the pump must be blocked. Take off the pump to clean up or repair.

## 8. Taper Attachment

**Installation Taper of Attachment:**

**STEP1:**

Install taper attachment on the carriage using screws NO.㉛ via hole “A” (Don’t tighten too tight using screw M10x40L and flat washer.)

**STEP2:**

Disengaged screw NO.⑧

**STEP3:**

Adjust the position of NO.① and let arc gage point is contacted with NO.206009.

**STEP4:**

Set a dial gage on the NO.⑲, and gage point is contacted the surface of bed. Moving NO.⑲, pointer has to be constant lifit's not, adjusting the position of NO.①.

**STEP5:**

Disengaged screw NO.206010 then locked NO.206009 to NO.⑦

**STEP6:**

Replaced screw NO.⑧

**STEP7:**

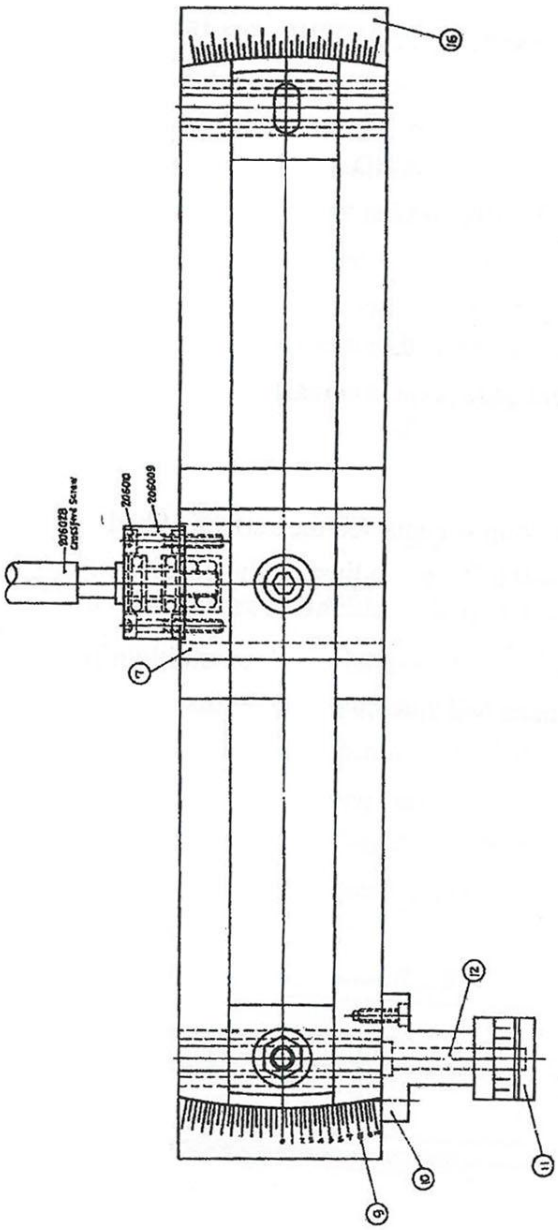
Drill B hole. (Using Ø 6m/m driller)

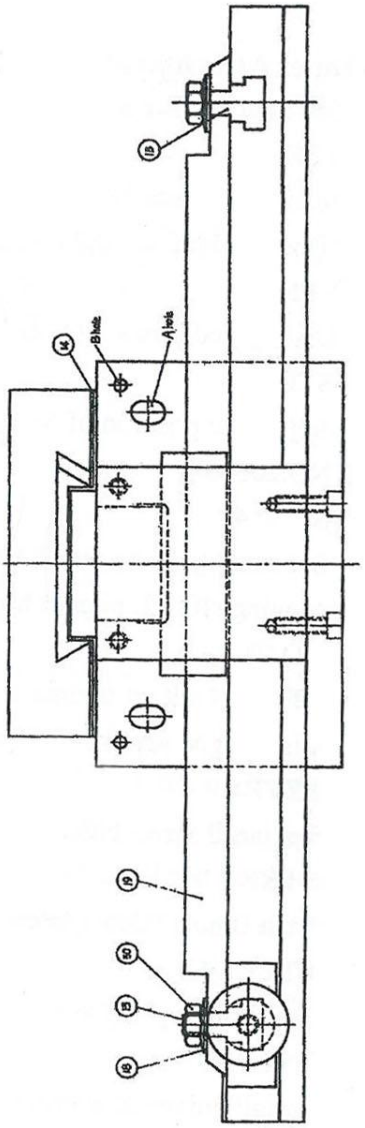
**STEP8:**

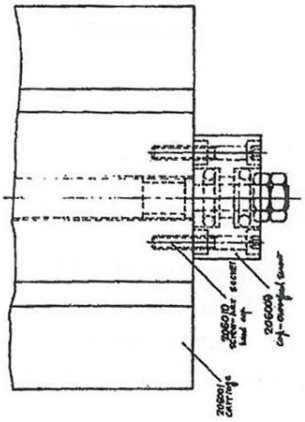
Set straight pin. (Ø 6x45l)

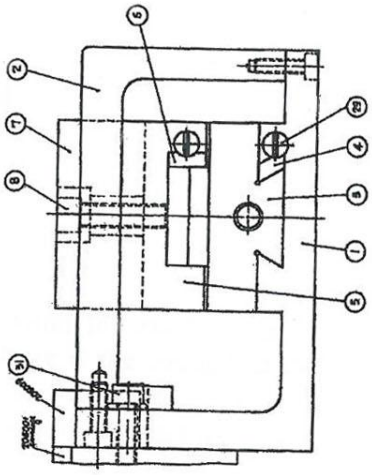
**STEP9:**

Install universal connected-rod.


16
205028
Cassette Screw
205010
205009
7
12
10
11
9


15
14
Blade
Axis
13
20
19
18


205028
Cassette Screw
205009
Cylindrical Screw
205010
Cassette Stopper
205010
Cassette Stopper


6
2
7
22
4
8
3
1
5
14
205009
Cylindrical Screw

# TROUBLESHOOTING
# THE "C" MODEL LATHE

The objective is to locate and isolate the problem

**NOISE IN HEADSTOCK/GEARBOX:**

Note: 85 % of noise normally comes from the output shaft pulley.

1. Run lathe with all controls in neutral to see if the problem is in **the spindle.**

   a. If the problem is in the spindle and the finish is good, the source is most likely in the rear bearing (Part #65). However if the finish is poor the problem could be the front bearings are either loose or damaged.

   b. If the problem is not in the spindle, continue by engaging one control at a time until the problem is found. **(Figure 1)**

   c. If the problem is not in the headstock, and before you continue to the gear box, check the change gears (Parts #41, 78 & 89) located on the back of the headstock for proper backlash and alignment. **(Figure 2)** If these gears are found to be in good working order, perform the same sequence as above on the gearbox. (engage one control) at a time until the problem is located. **(Figure 3)**

   d. Once you determine the problem is either in the gearbox or the headstock, that part of the machine must be opened up to inspect for possible worn or broken parts.

2. If the gearbox is in order and the feed or lead screws are not turning check the shear pins. (There are two shear pins on each shaft). **(Figure 4)**

Notes:


Figure 1

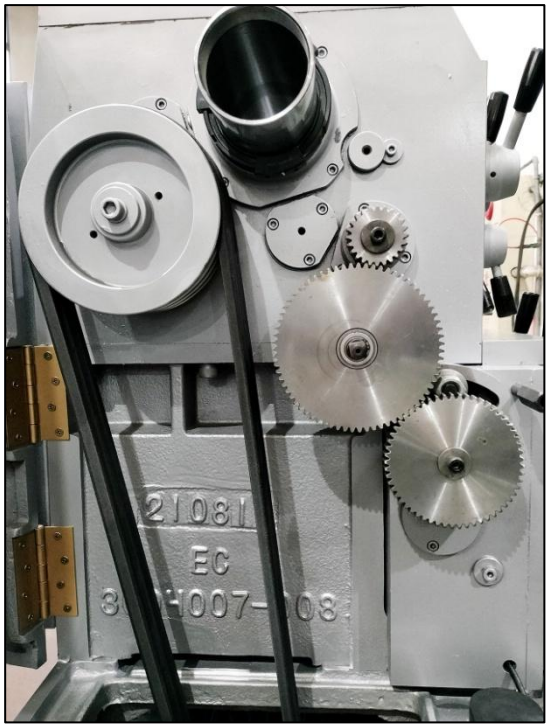


Figure 2


Figure 3

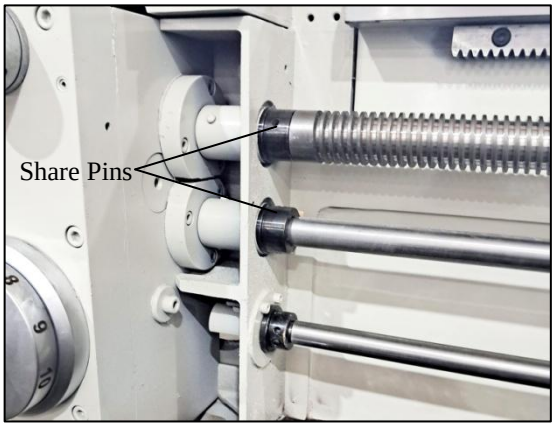



Figure 4

## THREADING PROBLEMS:

Should there be a problem cutting **standard threads:**

a. Check the chasing dial to see if it is loose from shaft.
b. Check gear at bottom of shaft for tightness & proper fit against the lead screw.
c. Check the half nut for proper fit.

**Note:** All Sharp Lathes are made to cut ASE (Inch) threads. To cut metric threads, make sure the half nuts are engaged at all times, because it is not a metric based machine, and therefore will not repeat according to the threading dials.

Notes:

**CHATTER/VIBRATION PROBLEMS:**

1. Spindle has excessive run out. **(Figure 5)**
2. Loose Compound, cross feed or saddle. **(Figure 6)**
3. Loose motor mount or motor not seated properly on base. **(Figure 7)**
4. Backlash on drive pulley shaft and key. **(Figure 2)**
5. New rack and old gear. (If machine has been crashed) **(Figure 8)**
6. Irregular power supply. (Not getting 3-phase)
7. Leveling bolts loose or lathe not properly leveled.
8. Defective live center. (On a long work piece chatter in the center & not on ends).

**COOLANT PUMP NOT WORKING OR PRESSURE TOO LOW.**

a. Check coolant level.
b. Check pump shaft for rotation. (Proper rotation is clockwise).
c. Check for clogged line. (Both suction and discharge).

Notes:

# ADJUSTMENTS AND REPAIRS:

## ADJUSTING LEAD SCREW BACKLASH

a. Remove plastic cover on the lead screw bracket.
b. Loosen lock nut ”A” under cover.
c. Tighten left side nut ”B” until backlash has been removed.
d. Re-tighten lock nut ”A” and replace plastic cover. (**Figure 9**)

## ADJUDTING SPINDLE BEARINGS

The front and middle spindle bearings are **precision taper roller bearings**. To adjust:

a. Loosen set screw (Part #60) on locking NUT (Part #62).
b. Tighten locking nut (Part #62) to obtain proper preload. (Check by spinning chuck by hand. Chuck should rotate freely for at least 2 revolutions).
c. Re-tighten set screw (Part #60) on lock nut. (**Figure 10**)

Notes:

## ADJUSTING THE FEED OVERLOAD

This machine is equipped with a safety overload which can be adjusted by the set screw (Part # 73) located in the center of cover (Part # 75) which is located in the center of the apron. (To increase tension turn clockwise, to reduce tension turn counterclockwise). **(Figure 13)**

## ADJUSTING HALFNUTS

1. Remove chasing dial assembly
2. Loosen 3 screws
3. Adjust half nuts and re-tighten the 3 screws
4. Test movement before reassembling.
   **(Figure 17)**

Notes:

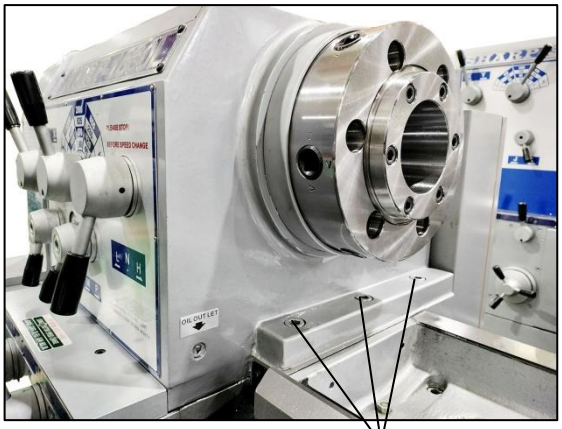


Figure 5

Loosen bolts a bit when aligning Head.

Figure 6

Figure 7

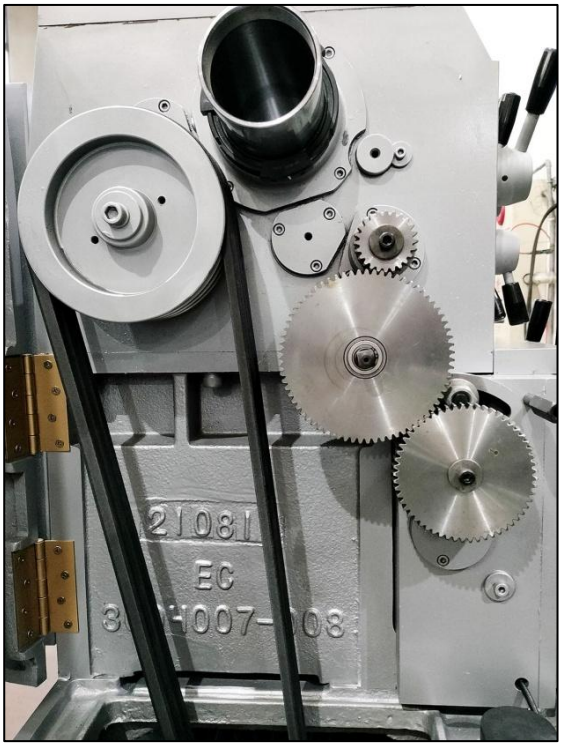


Figure 2

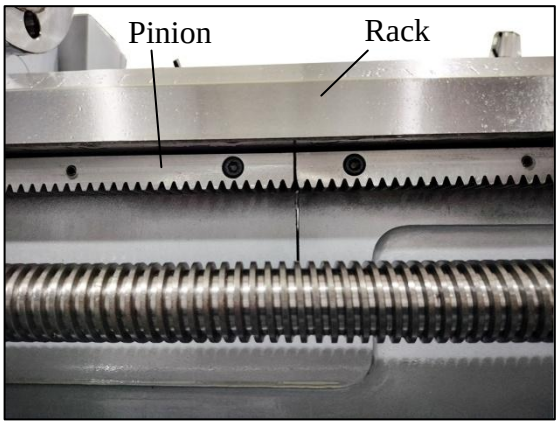



Figure 8

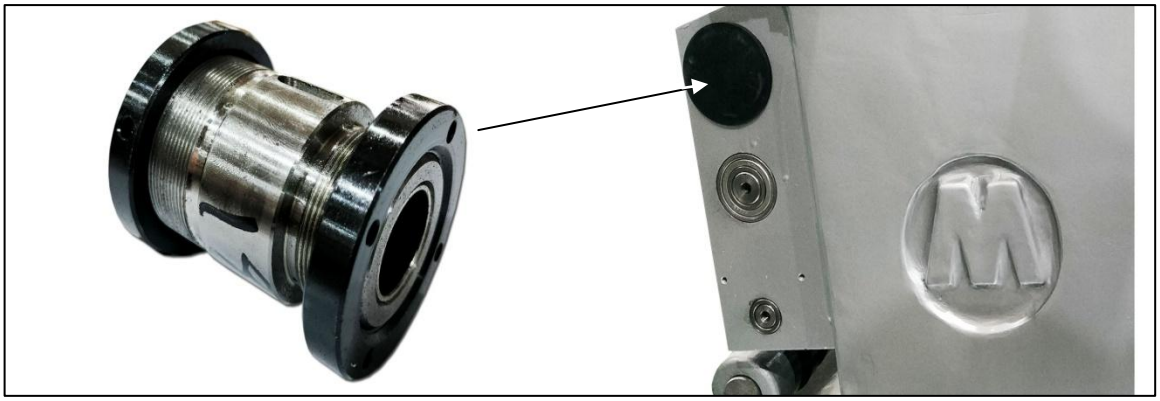


Figure 9

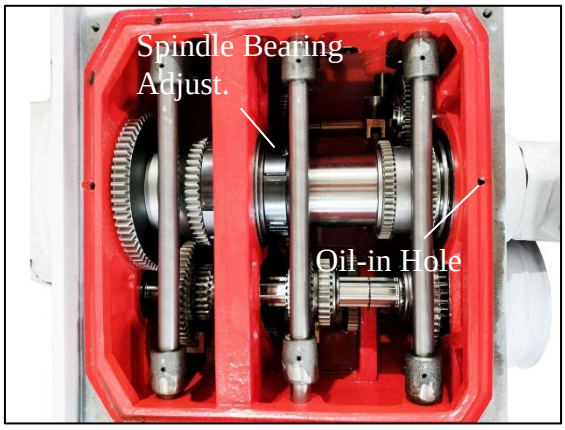



Figure 10

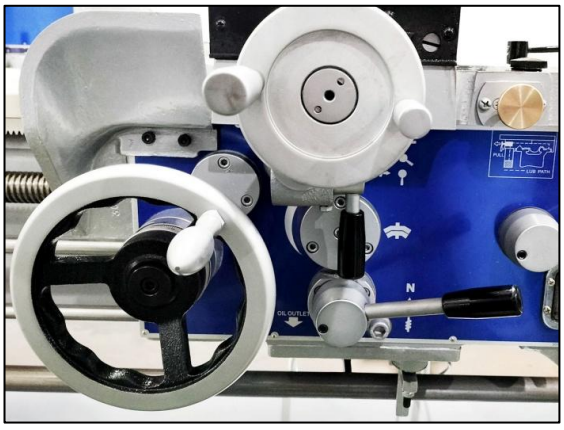
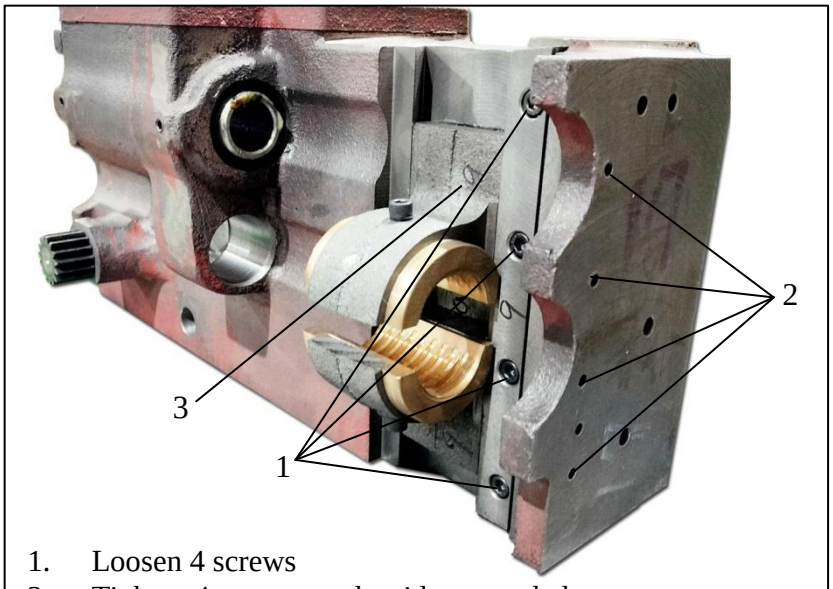


Figure 13




1. Loosen 4 screws
2. Tighten 4 screws on the side as needed (First take off chasing dial assembly.)

3. Make sure to test the up/down movement of halfnuts/holders before reassembling

Figure 17

## OIL LEAKS

**Headstock top cover leak:** Remove cover, clean all surfaces with a clean rag, apply a small coat of *grease* on the gasket surface and reinstall the cover.

**Oil leak around the spindle** is most likely caused by the oil level begin too high or oil return hole over the spindle being blocked or restricted. Most of the time this oil inlet hole can be cleaned out by simply blowing air thorough the passage. **(Figure 10)**

***Note:* Make sure to use 10W Oil only! Higher viscousity will result in leak!

**Oil leak at the rear of spindle:**

1. Mark lock nut and spindle. **(Figure 11)**
2. Mark balance weights on lock nut **(Figure 11)**
3. Remove lock nut. (First remove set screw )
4. Remove cover
5. Clear oil return hole using air pressure. **(Figure 12)**
   **Note:** Be sure cover is not obstructing return.

## ALIGNING THE HEAD

A taper will most likely be created by the head being out of alignment. To align head:

1. Loosen bolts on base of head slightly. (3 in front and 3 in back) **(Figure 5)**
2. Make appropriate adjustment to correct problem.
   a. “C” Model adjusting screws are in front of lathe.
   b. “S” and ”F” Models adjusting screws are in the back of the lathe.

Notes:

## APRON REMOVAL

1. Remove dowel pins from lead screw and feed shaft **(Figure 4)**
2. Remove chasing dial assembly **(Figure 15)**
3. Remove rotation lever assembly **(Figure 15)**
4. Remove lead screw bracket and slide lead screw & lead shafts out of apron **(Figure 16)**
5. Removing 4 bolts will allow the apron to be removed. (Caution should be taken when removing, due to its weight).

Notes:

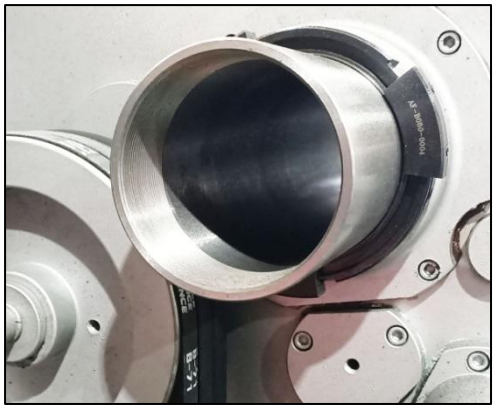


Figure 11

Figure 12

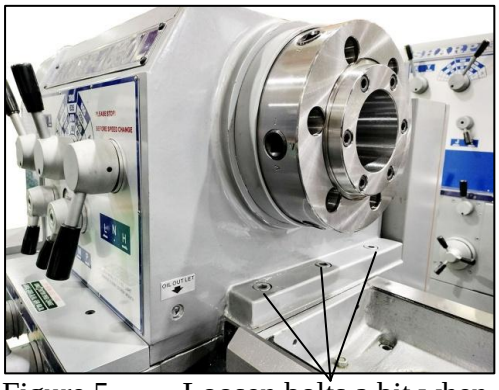


Figure 5 Loosen bolts a bit when aligning Head.

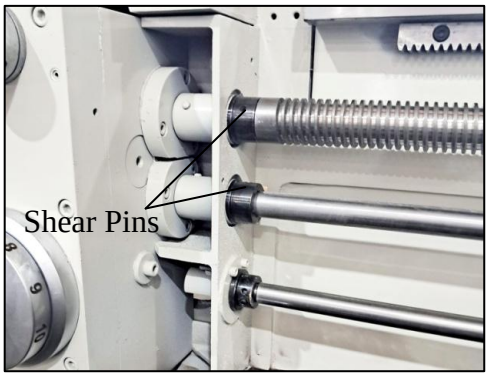



Figure 4


Figure 10

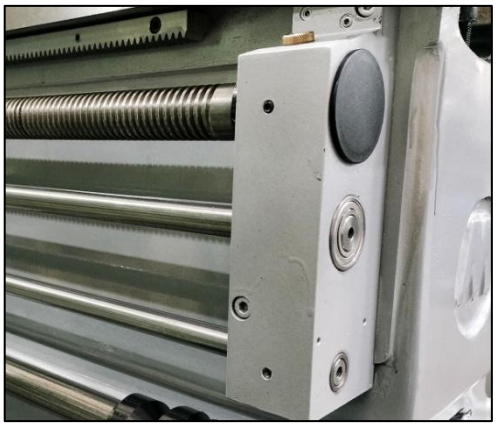


Figure 16

Figure 15

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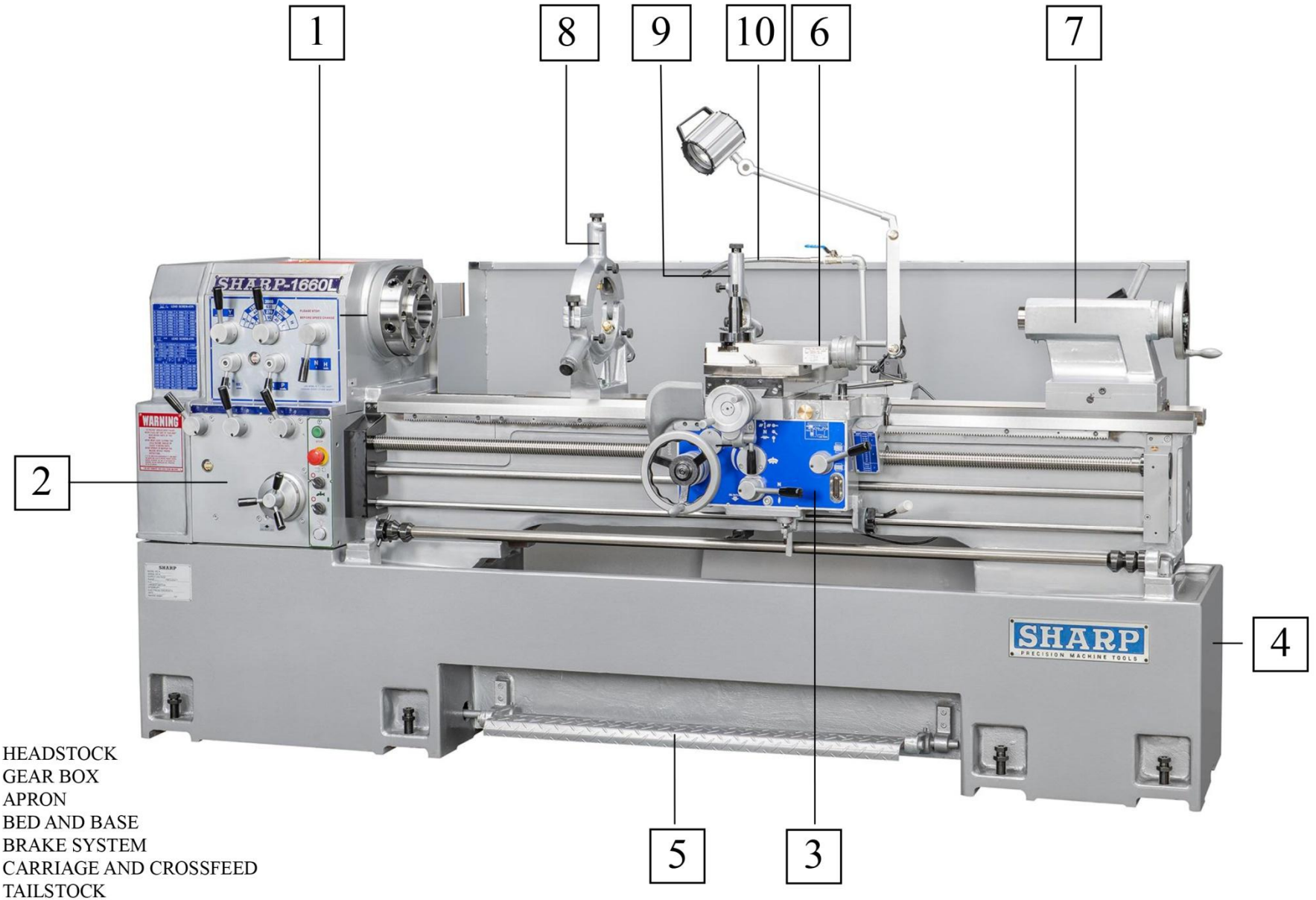


9-1 HEADSTOCK
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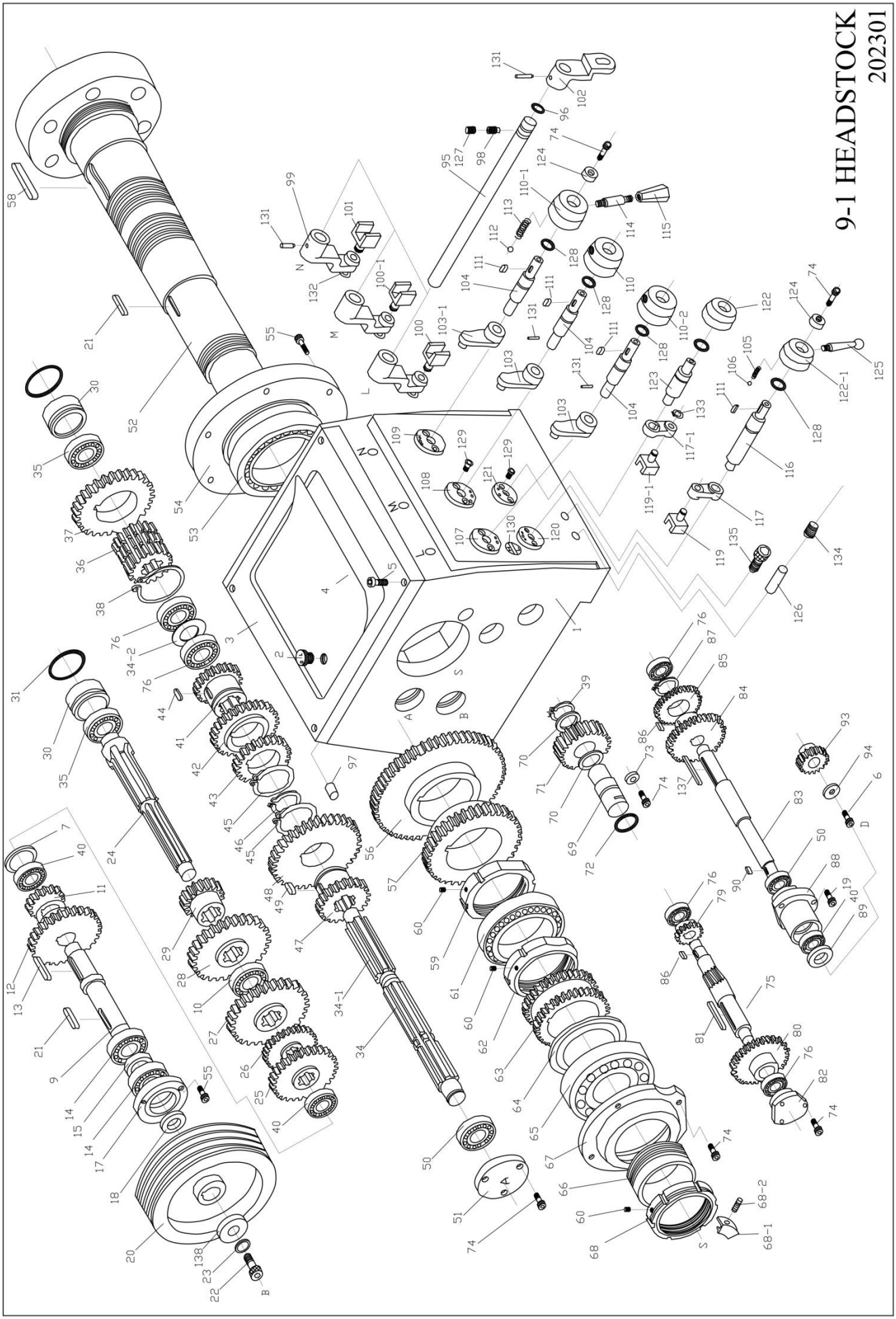
**9 SYSTEM IN EACH UNIT**


9-1 HEADSTOCK
202301

# HEADSTOCK ASSMBLY (Spindle Bore：80mm or 3")

| Item No. | Part Name | Amt. Used | Model: 17"(430) Part No. | Model: 19"(480) Part No. | Model: 21"(530) Part No. |
|---|---|---|---|---|---|
| 1 | Head stock | 1 | 3001001-173 | 3001001-193 | 3001001-213 |
| 2 | Oil plug | 1 | 3001002 | 3001002 | 3001002 |
| 3 | Head stock cover | 1 | 3001003 | 3001003 | 3001003 |
| 4 | Blanket | 1 | 3001004 | 3001004 | 3001004 |
| 5 | Hexagon socket screw, M8xP1.25x35L | 4 | 91110835 | 91110835 | 91110835 |
| 6 | Hexagon socket screw, M8xP1.25x25L | 1 | 9110825 | 9110825 | 9110825 |
| 7 | Snap ring , R48 | 1 | 9171R048 | 9171R048 | 9171R048 |
| 9 | Input-shaft | 1 | 3001009 | 3001009 | 3001009 |
| 10 | Ball bearing , 6206 | 1 | 91301021 | 91301021 | 91301021 |
| 11 | Gear-i | 1 | 3001011-001 | 3001011-001 | 3001011-001 |
| 12 | Gear-g | 1 | 3001012 | 3001012 | 3001012 |
| 13 | Square key , 8x7x45L | 1 | | | |
| 14 | Ball bearing , 6206 | 2 | 91301021 | 91301021 | 91301021 |
| 15 | Collar | 1 | 3001015 | 3001015 | 3001015 |
| 17 | Housing | 1 | 3001017 | 3001017 | 3001017 |
| 18 | Oil-seal , TC30x50x8 | 1 | 91523001 | 91523001 | 91523001 |
| 19 | Hexagon socket screw, M6xP1.0x20L | 3 | 91110620 | 91110620 | 91110620 |
| 20 | Pulley | 1 | 3001020 | 3001020 | 3001020 |
| 21 | Square key , 8x7x45L | 3 | | | |
| 22 | Hexagon socket screw, M12xP1.75x30L | 1 | 91111230 | 91111230 | 91111230 |
| 23 | Washer | 1 | | | |
| 24 | Shaft-B | 1 | 3001024 | 3001024 | 3001024 |
| 25 | Gear-d | 1 | 3001025 | 3001025 | 3001025 |
| 26 | Gear-b | 1 | 3001026 | 3001026 | 3001026 |
| 27 | Gear-f | 1 | 3001027 | 3001027 | 3001027 |
| 28 | Gear-k | 1 | 3001028 | 3001028 | 3001028 |
| 29 | Gear-o | 1 | 3001029-001 | 3001029-001 | 3001029-001 |
| 30 | Plug-cover | 2 | 3001030 | 3001030 | 3001030 |
| 31 | O-ring , P50x3.5 | 2 | 9151P050 | 9151P050 | 9151P050 |
| 34 | Shaft-A | 1 | 3001034 | 3001034 | 3001034 |
| 34-1 | Shaft-L | 1 | 3001034-001 | 3001034-001 | 3001034-001 |
| 34-2 | Snap ring | 1 | 3001034-002 | 3001034-002 | 3001034-002 |
| 35 | Ball bearing , 6305 | 1 | 91301029 | 91301029 | 91301029 |
| 36 | Gear-l | 1 | 3001036 | 3001036 | 3001036 |
| 37 | Gear-M | 1 | 3001037-001 | 3001037-001 | 3001037-001 |
| 38 | Snap ring , S65 | 2 | 9171S065 | 9171S065 | 9171S065 |
| 39 | Snap ring , S30 | 1 | 9171S030 | 9171S030 | 9171S030 |
| 40 | Ball bearing , 6005 | 3 | 91301010 | 91301010 | 91301010 |
| 41 | Gear-E | 1 | 3001041 | 3001041 | 3001041 |
| 42 | Gear-A | 1 | 3001042 | 3001042 | 3001042 |
| 43 | Gear-C | 1 | 3001043 | 3001043 | 3001043 |
| 44 | Square key , 8x7x85L | 1 | | | |
| 45 | Snap ring , S48 | 2 | 9171S048 | 9171S048 | 9171S048 |

# HEADSTOCK ASSMBLY (Spindle Bore：80mm or 3")

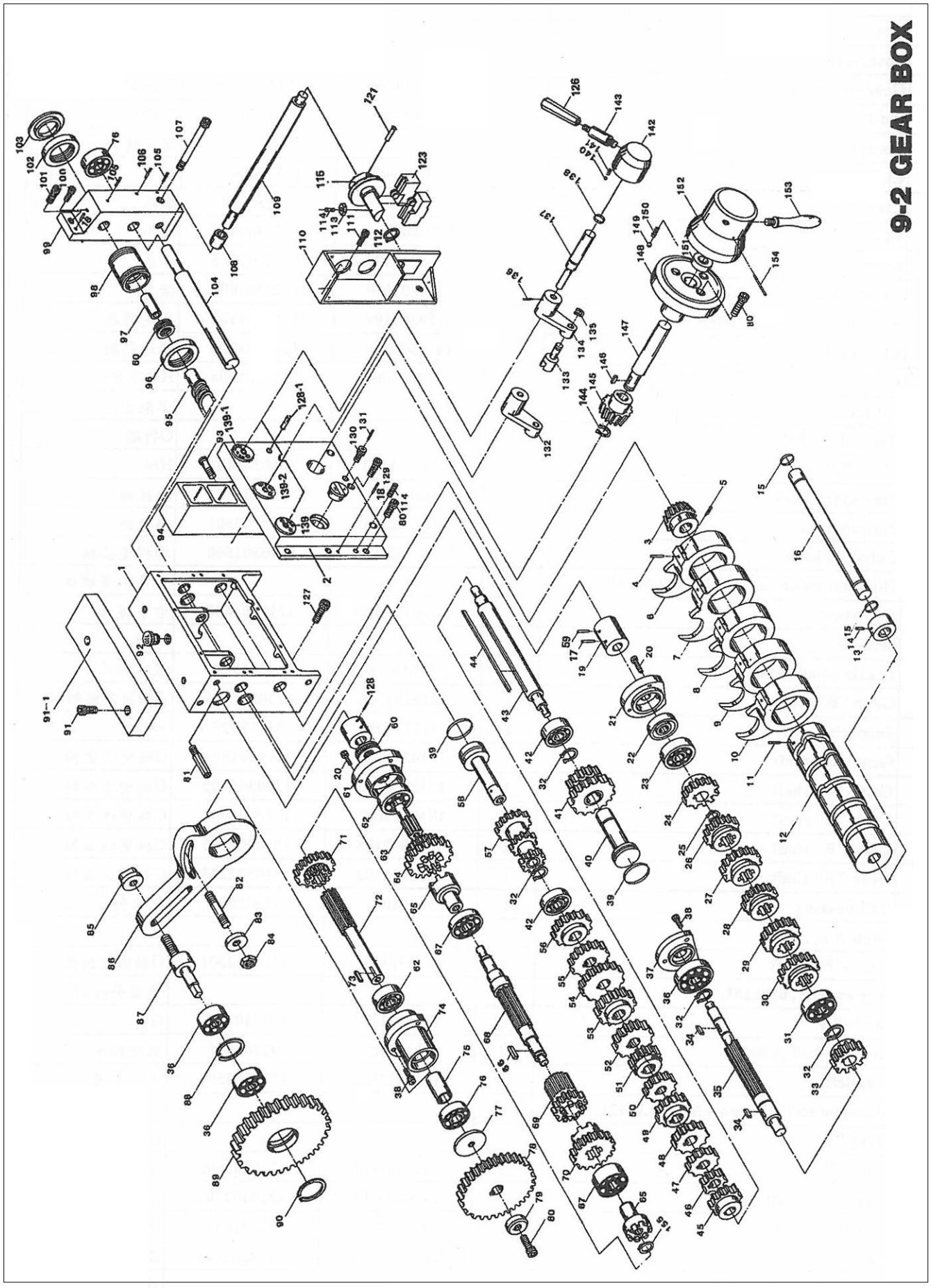
| Item No. | Part Name | Amt. Used | Model: 19”(480) Part No. | Model: 19”(480) Part No. | Model: 19”(480) Part No. |
|---|---|---|---|---|---|
| 46 | Snap ring , S34 | 1 | 9171S034 | 9171S034 | 9171S034 |
| 47 | Gear-h | 1 | 3001047 | 3001047 | 3001047 |
| 48 | Gear-j | 1 | 3001048-001 | 3001048-001 | 3001048-001 |
| 49 | Square key , 8x7x85L | 1 | | | |
| 50 | Ball bearing , 6205 | 1 | 91301020 | 91301020 | 91301020 |
| 51 | Cover | 1 | 3001051 | 3001051 | 3001051 |
| 52 | Spindle (A1-8) | 1 | 3001052-A03 | 3001052-A03 | 3001052-A03 |
| | (D1-8) | 1 | 3001052-D03 | 3001052-D03 | 3001052-D03 |
| 53 | Taper roller bearing, 32922 | | 91302028 | 91302028 | 91302028 |
| 54 | Cover | 1 | 3001054-003 | 3001054-003 | 3001054-003 |
| 55 | Hexagon socket screw, M6xP1.0x35L | 6 | 91110635 | 91110635 | 91110635 |
| 56 | Gear-p | 1 | 3001056-001 | 3001056-001 | 3001056-001 |
| 57 | Gear-n | 1 | 3001057-001 | 3001057-001 | 3001057-001 |
| 58 | Square key , 8x7x85L | 1 | 91620806 | 91620806 | 91620806 |
| 59 | Lock-nut | 1 | 3001059 | 3001059 | 3001059 |
| 60 | Sett screw, M8xP1.25x8L | 5 | 91120808 | 91120808 | 91120808 |
| 61 | Taper roller bearing, 32920 | 1 | 91302029 | 91302029 | 91302029 |
| 62 | Lock-nut | 1 | 9124F100 | 9124F100 | 9124F100 |
| 63 | Gear | 1 | 3001063-001 | 3001063-001 | 3001063-001 |
| 64 | Collar | 1 | 3001064-001 | 3001064-001 | 3001064-001 |
| 65 | Ball bearing , 6018 | 1 | 9130148 | 9130148 | 9130148 |
| 66 | Oil return collar | 1 | 3001066-001 | 3001066-001 | 3001066-001 |
| 67 | Cover | 1 | 3001067-001 | 3001067-001 | 3001067-001 |
| 68 | Lock-nut | 1 | 3001068 | 3001068 | 3001068 |
| 68-1 | Balance piece | 3 | 3001068-003 | 3001068-003 | 3001068-003 |
| 68-2 | Set screw, M5x8 | 6 | 3001068-002 | 3001068-002 | 3001068-002 |
| 69 | Idle gear shaft | 1 | 3001069 | 3001069 | 3001069 |
| 70 | Spacer | 2 | 3001070 | 3001070 | 3001070 |
| 71 | Idle gear | 1 | 3001071 | 3001071 | 3001071 |
| 72 | O-ring , P29 | 1 | 9151P029 | 9151P029 | 9151P029 |
| 73 | Washer | 1 | 3001073 | 3001073 | 3001073 |
| 74 | Hexagon socket screw, M6xP1.0x12L | 13 | 91110612 | 91110612 | 91110612 |
| 75 | Gear shaft-C | 1 | 3001075 | 3001075 | 3001075 |
| 76 | Ball bearing , 6204 | 5 | 91301018 | 91301018 | 91301018 |
| 79 | Gear | 1 | 3001079 | 3001079 | 3001079 |
| 80 | Gear | 1 | 3001080-001 | 3001080-001 | 3001080-001 |
| 81 | Square key , 6x6x65L | 1 | | | |
| 82 | Cover | 1 | 30010802 | 30010802 | 30010802 |
| 83 | Shaft-D | 1 | 30010803-001 | 30010803-001 | 30010803-001 |
| 84 | Gear | 1 | 30010804 | 30010804 | 30010804 |
| 85 | Gear | 1 | 30010805 | 30010805 | 30010805 |

# HEADSTOCK ASSMBLY (Spindle Bore：80mm or 3")

| Item No. | Part Name | Amt. Used | Model: 17”(430) Part No. | Model: 19”(480) Part No. | Model: 21”(530) Part No. |
|---|---|---|---|---|---|
| 86 | Square key , 6x6x18L | 2 | 91610604 | 91610604 | 91610604 |
| 87 | Snap ring , S40 | 1 | 9171S040 | 9171S040 | 9171S040 |
| 88 | Housing | 1 | 3001088 | 3001088 | 3001088 |
| 89 | Oil-seal , TC25x47x8L | 1 | 91522501 | 91522501 | 91522501 |
| 90 | Square key , 6x6x12L | 1 | 91610601 | 91610601 | 91610601 |
| 91 | Collar | 1 | 3001091 | 3001091 | 3001091 |
| 92 | Taper pin ,0#25L | 1 | 92010025 | 92010025 | 92010025 |
| 93 | Gear (24T in) | 1 | 3001093 | 3001093 | 3001093 |
| 94 | Washer | 1 | | | |
| 95 | Shifting shaft | 3 | 3001095-001 | 3001095-001 | 3001095-001 |
| 96 | O-ring , P16 | 6 | 9151P016 | 9151P016 | 9151P016 |
| 97 | Plug | 3 | 3001097 | 3001097 | 3001097 |
| 98 | Set screw | 3 | 3001098 | 3001098 | 3001098 |
| 99 | Shifting lever | 3 | 3001099 | 3001099 | 3001099 |
| 100 | Shifting fork | 1 | 3001100 | 3001100 | 3001100 |
| 100-1 | Shifting fork | 1 | 3001100-001 | 3001100-001 | 3001100-001 |
| 101 | Shifting fork | 1 | 3001101 | 3001101 | 3001101 |
| 102 | Shifting lever | 3 | 3001102 | 3001102 | 3001102 |
| 103 | Shifting lever | 2 | 3001103 | 3001103 | 3001103 |
| 103-1 | Shifting lever | 1 | 3001103-001 | 3001103-001 | 3001103-001 |
| 104 | Shaft | 3 | 3001104 | 3001104 | 3001104 |
| 105 | Spring , D6xd0.8x25L | 2 | | | |
| 106 | Ball steel , Ø 1/4" | 2 | 91820104 | 91820104 | 91820104 |
| 107 | Detent plate | 1 | 3001107 | 3001107 | 3001107 |
| 108 | Detent plate | 1 | 3001108 | 3001108 | 3001108 |
| 109 | Detent plate | 1 | 3001109 | 3001109 | 3001109 |
| 110 | Hub | 1 | 3001110 | 3001110 | 3001110 |
| 110-1 | Hub | 1 | 3001110-001 | 3001110-001 | 3001110-001 |
| 110-2 | Hub | 1 | 3001110-002 | 3001110-002 | 3001110-002 |
| 111 | Square key , 5x5x15L | 2 | 91610501 | 91610501 | 91610501 |
| 112 | Ball steel , Ø5/16" | 3 | 91820516 | 91820516 | 91820516 |
| 113 | Spring , D8xd0.8x25L | 3 | 3001113 | 3001113 | 3001113 |
| 114 | Lever | 3 | 3001114 | 3001114 | 3001114 |
| 115 | Knob | 3 | 3001115 | 3001115 | 3001115 |
| 116 | Shaft | 1 | 3001116 | 3001116 | 3001116 |
| 117 | Shifting lever | 1 | 3001117 | 3001117 | 3001117 |
| 117-1 | Shifting lever | 1 | 3001117-001 | 3001117-001 | 3001117-001 |
| 119 | Shifting fork | 1 | 3001119 | 3001119 | 3001119 |
| 119-1 | Shifting fork | 1 | 3001119 | 3001119 | 3001119 |
| 120 | Detent plate | 1 | 3001120 | 3001120 | 3001120 |
| 121 | Detent plate | 1 | 3001121 | 3001121 | 3001121 |
| 122 | Knob | 1 | 3001122 | 3001122 | 3001122 |
| 122-1 | Knob | 1 | 3001122-001 | 3001122-001 | 3001122-001 |

## HEADSTOCK ASSMBLY (Spindle Bore：80mm or 3")

| Item No. | Part Name | Amt. Used | Model: 17”(430) Part No. | Model: 19”(480) Part No. | Model: 21”(530) Part No. |
|---|---|---|---|---|---|
| 123 | Shaft | 1 | 3001123 | 3001123 | 3001123 |
| 124 | Washer | 5 | 3001124 | 3001124 | 3001124 |
| 125 | Lever | 2 | 3001125 | 3001125 | 3001125 |
| 126 | Pin | 2 | 3001126 | 3001126 | 3001126 |
| 127 | Set screw, M8xP1.25x10L | 3 | 91120810 | 91120810 | 91120810 |
| 128 | O-ring , P18xP1.0x14L | 5 | 9151P018 | 9151P018 | 9151P018 |
| 129 | Screw , M6xP1.0x14L | 10 | 91160614 | 91160614 | 91160614 |
| 130 | Lenz-oil , Ø 29 | 1 | 92552001 | 92552001 | 92552001 |
| 131 | Spring pin , Ø 5x32L | 9 | 92030532 | 92030532 | 92030532 |
|  | Spring pin , Ø 5x26L | 2 | 92030526 | 92030526 | 92030526 |
| 132 | Snap ring , S12 | 3 | 9171S012 | 9171S012 | 9171S012 |
| 133 | Snap ring , S10 | 2 | 9171S010 | 9171S010 | 9171S010 |
| 134 | Set screw, M8xP1.25x10L | 2 | 91121020 | 91121020 | 91121020 |
| 135 | Hexagon socket screw, M10xP1.5x95L | 2 | 91111095 | 91111095 | 91111095 |
| 136 | Hexagon socket screw, M6xP1.0x40L | 4 | 91110640 | 91110640 | 91110640 |
| 137 | Square key , 6x6x70L | 1 | 91610608 | 91610608 | 91610608 |
| 138 | Spring washer | 1 |  |  |  |


9-2 GEAR BOX

# GEAR BOX ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 1 | Gear box | 1 | 1210300307 | 1210300307 |
| 2 | Cover-gear box | 1 | 1210300101 | 1210300101 |
| 3 | Gear-driven bevel | 1 | 1210300405 | 1210300405 |
| 4 | Pin-fixed | 5 | 1210300503 | 1210300503 |
| 5 | Pin-split | 5 | | |
| 6 | Claw-shifter | 1 | 1210300601 | 1210300601 |
| 7 | Claw-shifter | 1 | 1210300709 | 1210300709 |
| 8 | Claw-shifter | 1 | 1210300807 | 1210300807 |
| 9 | Claw-shifter | 1 | 1210300905 | 1210300905 |
| 10 | Claw-shifter | 1 | 1210301000 | 1210301000 |
| 11 | Set screw , M8xP1.25x8L | 1 | 1210301108 | 1210301108 |
| 12 | Cam-shifter | 1 | 1210301206 | 1210301206 |
| 13 | Collar | 1 | 1210301304 | 1210301304 |
| 14 | Set screw , M8x12 | 2 | | |
| 15 | Ring-"O" , P18 | 2 | | |
| 16 | Shaft-"A" | 1 | 1210301402 | 1210301402 |
| 17 | Pin-taper , 4x38 | 3 | 92010438 | 92010438 |
| 18 | Pin-taper , 6x38 | 2 | 1210702301 | 1210702301 |
| 19 | Collar-linkage | 1 | 1210301500 | 1210301500 |
| 20 | Hexagon socket head cap, M6xP1.0x16L | 6 | | |
| 21 | Cap-right | 1 | 1210301608 | 1210301608 |
| 22 | Seal-oil | 1 | | |
| 23 | Bearing-ball , 6204 | 1 | 91301018 | 91301018 |
| 24 | Gear-"B" shaft (36T) | 1 | 1210301706 | 1210301706 |
| 25 | Snap ring , S25 | 2 | 9171S025 | 9171S025 |
| 26 | Gear-"B" shaft | 1 | 1210301804 | 1210301804 |
| 27 | Gear-"B" shaft | 1 | 1210301902 | 1210301902 |
| 28 | Gear-"B" shaft | 1 | 1210302007 | 1210302007 |
| 29 | Gear-"B" shaft | 1 | 1210302105 | 1210302105 |
| 30 | Gear-"B" shaft | 1 | 1210302203 | 1210302203 |
| 31 | Ball bearing | 1 | 91301006 | 91301006 |
| 32 | Snap ring , S20 | 2 | | |
| 33 | Gear-"B" shaft | 1 | 1210302301 | 1210302301 |
| 34 | Key-square , 6x6x20L | 2 | | |
| 35 | Shaft-"B" | 1 | 1210302409 | 1210302409 |
| 36 | Bearing-ball , 6003 | 3 | 91301005 | 91301005 |
| 37 | Cap-left | 1 | 1210302507 | 1210302507 |
| 38 | Hexagon socket screw , M6xP1.0x12L | 6 | | |
| 39 | Ring-"O" , P36 | 2 | | |
| 40 | Shaft-"C" | 1 | 1210302605 | 1210302605 |
| 41 | Gear-"C" shaft | 1 | 1210302703 | 1210302703 |
| 42 | Bearing , 6203 | 2 | 91301016 | 91301016 |
| 43 | Shaft-"D" | 1 | 1210302801 | 1210302801 |
| 44 | Key-square , 6x6x146L | 1 | | |
| 45 | Gear-"D" shaft | 1 | 1210302909 | 1210302909 |

# GEAR BOX ASSEMBLY

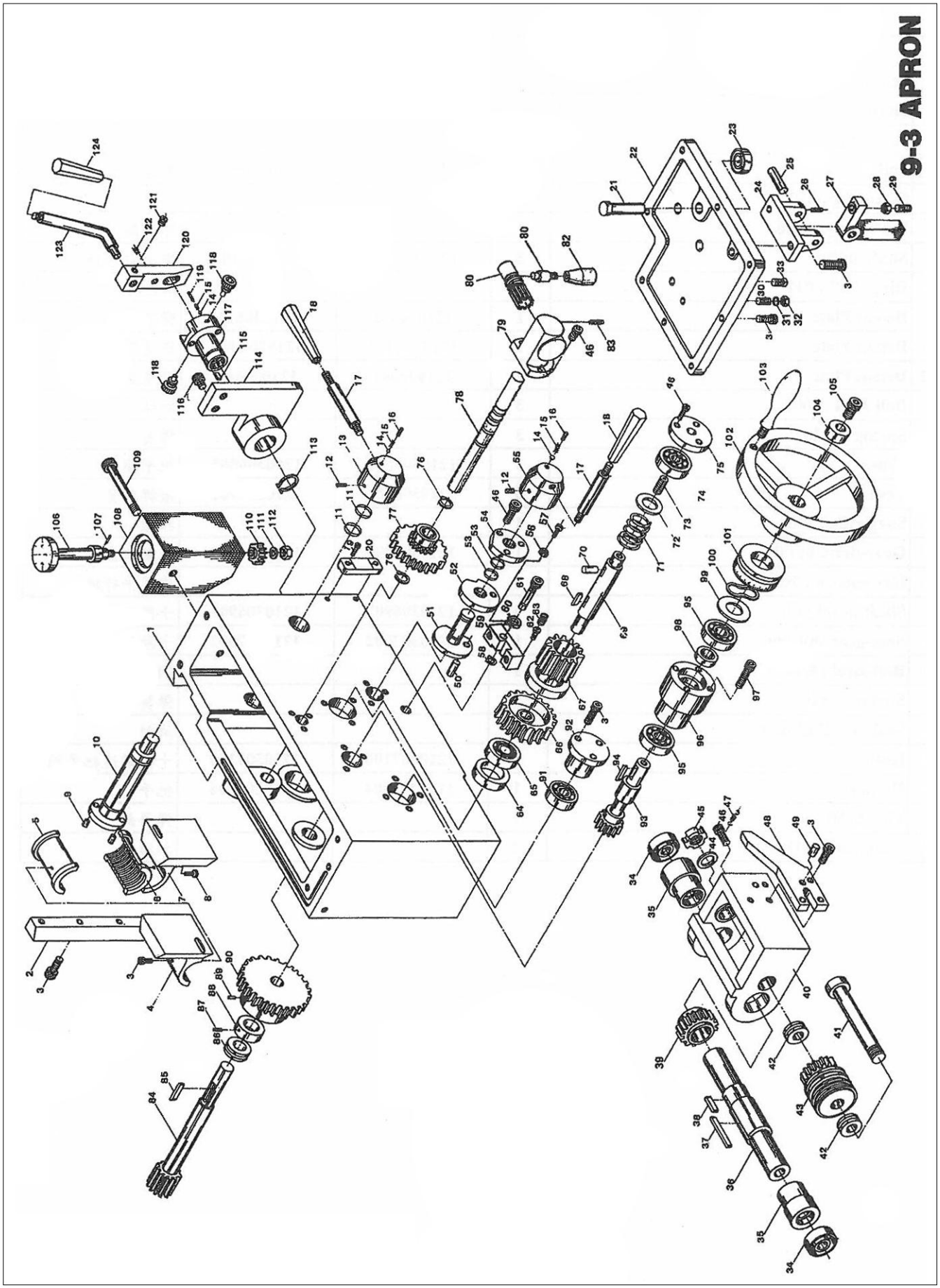
| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 46 | Gear-"D" shaft | 1 | 1210303004 | 1210303004 |
| 47 | Gear-"D" shaft | 1 | 1210303102 | 1210303102 |
| 48 | Gear-"D" shaft | 1 | 1210303200 | 1210303200 |
| 49 | Gear-"D" shaft | 1 | 1210303308 | 1210303308 |
| 50 | Gear-"D" shaft | 1 | 1210303406 | 1210303406 |
| 51 | Gear-"D" shaft | 1 | 1210303504 | 1210303504 |
| 52 | Gear-"D" shaft | 1 | 1210303602 | 1210303602 |
| 53 | Gear-"D" shaft | 1 | 1210303700 | 1210303700 |
| 54 | Gear-"D" shaft | 1 | 1210303808 | 1210303808 |
| 55 | Gear-"D" shaft | 1 | 1210303906 | 1210303906 |
| 56 | Gear-"D" shaft | 1 | 1210304001 | 1210304001 |
| 57 | Gear-"E" shaft | 1 | 1210304109 | 1210304109 |
| 58 | Shaft-"E" | 1 | 1210304207 | 1210304207 |
| 59 | Pin-taper | 1 | 1003502904 | 1003502904 |
| 60 | Bearing-thrust , 51104 | 2 | 91303003 | 91303003 |
| 61 | Cap | 1 | 1210304305 | 1210304305 |
| 62 | Bearing-ball , 6004V | 2 | 91301008 | 91301008 |
| 63 | Shaft-"F" | 1 | 1210304403 | 1210304403 |
| 64 | Gear-"F" shaft | 1 | 1210304501 | 1210304501 |
| 65 | Shaft-"F" (left) | 1 | 1210304609 | 1210304609 |
| | (right) | 1 | 1210304707 | 1210304707 |
| 66 | Square key , 4x4x20L | 2 | | |
| 67 | Bearing ball, 6005 | 2 | 91301010 | 91301010 |
| 68 | Shaft-"G" | 1 | 1210304805 | 1210304805 |
| 69 | Gear-"G" shaft | 1 | 1210304903 | 1210304903 |
| 70 | Gear-"G" shaft | 1 | 1210305008 | 1210305008 |
| 71 | Gear-"H" shaft | 1 | 1210305106 | 1210305106 |
| 72 | Shaft-"H" | 1 | 1210300209 | 1210300209 |
| 73 | Key-square , 6x6x13L | 1 | | |
| 74 | Cap-bearing | 1 | 1210305204 | 1210305204 |
| 75 | Bushing-"H" shaft | 1 | 1210305302 | 1210305302 |
| 76 | Bearing ball , 6004Z | 1 | 91301007 | 91301007 |
| 77 | Spacer | 1 | 1121600905 | 1121600905 |
| 78 | Gear-drive shaft (57T in ) | 1 | 1121600601 | 1121600601 |
| 79 | Washer | 1 | 1121602105 | 1121602105 |
| 80 | Hexagon socket screw ,<br>M8xP1.25x16L | 1 | | |
| 81 | Bolt-lock end cover | 1 | 1122100208 | 1122100208 |
| 82 | Stud | 1 | 1121601108 | 1121601108 |
| 83 | Washer, 1/2 | 1 | 1121602301 | 1121602301 |
| 84 | Nut, W16 | 1 | | |
| 85 | Nut-lock stud | 1 | 1121601706 | 1121601706 |
| 86 | Quadrat | 1 | 1121601000 | 1121601000 |
| 87 | Stud-gear | 1 | 1121601206 | 1121601206 |
| 88 | Snap ring , R35 | 1 | | |
| 89 | Gear-quadrat (71T in) | 1 | 1121600209 | 1121600209 |

# GEAR BOX ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 90 | Snap ring , S16 | 1 | | |
| 91 | Hexagon socket screw ,<br>M6xP1.0x25L | 2 | | |
| 91-1 | Cover | 1 | 1222100200 | 1222100200 |
| 92 | Plug-oil inlet | 1 | 1122101401 | 1122101401 |
| 93 | Hexagon socket screw ,<br>M6xP1.0x65L | 2 | | |
| 94 | Seat-pilot light | | 1210701206 | 1210701206 |
| 95 | Lead-screw (5 feet in) | 1 | 1210700209 | 1210700209 |
| | (5 feet mm) | 1 | 1210700101 | 1210700101 |
| | (6 feet in) | 1 | 1220700202 | 1220700202 |
| | (6 feet mm) | 1 | 1220700104 | 1220700104 |
| | (8 feet in) | 1 | 1230700205 | 1230700205 |
| | (8 feet mm) | 1 | 1230700107 | 1230700107 |
| | (10 feet in) | 1 | 1240700208 | 1240700208 |
| | (10 feet mm) | 1 | 1240700100 | 1240700100 |
| 96 | Nut-lock | 1 | 1210700709 | 1210700709 |
| 97 | Bushing-leadscrew | 1 | | |
| 98 | Plug-leadscrew | 1 | 1210700709 | 1210700709 |
| 99 | Supporter-for leadscrew, feed rod | 1 | 1210700807 | 1210700807 |
| 100 | Plug-oil inlet | 1 | 1122101509 | 1122101509 |
| 101 | Hexagon socket screw ,<br>M8xP1.25x30L | 1 | | |
| 102 | Nut-lock | 1 | 1210700709 | 1210700709 |
| 103 | Plug-plastic | 1 | 1122101607 | 1122101607 |
| 104 | Rod-feed | 1 | 1210700307 | 1210700307 |
| 105 | Set screw , M6xP1.0x20L | 2 | | |
| 106 | Pin-taper , 6x100L | 1 | 1210700601 | 1210700601 |
| 107 | Hexagon socket screw ,<br>M8xP1.25x80L | 1 | | |
| 108 | Bushing-spindle starting rod | 1 | 1210700905 | 1210700905 |
| 109 | Rod-spindle starting switch (5 feet) | 1 | 1210700405 | 1210700405 |
| | (6 feet) | 1 | 1220700408 | 1220700408 |
| | (8 feet) | 1 | 1230700401 | 1230700401 |
| | (10 feet) | 1 | 1240700404 | 1240700404 |
| 110 | Seat-switch | 1 | 1210701304 | 1210701304 |
| 111 | Hexagon socket screw ,<br>M8xP1.25x25L | 2 | | |
| 112 | Snap ring , S30 | 1 | | |
| 113 | Nut, M6xP1.0 | 1 | | |
| 114 | Set screw , M6xP1.0x20L | 1 | 1210305400 | 1210305400 |
| 115 | Bracket | 1 | 1210701402 | 1210701402 |
| 121 | Pin , 5x25L | 1 | | |

# GEAR BOX ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 122 | Screw socket headless set ,<br>M6xP1.0x8L | 1 | | |
| 123 | Switch | 2 | | |
| 126 | Knob | 3 | 1120207400 | 1120207400 |
| 127 | Hexagon socket screw ,<br>M10xP1.5x35L | 4 | 1210701500 | 1210701500 |
| 128 | Pin-taper , 0x38 | 1 | 1003502904 | 1003502904 |
| 128-1 | Pin-taper , 6x45 | 1 | | |
| 129 | Hexagon socket screw ,<br>M8xP1.25x40L | 7 | | |
| 130 | Screw-taper, oil outlet, PT3/8 | 1 | | |
| 131 | Screw-set, taper, PT1/8 | 1 | | |
| 132 | Shifter | 2 | 1210305606 | 1210305606 |
| 133 | Shoe-shifter | 3 | 121030571 | 121030571 |
| 134 | Shifter | 1 | 1210306005 | 1210306005 |
| 135 | Snap ring , S10 | 3 | | |
| 136 | Pin-spring , 5x26 | 3 | | |
| 137 | Shaft-shifter | 3 | 1210306103 | 1210306103 |
| 138 | Ring-"O" , P12 | 3 | | |
| 139 | Detent Plate | 1 | 121030621 | 121030621 |
| 139-1 | Detent Plate | 1 | 1210306309 | 1210306309 |
| 139-2 | Detent Plate | 1 | 121030641 | 121030641 |
| 140 | Ball-steel , 1/4 | 3 | | |
| 141 | Spring , 5x26 | 3 | | |
| 142 | Hub | 3 | 1210306505 | 1210306505 |
| 143 | Lever | 3 | 1210306701 | 1210306701 |
| 144 | Snap ring , S15 | 1 | | |
| 145 | Gear-drive bevel | 1 | 1210306809 | 1210306809 |
| 146 | Key-square , 5x5x15L | 1 | | |
| 147 | Shaft-bevel gear | 1 | 1210306907 | 1210306907 |
| 148 | Seat-gear shifting | 1 | 1210307002 | 1210307002 |
| 149 | Ball-steel , 5/16 | 1 | | |
| 150 | Spring , 8x20 | 1 | | |
| 151 | Seal-oil , 20x35x10 | 1 | | |
| 152 | Hub | 1 | 1210307100 | 1210307100 |
| 153 | Handle | 1 | 1120207204 | 1120207204 |
| 154 | Pin , 5x50 | 1 | | |
| 155 | Snap ring , S18 | 2 | | |


9-3 APRON

# APRON ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 1 | Body-Apron (right) | 1 | 1210900209 | 1210900209 |
| | (left ) | 1 | 1210900101 | 1210900101 |
| 2 | Gib | 1 | 1210901706 | 1210901706 |
| 3 | Hexagon socket screw ,<br>M6xP1.0x16L | 17 | | |
| 4 | Holder-half nut (right) | 1 | 1210900405 | 1210900405 |
| | (left) | 1 | 1210900307 | 1210900307 |
| 5 | Nut-half (in) | 1 | 121090051 | 121090051 |
| | (mm) | 1 | 121090061 | 121090061 |
| 6 | Nut-half (in) | 1 | 121090051 | 121090051 |
| | (mm) | 1 | 121090061 | 121090061 |
| 7 | Holder-half nut | 1 | | |
| 8 | Hexagon socket screw ,<br>M6xP1.0x16L | 1 | | |
| 9 | Pin-sliding | 2 | 1210902507 | 1210902507 |
| 10 | Shaft-haft nut (right) | 1 | 1210900807 | 1210900807 |
| | (left) | 1 | 1210900709 | 1210900709 |
| 11 | Ring-O , P26 | 2 | | |
| 12 | Set screw , M8xP1.25x20L | 2 | 1210902605 | 1210902605 |
| 13 | Hub (right) | 1 | 121090141 | 121090141 |
| | (left) | 1 | 1210901304 | 1210901304 |
| 14 | Ball-steel , 1/4" | 3 | | |
| 15 | Spring , Ø 1x6x30L | 3 | | |
| 16 | Set screw , M8xP1.25x10L | 2 | | |
| 17 | Lever | 2 | 1210902703 | 1210902703 |
| 18 | Knob | 2 | 1120207400 | 1120207400 |
| 19 | Hexagon socket screw ,<br>M10xP1.5x25L | 2 | | |
| 20 | Lenx-oil | 1 | 1210902801 | 1210902801 |
| 21 | Shaft-auto stop | 1 | 1210902909 | 1210902909 |
| 22 | Cover-bottom apron | 1 | 1210903004 | 1210903004 |
| 23 | Seal-oil , 15x25x7 | 1 | | |
| 24 | Seat-tappet | 1 | 1121601804 | 1121601804 |
| 25 | Shaft-tappet | 1 | 1121601902 | 1121601902 |
| 26 | Set screw , M6xP1.0x16L | 2 | | |
| 27 | Tappet | 1 | 1121602007 | 1121602007 |
| 28 | Nut , M8xP1.25 | 1 | | |
| 29 | Set screw , M8xP1.25x30L | 1 | | |
| 30 | Set screw , M6xP1.0x40L | 1 | | |
| 31 | Set screw , M6x40 | 1 | | |
| 32 | Nut , M6xP1.0 | 2 | | |
| 33 | Screw-oil leakage , PT1/4 | 1 | 92590601 | 92590601 |
| 34 | Seal-oil , 32x42x10 | 1 | | |
| 35 | Bushing | 2 | 1210901804 | 1210901804 |
| 36 | Sleeve-feed rod | 1 | 1210901902 | 1210901902 |
| 37 | Key-square , 6x6x42L | 1 | | |

# APRON ASSEMBLY

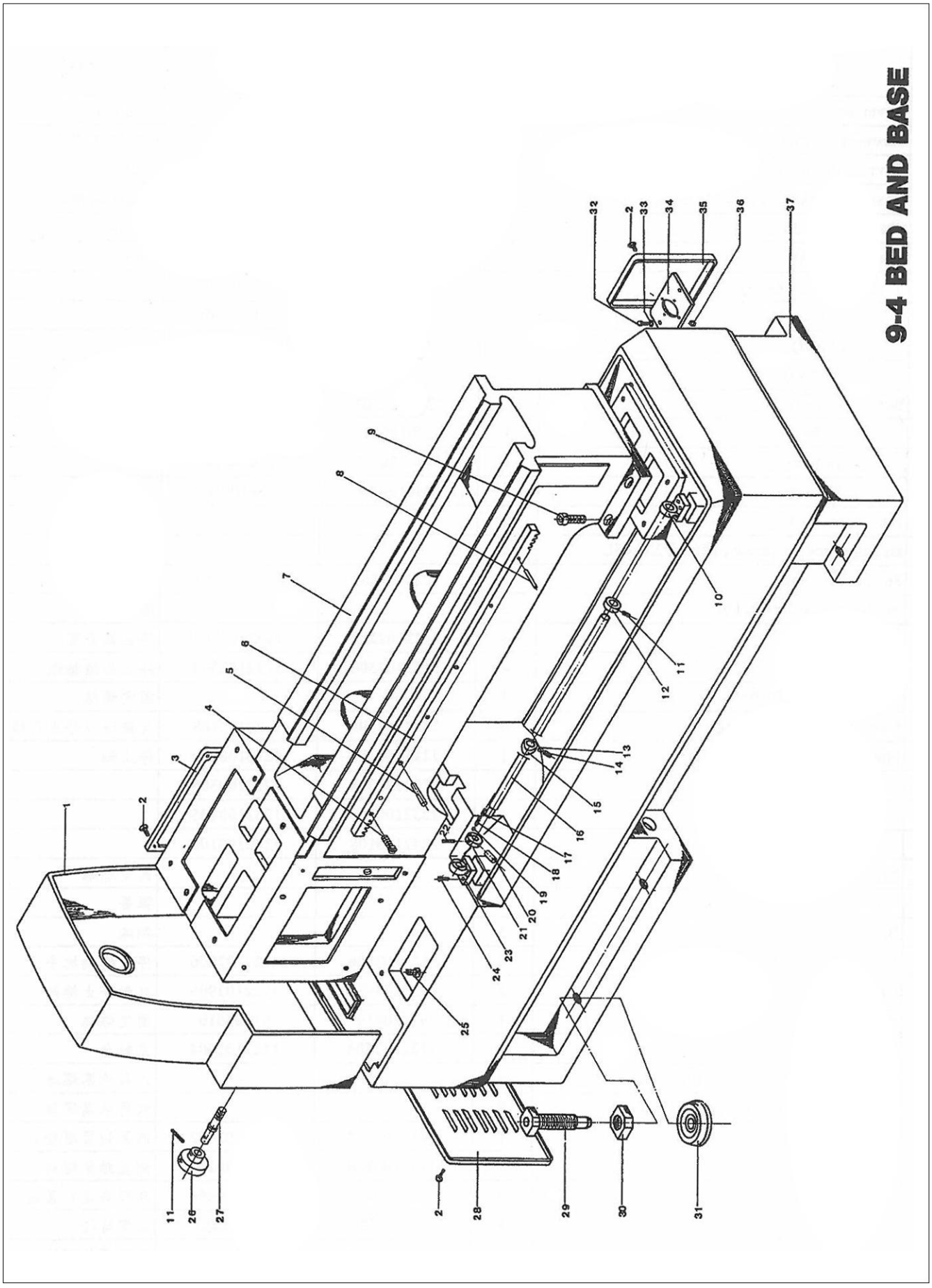
| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 38 | Key-square , 6x6x12L | 1 | | |
| 39 | Gear | 1 | 1210903200 | 1210903200 |
| 40 | Seat-worm | 1 | 1210903308 | 1210903308 |
| 41 | Shaft-worm | 1 | 1210903406 | 1210903406 |
| 42 | Bearing-thrust , 2904 | 2 | 91311005 | 91311005 |
| 43 | Worm gear | 1 | 1210902007 | 1210902007 |
| 44 | Washer-lock , 20 | 1 | | |
| 45 | Nut | 1 | | |
| 46 | Hexagon socket screw ,<br>M6xP1.0x12L | 8 | | |
| 47 | Spring, Ø 1x10x60L (right) | 1 | 1210905400 | 1210905400 |
| | (left) | 1 | 1210905508 | 1210905508 |
| 48 | Block-safe device (right) | 1 | 1210901000 | 1210901000 |
| | (left) | 1 | 1210900905 | 1210900905 |
| 49 | Pin, 5x18L | 2 | | |
| 50 | Pin | 1 | | |
| 51 | Shaft-auto feed (right) | 1 | 1210901206 | 1210901206 |
| | (left) | 1 | 1210901108 | 1210901108 |
| 52 | Collar (right) | 1 | 1210901206 | 1210901206 |
| 53 | Ring-O , P16 | 2 | | |
| 54 | Cover | 1 | 1210903602 | 1210903602 |
| 55 | Hub (right) | 1 | 121090141 | 121090141 |
| | (left) | 1 | 1210901304 | 1210901304 |
| 56 | Spring washer , M8 | 1 | | |
| 57 | Hexagon socket screw ,<br>M8xP1.25x12L | 1 | | |
| 58 | Snap ring, S10 | 1 | | |
| 59 | Lever | 1 | 1210903700 | 1210903700 |
| 60 | Spring washer, M12 | 1 | | |
| 61 | Screw | 1 | | |
| 62 | Hexagon socket screw ,<br>M5xP0.8x20L | 1 | | |
| 63 | Spring | 1 | 1210905606 | 1210905606 |
| 64 | Spacer | 1 | 1210903906 | 1210903906 |
| 65 | Bearing ball, 6005V | 1 | 91301012 | 91301012 |
| 66 | Worm-wheel | 1 | 1210902105 | 1210902105 |
| 67 | Wheel-friction | 1 | 1210902203 | 1210902203 |
| 68 | Key-square, 7x7x12L | 1 | | |
| 69 | Shaft-worm wheel | 1 | 1210904001 | 1210904001 |
| 70 | Pin | 1 | 1210904109 | 1210904109 |
| 71 | Spring, compressing | 1 | 1210905302 | 1210905302 |
| 72 | Washer | 1 | 1210904207 | 1210904207 |
| 73 | Set screw | 1 | | |
| 74 | Bearing-ball , 6204 | 1 | 91301018 | 91301018 |
| 75 | Cover | 1 | 1210904305 | 1210904305 |
| 76 | Snap ring , S20 | 2 | | |
| 77 | Gear | 1 | 1210902301 | 1210902301 |
| 78 | Shaft-cross feed | 1 | 1210904403 | 1210904403 |

# APRON ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 79 | Set (right) | 1 | 1210901608 | 1210901608 |
| | (left) | 1 | 1210901500 | 1210901500 |
| 80 | Shaft-lever | 1 | 1210904501 | 1210904501 |
| 81 | Lever | 1 | | |
| 82 | Sleeve-lever | 1 | | |
| 83 | Set screw , M4xP0.7x10L | 1 | | |
| 84 | Pinion-rack | 1 | 1210904707 | 1210904707 |
| 85 | Key-square , 6x6x20L | 1 | | |
| 86 | Bearing-niddle , NK20/22 | 1 | 91311001 | 91311001 |
| 87 | Set screw , M6xP1.0x10L | 1 | | |
| 88 | Collar | 1 | 1210904805 | 1210904805 |
| 89 | Pin-spring , 6x36L | 1 | | |
| 90 | Gear | 1 | 1210904903 | 1210904903 |
| 91 | Bearing-ball , 6003 | 1 | 91301005 | 91301005 |
| 92 | Cover | 1 | 1210905008 | 1210905008 |
| 93 | Pinion-handwheel | | 1210905106 | 1210905106 |
| 94 | Key-square , 6x6x25L | 1 | | |
| 95 | Bearing-ball , 6004V | 1 | 91301008 | 91301008 |
| 95-1 | Bearing-ball , 6005Z | 1 | 91301007 | 91301007 |
| 96 | Seat | | 1210905204 | 1210905204 |
| 97 | Hexagon socket screw ,<br>M6xP1.0x30L | 4 | | |
| 99 | Washer | | 1210701608 | 1210701608 |
| 100 | Washer-wave type | 1 | | |
| 101 | Dial-rack | 1 | 1220900202 | 1220900202 |
| 102 | Handwheel | 1 | 112210171 | 112210171 |
| 103 | Handle | 1 | 1121102002 | 1121102002 |
| 104 | Washer-lock | 1 | 1122101901 | 1122101901 |
| 105 | Hexagon socket screw ,<br>8xP1.25x20L | 1 | | |
| 106 | Dial-thread chasing (in, 4 parts) | 1 | 1003514708 | 1003514708 |
| | (mm, 5 parts) | 1 | 1003502404 | 1003502404 |
| | (mm, 7 parts) | 1 | 1003514904 | 1003514904 |
| 107 | Pin | 1 | | |
| 108 | Seat-dial shaft | 1 | 1003514502 | 1003514502 |
| 109 | Hexagon socket screw ,<br>10xP1.5x65L | 1 | | |
| 110 | Gear (in 16T) | 1 | 1003514600 | 1003514600 |
| | (mm 11T) | 1 | 1003502502 | 1003502502 |
| | (mm 13T) | 1 | 1003502600 | 1003502600 |
| | (mm 14T) | 1 | 1003514806 | 1003514806 |
| | (mm 15T) | 1 | 1003502708 | 1003502708 |
| | (mm 18T) | 1 | 1003502806 | 1003502806 |
| 111 | Washer-spring , 10 | 1 | | |
| 112 | Nut , M10xP1.5 | 1 | | |
| 113 | Snap ring , S30 | 1 | | |

# APRON ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 16<br>Part No. | Type: 18<br>Part No. |
|---|---|---|---|---|
| 114 | Seat-switch | 1 | 1210701706 | 1210701706 |
| 115 | Key-square , 6x8x25L | 1 | | |
| 116 | Hexagon socket screw ,<br>M8xP1.25x16L | 2 | | |
| 117 | Bracket | 1 | 1210701804 | 1210701804 |
| 118 | Screw-lock | 2 | 1210701902 | 1210701902 |
| 119 | Screw-hexa. socket headless cap,<br>M8xP1.25x8L | 1 | 1210702007 | 1210702007 |
| 120 | Seat-lever | 1 | 1210702105 | 1210702105 |
| 121 | Set screw , M8xP1.25x8L | 2 | 91120808 | 91120808 |
| 122 | Spring | 1 | | |
| 123 | Lever | 1 | 1210702203 | 1210702203 |
| 124 | Sleeve-lever | 1 | 1122103601 | 1122103601 |

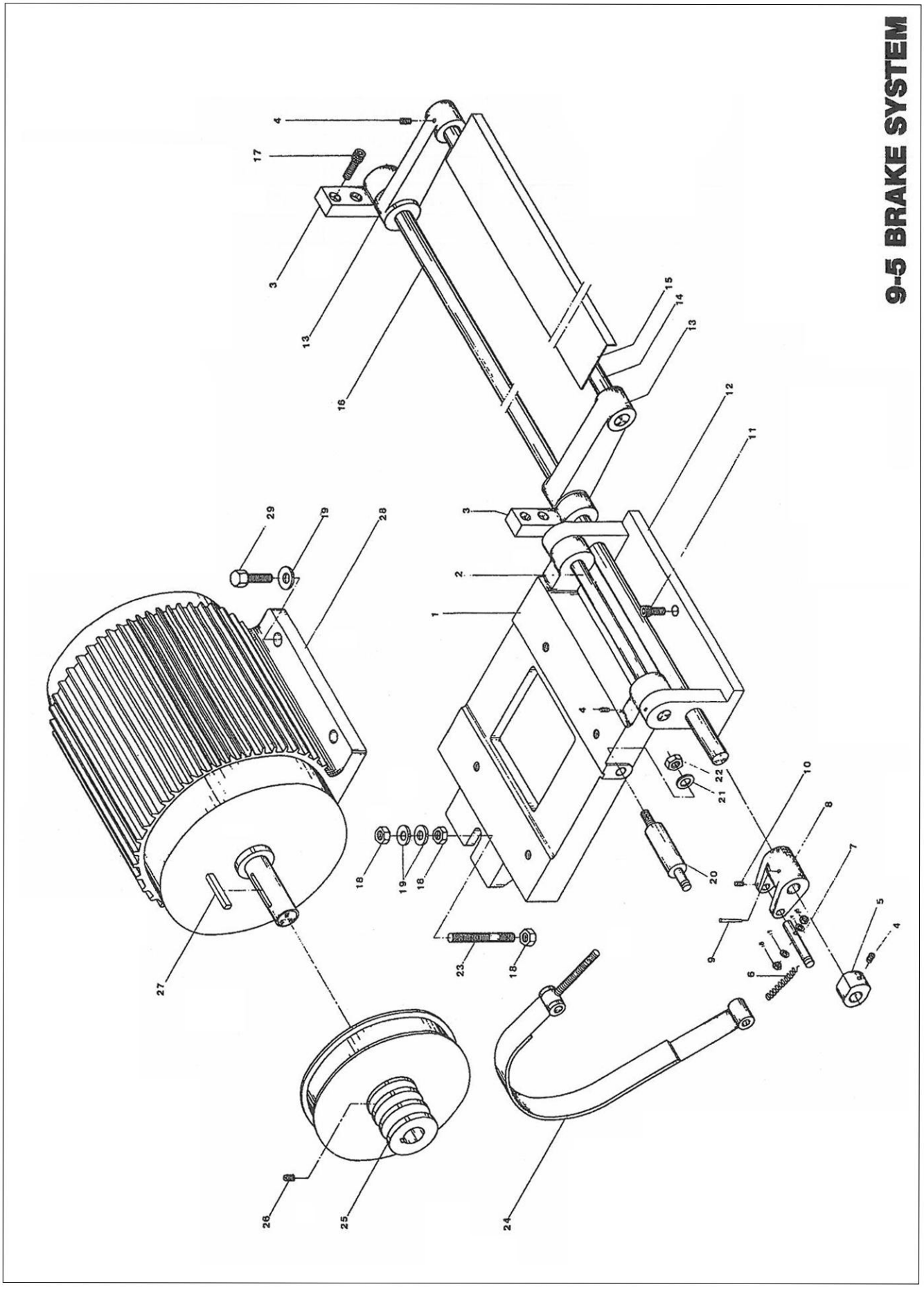

9-4 BED AND BASE

# BED AND BASE ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Cover-end | 1 | 1221600201 | 1221600201 |
| 2 | Screw-cross-recessed head, M6xP1.0x20L | 12 | | |
| 3 | Cover-electric box | 1 | 1122102006 | 1122102006 |
| 4 | Hexagon socket screw , M6xP1.0x25L | 10 | | |
| 5 | Pin-taper, 6x36 | 2 | | |
| 6 | Rack (5 feet ) | 1 | 1210701000 | 1210701000 |
| | (6 feet , right) | 1 | 1220700604 | 1220700604 |
| | (6 feet , left) | 1 | 1220700506 | 1220700506 |
| | (8 feet) | 1 | 1230700509 | 1230700509 |
| | (10 feet) | 1 | 1240700502 | 1240700502 |
| 7 | Bed (5 feet) | 1 | 1210100101 | 1210100101 |
| | (6 feet) | 1 | 1220100104 | 1220100104 |
| | (8 feet) | 1 | 1230100107 | 1230100107 |
| | (10 feet) | 1 | 1240100100 | 1240100100 |
| 8 | Pin-taper , 6x36 | 2 | | |
| 9 | Hexagon socket screw , M16xP2.0x45L | 4 | | |
| 10 | Supporter-shaft | 1 | 1122102104 | 1122102104 |
| 11 | Set screw , M6xP1.0x10L | 2 | | |
| 12 | Collar | 1 | 1122102202 | 1122102202 |
| 13 | Shoe-brass | 4 | 1122102300 | 1122102300 |
| 14 | Set screw , M6xP1.0x6L | 1 | | |
| 15 | Cam-auto feed stopping | 4 | 1122102408 | 1122102408 |
| 16 | Shaft-auto stopping (5 feet) | 1 | 1212100109 | 1212100109 |
| | (6 feet) | 1 | 1222100308 | 1222100308 |
| | (8 feet) | 1 | 1232100105 | 1232100105 |
| | (10 feet) | 1 | 1242100108 | 1242100108 |
| 17 | Set screw , M8xP1.25x8L | 1 | | |
| 18 | Spring , 1x6x8L | 1 | | |
| 19 | Ball-steel , 1/4" | 1 | | |
| 20 | Lever-turning shaft | 4 | 1122102506 | 1122102506 |
| 21 | Collar | 1 | 1122103905 | 1122103905 |
| 22 | Set screw , M8xP1.25x10L | 1 | 91120810 | 91120810 |
| 23 | Supporter-shaft | 1 | 1122102604 | 1122102604 |
| 24 | Hexagon socket screw , M8xP1.25x16L | 4 | | |
| 25 | Hexagon socket screw , M16xP2.0x55L | 8 | | |
| 26 | Plug | 1 | 1122102702 | 1122102702 |
| 27 | Bolt-lock | 1 | 1122100208 | 1122100208 |
| 28 | Cover-motor seat | 2 | 1122100806 | 1122100806 |
| 29 | Bolt-set machine | 6 | 112210281 | 112210281 |
| 30 | Nut-lock | 6 | 1122102800 | 1122102800 |

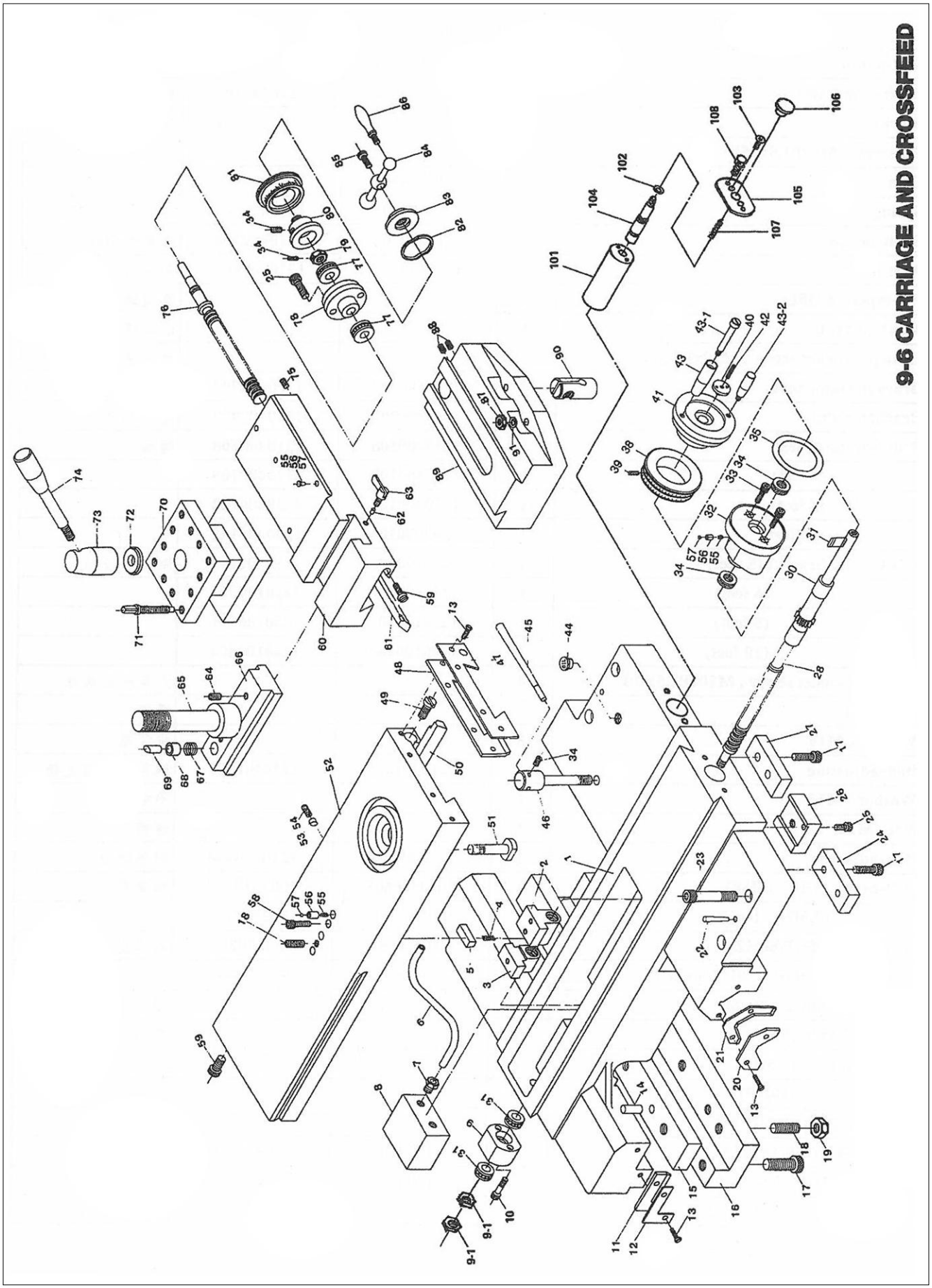
# BED AND BASE ASSEMBLY

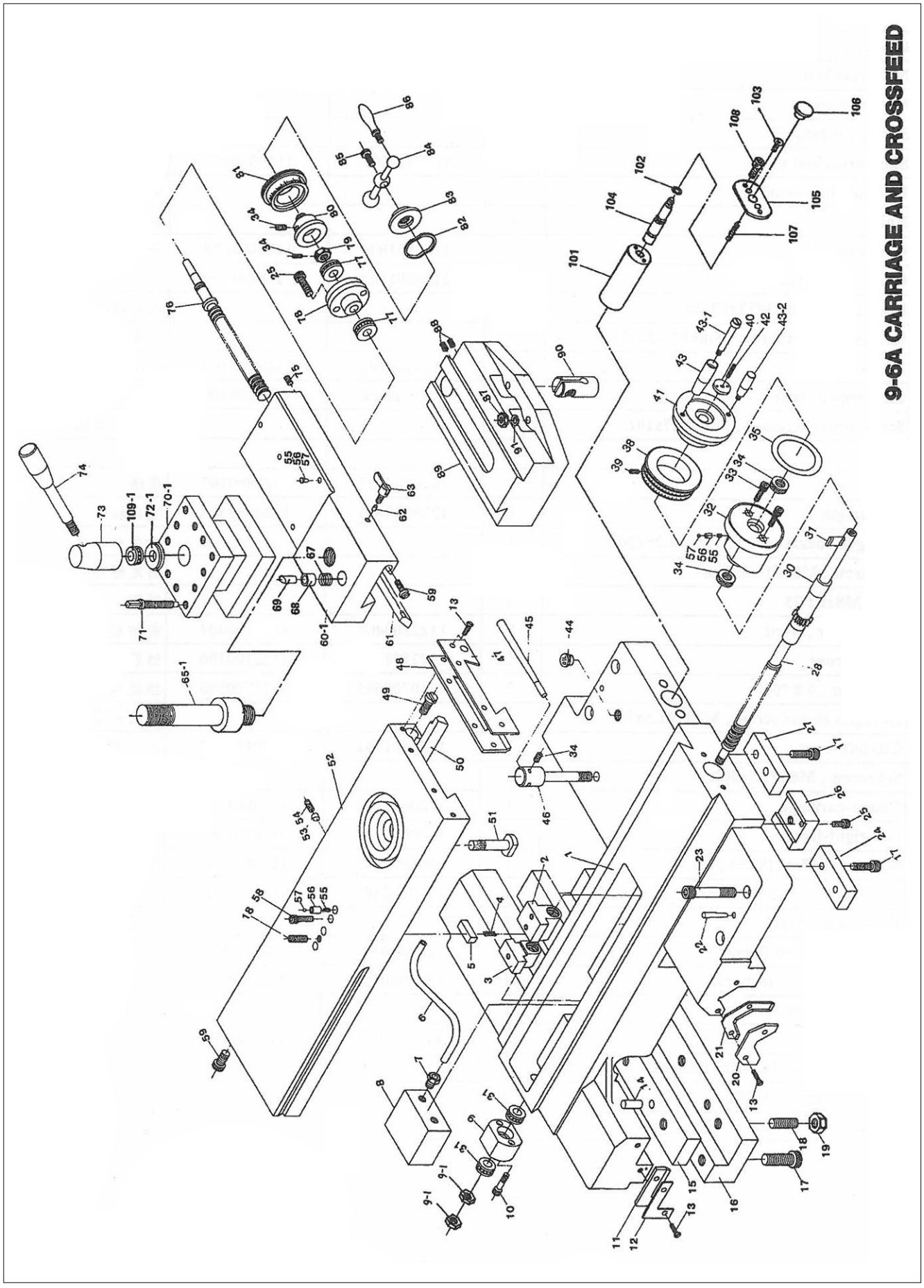
| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 31 | Block-leveling | 6 | 1003501809 | 1003501809 |
| 32 | Bolt-hexa. head , W1/4"x25 | 2 | | |
| 33 | Washer, W5/8" | 2 | | |
| 34 | Seat-coolant pump | 1 | 121010051 | 121010051 |
| 35 | Cover-coolant motor seat | 1 | 1005000403 | 1005000403 |
| 36 | Nut-lock , W1/4" | 2 | | |
| 37 | Base (5 feet) | 1 | 1210100209 | 1210100209 |
| | (6 feet) | 1 | 1220100202 | 1220100202 |
| | (8 feet) | 1 | 1230100205 | 1230100205 |
| | (10 feet) | 1 | 1246100208 | 1246100208 |


9-5 BRAKE SYSTEM

# BRAKE SYSTEM ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Seat-motor | 1 | 1210400606 | 1210400606 |
| 2 | Shaft-motor seat | 1 | 1210400204 | 1210400204 |
| 3 | Block | 2 | 1210100601 | 1210100601 |
| 4 | Screw-hexa. socket headless set, M6xP1.0x15L | 4 | | |
| 5 | Cam | 1 | 1210400606 | 1210400606 |
| 6 | Spring | 1 | 1210400302 | 1210400302 |
| 7 | Shaft-brake | 1 | 1210400704 | 1210400704 |
| 8 | Arm-brake | 1 | 1210400802 | 1210400802 |
| 9 | Pin-taper , 4"x38L | 1 | | |
| 10 | M6xP1.0x10L | 1 | | |
| 11 | Hexagon socket screw , M10xP1.5x20L | 3 | | |
| 12 | Bracket-motor seat | 1 | 1210100709 | 1210100709 |
| 13 | Bracket-pedal | 2 | 1210400900 | 1210400900 |
| 15 | Pedal-brake (5 feet) | 1 | 1210400508 | 1210400508 |
| | (6 feet) | 1 | 1220400109 | 1220400109 |
| | (8 feet) | 1 | 1230400102 | 1230400102 |
| | (10 feet) | 1 | 1240400105 | 1240400105 |
| 16 | Shaft-pedal bracket (5 feet) | 1 | 1210100105 | 1210100105 |
| | (6 feet) | 1 | 1220100300 | 1220100300 |
| | (8 feet) | 1 | 1230100401 | 1230100401 |
| | (10 feet) | 1 | 1240100404 | 1240100404 |
| 17 | Hexagon socket screw , M10xP1.25x20L | 4 | | |
| 18 | Nut , M16 | 5 | | |
| 19 | Washer , M16 | 8 | | |
| 20 | Bolt-adjusting | 1 | 1210401005 | 1210401005 |
| 21 | Washer , M12 | 1 | | |
| 22 | Nut , M12 | 1 | | |
| 23 | Bolt-adjusting | 1 | 1210400400 | 1210400400 |
| 24 | Belt-brake (5HP , 15HP) | 1 | 1003519605 | 1003519605 |
| | (7.5HP , 10HP) | 1 | 1003519703 | 1003519703 |
| 25 | Belt pulley (5HP/60HZ) | 1 | 3005025 | 3005025 |
| | (7.5HP, 10HP/60HZ) | 1 | 3005025-004 | 3005025-004 |
| 26 | Set screw , M8xP1.25x8L | 1 | | |
| 27 | Key, 8x7.5x40 (5HP) | 1 | | |
| | 10x8x65 (7.5HP) | 1 | | |
| | (10HP) | 1 | | |
| | 12x8x80 (15HP) | 1 | | |
| 28 | Motor (5HP/220/440/60) | 1 | 81000103 | 81000103 |
| | (7.5HP/220/440/60) | 1 | 81000205 | 81000205 |
| 29 | Bolt-hexa. head , M10x30L | 4 | | |


9-6 CARRIAGE AND CROSSFEED


9-6A CARRIAGE AND CROSSFEED

# CARRIAGE AND CROSSFEED ASSEMBLY

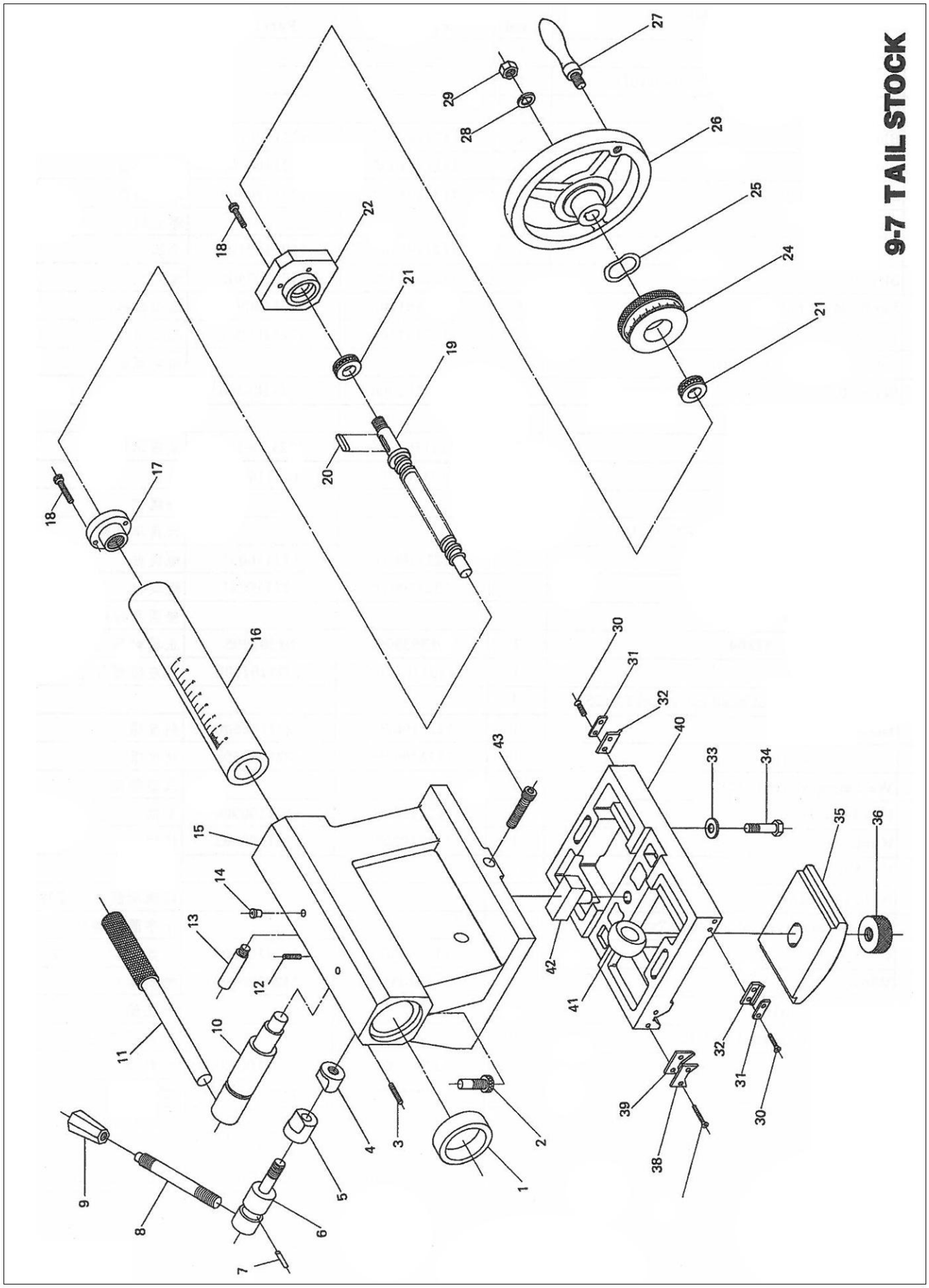
| Item No. | Part Name | Amt. Used | Type: 17 Part No. | Type: 19 Part No. |
|---|---|---|---|---|
| 1 | Carriage | 1 | 122080109 | 122080109 |
| 2 | Nut-crossfeed | 1 | | |
| 3 | Nut-crossfeed | 1 | | |
| 4 | Spring, 0.3x5x15L | 1 | | |
| 5 | Shim-crossfeed nut | 1 | 1120800901 | 1120800901 |
| 6 | Pipe-lubrication oil | 1 | | |
| 7 | Nut-copper | 1 | | |
| 8 | Conveyor-oil | 1 | 1120801006 | 1120801006 |
| 9 | Cap-crossfeed screw | 1 | 1120801104 | 1120801104 |
| 9-1 | Nut-hexa. Head, M12xP1.25 | 1 | | |
| 10 | Hexagon socket screw, M8xP1.25x35L | 2 | | |
| 11 | Wiper-rear | 1 | 1122100100 | 1122100100 |
| 12 | Case-wiper , rear | 1 | 1122100306 | 1122100306 |
| 13 | Screw-cross-recessed, M4xP0.7x10L | 8 | | |
| 14 | Pin | 2 | | |
| 15 | Gib | 1 | 1220800207 | 1220800207 |
| 16 | Holder-gib | 1 | 1220800403 | 1220800403 |
| 17 | Hexagon socket screw, M8xP1.25x20L | 2 | | |
| 18 | Set screw, M8xP1.25x20L | 5 | | |
| 19 | Nut , M8xP1.25 | 4 | | |
| 20 | Case-wiper, front | 1 | 1122100404 | 1122100404 |
| 21 | Wiper-front | 1 | 1122100100 | 1122100100 |
| 22 | Pin-taper, 6＃75L | 2 | 1210700503 | 1210700503 |
| 23 | Hexagon socket screw, M10xP1.5x70L | 4 | | |
| 24 | Gib-left-front | 1 | 1120801202 | 1120801202 |
| 25 | Set screw , M6xP1.0x20L | 3 | | |
| 26 | Clamp-carriage | 1 | 1120801300 | 1120801300 |
| 27 | Gib-right-front | 1 | 1120801408 | 1120801408 |
| 28 | Screw-crossfeed (8TPI , in) | 1 | 1000800403 | 1000800403 |
| | (5MM , mm) | 1 | 1000800109 | 1000800109 |
| 29 | Pin-spring , 5x30L | 1 | | |
| 30 | Pinion-crossfeed (local) | 1 | 1220800501 | 1220800501 |
| | (export) | 1 | 1220800609 | 1220800609 |
| 31 | Bearing thrust, 51101 | 1 | | |
| 32 | Bracket | 1 | 1120800107 | 1120800107 |
| 33 | Bolt-hexa. Socket, M8xP1.25x40L | 2 | | |
| 34 | Bearing-thrust, 51103 | 2 | 91303002 | 91303002 |
| 35 | Washer-wave type, 6210 | 2 | | |
| 36 | Set screw , M6xP1.0x10L | 1 | | |
| 37 | Clutch-dial | 1 | 1120802807 | 1120802807 |

# CARRIAGE AND CROSSFEED ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17 Part No. | Type: 19 Part No. |
|---|---|---|---|---|
| 38 | Dial-crossfeed (8TPI/export) | 1 | 1000808203 | 1000808203 |
| | (5MM/export) | 1 | 1000802603 | 1000802603 |
| 39 | Hexagon socket screw , M6xP1.0x15L | 1 | | |
| 40 | Set screw | 1 | 1120803000 | 1120803000 |
| 41 | Handle-wheel (local) | 1 | 1120802601 | 1120802601 |
| | (export) | 1 | 1120802709 | 1120802709 |
| 42 | Screw-adjusting , M6xP1.0x30L | 1 | | |
| 43 | Knob-handle (local) | 1 | 1120803206 | 1120803206 |
| | (export) | 1 | 1120803304 | 1120803304 |
| 43-1 | Screw-handle (export) | 1 | | |
| 43-2 | Knob-handle | 1 | 1120803402 | 1120803402 |
| 44 | Plug-oil inlet | 1 | 1122103405 | 1122103405 |
| 45 | Lever | 1 | 1120801506 | 1120801506 |
| 46 | Screw-carriage clamp | 1 | 1120800607 | 1120800607 |
| 47 | Case-wiper | 1 | | |
| 48 | Wiper | 1 | 1222100102 | 1222100102 |
| 49 | Screw-adjusting | 1 | | |
| 50 | Gib | 1 | 1220800305 | 1220800305 |
| 51 | Bolt | 1 | 1120800509 | 1120800509 |
| 52 | Cover-cross sliding | 1 | 1430800802 | 1430800802 |
| 53 | Shoe-clamp | 1 | 1220800707 | 1220800707 |
| 54 | Set screw, M8xP1.25x20L | 1 | | |
| 55 | Spring | 1 | | |
| 56 | Button | 1 | | |
| 57 | Ball-steel , 1/4" | 1 | | |
| 58 | Hexagon socket screw , M6xP1.0x3 | 3 | | |
| 59 | Screw-gib | 2 | | |
| 60 | Compound rest | 1 | | |
| 61 | Gib-compound rest | 1 | 1000804509 | 1000804509 |
| 62 | Shoe-clamp | 1 | 1220800707 | 1220800707 |
| 63 | Screw-clamp | 1 | | |
| 64 | Screw-hexa. socket headless cap , M8xP1.25x10L | 4 | | |
| 65 | Shaft-tool post | 1 | | |
| 65-1 | Shaft-tool post | 2 | | |
| 66 | Block-tee | 1 | | |
| 67 | Spring , 1x8x20L | 1 | | |
| 68 | Sleeve | 1 | | |
| 69 | Button | 1 | | |
| 70 | Tool post square (export) | 1 | 1003512802 | 1003512606 |
| | (local) | 1 | 1003512704 | 1003512508 |
| 71 | Screw-square head | 1 | 1000804107 | 1000804107 |
| 72 | Bearing-thrust, 51104 | 1 | 91303003 | 91303003 |
| 73 | Knob-lever | 1 | 1000810605 | 1000810605 |
| 74 | Lever | 1 | 1000810605 | 1000810605 |
| 75 | Screw-gib, M8xP1.25x31L | 1 | | |
| 76 | Screw-compound rest | 1 | 1000803904 | 1000803904 |

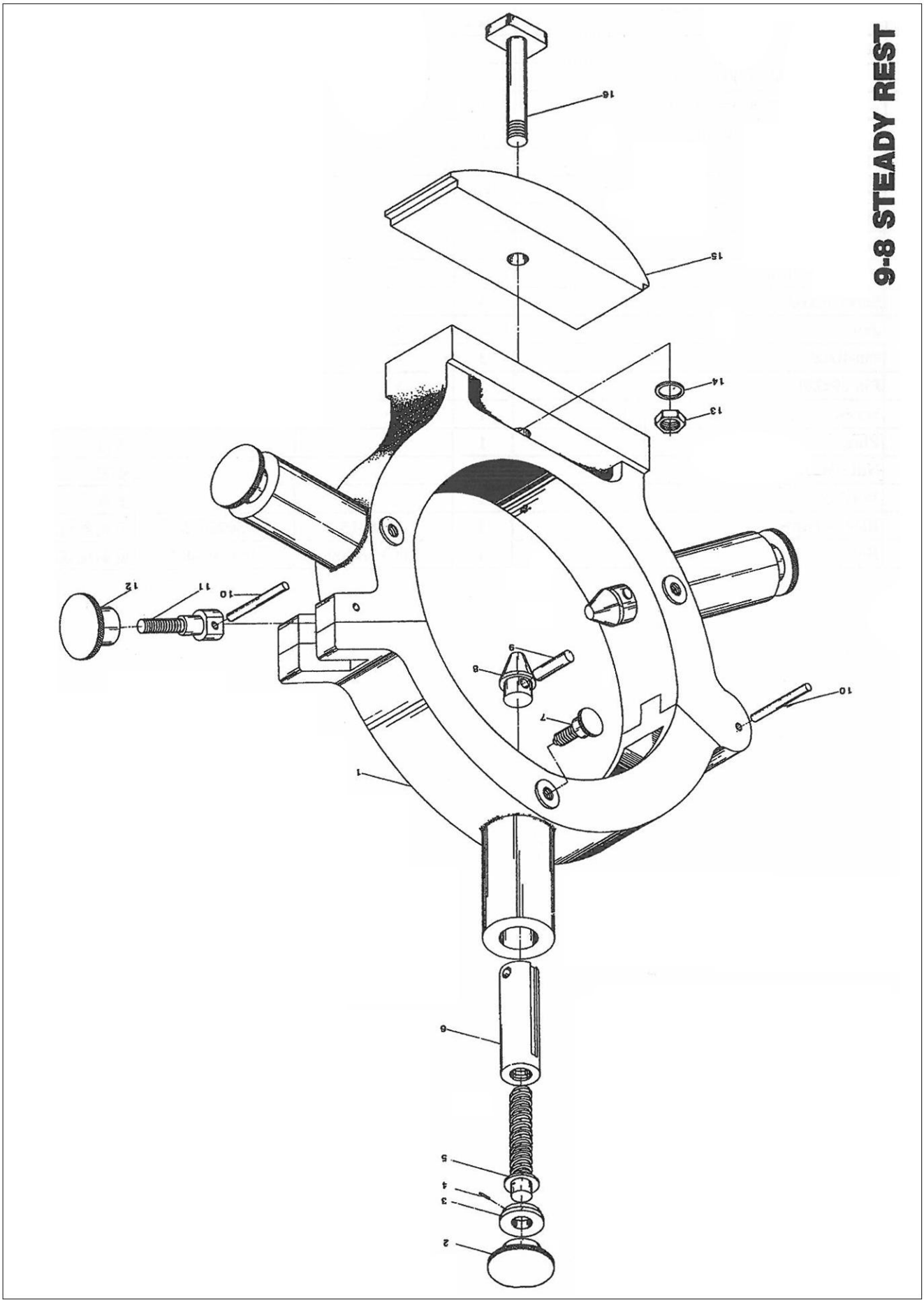
# CARRIAGE AND CROSSFEED ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17 Part No. | Type: 19 Part No. |
|---|---|---|---|---|
| 77 | Bearing-thrust, 51102 | 2 | | |
| 78 | Seat-compound rest screw | 1 | | |
| 79 | Nut | 1 | | |
| 80 | Collar | 1 | | |
| 81 | Dial-compound rest | 1 | 1000820003 | 1000820003 |
| 82 | Washer-wave type | 1 | | |
| 83 | Nut | 1 | | |
| 84 | Handle | 1 | | |
| 85 | Hexagon socket screw , M6xP1.0x16L | 1 | | |
| 86 | Knob-handle | 1 | | |
| 87 | Nut, M10xP1.5 | 4 | | |
| 88 | Set screw , M8xP1.25x8L | 2 | | |
| 89 | Swivel | 1 | | |
| 90 | Nut-compound rest screw | 1 | | |
| 91 | Spring washer , M10 | 4 | | |
| 101 | Body-pump | 1 | 1120801800 | 1120801800 |
| 102 | Ring-O , P10 | 1 | | |
| 103 | Screw , M5xP0.8x12L | 2 | | |
| 104 | Rod-pump | 1 | 1120801908 | 1120801908 |
| 105 | Stopper | 1 | 1120802003 | 1120802003 |
| 106 | Plug | 1 | 1120802101 | 1120802101 |
| 107 | Spring-compressing, Ø 1.2x10x63L | 1 | | |
| 108 | Screw-hexa. Socket head cap, M6xP1.0x16L | 2 | | |


9-7 TAIL STOCK

# TAILSTOCK ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Seal-oil , TC68x90x12 | 1 | | |
| 2 | Hexagon socket screw ,<br>M8xP1.25x10L | 1 | | |
| 3 | Set screw , M6xP1.0x10L | 1 | | |
| 4 | Block-clamp | 1 | 1121101005 | 1121101706 |
| 5 | Block-clamp | 1 | 1121101005 | 1121101706 |
| 6 | Shaft-clamp spindle | 1 | 1121101103 | 1121101804 |
| 7 | Pin, 5x12 | 1 | | |
| 8 | Lever | 1 | 1121102100 | 1121102100 |
| 9 | Sleeve-lever | 1 | 1120207400 | 1120207400 |
| 10 | Shaft-clamp bottom | 1 | 1121101201 | 1221100902 |
| 11 | Lever | 1 | 1121101201 | 1221100902 |
| 12 | Set screw , M6xP1.0x20L | 1 | | |
| 13 | Screw-brake | 1 | 1121102306 | 1121102306 |
| 14 | Plug-oil | 3 | | |
| 15 | Body-tailstock | 1 | 1121100106 | 1121100106 |
| 16 | Spindle-tang slot | 1 | 1121101309 | 1121101309 |
| 17 | Cap-spindle | 1 | | |
| 18 | Hexagon socket screw ,<br>M6xP1.25x10L | 3 | | |
| 19 | Screw-spindle feed (in) | 1 | 122110031 | 122110031 |
| | (mm) | 1 | 122110041 | 122110041 |
| 20 | Key-square , 6x6x25 | 1 | | |
| 21 | Bearing-thrust , 51204 | 2 | 91303005 | 91303005 |
| 22 | Cap-body end | 1 | 1121101407 | 1221101105 |
| 23 | Screw-hexa. Socket head cap,<br>96xP1.0x25L | 4 | | |
| 24 | Dial-feed (in) | 1 | 1121100508 | 1221100500 |
| | (mm) | 1 | 1121100606 | 1221100608 |
| 25 | Washer-wave type, 6205 | 1 | | |
| 26 | Handwheel | 1 | 1121100900 | 1121100900 |
| 27 | Knob | 1 | 1121102002 | 1121102002 |
| 28 | Washer , 1/2" | 1 | | |
| 29 | Nut , 1/2-20UNF | 1 | | |
| 30 | Screw-cross-recessed, M4xP0.7x12L | 4 | | |
| 31 | Case-wiper | 2 | 1122100600 | 1122100600 |
| 32 | Wiper | 2 | 1122100100 | 1122100100 |
| 33 | Washer-flat, M10 | 2 | | |
| 34 | Bolt-clamp, M10xP1.5x75L | 2 | | |
| 35 | Clamp | 1 | 1122100708 | 1122100708 |
| 36 | Washer | 1 | 1122103503 | 1122103503 |
| 38 | Case | 1 | 1122100502 | 1122100502 |
| 39 | Wiper | 1 | 1122100100 | 1122100100 |
| 40 | Bottom-tailstock | 1 | 122110141 | 122110021 |
| 41 | Bolt-clamp | 1 | | |
| 42 | Block-adjusting | 1 | 1221101301 | 1221101301 |
| 43 | Screw-hexa. socket, M10xP1.5x80L | 2 | | |


9-8 STEADY REST
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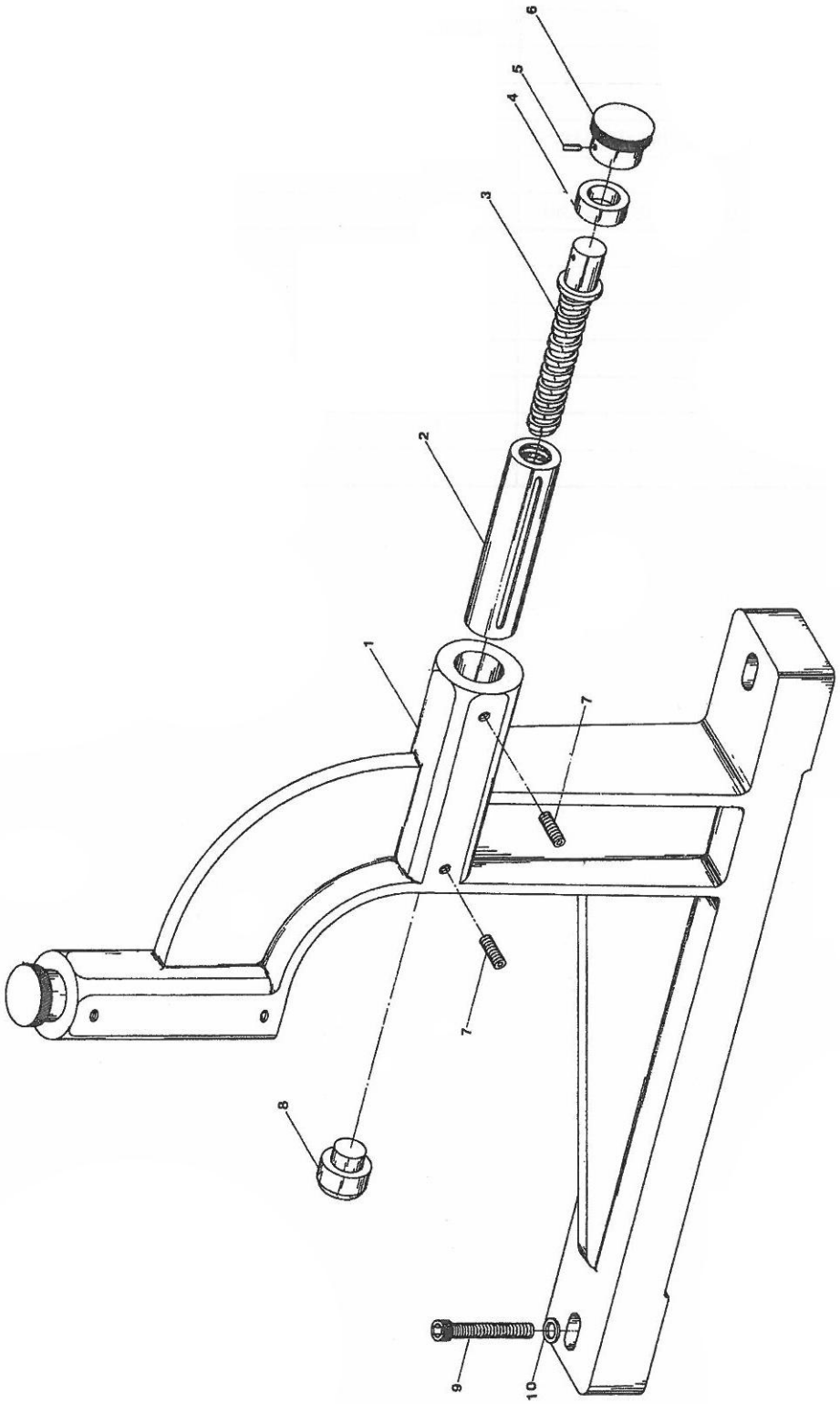
# STEADY REST ASSEMBLY

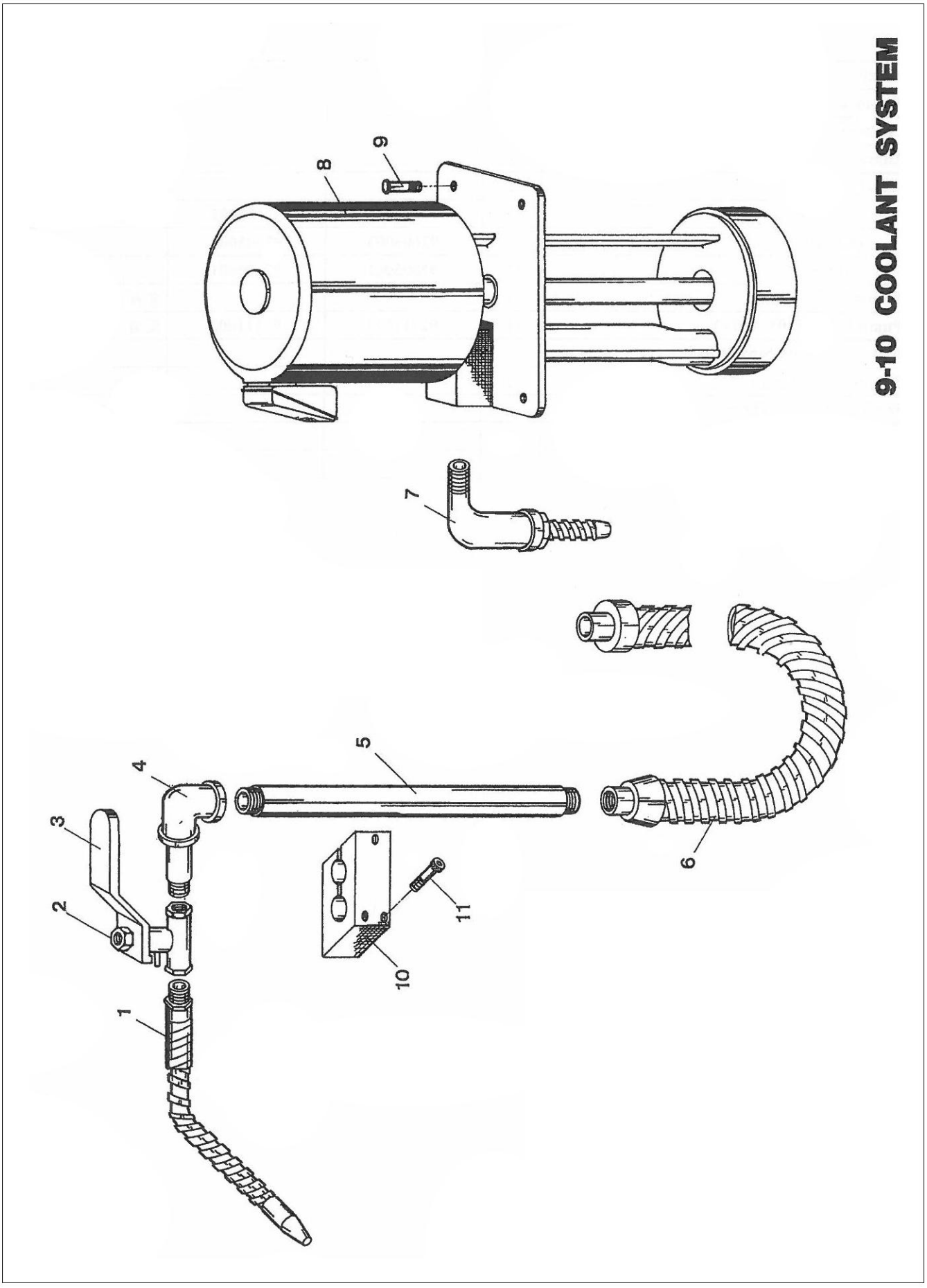
| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Steady-rest (6" Bronze tip type) | 1 | 1003519203 | 1003501103 |
| | (6" Roller type) | 1 | 1003519301 | 1003501201 |
| | (9" Bronze tip type) | 1 | | 1003501309 |
| | (9" Roller type) | 1 | | 1003501407 |
| 2 | Plug-lead screw | 3 | | |
| 3 | Cap, 6x52L | 12 | | |
| 4 | Pin | 3 | | |
| 5 | Lead-screw | 3 | | |
| 6 | Nut-lead screw | 3 | | |
| 7 | Screw-fixed | 3 | | |
| 8 | Jaw | 3 | | |
| 9 | Pin-fixed | 3 | | |
| 10 | Pin , 9x25L | 2 | | |
| 11 | Screw | 1 | | |
| 12 | Plug | 1 | | |
| 13 | Nut , W5/8" | 1 | | |
| 14 | Washer | 1 | | |
| 15 | Block-clamp | 1 | 3008015 | 3008015 |
| 16 | Bolt | 1 | 1003500400 | 1003500400 |

# 9-9 FOLLOW REST



# FOLLOW REST ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Body-follow rest (Bronze tip type) | 1 | 10035019409 | 1003503107 |
| | (Roller type) | 1 | 100352700 | 100352710 |
| 2 | Nut-lead screw | 2 | | |
| 3 | Lead-screw | 2 | | |
| 4 | Collar | 2 | | |
| 5 | Pin , 4x25L | 2 | | |
| 6 | Plug-lead screw | 2 | | |
| 7 | Screw-hexa. socket headless cap, M8xP1.25x10L | 4 | | |
| 8 | Shoe | 2 | | |
| 9 | Screw-hexa. Socket head cap, M10xP1.5x30L | 2 | | |
| 10 | Washer | 2 | | |


9-10 COOLANT SYSTEM
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# COOLANT SYSTEM ASSEMBLY

| Item No. | Part Name | Amt. Used | Type: 17<br>Part No. | Type: 19<br>Part No. |
|---|---|---|---|---|
| 1 | Nozzle | 1 | | |
| 2 | Nut-lock | 1 | | |
| 3 | Cock-lever | 1 | | |
| 4 | Elbow | 1 | | |
| 5 | Metal pipe | 1 | | |
| 6 | Pipe (5, 6 feet) | 1 | 92605002 | 92605002 |
| | (8 feet) | 1 | 92605003 | 92605003 |
| | (10 feet) | 1 | 92605001 | 92605001 |
| 7 | Elbow | 1 | | |
| 8 | Pump body (220V/440V) | 1 | 92111802 | 92111802 |
| 9 | Bolt-hex. Head , M6xP1.0x12L | 2 | | |
| 10 | Supporter-lock pipe | 1 | | |
| 11 | Screw-hexa. Socket head cap, M6xP1.10x20L | 3 | | |