

# *PANTHER*

## ALL GEARED LATHE MACHINE

### INSTRUCTION & SPARE PARTS MANUAL

**MODEL : 5610/**

**MACHINE No. :**

**GUJARAT LATHE MFG. CO. PVT. LTD.**

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MODEL – 5610**

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**MANUFACTURED BY:**

**GUJARAT LATHE MFG. CO. PVT. LTD.**

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## P R E F A C E

This machine have been manufactured with a view to obtain the highest degree of working accuracy and it has been thoroughly tested for the performance to confirm IS 11118-1984, IS 1878 (part-1) -1971 and Dr. Schlesinger's code for "Testing Machine Tools."

The accuracy of the machine can be achieved and maintained only if the instructions contained in this manual are starkly followed. The users of the machine are therefore, requested to get themselves acquainted with contents of the manual, before Installation, operation and maintenance of the machine. It is suggested that a copy of this manual be made available to the operation and maintenance staff on the shop floor, who will be directly handling this machine.

As the machine and accessories are constantly being improved this manual may differ in detail with the machine supplied.

At the time of ordering the spares, please mention the component number as indicated in this manual and serial number of the machine which is stamped on Right hand corner of the lathe machine bed.

### **Please Read Instruction Manual before Starting the Machine.**

For easy reference and under standing, this manual is divided in to followings five different sections.

- Section 1 Introduction
- Section 2 Installation
- Section 3 Operation
- Section 4 Settings, Maintenance and Trouble Shootings.
- Section 5 Assembly drawings and spare part list.



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## SECTION - 1 INTRODUCTION

### 1.1 Machine specifications :-

|                                      |                         |
|--------------------------------------|-------------------------|
| Type of bed                          | Gap bed                 |
| Width of bed                         | 655 mm                  |
| Height of center                     | 560 mm                  |
| Swing over bed                       | 1100 mm                 |
| Swing over saddle                    | 870 mm                  |
| Swing over cross slide               | 770 mm                  |
| Swing in gap                         | 1510 mm                 |
| Length of gap in front of face plate | 330 mm                  |
| No. of spindle speed                 | 8                       |
| Spindle speed range                  | 20 to 275 RPM           |
| Taper in spindle sleeve              | MT - 5                  |
| Spindle hollow                       | 104 mm                  |
| Spindle nose detail                  | Bayonet size 11         |
| No. of British threads               | 28                      |
| Range of British threads             | 1.5 to 22 TPI           |
| No. of Metric threads                | 22                      |
| Range of Metric threads              | 0.75 to 16 mm Pitch     |
| No. of feeds                         | 28                      |
| Range of Longitudinal feeds          | 0.2 to 3.0 mm / rev.    |
| Range of Transverse feeds            | 0.033 to 0.50 mm / rev. |
| Lead screw                           | 50.8 mm X 2 TPI         |
| Tail stock spindle diameter          | 105 mm                  |
| Taper in Tail stock spindle          | MT - 6                  |
| Cross slide travel                   | 560 mm                  |
| Compound slide travel                | 230 mm                  |
| Tail stock sleeve travel             | 310 mm                  |
| Tool shank size                      | 38 X 38 mm              |



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|----------------------|---------------|---------------|---------------|---------------|---------------|
| Length of bed        | 3950          | 4950          | 5950          | 6950          | 7950          |
| Admit between center | 2000          | 3000          | 4000          | 5000          | 6000          |
| Net weight           | 7750          | 9300          | 11500         | 13700         | 15300         |
| Motor H.P.           | 15 H.P.       | 15 H.P.       | 15 H.P.       | 20 H.P.       | 20 H.P.       |



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**MODEL****5610****PAGE NO.****06**Machine Model :- 5610/

Machine Specification :- \_\_\_\_\_

Machine Sr. no. :- J-

Date :- \_\_\_\_\_

| STANDARD ACCESSORIES |  |        | EXTRA ACCESSORIES |   |     |
|----------------------|--|--------|-------------------|---|-----|
| 1                    | Hardened guide ways  | 1 no.  | 1                 | Face plate  | no. |
| 2                    | Center adopter   | 1 no.  | 2                 | Steady rest   | no. |
| 3                    | Dead Center MT – 5 & 6   | 2 no.  | 3                 | Follow rest   | no. |
| 4                    | Carrier plate  | 1 no.  | 4                 | Coolant equipments with tank & fitting Make: _____ H.P. _____ Sr. _____       | no. |
| 5                    | Instruction manual   | 1 no.  | 5                 | Machine lamp with CT.   | no. |
| 6                    | Tool post key  | 1 no.  | 6                 | 3 jaw self centering chuck with flange $\varnothing$ _____<br>Make - _____    | no. |
| 7                    | Norton gear box  | 1 no.  |                   |   |     |
| 8                    | Dual speed gear box in tailstock quill movement                            | 1 no.  | 7                 | 4 jaw dog chuck with flange $\varnothing$ _____<br>Make _____                 | no. |
| 9                    | Change gears fitted with machine :-<br>60, 80, 80, 127                     | 4 no.  |                   |   |     |
| 10                   | Change gears packed in tool box :-<br>64, 65, 76, 90, 90,<br>100, 100, 110 | 8 no.  | 8                 | <b>Extra chuck flange</b>   | no  |
|                      |  |        | 9                 | Taper turning attachments   | no. |
|                      |  |        | 10                | Rear tool post  | no. |
| 11                   | Oil can  | 1 no.  | 11                | Rear splash guard   | no. |
| 12                   | Screw driver   | 1 no.  |                   |   |     |
| 13                   | Allen keys   | 9 no.  | 12                | Revolving center MT - 5   | no. |
| 14                   | Fixed spanner  | 9 no.  | 13                | Quick change tool post with 5 tool holders                                    | no. |
| 15                   | Long cross slide   | 1 no.  |                   |   |     |
| 16                   | <b>Electric motor</b><br>H.P. _____<br>Make- _____<br>Sr. no. _____        | 1 no.  | 14                | Rapid traverse of main saddle<br>Motor Sr. no. _____<br>Make _____ H.P. _____ | no. |
| 17                   | 'V' Belts no. -  | 5 nos. | 15                | Int./Ext./Combine tool post grinder with/without electric motor               | no. |
| 18                   | Electrical control panel   | 1 no.  |                   |   |     |

Any other accessories: -

Mode of packing: - \_\_\_\_\_

Name &amp; Address: - \_\_\_\_\_

Checked by: - \_\_\_\_\_





### **1.3 List of Accessories :-**

#### **1.3.1 Standard Accessories :- ( to be supplied with machine )**

- (01) Harden guide ways of lathe bed.
- (02) Electric Motor with V-Belts.
- (03) Forward – off – Reverse Limit Switch Box
- (04) Norton gear box.
- (05) Long cross slide.
- (06) Carrier plate.
- (07) Center adapter.
- (08) Dead center - MT-5.                    2nos.
- (09) Instruction manual with test chart.
- (10) Tool post bolt key.
- (11) Change gears for inch / mm threading. ( For 2 TPI lead screw ).
- (12) Oil can.
- (13) Screw driver.
- (14) Allen keys        - 10 no.
- (15) Fixed spanner    - 9 no.
- (16) Drop worm type feed engage / disengage lever.
- (17) Gear oil pump with splash lubrication for head stock.
- (18) Planner type rigid lathe bed.
- (19) Control panel box.

#### **1.3.2 Optional Accessories :- ( To be order along with machine )**

- (01) Electric coolant pumps with tank and fittings.
- (02) Rear tool post with tool holders.
- (03) Taper turning attachment.
- (04) Rear splash guard.
- (05) Drift type tail stock spindle.
- (06) Rake operated center.
- (07) Rapid movement of saddle.
- (08) Dual speed gear box in tail stock quill.



### **1.3.3 Optional Accessories :- ( Retro fitting possible )**

- (01) Face plate.
- (02) Steady rest pad type.
- (03) Follow rest pad type.
- (04) Chuck flange.
- (05) Machine lamp.
- (06) Quick change tool post with 5 tool holders.
- (07) Internal or external or combine tool post grinder with or with out elect. Motor – 2800 RPM & On – Off switch.
- (08) Keyway cutting attachment.
- (09) Revolving center.
- (10) 3 – Jaw self centering or 4 – Jaw Dog chuck.

### **1.3.4 List of change gears :- (Machine having 2 TPI lead screw. 7 DP)**

( A ) 60-64-65-76-80-80-90-90-100-100- 110-127 = 12 no.



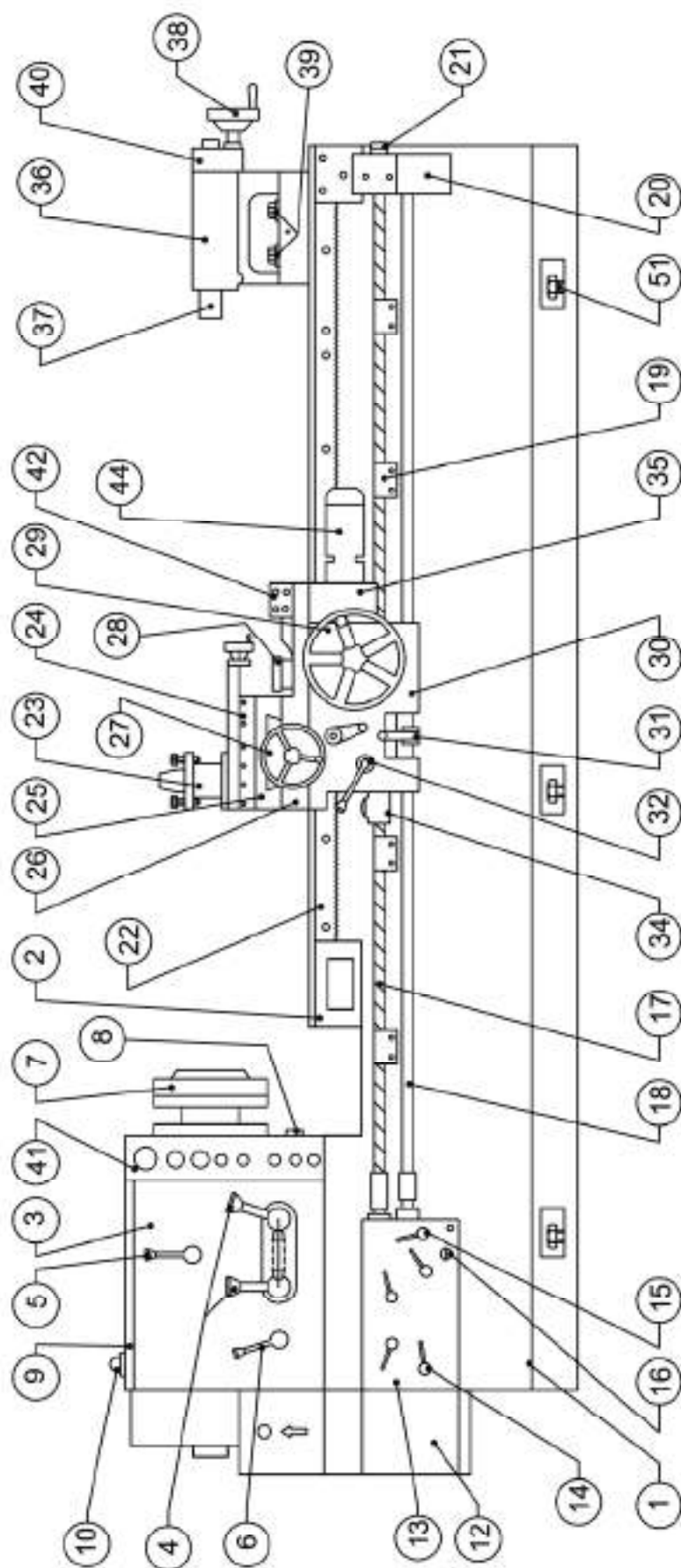
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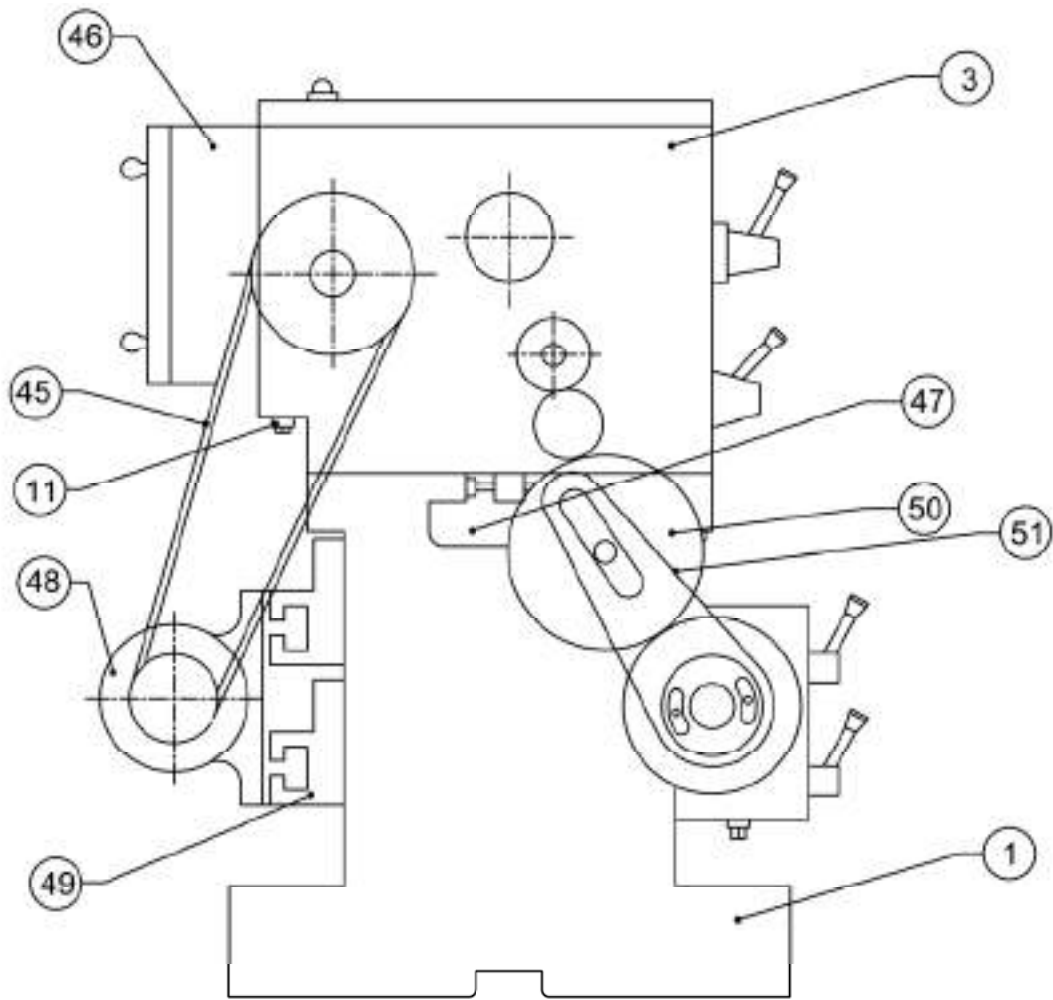
5610

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LEGEND



**LEGEND**



## **1.4 LEGEND :-**

- (1) Bed.
- (2) Bed Gap.
- (3) Head Stock.
- (4) Speed Changing Levers.
- (5) High – Low Speed Lever.
- (6) Feed Direction Change Lever.
- (7) Spindle ( Bayonet 11 Type ).
- (8) Oil Sight Glass.
- (9) Head Stock Top Cover.
- (10) Oil Filling Plug.
- (11) Oil Drain Plug.
- (12) Change Gear Cover.
- (13) Universal Norton Gear Box.
- (14-A) Feed Selecting Levers position A-B.
- (14-B) Feed Selecting Levers position R-S-T.
- (14-C) Feed Selecting Levers position C-D.
- (14-D) Feed Selecting Levers position X-Y-Z.
- (15) Thread – Feed Selecting Lever.
- (16-A) Oil Sight Glass.
- (16-B) Oil Filling Glass.
- (16-C) Oil Drain Glass.
- (17) Lead Screw.
- (18) Feed Shaft.
- (19) Lead Screw Support Brackets.
- (20) Off End Bracket.
- (21) Lead Screw Check Nuts.
- (22) Rake.
- (23) Tool Post Assembly.
- (24) Compound Assembly.
- (25) Long Cross Slide.
- (26) Carriage.
- (27) Transverse Hand Feed Wheel.
- (28) Carriage Oil Cups.
- (29) Longitudinal Hand Feed Wheel.



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- (31) Worm Box Assembly.
- (32-A) Feed Engaging Lever.
- (32-B) Feed Selective Lever.
- (33) Thread Engaging lever.
- (34) Thread Dial Indicator.
- (35) Rapid. Feed Gear Box.
- (36) Tail Stock.
- (37) Tail Stock Spindle.
- (38) Tail Stock Hand Wheel.
- (39) Tail Stock Lock Bolts.
- (40) Tail Stock Dual Speed Gear Box.
- (41) Push Button Box.
- (42) Rapid Push Button Box
- (43) Rapid Electric Motor.
- (44) V – Belts.
- (45) Control Panel Box.
- (46) Head Stock Setting Bolts.
- (47) Electric Motor.
- (48) Motor Rails.
- (49) Leveling Bolts.
- (50) Change Gear.
- (51) Arm Plate.



## **SECTION – 2** **INSTALATION**

### **2.1 Lifting the machine :-**

While lifting the machine by crane, proper care should be taken to prevent damage of machine paints, components and levers. Use suitable wooden block or felt packing, whenever chances of damage to machine part due to contact of Rope or chain are possible. Suitable capacity ropes / chains should be used, while lifting the machine and it should be lift in balance position. For proper balancing of the machine, move tail stock and carriage at appropriate position and clamp on bed.

### **2.2 Unpacking and cleaning :-**

Once machine is brought in shop Floor, for unpacking of the machine, proper care should be taken. In case of machine with case packing, top direction is marked on wooden case. It is suggested that the packing case is opened soon after its receipt and verification is made for the standard and extra accessories mention in packing slip.

Prior to dispatch, all Slides all unpainted parts, handles etc are coated with anti corrosive / rust – preventive. This should be carefully removed and wiped dry and then all bright machine parts should be oiled Immediately.

### **2.3 Foundation :-**

The lathe machine can give satisfactory performance only, if it is put on proper foundation and proper leveling is done. Foundation should be prepared as per foundation drawing and sufficient time should be allowed for concrete slab to be fully cured and dried. The depth of the foundation slab given in foundation drawing is only recommender and it should be directly decided by the users, depending upon the soil condition and surrounding atmosphere. The load bearing capacity of the soil should be taken in account for preparing foundation.



## 2.4 Leveling of The Machine :-

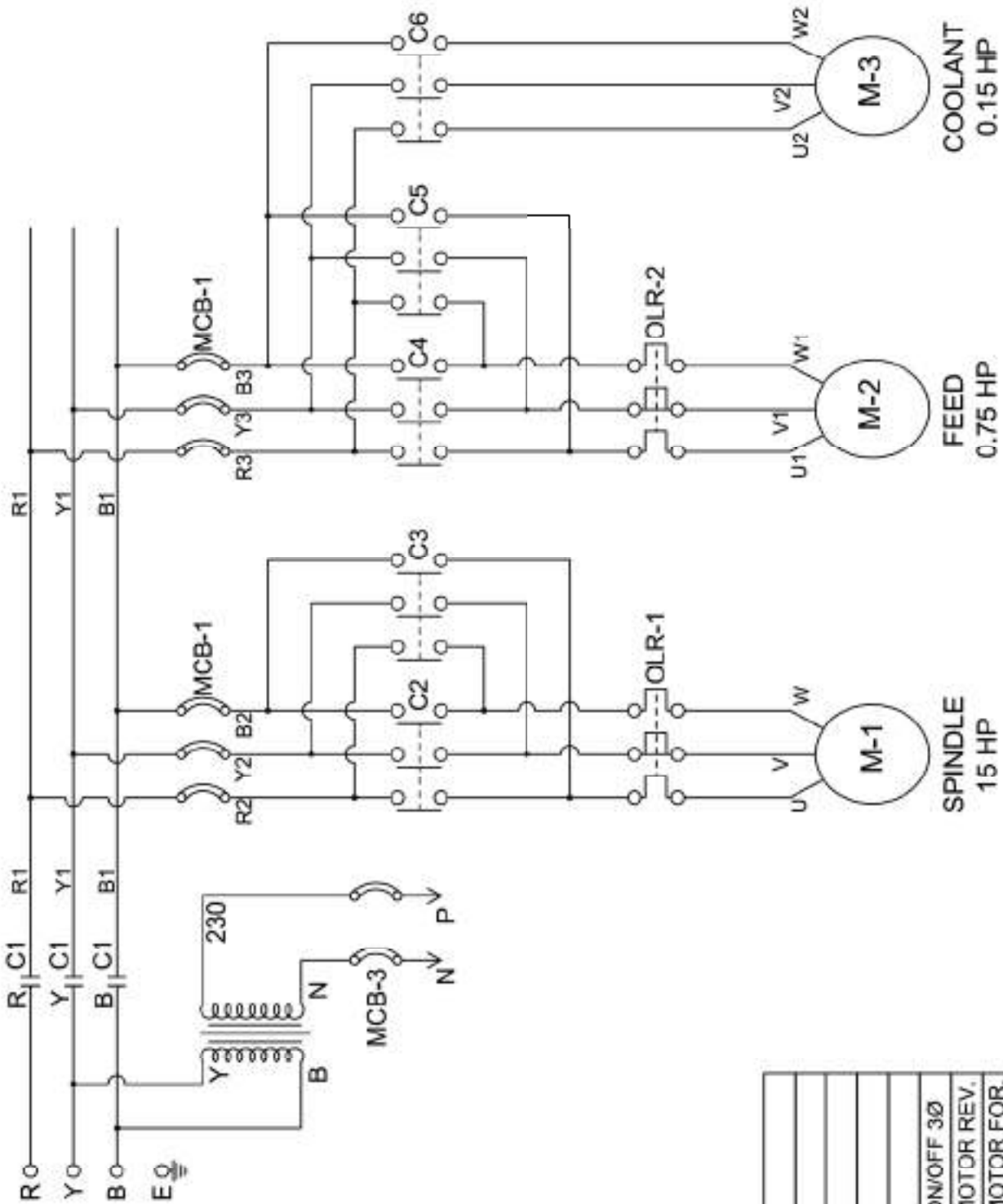
Leveling is very important and should be carried out with proper care. The accuracy of spirit level which recommended is 0.020 mm/mtr. For leveling follow the procedure given below.

- Keep the precision level on surface slide top face at centre in transverse position.
- Adjust the leveling bolt to make the position of level bubble in centre.
- Move carriage slide without disturbing level towards head stock side and adjust the bubble in level at centre position by adjusting level bolt.
- Move carriage slide toward tail stock side and repeat the procedure.
- Make both the readings at head stock side and tail stock side to be identical.
- After setting transverse level, move the carriage to the centre of bed.
- Keep precision level on surface slide top near V guide ways of bed in longitudinal position.
- Ensure the bubble position at centre of level by using thin paper if required.
- Move carriage towards head stock side and than tail stock side and ensure the variation and adjust level if required.
- Re check the transverse level.

After proper leveling of machine, run machine for about 2 hours at various speed and feed and re check levels and re set the level if required.

Then the foundation bolts are grouted in larger holes with 1:3 cement and sand mixture. Sufficient time should be allowed for concrete to cure. The foundation bolts are then tightened without undue force. Periodically check up bed level to ensure continued level accuracy.

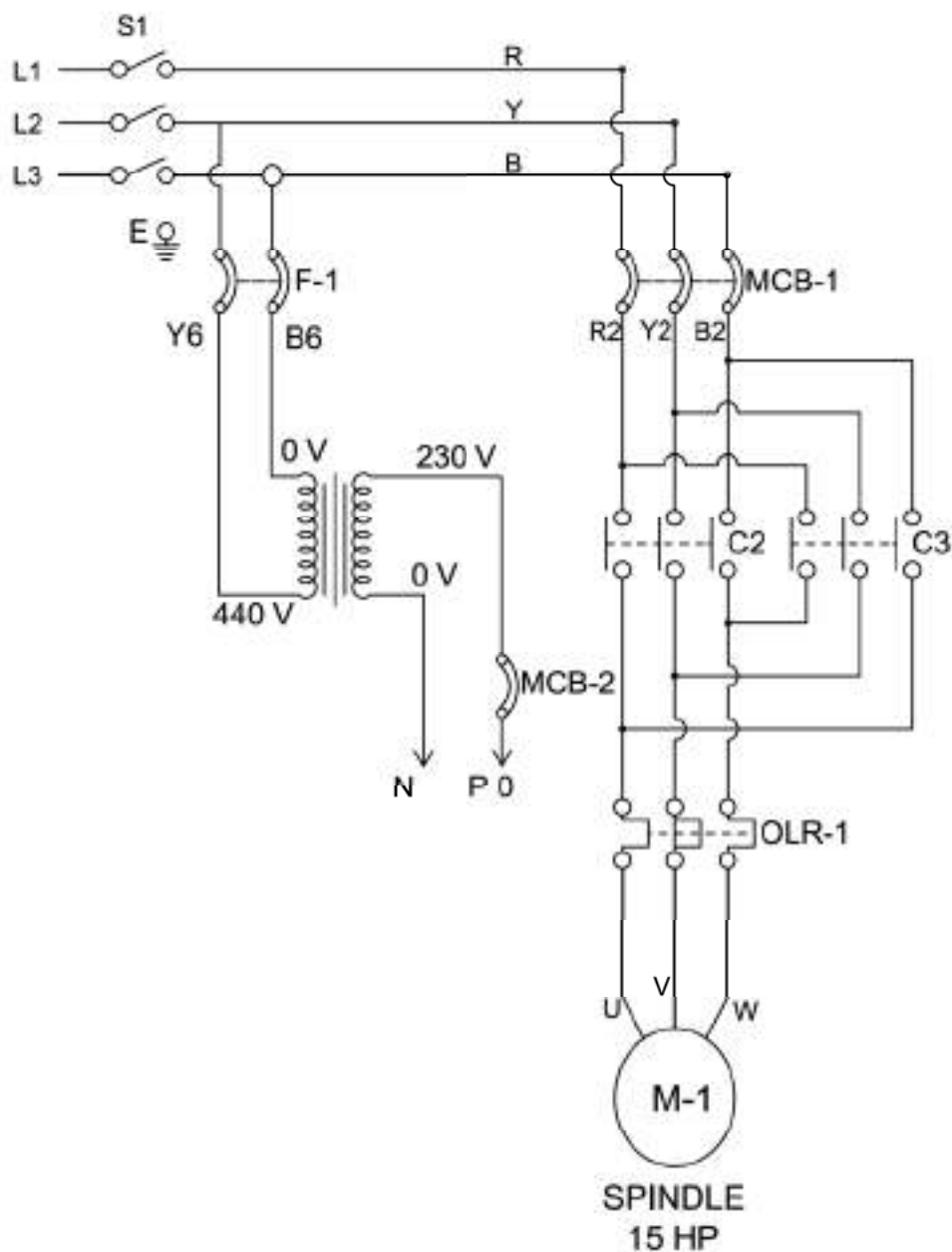




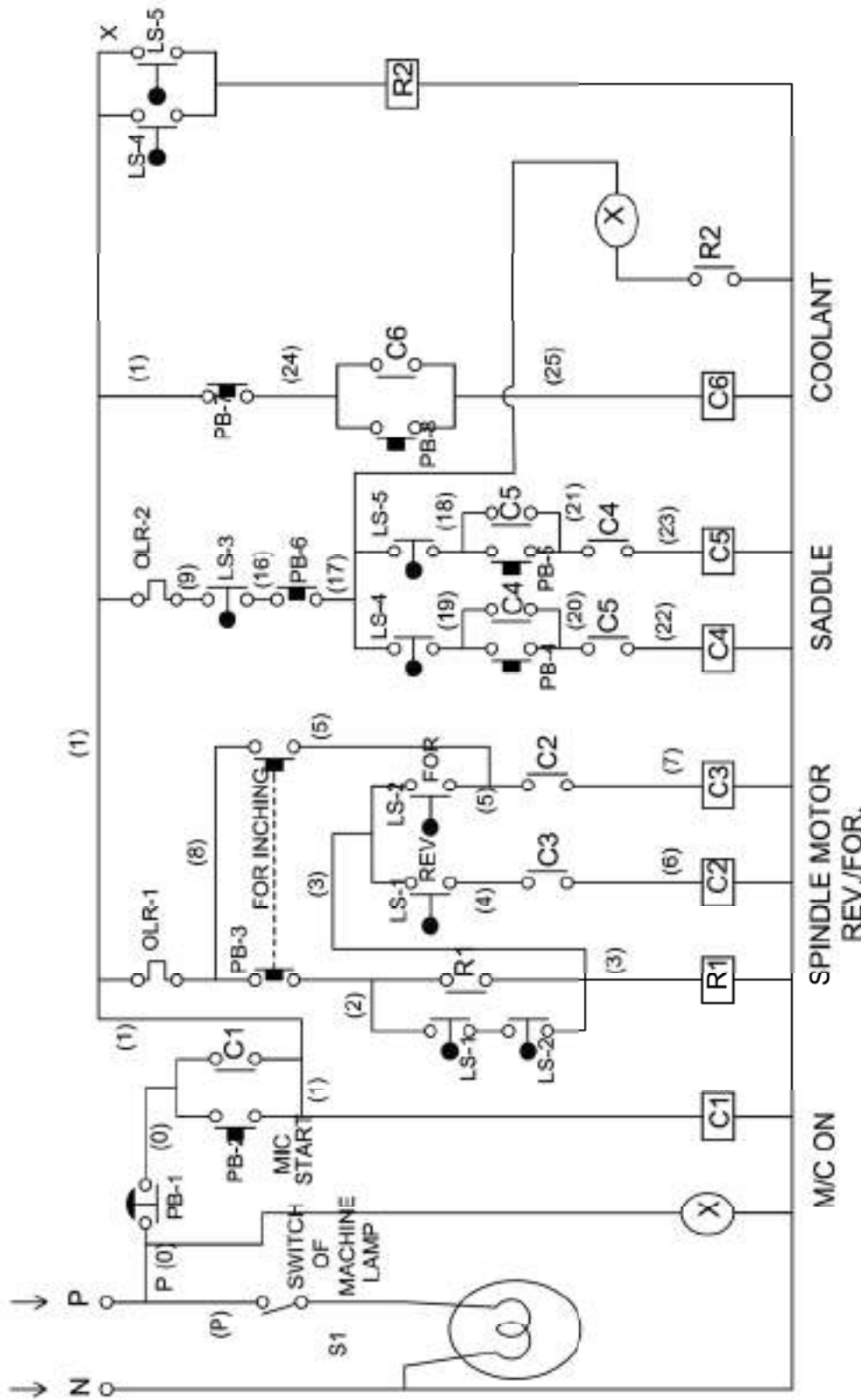
|       |                    |
|-------|--------------------|
| MCB-1 | 32-A 3Ø            |
| MCB-2 | 6-A 3Ø             |
| MCB-3 | 2-A 2Ø             |
| OLR-1 | 16-24 A            |
| OLR-2 | 1-1.5 A            |
| C1    | SPINDLE ON/OFF 3Ø  |
| C2    | SPINDLE MOTOR REV. |
| C3    | SPINDLE MOTOR FOR. |
| C4    | APRON MOTOR REV.   |
| C5    | APRON MOTOR FOR.   |
| C6    | COOLANT MOTOR      |



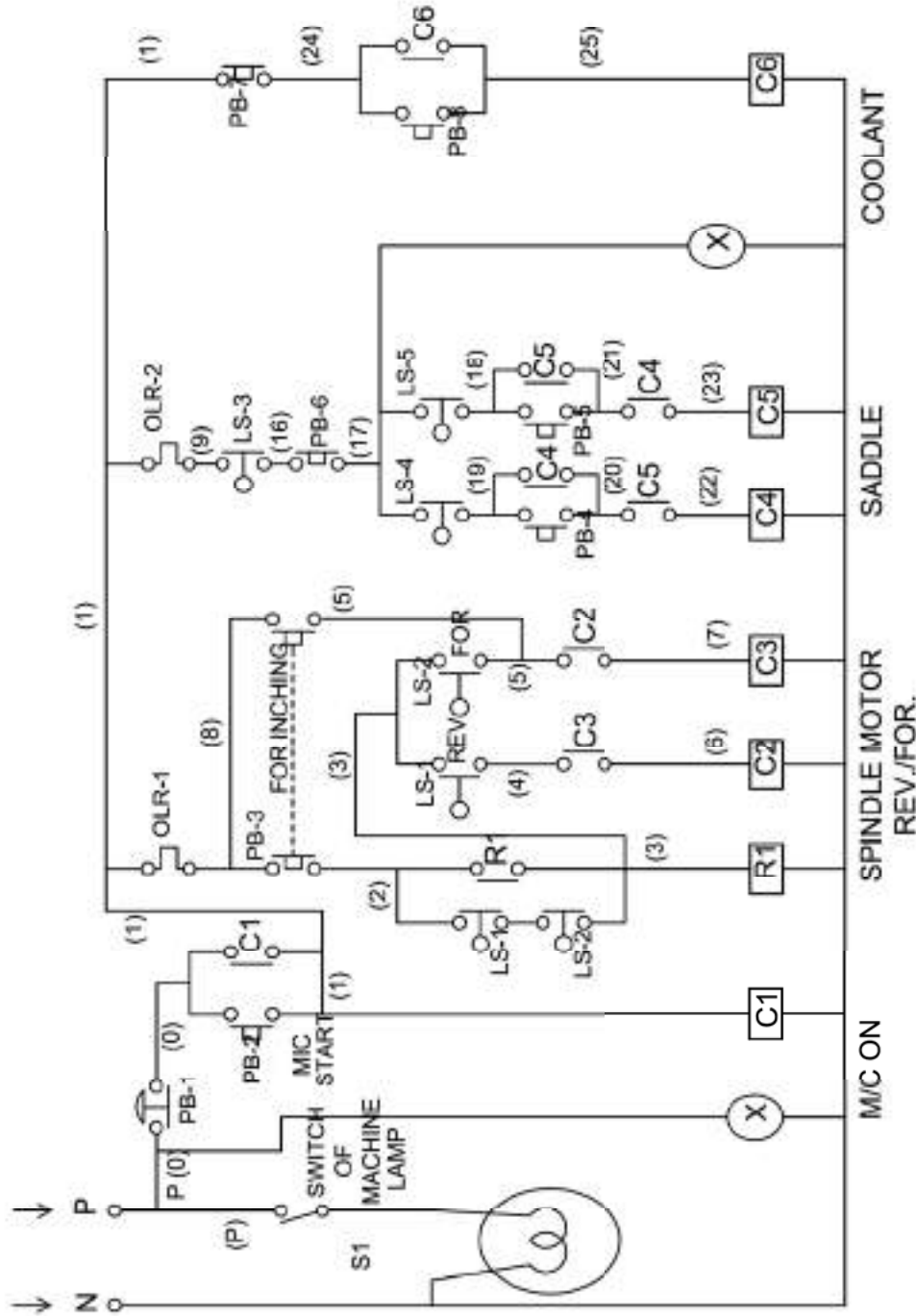
## POWER WIRING DIAGRAM



|       |                    |
|-------|--------------------|
| MCB-1 | 50-A 3Ø            |
| MCB-2 | 2-A 1Ø             |
| F-1   | 0.5 -A             |
| OLR-1 | 24-32 A            |
| S1    | MAINS SWITCH       |
| C2    | SPINDLE MOTOR REV. |
| C3    | SPINDLE MOTOR FOR. |



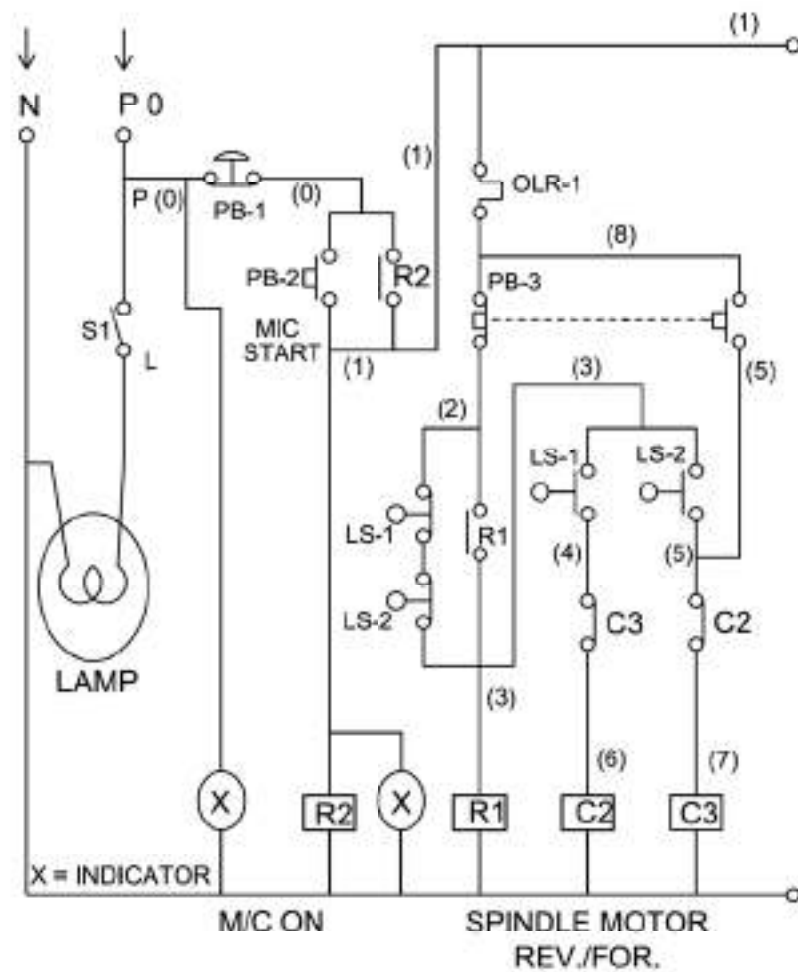
|      |                    |      |                            |
|------|--------------------|------|----------------------------|
| PB-1 | EMERGENCY STOP     | PB-8 | COOLANT ON                 |
| PB-2 | MACHINE START (ON) | LS-1 | SPINDLE REV.               |
| PB-3 | FORWARD INCHIUR    | LS-2 | SPINDLE FOR.               |
| PB-4 | APRON FOR.         | LS-3 | SADDLE OFF                 |
| PB-5 | APRON REV.         | LS-4 | FOR APRON LIMIT OFF        |
| PB-6 | SADDLE MOTOR OFF   | LS-5 | REV APRON LIMIT OFF        |
| PB-7 | COOLANT OFF        | S-1  | MACHINE LAMP ON/OFF SWITCH |



|      |                    |      |                            |
|------|--------------------|------|----------------------------|
| PB-1 | EMERGENCY STOP     | PB-8 | COOLANT ON                 |
| PB-2 | MACHINE START (ON) | LS-1 | SPINDLE REV.               |
| PB-3 | FORWARD INCHING    | LS-2 | SPINDLE FOR.               |
| PB-4 | APRON FOR.         | LS-3 | SADDLE OFF                 |
| PB-5 | APRON REV.         | LS-4 | FOR, APRON LIMIT OFF       |
| PB-6 | SADDLE MOTOR OFF   | LS-5 | REV, APRON LIMIT OFF       |
| PB-7 | COOLANT OFF        | S-1  | MACHINE LAMP ON/OFF SWITCH |



## CONTROL WIRING DIAGRAM



|      |                    |       |                    |
|------|--------------------|-------|--------------------|
| PB-1 | EMERGENCY STOP     |       |                    |
| PB-2 | MACHINE START (ON) | C2    | SPINDLE MOTOR REV. |
| PB-3 | FORWARD INCHING    | C3    | SPINDLE MOTOR FWD. |
| LS-1 | SPINDLE REV.       | R1-R2 | CONTROL RELAY      |
| LS-2 | SPINDLE FOR.       | S-1   | LAMP ON/OFF SWITCH |

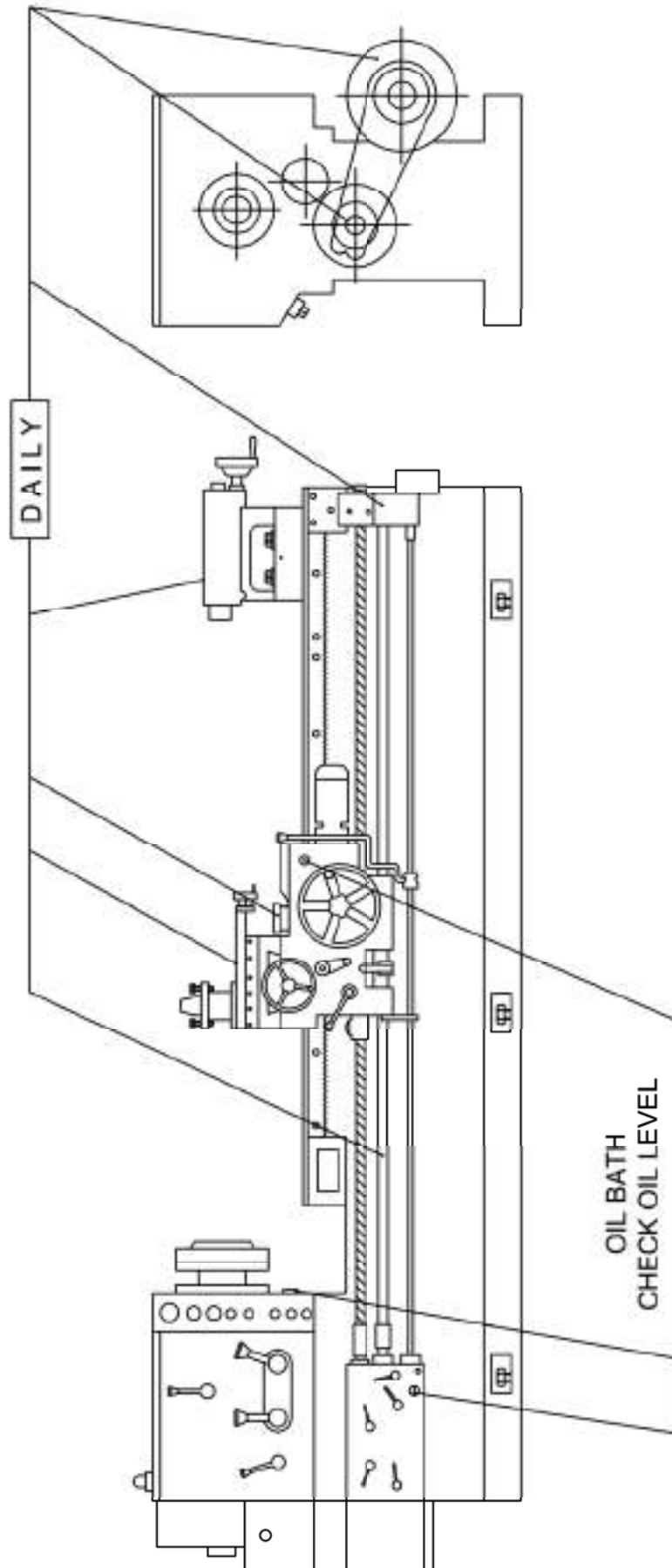


## **2.5 Electric Connections :-**

Machine is supplied with electrical, hence internal wiring of electric motor and reverse/forward switch is done in machine. Give Elect. Power supply of three phase and proper ear thing to machine. Keep rev / for handle in center position for safety. Give power supply to machine and check machine body with tester for leak aging of power supply for safety. Press ON push button to start power supply. Rotate rev / for handle in required position to start machine. Check machine spindle rotation, it should be matched with position of rev / for start handle. If position is not matched than interchange any two pair of leads from main elect. supply. During connection of power, main power supply should be kept off.

To stop the machine press OFF push button on rotate rev / for handle in center position. If machines stopped by OFF push button, for restart machine ON push button should be used. If machine stopped by rev / for handle, machine can restart by same handle without pressing push buttons. Thus this system provides facility to operate machine from two points (1) from push button at head stock (2) from handle at apron.

Internal electric wiring of electric motor and controls is done with wiring panel kept in electric cabinet. Wiring diagram is also given in this manual. During connection of power, main power supply should be kept off.



LUBRICATION POINTS



## **2.6 Idle running of the machine :-**

At the time of machine dispatch, speed and feed levers are set for the lowest value. You are requested to ensure that these positions are maintained at the time of starting the machine to avoid any accidental switching on at high speed and feed, which may damage the machine.

Machine saddle, tail stock spindle etc are kept locked at the time of machine dispatch. Do not try to move them until they are properly cleaned. Lubricated and unlocked.

## **2.7 Lubrication :-**

Proper lubrication of lathe machine plays vital roll to retain accuracy and gives satisfactory service. If lubrication is neglected the bearing surface may be damage, impairing the accuracy and shortening the life of machine.

Lubrication head stock and Norton gear box are done by splash lubrication. Oil level indicator is provided in head stock and Norton gear box. Check oil level through oil level indicator regularly, if oil level seems down then pour oil through oil filling plug. One gear pump is provided in the head stock for lubrication of head stock gears and bearings. Working of lubrication pump is indicated through oil window given in head stock front side.

In initial period, or first time running oil should be changed after first 300 hours running and than after 500 running hours.

Latter on oil can be used up to 1000 to 1500 running hours. Before filling new oil, the head stock should be washed with kerosene and thoroughly dried Quantity of oil and type of oil to be used in head stock and Norton gear box is show in lubrication chart. Lubrication of apron, surface slide, lead screw and tail stock are done by oil can. Various oil holes are provided for lubrication.

All the oil holes, oil cups, grease nipple of the lathe machine should be inspected and filled at least once in day or more often if machine is operate day and night shifts or high speed and feed value is engaged Dirt chip should be brushed away before oiling or greasing to prevent them to enter in to holes.





### **2.7.1 Lubrication through various oil holes :-**

Oil holes are provided at various places for oiling.

- (1) Arm plate stud, (2) Thread dial indicator.

Apply oil daily in these oil holes by oil can.

### **2.7.2 Lubrication through various oil nipples :-**

Various oil nipples are provided for oiling.

- (1) Carriage screw, (2) Carriage screw nut, (3) Compound screw, (4) Compound screw nut, (5) Surface slide, (6) Compound slide, (7) Tail stock body bore.

Apply oil daily in these oil holes by oil can.

### **2.7.3 Lubrication through oil cups :-**

Small oil cups are provided for lubrications.

- (1) Carriage, (2) Lead screw brackets, (3) Tail stock body.

Apply oil daily to oil cups by oil can.

### **2.7.4 Apron :-**

One oil level indicator is given in front face of apron box.

Pour oil through oil pouring holes given on top face of carriage slide up to level marked in oil level indicator if required. One oil drain plug is given at the bottom face of apron body to remove oil remove oil from apron box.

### **2.7.5 List of recommended lubrication :-**

| <b>Sr. No.</b> | <b>Company</b> | <b>Head stock<br/>Feed box</b> | <b>Guide ways<br/>Lead screw<br/>Tail stock<br/>Apron</b> |
|----------------|----------------|--------------------------------|---|
| 1              | HPCL           | PARTHAN EP 220                 | WAYLUB 220  |
| 2              | BPCL           | MAK AMOCAM                     | WAYLUB 220  |
| 3              | ISO GRADE      | 320                            | 220   |
| 4              | CASTRO OIL     | GEAR OIL 320                   | MAGNA 220   |
| 5              | MOBIL OIL      | GEAR OIL 632                   | VACTRA 4  |
| 6              | SHELL OIL      | OMALA 320                      | TONNA 220   |



## Section - 3 OPERATIONS

### 3.1 Safety :-

- (1) Protect your eyes by wearing safety glasses.
- (2) Wear shoes with oil resistance soles.
- (3) If you have long hair, tie it back properly.
- (4) Do not wear long sleeved clothes or loose clothing.
- (5) Make sure that your work area should be free from chips, coolant, Elect. wire, air-hoses, oils or any thing that can be get in your way and cause you to fall.
- (6) Make sure that work holding are firm.
- (7) Make sure that tool holding are firm.
- (8) Ensure proper belt tension.
- (9) Refit covers and guards before the machine is put again into operation after opening of any cover or guards.
- (10) Do not file work piece, when they are being rotate under power. This is extremely hazardous.
- (11) Do not touch machine part immediately after machining, it may have sharp edges ad considerable amount of heat.
- (12) Wear rubber sole shoes while working on electrical cabinet.
- (13) All maintenance work should be done with power off condition.
- (14) Electrical shock can cause serious injury or loss of life. All service and maintenance work within the electrical cabinet should be performed by qualified electrician in power off condition.
- (15) When replacing fuse always replace them with the same type and rating. Do not substitute fuses for higher current or different voltage.
- (16) While working on the machine parts like brake unit transformer etc it may be extremely hot. Take sufficient care when handling such parts.



### 3.2 Do, Do Not And CHECKS :-

#### DO :

- Check and maintain oil level in head stock and feedbox.
- Amplified pitches. Do follow guide line given for amplified pitches.
- The following table gives guideline for selection of maximum spindle speed while cutting high range pitch threading / amplified pitches.

| Metric Pitch | English Thread | Spindle Speed |
|--------------|----------------|---------------|
| 0.75         | 22             | 275           |
| 4            | 15             | 135           |
| 8            | 10             | 65            |
| 12           | 5              | 31            |
| 16           | 1.5            | 20            |

#### DO NOT :

- Do not open head stock covers or end feed gear covers while machine is running.
- Do not shift gears in motion.
- Do not exceed speeds of chuck or face plate beyond the specified limit.
- Do not exceed more than 30 reversals of the motor switches per hour.
- Do not remove chucks from threaded spindle by rotating spindle in reverse direction.

#### CHECKS :

- Job weight limitation. Do not load jobs weighing more than 200 Kgs. Without steady rest or centre support.
- Do not start the machine at high speed with heavy jobs.
- Sudden reversal of spindle at speed above 145 RPM is not recommended.
- It is recommended that cast iron chucks should not be run at surface speed more than 16 mtr / sec. Accordingly 200 mm diameter chuck should not run at more than 1500 RPM.



### **3.3 Head stock :-**

Head stock pulley is directly driven by electric motor through five V-belts. Power transmission in side the head stock to main spindle is through gear arrangement. Total 8 nos. different spindle speeds are available.

Main spindle RPM is selected by two levers, High / low speed changing lever (05) and Speed changing lever (04). Lever 05 have two different positions one is high speed position second is low speed range. Lever 04 are two different levers each lever have 3 different positions. L.H. Lever have position 1, Neutral & 2, similarly R.H. lever have position 3, Neutral & 4. Both the levers are interlocked with each other. L.H. lever will give selection of position 1 or 2 and R.H. lever will give selection of position 3 or 4.

First of all put both levers (04) in neutral position than rotate any one lever to your required position 1-2 or 3-4. If any one lever is set in engage position than automatically second lever will be locked in neutral position. Feed selecting lever (06) has three different positions Reverse. Neutral and forward feed direction.

Oil sight glass (08) is provided for checking oil level in head stock. Lubrication of main bearings, gears, shifters and shafts are done by splash lubrication system as well as gear oil pump. Gear oil pump will give lubrication oil at various points in head stock with force lubrication. One Indicator glass is provided in head stock which indicates working of gear pump. It is necessary to keep always proper oil level in head stock to give lubrication of head stock parts. Oil filling plug (10) is given on top face of head stock cover and oil drain plug (11) is given at back side of head stock bottom face.

#### **3.3.1 RPM Chart :-**

| SPINDLE SPEED IN RPM |    |     |     |     |
|----------------------|----|-----|-----|-----|
| LEVER POSITION       | 4  | 1   | 3   | 2   |
| L                    | 20 | 31  | 42  | 65  |
| H                    | 95 | 135 | 180 | 275 |



### **3.4 Norton gear box :-**

Norton gear box is provides for selection of various feeds and threads. Total 28 types of British threads and 22 types of metric threads can be cut by selecting different levers positions. Total 4 different knobs are given in Norton gear box. Feed selecting knob (14-A) has two different positions A and B, Knob (14-B) has three different positions R,S and T, and Knob (14-C) has two different positions C and D, Knob (14-D) has three different positions X,Y and Z. By selecting any one position of each four levers different thread pitch can be set.

For selection of threading or feed operation, knob (15) is given. By using knob (15) you can select either threading or feed operation.

Oil filling plug (16-B) and oil drain plug (16-C) is given for adding or removing oil from Norton gear box. Oil sight glass (16-A) is given for checking oil level in Norton gear box. It is necessary to maintain proper oil level in Norton gear box. Lubrication of Norton gear box is done by splash lubrication system.

### **3.5 End feed gears train :-**

At the rear end of the head stock, change gear train is fitted to give longitudinal feed, transverse feed and threading operation. To change the direction of rotation of gear train, feed changing lever (06) is given in head stock.

One arm plate with arm stud and gun metal bush is fitted with Norton gear box. Change gears are connected in this arm plate to give drive from head stock output gear to Norton gear box.



### 3.5.1 Thread chart 2 TPI British Threads :-

| <b>BRITISH THREADS</b>                                    |              |           |           |           |           |
|---|--------------|-----------|-----------|-----------|-----------|
| <b>GEAR</b>   | <b>LEVER</b> | <b>AC</b> | <b>AD</b> | <b>BC</b> | <b>BD</b> |
| $\frac{64}{80} \times \frac{90}{90}$                      | TX           | 1.5       | 3         | 6         | 12        |
|   | TY           | 2         | 4         | 8         | 16        |
|   | SX           | 1.875     | 3.75      | 7.5       | 15        |
|   | SY           | 2.5       | 5         | 10        | 20        |
| $\frac{64}{110} \times \frac{90}{90}$                     | TY           | 2.75      | 5.5       | 11        | 22        |
| $\frac{64}{76} \times \frac{90}{90}$                      | SY           | 2.375     | 4.75      | 9.5       | 19        |
| $\frac{64}{100} \times \frac{100}{65}$                    | TY           | 1.625     | 3.25      | 6.5       | 13        |
| <b>FEED mm/rev : Long. 4.75 / TPI – Trans 0.730 / TPI</b> |              |           |           |           |           |



### 3.5.2 Thread chart 2 TPI Metric Threads :-

| METRIC THREADS                        |       |     |      |       |       |
|---------------------------------------|-------|-----|------|-------|-------|
| GEAR                                  | LEVER | AC  | AD   | BC    | BD    |
| $\frac{60}{127} \times \frac{80}{80}$ | RX    | 16  | 8    | 4     | 2     |
|                                       | SZ    | 14  | 7    | 3.5   | 1.75  |
|                                       | RY    | 12  | 6    | 3     | 1.5   |
|                                       | TX    | 10  | 5    | 2.5   | 1.25  |
|                                       | SX    | 8   | 4    | 2     | 1     |
|                                       | TY    | 7.5 | 3.75 | 1.875 | 0.937 |
|                                       | SY    | 6   | 3    | 1.5   | 0.75  |

**FEED mm/rev : Long 0.1870 × mm pitch.  
Trans 0.0288 × mm pitch.**



### 3.6 Thread dial indicator :-

Thread dial indicator (34) is used during threading operation. By using thread dial indicator half nut with lead screw can engage at correct position during successive threading cuts, so that tool will follow the original cuts and it will eliminates the necessity of reversing the lathe spindle.

#### For British Threading :-

For all odd and even threads in each inch, close half nuts at any no. on dial. ( For example at no. 4, 5, 6 etc. )

For all threads involving one half threads in each size, close half nuts at any alternative no. on dial. ( For example 2, 4, 6 or 1, 3, 5 )

#### For Metric Threading :-

During metric threading thread dial indicator will not be used and spindle has to run in reverse direction with out dish engaging half nuts in second and subsequent cuts till threading operation is completed.

### 3.6.1 Special threading not indicating in thread chart :-

#### British Threads :-

Gear train for required TPI = Gear train of selected TPI  $\times \frac{\text{Selected TPI}}{\text{Required TPI}}$

For example 19 TPI threads required. Than select nearest 20 TPI threads and set levers position as per 20 TPI of Norton gear box, that will be SY - BD

$$= \frac{64}{80} \times \frac{90}{90} \times \frac{20}{19}$$

$$= \frac{64}{76} \times \frac{90}{90}$$





### Metric Threads :-

Gear train of required pitch = Gear train of selected pitch  $\times$   $\frac{\text{Required pitch}}{\text{Selected pitch}}$

For example pitch required is 1.75 mm, than select nearest pitch of 2.00 mm and set levers as per 2.00 mm pitch that will be SX - BC

$$= \frac{60}{127} \times \frac{80}{80} \times \frac{1.75}{2.00}$$
$$= \frac{60}{127} \times \frac{70}{80}$$

### 3.6.2 Feed Calculations :-

$$\text{Longitudinal feed (In mm/rev.)} = \frac{4.75}{\text{TPI}} \quad \text{OR} \quad 0.187 \times \text{Pitch}$$

$$\text{Transverse feed (In mm/rev.)} = \frac{0.730}{\text{TPI}} \quad \text{OR} \quad 0.0288 \times \text{Pitch}$$

➤ For example if machine change gears set as per 10 TPI than

- Longitudinal feed will be  $\frac{4.75}{10} = 0.475 \text{ mm / rev.}$

- Transverse feed will be  $\frac{0.730}{10} = 0.073 \text{ mm / rev.}$

➤ For example if machine change gears set as per 2.5 mm pitch than

- Longitudinal feed will be  $0.187 \times 2.5 = 0.467 \text{ mm / rev.}$

- Transverse feed will be  $0.0288 \times 2.5 = 0.072 \text{ mm / rev.}$



### **3.7 Carriage :-**

Carriage slide (27) is fitted on bed top face with one lock piece and setting wedge at rear side and two lock pieces on front side. On the top face of carriage, surface slide (26) fitted on Dow tail guide ways with setting wedge. On the side edge of carriage two tapped holes are given to clamp follow rest guide. Aluminum chip guards with felt are given at all four corners of carriage to prevent to enter dust and chips inside the sliding surface. Two oil cups (29) with cap are provided on top face of carriage slide for lubrication of sliding surface. One lock bolt is provided on carriage surface to lock carriage movement if required.

Surface slide (26) is fitted on carriage (27) Dow tails. On the front face of carriage one screw boss fitted to guide surface screw and nut. Surface screw and gear is fitted in carriage and surface screw gun metal nut is fitted on bottom face of surface slide (26). One hand wheel with micro ring (28) is fitted on surface screw to give manual hand feed to surface slide. On the top face of surface slide one circular T-slot is given and angular marking of 180 degree ( 90 degree on either side. ) is done to set compound slide at any desire angular position.

Compound slide assembly (25) is located in center of surface slide (26) and clamped with surface through two nos. T-bolts. One 4 way tool post (24) is fitted on top face of compound slide to hold tools.

### **3.8 Apron box :-**

Construction of apron gear box (31) is rigid and box type. Apron gear box is fitted at bottom face of carriage (27). Lead screw is passes through apron gear box worm to give drive to apron box. One thread cutting lever (33) is fitted on left side of apron gear box. This lever operates engage / dish engage of half nut on lead screw during threading operation. Thread dial indicator (34) is fitted on left hand side of apron gear box. Feed mechanism is drop worm type. Feed engage / disengage is done by feed engage lever (32-A). For engaging feed, lift lever (32-A) in upward direction and for disengage feed push lever (32-A) in downward direction. Feed selection for longitudinal or transverse is done by feed selection lever (32-B).



Feed selecting lever (32-B) with spring loaded plunger is provided on apron gear box. This lever has 3 positions Reverse, Neutral & Forward feed. Thread cutting lever and feed engage lever (32-A) are inter locked with each other to prevent operating of both levers simultaneously. During thread cutting operation feed engage lever (32-A) should be in neutral position, otherwise thread engage lever (33) will not work. Similarly during turning operation thread engage lever (33) should be in dis engage condition with lead screw, otherwise feed engage lever (32-A) will not work.

One hand wheel (35) is provided to move carriage slide on lathe bed by manual operation. For optional rapid movement of carriage on bed one rapid feed gear box (36) with electric motor (45) is fitted on right side of apron box.

### **3.9 Tail stock :-**

Tail stock body (37) with tail stock base is fitted on lathe bed to provide support during turning operation or to perform drilling, boring, taper turning, and etc. operation. Tail stock assembly (37) is clamped on lathe bed by two tail stock clamping pad and bolt (40). After setting tail stock at desired position on bed. It should be clamped with bed by clamping bolt. Two setting bolts are provided on either side of tail stock base to set alignment of tail stock spindle with lathe spindle.

Tail stock spindle (38) guide in tail stock body and moves axially by hand wheel (39) and screw nut assembly fitted with hand wheel. One clamping handle is given to clamp tail stock spindle movements if required. As optional for dual hand feed of tail stock spindle one dual feed gear box (41) is provided on back face of tail stock.

### **Least count of hand wheels :-**

|   |   |                 |
|---|---|-----------------|
| Longitudinal movements by apron hand wheel  | = | 0.500 mm / div. |
| Transverse movements by carriage hand wheel | = | 0.050 mm / div. |
| Compound slide hand wheel                   | = | 0.050 mm / div. |



## Section - 4 Settings and Maintenance

Proper care and maintenance of the machine is important factor to increase life and reliability of machine performance. Following are the few important settings, which needed attention.

### 4.1 Head stock :-

#### 4.1.1 Taper setting :-

Head stock is mounted on bed by six bolts. To set head stock alignment, first loose bolts slightly and than insert test mandrel of 300 mm length in spindle nose and align axis of taper mandrel with longitudinal movements and clamped bolts.

#### 4.1.2 Spindle setting :-

Main spindle runs in two taper roller bearings and one roller bearing. To adjust radial or axial clearance of spindle tightens check nuts so that the spindle can be rotate by hand with light drag.

#### 4.1.3 V-Belts setting :-

Main electric motor is mounted on motor mounting bracket on back side of lathe bed. Five nos. V Belts are fitted between motor pulley and head stock pulley. To adjust belt tension, un clamps four bolts of elect. Motor and re adjust the position of motor on motor on motor mounting bracket and clamp bolts.

### 4.2 Lead screw :-

Lead screw is coupled with out put shaft of Norton gear box by dowel pin.



### **4.3 Carriage :-**

Carriage is fitted on bed with one V guide and one flat surface. Carriage is set on bed guide ways with two keeper blocks on operator side and one keeper plate with parallel wedge in rear side.

### **4.4 Surface slide and Compound slide :-**

Surface slide and compound slide is scraped and matched in guide ways with one wedge, Setting bolts are given to set slide wedge clearance.

### **4.5 Tail stock :-**

Taper turning of long job can be done by off setting of tail stock with respect to head stock center line. In tail stock base two setting bolts are given on either side. By loosen one setting bolt and tighten other setting bolt tail stock body can be set off set.

### **4.6 Tool post :-**

After long use the tool post clamping handle may extend beyond the convenient zone of clamping. To get back proper angle of tool post clamping handle face the bottom spacer of clamping lever by required amount.

### **4.7 Half nut :-**

Half nuts are guided in guide ways of apron body. Clearance of guide ways can be set by setting bolts given on left hand side of apron body. First loosen slightly two hex bolts given on guide ways and compete settings, after completing settings,, clamping bolts should be tighten.



## 4.8 Trouble shooting and remedy :-

| <b>SR.</b> | <b>TROUBLE</b>  | <b>CAUSE</b>   | <b>REMEDY</b>  |
|------------|---|--|--|
| 1          | Machine vibrates while running.                           | (A) Improper leveling.<br>(B) Job not balanced.  | Level machine properly and tighten on foundation<br>Balance job by adding counter weight and reduce spindle speed and feed.  |
| 2          | Machine vibrates while machining and chatter mark on job. | (A) Improper tension of V belts.<br>(B) Excessive tool over hang<br>(C) Wrong tool.<br><br>(D) Wrong cutting parameters.<br><br>(E) Improper tool center.<br>(F) Work holding not rigid.<br>(G) Clearances between carriage, surface, or comp. slides are not proper.<br>(H) Slender components machine without support.<br>(I) Back plate of chuck is loose.<br>(J) Pre loading of main spindle is not correct. | Adjust V belt tension.<br><br>Reduce over hang of tool and clamp tool rigidly<br>Check proper tool material and tool geometry<br>Select proper speed, feed and depth of cut consider job material, tool material and job diameter<br>Adjust correct tool center<br><br>Check job holding<br><br>Adjust proper clearances between all wedges<br><br>Put proper support to job<br><br>Check back plate of chuck<br>Adjust pre loading of spindle |



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| SR. | TROUBLE  | CAUSE  | REMEDY  |
|-----|--|--|---|
| 3   | Spindle runs too tight or loose.                             | (A) Preloading of spindle is not proper.   | Adjust check nuts given at rear end of head stock such that spindle should rotate by hand with light drag                                     |
| 4   | Machine cuts taper on job.                                   | (A) Alignment of head stock is not proper.   | Align head stock axis with carriage movement  |
| 5   | Machine cuts taper on job held between centers.              | (A) Alignment of tail stock not proper.<br>(B) Improper m/c level.<br>(C) Tool worn out.   | Align tail stock axis<br>Level machine properly<br>Re grind or replace tool   |
| 6   | Gear train in end feed gear train make sound during running. | (A) Alignment of change gear is not proper.<br>(B) Fixing nut bolts not proper tight.<br>(C) Some damage mark on gear teeth.<br>(D) Lubricant is not sufficient. | Adjust backlash of change gears<br>Tighten fixing nut and bolts<br>Inspect and remove damage mark from gear<br>Provide sufficient lubrication |
| 7   | Machine is not able to take heavy cuts.                      | (A) Belt tension is not proper.  | Adjust proper belt tension  |



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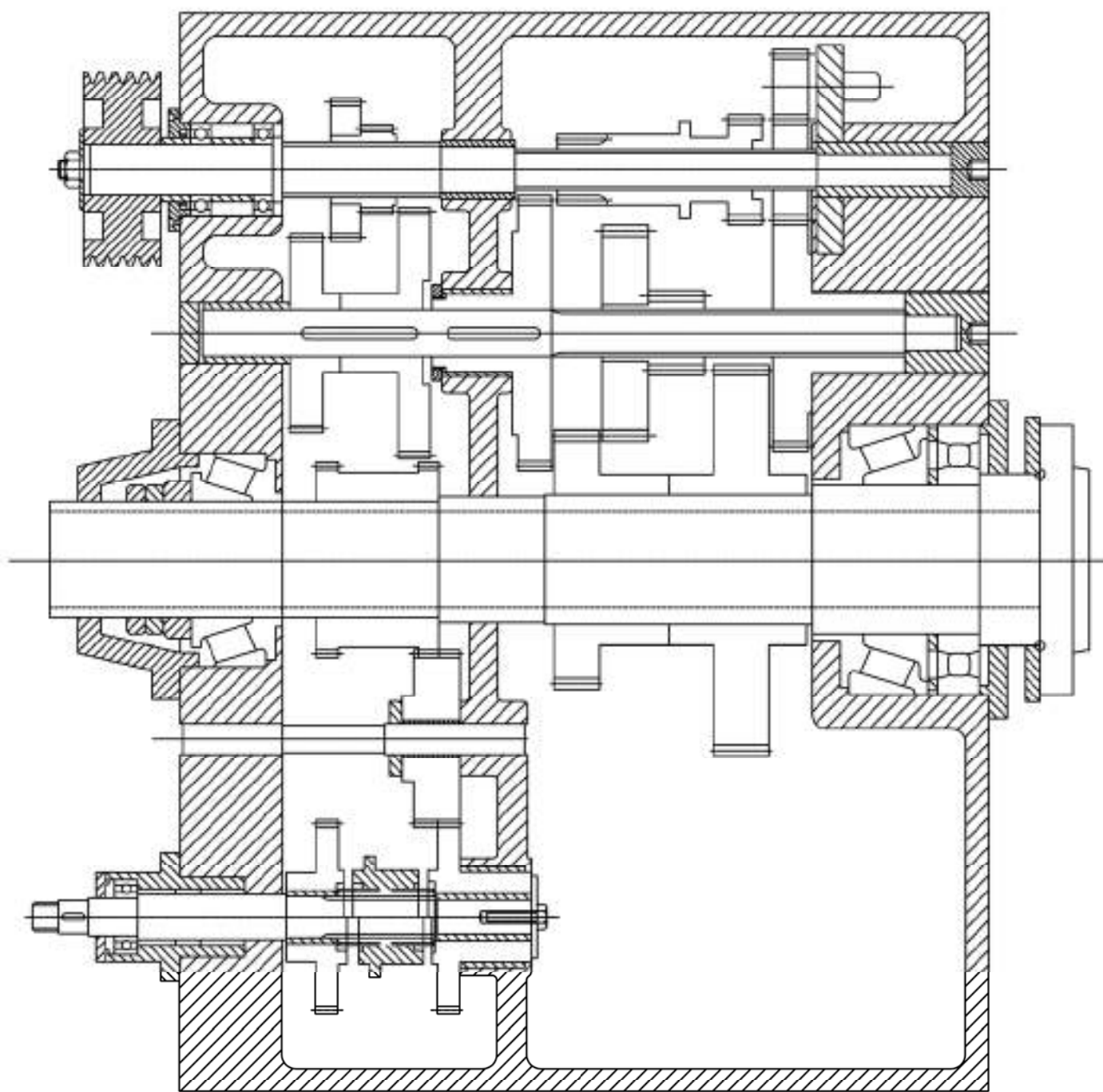
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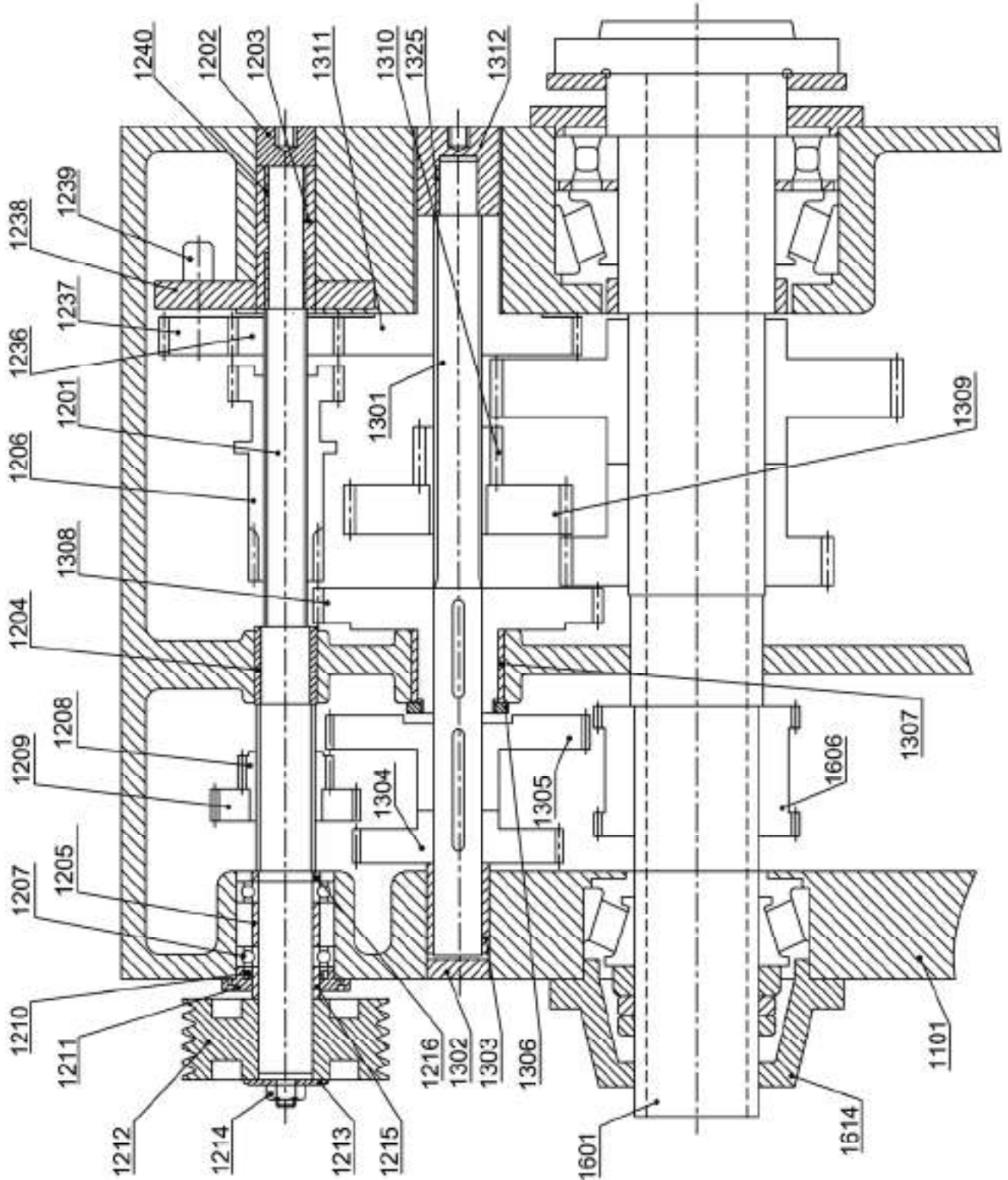
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|------------|-----------------------|--|---|
| 8          | Threading over lapse. | (A) Excessive axial play of lead screw.<br>(B) Excessive play in half nuts.<br>(C) Gear train or Norton lever position is not proper.<br>(D) Engagement of half nut is not proper. | Set axial play of lead screw.<br>Set play of half nuts.<br>Set proper gear train or proper lever position of norton gear box.<br>Engage half nut as per instruction given in thread dial indicator. |
| 9          | Noise in head stock.  | (A) Lubricant is not sufficient.<br>(B) Gear damage.<br>(C) Bearing damage.  | Check oil lever and maintain proper oil level.<br>Replace damage gear.<br>Replace bearing.  |



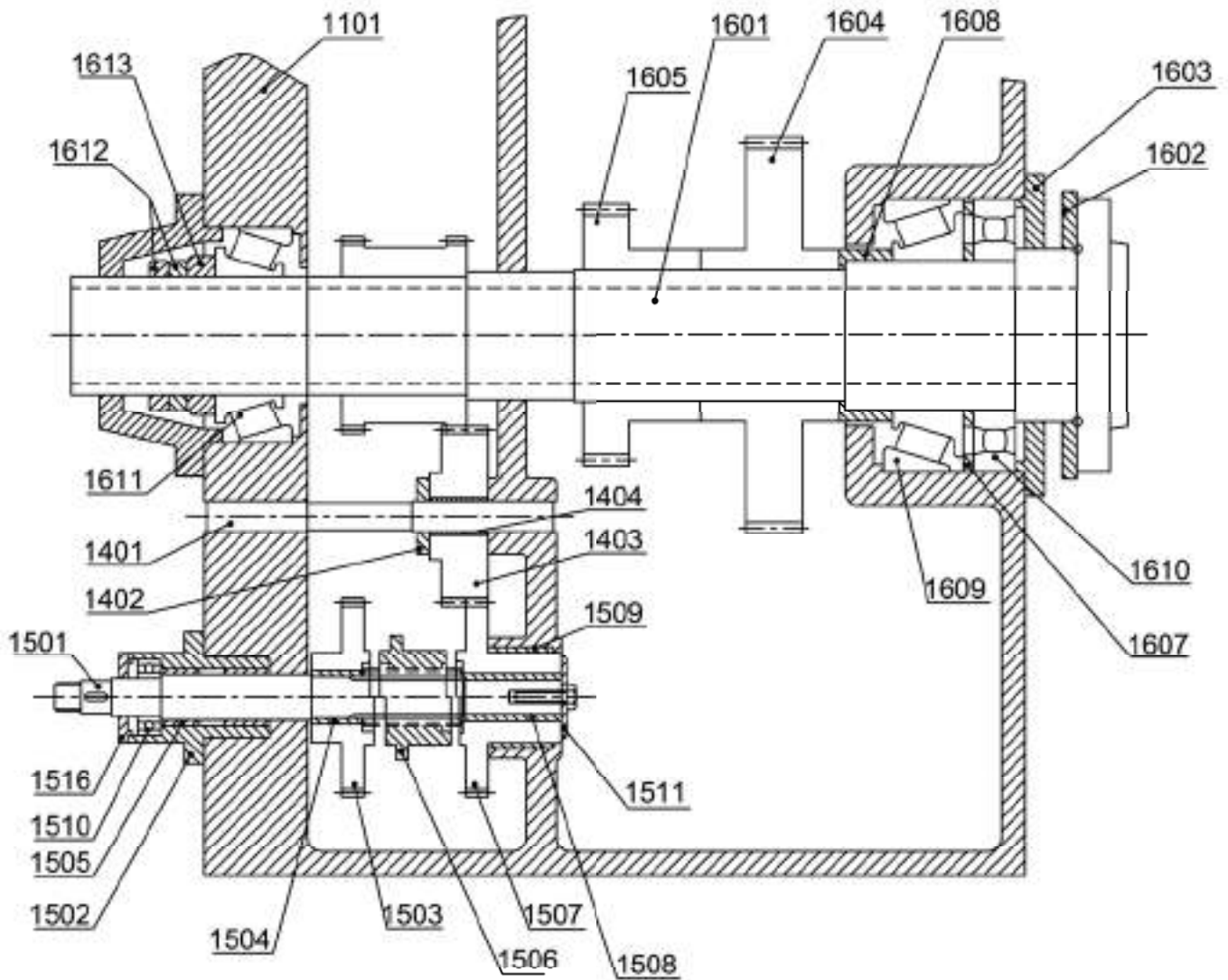


## HEAD STOCK SUB ASSEMBLY



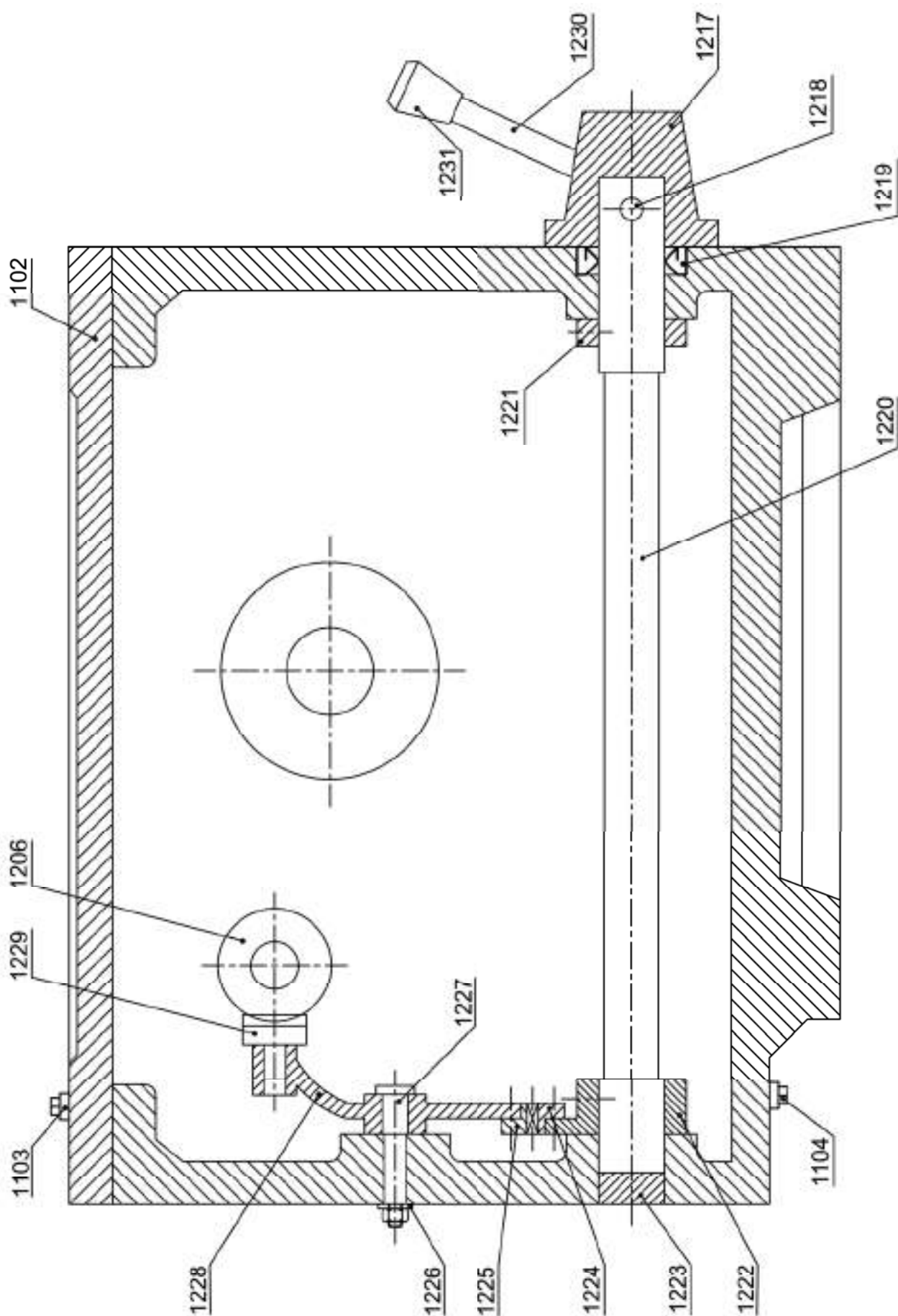


**HEAD STOCK SUB ASSEMBLY**



**HEAD STOCK SUB ASSEMBLY**





HEAD STOCK ASSEMBLY



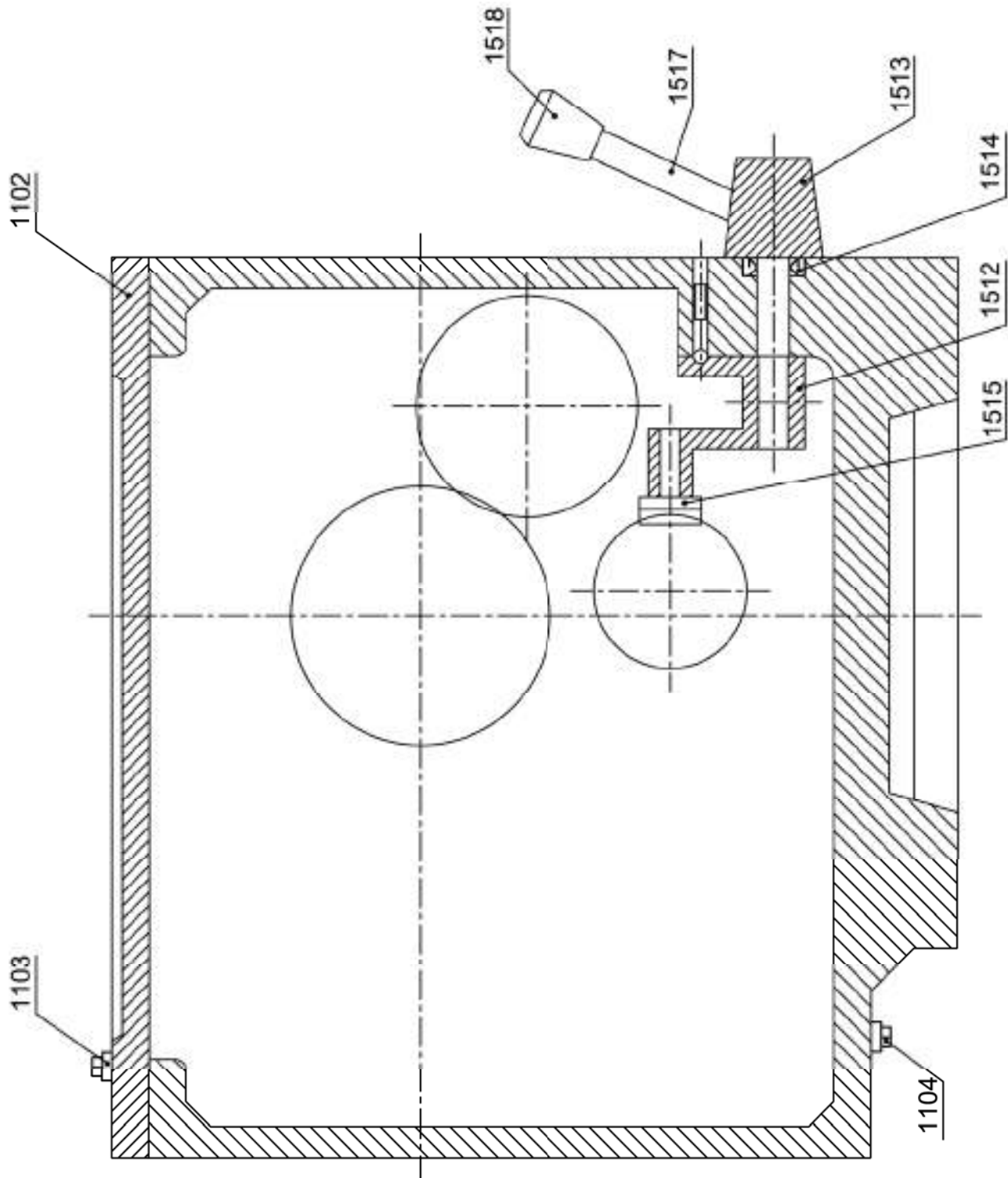
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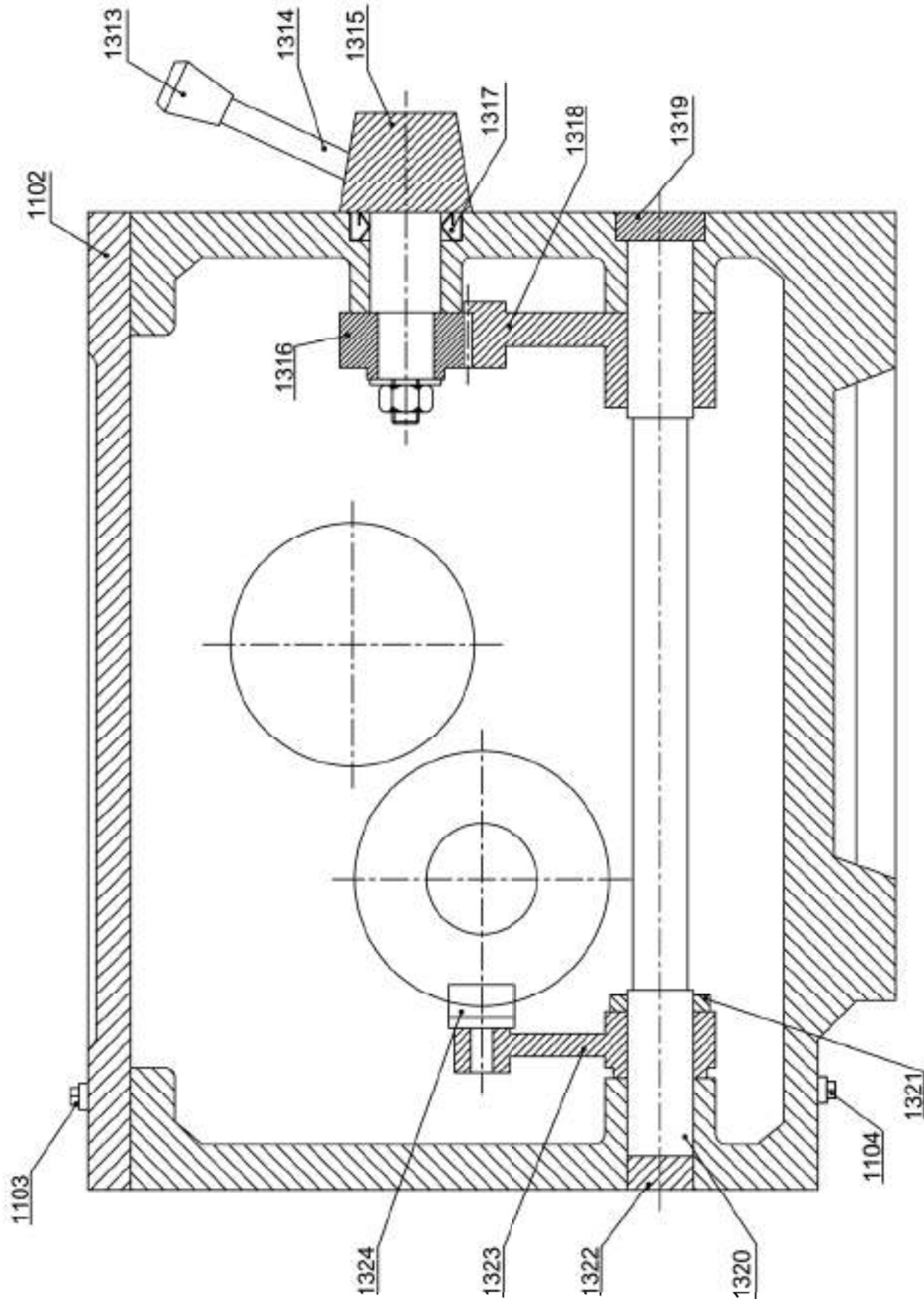
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1500 SERIES SHAFT ASSEMBLY



1300 SERIES SHAFT ASSEMBLY



## 5.1 HEAD STOCK ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>                       | <b>Quantity</b> |
|-----------------|--|-----------------|
| 1101            | Head stock body                        | 1               |
| 1102            | Head sock top cover                    | 1               |
| 1103            | Oil filling plug                       | 1               |
| 1104            | Oil drain plug                         | 1               |
| 1201            | Driving shaft                          | 1               |
| 1202            | Plug                                   | 1               |
| 1203            | G.M. R H Guide bush                    | 1               |
| 1204            | G.M. Middle guide bush                 | 1               |
| 1205            | Bearing spacer                         | 1               |
| 1206            | Cluster gear Z = 26 & Z = 16           | 1               |
| 1207            | Ball bearing ( no. 6211)               | 2               |
| 1208            | Gear Z = 21                            | 1               |
| 1209            | Gear Z = 34                            | 1               |
| 1210            | Oil seal 70 - 90 - 10                  | 1               |
| 1211            | Cover                                  | 1               |
| 1212            | Head stock driving pulley              | 1               |
| 1213            | Washer                                 | 1               |
| 1214            | Driving pulley lock nut                | 1               |
| 1215            | Spacer                                 | 1               |
| 1216            | Spacer                                 | 1               |
| 1217            | Front lever boss                       | 2               |
| 1218            | Taper pin                              | 2               |
| 1219            | Oil seal                               | 2               |
| 1220            | Gear shifter shaft for gear (no. 1206) | 2               |
| 1221            | Collar                                 | 2               |
| 1222            | Bottom gear sector type lever          | 2               |
| 1223            | Plug                                   | 2               |
| 1224            | Gear sector for bottom lever           | 1               |
| 1225            | Gear sector for top lever              | 1               |
| 1226            | Washer                                 | 2               |
| 1227            | Top lever locating pin                 | 2               |
| 1228            | Top lever for gear shifting            | 1               |
| 1229            | Fork                                   | 1               |





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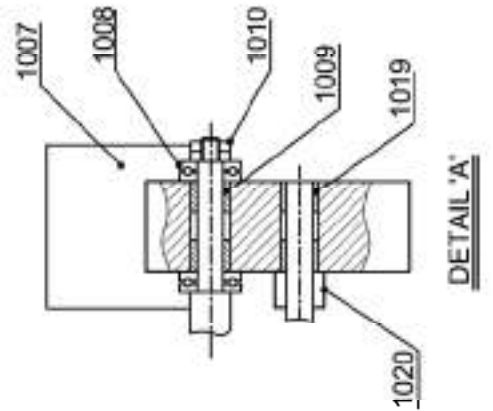
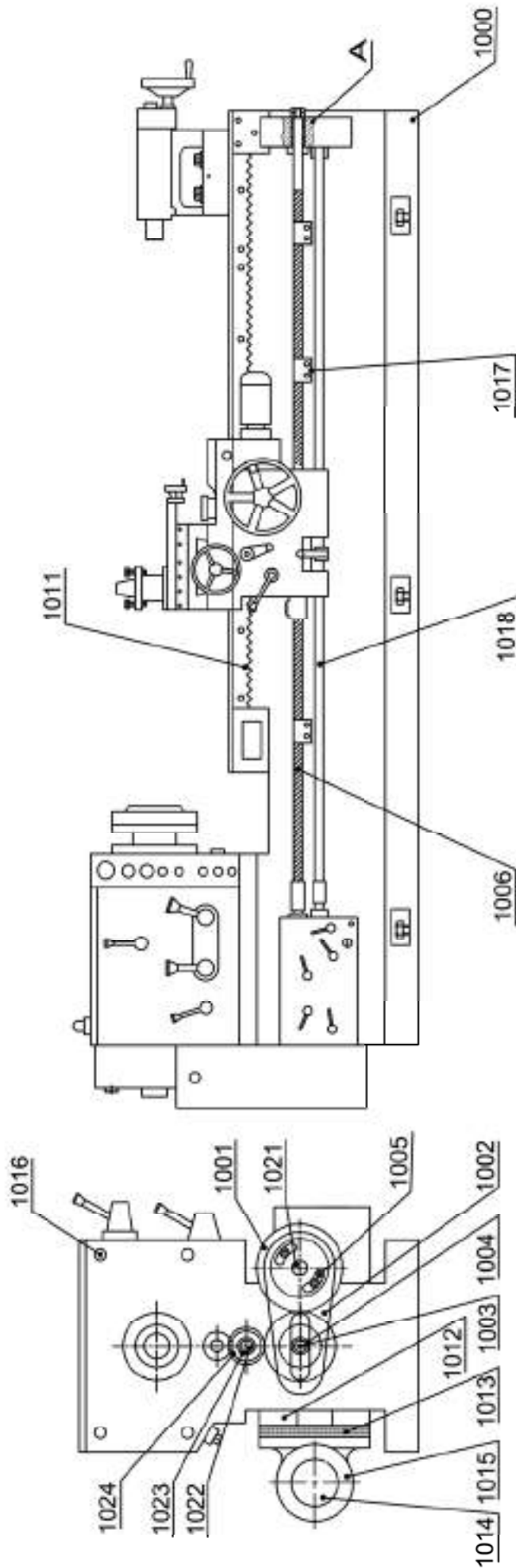
| <b>Part No.</b> | <b>Part Name</b>                        | <b>Quantity</b> |
|-----------------|---|-----------------|
| 1230            | Handle for front lever boss             | 2               |
| 1231            | Knob                                    | 2               |
| 1232            | Gear sector for top lever for gear 1208 | 1               |
| 1233            | Gear sector for bottom lever            | 1               |
| 1234            | Top shifter lever for gear 1208         | 1               |
| 1235            | Fork                                    | 1               |
| 1236            | Driving gear for pump                   | 1               |
| 1237            | Gear Z =                                | 1               |
| 1238            | Locating plate                          | 1               |
| 1239            | Gear pump                               | 1               |
| 1301            | Middle shaft                            | 1               |
| 1302            | End plug                                | 1               |
| 1303            | G. M. Guide bush L H side               | 1               |
| 1304            | Gear Z = 50                             | 1               |
| 1305            | Gear Z = 63                             | 1               |
| 1306            | Check nut for gear 1308                 | 1               |
| 1307            | G. M. Middle guide bush                 | 1               |
| 1308            | Gear Z = 68                             | 1               |
| 1309            | Gear Z = 44                             | 1               |
| 1310            | Gear Z = 16                             | 1               |
| 1311            | Gear Z = 58                             | 1               |
| 1312            | Middle shaft and guide bush             | 1               |
| 1313            | Knob                                    | 1               |
| 1314            | Handle for front lever boss – 1315      | 1               |
| 1315            | Front lever pin for gear 3010           | 1               |
| 1316            | Gear Z = 40                             | 1               |
| 1317            | Oil seal                                | 1               |
| 1318            | Shifter lever for bottom shaft          | 1               |
| 1319            | Plug                                    | 1               |
| 1320            | Gear shifter lever for bottom shaft     | 1               |
| 1321            | Collar                                  | 1               |
| 1322            | Plug                                    | 1               |
| 1323            | Rear side gear sifter lever             | 1               |
| 1324            | Fork                                    | 1               |
| 1401            | Idler gear shaft                        | 1               |



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| <b>Part No.</b> | <b>Part Name</b>                     | <b>Quantity</b> |
|-----------------|--------------------------------------|-----------------|
| 1402            | Collar                               | 1               |
| 1403            | Idler shaft gear Z = 48              | 1               |
| 1404            | G. M. Bush for idler gear            | 1               |
| 1501            | Change gear spline shaft             | 1               |
| 1502            | Change gear shaft housing            | 1               |
| 1503            | Gear Z = 56                          | 1               |
| 1504            | G. M. Bush for 1503 gear             | 2               |
| 1505            | Housing G. M. bush                   | 1               |
| 1506            | Claw bush for Rev./ For. Feed        | 1               |
| 1507            | Gear Z = 56                          | 1               |
| 1508            | Guide bush for 1507 gear             | 1               |
| 1509            | G. M. Bush for 1507 gear             | 1               |
| 1510            | Ball bearing 6208                    | 1               |
| 1511            | Washer                               | 1               |
| 1512            | Shifter lever for claw bush shifting | 1               |
| 1513            | Boss for feed reversing lever        | 1               |
| 1514            | Oil seal                             | 1               |
| 1515            | Fork for bottom gear                 | 1               |
| 1516            | Change gear shaft housing cover      | 1               |
| 1517            | Handle                               | 1               |
| 1518            | Knob                                 | 1               |
| 1601            | Spindle bayonet size 11 type         | 1               |
| 1602            | Lock ring                            | 1               |
| 1603            | Front bearing cover                  | 1               |
| 1604            | Gear Z = 79                          | 1               |
| 1605            | Gear Z = 51                          | 1               |
| 1606            | Gear Z = 56                          | 1               |
| 1607            | Bearing spacer                       | 1               |
| 1608            | Inner spacer                         | 1               |
| 1609            | Taper roller bearing 32232           | 1               |
| 1610            | Ball bearing 6232                    | 1               |
| 1611            | Taper roller bearing 32226           | 1               |
| 1612            | Spindle check nuts                   | 2               |
| 1613            | Rear bearing spacer                  | 1               |
| 1614            | Rear bearing cover                   | 1               |
| 1615            | Thrust socket                        | 2               |
| 1616            | Driving button                       | 1               |
| 1617            | Bayonet stud                         | 6               |

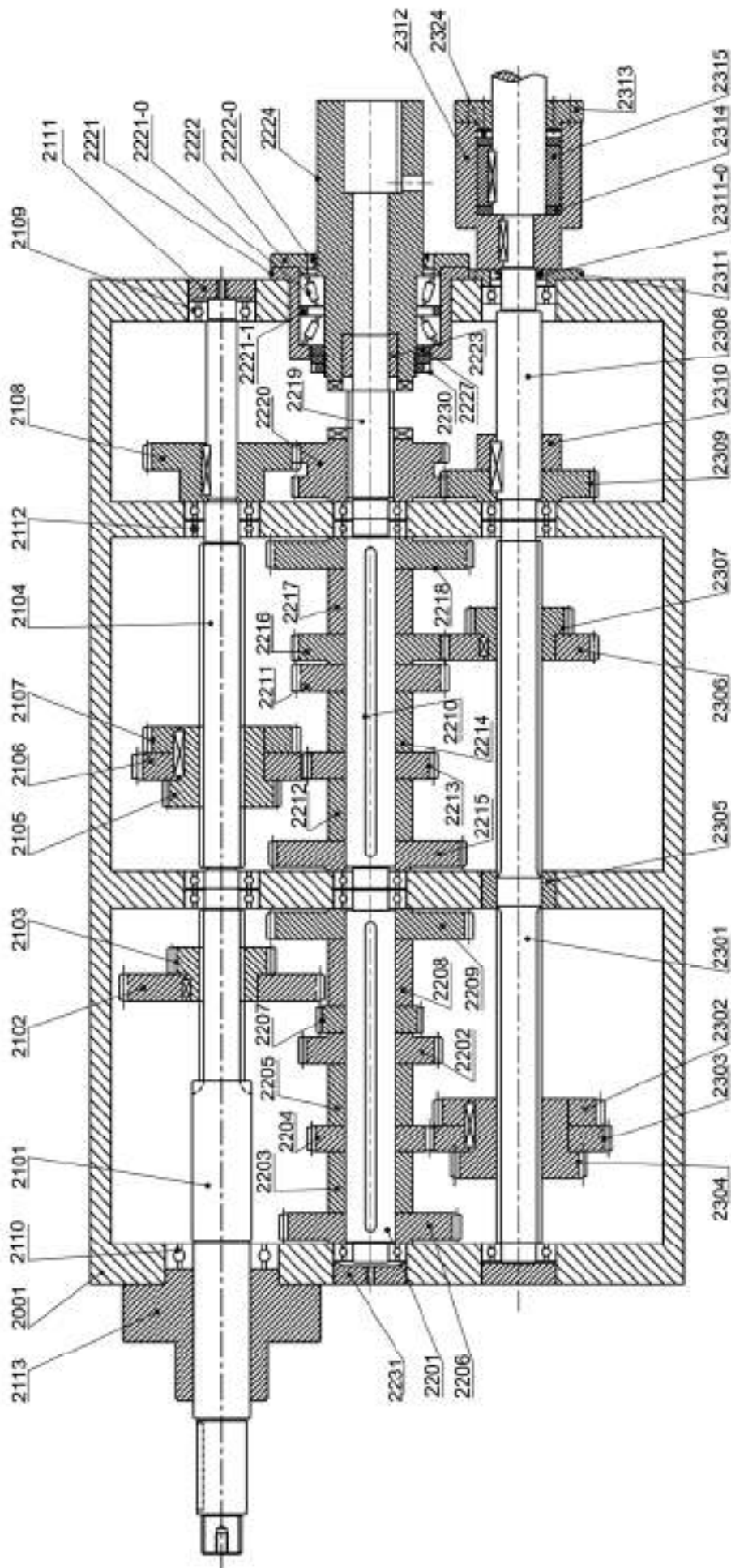


## END FEED ASSEMBLY

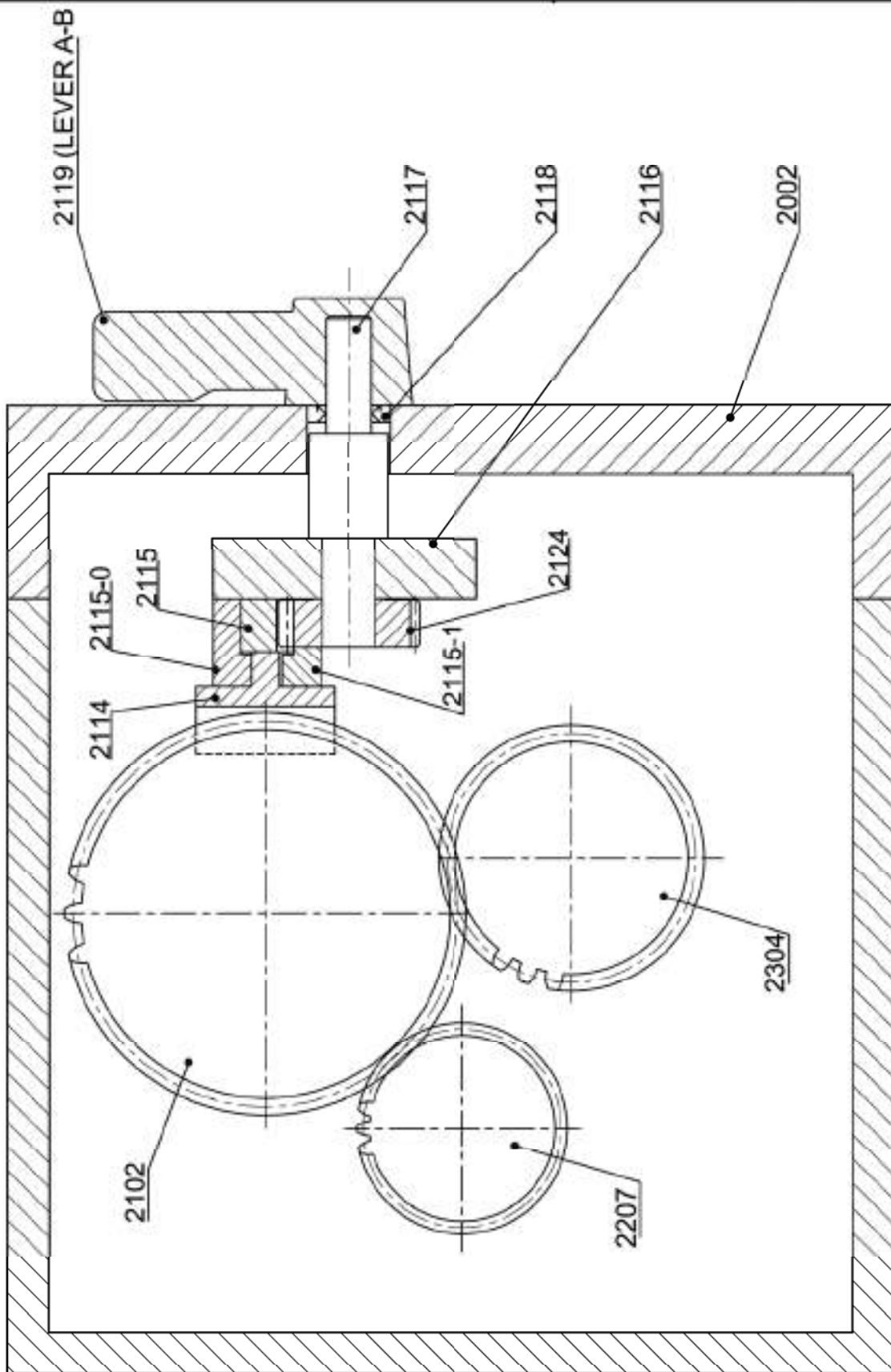


## 5.2 END FEED TRAIN ASSEMBLY

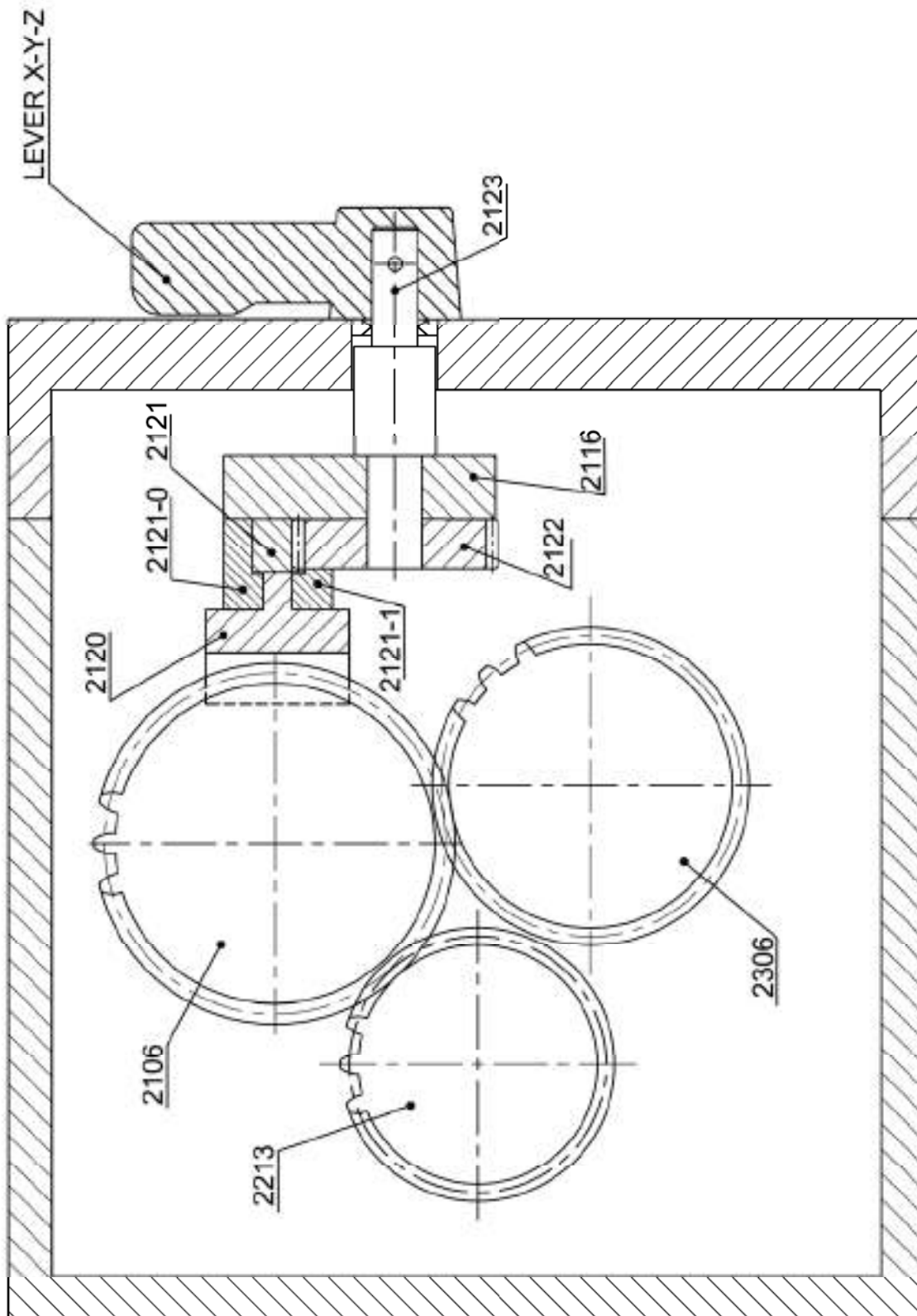
| <b>Part No.</b> | <b>Part Name</b>                         | <b>Quantity</b> |
|-----------------|--|-----------------|
| 1000            | Lathe bed with gep                       | 1               |
| 1001            | Change gear ( As per packing slip )      | --              |
| 1002            | Arm plate                                | 1               |
| 1003            | Arm plate stud                           | 1               |
| 1004            | Gun metal bush of arm plate stud         | 1               |
| 1005            | Clamping stud of arm plate               | 2               |
| 1006            | Lead screw                               | 1               |
| 1007            | Lead Screw Bracket (RH)                  | 1               |
| 1008            | Thrust bearing 51107                     | 2               |
| 1009            | Gun metal bushes for lead screw brackets | 1               |
| 1010            | Check nut                                | 2               |
| 1011            | Rack                                     | --              |
| 1012            | Motor Rail Pata                          | 2               |
| 1013            | Motor Rail                               | 2               |
| 1014            | Motor Pulley                             | 1               |
| 1015            | Electric Motor                           | 1               |
| 1016            | Side Cover Stud                          | 4               |
| 1017            | Lead Screw Support                       | -               |
| 1018            | Feed Rod                                 | 1               |
| 1019            | Feed Rod G.M. Bush                       | 2               |
| 1020            | Feed Rod Collar                          | 1               |
| 1021            | Change gear spacer                       | 1               |
| 1022            | Idler stud                               | 1               |
| 1023            | Idler stud GM bush                       | 1               |
| 1024            | Idler gear for 40 T                      | 2               |



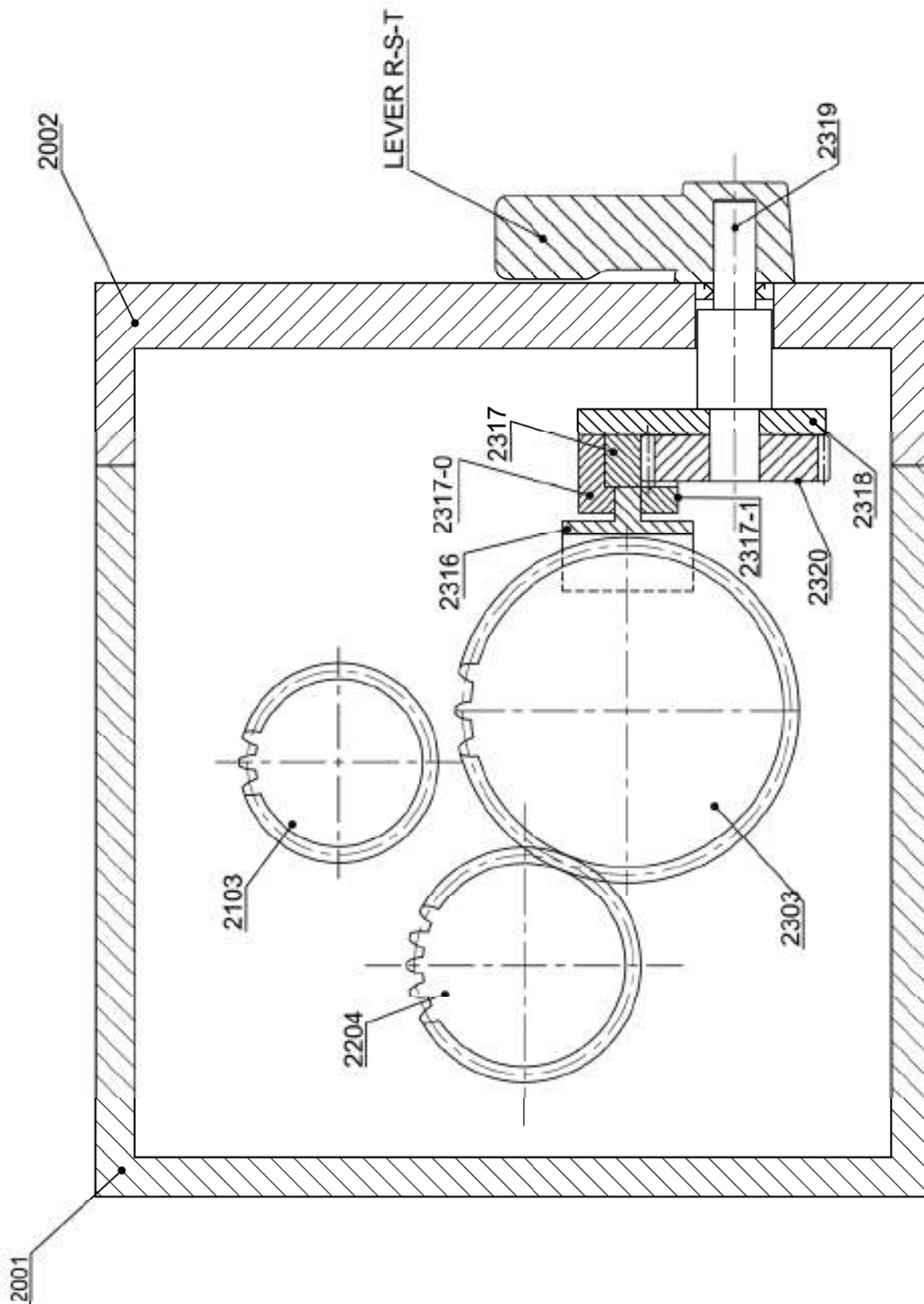
**NGB ASSEMBLY**



SECTION "A-A"

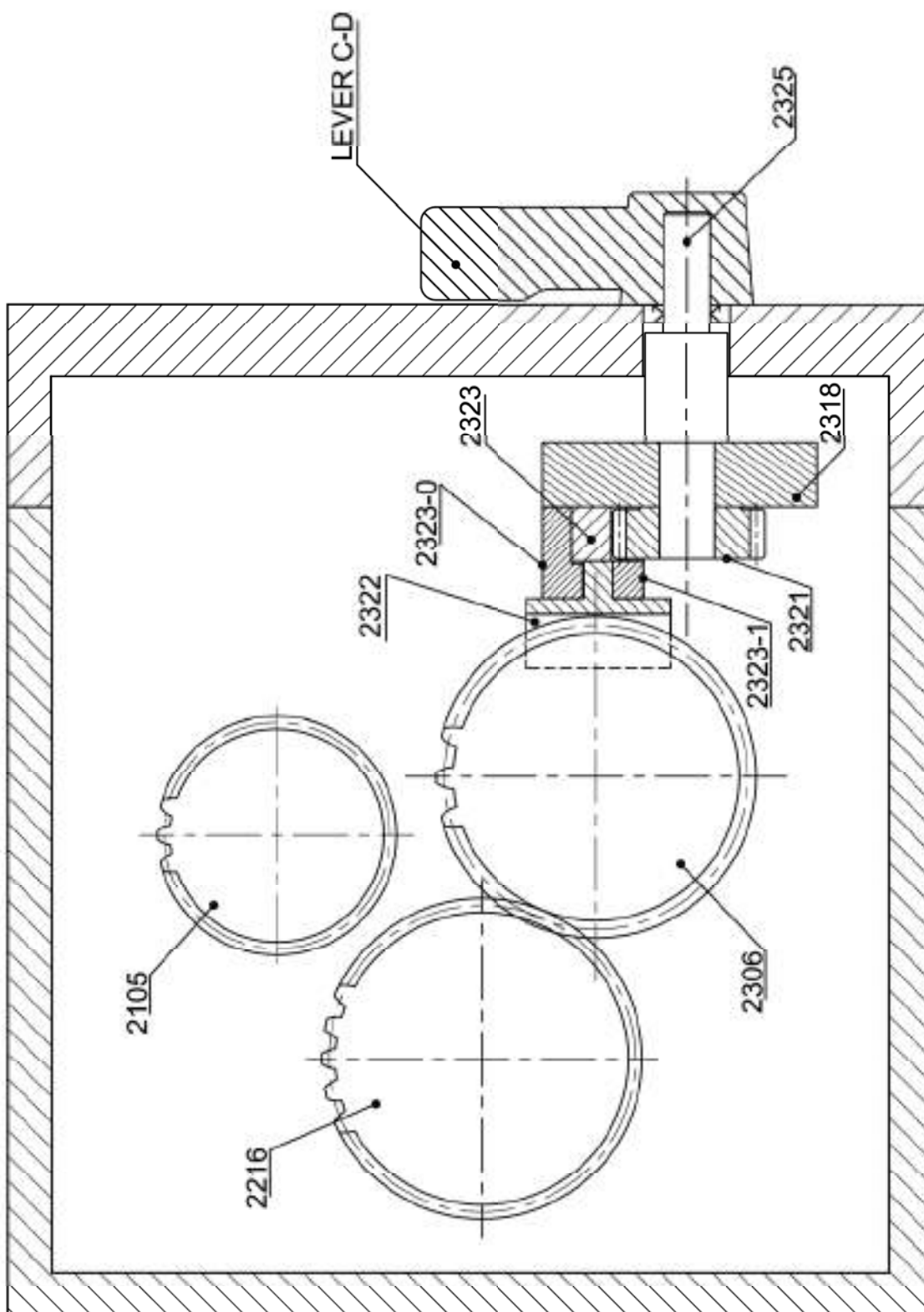


SECTION "B-B"

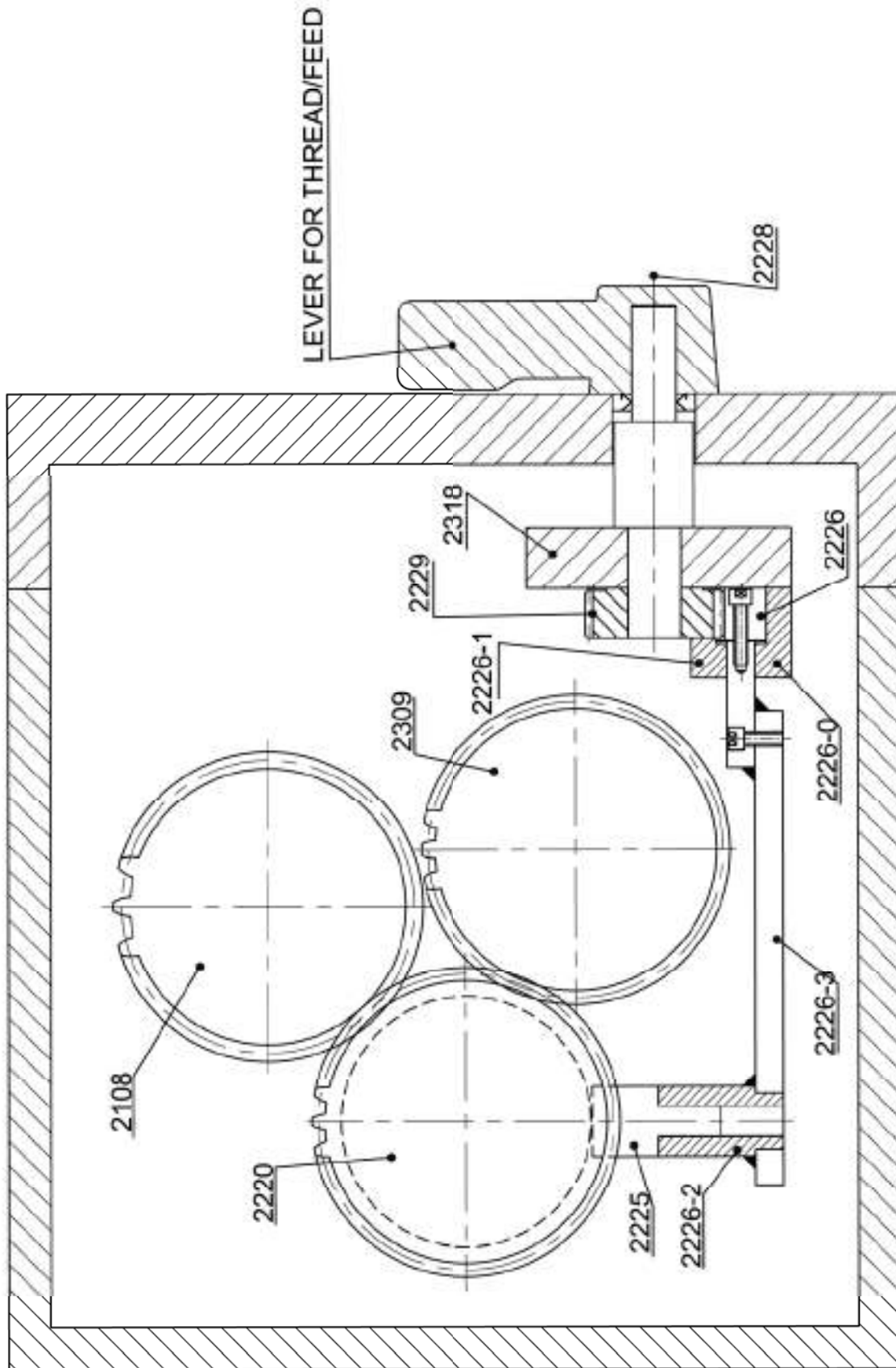


SECTION "C-C"





SECTION "D-D"



SECTION "E-E"



### 5.3 NORTON GEAR BOX ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>      | <b>Quantity</b> |
|-----------------|-----------------------|-----------------|
| 2001            | Norton gear box body  | 1               |
| 2002            | Lid for gear box body | 1               |
| 2101            | Top shaft L. H.       | 1               |
| 2102            | Gear Z = 44           | 1               |
| 2103            | Gear Z = 22           | 1               |
| 2104            | Top shaft middle      | 1               |
| 2105            | Gear Z = 24           | 1               |
| 2106            | Gear Z = 40           | 1               |
| 2107            | Gear Z = 35           | 1               |
| 2108            | Gear Z = 35           | 1               |
| 2109            | Spacer                | 1               |
| 2110            | Top shaft R. H.       | 1               |
| 2111            | Bearing               | 14              |
| 2112            | Plug                  | 3               |
| 2113            | Input boss            | 1               |
| 2114            | Shifter               | 1               |
| 2115            | Rake                  | 1               |
| 2116            | Guide plate           | 1               |
| 2117            | Pin for handle        | 1               |
| 2118            | Oil seal              | 1               |
| 2119            | Operating handle      | 1               |
| 2120            | Shifter               | 1               |
| 2121            | Rake                  | 1               |
| 2122            | Guide plate           | 1               |
| 2123            | Pin for handle        | 1               |
| 2124            | Oil seal              | 1               |
| 2125            | Operating handle      | 1               |
| 2201            | Middle shaft L. H.    | 1               |
| 2202            | Gear Z = 30           | 1               |
| 2203            | Spacer                | 1               |
| 2204            | Gear Z = 28           | 1               |
| 2205            | Spacer                | 1               |



# PANTHER

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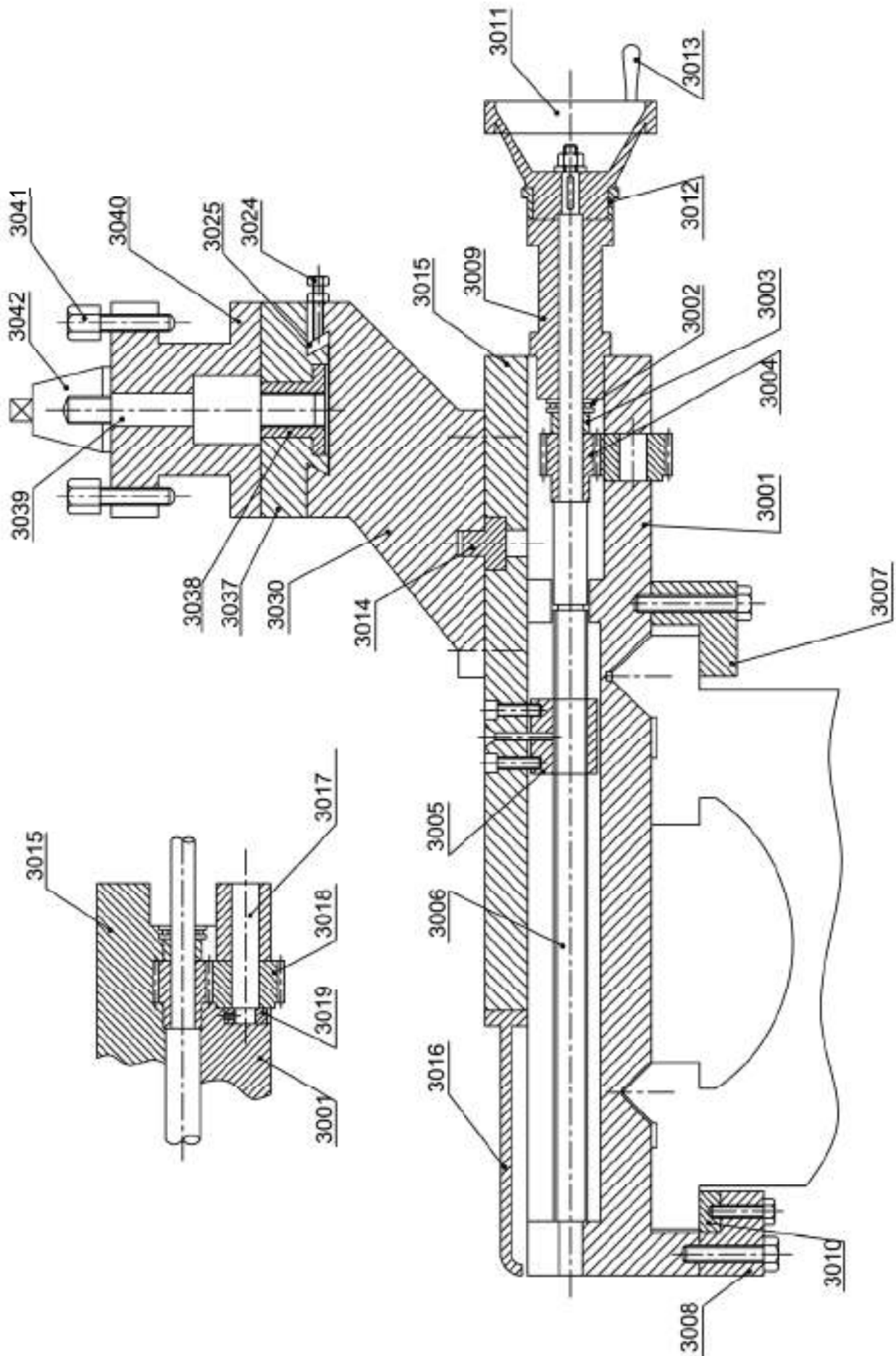
| <b>Part No.</b> | <b>Part Name</b>               | <b>Quantity</b> |
|-----------------|--------------------------------|-----------------|
| 2206            | Gear Z = 40                    | 1               |
| 2207            | Gear Z = 22                    | 1               |
| 2208            | Spacer                         | 1               |
| 2209            | Gear Z = 44                    | 2               |
| 2210            | Bearing                        | 1               |
| 2211            | Gear Z = 35                    | 1               |
| 2212            | Spacer                         | 1               |
| 2213            | Gear Z = 30                    | 1               |
| 2214            | Spacer                         | 1               |
| 2215            | Gear Z = 42                    | 1               |
| 2216            | Gear Z = 33                    | 1               |
| 2217            | Spacer                         | 1               |
| 2218            | Gear Z = 44                    | 1               |
| 2219            | Middle shaft R.H.              | 1               |
| 2220            | Gear Z = 35                    | 1               |
| 2221            | Bearing housing                | 1               |
| 2222            | End cover                      | 1               |
| 2223            | G. M. bush                     | 1               |
| 2224            | Housing for L S claw bush type | 1               |
| 2225            | Shifter                        | 1               |
| 2226            | Rake                           | 1               |
| 2227            | Guide plate                    | 1               |
| 2228            | Pin for handle                 | 1               |
| 2229            | Oil seal                       | 1               |
| 2230            | Operating handle               | 1               |
| 2301            | Bottom shaft L. H.             | 1               |
| 2302            | Gear Z = 36                    | 1               |
| 2304            | Gear Z = 42                    | 1               |
| 2305            | G. M. bush                     | 1               |
| 2306            | Gear Z = 33                    | 1               |
| 2307            | Gear Z = 22                    | 1               |
| 2308            | Bottom shaft R. H.             | 1               |
| 2309            | Gear Z = 35                    | 1               |
| 2310            | Spacer                         | 1               |



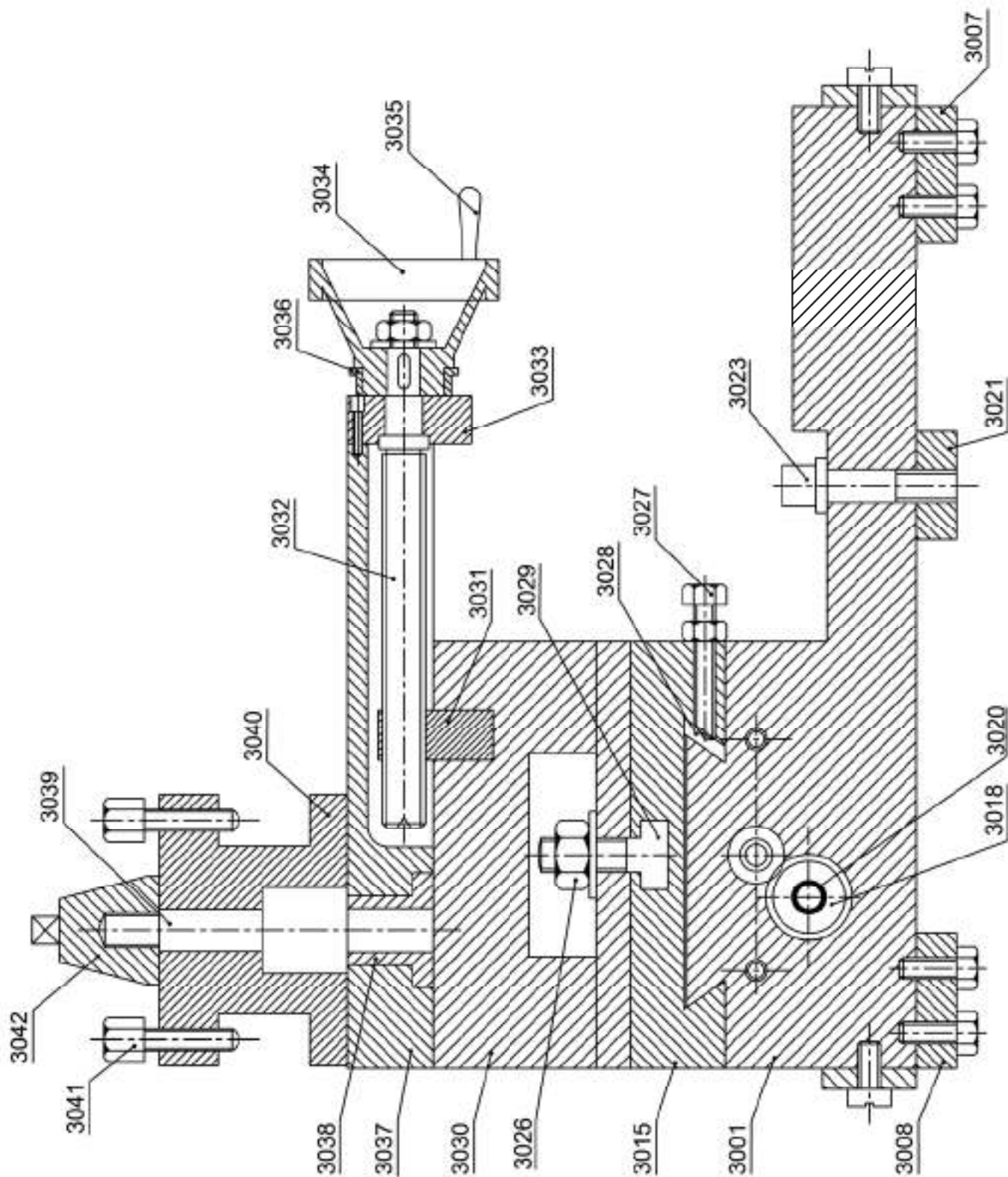
# ***PANTHER***

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| <b>Part No.</b> | <b>Part Name</b>             | <b>Quantity</b> |
|-----------------|------------------------------|-----------------|
| 2311            | R. H. end cover bottom shaft | 1               |
| 2312            | Feed housing                 | 1               |
| 2313            | End cover                    | 1               |
| 2314            | Fiber plate                  | 2               |
| 2315            | Housing bush                 | 1               |
| 2316            | Shifter                      | 1               |
| 2317            | Rake                         | 1               |
| 2318            | Guide plate                  | 1               |
| 2319            | Pin for handle               | 1               |
| 2320            | Oil seal                     | 1               |
| 2321            | Operating handle             | 1               |
| 2322            | Shifter                      | 1               |
| 2323            | Rake                         | 1               |
| 2324            | Guide plate                  | 1               |
| 2325            | Pin for handle               | 1               |
| 2326            | Oil seal                     | 1               |
| 2327            | Operating handle             | 1               |



CARRIAGE AND TOOL POST ASSEMBLY



CARRIAGE AND TOOL POST ASSEMBLY



## 5.4 CARRIAGE AND TOOL POST ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>                    | <b>Quantity</b> |
|-----------------|-------------------------------------|-----------------|
| 3001            | Saddle                              | 1               |
| 3002            | Thrust bearing                      | 1               |
| 3003            | Collar                              | 1               |
| 3004            | Gear for cross slide screw $Z = 13$ | 1               |
| 3005            | Cross slide screw nut               | 1               |
| 3006            | Cross slide screw                   | 1               |
| 3007            | Saddle front lock piece             | 1               |
| 3008            | Saddle rear keeper plate            | 1               |
| 3009            | Surface boss                        | 1               |
| 3010            | Parallel wedge                      | 1               |
| 3011            | Cross slide hand wheel              | 1               |
| 3012            | Micro ring                          | 1               |
| 3013            | Plastic handle grip with stud       | 1               |
| 3014            | Compound slide locating plug        | 1               |
| 3015            | Cross slide                         | 1               |
| 3016            | Cross slide cover                   | 1               |
| 3017            | Idler gear pin                      | 2               |
| 3018            | Idler gear $Z = 18$                 | 1               |
| 3019            | Collar for idler gear pin           | 2               |
| 3020            | Idler gear $Z = 36$                 | 1               |
| 3021            | Saddle lock piece                   | 1               |
| 3022            | Oil cups                            | 2               |
| 3023            | Saddle lock bolt                    | 1               |
| 3024            | Compound slide setting bolts        | 5               |
| 3025            | Compound slide wedge                | 1               |
| 3026            | Compound lock nut                   | 2               |
| 3027            | Cross slide setting bolts           | 6               |
| 3028            | Cross slide wedge                   | 1               |
| 3029            | T – bolt                            | 2               |
| 3030            | Compound slide base                 | 1               |





# *PANTHER*

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| <b>Part No.</b> | <b>Part Name</b>              | <b>Quantity</b> |
|-----------------|-------------------------------|-----------------|
| 3031            | Compound slide screw nut      | 1               |
| 3032            | Compound slide screw          | 1               |
| 3033            | Compound slide boss           | 1               |
| 3034            | Compound slide hand wheel     | 1               |
| 3035            | Plastic handle grip with stud | 1               |
| 3036            | Micro ring                    | 1               |
| 3037            | Compound slide                | 1               |
| 3038            | Compound slide threaded buss  | 1               |
| 3039            | Tool post stud                | 1               |
| 3040            | Tool post                     | 1               |
| 3041            | Tool clamping bolt            | 1               |
| 3042            | Tool post clamping boss       | 1               |



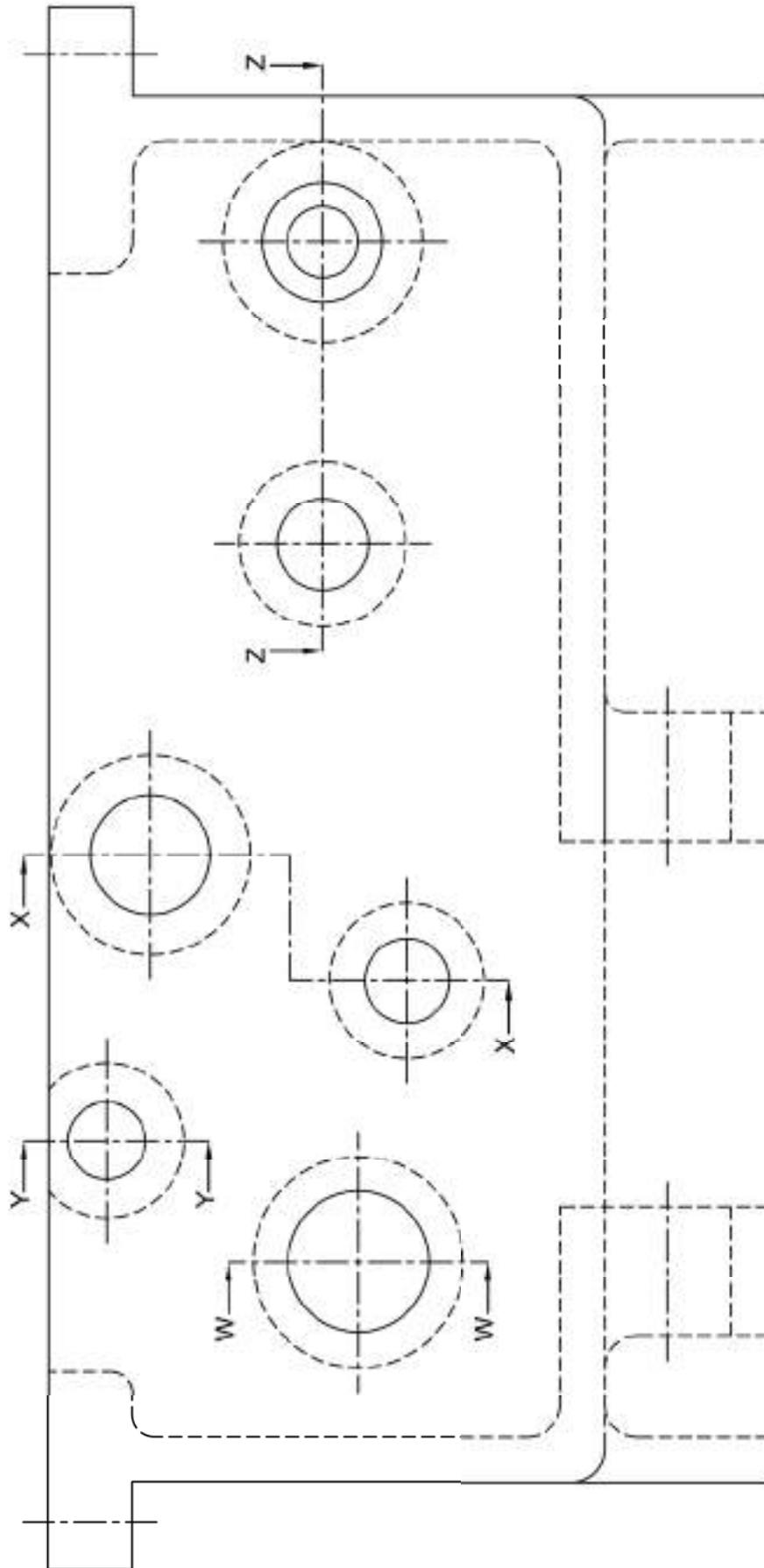
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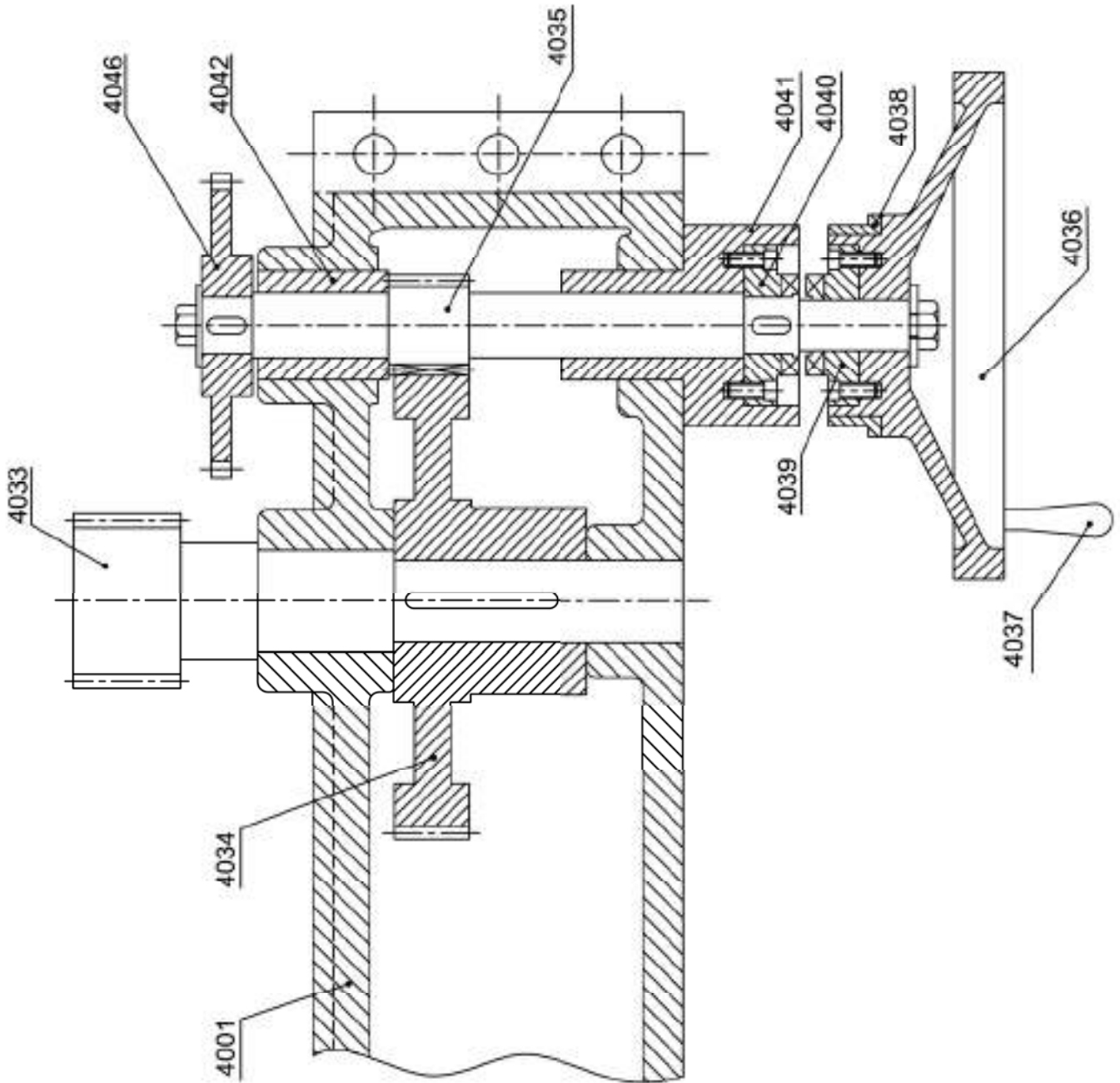
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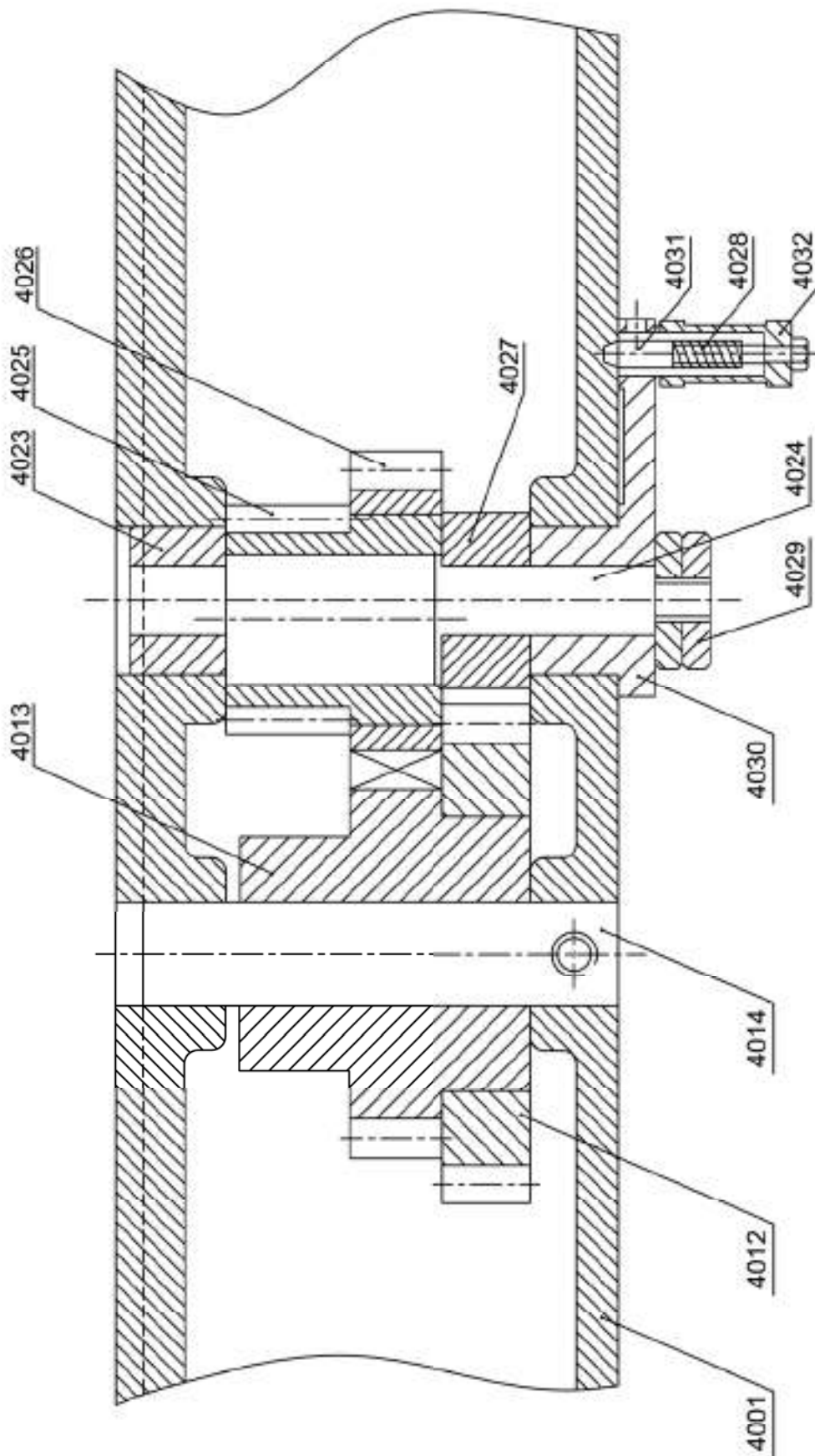
62



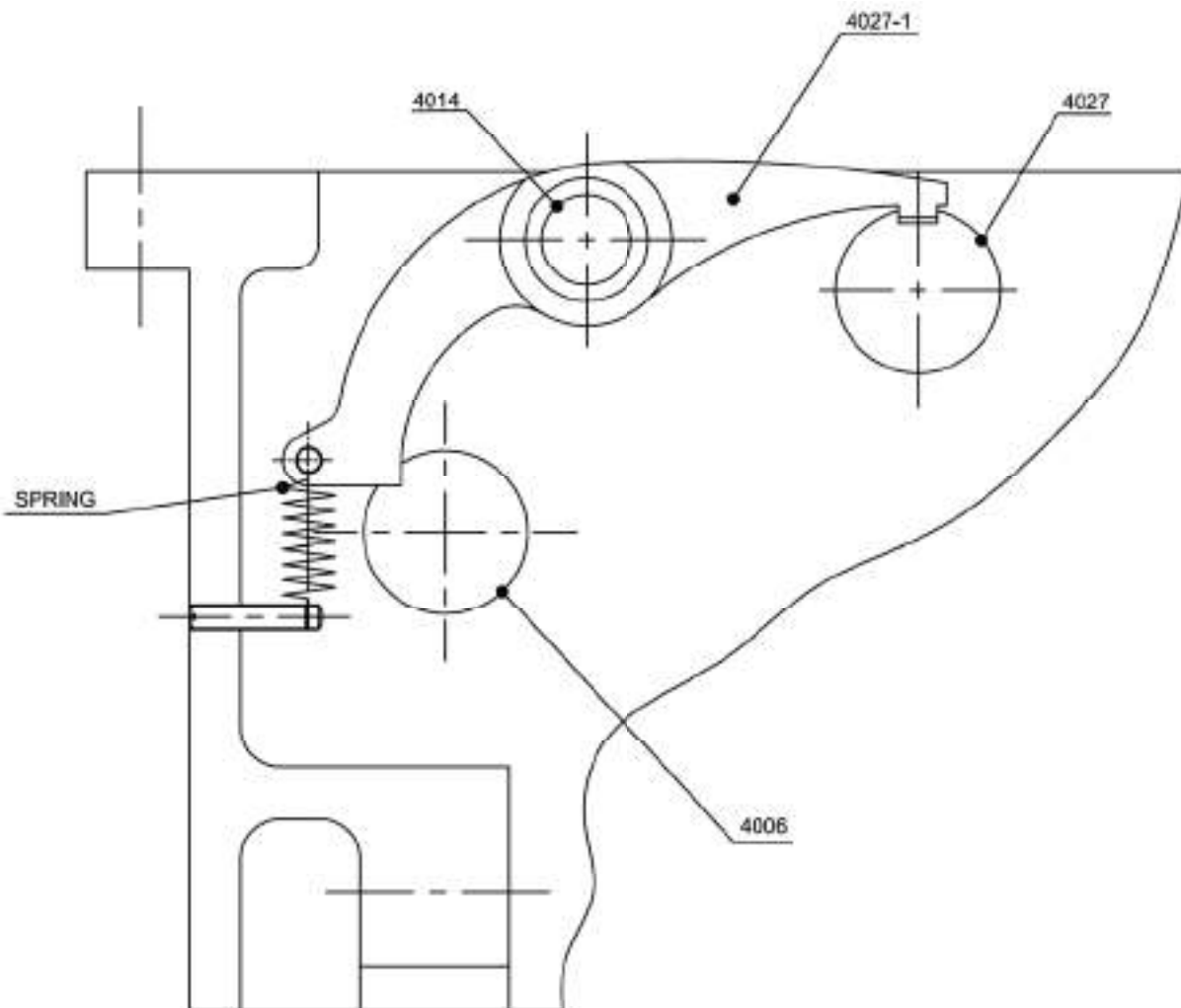
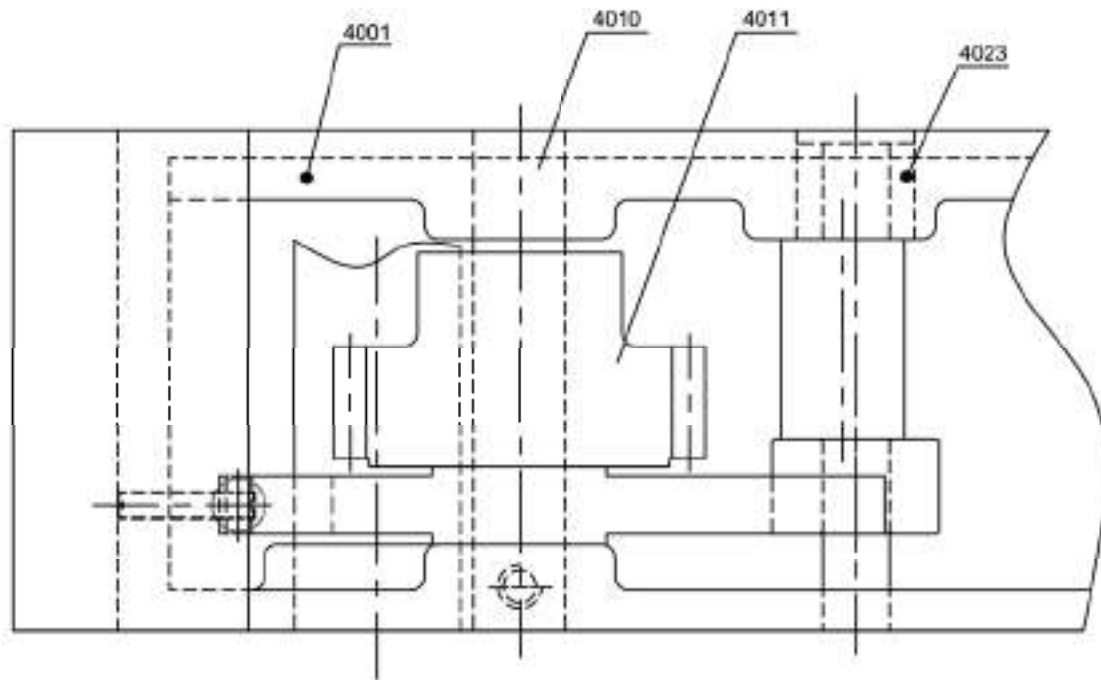
APRON BODY



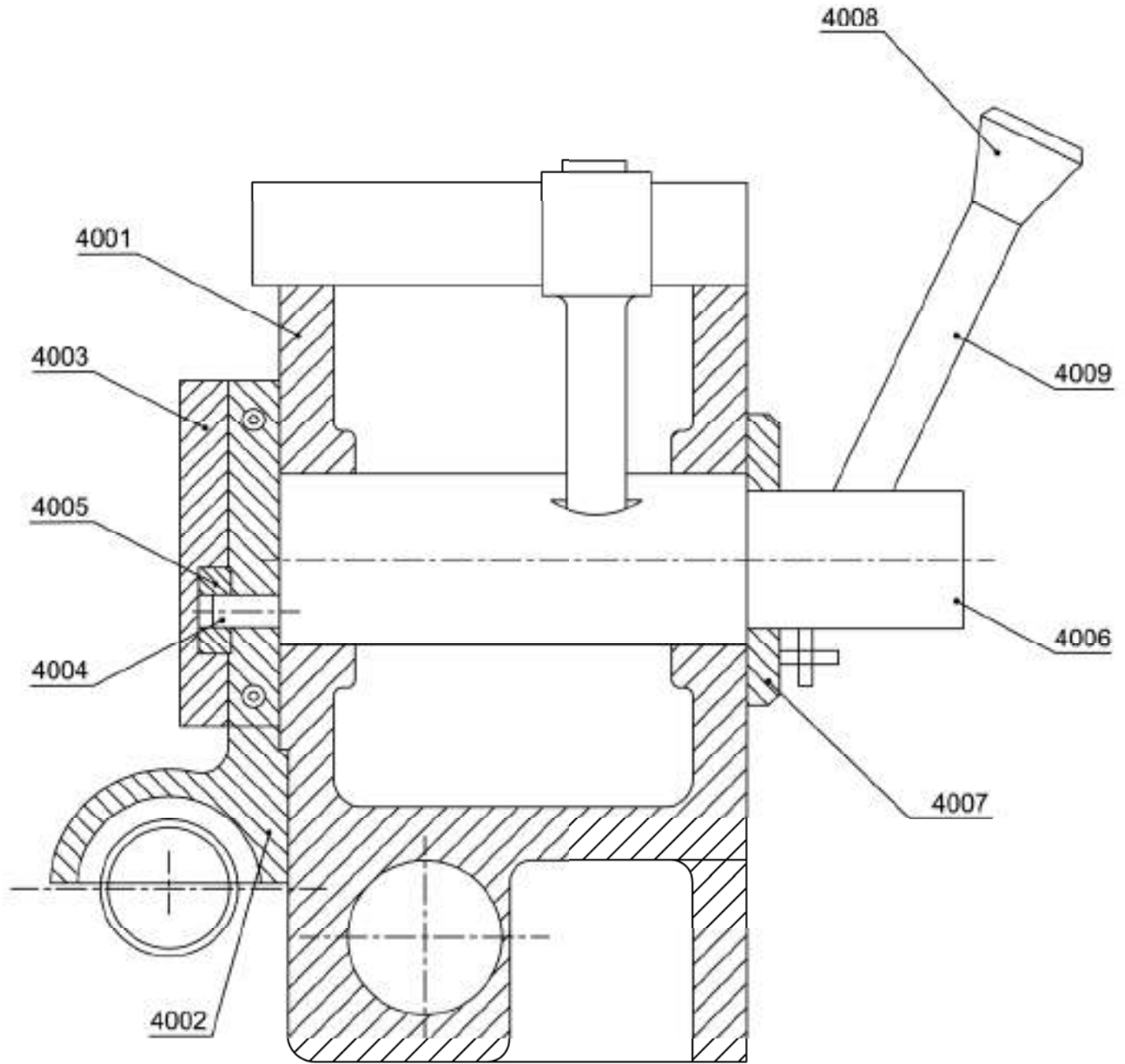
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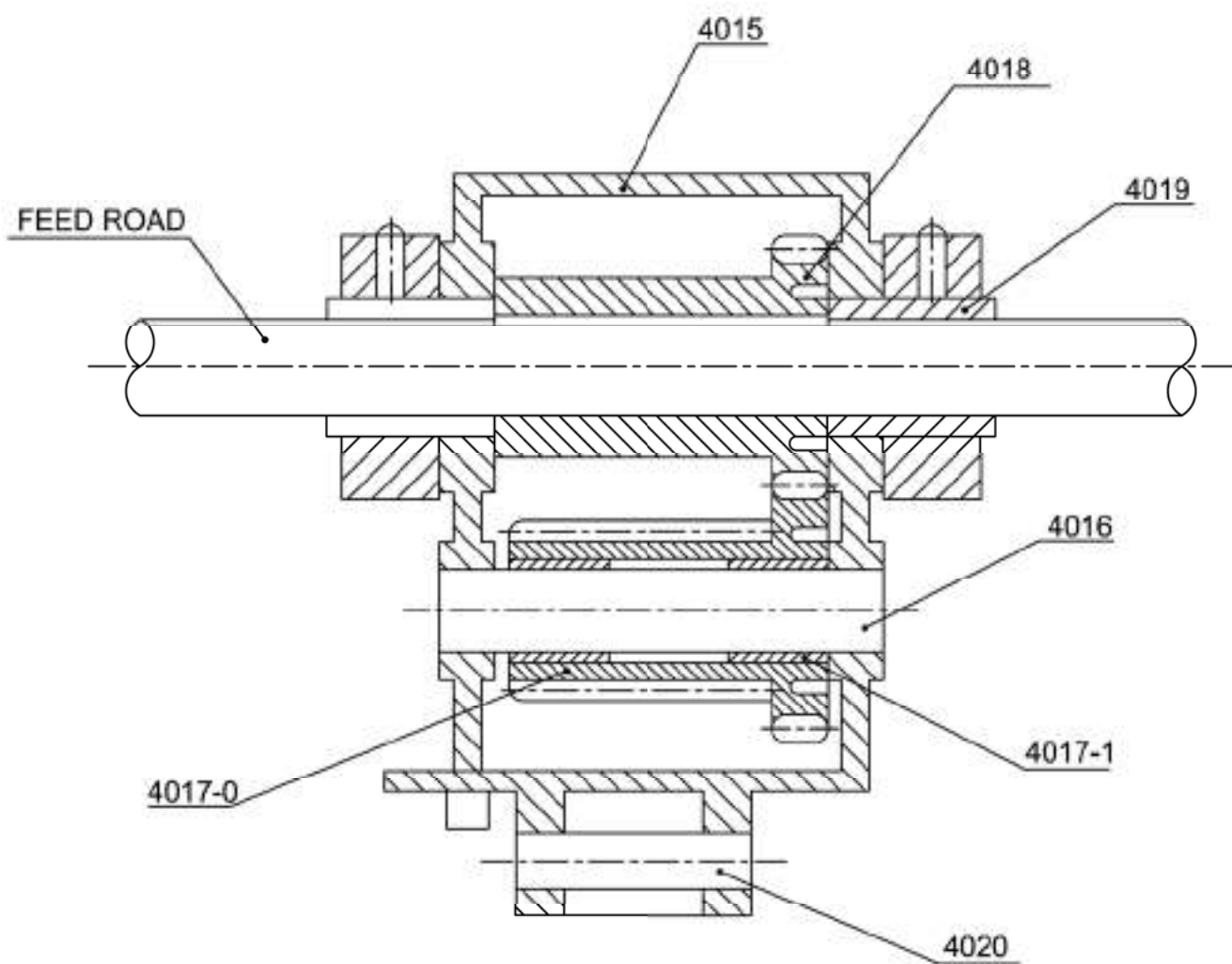
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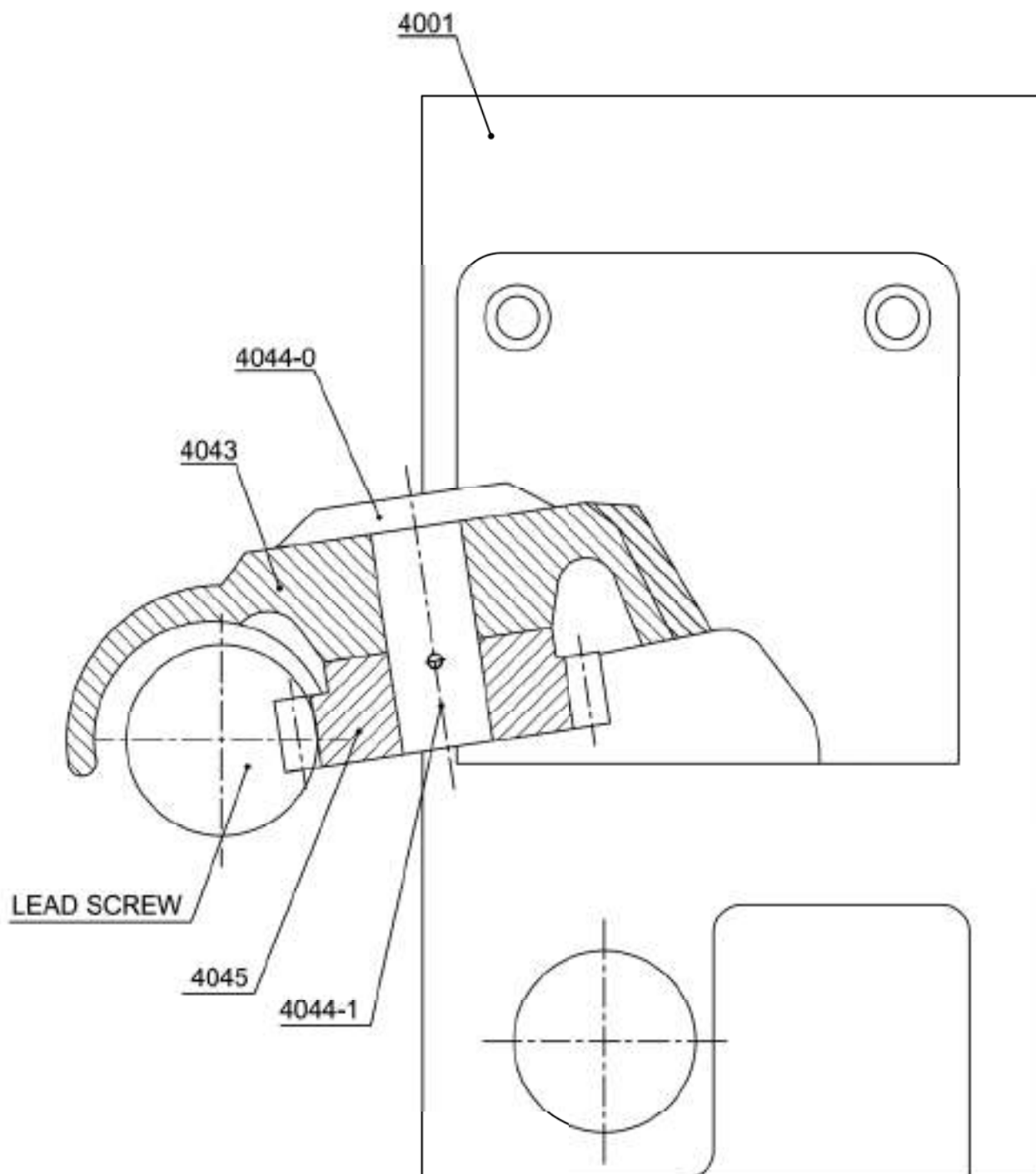
SECTION "YY"



**SECTION "W W"**



HALF NUT ASSEMBLY



DIAL INDICATOR ASSEMBLY





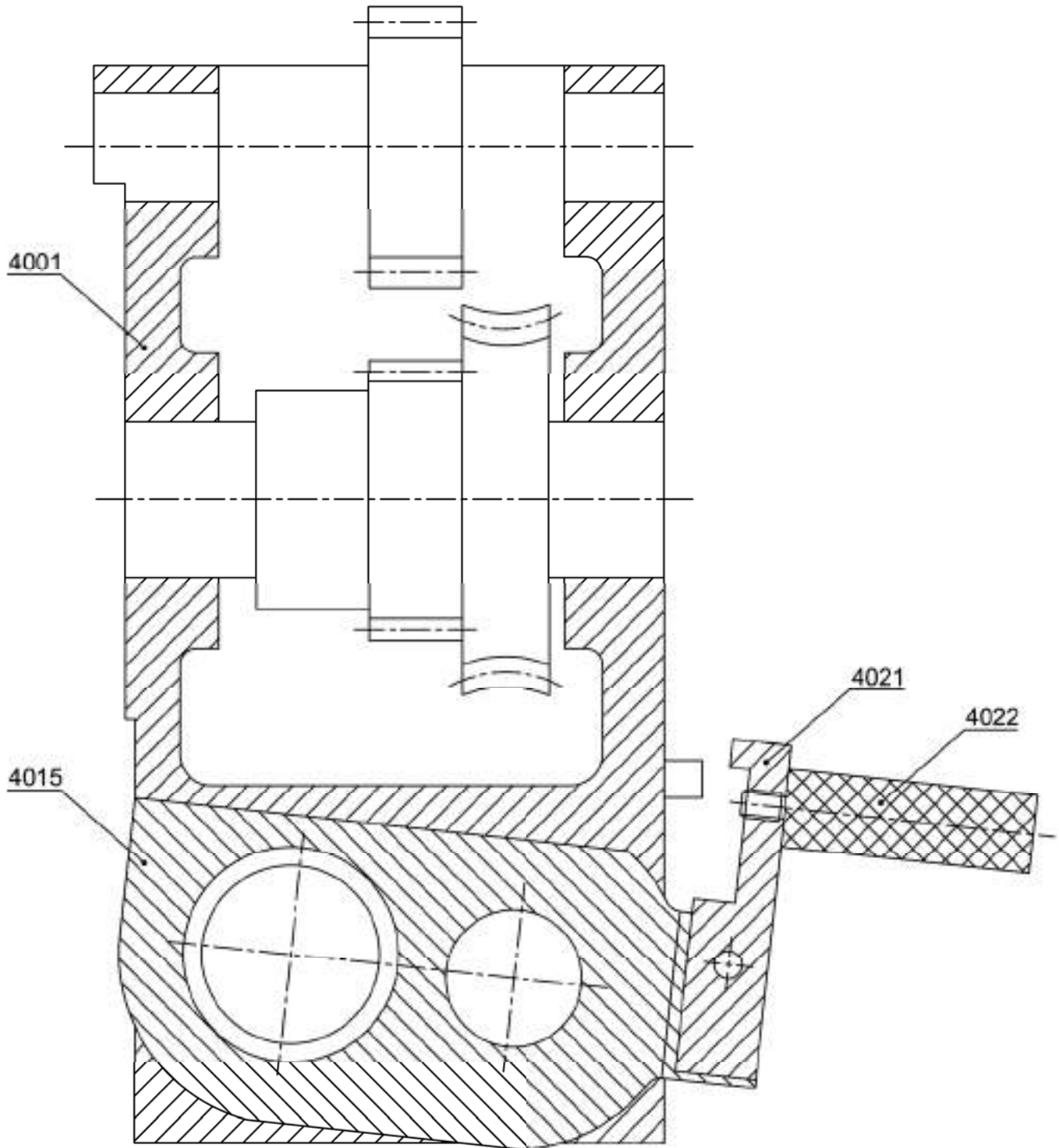
# PANTHER

MODEL

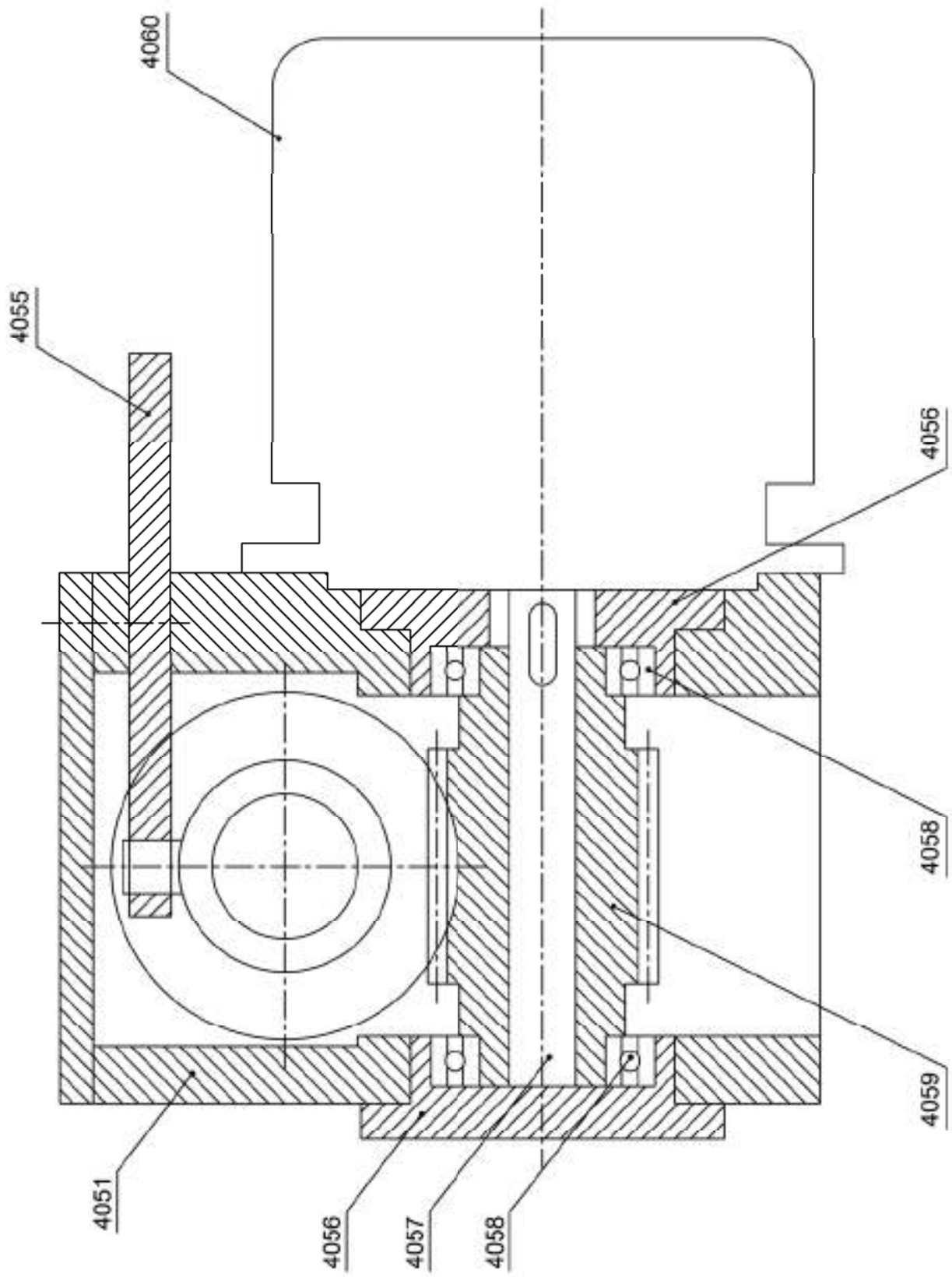
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PAGE NO.

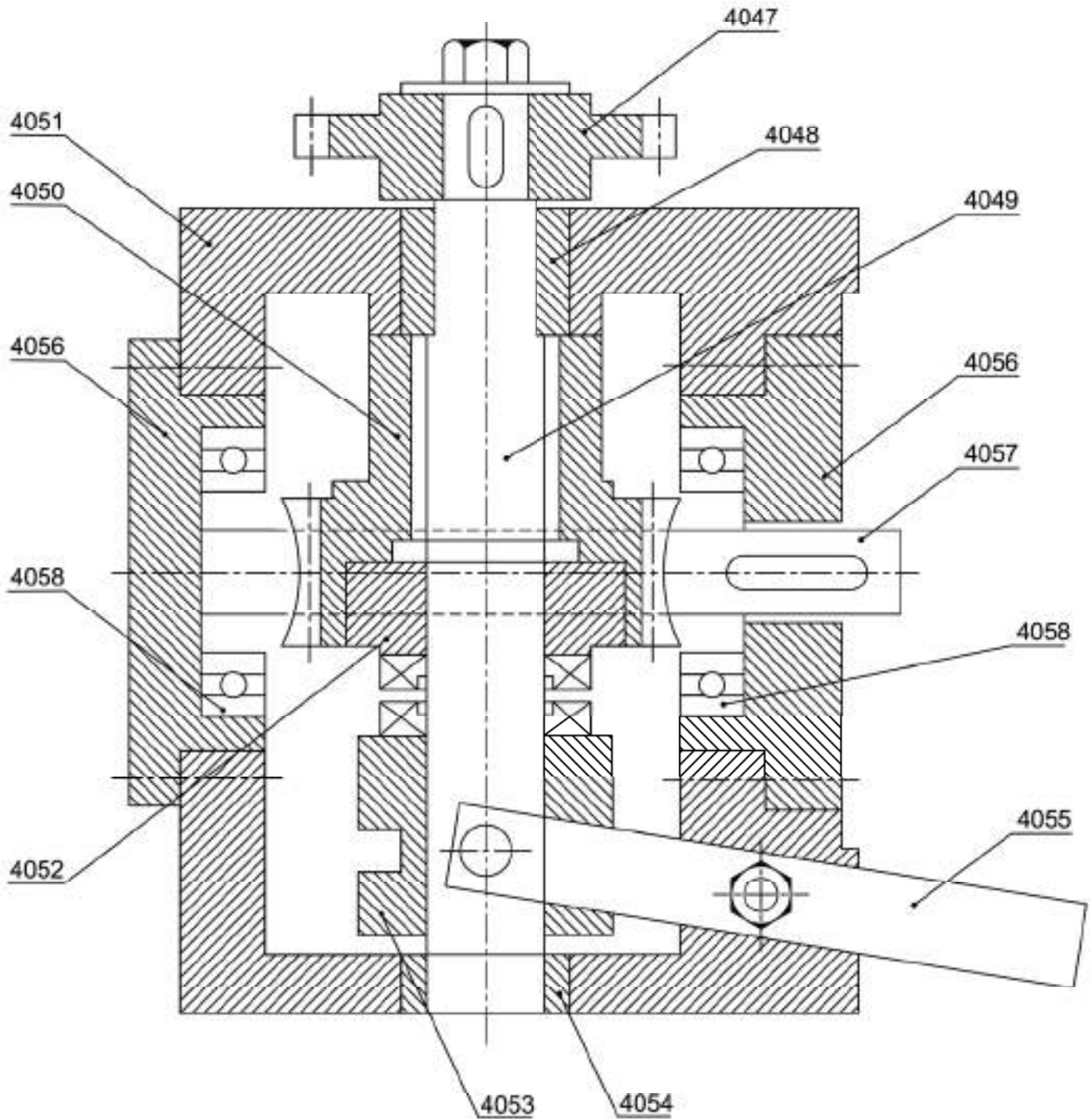
69



**FEED CLUTCH LEVER ASSEMBLY**



**RAPID BOX ASSEMBLY**



**RAPID BOX ASSEMBLY**



# PANTHER

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## 5.5 APRON ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>                  | <b>Quantity</b> |
|-----------------|-----------------------------------|-----------------|
| 4001            | Apron                             | 1               |
| 4002            | Half nut                          | 1               |
| 4003-0          | Half nut guide plate              | 1               |
| 4003-1          | Gm Wedge                          | 1               |
| 4004            | Eccentric pin                     | 1               |
| 4005            | Roller                            | 1               |
| 4006            | Half nut operating shaft          | 1               |
| 4007            | Front plate for H/N shaft         | 1               |
| 4008            | Knob                              | 1               |
| 4009            | Handle                            | 1               |
| 4010            | Guide pin for surface feed gear   | 1               |
| 4011            | Surface feed gear Z=36            | 1               |
| 4012            | Worm gear Z=41 D.P.6              | 1               |
| 4013            | Gear Z=39                         | 1               |
| 4014            | Pin for worm gear                 | 1               |
| 4015            | Worm box body                     | 1               |
| 4016            | Locating pin for worm             | 1               |
| 4017-0          | Worm with Gear                    | 1               |
| 4017-1          | G M Bush for Worm                 | 2               |
| 4018            | Driving gear                      | 1               |
| 4019            | Worm box body guide bush          | 2               |
| 4020            | Hinge pin                         | 1               |
| 4021            | Feed clutch lever                 | 1               |
| 4021-0          | Resting pad                       | 1               |
| 4022            | Feed clutch handle                | 1               |
| 4023            | Guide bush for eccentric shaft    | 1               |
| 4024            | Eccentric shaft                   | 1               |
| 4025            | Gear Z=21                         | 1               |
| 4026            | Gear Z=32                         | 1               |
| 4027-0          | Locating bush for interlock lever | 1               |
| 4027-1          | Interlock Lever                   | 1               |
| 4028            | Spring                            | 1               |
| 4029            | Lock nut for feed selection lever | 2               |
| 4030            | Feed selecting lever              | 1               |

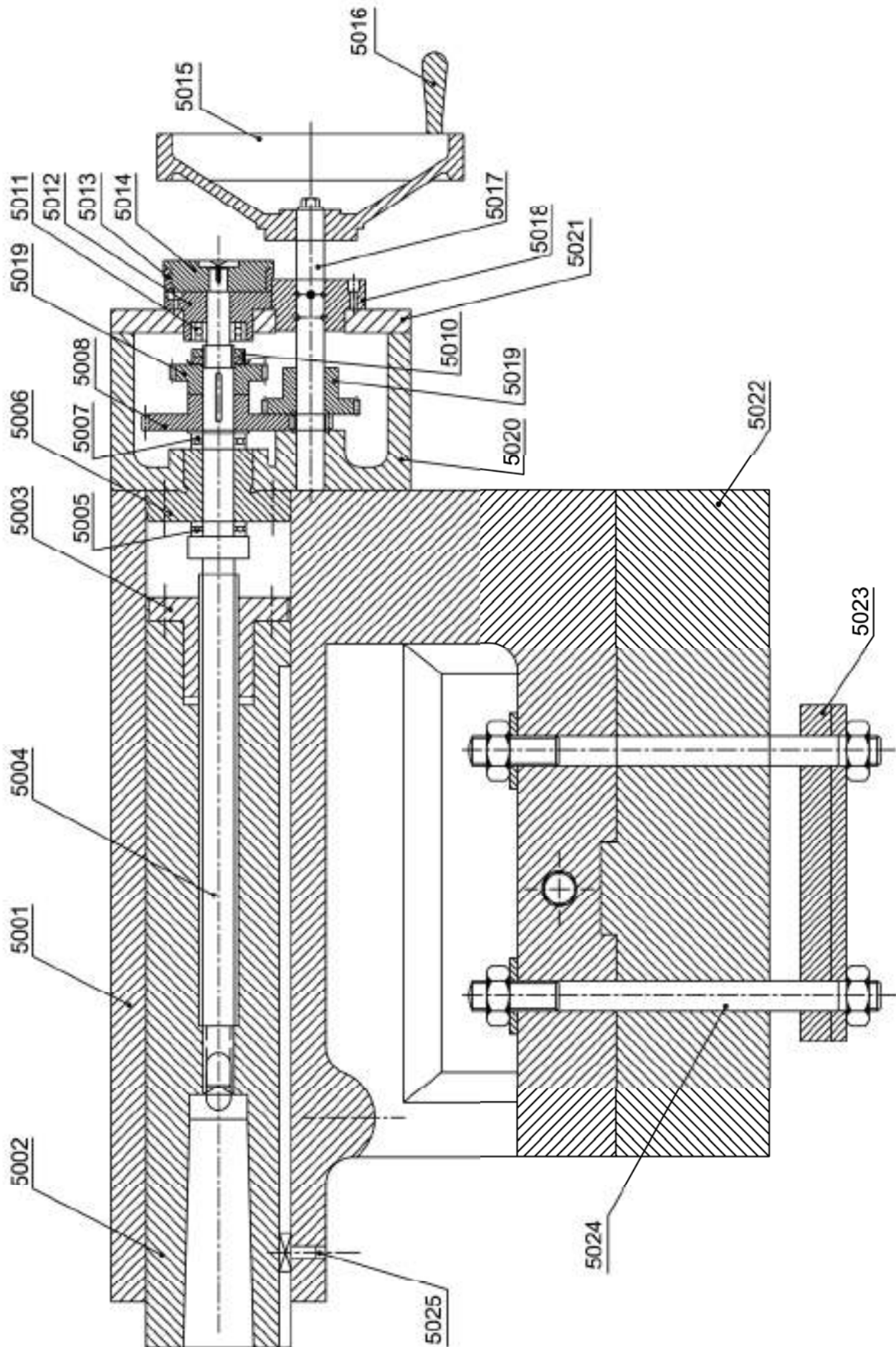


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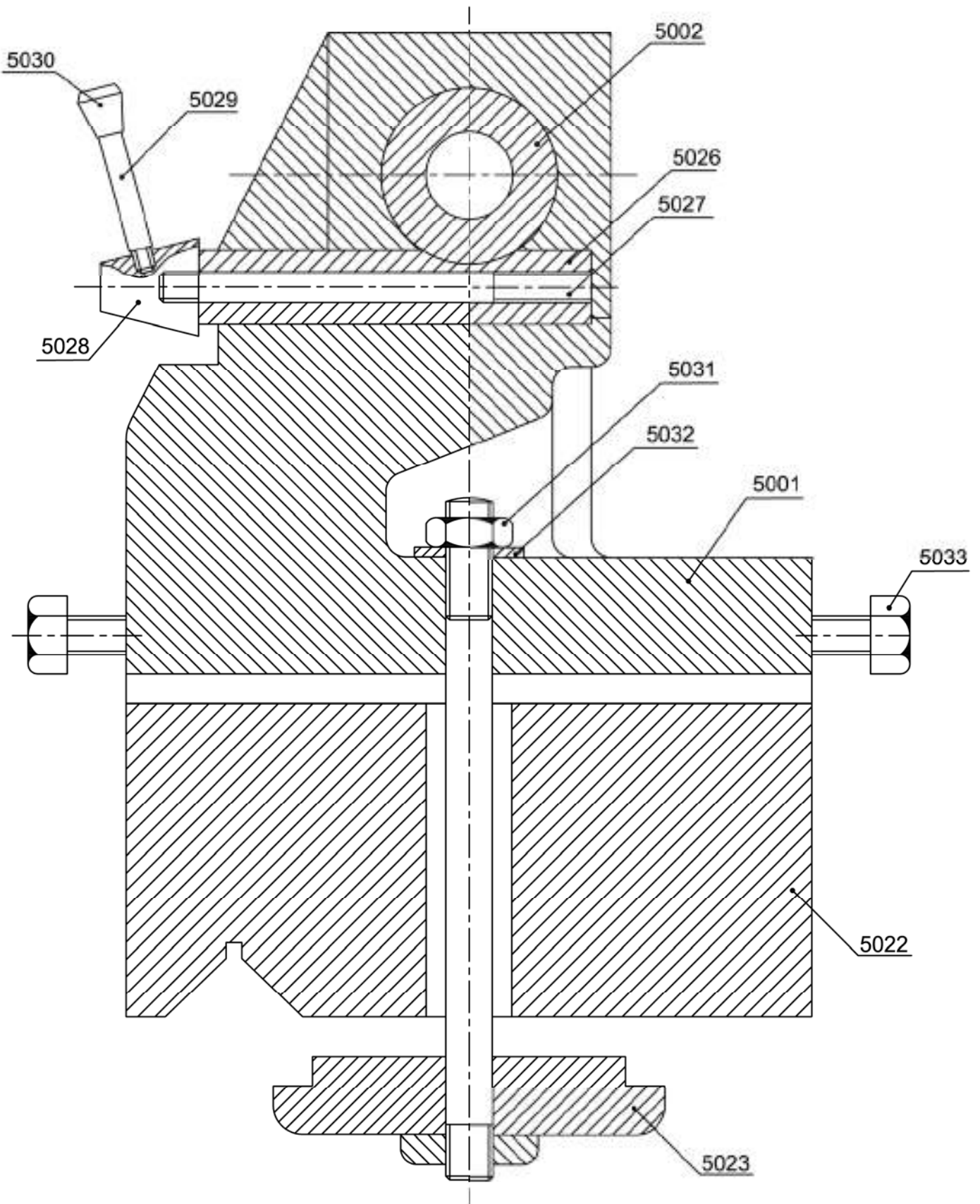
**MODEL****5610****PAGE NO.****72**

## 5.5 APRON ASSEMBLY

| Part No. | Part Name                       | Quantity |
|----------|---------------------------------|----------|
| 4031     | Locating pin                    | 1        |
| 4032     | Handle for feed selection lever | 1        |
| 4033     | 15 Teeth gear shaft for rake    | 1        |
| 4034     | Gear Z = 63                     | 1        |
| 4035     | Hand wheel gear shaft Z = 12    | 1        |
| 4036     | Hand wheel                      | 1        |
| 4037     | Handle                          | 1        |
| 4038     | Micro ring                      | 1        |
| 4039     | Claw bush male                  | 1        |
| 4040     | Claw bush female                | 1        |
| 4041     | Boss for hand wheel             | 1        |
| 4042     | Bush for hand wheel             | 1        |
| 4043     | Dial indicator bracket          | 1        |
| 4044-0   | Dial indicator                  | 1        |
| 4044-1   | Dial Indicator Pin              | 1        |
| 4045     | Gear for dial indicator         | 1        |
| 4046     | Sprocket wheel                  | 1        |
| 4047     | Sprocket wheel                  | 1        |
| 4048     | Guide bush                      | 1        |
| 4049     | Main shaft                      | 1        |
| 4050     | Worm gear Z = 29                | 1        |
| 4051     | Gear box                        | 1        |
| 4052     | Claw bush fixed                 | 1        |
| 4053     | Claw bush sliding               | 1        |
| 4054     | G.M. bush                       | 1        |
| 4055     | Rapid operating lever           | 1        |
| 4056     | End cover                       | 2        |
| 4057     | Worm guide pin                  | 1        |
| 4058     | Bearing                         | 2        |
| 4059     | Worm                            | 1        |
| 4060     | Flange mounted motor            | 1        |



**TAIL STOCK ASSEMBLY**



**TAIL STOCK ASSEMBLY**



# PANTHER

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## 5.6 TAIL STOCK ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>                         | <b>Quantity</b> |
|-----------------|--|-----------------|
| 5001            | Tail stock body                          | 1               |
| 5002            | Tail stock spindle                       | 1               |
| 5003            | Tail stock screw nut                     | 1               |
| 5004            | Tail stock screw                         | 1               |
| 5005            | Thrust bearing (no. 51104)               | 1               |
| 5006            | Locating plug for gear box               | 1               |
| 5007            | Thrust bearing (no. 51104)               | 1               |
| 5008            | Gear Z – 48                              | 1               |
| 5009            | Gear Z – 30                              | 1               |
| 5010            | Chuck nut                                | 2               |
| 5011            | Ball bearing (no. 6202)                  | 1               |
| 5012            | Locating plug for ball bearing           | 1               |
| 5013            | Micro ring                               | 1               |
| 5014            | Micro ring boss                          | 1               |
| 5015            | Tail stock hand wheel                    | 1               |
| 5016            | Plastic handle grip with stud            | 1               |
| 5017            | Hand wheel shaft gear Z - 12             | 1               |
| 5018            | Locating bush for hand wheel shaft       | 1               |
| 5019            | Gear Z – 30                              | 1               |
| 5020            | Dual speed gear box for tail stock       | 1               |
| 5021            | Dual speed gear box cover                | 1               |
| 5022            | Tail stock base                          | 1               |
| 5023            | Tail stock clamping plate                | 1               |
| 5024            | Tail stock clamping stud                 | 2               |
| 5025            | Key for tail stock spindle               | 1               |
| 5026            | Tail stock spindle locking bush          | 1               |
| 5027            | Tail stock spindle locking stud          | 1               |
| 5028            | Boss for tail stock spindle locking stud | 1               |
| 5029            | Handle for boss                          | 1               |
| 5030            | Knob                                     | 1               |
| 5031            | Nut for tail stock clamping stud         | 1               |
| 5032            | Washer for tail stock clamping stud      | 1               |
| 5033            | Tail stock setting bolts                 | 2               |



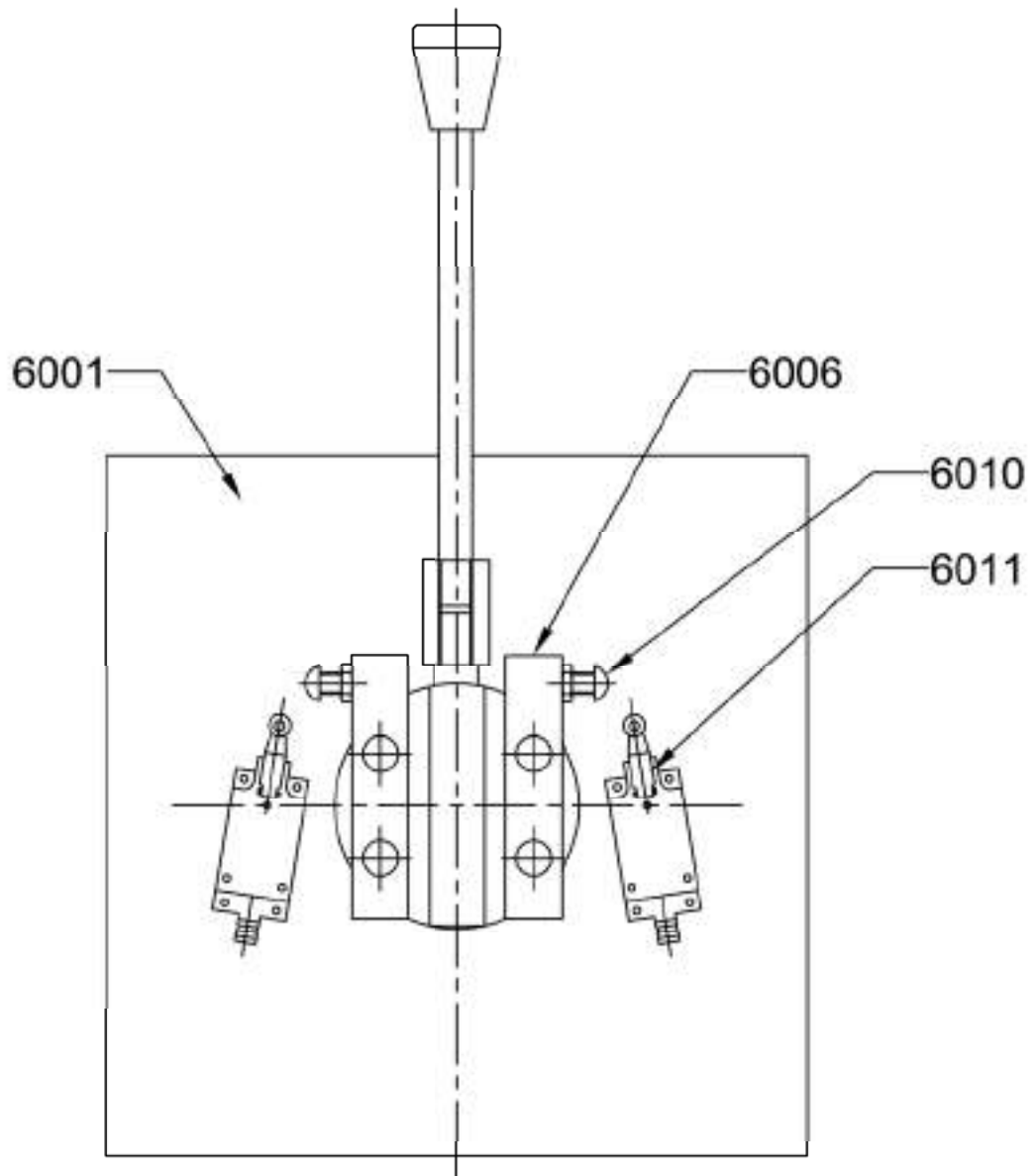


# PANTHER

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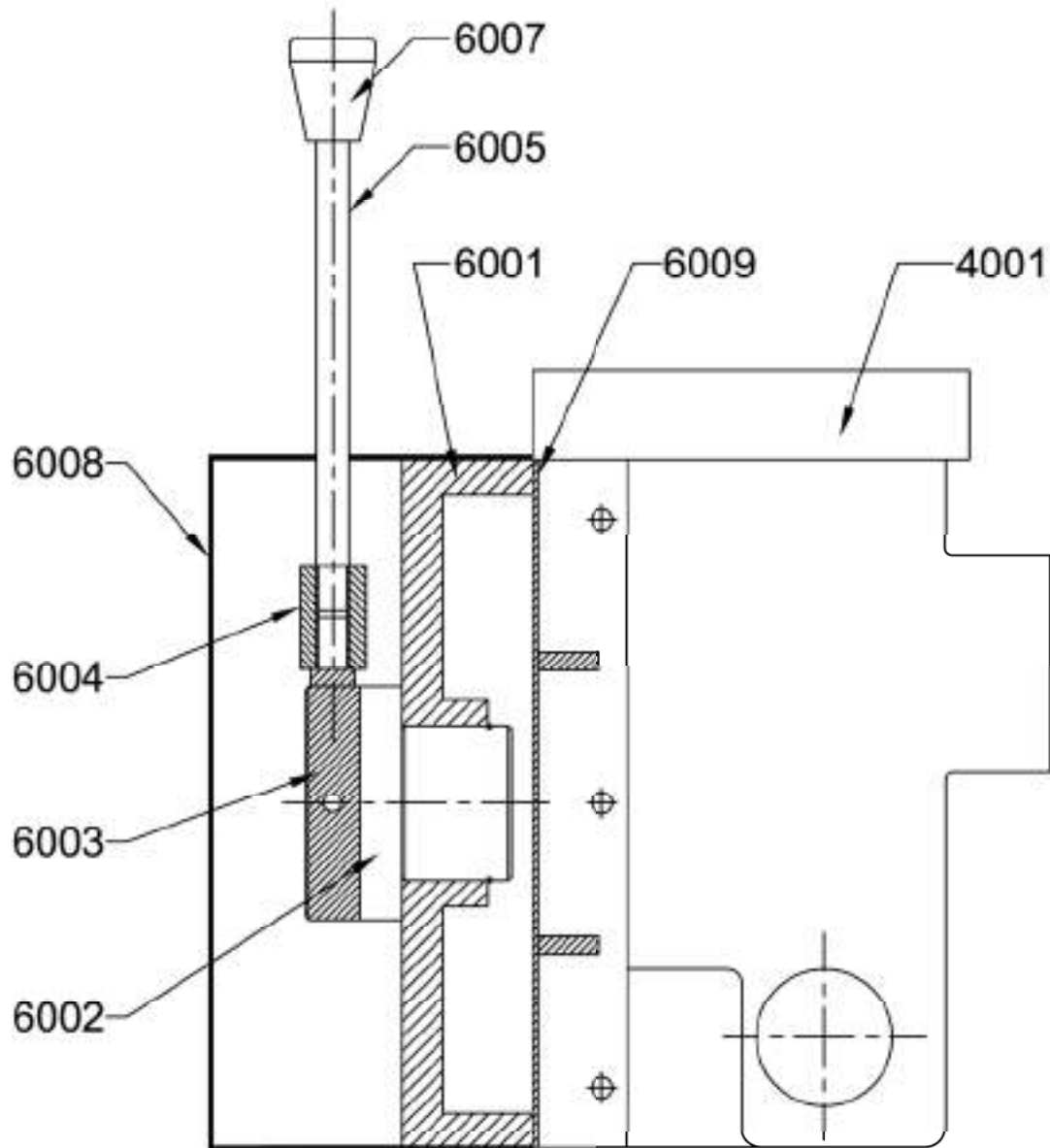
## 5.7 EXTRA ACCESSORIES

| <b>Part No.</b> | <b>Part Name</b>                               |
|-----------------|--|
| X001            | Face plate                                     |
| X002            | Steady rest base                               |
| X003            | Steady rest body                               |
| X004            | Steady rest clamp                              |
| X005            | Follow rest                                    |
| X006            | Coolant pump with on/off switch                |
| X007            | Coolant tank                                   |
| X008            | Spout assembly                                 |
| X009            | Machine lamp                                   |
| X010            | Chuck flange                                   |
| X011            | Self centering chuck                           |
| X012            | Dog chuck                                      |
| X013            | Rear splash guard                              |
| X014            | Rear tool post with tool holders               |
| X015            | Revolving center                               |
| X016            | Internal/ external / Combine tool post grinder |
| X017            | Electric motor for tool post grinder           |
| X018            | Quick change tool post with 5 tool holders     |
| X019            | Key way cutting attachment                     |
| X020            | Taper turning attachment                       |
| X021            | Rapid feed attachment for carriage             |





## Rev./For. SWITCH ASSEMBLY





# ***PANTHER***

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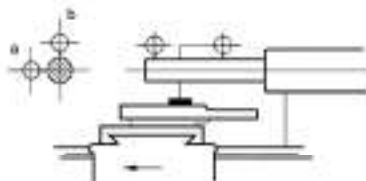
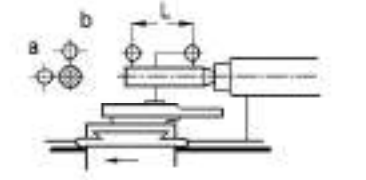
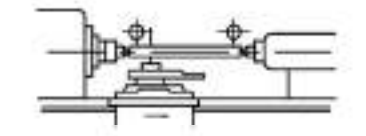
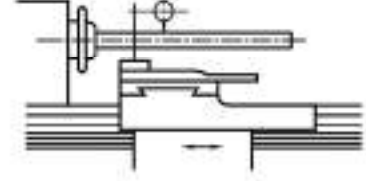
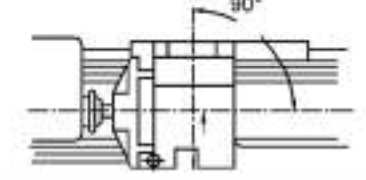
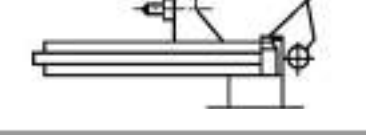
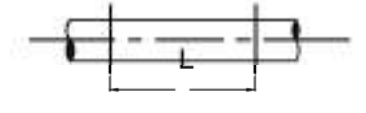
## REV. / FOR. SWITCH ASSEMBLY

| <b>Part No.</b> | <b>Part Name</b>               | <b>Qty.</b> |
|-----------------|--------------------------------|-------------|
| 6001            | Rev. / For. Switch guide plate | 1           |
| 6002            | Rev. / For. Switch plug        | 1           |
| 6003            | Rev. / For. lever              | 1           |
| 6004            | Rev. / For. Switch handle Nut  | 1           |
| 6005            | Rev. / For. Switch stud        | 1           |
| 6006            | Limit switch lever             | 2           |
| 6007            | Knob                           | 1           |
| 6008            | Rev. / For. Switch cover       | 1           |
| 6009            | Rev. / For. Switch bracket     | 1           |
| 6010            | Limit switch operating bolt    | 2           |
| 6011            | Limit switch                   | 2           |


**MODEL: 5610 /**
**MACHINE NO.:** \_\_\_\_\_

| SR. | FIGURE | OBJECTS  | PERMISSIBLE DEVIATIONS  | ACTUAL ERROR |
|-----|--------|--|---|--------------|
| 1   |        | Straightness of carriage slide ways<br>(a) In longitudinal direction<br>(b) In transverse direction.       | 0.05<br>(Convex)<br>0.040                                       |              |
| 2   |        | Straightness of carriage movement in horizontal plane.   | 0.025mm   |              |
| 3   |        | Parallelism of tailstock movement to carriage movement<br>(a) In horizontal plane<br>(b) In vertical plane | 0.040 mm<br>0.040 mm  |              |
| 4   |        | (a) Periodic axial slip<br>(b) Coming of the face plate mounting surface                                   | (a) 0.015mm<br>(b) 0.020mm<br>(including periodic axial slip)   |              |
| 5   |        | Run out or spindle nose  | 0.015 mm  |              |
| 6   |        | True running of taper bore of spindle<br>(a) Near to the spindle<br>(b) At a dist. 300 mm                  | 0.015 mm<br>0.050mm   |              |
| 7   |        | Parallelism of spindle axis to the carriage movement<br>(a) In horizontal plane<br>(b) In vertical plane   | (a) 0.030<br>(towards tool only)<br>(b) 0.040<br>(upwards only) |              |

**MODEL: 5610 /****MACHINE NO. : \_\_\_\_\_**

| SR. | FIGURE  | OBJECTS  | PERMISSIBLE DEVIATIONS  | ACTUAL ERROR |
|-----|---|--|---|--------------|
| 8   |    | Parallelism of external surface of tailstock sleeve to carriage movement<br>(a) In horizontal plane<br>(b) In vertical plane | (a) 0.020<br>(towards tool only)<br>(b) 0.030<br>(upwards only) |              |
| 9   |    | Parallelism of taper bore of tailstock sleeve to carriage movement<br>(a) In horizontal plane<br>(b) In vertical plane       | (a) 0.050<br>(towards tool only)<br>(b) 0.050<br>(upwards only) |              |
| 10  |  | Difference in height between headstock and tailstock centre  | 0.060 mm<br>(Tailstock centre higher than headstock centre)     |              |
| 11  |  | Parallelism of the longitudinal movement of the tool slide to the spindle axis   | 0.040 upwards only  |              |
| 12  |  | Squareness of the transverse movement of the cross slide to spindle axis   | 0.020 mm  |              |
| 13  |  | Axial slip   | 0.020 mm  |              |
| 14  |  | Accuracy of the pitch generated by the lead screw  | (a) 0.040<br>(b) 0.015  |              |

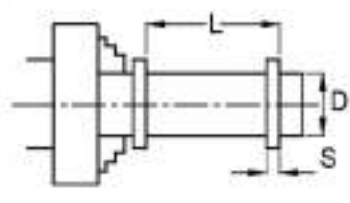
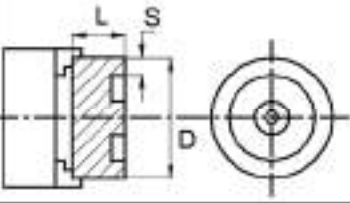
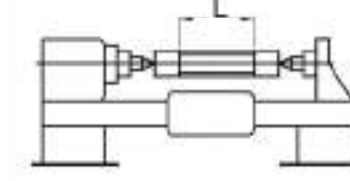


# PANTHER

**MODEL****PAGE NO.****5610****82**

## PRACTICAL TEST

**MODEL: 5610 /****MACHINE NO. : \_\_\_\_\_**

| SR. | FIGURE   | OBJECTS  | PERMISSIBLE DEVIATIONS       | ACTUAL ERROR |
|-----|--|--|------------------------------|--------------|
| 1   |   | Turning of cylindrical test piece held in chuck<br>(a) Roundness<br>(b) Cylindricity                           | (a) 0.020<br>(b) 0.040       |              |
| 2   |   | Facing of cylindrical test piece held in chuck<br>(Flat or Concave only.)                                      | 0.025                        |              |
| 3   |  | Thread cutting a cylindrical test piece<br>(a) Deviation over length or 300<br>(b) Deviation over length of 50 | (a) 0.04 mm<br>(b) 0.015 mm  |              |
| 4   |  | Hardness of lathe bed<br>(a) Standard bed<br>(b) Flame harden bed  | 180 BHN min.<br>300 BHN min. | -----        |

- THE MACHINE CONFIRMS TO GRADE - 1 STANDARD OF ACCURACY AS PRESCRIBED BY D.O. (TOOLS).
- THE TEST CHART USED IS TO IS : 1878 (PART - II) - 1992.

- TESTED BY : \_\_\_\_\_.

- INSPECTION DEPT : \_\_\_\_\_.

For, Gujarat Lathe Mfg. Co. Pvt. Ltd.  
Shapar (Dist. Rajkot)