

PANTHER

ALL GEARED LATHE MACHINE

INSTRUCTION & SPARE PARTS MANUAL

**MODEL: 1350/
1650/**

MACHINE No. :

GUJARAT LATHE MFG. CO. PVT. LTD.

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MODEL – 1350/1650**

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MANUFACTURED BY:

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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.

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.

Note :- All detail given in this manual are general information so detail might be vary from machine to machine.

PACKING SLIP

Machine Model: _____ Machine Specifications: _____

Machine Sr. No.: _____ 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-4	2 Nos.	3	Follow rest	No.
4	Carrier Plate	1 No.	4	Coolant equipments with tank & fittings. Maker <u>Rajamane</u>	No.
5	Instruction Manual	1 No.		H.P.:- <u>0.10</u> Sr. _____	
6	Tool Post Key	1 No.	5	3 Jaw self centering chuck with flange diameter _____	No.
7	Norton gear box	1 No.	6	4 Jaw dog chuck with flange diameter _____	No.
8	Change gears fitted with machine: 50,52,56,82,126	5 Nos.	7	Extra chuck flange	No.
9	Oil can	1 No.	8	Taper turning attachments	No.
10	Screw driver	1 No.	9	Machine lamp with CT	No.
11	Allen keys 4 – 5 – 6 – 8 – 10 mm.	5 No.	10	Rear tool post	No.
12	Fixed spanner: 12 x 13, 16 x 17, 18 x 19,	3 No.	11	Electric control panel	No.
13	Long cross slide	1 No.	12	Foot pedal / Foot brake	No.
14	Electric motor Make _____ H.P. _____ RPM. :- _____ Sr. No. _____	1 No.	13	Rear splash guard	No.
15	V-Belts No. _____	2 No.	14	Revolving center MT-4	No.
16	R \ F switch	1 No.	15	Quick change tool post with tool holders	No.
			16	In./Ext./Combine tool post grinder with/without electric motor	No.
			17	Key way cutting attachment	No.
			18	Feed stopping attachment	No.

Any Other accessories:

Mode of Packing : _____.

Name & Address : _____

Checked By : _____.

It any discrepancy is found with regard to the above accessories. It should be immediately notified to us along with machine serial no.



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SECTION – 1

INTRODUCTION

1.1 Machine specifications.

Descriptions	MODEL			
	1350/1	1350/2	1650/1	1650/2
Type of bed.	Gap bed	Gap bed	Gap bed	Gap bed
Length of bed.	1370 mm	1830 mm	1830 mm	2440 mm
Width of bed.	230 mm	230 mm	265 mm	265 mm
Height of centre.	177 mm	177 mm	215 mm	215 mm
Admit between centers.	540 mm	1000 mm	1000 mm	1500 mm
Swing over bed.	335 mm	335 mm	410 mm	410 mm
Swing over saddle.	245 mm	245 mm	310 mm	310 mm
Swing over cross slide.	200 mm	200 mm	250 mm	250 mm
Swing in gap.	535 mm	535 mm	610 mm	610 mm
Length of gap in front of faceplate.	125 mm	125 mm	125 mm	125 mm
No. of spindle speed.	8/16	8/16	8/16	8/16
Spindle speed range.	45-938/30-1250	45-938/30-1250	45-938/30-1250	45-938/30-1250
Taper in spindle.	MT 4	MT 4	MT 4	MT 4
Spindle hollow.	42 mm	42 mm	42 mm	42 mm
Spindle nose detail.	A2 size 4 or	A2 size 4 or	A2 size 4 or	A2 size 4 or
	D1 size 4	D1 size 4	D1 size 4	D1 size 4
No. of British threads.	65	65	65	65
Range of British threads.	4-60 TPI	4-60 TPI	4-60 TPI	4-60 TPI
No. of Metric threads.	54	54	54	54
Range of Metric threads.	0.35-6 mm	0.35-6 mm	0.35-6 mm	0.35-6 mm
No. of D.P. threads.	44	44	44	44
Range of D.P. threads.	8-140 DP	8-140 DP	8-140 DP	8-140 DP



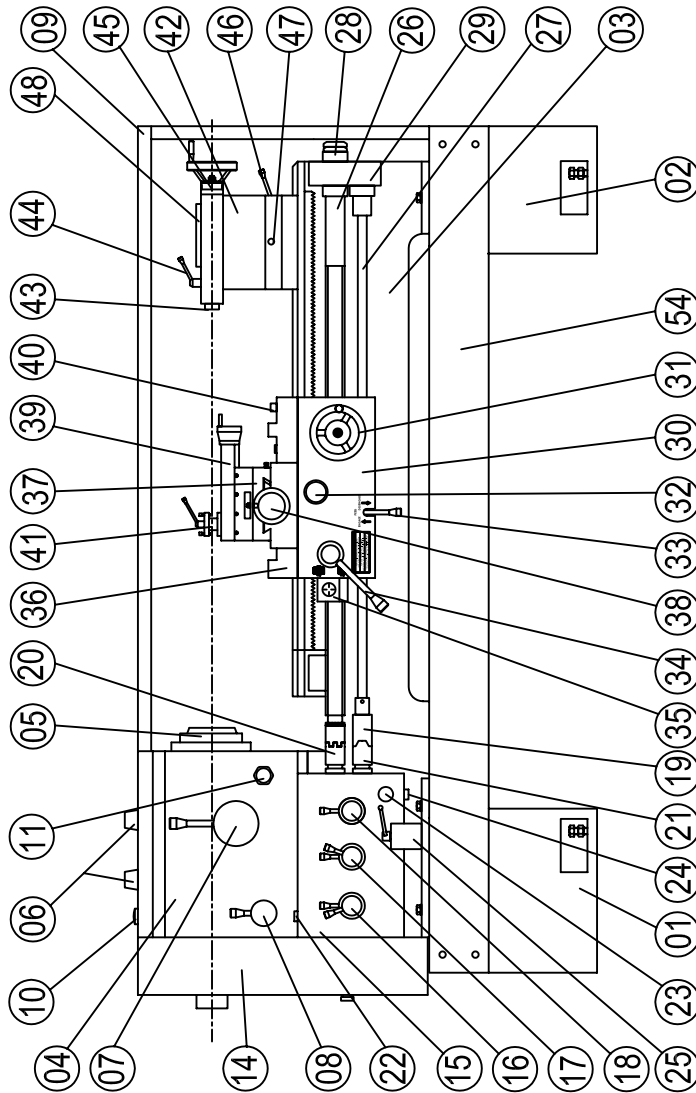
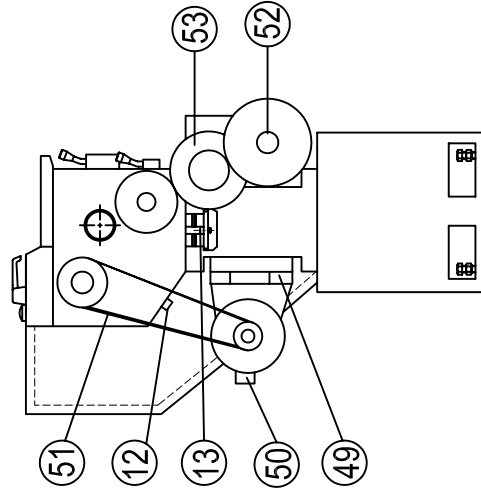
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Descriptions	MODEL			
	1350/1	1350/2	1650/1	1650/2
No. of module threads.	44	44	44	44
Range of module threads.	0.187-3 mod	0.187-3 mod	0.187-3 mod	0.187-3 mod
No. of feeds.	65	65	65	65
Range of long. Feeds.	0.05-0.8 mm/Rev.	0.05-0.8 mm/Rev.	0.05-0.8 mm/Rev.	0.05-0.8 mm/Rev.
Range of Trans. Feeds.	0.03-0.48 mm/Rev.	0.03-0.48 mm/Rev.	0.03-0.48 mm/Rev.	0.03-0.48 mm/Rev.
Lead screw.	Dia. 31.75 4 TPI or 6 mm pitch	Dia. 31.75 4 TPI or 6 mm pitch	Dia. 31.75 4 TPI or 6 mm pitch	Dia. 31.75 4 TPI or 6 mm pitch
Feed shaft.	19 mm	19 mm	19 mm	19 mm
Tall stock quill Dia.	45 mm	45 mm	45 mm	45 mm
Taper in tail stock quill.	MT 4	MT 4	MT 4	MT 4
Cross slide travel.	210 mm	210 mm	250 mm	250 mm
Compound slide travel.	130 mm	130 mm	135 mm	135 mm
Tall stock sleeve travel.	130 mm	130 mm	130 mm	130 mm
Tool shank size.	16×16 mm	16×16 mm	16×16 mm	16×16 mm
Motor HP/KW.	2 / 1.5	2 / 1.5	3 / 2.2	3 / 2.2
Motor RPM.	1440	1440	1440	1440
Rated Amp.	3.5 A	3.5 A	5 A	5 A
Class of insulation.	E	E	E	E
Duty type.	S 1	S 1	S 1	S 1
Net weight. (Approx.)	950 Kg.	1100 Kg.	1250 Kg.	1350 Kg.
Gross weight. (Approx.)	1000 Kg.	1150 Kg.	1400 Kg.	1550 Kg.
Floor space occupied. (Approx.)	2350 x 1100 mm	2800 x 1100 mm	2800 x 1150 mm	3350x1150 mm



1 : 2 LEGEND





1.2 Legend.

- (01) Pedestal (Head stock side)
- (02) Pedestal (Tail stock side)
- (03) Bed.
- (04) Head Stock.
- (05) Spindle.
- (06) Speed changing levers.
- (07) High-low speed lever.
- (08) Feed direction change lever.
- (09) Splash guard.
- (10) Oil filling plug.
- (11) Oil sight glass.
- (12) Oil drain plug.
- (13) Head stock setting bolt.
- (14) Change gear cover.
- (15) Feed box. (Norton gearbox).
- (16) Feed selecting levers.
- (17) Feed selecting levers.
- (18) Feed selecting levers.
- (19) Feed clutch-setting collar.
- (20) Lead screw push-pull clutch.
- (21) Feed safety clutch.
- (22) Oil filling plug.
- (23) Oil sight glass.
- (24) Oil drain plug.
- (25) Reverse forward switch (optional).
- (26) Lead screw.
- (27) Feed shaft.
- (28) Lead screw check nut.
- (29) Off end bracket.
- (30) Apron.



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- (31) Longitudinal hand feed wheel.
- (32) Feed selecting knob.
- (33) Feed engaging lever.
- (34) Half nut engaging lever.
- (35) Thread dial indicator.
- (36) Carriage.
- (37) Surface slide.
- (38) Transverse hand feed wheel.
- (39) Compound slide.
- (40) Carriage lock bolt.
- (41) Tool post.
- (42) Tail stock.
- (43) Tail stock spindle.
- (44) Tail stock spindle locking lever.
- (45) Tail stock spindle wheel.
- (46) Tail stock clamping lever.
- (47) Tail stock setting bolt.
- (48) Tool tray.
- (49) Motor Rail.
- (50) Electric motor.
- (51) V Belt.
- (52) Arm plate.
- (53) Change gears.
- (54) Chip tray.



Fig. No. (1.2) is of four different types of machine constructions. Depending upon your and machine specification suitable figure is put in this manual with this part list and part list is common for all four type of machine constructions, so it may happen that this figure may or may not indicate all items of this part list.

1.3 List of Accessories.

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

- (01) Harden guide ways of lathe bed.(In built)
- (02) Electric motor.
- (03) Reverse forward switch.
- (04) V belts.
- (05) Carrier plate.
- (06) Centre adapter.
- (07) Dead centre – MT – 4, Qty:- 2nos.
- (08) Tool post bolt key.
- (09) Change gears for inch/mm threading. (For 4 TPI lead screw).
- (10) Oil can.
- (11) Screw driver.
- (12) Allen keys - 5 no.
- (13) Fixed spanner - 2 no.
- (14) Shear keys - 2 no.



1.3.2 Optional Accessories (To be order along with machine).

- (01) 16 spindle speed with speed selector switch and Reverse Forward switch.
- (02) 8 spindle speed with foot pedal, control panel and starting third shaft.
- (03) 16 spindle speed with foot pedal, control panel and starting third shaft.
- (04) 8 spindle speeds with foot brake, control panel and starting third shaft only with A2 size 4 or DI size 4 cam lock spindles.
- (05) 16 spindle speed with foot brake, control panel and starting third shaft only with A2 size 4 or DI size 4 cam lock spindle.
- (06) 6 mm pitch lead screw in lieu of 4 TPI lead screw.
- (07) Electric coolant pumps with tank and fittings.
- (08) Rear tool post with tool holders.
- (09) Taper turning attachment.
- (10) Rear splash guard.
- (11) Hydro copying attachment.
- (12) Drift type tail stock spindle.
- (13) Hydraulic operated centre.
- (14) Rake operated centre.
- (15) Lever operated cullet adaptor with collets.

1.3.3 Optional Accessories (Retro fitting possible).

- (01) Face plate Dia. 340 mm.
- (02) Steady rest max Dia. 100 mm pad type.
- (03) Follow rest max Dia. 70 mm pad type.
- (04) Chuck flange Std / A2 size 4 / DI size 4 cam lock.
- (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) Three jaw self centre chucks.
- (10) Four jaw dog chuck.
- (11) Revolving centre.



- (12) Module / DP change gears.
- (13) Dead stop for carriage.
- (14) Micrometer carriage stops.
- (15) Five position carriage stop.
- (16) Tool tray.
- (17) Snap tap threading attached.
- (18) Digital read out.

1.4 Charts.

1.4.1 Speed chart for 8 spindle speed.

RPM	Front Lever	Top Lever
45	A	1
60	A	2
93	A	3
145	A	4
288	B	1
384	B	2
598	B	3
938	B	4

1.4.2 Speed chart for 16 spindle speeds.

RPM		Front lever	Top lever
I	II		
30	60	A	1
40	80	A	2
62	124	A	3
96	192	A	4
192	384	B	1
256	572	B	2
398	796	B	3
625	1250	B	4



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1.4.3 Thread chart for machine having 4 TPI pitch lead screw

1.4.3.1 Thread chart for inch and metric threading

 PANTHER	BRITISH					METRIC				
	LEV.	AD	AC	BD	BC	LEV.	AD	AC	BD	BC
GEARS 56  82  126 	TE 4	---	5.25	10.5	21	MG 1	3	1.5	0.75	0.375
	TF 3	4	8	16	32	MG 1	3.75	1.875	0.937	0.468
	TF 4	4.5	9	18	36	MG 4	4	2	1	0.5
	TG 3	5	10	20	40	MG 3	4.5	2.25	1.125	0.562
	TG 4	5.625	11.25	22.5	45	MF 4	5	2.5	1.25	0.625
	TF 1	6	12	24	48	MF 3	5.6	2.8	1.4	0.7
	TF 2	6.5	13	26	52	ME 1	6.4	3.2	1.6	0.8
	TG 1	7.5	15	30	60					
52  82  126 	MF 4	5.5	11	22	44	MG 1	2.8	1.4	0.7	0.35
	TF 2	7	14	28	56	MF 2	3.25	1.625	0.812	0.406
	TG 2	8.75	17.5	35	70	MF 1	3.5	1.75	0.875	0.437
						TG 3	4.75	2.375	1.187	0.593
						ME 2	5.5	2.75	1.375	0.687
50  126  82 	ME 1	---	5.75	11.5	23	MG 2	3.8	1.9	0.95	0.475
	ME 2	---	6.25	12.5	25	TG 4	6.2	3.1	1.55	0.775
	MG 3	4.125	8.25	16.5	33					
	TF 1	4.375	8.75	17.5	35					
	MG 4	4.625	9.25	18.5	37					
	TF 2	4.75	9.5	19	38					
FEED MM/REV	LONG FEED = $\frac{3.175}{\text{TPI}}$ OR $\frac{\text{MM PITCH}}{8}$					TRANS.FEED = $\frac{1.9}{\text{TPI}}$ OR $\frac{\text{MM PITCH}}{13.33}$				



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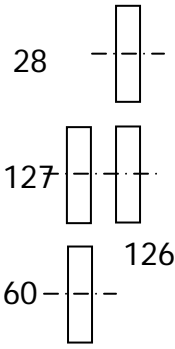
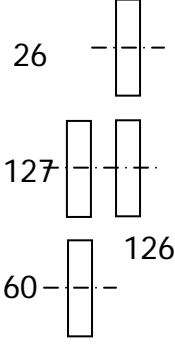
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1.4.3 Thread chart for machine having 6 mm pitch lead screw


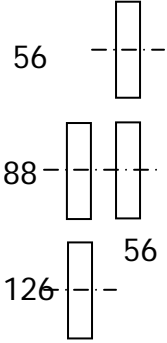
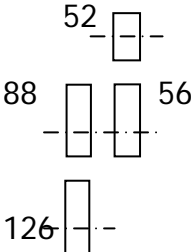
1.4.3.1 Thread chart for inch and metric threading

 PANTHER	BRITISH					METRIC				
	LEV.	AD	AC	BD	BC	LEV.	AD	AC	BD	BC
	TF 3	4	8	16	32	MG 1	3	1.5	0.75	0.375
	TF 4	4.5	9	18	36	MF 1	3.75	1.875	0.937	0.468
	TG 3	5	10	20	40	MG 4	4	2	1	0.5
	TF 1	6	12	24	48	TF 1	4.25	2.125	1.062	0.531
	TF 2	6.5	13	26	52	MG 3	4.5	2.25	1.125	0.562
	MF 1	6.75	13.5	27	54	MF 4	5	2.5	1.25	0.625
	TG 1	7.5	15	30	60					
	ME 1	4.25	8.5	17	34	MF 2	3.25	1.625	0.812	0.406
	MF 4	5.5	11	22	44	MF 1	3.5	1.75	0.875	0.437
	TF 2	7	14	28	56	TG 3	4.75	2.375	1.187	0.593
	TG 2	8.75	17.5	35	70	ME 2	5.5	2.75	1.375	0.687
						ME 1	6	3	1.5	0.75
FEED MM/REV	LONG FEED = $\frac{3.175}{\text{TPI}}$ OR $\frac{\text{MM PITCH}}{8}$					TRANS.FEED = $\frac{1.9}{\text{TPI}}$ OR $\frac{\text{MM PITCH}}{13.33}$				



1.4.3 Thread chart for machine having 4 TPI pitch lead screw


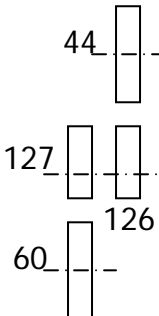
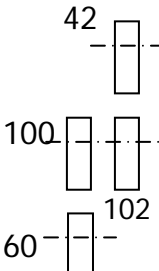
1.4.3.1 Thread chart for DP and Module threading

 PANTHER	DP THREAD					MODULE				
	LEV.	AD	AC	BD	BC	LEV.	AD	AC	BD	BC
	TF 3	8	16	32	64	MF 4	2.5	1.25	0.625	0.312
	TF 4	9	18	36	72	MG 3	2.25	1.125	0.562	0.281
	TG 3	10	20	40	80	TF 1	2.125	1.062	0.531	0.265
	TF 1	12	24	48	96	MG 4	2	1	0.5	0.25
	TF 2	13	26	52	104	MF 1	1.875	0.937	0.468	0.234
	MF 1	13.5	27	54	108	MG 1	1.5	0.75	0.375	0.187
	TG 1	15	30	60	120					
	ME 1	8.5	17	34	68	ME 1	3	1.5	0.75	0.375
	MF 4	11	22	44	88	ME 2	2.75	1.375	0.687	0.343
	TF 2	14	28	56	112	TG 3	2.375	1.187	0.593	0.296
	TG 2	17.5	35	70	140	MF 1	1.75	0.875	0.437	0.218
						MF 2	1.625	0.812	0.406	0.203



1.4.3 Thread chart for machine having 6 mm pitch lead screw

1.4.3.1 Thread chart for DP and Module threading

 PANTHER	DP THREAD					MODULE				
	LEV.	AD	AC	BD	BC	LEV.	AD	AC	BD	BC
	TF 3	8	16	32	64	MF 4	2.5	1.25	0.625	0.312
	TF 4	9	18	36	72	MG 3	2.25	1.125	0.562	0.281
	TG 3	10	20	40	80	TF 1	2.125	1.062	0.531	0.265
	TF 1	12	24	48	96	MG 4	2	1	0.5	0.25
	TF 2	13	26	52	104	MF 1	1.875	0.937	0.468	0.234
	MF 1	13.5	27	54	108	MG 1	1.5	0.75	0.375	0.187
	TG 1	15	30	60	120					
	ME 1	8.5	17	34	68	ME 1	3	1.5	0.75	0.375
	MF 4	11	22	44	88	ME 2	2.75	1.375	0.687	0.343
	TF 2	14	28	56	112	TG 3	2.375	1.187	0.593	0.296
	TG 2	17.5	35	70	140	MF 1	1.75	0.875	0.437	0.218
						MF 2	1.625	0.812	0.406	0.203



1.5 List of change gears (14 DP) required for.

1.5.1 Machine having 4 TPI lead screw.

- (A) For British & Metric threading 50-52-56-82-126
(B) For DP & Module threading 52-56-56-88-126

1.5.2 Machine having 6 mm pitch lead screw

- (A) For British & Metric thread 26-28-60-126-127
(B) For DP & Module thread 42-44-60-100-102-126-127

1.6 Lubrication Charts.

Sr. No.	Company	Head stock Feed box	Guide ways Lead screw Tail stock Apron
1	HPCL	PARTHAN EP 220	WAYLUB 220
2	BPCL	MAK AMOCAM 220	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



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, when ever 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 ease of machine with ease 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 recommended 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.



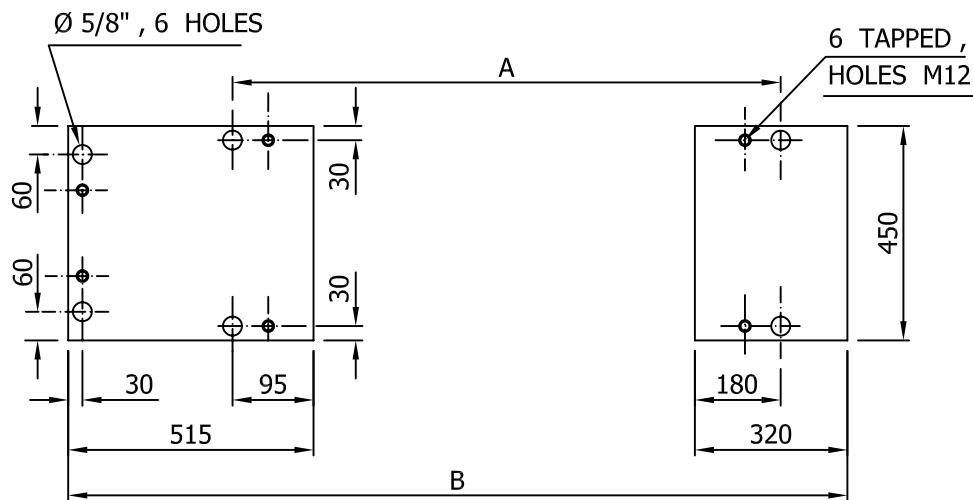
PANTHER

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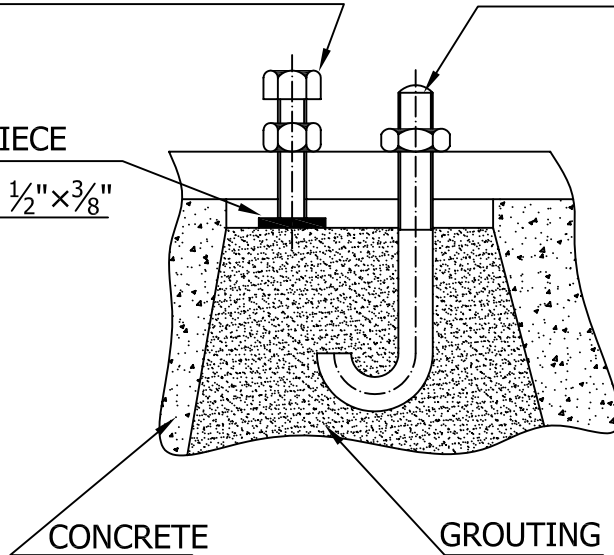
17 B



6 NOS M12 × 60 mm. LONG
LEVELING SET SCREW

6 NOS M12 × 210mm LONG

SET PIECE
 $1 \frac{1}{2}'' \times 1 \frac{1}{2}'' \times \frac{3}{8}''$



MODEL	A	B
1350/1	1020	1580
1350/2	1480	2040
1650/1	1480	2040
1650/2	2090	2650



2.4 Leveling

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

- Keep the precision level on cross slide to 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.
- 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 cross 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 checks the transverse level.

After proper leveling of machine, run machine for about 2 hours at various speeds 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.



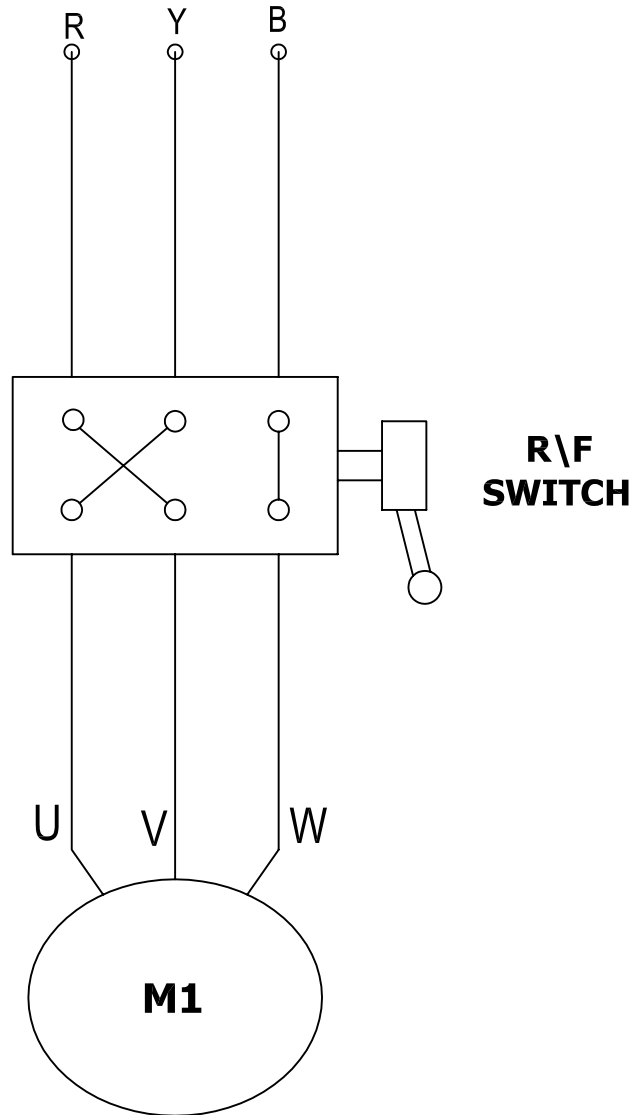
PANTHER

MODEL

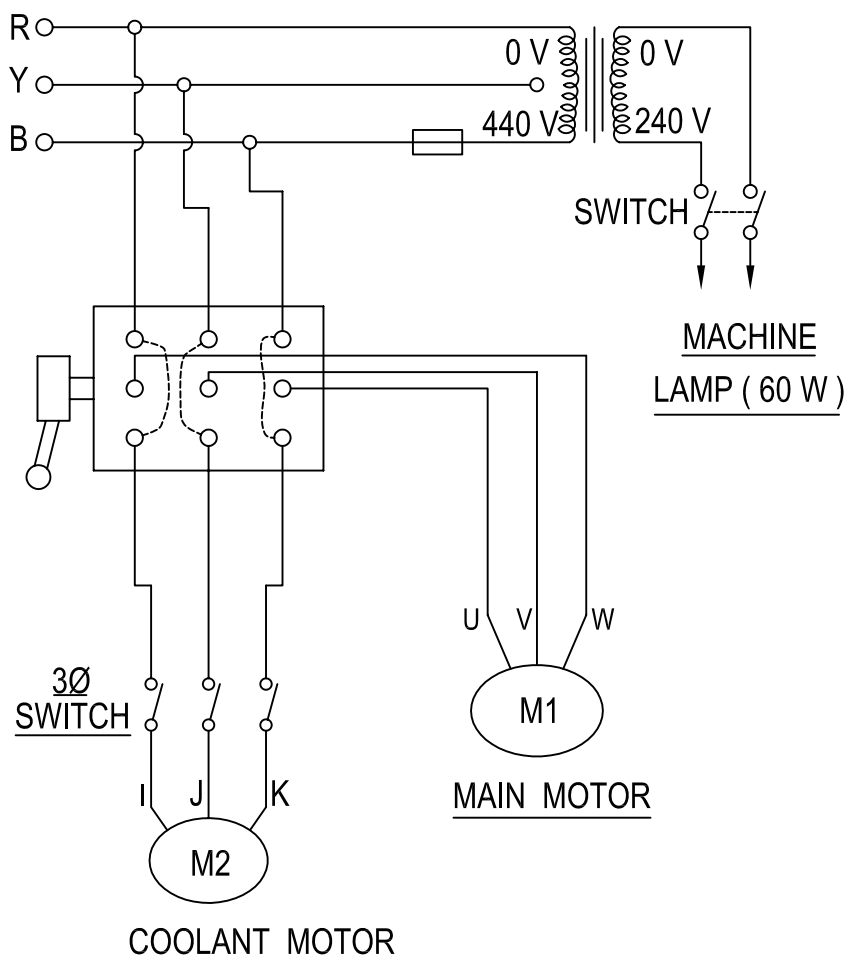
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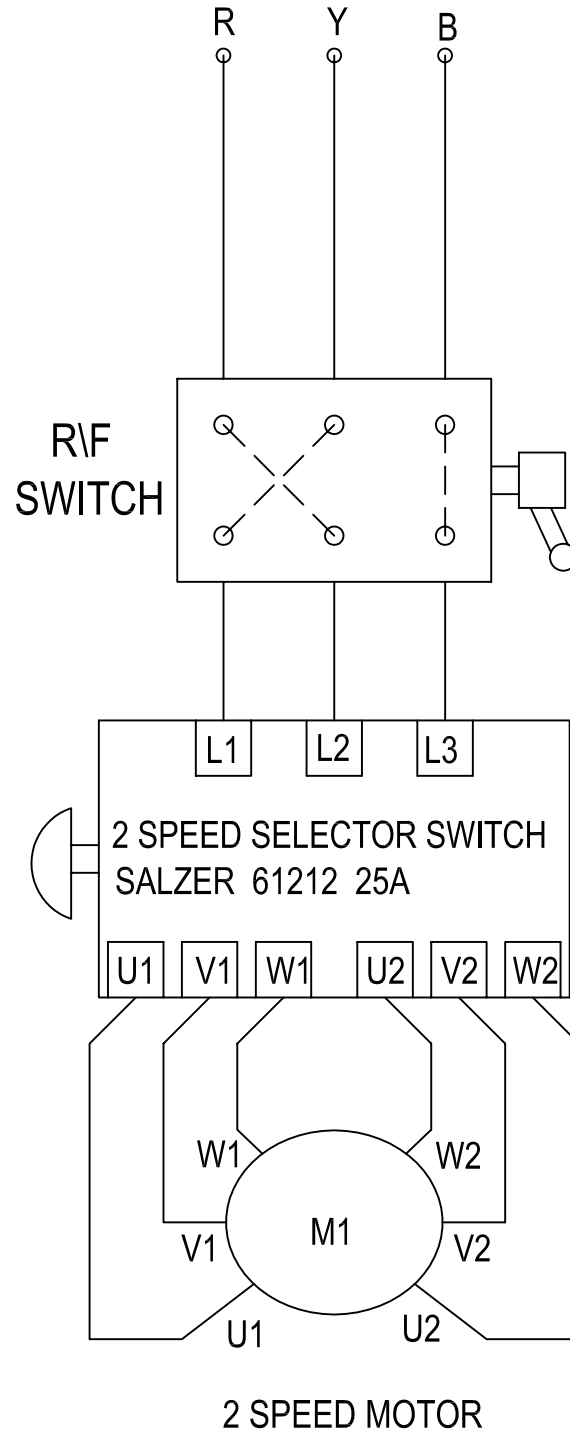
19A



R\F ONLY



R\F + COOLANT + M\C LAMP WITH CONTROL TRANSFORMER



SPEED SELECTOR + R\F



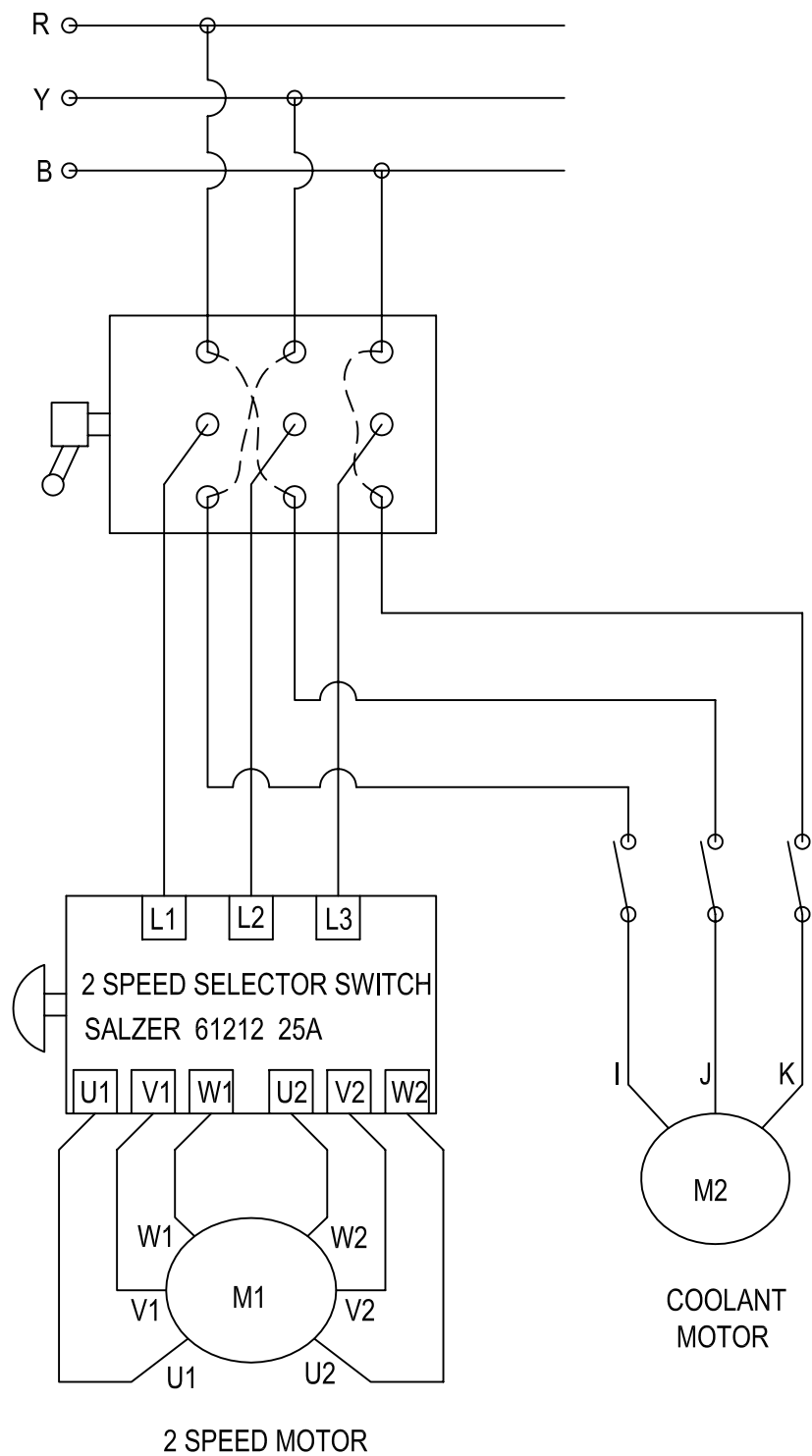
PANTHER

MODEL

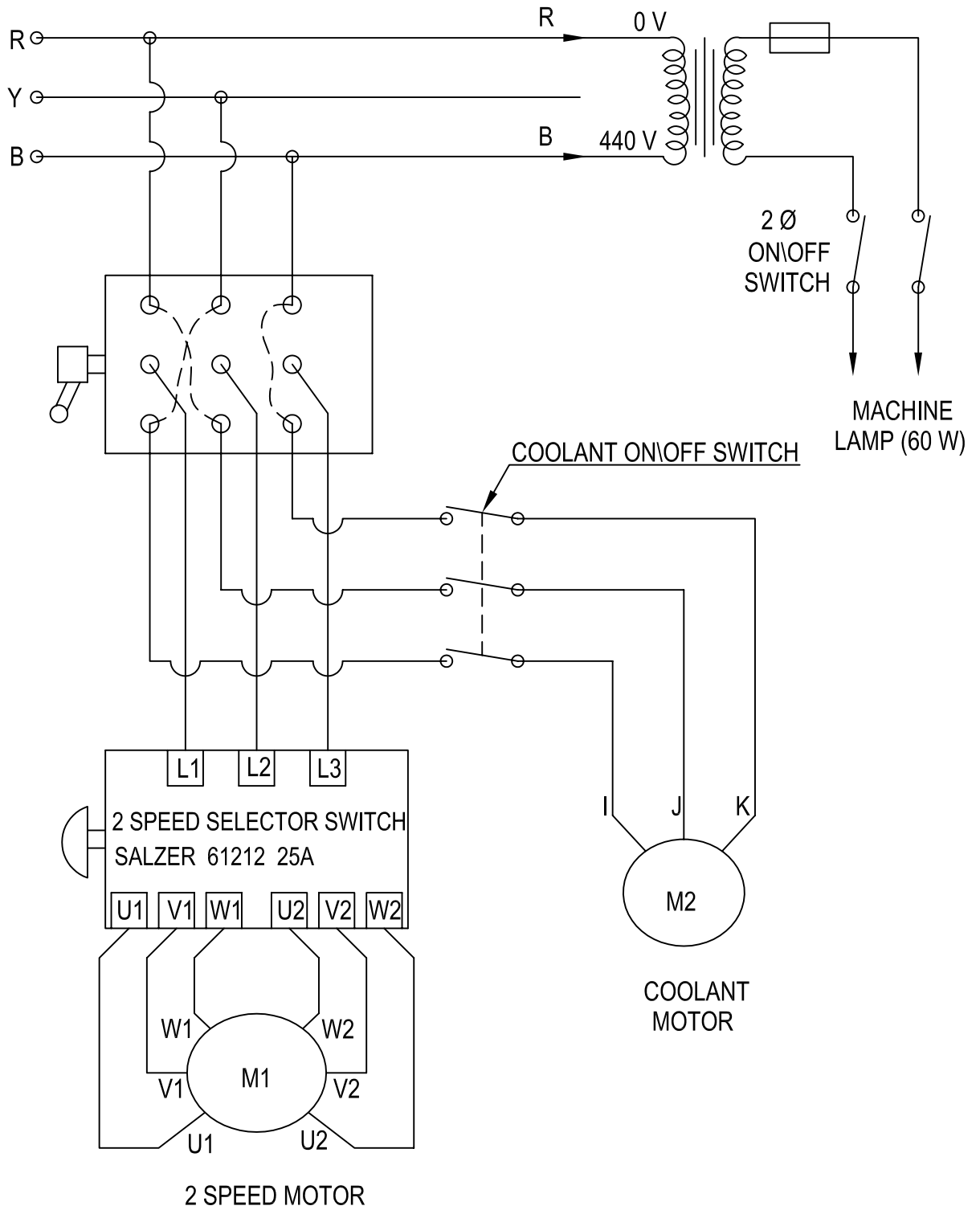
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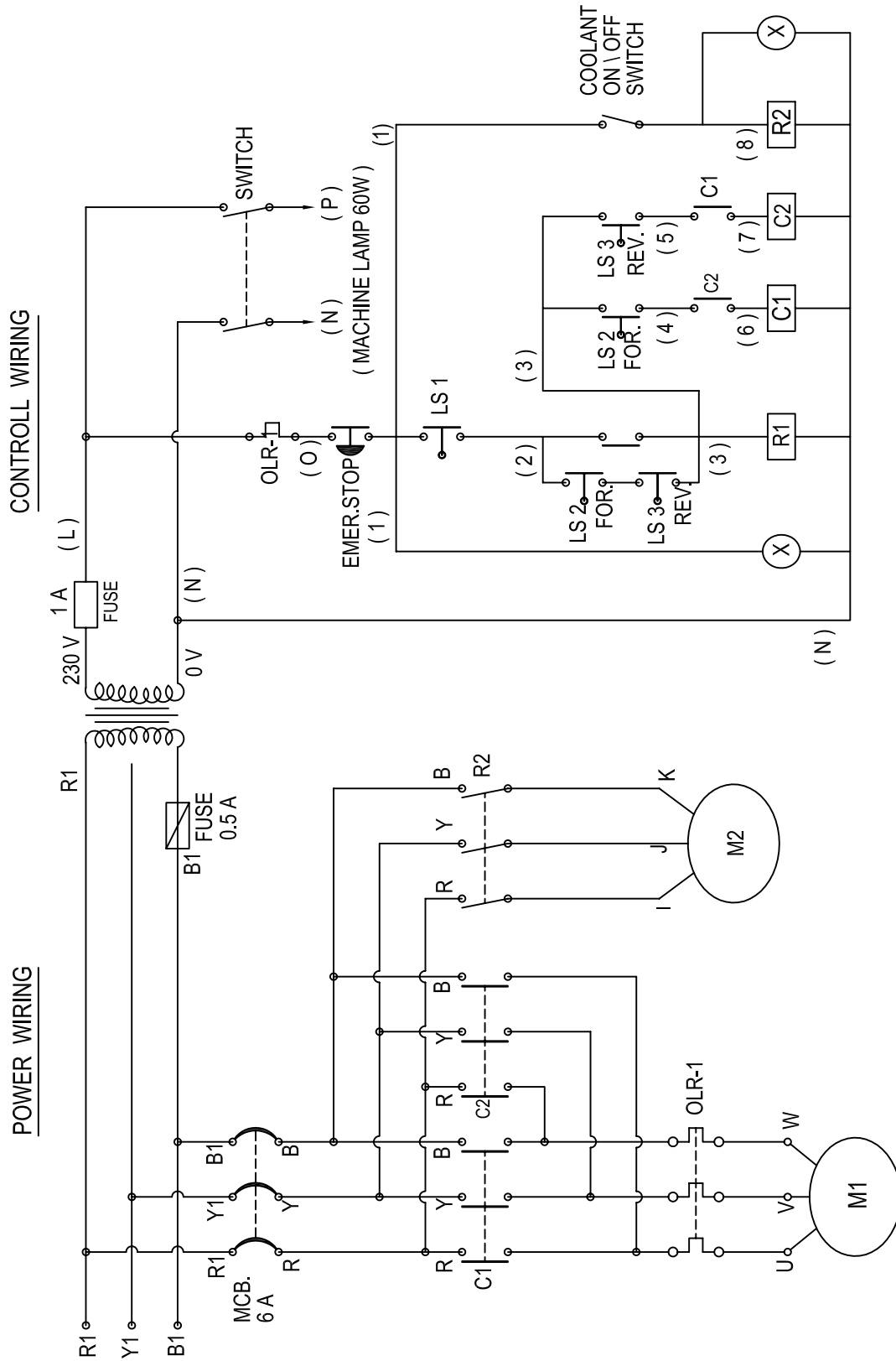
19 D



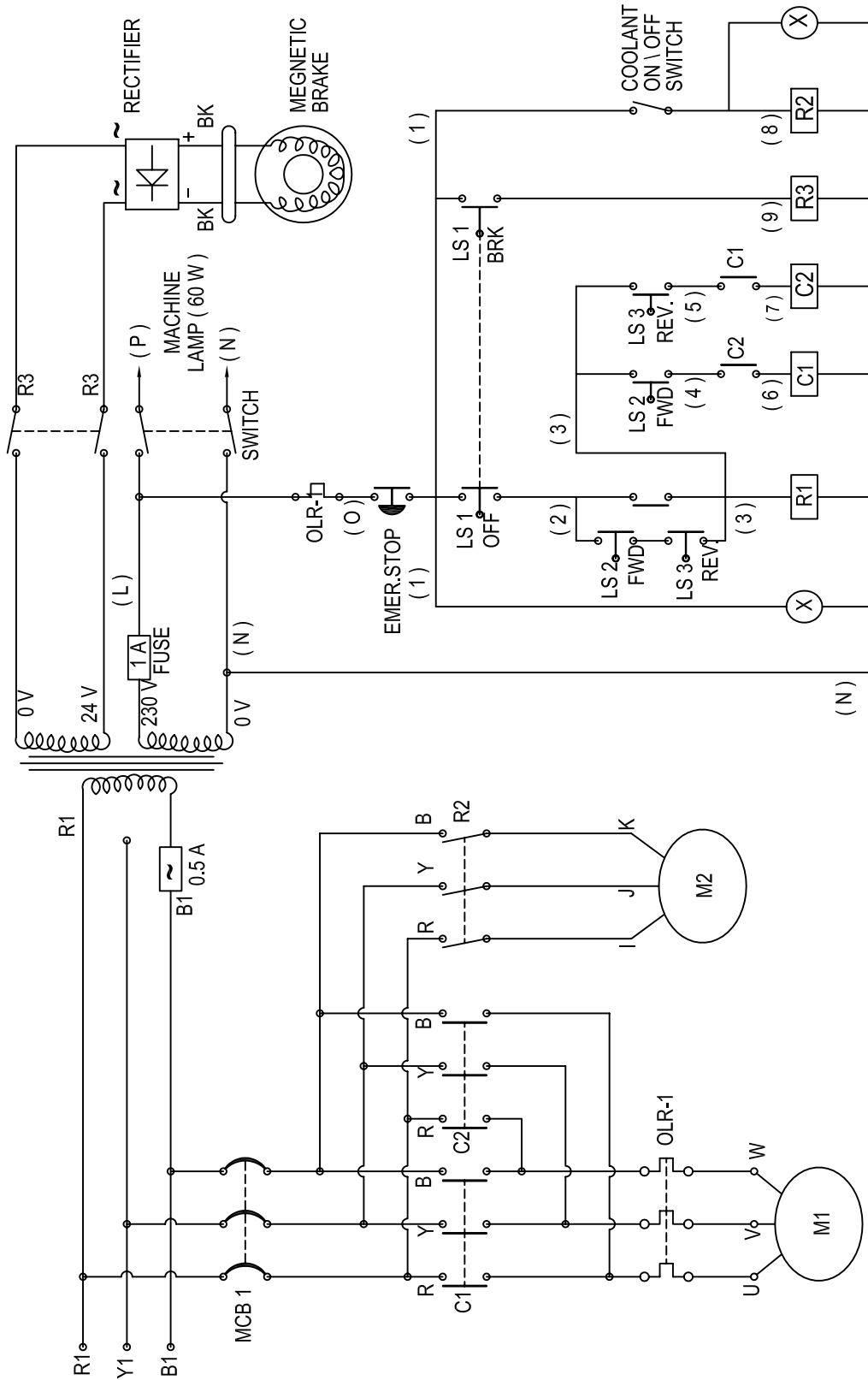
R\F + SPEED SELECTOR + COOLANT



SPEED SELECTOR + R/F + COOLANT + MACHINE LAMP



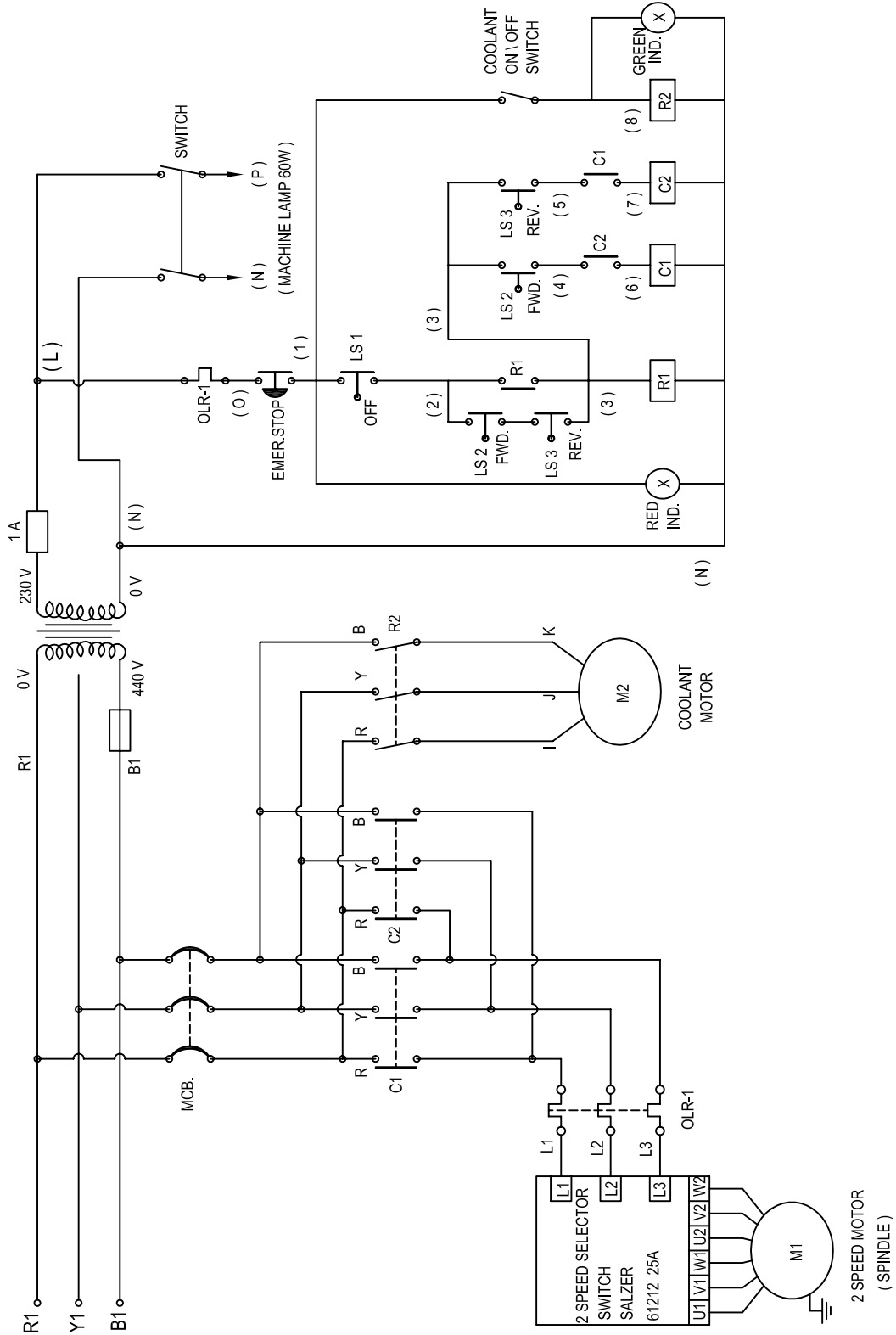
SINGLE SPEED 3rd SHAFT



SINGLE SPEED 3rd SHAFT - WITH BRAKE



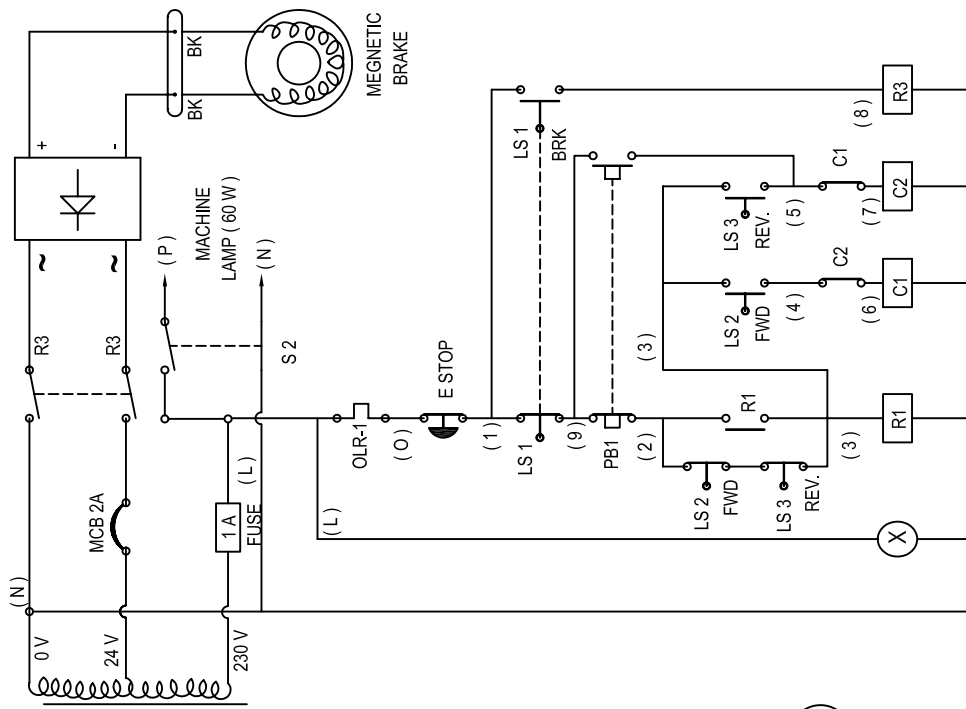
POWER WIRING



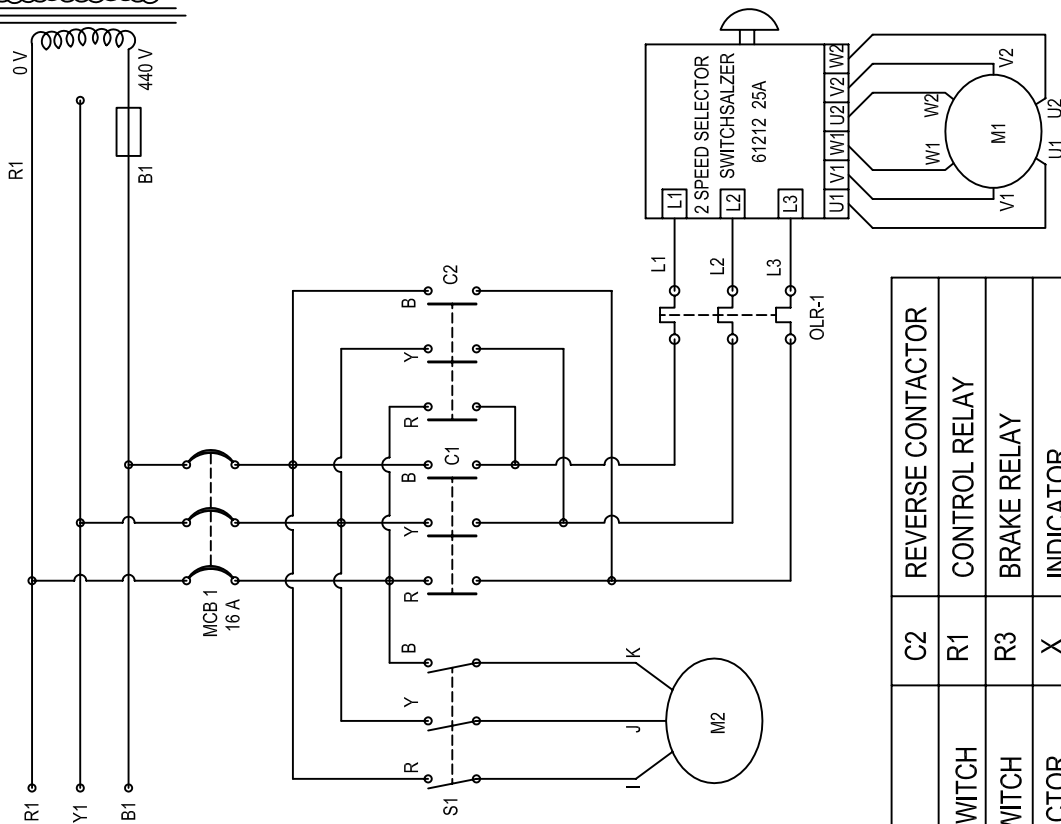
TWO SPEED 3rd SHAFT



CONTROL WIRING DIAGRAM



POWER WIRING DIAGRAM



LS1	FOOT SWITCH	C2	REVERSE CONTACTOR
LS2	FORWARD LIMIT SWITCH	R1	CONTROL RELAY
LS3	REVERSE LIMIT SWITCH	R3	BRAKE RELAY
C1	FORWARD CONTACTOR	X	INDICATOR
OLR1	OVERLOAD RELAY 4 TO 6.5 A	PB1	INCHING PUSH BUTTON
S1	COOLANT PUMP SWITCH	S2	M/C LAMP SWITCH

TWO SPEED 3rd SHAFT FOOT BRAKE



2.5 Electric connections.

Machine may be supplied with any one option listed below.

- (1) Simple Reverse forward switch.
- (2) 16 spindle speeds by using two speeds elect. Motor with speed selector switch and Reverse / Forward switch.
- (3) Foot pedal with Reverse / Forward starting shaft having 8 or 16 spindle speed.
- (4) Foot brake with Reverse / Forward starting shaft having 8 or 16 spindle speeds.

2.5.1 Simple Reverse Forward switch.

Refer wiring diagram On Page no. 19A

One fuse box is provided on backside of cabinet / headstock leg. Open this fuse box and connect 3-phase power supply with fuse terminal and copper earthing with machine body.

After completing this connection, please check rotation of main spindle in forward and reverse direction. If the direction of spindle speed is not matched with Reverse / Forward switch position than inter change any of the two phase of elect. Wire at the main supply. During wiring proper earthing should be made to avoid any accident.

2.5.2 16-spindle speed by using two speeds elect. Motor with speed selector switch and Reverse – Forward switch.

Refer wiring diagram On Page no.19C

In this option one electrical box is provided in place of Reverse Forward switch. In this electrical box one speed selector switch is provided which allows to select motor speed range high or low and one reverse/forward switch is also provided to select spindle rotation in Reverse or Forward direction. For detail wiring refer wiring diagram given on page no.19C



2.5.3 Foot pedal with Reverse / Forward starting shaft having 8/16 spindle speed.

Refer wiring diagram On page no.19F

In this option one electrical panel is provided in head stock leg in case of leg type machine or on backside of cabinet in case of cabinet type machine. In leg type machine this control panel is kept inside of head stock leg and one hinge door is given to protect this control panel.

On on/off rotary switch is given on control panel door which provides interlocking for safety, when power supply is on this door cannot be open but to open the door you have to switch off power supply.

For detail wiring refer wiring diagram given on page no.19F

2.5.4 Foot brake with Reverse / Forward starting shaft having 8/16 spindle speed.

Refer wiring diagram On page no.19I

In this option wiring is as per detail given in 2.5.3. The only difference is one electro magnetic brake; operated on 24 V.DC power supply is provided with head stock pulley. Due to this electro magnetic brake machine spindle stops instantly when power supply cut off.

For detail wiring refer wiring diagram given on page no.19I

2.6 Lubrication

Proper lubrication of Lathe machine plays vital rolls to retain accuracy and gives satisfactory performance. If the lubrication is neglected the bearing surface may be damage. Impairing the accuracy and shortening the life of the machine.



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Lubrication in headstock and Norton gearbox are done by splash lubrication. Oil level indicator is provided in headstock and Norton gearbox. Check oil level through oil level indicator regularly. If oil level seems down in headstock, then pour oil through oil filling plug.

In initial period, for the first time running oil should be changed after first 300 running hours and then 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 gearbox is shown in lubrication chart given in Introduction section on Page no.16

Lubrication of Apron, Slides, Lead Screw and tail stock are done by oil can. Various oil holes are provided for lubrication purpose. Dirt, chips should be brushed away before oiling to prevent them from entering in to the oil holes.

Apron	2oil holes are given on carriage.
Carriage	2oil holes are given on carriage.
Lead screw support	1oil hole is given on end bracket.
Surface screw	1oil hole is given on carriage.
Compound Slide	1oil hole is given on compound slide.
Tail stock sleeve	2oil holes are given on tail stock body.
Tail stock screw	1oil hole is given on tail stock screw boss.



2.7 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 position are maintained at the time of starting the machine to avoid 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 move them until they are properly cleaned, lubricated and unlocked. Before starting the machine study machine control as illustrated.

Ensure you know how to start/stop the machine before starting the machine.

For option 2.5.1 or 2.5.2

In case of machine having only Reverse / Forward switch (8 spindle speed) or machine having speed selector switch and reverse forward switch (16 spindle speed), machine can be start or stop by reverse forward switch.

For option 2.5.3 or 2.5.4

In case of machine having third shaft and control panel box to start machine first put on/off switch (60) given at head stock leg in on position than turn power-on key given in control panel (59) and then machine can be start by reverse forward handle (25). This lever have 3 positions, center position is neutral position. On either side, one position is reverse and other position is forward. To engage any one position, first this lever should press toward head stock side and than it can be rotate to desire position.

Machine can be stop by pressing foot pedal or foot brake (57) or machine can be stop by pressing emergency stop push button given on control panel (59). For again re-start the machine, reverse – forward handle (25) should bring in neutral center position and again engage in desire position.



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 and 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.
- (17) Do not shift gear in the running condition in headstock as well as Norton gearbox.



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
2	12	280
3	8	180
4	6	112
5	5	112
6	4	71

DO NOT

- Do not open head stock covers or change 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 reversal of the motor switches per hour.
- Do not operate spindle locking lever (9) while machine spindle is rotating.
- 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.
- The machine reaches peak torque 0-100 NM In 1350 series and 150 NM in 1650 series Lathe machine at 145 RPM.
- Do not exceed the rated full load current specified for the motor 3.5 Amp. For 1350 and 5.0 Amp. For 1650 series lathe.
- 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 the electric motor through two V belts. Power Transmission inside the head stock to the main spindle is through gear arrangement. Total 8 nos. spindle are available for standard machine. 16 nos. spindle speed are also available by using two speed electric motor.

Main spindle RPM is selected by two levers speed changing lever (6) and High-low speed lever (7).

Levers (6) are two levers each lever have 3 position. L.H. lever have position 1, Neutral and 2, similarly R.H. lever have position 3, Neutral and 4, Both levers are interlocked with each other. LH lever will give position 1 or 2, RH lever will give position 3 or 4.

First of all put both levers in neutral position than rotate any one lever to your required number 1 to 4. Suppose you have select LH speed lever position as no.2. Than RH speed lever having position 3 & 4 will be automatically interlocked. At a time, You can select any one position form 1 to 4 by using both the levers. Now suppose you want to select no.4 speed. Range than put LH lever into neutral position from position no.2 and than automatically RH lever having position 3 & 4 become free to engage in position no.4 and again LH lever having position 1 & 2 will be locked.

This arrangement will provides safety of interlocking of both levers (6), as well as selection of speed through position from 1 to 4.



High low speed lever (7) have 3 positions A, Neutral and B. Position A will be give low speed range and position B will be give high speed range. For engaging this lever. First of all pull lever out side to disengage locking pin from head stock body and than rotate lever to your desire position A or B and again engage locking pin in head stock body. This locking pin will give positive positioning of lever.

Feed direction changing lever (8) have 3 position Reverse, Neutral, Forward. You can select any position by rotating this lever.

Oil sight glass (11) is provided to cheek the oil level in side the head stock. Lubrication of main bearings, gears, shifters and bushes are done by splash lubrication system. It is necessary to keep always proper oil level in head stock to give lubrication to main bearings and gears.

Oil drain plug (12) is given at back side of the head stock bottom face to remove or drain lubricating oil from head stock.

Oil filling plug (10) is given on top cover of head stock to add the lubricating oil inside the head stock.

For removing chuck form A2 Size 4 type main spindle nose, first remove chuck from back plate. Then remove back plate from main spindle nose. For mounting chuck reverse procedure given above.

CAUTION : Do not shift gear while M/c is running.



3.4 Feed gear box (Norton gear box)

Feed gear box will provide selection of various feeds and thread pitch. Total 44 positions are given in feed gear box. Feed selecting lever (16) are two levers One is inner lever and another is outer lever. Inner lever have two positions T & M and outer lever have Two position A & B. similarly feed selecting lever (17) are two levers. Inner lever have position C & D and outer lever have position G,E & F. Feed selecting lever (18) is only single lever have four positions 1,2,3, & 4.

To get any one position, rotates these feed selecting levers (16), (17) and (18). Lever (16) and lever (17) have inner and outer position and lever (18) have only one position so by rotating and adjusting these levers you can select any one threading position.

CAUTION : Do not shift gear while M/c is running.

For example

Feed selecting lever- (16) inner lever will give position between T & M outer lever will give position between A & B.

Feed selecting lever- (17) inner lever will give position between C & D outer lever will give position between G, E & F.

Feed selecting lever- (18) will give position between 1, 2, 3, & 4.

Oil filling plug (22) is given on top face to add lubricating oil into feed box.

Oil drain plug (24) is given at bottom side of feed gear box for draining oil from feed box. Oil sight glass (23) is given for checking oil level in feed gear box lubrication of gears and bushes are done by splash lubrication system, it is necessary to maintain proper oil level in feed box.

Out put of lead screw (26) and feed shaft (27) are given separately on right hand side of the feed box.

CAUTION: Do not shift gear while M/c is running.



Lead screw engage / disengage clutch (20) is given on lead screw. During threading operation push this clutch (20) in side to engage lead screw with feed box drive. While in simple turning operation lead screw is not require to be rotate so pull clutch (20) out side to disengage lead screw from feed box drive.

Feed safety clutch (21) is provided on feed shaft. This feed safety clutch (21) is set with proper spring tension by collar (19). In case of over loading this clutch will slipped from housing to prevent further damage.

In first pick off change gear (53), Aluminum shear key is provided. In case of overloading, this aluminum shear key will be sheared off and drive will be discontinuing at this stage to prevent further damage in feed box.

3.4.1 Thread cutting.

Machine is supplied with 4 TPI lead screw but as a optional machine with 6 mm PITCH lead screw also can be supplied. Thread range of British thread and metric pitch will remain same with 4 TPI or 6 mm PITCH lead screw.

Lead screw of 4 TPI.

British thread 4 TPI to 70 TPI can be on machine. Detail thread chart is given on feed box.

For example you want to get 24 TPI than adjust feed selecting levers (16), (17) and (18) on position T.B.D.F and I.

Set change gear train as per position shown in thread chart i.e. change gears 52, 82 and 126 teeth.



For any odd TPI threading, which are not mention in thread chart.

For example you want to get 19 TPI. Details of 19 TPI. Threading is not given on thread chart than select nearest. TPI position from thread chart and set levers (16), (17) and (18) accordingly on the feed box. Nearest TPI for 19 TPI threading is 20 TPI. So select levers (16), (17) and (18) as per 20 TPI. Now we have to calculate gear train for 19 TPI.

Gear train for required TPI = Gear train of selected TPI X $\frac{\text{Selected TPI}}{\text{Require TPI}}$

Gear train for 19 TPI = (Gear train of 20 TPI) X $\frac{(\text{TPI Selected})}{(\text{TPI Required})}$

$$= \frac{56}{126} \times \frac{20}{19}$$

Means if you set gear train as per $\frac{56}{126} \times \frac{40}{38}$ and kept levers (16), (17) and (18) as per 20 TPI than you will get 19 TPI. Instead of 20 TPI.

Metric threads 6 mm pitch to 0.375 mm pitch can be cut on machine. Detail thread chart is given on feed box.

For example you want to get 1.5 mm pitch threading than select levers (16) on position M & A. Select levers (17) on position C & G and select lever (18) on position 1. You will get 1.5 mm pitch threading total 2 types of change gears settings are given to complete entire range of Metric threads.

For any odd metric threading, which are not mentions in thread chart.

For example you want to get 0.8 mm pitch than select nearest pitch position on feed box. Suppose you have select levers (16), (17) and (18) as per 0.875 mm pitch.



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Than

$$\text{Gear train for required Pitch 0.8 mm} = \frac{\text{Gear train of Selected pitch}}{\text{Selected pitch}} \times \frac{\text{Required pitch}}{\text{Selected pitch}}$$

$$= \frac{52}{126} \times \frac{0.8}{0.875}$$

$$= \frac{52}{126} \times \frac{32}{35}$$

For getting 0.8 mm pitch threading, set gear train as per above calculation and set levers (16), (17) and (18) as per 0.875 mm pitch.

Thread charts for British and metric threads having 6 mm pitch – lead screw in lieu of 4 TPI lead screw.

Basically thread chart of 4 TPI lead screw machine and 6 mm pitch lead screw machine are different. In 6 mm pitch lead screw machine, threading range, lever position, all are same as per 4 TPI lead screw machine chart. Only difference is value of gear train position will be different.

For 6 mm Pitch lead screw machine Change gear Train Will Be:

$$\text{Change Gear train } \frac{56}{126} \text{ will become as } \frac{28}{126} \times \frac{127}{60}$$

$$\text{Change Gear train } \frac{56}{126} \text{ will become as } \frac{26}{126} \times \frac{127}{60}$$



Limitation of change gears.

For any odd threading, if you calculate change gears than following are the limitations for change gears.

$$\begin{aligned} A &= 66 \text{ Teeth (maximum) X 14 DP} \\ C + D &= 240 \text{ teeth maximum X 14 DP} \\ D < 127 \text{ Teeth maximum X 14 DP} \end{aligned}$$

Thread dial indicator (35) is usually used for thread cutting operations. This device permits dis- engaging the half nut at the end of the cut, returning the carriage to the starting point by hand and than re engage the half nut at the correct time so that the tool will follow the original helix formed during first cut. This eleminates the revesing of lathe spindle.

For machine having 4 TPI lead screw.

For all odd and even threads in each inches (i, e, 4, 5, 6, 7 TPI etc.) close half nut at any line on the dial.

For all threads involving half thread in each inch (i, e, 4.5, 5.5, 6.5 TPI) close the half nut at any alternate line on the dial.

For cutting metric threads, the dial indicator cannot be used. But Method is only to reverse spindle without dis- engage, half during second and subsequent cuts.

For Machine having 6 mm pitch lead screw. In British threading operation, Thread dial indicator cannot be used but method is only reverse spindle without disengage the half nut during second and subsequent cuts.



3.4.2 Feed

For example, If m/e change gears & levers is set as per 20 TPI
Than

$$\text{Longitudinal Feed} = \frac{3.175}{\text{TPI}} \text{ mm / Rev.}$$

$$\text{Longitudinal Feed} = \frac{3.175}{20} = 0.15875 \text{ mm / Rev.}$$

$$\text{And Transverse Feed} = \frac{1.9}{20} \text{ mm / Rev.}$$

$$\text{Transverse Feed} = \frac{1.9}{20} = 0.095 \text{ mm / Rev.}$$

If change gears and levers of machine is set as per 1.25 mm pitch
(Metric threads) **Than**

$$\text{Longitudinal Feed} = \frac{\text{Pitch}}{8} \text{ mm / Rev.}$$

$$\text{Longitudinal Feed} = \frac{1.25}{8} = 0.15625 \text{ mm / Rev.}$$

$$\text{And Transverse Feed} = \frac{\text{Pitch}}{133.33} \text{ mm / Rev.}$$

$$\text{Transverse Feed} = \frac{1.25}{133.33} = 0.09377 \text{ mm / Rev.}$$

For any specific feed requirement.

Suppose you required 0.23 mm/Rev. longitudinal feed and
machine settings are as per metric threads.

Than

$$\text{Longitudinal feed} \times 8 = \text{MM Pitch} = 0.23 \times 8 = 1.84 \text{ mm pitch}$$

Nearest mm pitch is 1.87 mm. Set machine as per 1.875 mm pitch.



3.5 Apron

Apron Mechanism is drop worm type mechanism. Feed engage and disengage is done just by operating feed engage lever (33). For engaging feed, lift lever (33) in upward direction and for dis- engaging feed push lever (33) in downward direction.

Feed selecting knob (32) has 3 positions longitudinal newtral and transverse. To get transverse feed pull knob (32) out side. To get longitudinal feed push knob (32) in side and centre position is newtral position. Hand wheel (31) is provided to move carriage on bed by manual operation. While moving carriage on bed manually, keep feed selective knob (32) in newtral position.

Half nut engaging lever (34) is used during threading operation.

Half nut engaging lever (34) and feed engage lever (33) both are interlocked with each other to avoid accident. If you engage lever (34) for threading operation than lever (33) for feed engagement will be locked and viceversa.

3.6 Carriage

Carriage (36) are provided with flat surface for clamping area for odd job and fixture.

Surface slide (37) is moves in transverse direction man only by hand wheel (38). Surface slide is guided in carriage in 2 dowetails. Back lash adjustment arrangement is provided in gun metal surface screw nut. You can unlock lock nut and rotate split hex nut of main nut to adjust axial backlash and than retight lock-nut.

Spigot located compound slide (39) is provided on top face of surface slide (37). You can set compound slide at any desire angle. For setting compound slide at angle unlock two hex nuts provided on compound slide base and set compound slide at desire angle than clamp these two hex nuts.



0 to 90° on either side and total 180° graduation are given on surface slide to set compound slide at desired angle.

Tool post (41) is provided on top face of compound slide. This tool post is indexable type, 4 way tool posts.

3.7 Tail stock

Tail stock is clamped on bed guide ways by tail stock clamping lever (46). You can adjust clamping pressure by loosening or tightening of tail stock clamping stud nut. Clamping of tail stock on lathe bed is cam operated- easy locking system.

Two setting bolts (47) are provided either side of tail stock to shift the tail stock assembly in transverse direction. This setting is become useful in taper turning operation of long job in between centre settings.

Tail stock spindle moves through hand wheel (45). Tail stock spindle clamping lever (44) clamps, Tail stock spindle in tail stock body.

Tool tray (48) is provided on top face of tail stock assembly.

3.8 Least Counts of all hand wheels.

Longitudinal movement by Apron hand wheel (31) and least count is 0.200 mm/Rev.

Transverse movement by surface hand wheel (38) and least count is 0.020 mm/Rev. Tail stock spindle movement by hand wheel (45) and least count is 0.040 mm/Rev. Compound slide hand wheel least count is 0.020 mm/Rev.



Section 4 SETTINGE & MAINTENANCE

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

4.1 Head stock

4.1.1 Main spindle bearings

Main spindle is mounted on two precision back to back taper roller bearings in front wall and one needle roller bearing in rear wall. During continuous running of the machine spindle, spindle gets heated and due to thermal expansions, length of the spindle increase. These bearings arrangement provide compensation of thermal expansion of spindle.

For the preloading of the main spindle two check nuts are provided inside the head stock body. First remove head stock cover and than tighten or loosen the check nuts of main spindle such that the spindle can be rotate by hand with light drag. Inner check nut is for preloading and outer check nut is for locking.

Check nut provided on the rear side of the head stock is not for preloading of bearings. This check nut is used only for retaining spindle locking bush and other assembly and not for setting purpose.

4.1.2 Taper setting.

Head stock is mounted on lathe bed by 2 bolts provided on front side and one clamping plate is provided on rear side. To set the head stock, first slightly loosen two bolts provided on front side and one clamping plate nut provided at rear side, than adjust setting bolts as per your requirement and tighten the bolts and nut.



4.1.3 Pick-up change gear.

To protect the feed box from overload, an Aluminum shear key is provided in 1st pickup change gear. In case of over loading this key will be shears off and drive will be stopped from this point.

A new key of Aluminum alloy of hardness 75-85 HV should replace the shear key. Refer sketch for Dimension of shear key.

4.1.4 V Belts.

Main Electric motor is mounted on back side of Lathe bed to adjust the belt tension or to replace V belts, loosen, 4 bolts provided on motor rails and raise or lower the electric motor as per your requirement, again tighten 4 bolts provided on motor rail to fix motor in position.

4.2 Feed box

4.2.1 Feed safety clutch

Feed safety clutch (21) is provided on feed shaft. This safety clutch is gives safety against overloading. One compression spring is fitted on back face of safety clutch. After giving adequate pressure on spring, tighten feed safety clutch spring collar (19) on feed shaft.

For applying pressure on spring, put on iron bar in between apron and color face. Move carriage toward head stock side and press collar, so tension will come on spring. After sufficient pressure on spring, lock grub screw of collar, in pressing condition and than move carriage toward tail stock side and remove iron bar.



4.2.2 Lead screw

Lead screw is arrested axially between off end bracket (29). On either side of off end brackets, two thrust bearings are provided. Axial play of the lead screw is set with two check nuts (28). Inner check nut is for setting purpose and outer check nut is for locking purpose.

To set axial play put magnetic stand and dial gauge on the end face of lead screw. Then engage nut by half nut engaging lever (34) to clamp lead screw. Apply manual movement on apron hand wheel (31). Dial gauge will indicate value of axial play.

After setting axial play of lead screw release half nut lever and rotate lead screw by hand, lead screw should be rotate by hand with light drag.

4.3 Surface screw and Carriage.

4.3.1 Surface screw back lash adjustment.

On main nut of surface screw, one split type gunmetal nut and lock nut is provided for adjustment of backlash of surface slide screw. For adjustment of backlash, in split type gun metal nut loosen inner locknut and tighten the outer portion of split nut, after done proper setting ensure smooth travel of cross slide on entire length than tighten inner locknut and repeat the procedure for checking smooth travel on entire length.

4.3.2 Carriage.

Carriage is fitted on bed with one V guide ways and another flat surface.

Carriage is set on Bed guide ways with two keeper stock in operator side and one parallel wedge in rear side.



4.4 Surface Slide and Compound Slide.

In surface slide and compound slide setting wedge is given which can be set by using setting screw.

4.5 Tail stock.

4.5.1 Tail stock clamping

Tail stock body is clamped on bed by eccentric lever (46). Eccentricity of lever is fixed but length of clamping stud can be set by hex nut provided on bottom side of clamping cast iron plate.

4.5.2 Tail stock – off set

Taper turning of long job can be done by off setting of tail stock with respect to head stock centre line. In tailstock body two setting bolts are provided on either side. By loosening one setting bolt and tightening another setting bolt tail stock body can be set off set.

4.6 Tool post

After a 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 Trouble shooting and remedy.

SR.	TROUBLE	CAUSE	REMEDY
4.7.1	Machine vibrates While running.	(A) Improper leveling. (B) Job not balances.	Level the machine properly and tighten on foundation. Balance job by adding counter weight and reduce spindle speed.
4.7.2	Machine vibrates while machining and chatter marks on job.	(A) Improper leveling. (B) Improper tensioning on V- belt. (C) Excessive tool over hang. (D) Wrong tool. (E) Wrong cutting parameters. (F) Improper tool centre. (G) Work holding not rigid. (H) Clearance between saddle, surface slide and comp slide jib not proper. (I) Preload of main spindle is not correct.	Level the machine. Adjust V – belt tension. Reduce over hang of tool and clamp tool rigidly. Check proper tool material and tool geometry. Select proper speed feed and depth of cut considering job material, tool material, job diameter. Adjust correct tool height. Check holding of job. Adjust proper clearances between all jibs. Adjust preloading of main spindle.



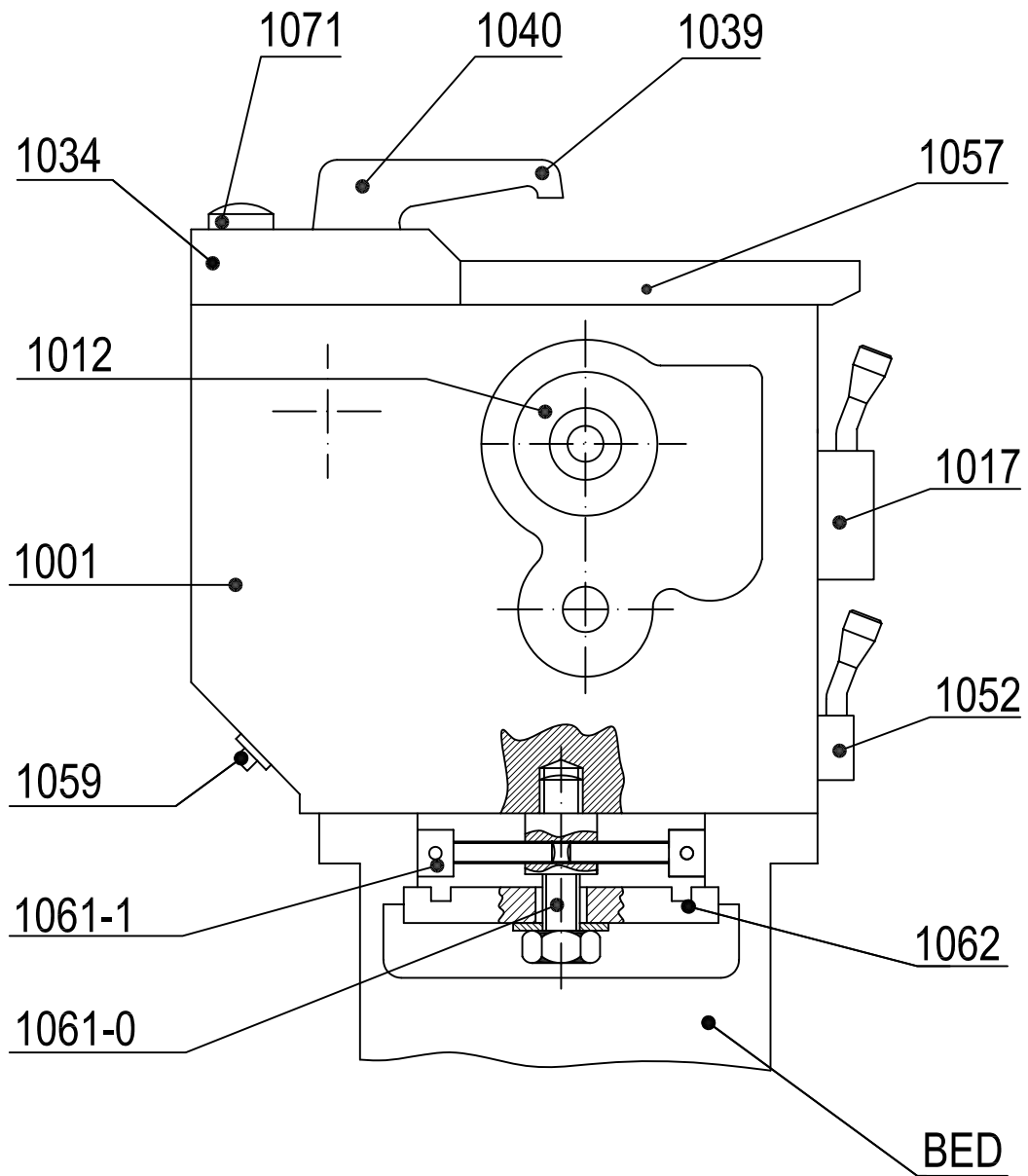
SR.	TROUBLE	CAUSE	REMEDY
4.7.3	Spindle runs too tight and bearing become too hot in head stock.	(A) Preloading of main spindle is not correct.	Adjust preloading of main spindle.
4.7.4	Machine cuts taper on job held between center.	(A) Tail stock alignment not proper. (B) Improper machine level. (C) Tool worn out.	Re align tail stock. Level machine properly. Re grind or replace tool.
4.7.5	Gear train in end feed mechanism makes sound during running.	(A) Back lash of change gear not set properly. (B) Fixing nut and bolt not properly tight. (C) Some damage mark on gear teeth. (D) Lubrication is not done.	Set proper back lash between change gears. Tighten fixing nut and bolt. Inspect change gear and deburr damage mark. Provide proper lubrication.
4.7.6	Machine is not able to take heavy cut or spindle stops under load.	(A) Belt tension is not proper. (B) Safety key sheared. (C) Feed clutch slipping.	Set proper belt tension. Replash safety key in 1st pick up gear. Set proper spring tension in feed clutch.
4.7.7	Noise in head stock.	(A) Lubrication not sufficient. (B) Gear damage. (C) Bearing seized or damage.	Check oil level and maintain proper oil level. Replace damage gear. Inspect and replace bearings.



SR.	TROUBLE	CAUSE	REMEDY
4.7.8	Noise in main motor.	(A) Motor shaft bearing failure. (B) Motor fan may be loose. (C) Fan cover touches with fan.	Replace bearing. Tighten motor fan. Re align and tight fan cover.
4.7.9	Lead screw does not rotate or stops under load.	(A) Safety key sheared.	Replace safety key.
4.7.10	Main motor does not start.		Check fuse / MCB / DOL etc.
4.7.11	Main motor does not start after some time in operation.	(A) Due to too frequent reversal, thermal relay might have tripped.	Wait for the motor to cool down and re set relay.
4.7.12	Threading overlaps.	(A) Excessive axial play of lead screw. (B) Excessive play in half nut. (C) Gear train or lever position of feed box is not ok. (D) Engagement of half nut is not proper.	Set axial play of lead screw. Set half nut play. Set proper gear train and feed box knob and lever. Engage half nut lever as per instruction given in head of thread dial indicator.



REAR SIDE VIEW





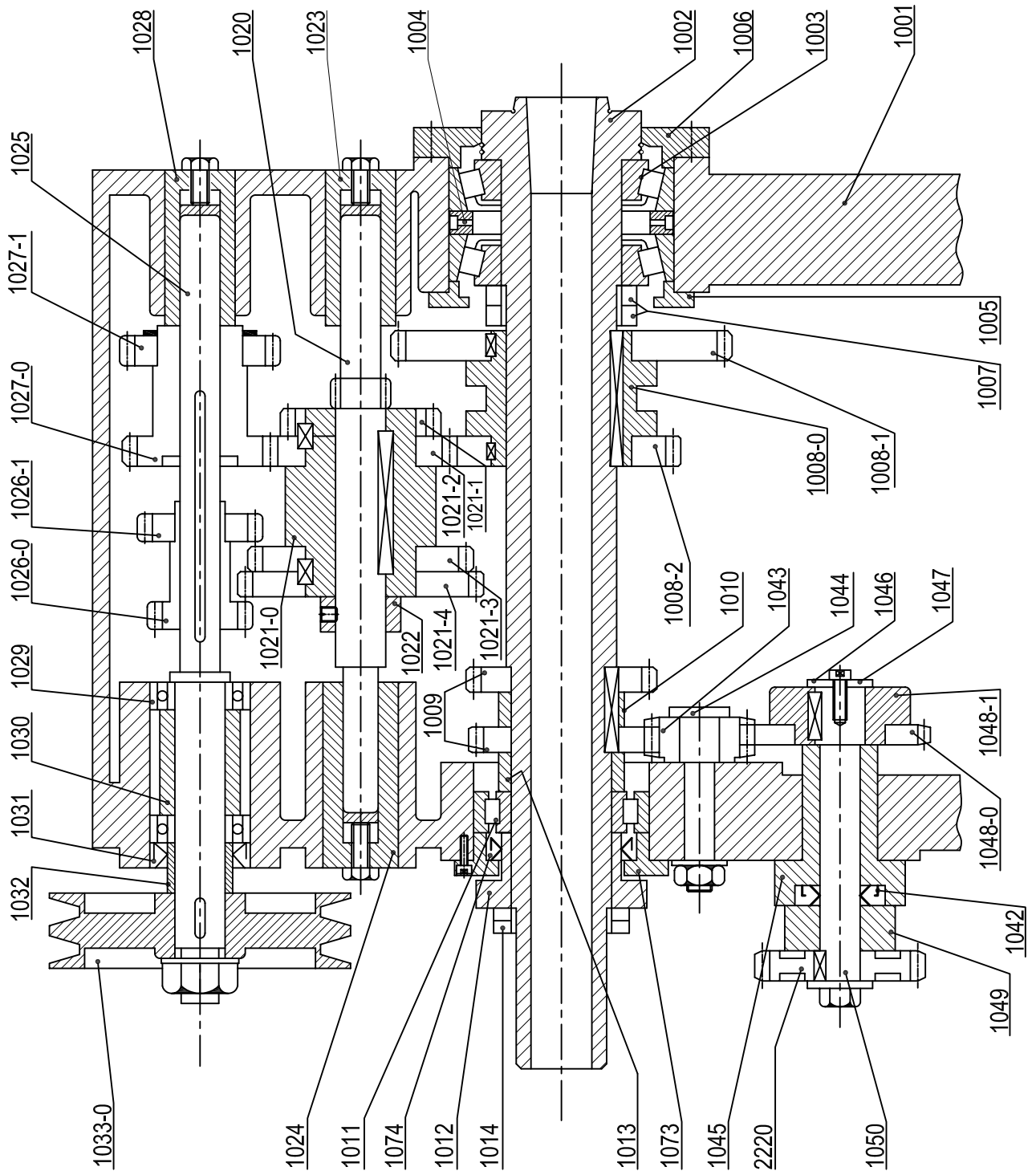
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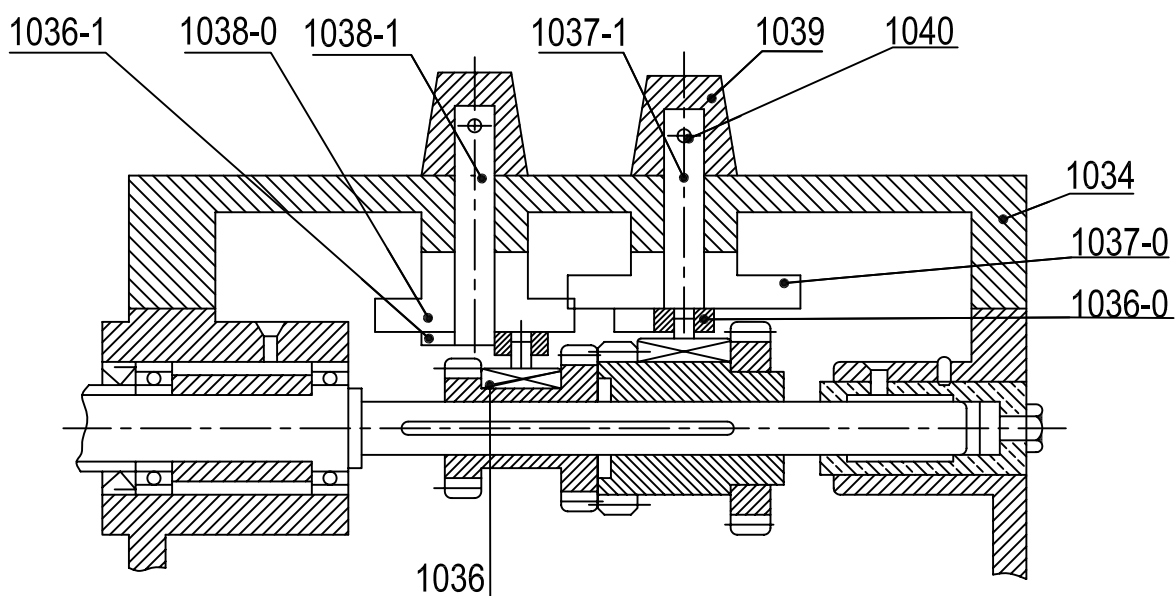
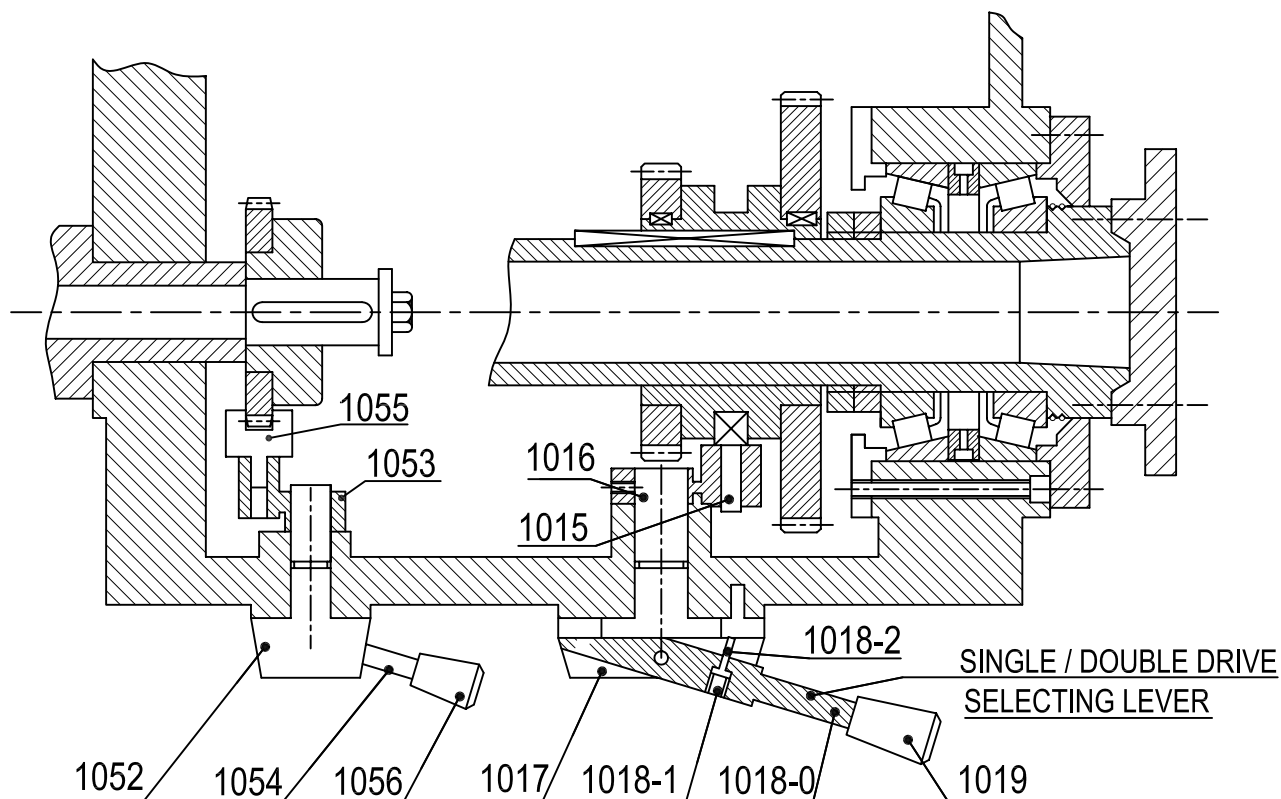
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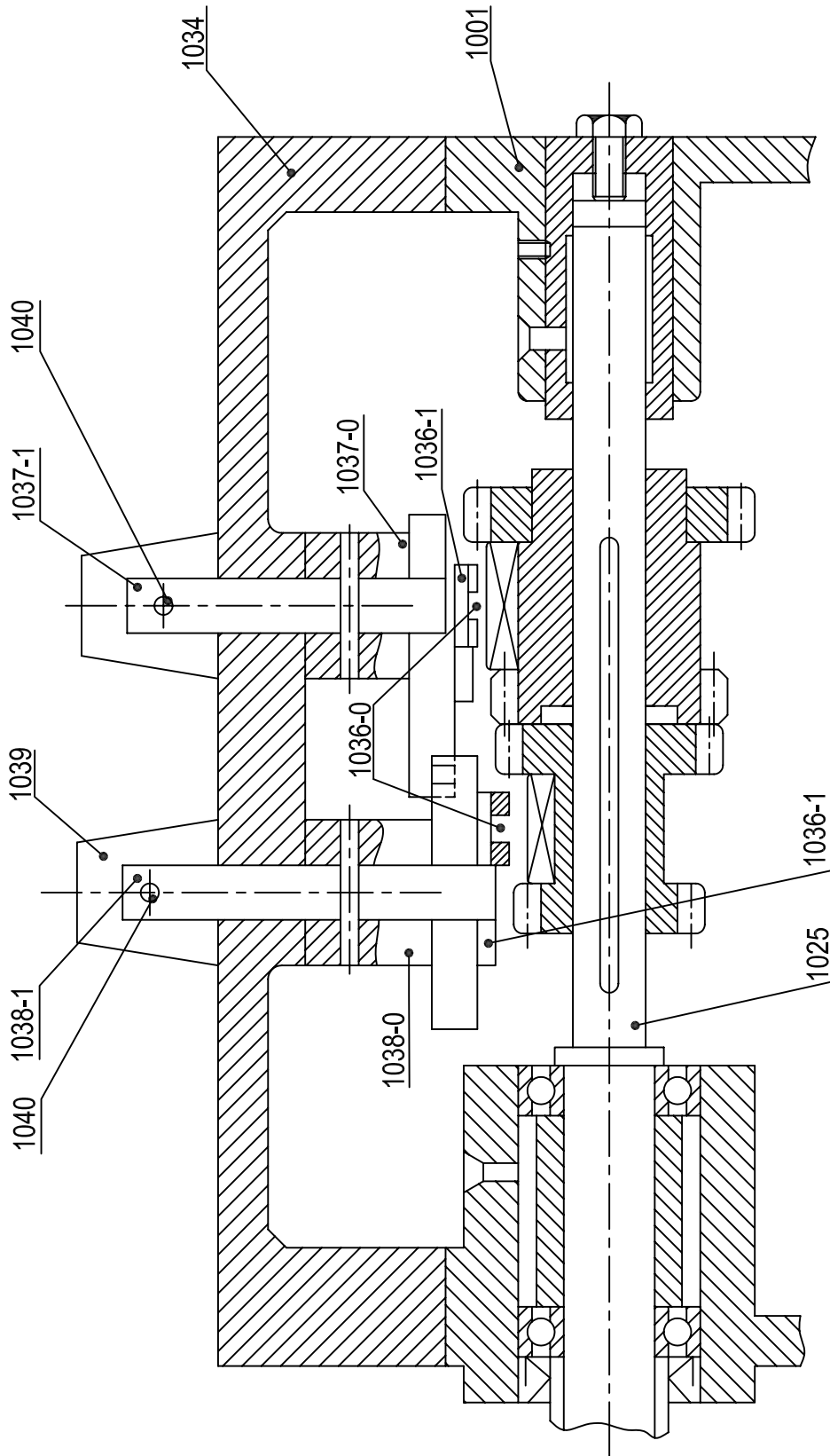
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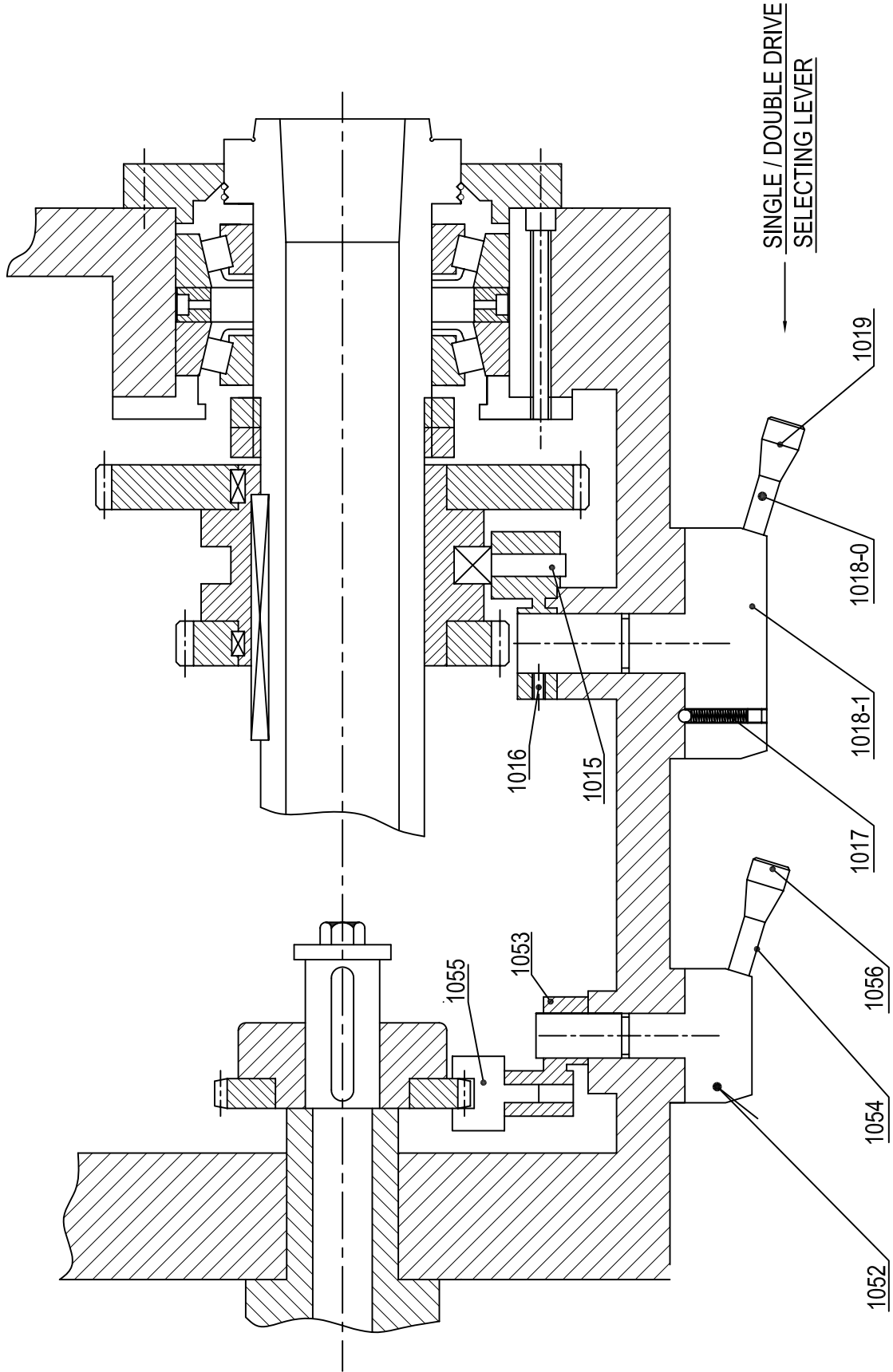




SPINDLE SPEED SELECTING LEVERS



HEAD STOCK SHIFTER ASSEMBLY. MODLE :- 1350 (All Gear)





5.1 HEAD STOCK SUB ASSEMBLY

Part No.	Part Name	Quantity
1001	Head stock	1
1002	Spindle	1
1003	Taper Roller bearing 32213	2
1004	Front bearing spacer	1
1005	Front bearing inside cover	1
1006	Front bearing outside cover	1
1007	Front bearing check nut	2
1008-0	Spindle gear boss	1
1008-1	Spindle gear 98 Teeth	1
1008-2	Spindle gear 57 Teeth	1
1009	Spindle gear 42 Teeth	2
1010	Gear spacer collar	1
1011	Needle roller bearing N 211	1
1012	Spacer collar for locking	1
1013	Bearing spacer	1
1014	Rear bearing check nut	2
1015	Front lever clutch	1
1016	Front lever clutch bracket	1
1017	Front lever clutch stud	1
1018-0	Front lever clutch handle	1
1018-1	Screw for F.L.C.	1
1018-2	Pin for F.L.C.	1
1019	Bakelite grip	1
1020	Middle gear shaft 15 Teeth	1
1021-0	Compound gear boss	1
1021-1	Compound gear 46 Teeth	1
1021-2	Compound gear 56 Teeth	1
1021-3	Compound gear 65 Teeth	1
1021-4	Compound gear 70 Teeth	1



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MODEL**1350/1650****PAGE NO.****51**

Part No.	Part Name	Quantity
1022	Middle shaft collar	1
1023	Middle shaft bush (RH)	1
1024	Middle shaft bush (LH)	1
1025	Driving shaft	1
1026-0	Compound gear 21 Teeth	1
1026-1	Compound gear 26 Teeth	1
1027-0	Compound gear 35 Teeth	1
1027-1	Compound gear 45 Teeth	1
1028	Driving shaft bush (RII)	1
1029	Ball bearing 6205	2
1030	Bearing spacer	1
1031	Oil seal 35 × 52 × 10	1
1032	Outer collar	1
1033-0	Driving pulley (Head stock pulley)	1
1033-1	Motor pulley	1
1034	Rear top cover	1
1036-0	T C L pin	2
1036-1	T C L pin bracket	2
1037-0	Interlocking lever (RII)	1
1037-1	Interlocking lever pin (RH)	1
1038-0	Interlocking lever (LH)	1
1038-1	Interlocking lever pin (LH)	1
1039	Top lever handle	2
1040	Top lever set pin	2
1042	Oil seal – 22 × 35 × 7	1
1043	Idle gear 26 Teeth	1
1044	Stud for Idle gear	1
1045	Bush for change gear stud	1
1046	Change gear shaft	1
1047	Washer for stud	1



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Part No.	Part Name	Quantity
1048-0	Bottom gear 42 Teeth	1
1048-1	Boss for bottom gear	1
1049	Collar for change gear	1
1050	Shear Aluminum key	1
1052	Feed reversing stud	1
1053	Feed reversing lever	1
1054	Feed reversing handle	1
1055	Feed reversing clutch	1
1056	Bakelite grip	1
1057	Front top cover	1
1058	Oil indicator	1
1059	Oil drain plug	1
1060-0	Front adjusting stud	1
1060-1	Screw pin (Front)	1
1061-0	Rear adjusting stud	1
1061-1	Screw pin (Rear)	1
1062	Rear clamping plate	1
1063	Catch plate	1
1064	Catch plate stud	1
1065	Face plate (Optional)	1
1066	Centre bush	1
1067	Dead centre MT – 4	1
1070	Bakelite grip	1
1071	Oil filling plug	1
1073	Rear bearing out side cover	1
1074	Oil seal 65 × 90 × 12	1
1075	Head stock window	1



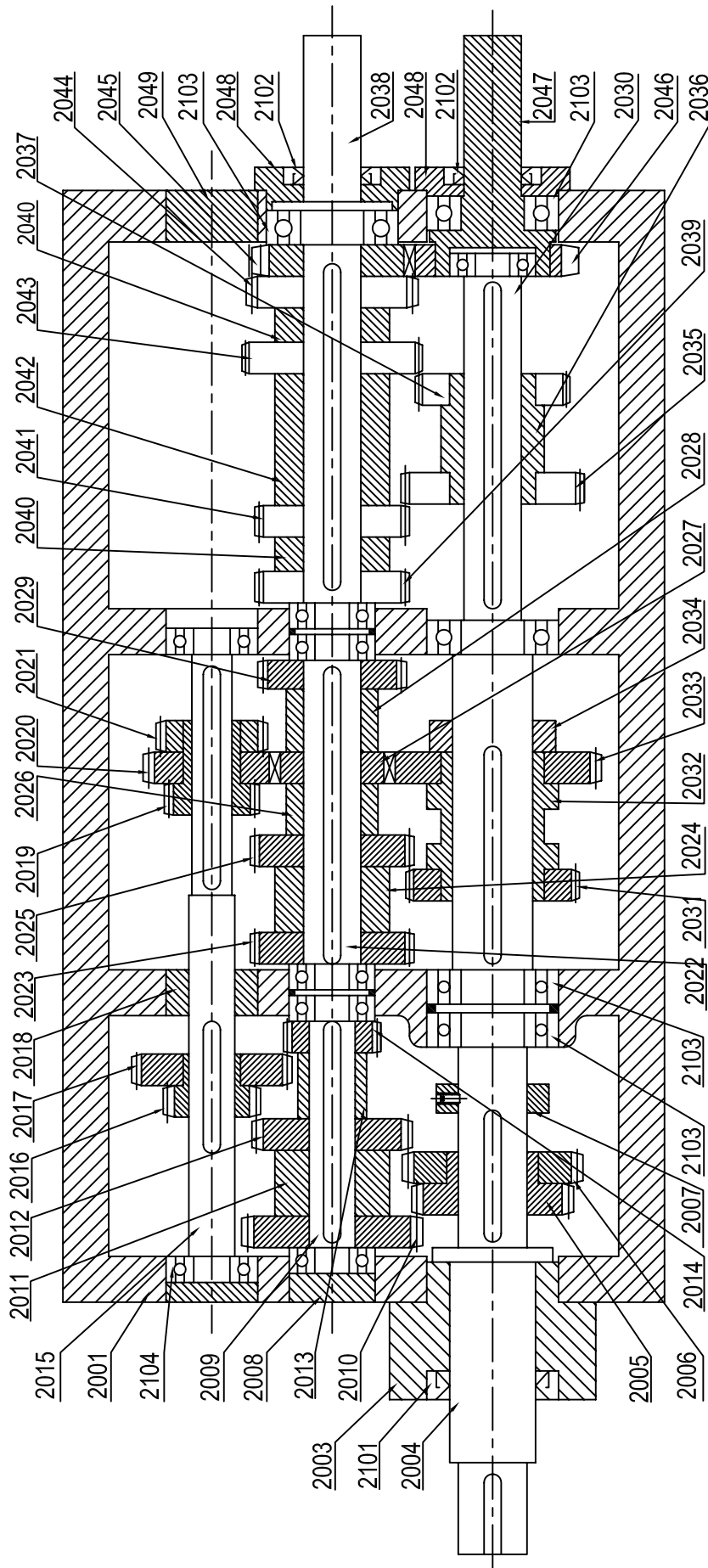
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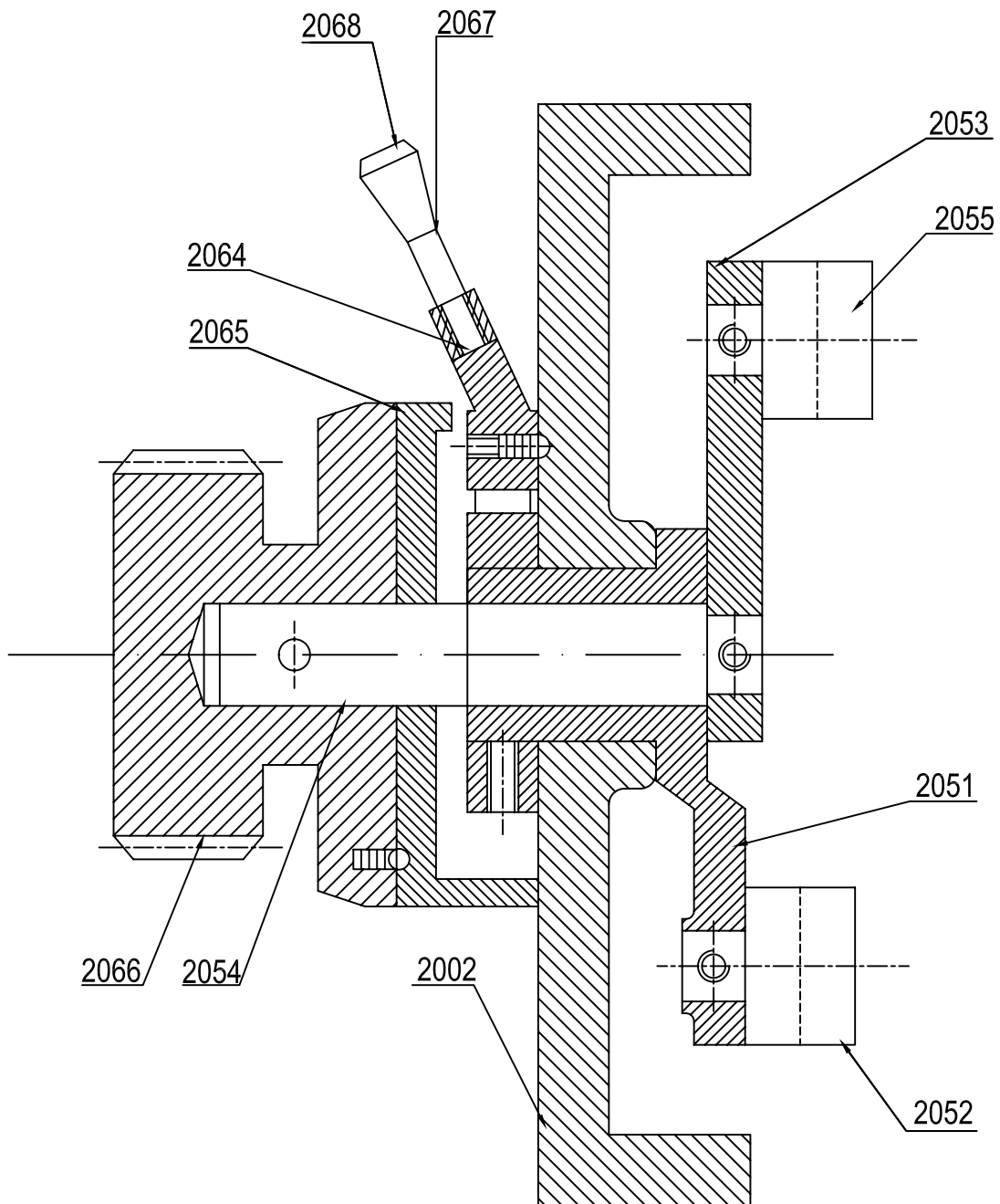
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NORTON GEAR BOX ASSEMBLY

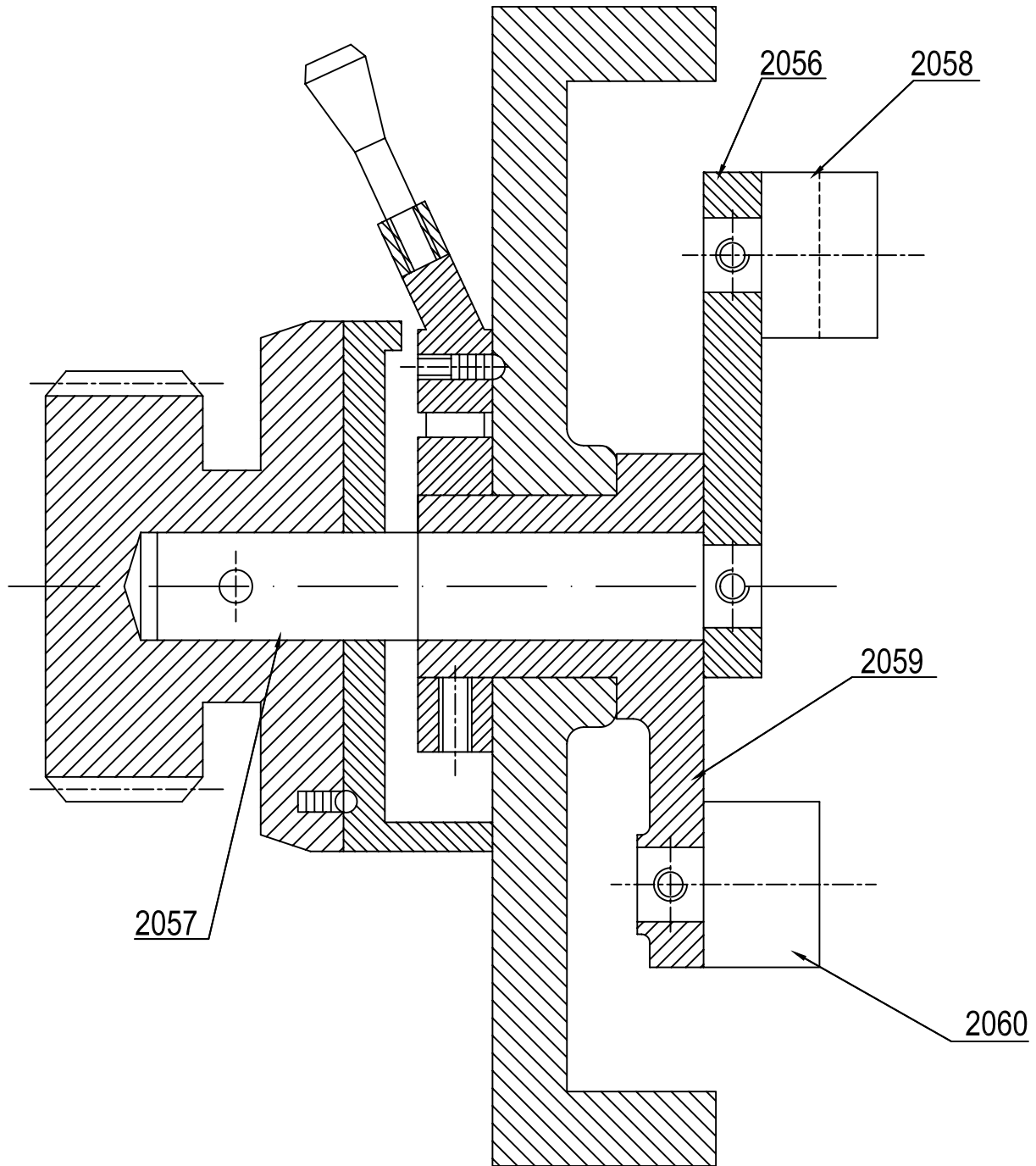


ASSEMBLY OF LEVER M-T & A-B



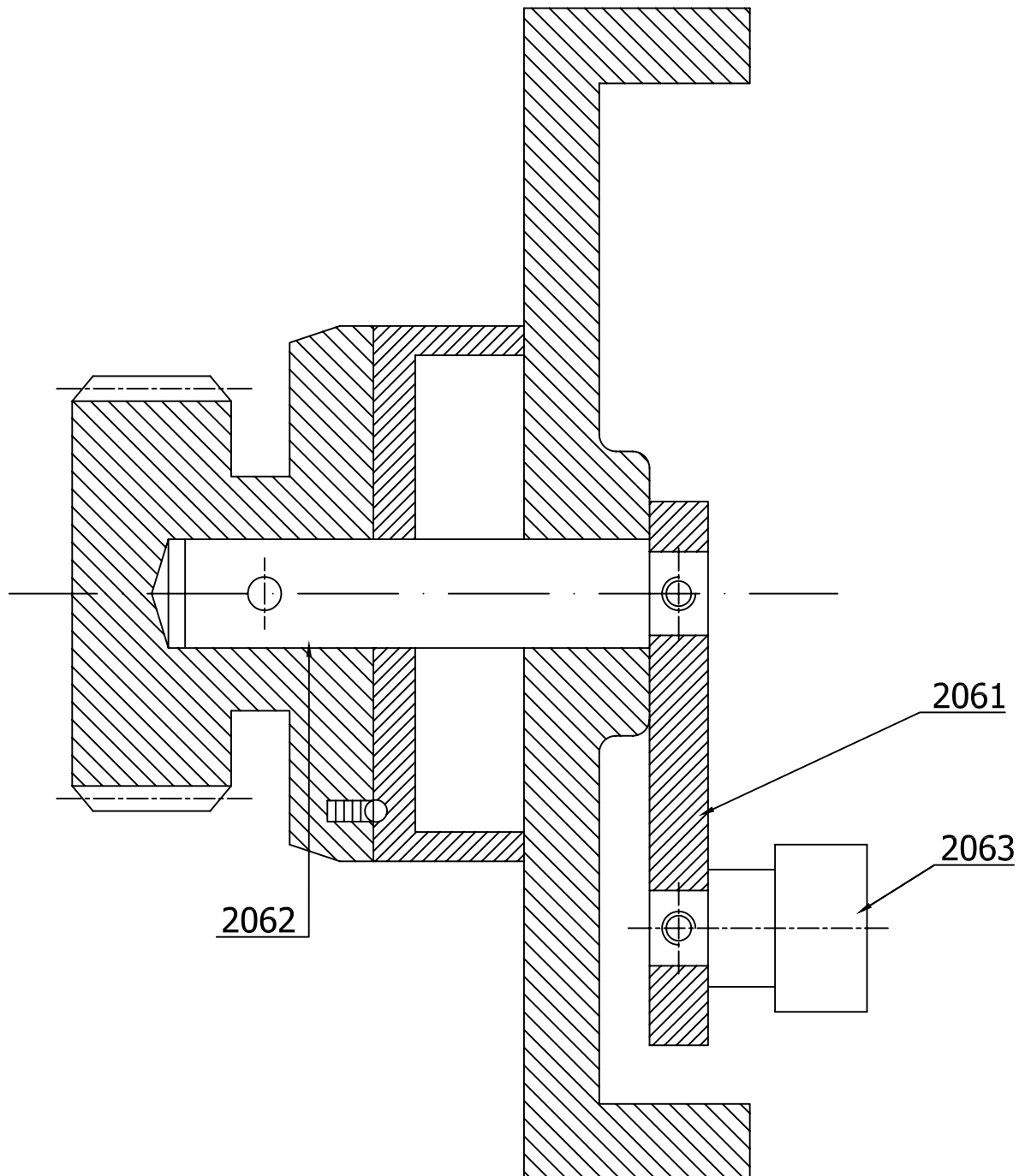


ASSEMBLY OF LEVER C-D & G-E-F



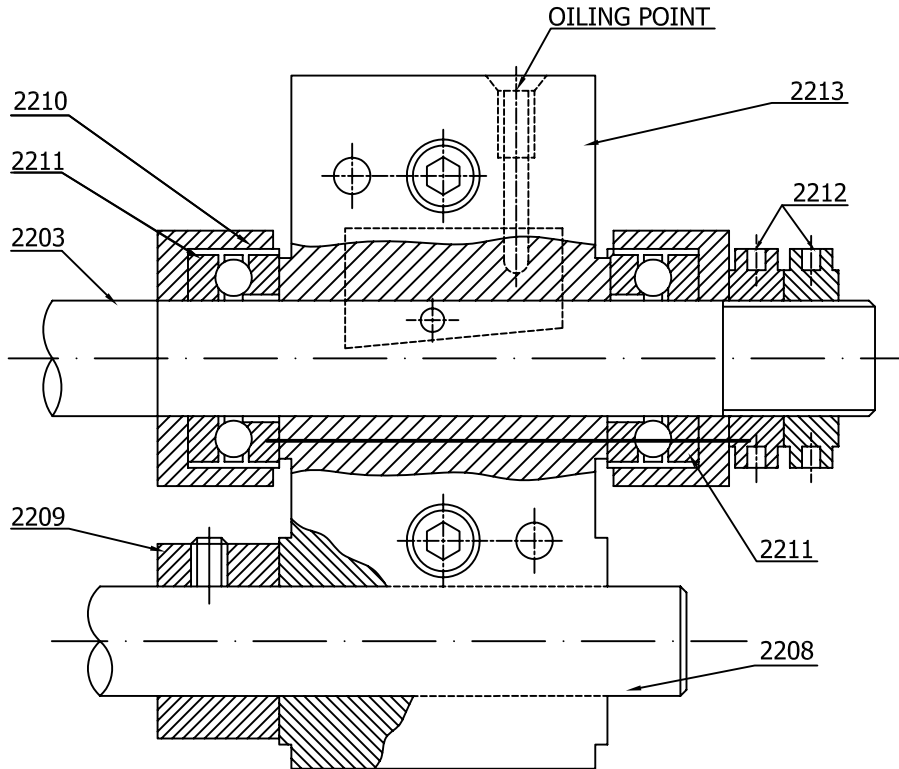


ASSEMBLY OF LEVER 1-2-3-4

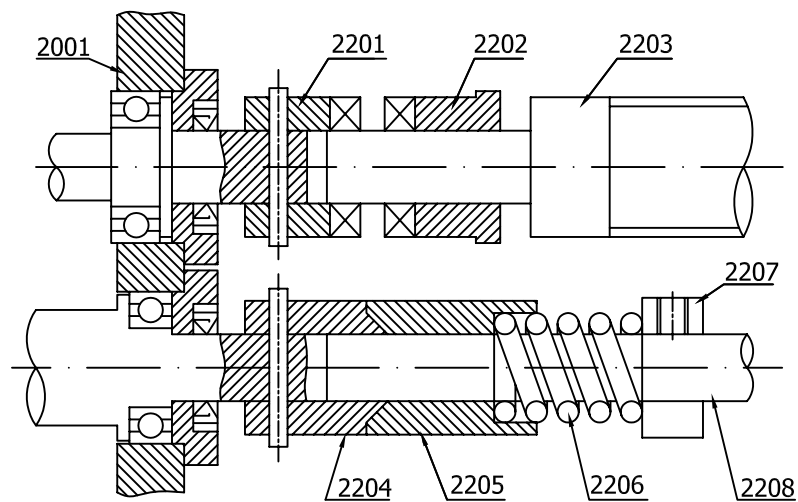




OFF END BRACKET ASSEMBLY

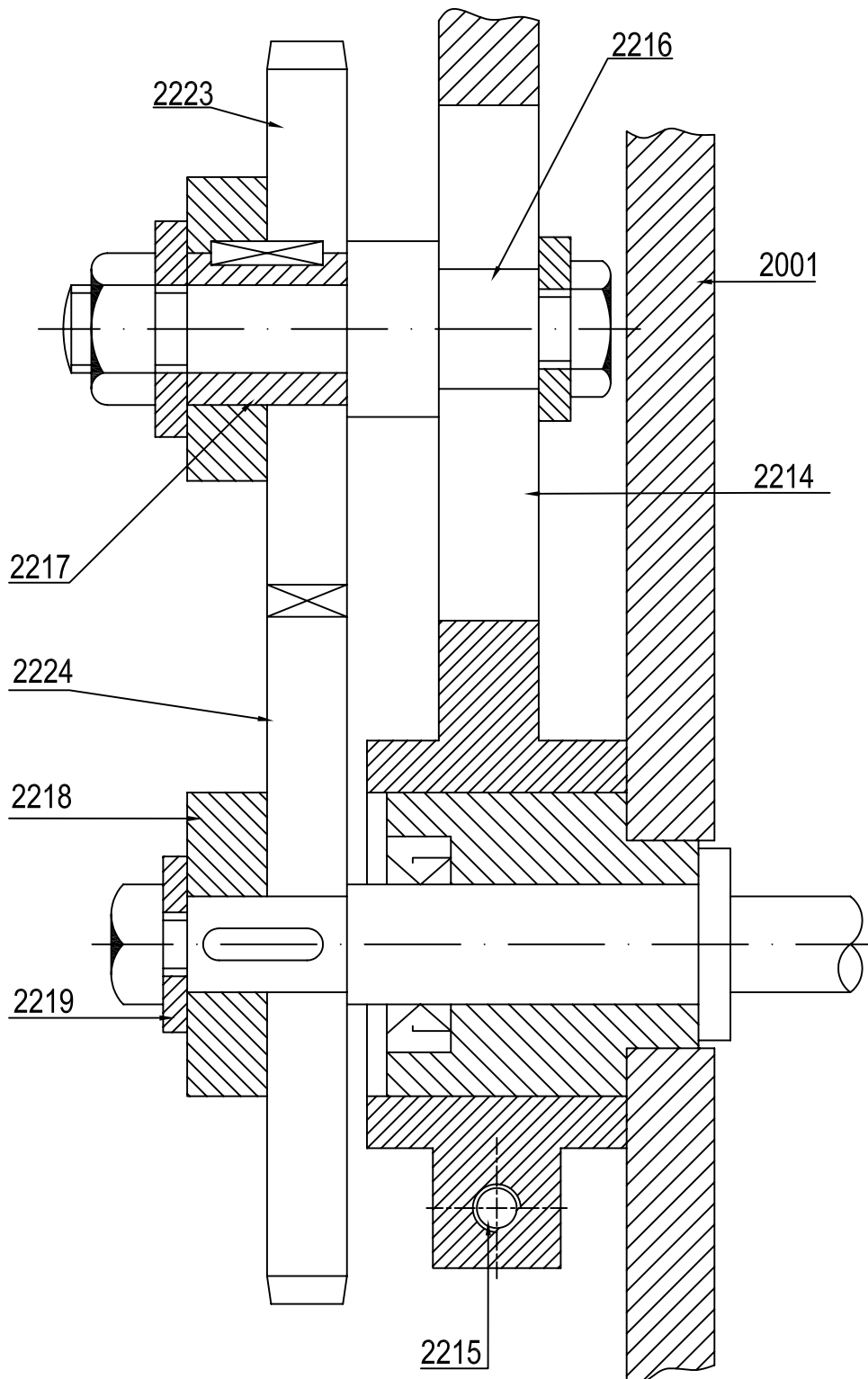


LEAD SCREW ENGAGE / DISENGAGE CLUTCH





CHANGE GEAR ASSEMBLY





5.2 NORTON GEAR BOX SUB ASSEMBLY

Part No.	Part Name	Quantity
2001	Gear Box Body	1
2002	Gear Box Body Cover	1
2003	Input Boss	1
2004	Input Shaft	1
2005	Gear 31 Teeth	1
2006	Gear 32 Teeth	1
2007	Stopper collar	1
2008	Plugs	3
2009	L.H. Middle Shaft	1
2010	Gear 35 Teeth	1
2011	Spacer	1
2012	Gear 32 Teeth	1
2013	Spacer	1
2014	Gear 16 Teeth	1
2015	Top Shaft	1
2016	Gear 16 Teeth	1
2017	Gear 32 Teeth	1
2018	Guide Bush	1
2019	Gear 18 Teeth	1
2020	Gear 27 Teeth	1
2021	Gear 21 Teeth	1
2022	Middle Shaft	1
2023	Gear 32 Teeth	1
2024	Spacer	1
2025	Gear 30 Teeth	1
2026	Spacer	1
2027	Gear 21 Teeth	1
2028	Spacer	1
2029	Gear 28 Teeth	1
2030	Bottom Shaft	1



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Part No.	Part Name	Quantity
2031	Gear 32 Teeth	1
2032	Gear Hub	1
2033	Gear 42 Teeth	1
2034	Stopper Collar	1
2035	Gear 24 Teeth	1
2036	Gear Hub	1
2037	Gear 24 Teeth	1
2038	L.S. Out Put Shaft	1
2039	Gear 18 Teeth	1
2040	Spacers	2
2041	Gear 16 Teeth	1
2042	Spacer	1
2043	Gear 26 Teeth	1
2044	Gear 24 Teeth	1
2045	Gear 32 Teeth	1
2046	Gear 32 Teeth	1
2047	Feed Out put Shaft	1
2048	Out Put Shaft Covers	2
2049	Plug	1
2051	Lever M – T	1
2052	Gear Shifter M – T	1
2053	Lever A – B	1
2054	Lever Pin A – B	1
2055	Gear Shifter A – B	1
2056	Lever G – E – F	1
2057	Lever Pin G – E – F	1
2058	Gear Shifter G – E – F	1
2059	Lever C – D	1
2060	Gear Shifter C – D	1
2061	Lever 1 – 2 – 3 – 4	1
2062	Lever Pin 1 – 2 – 3 – 4	1
2063	Gear Shifter 1 – 2 – 3 – 4	1
2064	Handle	2
2065	Handle Cap	3



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Part No.	Part Name	Quantity
2066	Knob	3
2067	Handle Stud	2
2068	Plastic Grip	2
2101	Oil Seals 28427	1
2102	Oil Seals 19307	2
2103	Ball Bearings 6004	5
2104	Ball Bearings 6001	8
2201	Feed Box Clutch	1
2202	Lead Screw Clutch	1
2203	Lead Screw	1
2204	Feed Box Safety Clutch	1
2205	Feed Rod Safety Clutch	1
2206	Spring	1
2207	Spring Tension Collar	1
2208	Feed Rod	1
2209	Feed Rod Collar	1
2210	Thrust Bearing Caps	2
2211	Thrust Bearings	2
2212	Lead Screw Check Nuts	2
2213	Off - End Bracket	1
2214	Arm Plate	1
2215	Arm Clamping Bolt	1
2216	Arm Stud	1
2217	G.M. Bush	1
2218	Spacers	2
2219	Washer	2
2220	Change Gear 50 Teeth	1
2221	Change Gear 52 Teeth	1
2222	Change Gear 56 Teeth	1
2223	Change Gear 82 Teeth	1
2224	Change Gear 126 Teeth	1
2225	C - Gear + V belt gard	1



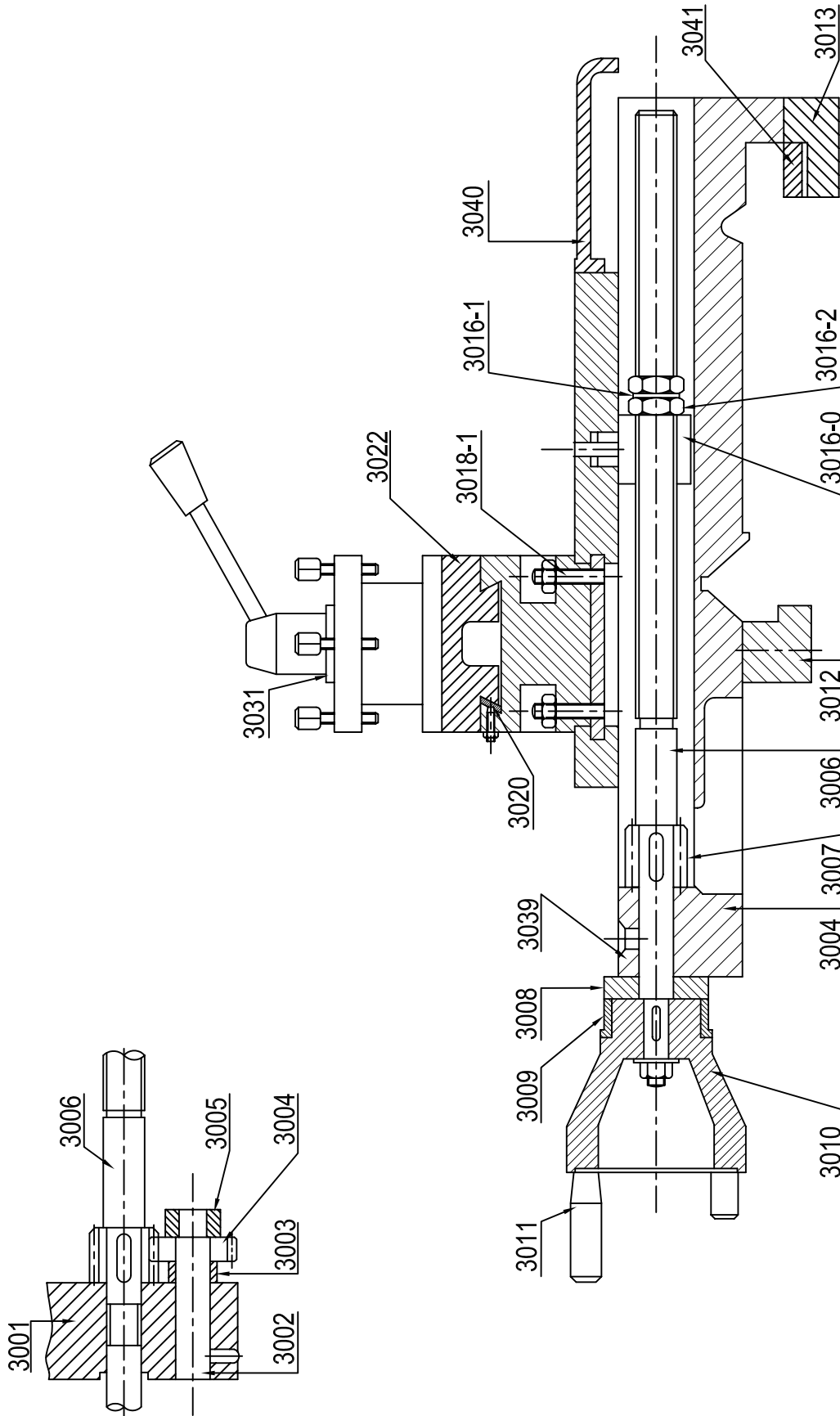
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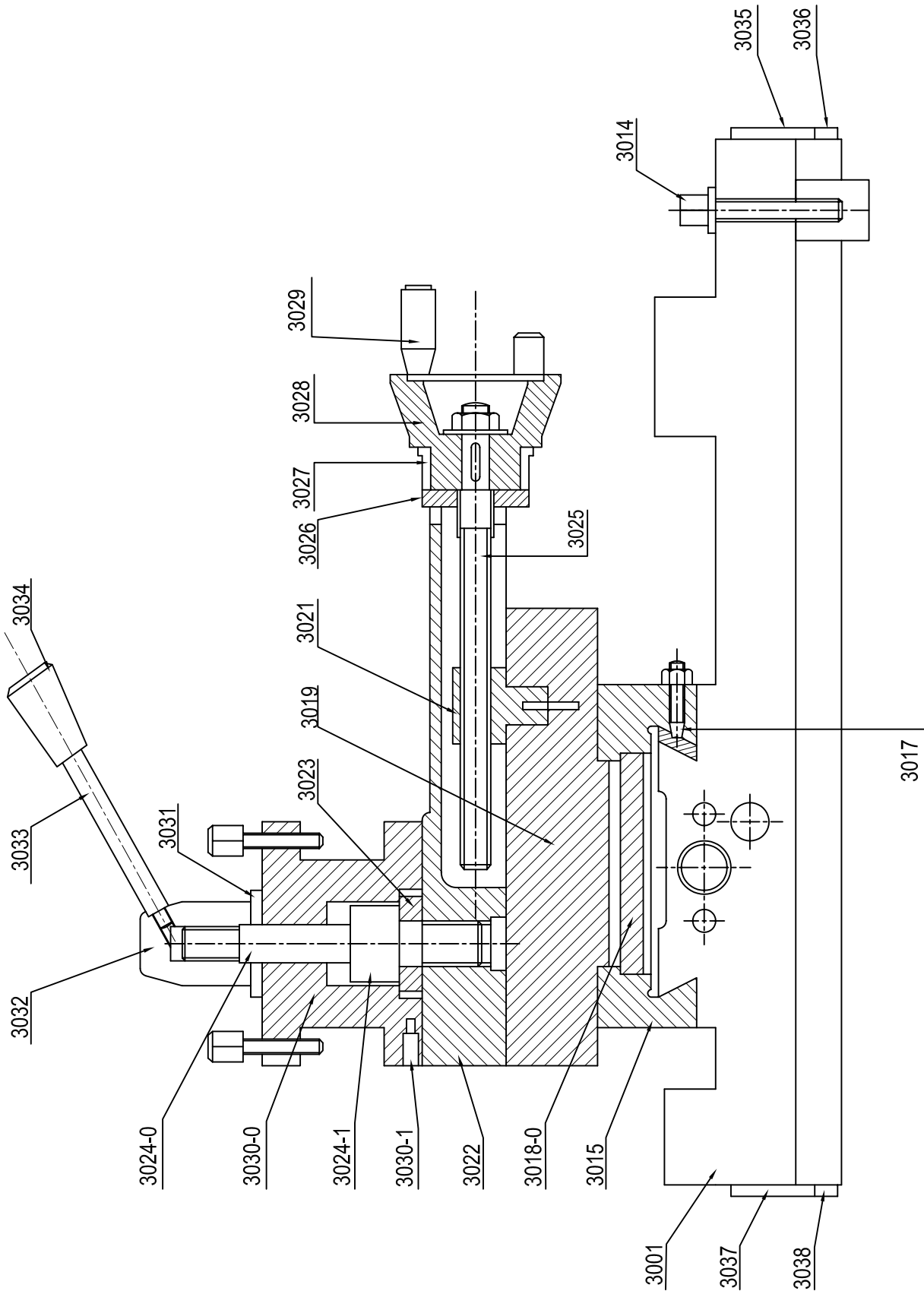
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CARRIAGE AND SLIDE ASSEMBLY



CARRIAGE AND SLIDE ASSEMBLY



5.3 CARRIAGE AND TOOL POST SUB ASSEMBLY

Part No.	Part Name	Quantity
3001	Saddle	1
3002	Idler gear stud	1
3003	Collar for idler gear stud	1
3004	Idler gear 21 Teeth	1
3005	Rear collar for idler gear	1
3006	Cross slide screw	1
3007	Gear for cross slide screw 16 Teeth	1
3008	Cross slide screw plate	1
3009	Cross slide micro ring	1
3010	Cross slide hand wheel	1
3011	Handle	1
3012	Saddle front lock piece	2
3013	Saddle rear pous	1
3014	Saddle lock bolt	1
3015	Cross slide	1
3016-0	Cross slide screw nut	1
3016-1	Backlash adjustment nut	1
3016-2	Lock nut	1
3017	Cross slide pous	1
3018-0	Cross slide swivel washer	1
3018-1	Stud for C.S.S. washer	1
3019	Swivel saddle	1
3020	Swivel saddle pous	1
3021	Tool post slide screw nut	1
3022	Tool post slide	1
3023	Index ring	1
3024-0	Tool post stud	1
3024-1	Nut for tool post index ring	2
3025	Tool post slide screw	1



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Part No.	Part Name	Quantity
3026	Tool post slide screw plate	1
3027	Tool post slide micro ring	1
3028	Tool post slide hand wheel	1
3029	Handle	1
3030-0	4 Way tool post	1
3030-1	Ratchet pin	1
3031	Washer	1
3032	Handle boss	1
3033	Handle	1
3034	Bakelite grip	1
3035	Saddle front wiper RH	1
3036	Saddle rear wiper RH	1
3037	Saddle front wiper LH	1
3038	Saddle rear wiper LH	1
3039	C.S. Screw front cover	1
3040	C.S. Screw rear plate	1
3041	Parallel pous	1
3042	Tool post key	1
3043	Tool post bolt 3/8"	1
3044	Saddle oil cup	1



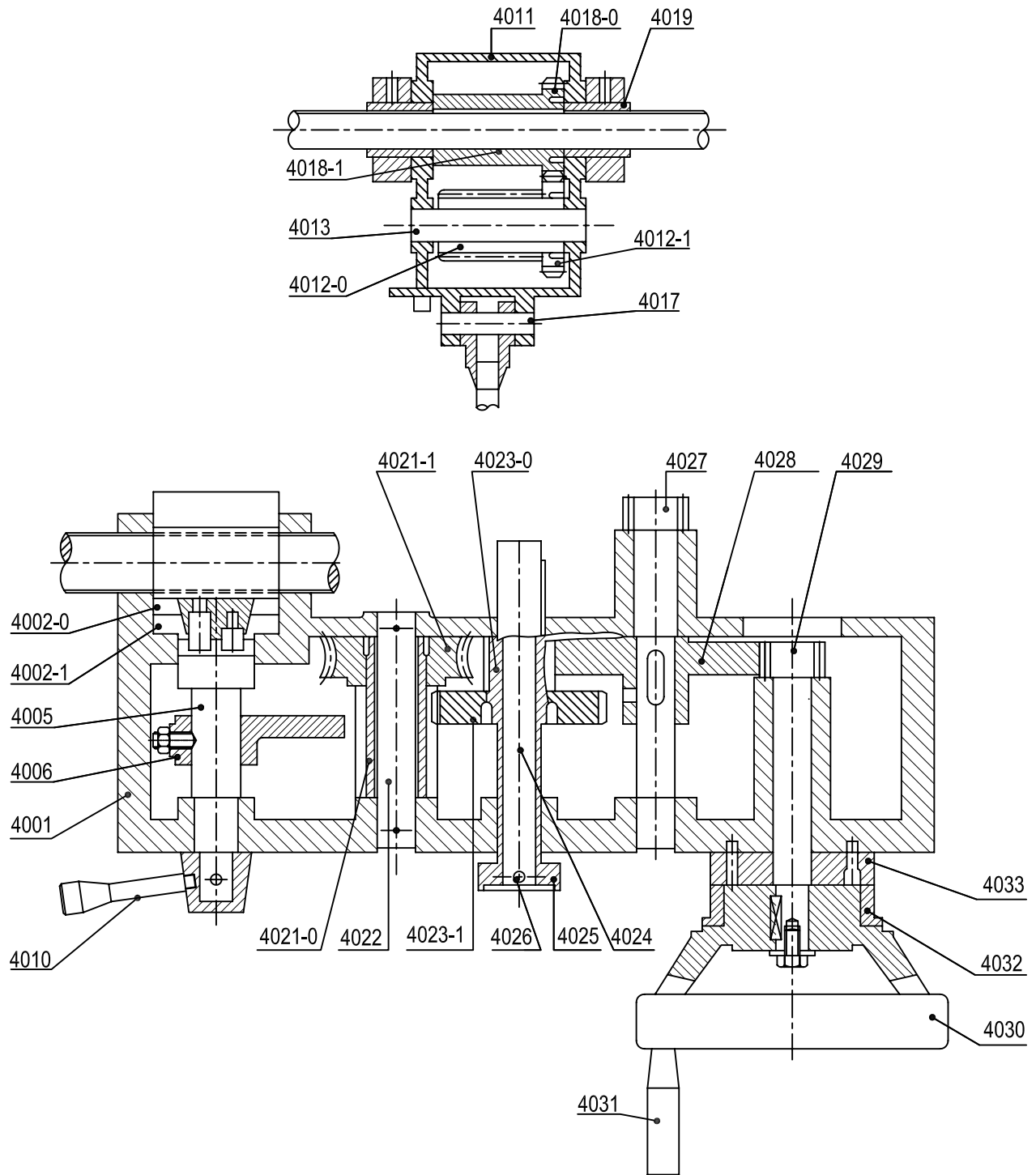
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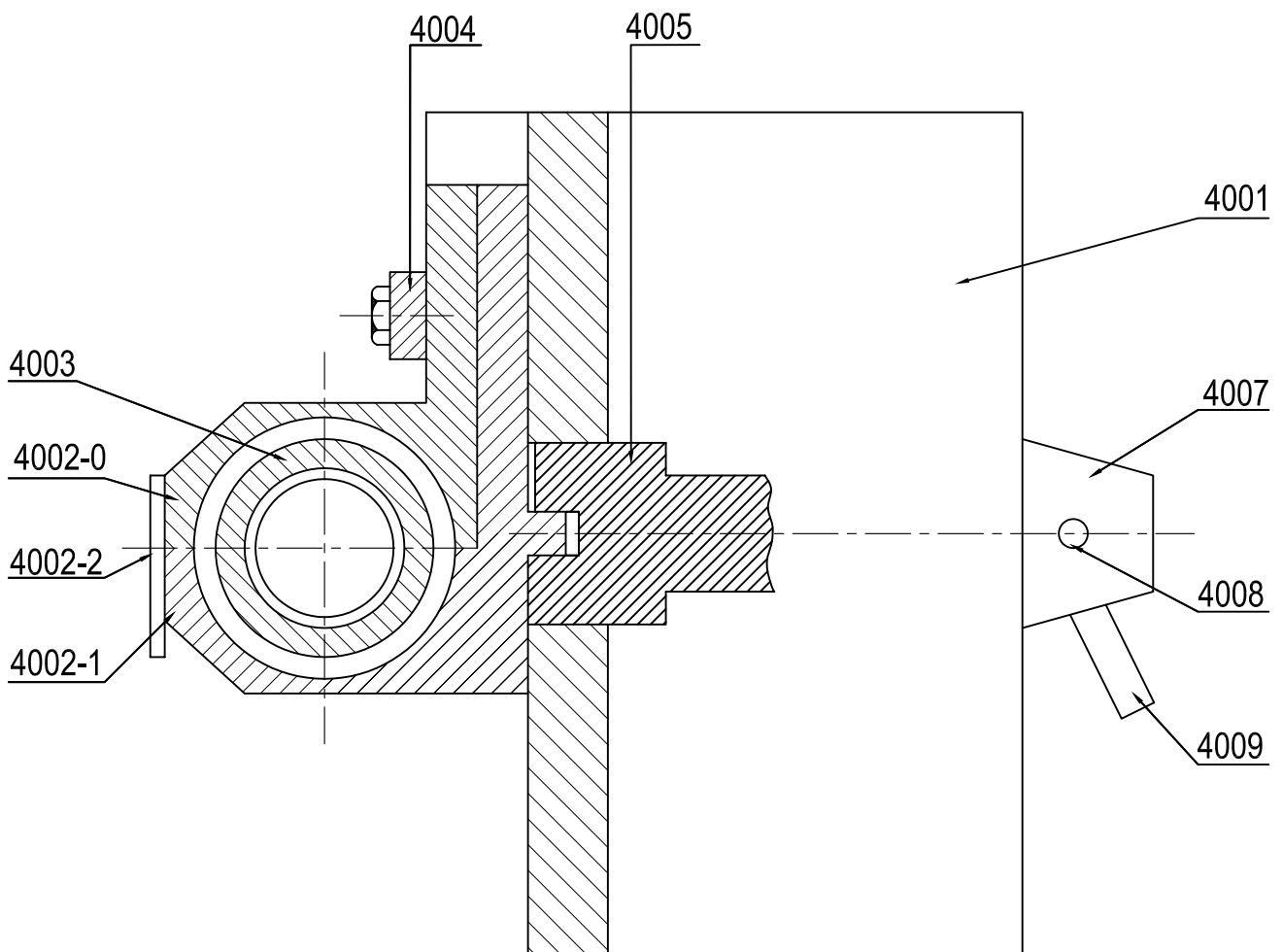
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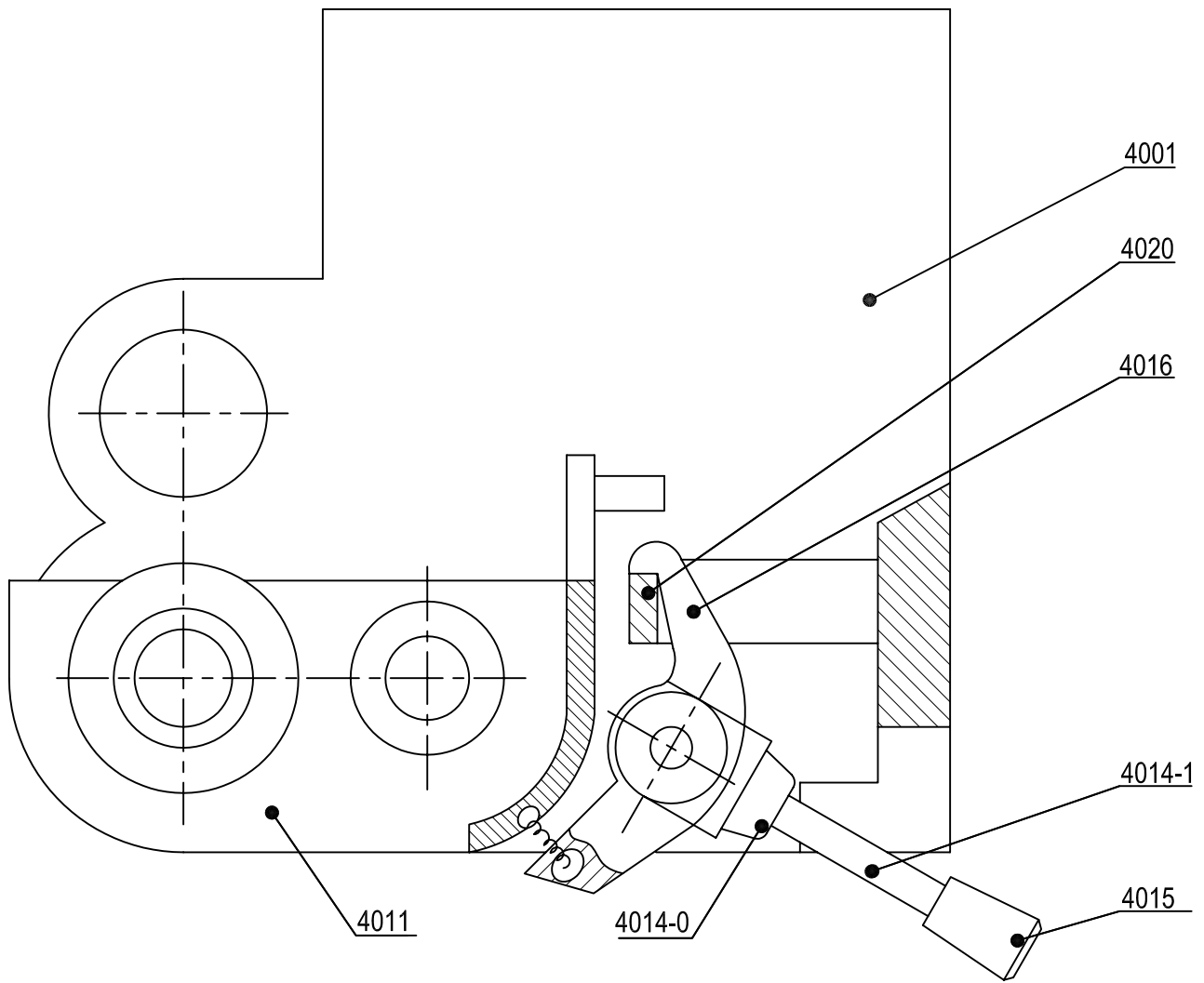


LEAD NUT HOUSING ASSEMBLY



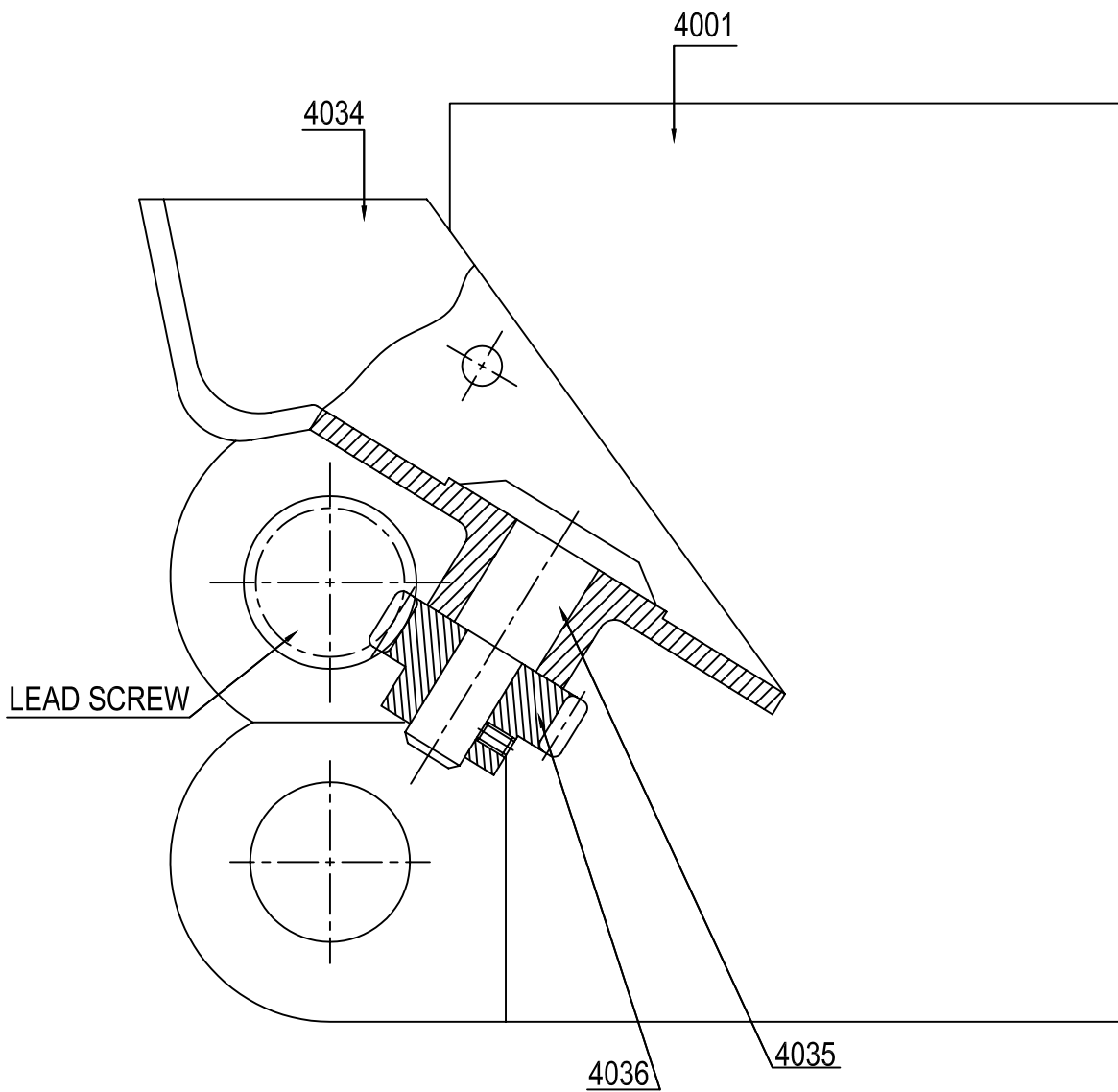


FEED CLUTCH LEVER ASSEMBLY





DIAL INDICATOR ASSEMBLY





5.4 APRON SUB ASSEMBLY

Part No.	Part Name	Quantity
4001	Apron	1
4002-0	Lead nut top housing	1
4002-1	Lead nut bottom housing	1
4002-2	Guard for L.N. top housing	1
4003	Lead nut pieces	2
4004	Lead nut guide strip	1
4005	Lead nut shaft	1
4006	Feed locking lever	1
4007	Boss for lead nut shaft	1
4008	Set pin	1
4009	Stud for boss	1
4010	Bakelite grip	1
4011	Worm box body	1
4012-0	Worm	1
4012-1	Gear 30 Teeth	1
4013	Worm pin	1
4014-0	Feed clutch bracket	1
4014-1	Stud for F.L.B.	1
4015	Bakelite grip	1
4016	Feed clutch lever	1
4017	Feed clutch pin	1
4018-0	Feed gear 30 teeth	1
4018-1	Boss for feed gear	1
4019	Collar for worm box	2
4020	Feed clutch strip	1
4021-0	Gear 24 teeth	1
4021-1	Worm wheel 32 teeth	1
4022	Worm gear shaft	1
4023-0	Compound gear 15 teeth	1



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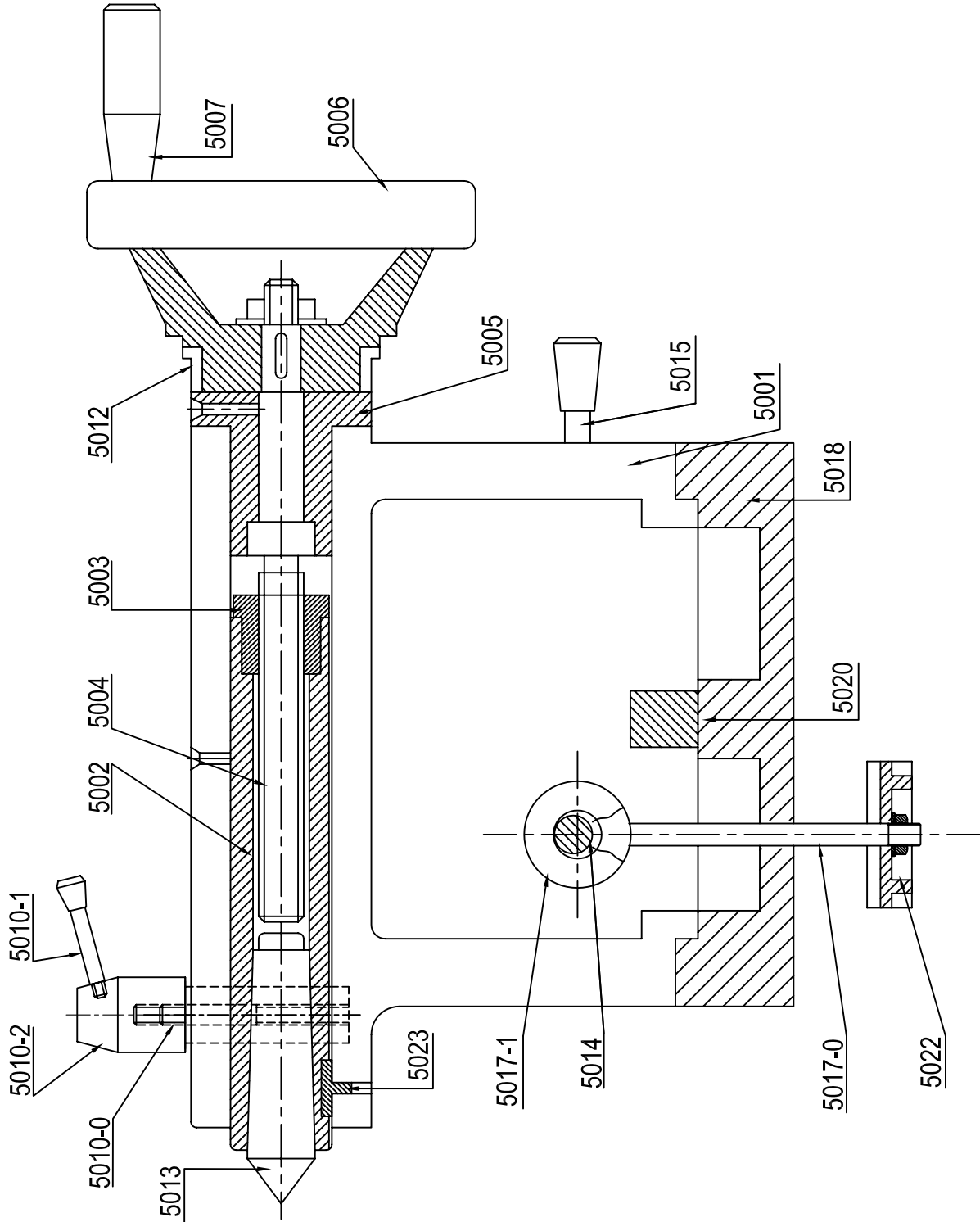
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Part No.	Part Name	Quantity
4023-1	Gear 56 teeth	1
4024	Feed selecting shaft	1
4025	Feed selecting knob	1
4026	Set pin for knob	1
4027	15 teeth Gear shaft for Rake	1
4028	Gear 50 teeth	1
4029	Gear shaft 14 teeth	1
4030	Hand wheel	1
4031	Handle	1
4032	Micro ring	1
4033	Micro ring plate	1
4034	Dial indicator bracket	1
4035	Dial indicator	1
4036	Gear for dial indicator 16 teeth	1
4037	24" Rake (12 DP)	1

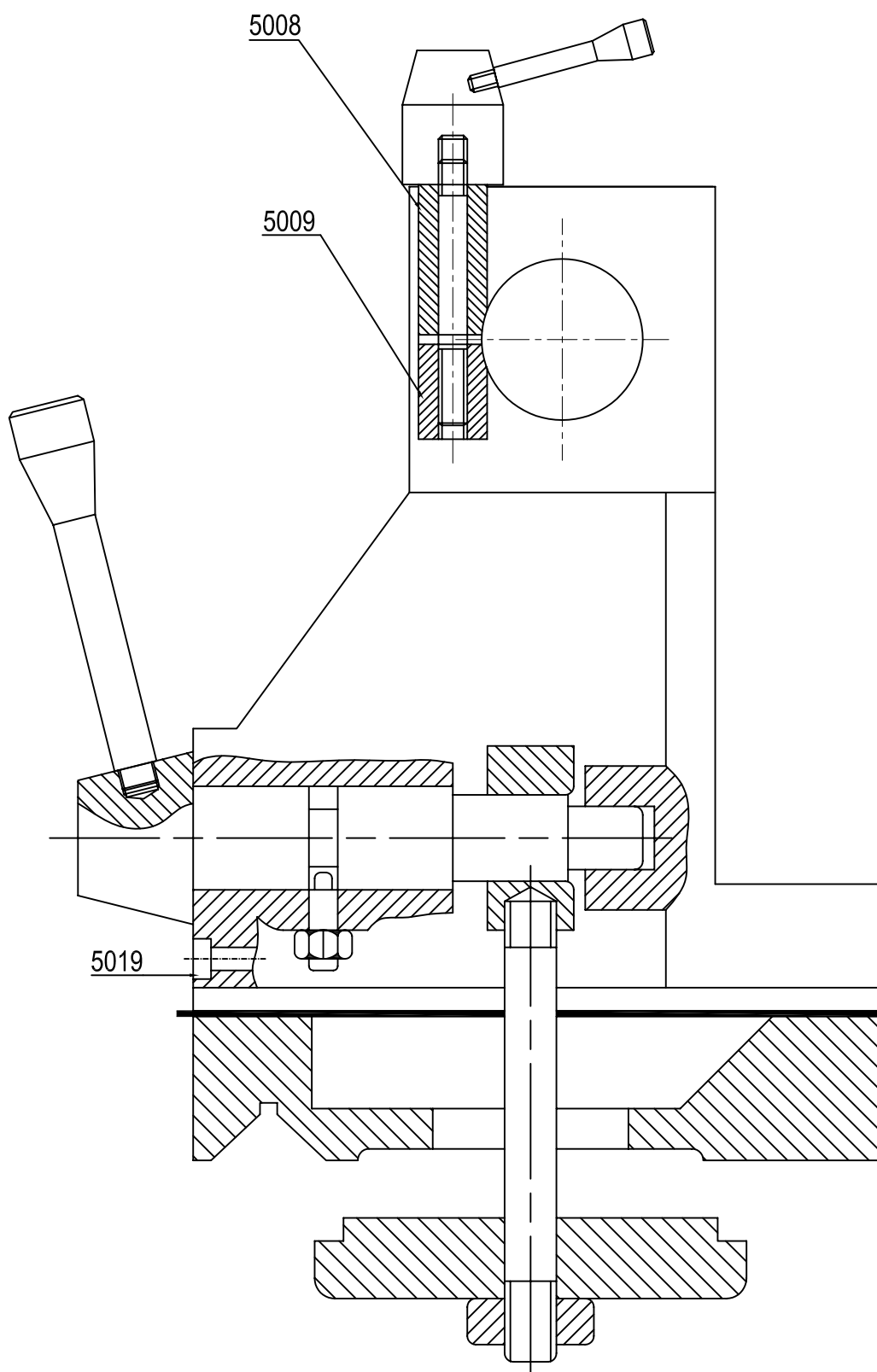


TAIL STOCK ASSEMBLY





TAIL STOCK ASSEMBLY



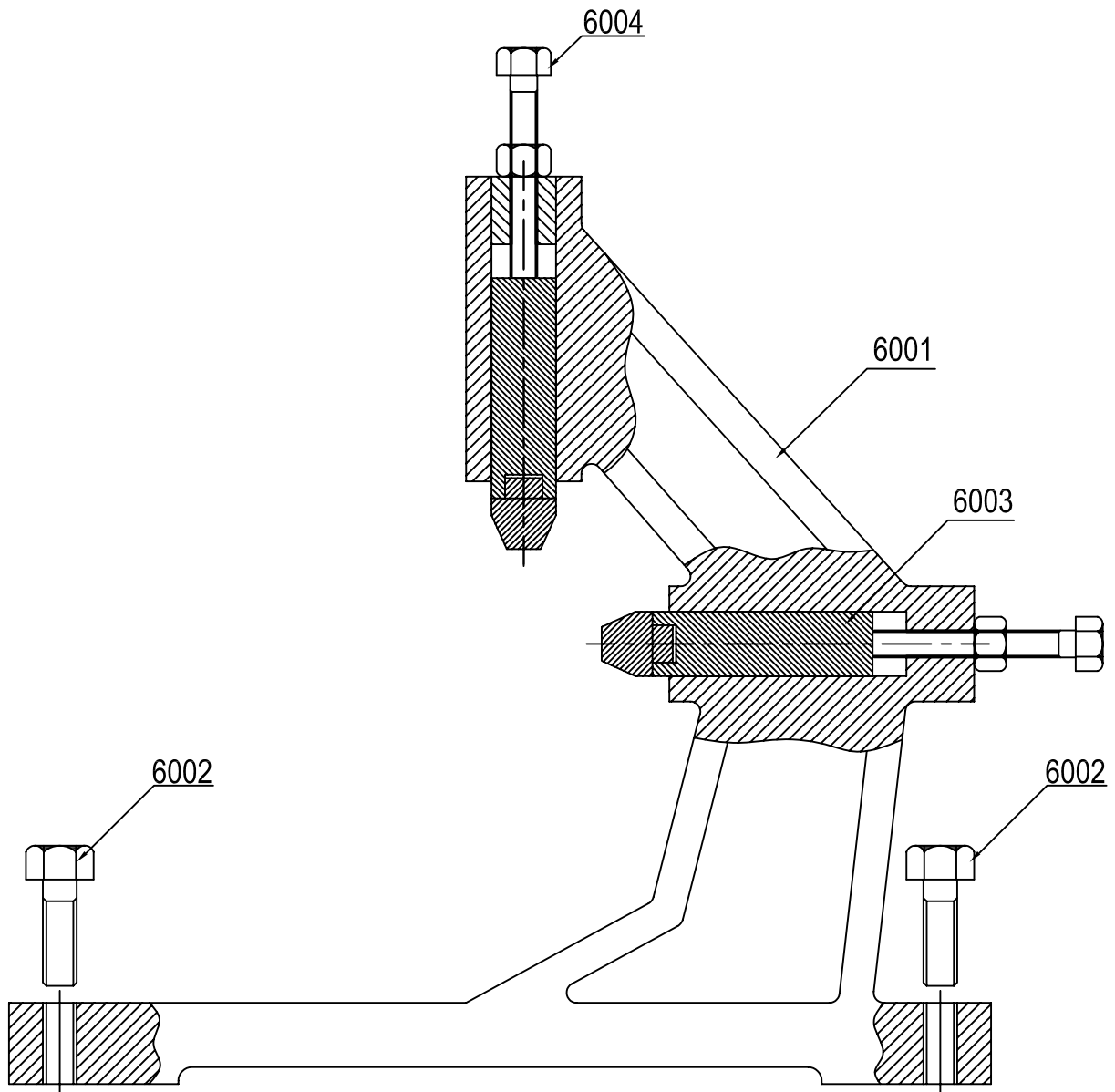


5.5 TAIL STOCK SUB ASSEMBLY

Part No.	Part Name	Quantity
5001	Tail stock body	1
5002	Tail stock spindle	1
5003	Tail stock screw nut	1
5004	Tail stock screw	1
5005	Tail stock bush	1
5006	Tail stock hand wheel	1
5007	Handle	1
5008	Spindle locking nut	1
5009	Spindle locking nut	1
5010	Spindle locking handle	1
5011	Bakelite grip	1
5012	Micro ring	1
5013	Centre MT – 4	1
5014	Eccentric shaft	1
5015	Eccentric shaft handle	1
5016	Bakelite grip	1
5017-0	Clamping stud	1
5017-1	Clamping stud collar	1
5018	Tail stock base	1
5019	Adjusting bolt	1
5020	Nut for adjusting bolt	1
5021	Lock bolt with nut	1
5022	Clamping plate	1
5023	Key for tail stock spindle	1
5024	Center top dish	1



FOLLOW REST ASSEMBLY





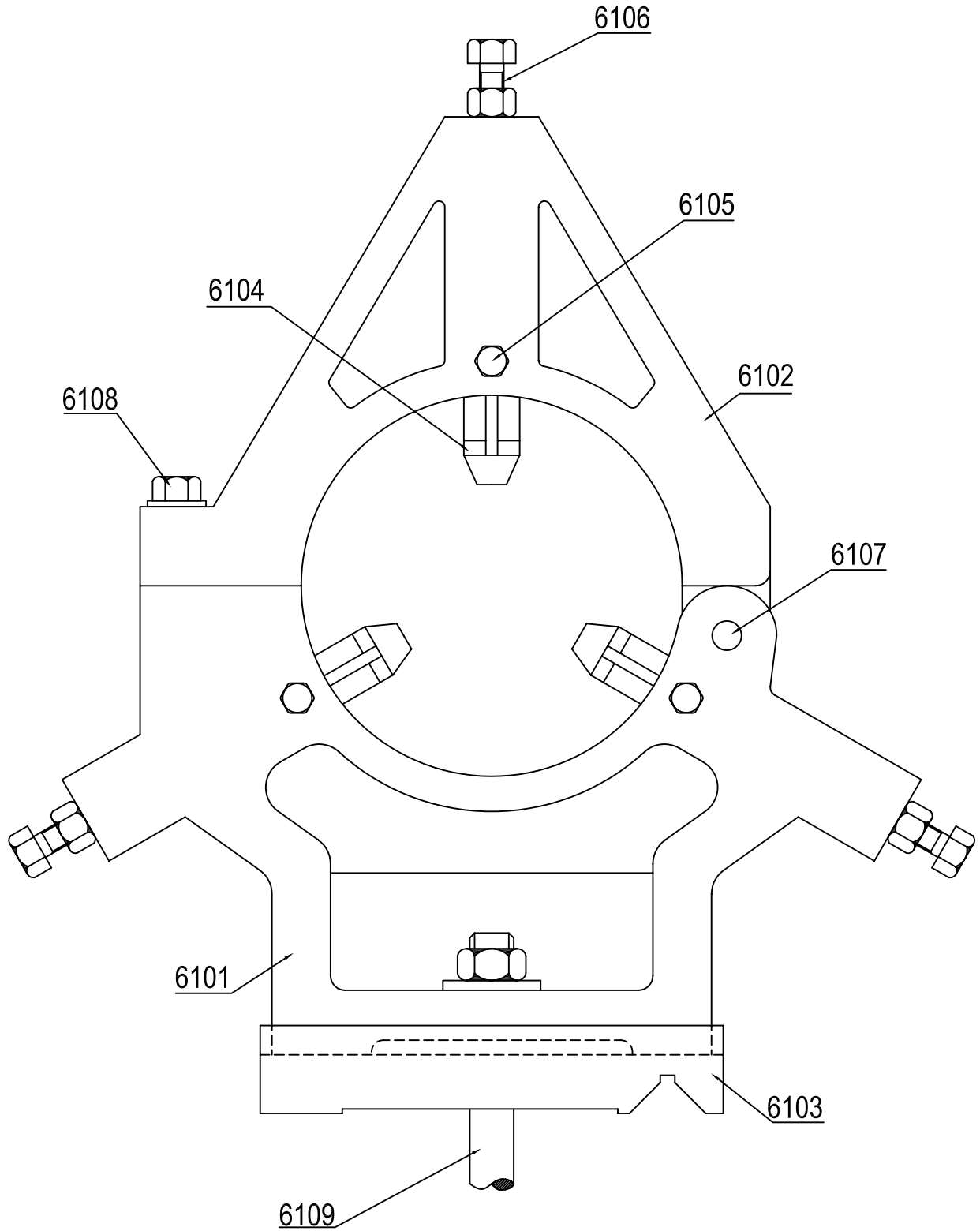
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5.6 STEDY / FOLLOW REST SUB ASSEMBLY

Part No.	Part Name	Quantity
6001	Follow rest body	1
6002	Clamping bolt	2
6003	Guide jaw with G.M. pad	2
6004	Adjusting bolt with check nuts	2
6005	Guide jaw clamping bolt	2
6101	3 pin body lower	1
6102	3 pin body upper	1
6103	3 pin base	1
6104	Guide jaw with G.M. pad	3
6105	Guide jaw clamping bolt	3
6106	Guide jaw adj. bolt with lock nut	3
6107	Hinge pin	1
6108	Upper & Lower half clamping bolt	1
6109	3 pin clamping stud	1



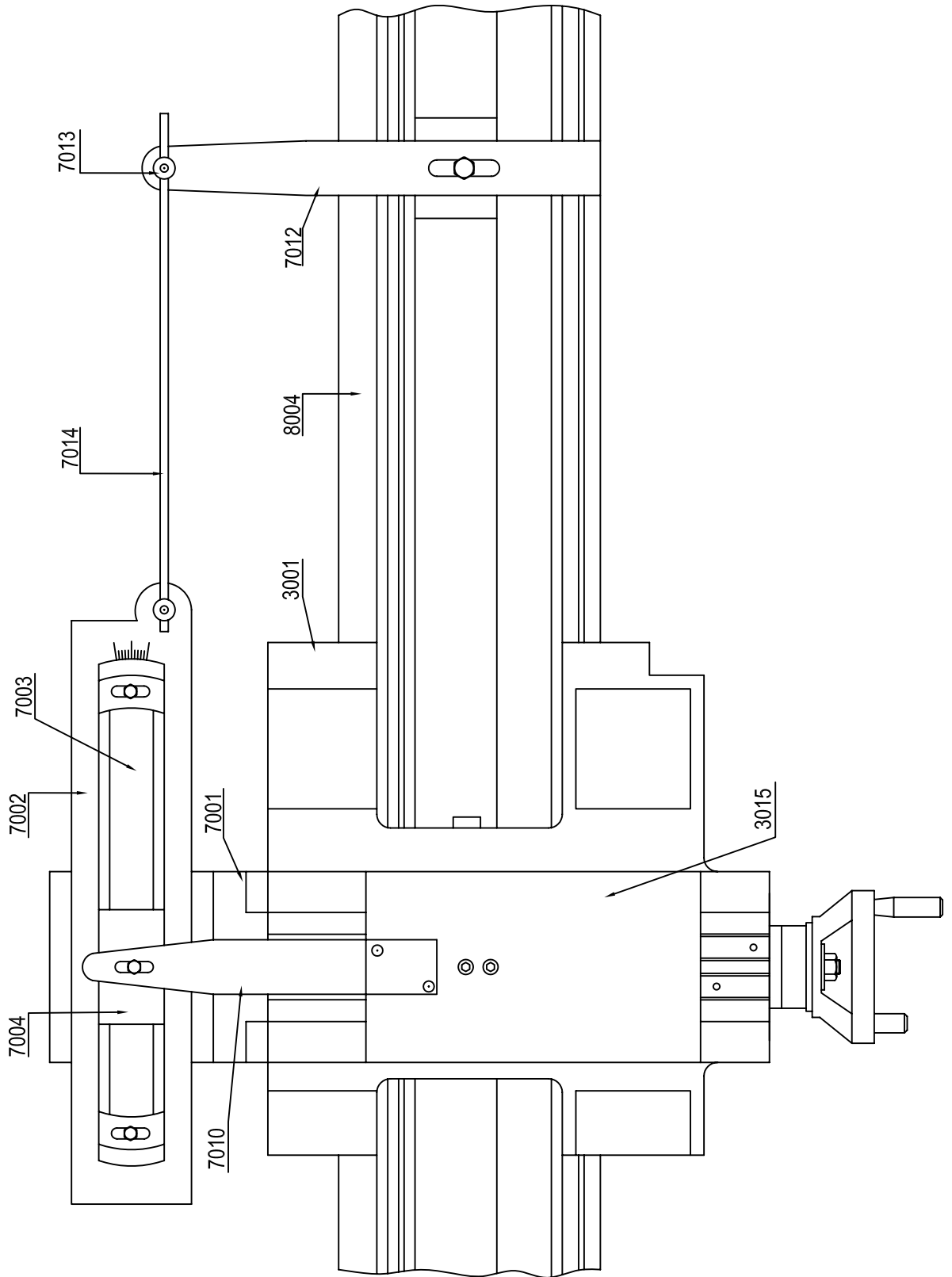
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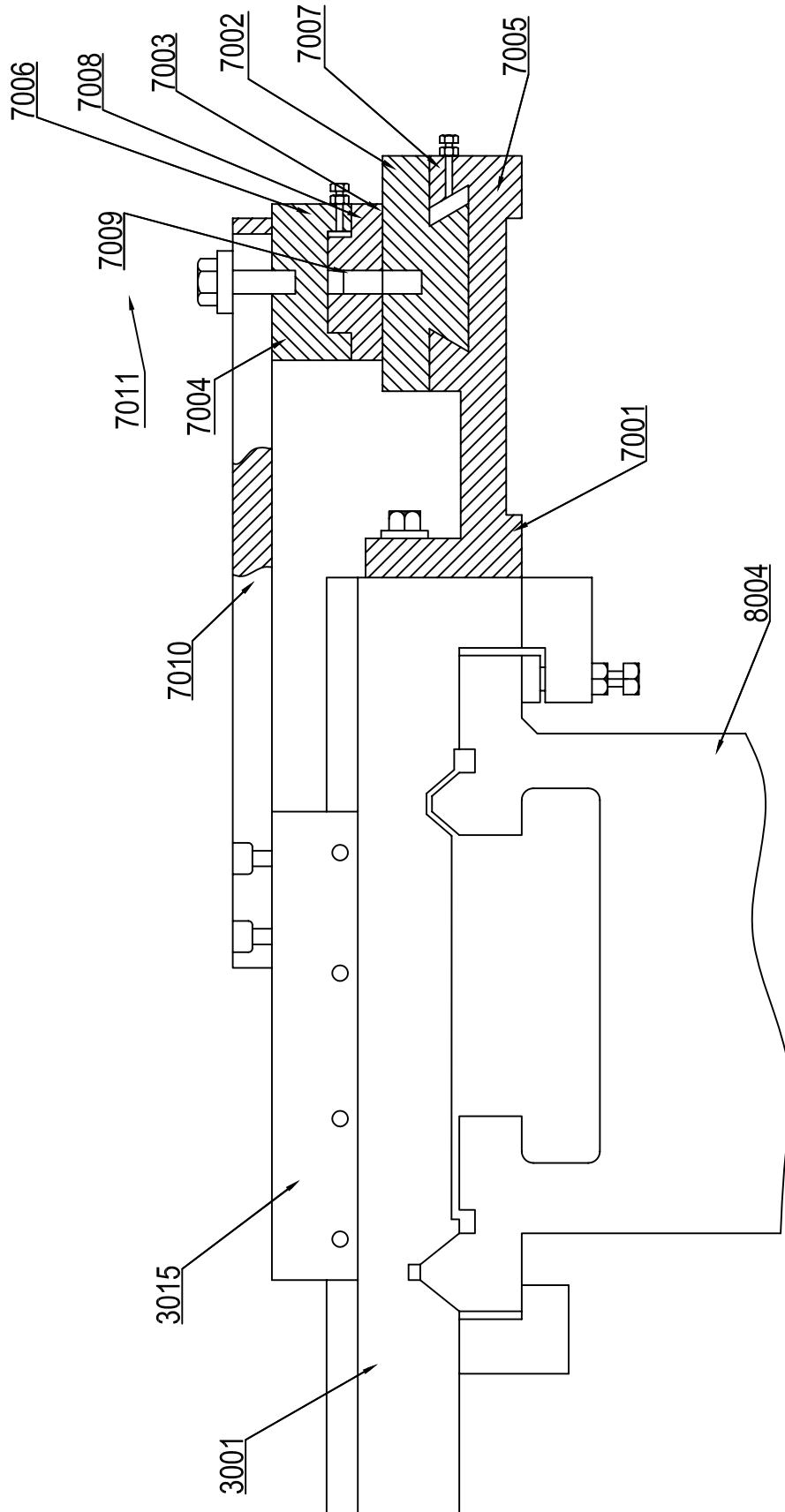
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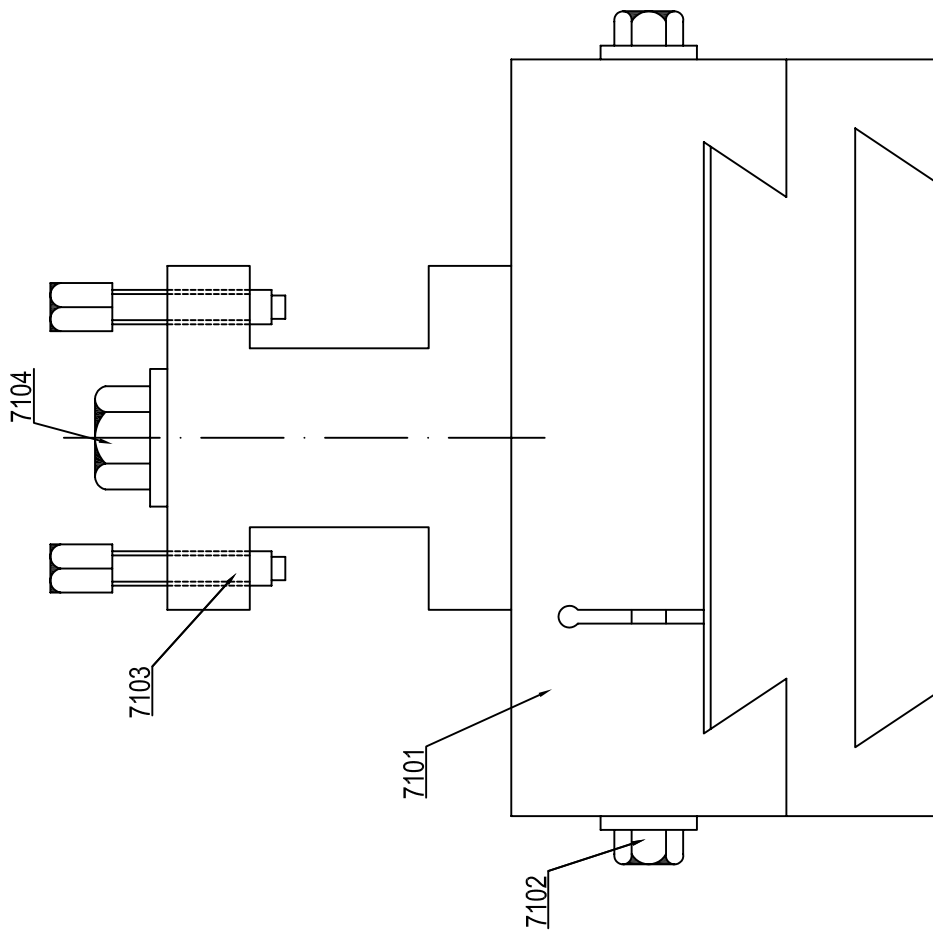
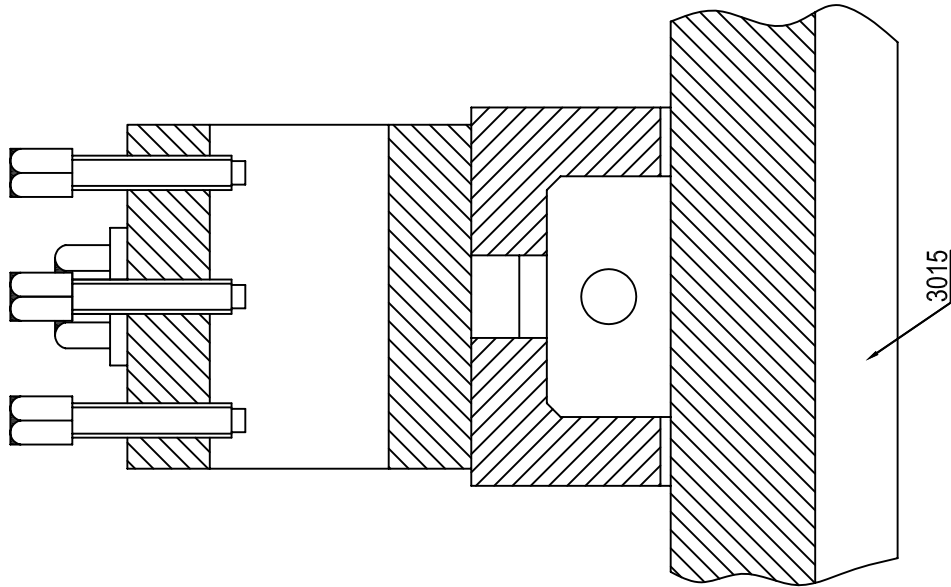
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5.7 TAPER TURNING SUB ASSEMBLY

Part No.	Part Name	Quantity
7001	Angle bracket	1
7002	Bracket guide	1
7003	Swivel guide	1
7004	Guide block	1
7005	Taper wedge for bracket guide	1
7006	Parallel wedge for guide block	1
7007	Setting bolt for taper wedge	4
7008	Setting bolt for parallel wedge	4
7009	Location plug	1
7010	Surface clamp	1
7011	Guide block clamping bolt	1
7012	Bed clamp	1
7013	Clamp pad	2
7014	Clamp Rod	1

5.7 REAR TOOL POST SUB ASSEMBLY

Part No.	Part Name	Quantity
7101	R.T.P. Base	1
7102	Clamping Stud	1
7103	Rear tool post	1
7104	Tool post clamping bolt	1



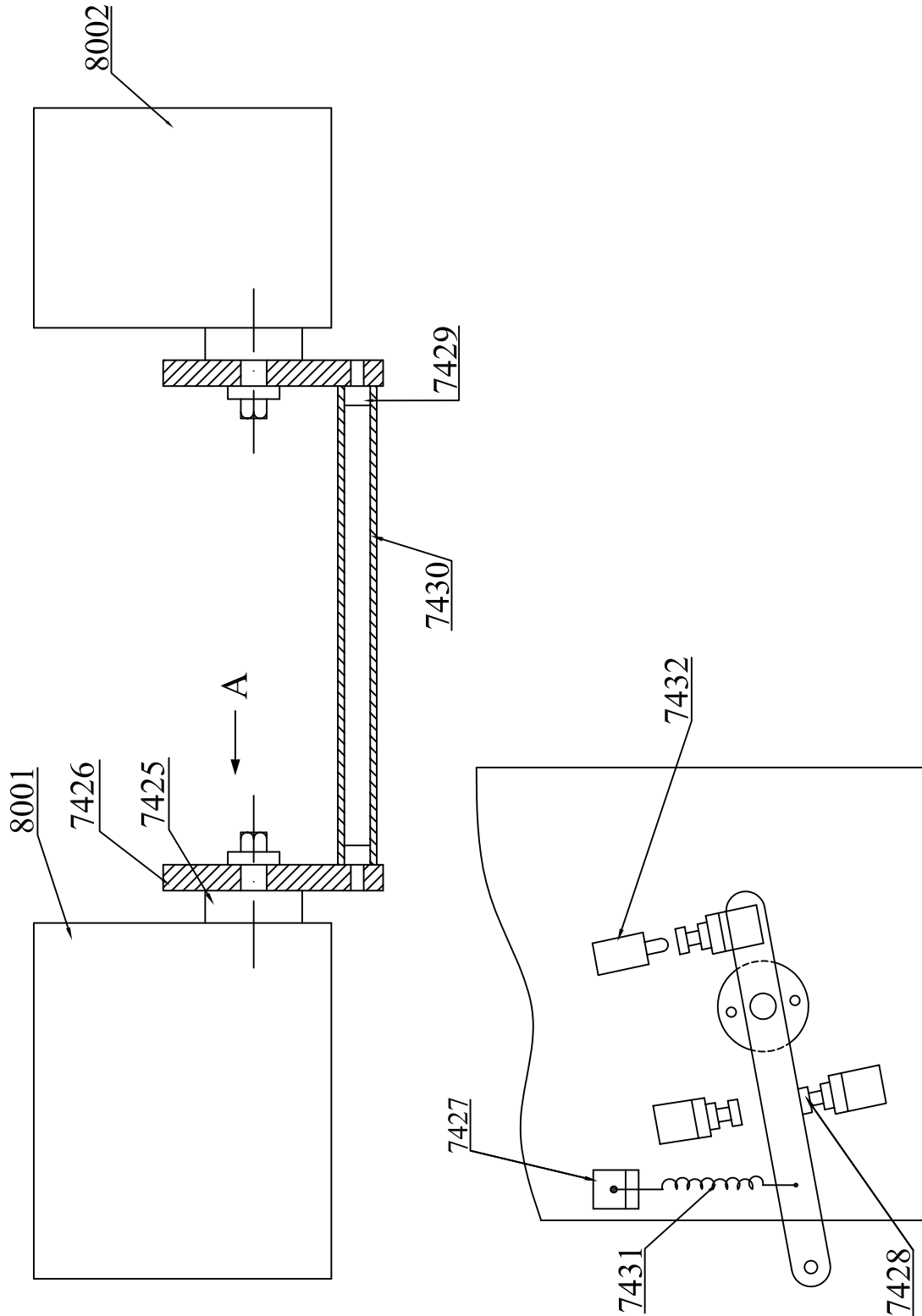
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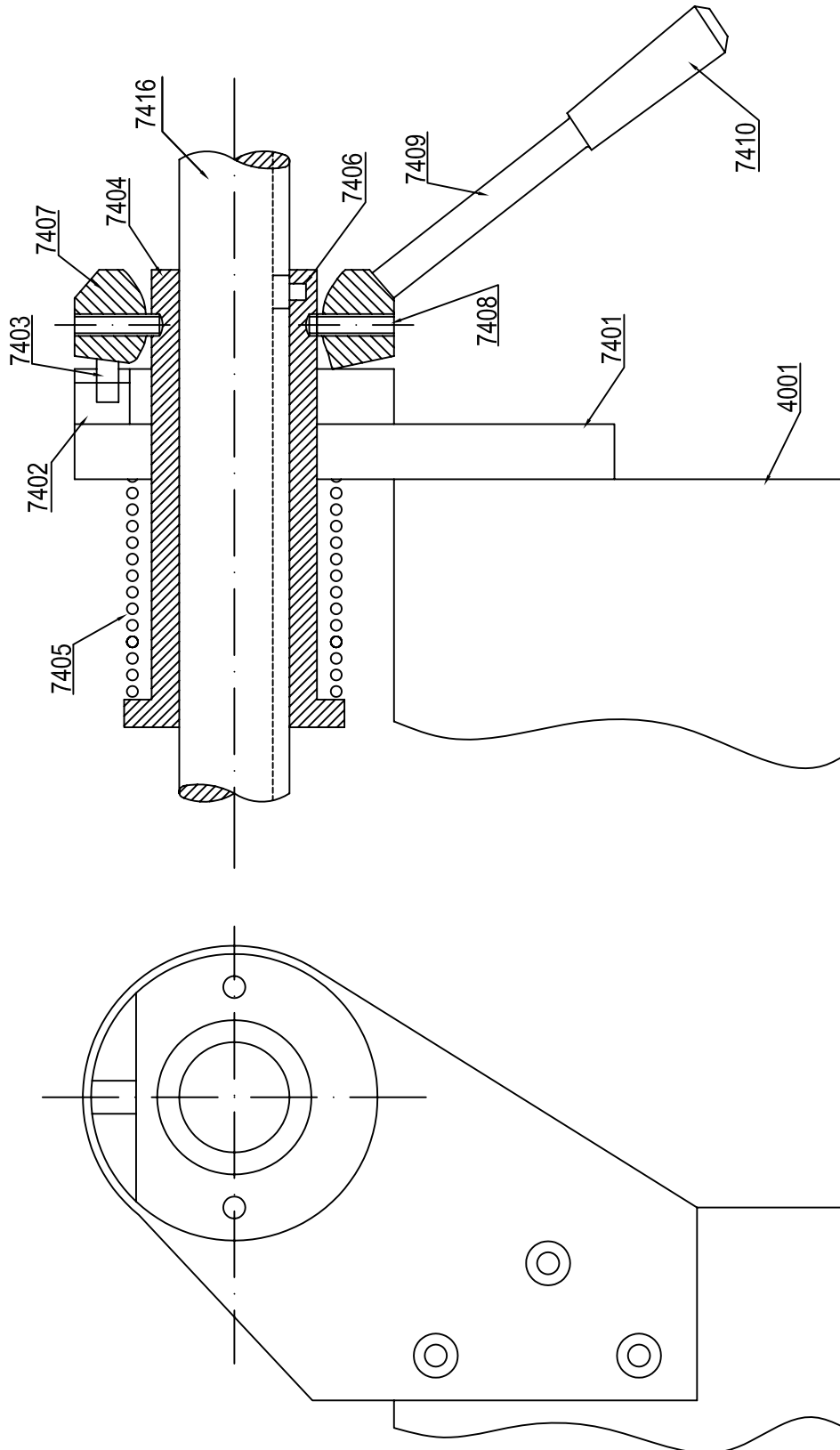
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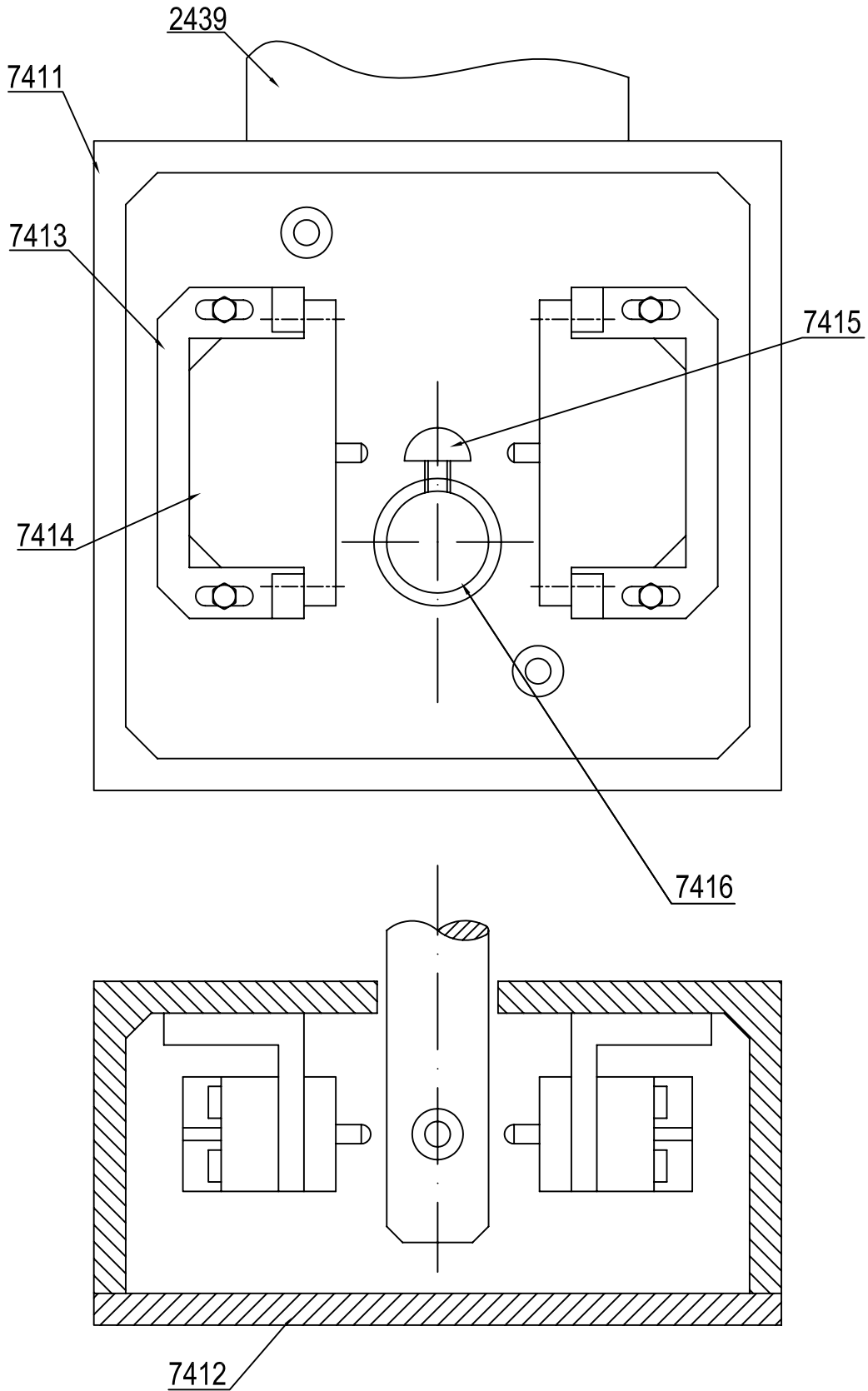
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VIEW - A



REVERS & FORWARD HANDLE ASSEMBLY



SWITCH - SHAFT AND LIMIT SWITCH



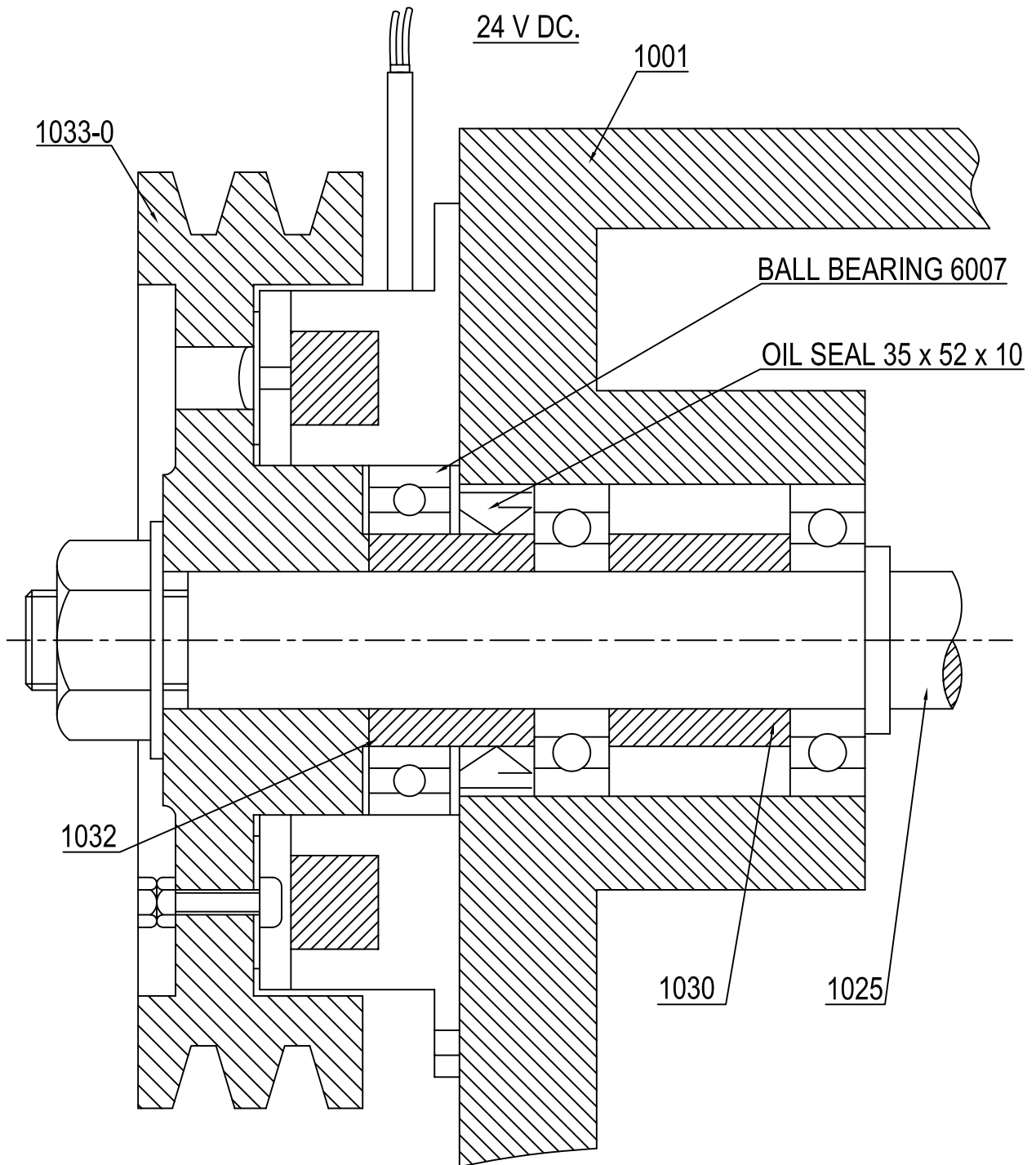
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ELECTRO - MAGNETIC BRAKE



5.8 SWITCH SHAFT SUB ASSEMBLY

Part No.	Part Name	Quantity
7401	Guide plate	1
7402	Lock ring	1
7403	Lock pin	1
7404	Guide bush	1
7405	Spring	1
7406	Guide bush key	1
7407	Handle ring	1
7408	Hindge bolt	2
7409	Handle	1
7410	Plastic grip	1
7411	Limit switch box	1
7412	Limit switch box cover	1
7413	L. S witch bracket	2
7414	Limit switch No. XCE-118	2
7415	Operating dog bolt	1
7416	Switch shaft	1
7425	Pivot plug	2
7426	Strip	2
7427	Angle bracket	7
7428	Stopper bolt with nut	4
7429	Plug for pipe	2
7430	Pipe	1
7431	Spring	2
7432	Limit Switch No. PC-600	1



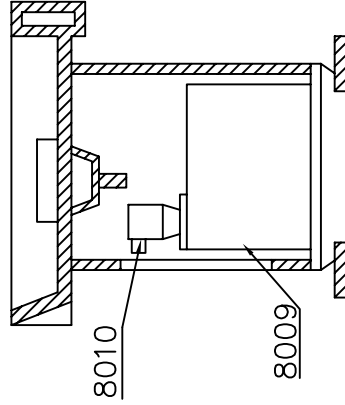
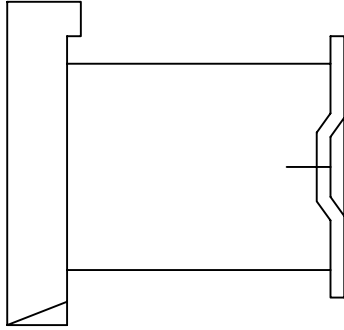
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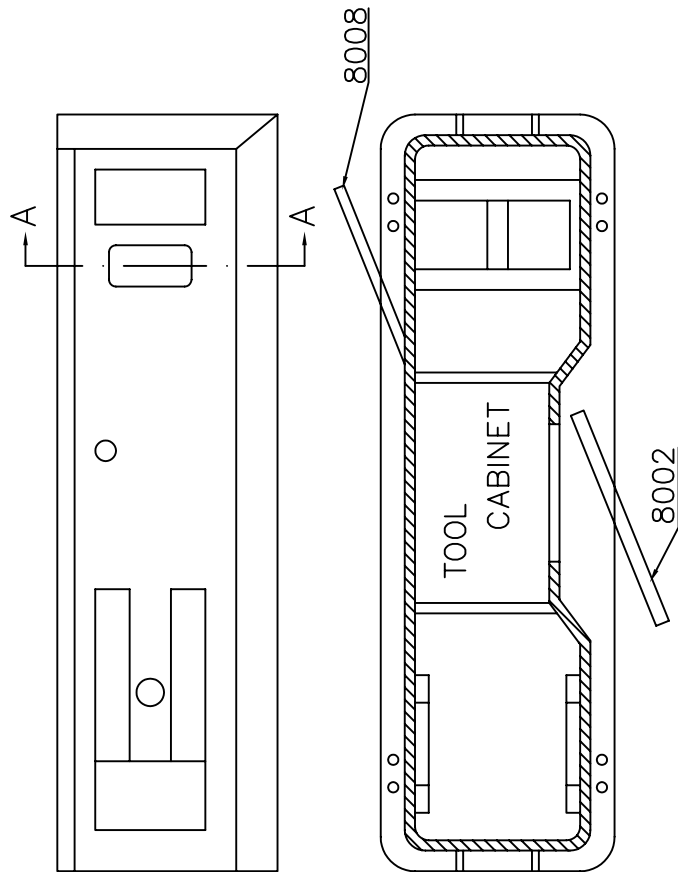
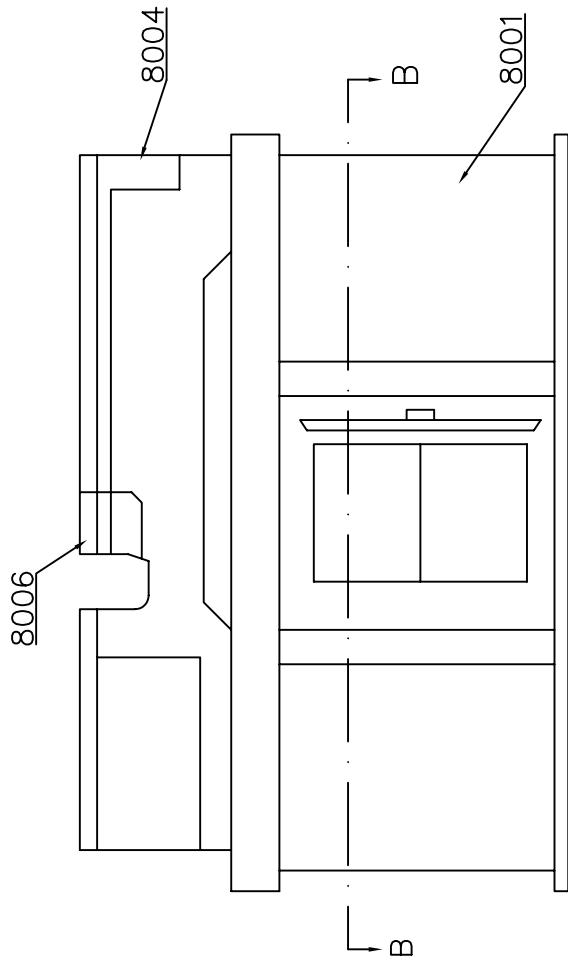
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SECTION - AA



SECTION - BB



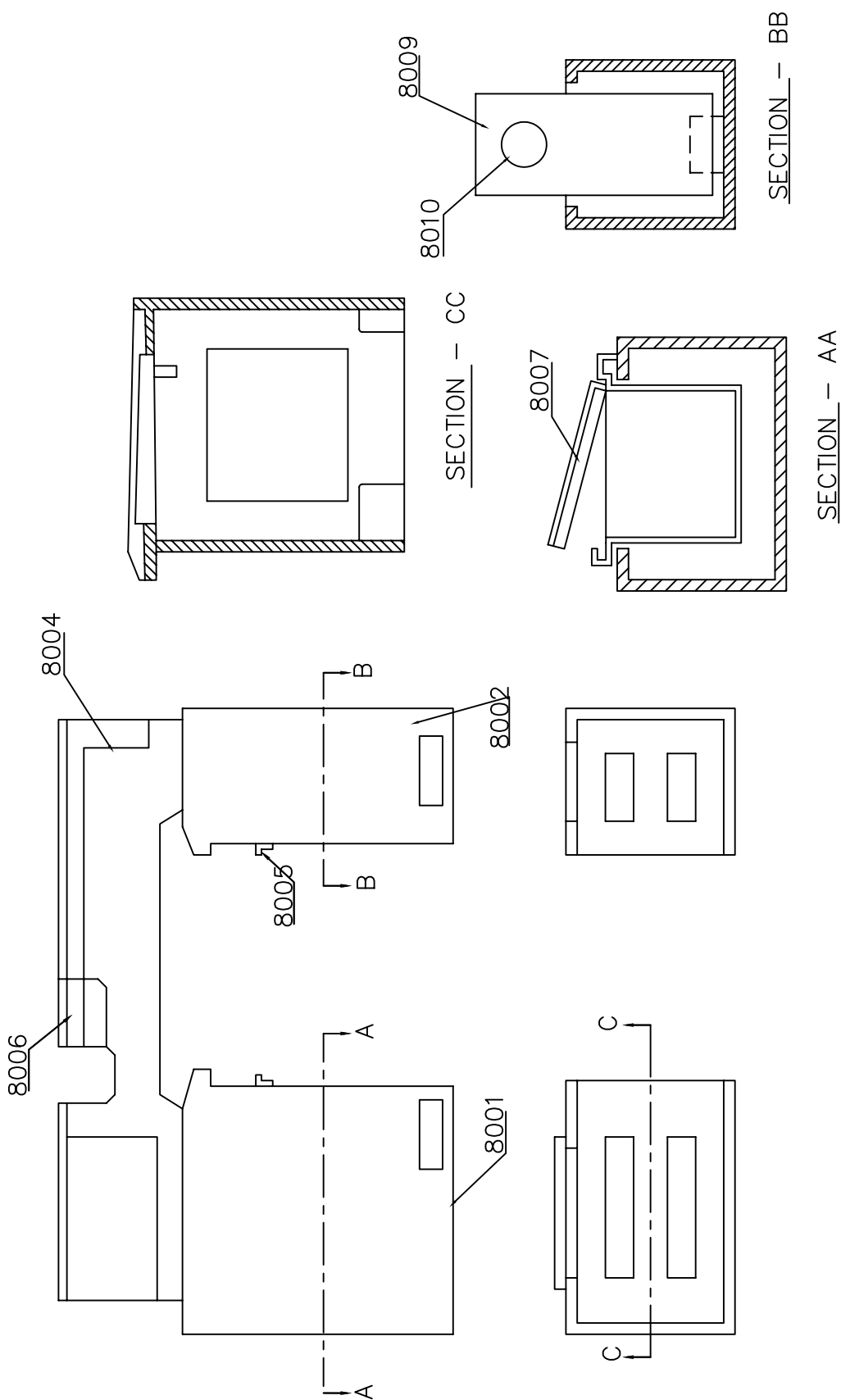
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5.9 STRUCTURES SUB ASSEMBLY

Part No.	Part Name	Quantity
8001	Pedestal H.S. Side	1
8002	Pedestal centre Side	1
8003	Chip tray	1
8004	Bed	1
8005	Chip tray bracket	2
8006	Gap	1
8007	Electrical panel box with door	1
8008	M S sheet cover	1
8009	Coolant tank	1
8010	Coolant pump	1



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MODEL: _____

MACHINE NO. : _____

SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
1		Straightness of carriage slide ways (a) In longitudinal direction (b) In transverse direction.	0.03 mm (Convex) 0.04	
2		Straightness of carriage movement in horizontal plane.	0.02mm	
3		Parallelism of tailstock movement to carriage movement (a) In horizontal plane (b) In vertical plane	0.03 mm 0.03 mm	
4		(a) Periodic axial slip (b) Comming of the face plate mounting surface	(a) 0.01mm (b) 0.02 mm	
5		Runout or spindle nose	0.01 mm	
6		True running of taper bore of spindle (a) Near to the spindle (b) At a dist. 300 mm	0.01 mm 0.02 mm	
7		Parallelism of spindle axis to the carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.015/300 (towards tool only) (b) 0.02/300 (upwards only)	



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MODEL: _____

MACHINE NO. : _____

SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
8		Parallelism of external surface of tailstock sleeve to carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.015/100 (towards tool only) (b) 0.02/100 (upwards only)	
9		Parallelism of taper bore of tailstock sleeve to carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.03/300 (towards tool only) (b) 0.03/300 (upwards only)	
10		Difference in height between headstock and tailstock centre	0.04 mm (Tailstock centre higher than head stock centre)	
11		Parallelism of the longitudinal movement of the tool slide to the spindle axis	0.04/300 upwards only	
12		Squareness of the transverse movement of the cross slide to spindle axis	0.02/300 mm	
13		Axial slip	0.015 mm	
14		Accuracy of the pitch generated by the lead screw	(a) 0.04/300 (b) 0.015/50	



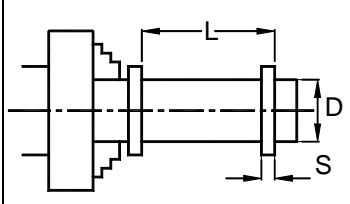
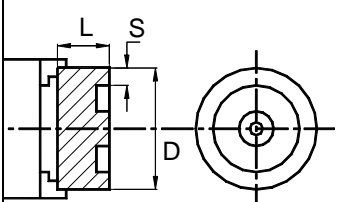
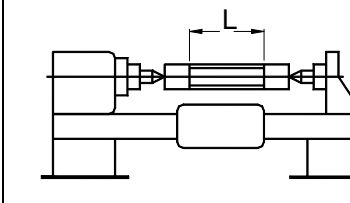
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PRACTICAL TEST

MODEL: _____

MACHINE NO.: _____

SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
1		Turning of cylindrical test piece held in chuck (a) Roundness (b) Cylindricity	(a) 0.01 (b) 0.04/300	
2		Facing of cylindrical test piece held in chuck (Flat or Concave only.)	0.025/300 dia.	
3		Thread cutting a cylindrical test piece (a) Deviation over length or 300 (b) Deviation over length of 50	(a) 0.04 mm (b) 0.015 mm	
4		Hardness of lathe bed (a) Standard bed (b) Flame harden bed	180 BHN min. 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 – 1) – 1971.

- TESTED BY : _____.

- INSPECTION DEPT : _____.

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