

# OPERATION MANUAL And PARTS LIST

# **HL-series Heavy Duty Lathe**



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15. ANNEX

Property

• PART LIST - HEADSTOCK WITH SPINDLE BORE 9", 12", 15"

# 2. GENERAL LAYOUT

1.END GEAR TRAIN
2.HEADSTOCK
3.GEAR BOX
4.ELECTRIC CONTROL
5.CENTER
6.FEED ROD
7.GAP BLOCK
8.LEADSCREW

9.APRON 10.TOP-SLIDE 11.SADDLE AND CROSS-SLIDE 12.ELECTRIC CONTROL 13.SLODEING PLATE 14.BED 15.TAILSTOCK



# 3. Before Operation

Power Source Wiring

'Power connector is at lower left part of the lathe.

Power source switches with fuse must be set up in the lathe and electric circuit. The wire of the lathe must be ground connected too.

After wire connection, then, input the power source by power source button.

To change the spindle in low speed, check the spindle rotating direction by operating the start-lever in the right side of APRON. See the result whether it is normal or not, in this case, the spindle rotates to the direction of operator, then the rotation is normal. As the spindle rotates to the opposite direction, you should replace any two of the three electric wires.

Identification and preparation before operation

'To supply oil to all the necessary positions. (Check "lubrication diagram" in term of 9. lubrication system)

Check all the levers and handles, whether or no in normal condition.

Check the V-belt of headstock motor, whether or no in adequate tension state.

<sup>•</sup>Make clear the relative positions before operate the transmission mechanism, such as head stock, feed gear box, cross slide, and etc, and automatic feeding, tread cutting.

# 4. UNPACKING AND UNLOADING

# Lifting way (A)

Each machine is dispatched fully assembled except for attachment such as taper attachment etc. Unloading the machine, packed in the wooden case, should be made by wiring cable from the sleepers.

Lifting unpacked machine is made easily by the method shown in the following.

Figure and according to the center of gravity of this laths.

Raising and lowering the lathe, should be done carefully, especially when you lower the lathe, be careful not to bump it against the floor and give attention to the other men to attain the purpose of safety.



# Lifting way (B)

Instruction for Machine lifting:

A) Place crossbars (square bars) at the bottom of lathe

- 1. Prop up machine off the ground about 200mm height.
- 2. Place crossbars 2 & 4 at proper position on both sides in the bottom of the machine.
- 3. Place round bars inside the inner holes at both rear ends of crossbars for preventing the steel ropes sliding inward as shown in the figure as below.
- 4. Place steel ropes into the crossbars between two holes at both rear ends of crossbars.
- 5. Place round bars inside the outer holes at both rear ends of crossbars for preventing the steel ropes sliding outward.
- 6. Let Machine down.
- B) Place crossbars (square bars) above in the lathe.
  - 1. Let the hook of overhead travelling crane descend to appropriate height.
  - 2. Place crossbars 1 & 3 at the hooks of overhead travelling craned 1 and 2.
  - 3. Place round bars inside the inner holes at both rear ends of crossbars for preventing the steel ropes sliding inward as shown in the figure as below.
  - 4. Place steel ropes into the crossbars between two holes at both rear ends of crossbars.
  - 5. Place round bars inside the outer holes at both rear ends of crossbars for preventing the steel ropes sliding outward.
- C) Lifting / moving machine
  - 1. Prop up the machine slowly from the ground and check up machine's heavy point.
  - 2. Adjust the hooks' position of overhead travelling crane, so that let the machine move horizontally.
  - 3. Move two overhead travelling cranes at the same time. Please pay most attention to the height can't be too high.
  - 4. It must be clearance and no goods placed in the moving direction of overhead travelling crane.
  - 5. Decline slowing the machine after moving to a fixed position, and adjust the position above the foundation bolts.
  - 6. Confirm the location and then let the machine down.



# 5. SPINDLE SPEED CONTROL:

(For spindle bore 6")

The 16-step spindle speeds are obtained by selecting the proper lever position shown on the speed name plate.

Do not move speed-selector controls while the spindle is rotating.



- 1. END GEARS OUTPUT
- 2. FOR/REV LEVER
- 3. FEEDING SPEED CHANGE LEVER
- 4. 16-STEP LEVER
- 5. SPEED NAME PLATE
- 6. ELECTRIC CONTROL
- 7. HIGH/LOW LEVER

(For spindle bore 9"~15")

The 12-step spindle speeds are obtained by selecting the proper lever position shown on the speed name plate.

Do not move speed-selector controls while the spindle is rotating.



- 1. END GEARS OUTPUT
- 2. FEEDING SPEED CHANGE LEVER
- 3. ELECTRIC CONTROL
- 4. FOR/REV LEVER
- 5. HIGH/LOW LEVER
- 6. SPEED NAME PLATE

# **ELECTRIC CONTROL**



3-a) pilot lamp for coolant pump

When coolant pump is ON, lamp is light. When pump is OFF, light is out.

- 3-b) coolant pump ON/OFF
- 3-c) Pilot lamp for main power switch
- 3-d) Main power switch
- 3-e) Emergency stop

Press (e) emergency stop for spindle stop, and then machine power off.

Turn right to release this emergency switch, and then end user can start the machine again.

The function of this emergency switch is the same as on Apron.

3-f) Jog button

Press (f) jot button to start the machine for a moment and then user can do workpiece correcting or speed changing,

# 6. THEADS AND FEEDS:

# (GEARBOX OPERATION)

All the threads and feeds directly available from the gearbox are shown on the data plate fitted on the front of gearbox and the setting of control levers are shown in fig.

If you want threads DP/MP, please set No-5 change lever to "DP/MP". And must set No-3 change lever to "IN" or "MM" (DP=IN,MP=MM)



- 1. A,B-STEP CHANGE LEVER
- 2. C,D,E-STEP CHANGE LEVER
- 3. IN, MM-STEP CHANGE LEVER
- 4. 10-STEP CHANGE LEVER
- 5. THREADS IN/MM OR DP/MP, AND FEEDS CHANGE LEVER

#### THREAD CUTTING INDEX

				IN				-	X	₩	-		Dł	þ					Æ	£	-
		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
	AC	16	18	19	20	22	23	24	26	28	30	64	72	76	80	88	92	96	104	112	120
	AD	8	9	9½	10	11	11 ½	12	13	14	15	32	36	38	40	44	46	48	52	56	60
Ι	AE	4	4 ½	4 ¾	5	5 1/2	5 ¾	6	6½	7	7 ½	16	18	19	20	22	23	24	26	28	30
	BD	2	$2\frac{1}{4}$	2 3/8	21/2	2 3⁄4	2 7/8	3	3 1/4	3 1/2	3 ¾	8	9	9½	10	11	11 ½	12	13	14	15
	BE	1	$1\frac{1}{8}$	1 3/16	1 1/4	$1\frac{3}{8}$	1 7/16	1 1/2	$1\frac{5}{8}$	1 3⁄4	$1\frac{7}{8}$	4	4 1/2	4 ¾	5	5 ½	5 ¾	6	61/2	7	7 ½
Π	BD	1/2	%16	19/32	5/8	11/16	<sup>23</sup> / <sub>32</sub>	3∕₄	<sup>13</sup> / <sub>16</sub>	7⁄8	15/16	2	2 1/4	2 3/8	2 1/2	2 3/4	$2\frac{7}{8}$	3	3 1/4	3 1/2	3 3/4
Ш	BE	1⁄4	%32	19/64	5/16	11/32	<sup>23</sup> ⁄ <sub>64</sub>	3∕8	<sup>13</sup> / <sub>32</sub>	7/16	15/32	1	$1\frac{1}{8}$	1 ¾	$1\frac{1}{4}$	$1\frac{3}{8}$	$1 V_{16}$	11/2	1 %	$1\frac{3}{4}$	1 7⁄8

			ММ								MP										
		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
	AC	1	$\geq$	$\smallsetminus$	1.25	/	$\smallsetminus$	1.5	$^{\prime}$	1.75	$\geq$	0.25	$\smallsetminus$	Ζ	Ζ	<	Ζ	0.375	$\geq$	Ζ	$\overline{\ }$
	AD	2	2.25	Ζ	2.5	2.75	Ζ	3	3.25	3.5	3.75	0.5	$^{\prime}$	Ζ	0.625	$\times$	/	0.75	$^{\prime}$	0.875	$\overline{\ }$
Ι	AE	4	4.5	4.75	5	5.5	5.75	6	6.5	7	7.5	1	1.125	Χ	1.25	1.375	$\geq$	1.5	1.625	1.75	$\overline{\ }$
	BD	8	9	9.5	10	11	11.5	12	13	14	15	2	2.25	2.375	2.5	2.75	2.875	3	3.25	3.5	3.75
	BE	16	18	19	20	22	23	24	26	28	30	4	4.5	4.75	5	5.5	5.75	6	6.5	7	7.5
π	BD	32	36	38	40	44	46	48	52	56	60	8	9	9.5	10	11	11.5	12	13	14	15
ш	BE	64	72	76	80	88	92	96	104	112	120	16	18	19	20	22	23	24	26	28	30

		$\sim$	~~-			Π	N		$( \begin{cases} 1 \\ 2 \\ 1 \end{cases} = \frac{1}{2} )$			
			1	2	3	4	5	6	7	8	9	10
	AC	mm	0.1356	0.1206	0.1142	0.1085	0.0987	0.0943	0.0904	0.0834	0.0775	0.0724
	AC	inch	0.0053	0.0047	0.0045	0.0043	0.0039	0.0037	0.0036	0.0033	0.0031	0.0029
		mm	0.2712	0.2411	0.2284	0.2170	0.1973	0.1887	0.1809	0.1669	0.1550	0.1448
		inch	0.0107	0.0095	0.0090	0.0085	0.0078	0.0074	0.0071	0.0066	0.0061	0.0057
	ΔF	mm	0.5425	0.4822	0.4568	0.4339	0.3946	0.3774	0.3617	0.3338	0.3099	0.2896
1		inch	0.0214	0.0190	0,0180	0.0171	0.0155	0.0149	0.0142	0.0131	0.0122	0.0114
	BD	mm	1.0850	0.9644	0.9137	0.8679	0.7893	0.7548	0.7235	0.6675	0.6198	0.5792
	60	inch	0.0427	0.0380	0.0360	0.0342	0.0311	0.0297	0.0285	0.0263	0.0244	0.0228
	RE	mm	2.1699	1.9288	1.8274	1.7358	1.5785	1.5095	1.4469	1.3350	1.2397	1.1584
	DL	inch	0.0854	0.0759	0.0719	0.0683	0.0621	0.0594	0.0570	0.0526	0.0488	0.0456
	вD	mm	4.3398	3.8576	3.6547	3.4715	3.1570	3.0190	2.8939	2.6701	2.4794	2.3168
ш	00	inch	0.1709	0.1519	0.1439	0.1367	0.1243	0.1189	0.1139	0.1051	0.0976	0.0912
11	BE	mm	8.6797	7.7152	7.3094	6.9430	6.3140	6.0381	5.7878	5.3402	4.9587	4.6336
	52	Inch	0.3417	0.3037	0.2878	0.2733	0.2486	0.2377	0.2279	0.2102	0.1952	0.1824







Part NO.	SP Set	HL-3006	HL-3012	HL-3013	HL-3025	HL-3016	HL-3029			
Gear	0.5	21	42	21	42	16	16			
Part NO.	HL-4013	HL-4017	HL-4019	HL-4022	HL-4021	HL-4008	HL-4009	HL-4003	HL-4002	gear modulus
Gear	25	27	27	32	1	47	29	67	16	3
feed rate	Gear AC1	0.13562								

#### FUNCTION OF GEAR BOX

The main function of the gear box is to cutting thread and auto-feed.

#### OPERATION OF THREAD CUTTING

When the thread cutting is desired, operate all the speed change levers and set at proper positions according to the thread cutting index, then thread cutting can be operated to cut the required kind and pitch of thread.

Finally, rotate the feed change lever to "lead screw" position, then the operation of thread cutting can be proceeded.

#### OPERATION OF AUTOMATIC FEED

"When the operation of automatic feed should be operated, at first, operate all the speed change levers and set at the proper positions according to the feed speed of requirement (Refer to the thread cutting index chart, please .), and then operate the feed change lever to "feed" position, thereupon the operation of auto feed can be proceeded.

#### The operating method of Auto-feed:

		$\sim$	~~-	-		I	N		$\left(\begin{array}{c} \begin{array}{c} \\ \\ \end{array}\right) = \frac{1}{2}$			
			1	2	3	4	5	6	7	8	9	10
	20	mm	0.1356	0.1206	0.1142	0.1085	0.0987	0.0943	0.0904	0.0834	0.0775	0.0724
	70	inch	0.0053	0.0047	0.0045	0.0043	0.0039	0.0037	0.0036	0.0033	0.0031	0.0029
		mm	0.2712	0.2411	0.2284	0.2170	0.1973	0.1887	0.1809	0.1669	0.1550	0.1448
		inch	0.0107	0.0095	0.0090	0.0085	0.0078	0.0074	0.0071	0.0066	0.0061	0.0057
		mm	0.5425	0.4822	0.4568	0.4339	0.3946	0.3774	0.3617	0.3338	0.3099	0.2896
I		inch	0.0214	0.0190	0.0180	0.0171	0.0155	0.0149	0.0142	0.0131	0.0122	0.0114
	вD	mm	1.0850	0.9644	0.9137	0.8679	0.7893	0.7548	0.7235	0.6675	0.6198	0.5792
	00	inch	0.0427	0.0380	0.0360	0.0342	0.0311	0.0297	0.0285	0.0263	0.0244	0.0228
	BE	mm	2.1699	1.9288	1.8274	1.7358	1.5785	1.5095	1.4469	1.3350	1.2397	1.1584
	DL	inch	0.0854	0.0759	0.0719	0.0683	0.0621	0.0594	0.0570	0.0526	0.0488	0.0456
	вD	mm	4.3398	3.8576	3.6547	3.4715	3.1570	3.0190	2.8939	2.6701	2.4794	2.3168
п	00	inch	0.1709	0.1519	0.1439	0.1367	0.1243	0.1189	0.1139	0.1051	0.0976	0.0912
11	BE	mm	8.6797	7.7152	7.3094	6.9430	6.3140	6.0381	5.7878	5.3402	4.9587	4.6336
		inch	0.3417	0.3037	0.2878	0.2733	0.2486	0.2377	0.2279	0.2102	0.1952	0.1824



- 1. END GEARS OUPUT
- 2. FOR/REV LEVER
- 3. FEEDING SPEED CHANGE LEVER
- 4. 10-STEP LEVER
- 5. SPEED NAME PLATE
- 6. ELECTRIC CONTROL
- 7. HIGH / LOW LEVER

#### A. Set procedure

1. According to thread cutting index, set the required feeding speed and all the shift levers at proper position.

- B.)Operating example:
  - a) Select auto-feed value "0.1356".

b) Set No. ② FOR/REV LEVER on the headstock (turn left or right).

c) Set No. (5) THREAD Change lever on gear box

to be to be right position for Auto-feed.

d) NO MATTER THE LEAD SCREW IS INCH SYSTEM OR METRIC SYSTEM, No. ③ IN,MM-STEP CHANGE LEVER on the gear box

MUST BE SELECTED to position "IN" ONLY.

e) Set No. (1) A/B step change lever on the gear box to "A".

f) Set No. (2) C.D.E.- step change lever on the gear box to "C".

g) Set "10-STEP CHANGE LEVER" on the gear box to "1"







#### Operation instruction -(See Apron panel)

a) If apron in right hand side, pull up lever 4 to fix the turning direction for (longitudinal) sliding feed and down for (cross) surfacing feed.

If apron in left hand side, **press down lever 4** to fix the turning direction for (longitudinal) sliding feed and **UP** for (cross) surfacing feed.

b) Move up lever 5 for sliding feed (Longitudinal) and down for surfacing (cross) feed and middle for neutral racing.

c) When "② For/Rev Lever on the headstock" as photo shown as right set on left side, spindle start, move up the "lever 8 on the apron" for forwarding and push down for backward. When "2 For/Rev Lever on the headstock" as photo shown as right set on right side, spindle start,

When "2 For/Rev Lever on the headstock" as photo shown as right set on right side, spindle st move up the "lever 8 on the apron" for backward and push down for forwarding. d) Pull down lever 5 to stop auto feed  $\circ$ 



#### **LUBRICATION**

'The gear box is lubricated by oil bath lubrication and splash lubrication. During the machine is running, the oil will be supplied to all bearings and gears by gears and driving shafts splashed. We can check the oil quantity through the oil window and fill oil into oil inlet should up to red line of oil window in gear box.

#### THREAD INDICATOR

Thread cutting indicator is installed on the left side of APRON, it is used for cutting inch thread.To cut threads of an even number per inch, close the half nut as any line on the dial pass datum mark.

To cut threads of odd numbers per inch close the half nut as any one long number on the dial passes datum mark.

Fractional threads of 1/2 or 3/4 T.P.I may be by closing the half nut at the same line on each pass of the tool.

This dial indicator can't be used with an inch lead screw to cut metric threads, D.P., module pitches. For that will cut the metric threads, the half nut of APRON must be kept closed ,can only be cut by the spindle reverse-For ward rotation lever in APRON and carriage return is driven by half nut and lead screw.

# 7. SADDLE AND APRON CONTROL :



- 1. SQUARE TOOL HODLE AND TOP-SLIDE
- 2. CROSS-SLIDE HANDWHEEL
- 3. SADDLE CASTING
- 4. THE LEVER IS TO FIX THE TURNING DIRECTION-UP FOR SLIDING FEED AND DOWN FOR SURFACING FEED
- 5. THE LEVER IS MOVE UP FOR SLIDING FEED AND DOWN FOR SURFACING FEED
- 6. THE LEVER IS PRESSED DOWNWARD TO ENGAGE THE LEADSCREW-NUT FOR SCREW-CUTTING.
- 7. APRON CASTING.
- 8. THE LEVER IS MOVE UP FOR AUTO-FEED AND DOWN FOR AUTO MOTOR-FEED.
- 9. LONGITUDINAL FEED OF HANDWHEEL
- 10. ELECTRIC OPERATING CONTROL.

# SADDLE AND APRON CONTROL

#### LEFT HAND SIDE:



- 1. SQUARE TOOL HADLE AND TOP-SLIDE
- 2. CROSS-SLIDE HANDWHEEL
- 3. SADDLE CASTING
- 4. THE LEVEL IS TO FIX THE TURNING DIRECTION –UP FOR SLIDING FEED AND DOWN FOR SURFACING FEED.
- 5. THE LEVEL IS MOVE UP FOR SLIDING FEED AND DOWN FOR SURFACING FEED.
- 6. THE LEVEL IS PRESSED DOWNWARD TO ENGAGE THE LEADSCREW-NUT FOR SCREW-CUTTING.
- 7. APRON CASTING.
- 8. THE LEVEL IS MOVE UP FOR AUTO-FEED AND DOWN FOR AUTO MOTOR-FEED.
- 9. LONGITUDINAL FEED OF HANDWHEEL.
- 10. ELECTRIC OPERATING CONTROL

# ELECTRIC OPERATING CONTROL



10-a) Main switch

Select feeding direction by rotate switch (d) FOR/REV, and then press (a) main switch for spindle rotating.

10-b) Emergency stop

Press (b) emergency stop for spindle stop, and then machine power off. Turn right to release this emergency switch, and then end user can start the machine again. The function of this emergency switch is the same as on Headstock.

10-c) Jog button

Select feeding direction by rotate switch (d) FOR/REV, and then press (c) jog button to rotate spindle. If release, spindle stop rotating.

- 10-d) Forward /Reverse feeding direction
- 10-e) Rapid feed: Feeding direction by turn right or left. (Match with the function of auto-feed)
- 10-f) Spindle stop:

This effect of SPINDLE STOP push button is similar as emergency stop. Keep pressing this button to stop the spindle rotating and brake is provided. Release this push button, release brake, then the spindle rotate again.

# CUTTING OF PLANE

'When the longitudinal feed will be moved large in the plane cutting. In order to avoid the carriage backward and unbalance of cutting plate, so that there is a <u>look bolt "D" on the carriage</u>, and fasten it tightly can increase the stability of compound rest to obtain the plane cutting in accurate value.



#### CUTTING OF TAPERED PLANE

'There are many graduated divisions on the slide plate of carriage. For the cutting tapered-plane, please loose the <u>4 piece of locking screw "B" located in the front and rear</u> on the compound rest firstly, and then rotate the **compound rest** according to the required angle. After the adjustment had finished, fasten the setting screw again, then the cutting of tapered plane can be proceeding.

#### ADJUSTMENT OF BEVEL-GIB

<sup>•</sup>Owing to the friction of long time relative motion between saddle and cross slide, there will be wear produced .In order to eliminate the excess crevice. <u>The Bevel- gib (Arrow C)</u> should be adjusted. Its adjusting method : Loose the set screw in the end of gib first, and fasten the <u>adjusting screw A</u>, then the gib will be pushed forward to proper position that the clearance between saddle and cross slide is adequate till then , fasten the setting screw again.



#### GRADUATED COLLAR (MICROMETER COLLAR)

'There are the graduate collar on the longitudinal feed and cross feed handle. They are divided into 200 divisions, each division means 0.05mm,10mm for one revolution. When the zero will be return, please loose setting screw first. After the adjustment had finished, fasten the setting screw again.

#### LUBRICATION OF CARRIAGE

'The oiling inlets are installed on the carriage and cross slide. Before the operating, in order to eliminate the wear, it must hand oiling usually. To lubricate the sliding surface from the oil inlet on carriage by using gun.

#### TRANS MISSION OF THREAD CUTTING

'Only as the automatic feed lever at the central position, the half nut control lever can be put to downward position, and half nut engage with the lead screw, then the carriage can be moved leftward or rightward to perform the thread cutting. To stop thread cutting by push up the half nut lever only to release the engagement to half-nut with lead screw.

The safety bar installed in the apron to keep the thread cutting and auto-feed from simultaneous operation to attain the purpose of safety.

#### RAPID FEED

This lathe is installed with standard rapid feed.



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Please refer to the layout of saddle / apron / toolpost as above and previous description.

- A) Longitudinal rapid feed & Cross feed
  - Please refer to the layout of saddle / apron / toolpost as above and previous description. i)) Set lever (8) in the neutral position as shown on the photo 1.

Longitudinal feed-	Longitudinal feed-
Apron in right hand side	Apron in left hand side
iii) Press <b>down</b> the lever 4 on the apron.	iii) Push <b>up</b> the lever 4 on the apron.
iv) Press <b>down</b> the lever 5 on the apron.	iv) Press down the lever 5 on the apron.

Cross feed-	Cross feed-
Apron in right hand side	Apron in left hand side
iii) Push <b>up</b> the lever 4 on the apron.	iii) Press <b>down</b> the <u>lever 4</u> on the apron.
iv) Push <b>up</b> the lever 5 on the apron.	iv) Push <b>up</b> the lever 5 on the apron.

v) Turn the switch (10-e) Rapid feed on the ELECTRIC OPERATING CONTROL for the Feeding direction by turn right or left.

iv) Push down the lever 5 and set in the neutral position to stop rapid feeding.







Longitudinal feed-	Longitudinal feed-
Apron in right hand side	Apron in left hand side
iii) Press down the lever 4 on the apron.	iii) Push up the lever 4 on the apron.
iv) Press down the lever 5 on the apron.	iv) Press down the lever 5 on the apron.

Cross feed-	Cross feed-
Apron in right hand side	Apron in left hand side
iii) Push up the <u>lever 4</u> on the apron.	iii) Press down the lever 4 on the apron.
iv) Push up the lever 5 on the apron.	iv) Push up the lever 5 on the apron.

v) Press inward the **<u>push button (b</u>**) as shown on the photo 2 for toolpost auto feed. vi) Turn the switch (10-e) Rapid feed on the ELECTRIC OPERATING CONTROL for the Feeding direction by turn right or left.

vii) Push down the lever 5 and set in the neutral position to stop rapid feeding.

#### For <u>Taper turning</u> can make +/- 70 • Taper turning

i)) Press down lever (8) as shown on the photo 1.

ii) Press inward the <u>push button (a)</u> as shown on the photo 2 for rapid feed of toolpost, and pull out push button (a) for cross feed.

Longitudinal feed-	Longitudinal feed-
Apron in right hand side	Apron in left hand side
iii) Press down the lever 4 on the apron.	iii) Push up the lever 4 on the apron.
iv) Press down the lever 5 on the apron.	iv) Press down the lever 5 on the apron.

Cross feed-	Cross feed-
Apron in right hand side	Apron in left hand side
iii) Push up the lever 4 on the apron.	iii) Press down the lever 4 on the apron.
iv) Push up the lever 5 on the apron.	iv) Push up the lever 5 on the apron.

v) Press inward the **push button (b)** as shown on the photo 2.

vi) Push down the lever 5 and set in the neutral position to stop rapid feeding.

#### 8. TAILSTOCK OPERATION

#### GENERAL DESGRIPTION OF TAIL STOCK

The main structure of tailstock consist tailstock body, base mounting, mandrel and change speed box. The mandrel of tailstock and the spindle of headstock are in the same central line, The tailstock depend on the long or short of work pieces, or required position, can be clamped at anywhere arbitrarily along bed, then it cooperate with the spindle to spindle to proceed to cut work between two centers and to bore hole.



- 1. TAIL STOCK CASTING
- 2. ADJUST SCREW
- 3. BASE CASTING
- 4. SPINDLE LOCKING LEVER
- 5. BASE CLAMPING LEVER
- 6. HIGH-LOW SPEED CHANGE LEVER
- 7. SPINDLE FOR-BACKWARD HANDWHEEL
- 8. TAILSTOCK SLIDING BLOCK

#### **OPERATIONAL METHOD**

When the tailstock mandrel and spindle center are not in the same central line. Loose the adjusting screws "A". Use the same method to adjust the tailstock central line and to set up a deviation measure with the spindle and provide for the taper cutting between two centers.

#### LUBRICATION OF TAILSTOCK

Tailstock is lubricated by oil bath lubrication system and its mandrel center and slide parts must hand oiling from time to time.

# 9. MAINTENANCE

Identification on Operation

<sup>•</sup>Operate the machine correctly to keep the machine in accurate state and long life under normal conditions.

'It is important to check the oil level through oil windows all oil reservoirs and top up as necessary before starting the machine. Especially pay attention to hand oiling daily between saddle and slide way. Lubrication points are shown as "Lubrication Diagram" in term of 10. Preventive Maintenance Check List

	CHECK	BASE LINE					
ITEM	POINT		DAY	WEEK	MONTH	SEASON	YEAR
	Before/	Normal			7		
	During/	/ Error			C		
	Operation						
Spindle log	Before		$\bigcirc$				
Spindle reverse	Before		$\bigcirc$				
Spindle Forward	Before		$\bigcirc$				
Spindle electromagnetic	Before						
brake			0				
Tailstock spindle forward	Before		0		5		
Quill retreat	Before		$\bigcirc$				
Interference limit of tailstock	During			5			
handwheel	Defere		0				
Tailstock body forward	Belore		0				
Tailstock body retreat	Before		0				
Locking limit of tailstock body	During		$\bigcirc$				
Anti-retreat limit switch of	During		$\bigcirc$				
IdiiSluck	During		0				
The tallstock protection switch	During	2	0				
	During		0				
Emergency stop	During		0				
Pump on / off	During		0				
Slideway lubricating oil	During		$\bigcirc$				
Tailstock lubricating oil	After			$\bigcirc$			
Spindle belt	After			$\bigcirc$	$\bigcirc$		
Headstock lubricating oil	After				$\bigcirc$		
Tailstock wipers	After				$\bigcirc$		
Apron wipers	After				$\bigcirc$		
Apron lubricating oil	After				$\bigcirc$		
Cross slide wipers	After				$\bigcirc$		
Circulation Oil in Gear box	After				$\bigcirc$		
Saddle taper pin	After					$\bigcirc$	
Dynamic accuracy	After					$\bigcirc$	
Feed sleeve	After					$\bigcirc$	
Cross slide taper pin	After					$\bigcirc$	
The level of the machine	After					$\bigcirc$	
Static accuracy	After					$\bigcirc$	

# 10. Lubrication system

Renew the lubrication oil in headstock after first 3 months usage, in order to reduce the noise be produced.

Stop the machine immediately if the following are happened, overheat in headstock, vibration, oil leakage or no oil, and then repair it as soon as possible.

Don't use hammer or other tool to knock the workpiece, in order to keep the accuracy of spindle.

'Be care not let the tool to hurt the slide ways.

'Don't to adjust or operate this machine arbitrary unless operator to it.

'It is great profit to the life and accuracy of this machine to maintain it periodically.

Clean the machine, remove the chips from machine and surrounding, apply oil on the sliding surfaces and turn off the power source after work per day

#### Lubrication diagram for HL series

Part to be lubricated	Headstock	Gear box	Apron	Slide ways (Saddle & Carriage)	Tailstock slide ways	Tailstock Gears	End Gears	
Recommend Iubricant	Circulation Oil.	Circulation Oil.	Circulation Oil.	Way Lubricating oil		high-temperature butter		
Recommend brand	CPC R68		CPC way lubricant 68		Super Cup Grease No.3			
	N	1obil: DTE-2	6	Mobil: Vactra #2		Shell-ALVANIA EP3		
	S	hell: Tellus #6 (=S2 M68 )	8	Shell: Tonna T68 (=S2 M68)		MOBIL LUZ EP3		
	BP: E	nergol HLP-H	M #68	BP: Maccurat #68		BP Enorgrease LS-EP3		
	CALT	EX: Rando HI	D #68	CALTEX: V				
		0	r other brand	with the same lev				
Refuel method	oil jug	oil jug	oil jug	oil gun	oil gun	By hand		
Initial change volume	110 liter	12 liter	liter 8 liter Depend		Depend on the demand for machining.		fill properly	
Oil Adding								
Interval	depend	d on the volu consumption	me of oil	every day	every day	depend on of oil con	the volume sumption	
Oil volume		fill properly		fill properly	fill properly	fill properly	fill properly	
Exchanging Oil		. 0						
Interval	3 ~ 6 month	3~6 month	3 ~ 6 month	Please refer the detail instruction as below.		6 month	6 month	
Oil volume	110 liter	12 liter	8 liter			appro	priate	
CHECK POINT Before / During /After Operation	Before	Before	Before	Before	Before	Before	Before	
BASE LINE (Normal/ Error)								

#### Capacity of coolant tank

Distance between centers	~2000 (80")	~3000 (20")	~4000 (160″)	~5000 (200")	~6000 (240")	~7000 (275″)	~8000 (315″)
Liter	85	113	141	169	197	225	253

ir Note: ₩

Above diagram is just for reference. Because the OIL exchanging, adding and oil volume is depended on the procedure of processing work, some parts can be finished turning within 1 min, but some parts 5 min, consumed oil is different.

Please consider by yourselves the interval of changing oil and the refueling oil volume.

# Headstock:

- 1. The spindle head oil inlet hole is located on the top of the gear box (it has black cap with the word Oil written on them).
- 2. The spindle oil drain hole is located on the rear side of the spindle head under the electric box.



- 3. Lubrication oil level, there are 2 oil windows on the front side of the spindle head.
- A) The oil sight on the left top side is to check the condition of lubricating in the headstock.
- It will be shown the oil splash on the oil window, which indicate that the gears in the headstock are lubricating.
- B) The oil sight on the right bottom side is to check the oil volume in the headstock.

When the oil is under the level line "L", please refuel.

#### **GEAR BOX**

- 1. The gear box oil inlet is on the right side of the gear box (it has black cap with the word Oil written on them).
- 2. The gear box oil drain is on the bottom of right side of the gear box.
- 3. For checking the lubrication oil level, there are 1 oil windows on the front side of the gear box.

When the oil is under the level line "L", please refuel.





# APRON

1. Apron oil inlet hole is located on the right side of the apron (it has black cap with the word Oil written on them).

- 2. Apron oil drain hole is located on the left side of the apron.
- 3. For checking the lubrication oil level there is 1 oil window on the front side of the apron.

When the oil is under the level line "L", please refuel.



# SADDLE

1. Saddle slide ways are lubricated automatically by Auto lubricator which is located under the electric box.

Saddle slide ways is lubrication by auto lubricator.

Way lubricating oil is consumable oil. When the machine is running and gets the alarm of no oil, it is necessary to refuel.

Lubricating interval is set every 30 minutes.

Lubricating time is set for 5 seconds. (around 20 cc).

Auto lubricator operates automatically when the spindle has l started, and lubricates once for 5 sec. / around 20 cc lubrication oil every 30 minutes.

Sort of lubricant oil: Way Lubricating oil Recommend brand: CPC way lubricant 68 Mobil: Vactra #2 Shell: Tonna T68 (=S2 M68) BP: Maccurat #68 CALTEX: WAY #68



#### CARRIAGE

- 1. Carriage cross and longitudinal slide ways are lubricated automatically by Auto lubricator which is located under the electric box.
- 2. Cross slide screw is lubricated manually.
  - 1) Oil inlet is located in the middle of cross slide.
  - 2) The refuel method for cross slide screw.
    - a) Loose the 4 piece screws of square black cover on the middle of cross slide.
    - b) Use magnetic base to pick up the square black cover. (See photo 1 & photo 2)
    - c) Check the oil volume and drain lubricating oil regularly.
    - 3) When the oil is under the level of the middle of cross slide screw, please add the lubricating oil. (See photo 3)
    - 4) Interval of adding oil is suggesting every 3 months.

But, depended on the demand for machining, please consider by yourselves the interval of changing oil and the refueling oil volume.

Sort of lubricant oil: Way Lubricating oil Recommend brand:

CPC way lubricant 68 Mobil: Vactra #2 Shell: Tonna T68 (=S2 M68) BP: Maccurat #68 CALTEX: WAY #68









#### END GEAR

Please lubricate the end gears with <u>high-temperature</u> <u>butter</u> (yellow solid oil) regularly.

Oil interval is suggesting for every month.

Sort of lubricant oil: <u>high-temperature butter</u> Recommend brand:

- 1. Super Cup Grease No.3
- 2. Shell-ALVANIA EP3
- 3. MOBIL LUZ EP3
- 4. BP Enorgrease LS-EP3



# **11. CONSUMABLE PARTS LISTS**

oroperty

ITEM	MODEL	PH	HP	KW	Hz	Amp	V	Ref. Delivery (days)
Pump	MC-8	3PH	1/8	0.094	60	0.23A		20
Lubrication device	CESH			22W		0.6 A	220V	20
Auto-lubricator	1RA-3FS					1/4PT		15
Spindle V-belt	Please see the size marked on the Belt							8
Tailstock Oil seals	TCZ00x230x5 & TC120x140x13 & TC120x150x14				C	S CO		8

5



HEADSTOCK								
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY				
01		BEARING	6309	2				
0 2		SNAP RING	S65	1				
03	HL- 2006	GEAR	S	1				
04		KEY	10 x 8 x 35L	1				
05	HL- 2005	GEAR		1				
06	HL- 2004	SHAFT		1				
07	HL- 2007	GEAR		1				
08		KEY	10 x 8 x 35L	1				
09	HL- 2008	GEAR		1				
10		BEARING	6309	1				
11	HL- 2009	COLLAR		1				
12		BEARING	6211	1				
13	HL- 2011	GEAR		1				
14	<u> </u>	KEY	10 x 8 x 35L	1				
15	0	SNAP RING	S65	1				
16	HL- 2010	HEAR SHAFT		1				
17		BEARING	6309	1				
18	HL- 2012	PUMP BASE		1				
19	HL- 2026	GEAR (56T)		1				
20	HL- 2025	GEAR (24T)		1				
21	HL- 2001	BODY		1				
22		SCREW	M8	3				
23		BEARING	6211	1				
24		SCREW	M8	3				
2 5	HL- 2014	COVER		2				
26	HL- 2023	SHAFT		1				

HEADSTOCK								
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY				
27	HL- 2030	GEAR		1				
28	HL- 2029	GEAR		1				
29		BEARING	32040x	1				
30		DRIVING BOTTOM	9	1				
31	HL- 2002	SHAFT		1				
32	HL- 2031	NUT	$\cdot $	2				
33		KEY	18 x 12 x 140L	2				
34	HL- 2034	COVER		1				
35		BEARING	32038x	1				
36	HL- 2032	NUT	×V	2				
37	HL- 2036	SHAFT		1				
38		BEARING	6208	1				
39	HL- 2039	SHAFT		1				
40		KEY	10 x 8 x 30L	1				
41	HL- 2042	GEAR		1				
42		KEY	10 x 8 x 90L	1				
43		BEARING	6208	1				
44	HL- 2046	GEAR		1				
4 5	HL- 2041	GEAR		1				
46	HL- 2045	GEAR		1				
47	HL- 2040	GEAR		1				
48	HL- 2044	SHAFT		1				
49		BEARING	6208	1				
50		SCREW	M10	4				
51	HL- 2047	COVER		1				
52		BEARING	6207	1				

		HEADSTOCK		
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
53		OIL SEAL	TC357210	1
54	HL- 3064	WASHER		1
5 5		SCREW	M8	1
56		BEARING	6208	1
57	HL- 2043	COVER		1
58		BEARING	6208	2
59		SCREW	M10	2
60	HL- 2038	PRESS BLOCK		1
61	HL- 2035	COVER		1
62	HL- 2037	GEAR	XY	1
63		BEARING	6036	2
64		KEY	18 x 12 x 45L	1
65	HL- 2021	GEAR		2
66		BEARING	6211	1
67	HL- 2020	GEAR		1
68	HL- 2019	GEAR		1
69	HL- 2018	GEAR		1
70	HL- 2027	COVER		1
71		BEARING	6309	1
72		SCREW	M10	3
73		OIL SEAL	TC45608	1
74		KEY	10 x 8 x 70L	2
75	HL- 2016	NUT		2
76	HL- 2015	BELT PULLEY		1
77		SCREW	M10	
78		CLUTCH	TMB20	1




		HEADSTOCK		
REF				
NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
01		SCREW	M8	3
02		BEARING	6208	1
03	HL- 2052	COVER		1
04	HL- 2063	GEAR SHAFT	9	1
05		SCREW	M8	3
06	HL- 2067	SHAFT		1
07		OIL COVER	\$ 32	3
08		SET SCREW	M10	1
09	HL- 2071	COLLAR		1
10	HL- 2070	GEAR		1
11		SET SCREW	M10	2
12		SNAP RING	S30	1
13	HL- 2068	GEAR		1
14	HL- 2064	STICK		1
15	$\langle \langle \rangle$	KEY	6 x 6 x 60L	1
16	0	BEARING	6307	1
17	HL- 2069	SHAFT		1
18	HL- 2062	GEAR		1
19	HL- 2066	GEAR		1
20		SNAP SCREW	S30	1
21		SET SCREW	M10	2
2 2	HL- 2070	GEAR		1
23	HL- 2065	SHAFT		1
24	HL- 2061	GEAR		1
2 5	HL- 2058	NAME PLATE COVER		1
26		OIL CAP	M6	1

		HEADSTOCK		
REF				
NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
27		OIL SEAL	TC-357010	1
28	HL- 2059	NAME PLATE COVER		1
29		SCREW	M8	1
30	HL- 2057	STEM ARM	5	1
31	HL- 2056	HANDLE		2
3 2	HL- 2060	SHAFT		1
33		SCREW	M10	1
34		SPRING	M8	1
35		BALL	.0	1
36	HL- 2076	FORK		2
37	HL- 2075	FORK ARM	0	2
38		SCREW	M8	4
39	HL- 2056	HANDLE		2
40	HL- 2073	STEM ARM		2
41		SCREW	M8	2
42	HL- 2074	BUSHING		2
43	HL- 2052	COVER		1
4 4		SCREW	M8	3
45		SET SCREW	M10	4
46	HL- 2049	CAM		1
4 7	HL- 2048	SHAFT		1
4 8	HL- 2055	PIN		3
49		BEARING	6208	1
5 0		KEY	6 x 6 x 25L	1
51	HL- 2051	GEAR		1
52		SCREW	M10	1

	HEADSTOCK					
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY	
	53	HL- 2050	CAM		1	
	54	HL- 2053	SHAFT		1	
	5 5	HL- 2054	FORK	7	1	
	56	HL- 2054	FORK	S	1	
	57	HL- 2054	FORK		1	
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## HEADSTOCK



			HEADSTOCK		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01		PIN	Ø5	1
	0 2	HL-2078	STEM ARM		1
	03		SCREW	M8	1
	04		OIL SEAL	TC-30428	1
	05	HL- 2077	HANDLE		1
	06		SPRING	M8	1
	07		BALL	Ø8	1
	08		SCREW	M8	2
	09	HL-2079	BALL		1
	10		SCREW	M10	2
	11	HL-2081	SET RING	0	1
	12	HL-2080	SHAFT	2	1
	13	HL-2082	FORK ARM		1
	14		SNAP RING	S25	1
	15	HL-2083	FORK		1
		0	20		
		4			
	0				
	0				
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BED

			BED		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01	HL- 1001	BED		1
	02	HL- 1006	LEAD SCREW		1
	03	HL- 1007	FEED ROD		1
	04	HL- 1002	GAP PLATE	C	1
	05	HL- 1003	PACK		1
	06	HL- 1004	PACK		1~
	07		BEARING	#6008	2
	08		SCREW	M10	4
	09	HL-1009	COLLAR		1
	10	HL- 1010	COLLAR		1
	11	HL- 1008	BRACKET	$\sim$	1
	12		SCREW	M8	6
	13	HL- 1011	COVER		1
	14	HL- 1014	COVER		1
	15		BEARING	6005	1
	16	HL- 1012	COLLAR		2
	17	HL- 1013	COLLAR		1
	18	HL- 1030	ADJUSTING BOLT		14~
	19	HL- 1031	WASHER BLOCK		14~
	0				
$\langle \cdot \rangle$					





			BED		
	REF NO	PART NO	DESCRIPTION	PARTS NAME	0'ТҮ
	01		V-BELT	B-	5
	0 2		MOTER	20HP	1
	03	HL- 1019	PULLEY		1
	04	HL- 1016	LOW-PLATE	G	1
	05	HL- 1018	BLOT		2
	06	HL- 1017	SHAFT		2
	07		NUT	M16	8
	08		WASHER		4
	09		SCREW		4
	10	HL- 1015	MOTOR PLATE		1
	11	HL-1019-1	CONNECTING ROD	0	2
	12		SCREW	M8	2
	13	HL-1025	CONNECTING ROD		2
	14		SCREW	M8	2
	15	HL-1023	LOCTING BED		2
	16	HL- 1024	LOCTING BED		2
	17		SPRING	M8	2
	18	HL- 1027	PUSH BLOCK		2
	19	HL- 1028	PUSH BLOCK		2
25	20	HL- 1029	WASHER		12
X i	21		SCREW	M10	12
	22	HL- 1021	BRACKET		2
	23	HL- 1020	BRACKET		2
	24	HL- 1022	BRACKET		2

## CARRIAGE



CARRIAGE						
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY		
01		SCREW	M8	1		
0 2		HANDLE		1		
03		KEY	4 x 16	1		
04		SCRWE	M10	1		
05	HL- 5005	BUSHING		1		
06		SCREW	M10*10	1		
07		SPRING	5/16x20L	1		
08	M130902	BALL	5/16	1		
09		SCREW	M16	4		
10	HL- 5003	GRADUATON BED		1		
11	HL- 5023	NUT	0	4		
12		KEY	6 x 25	1		
13	HL- 5009	GEAR	18T	1		
14	HL- 5002	SLIDING		1		
15	Y	OIL SEAL	TC30428	1		
16	0	BEARING	RNA4905	1		
17	HL- 5010	NUT (leadscrew use)		1		
18		SCREW	M10	2		
19	HL- 5024	COVER		1		
20	HL- 5011	NUT (leadscrew use)		1		
21	HL- 5012	COLLAR		1		
2 2		SCREW	M6	4		
23		SCREW	M5	4		
24		BEARING	6004	1		
2 5	HL- 5013	BRACKET		1		
26		OIL COVER	ø32	1		

			CARRIAGE		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	27		NUT	AN05	1
	28	HL- 5006A/B	GRADUATION		1
	29		BEARING	51105	1
	30	HL- 5007	BRACKET		1
	31	HL- 5008	LEAD SCREW		1
	32		SCREW	M8	2
	33		BEARING	51105	1
	34	HL- 5014	SHAFT		1
	3 5	HL- 5022	SHAFT		1
	36	HL- 5015	GEAR	M2.5 x 18T	1
	37		SCREW	M12	4
	38	HL- 5019	LOCK PLATE		1
	39		SCREW	M8	4
	40	HL- 5021	PAPER		1
	41		SCREW	M12	5
	4 2	HL- 5020	LOCK PLATE		1
	43		SCREW	M8	3
.C	44	HL- 5016	LOCK PLATE		1
0	4 5		BLOT	M16	1
X	46	HL- 5018	LOCK PLATE		1
	47	HL- 5004	PAPER		1
	48	HL- 5001	CARRIAGE		1

GEAR BOX



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		GEAR BOX		
REF				
NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
01	HL- 3005	SHAFT		1
02		SNAP RING	S25	1
03		BEARING	6007	2
04	HL- 3004	COVER	G	1
05		SCREW	M8	3
06	HL- 3001	GEAR BOX		1
07		SPRING WASHER	ø62	1
08	HL- 3006	GEAR		1
09		KEY	8 x 7 x 50L	1
10	HL- 3012	GAER		1
11		KEY	8 x 7 x 130L	1
12	HL- 3011	SHAFT		1
13	HL- 3013	GEAR		1
14		BEARING	#6206	2
15	× ×	BEARING	6206	2
16	0	SPRING WASHER	RTW56	1
17	HL- 3015	GEAR		1
18		SNAP RING	S38	1
19	HL- 3014	SHAFT		1
20	HL- 3016	GEAR		1
21	HL- 3017	GEAR		1
22	HL- 3018	GEAR		1
23	HL- 3019	GEAR		1
24	HL- 3020	GAER		1
2 5		KEY	8 x 7 x 50L	1
26		BEARING	RNA4908	1

		GEAR BOX		
REF		DESCRIPTION	DADTS NAME	O'TV
NO.	HI 3021	GEAD	PARIS NAME	<u>Q 11</u>
27	11L- J021		DN14 4005	1
2.8		BEARING	RNA4905	1
29		BEARING	RNA4905	1
30		KEY	8 x 7 x 40	1
31	HL- 3023	GEAR		1
3 2	HL- 3022	SHAFT		1
33		SNAP RING	\$35	1
34		KEY	8 x 7 x 25	2
35	HL- 3009	GEAR	CO.	1
36		NUT	AN08	2
37		BEARING	#32008X	1
38	HL- 3008	SHAFT		1
39		BEARING	#32008X	1
40	HL- 5007	COVER		1
41	× ×	SCREW	M8	3
42	0	SPRING WASHER	ø68	1
43	4	BEARING	6206	3
44	HL- 3010	COVER		3
45	HL- 3039	COVER		1
46	HL- 3025	GAER		1
47	HL- 3024	SHAFT		1
48	HL- 3026	GEAR		1
49		BEARING	RNA4905	1
50	HL- 3028	GEAR		1
51		BEARING	RNA4910	1
52	HL- 3029	GEAR		1

		GEAR BOX		
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
53	HL- 3030	GEAR		1
54	HL- 3031	GEAR	2	1
5 5	HL- 3032	GEAR	G	1
56	HL- 3033	GEAR		1
57	HL- 3028	GEAR		1
58		BEARING	RNA4910	1
59		BEARING	RNA4905	2
60	HL-3035	GEAR		1
61	HL- 3034	SHAFT		1
62	HL- 3036	GEAR	0	1
63	HL- 3038	COLLAR		1
64		BEARING	RNA4910	1
65	HL- 3037	SHAFT		1
66	<u> </u>	OIL SEAL	TC45608	1
67	0	SCREW	M8	3
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	REF NO. 53 54 55 56 57 58 59 60 61 62 63 64 63 64 65 66 67	REF  PART NO.    5 3  HL- 3030    5 4  HL- 3031    5 5  HL- 3032    5 6  HL- 3033    5 7  HL- 3028    5 8	REF    PART NO.    DESCRIPTION      5 3    HL- 3030    GEAR      5 4    HL- 3031    GEAR      5 5    HL- 3032    GEAR      5 6    HL- 3033    GEAR      5 6    HL- 3033    GEAR      5 7    HL- 3032    GEAR      5 8    GEAR    GEAR      5 9    BEARING    GEAR      6 0    HL- 3035    GEAR      6 1    HL- 3034    SHAFT      6 2    HL- 3036    GEAR      6 3    HL- 3038    COLLAR      6 4    BEARING      6 5    HL- 3037    SHAFT      6 6    OIL SEAL      6 7    SCREW      6 7    SCREW      6 7    International internatinternatinterinternational interinterinal international interinte	GEAR BOX      REF    PART NO.    DESCRIPTION    PARTS NAME      5 3    HL- 3030    GEAR

### GEAR BOX



		GEAR BOX		
REF		DECODIDITION		
NO.	PARI NO.	DESCRIPTION	PARIS NAME	QTY
01	HL- 3002	COVER		1
02	HL- 3055	SHAFT		1
03	HL- 3056	SHAFT	1	1
04	HL- 3057	GEAR	G	1
05		SNAP RING	S38	1
06		DEY	5 x 5 x 8L	1
07		SCRW	M8	4
08	HL- 3052	BUSHING	0	1
09	HL- 3053	NAME-PLATE COVER		1
10	HL- 2073	ROCKER ARM		4
11		SCREW	M8	1
12	HL- 2072	HANDLE		6
13		OIL COVER	ø32	3
14	HL- 3049	BUSHING		4
15	HL- 2073	ROCKER ARM		4
16		OIL SEAL	TC25357	4
17		SCREW	M8	4
18	HL- 3050	FORK ARM		1
19		SCRW	M8	8
20		BEARING	6206	1
21	HL- 3040	SHAFT		1
2 2		SET SCREW	M10	4
23	HL- 2055	PIN		5
24	HL- 3044	FORK		5
2 5	HL- 3042	GEAR		1
26		KEY	6 x 6 x 25L	1

			GEAR BOX		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	27		BEARING	6305	1
	28	HL- 3010	COVER		1
	29		SCREW	M8	8
	30	HL- 3051	FORK ARM		3
	31	HL- 3003	COVER		1
	32		SCREW	M8	2
	33		BALL	M8	5
	34		SPRING	M8	5
	35		SCRW	M10	5
	36	HL- 3047	FORK		2
	37	HL- 3048	FORK		1
	38	HL- 3045	SHAFT		1
	39	HL- 3046	FORK		1
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## END GEARS



			GEAR BOX		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01	HL- 3059	GEAR		1
	0 2	HL- 3064	WASHER		2
	03		SCREW	M8	2
	04	HL- 3060	GEAR		2
	05	M130607	SNAP RING	R55	2
	06		BEARING	6006	4
	07	HL- 3061	SHAFT		2
	08	M130648	SNAP RING	S30	2
	09		SCREW	M24	1
	10		WASHER	M24	1
	11	HL- 3058	BRACKET		1
	12	HL- 3062	NUT		2
	13	HL- 3063	WASHER		1
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#### APRON



		APRON		
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
01	HL- 4034(IN/M)	HALF NUT		1
0 2		SCREW	M12	1
03		NUT	M12	1
04	HL- 4038	FORK	G	1
05	HL- 4037	SHAFT		1
06		BEARING	6005	1
07	HL- 4012	GEAR		1
08		BEARING	6006	2
09	HL- 4011	SHAFT		1
10		SNAP RING	S30	2
11		SNAP RING	R55	2
12	HL- 4005	GEAR	2	1
13		BEARING	6206	1
14		SPRING WASHER	STW35	1
15	HL- 4004	SHAFT		1
16	0	BEARING	6006	2
17	HL- 4007	CLUTCH GEAR		1
18	HL- 4002	GEAR-SHAFT		1
19	M090504	BEARING	RNA4908	1
20	HL- 4033	NUT SEAT		1
21	HL- 4001	APRON		1
22		SCREW	M8	4
23	HL- 4035	PAPER		1
24		PIN	ø10	2
2 5	HL- 4032	SHAFT		1
26		OIL SEAL	TC30428	1

			APRON		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	27		BALL	M8	1
	28		SCREW	M8	2
	29	HL- 4042	COVER		2
	3 0		SCREW	M6	6
	31		KEY	8 x 7 x 30	1
	3 2	HL- 4026	GEAR		1
	33		BEARING	6206	2
	34		SCREW	M8	2
	3 5	HL- 4027	COVER		1
	36	HL- 4028	GRADUATION		1
	37		SCREW	M8	3
	38	HL- 4029	HANDLE WHEEL	7	1
	39		HANDLE	ø25	1
	40		OIL SEAL	TC30428	1
	41	HL- 4030	HANDLE		1
	42	HL- 4031	ROCKER ARM		1
	43	3	SCREW	M8	1
	44		SPRING	M8	1
	45		SET SCREW	M10	1
	46	HL- 2072	HANDLE		1
$\mathbf{X}$	47		SCREW	M8	2
	48		BEARING	6005	1
	49		OIL SEAL	TC253507	1
	50		SCREW	M8	1
	51		SPRING	M8	1
	52		SCREW	M10	1

		APRON		
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
53		STEEL BALL	ø8	1
5 4	HL- 4008	GEAR		1
5 5	HL- 4009	GEAR	9	1
56		BEARING	6006	2
57		BEARING	6206	1
58		SNAP RING	S30	1
59	HL- 4006	SPLING SHAFT	6206	1
60		SCREW	M6	4
61		SCREW	M8	3
62	HL- 4003	GEAR		1
63		SNAP RING	S40	1
64	M090112	BEARING	6008Z	1
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## APRON



			APRON		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01		SCREW	M10	1
	0 2	HL- 4015	BUSHING		1
	03	HL- 4001	APRON		1
	04		SCREW	M8	2
	05	HL- 4025	COVER		1
	06	HL- 4018	SHAFT-F		1
	07	HL- 4020	COLLAR		1
	08		BEARING	6005	2
	09	HL- 4019	GEAR		1
	10	HL- 4017	GEAR		1
	11		BEARING	6005	2
	12		SNAP RING	R47	2
	13		BEARING	6008	2
	14	HL- 4014	COVER		1
	15		OIL SEAL	TC40558	2
	16	HL- 4013	GEAR		1
	17		O-RING	P21	1
	18		O-RING	G25	1
	19		KEY	5 x 5 x 15L	1
~	20		OIL SEAL	TC40708	1
$\mathbf{C}$	21		SCREW	M8	4
*	2 2		PUMP	AM2	1
	23	HL- 4023	PUMP		1
	24		SET SCREW	M6	1
	2 5		BALL	M8	1
	26		NUT	AN08	2

			APRON		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	27		TAPER ROLL	32008	1
	2 8	HL- 4021	STICK		1
	29	HL- 4022	GEAR	9	1
	3 0	HL- 4040	BUSHING		1
	31	HL- 2037	ROCKER ARM	.0	1
	3 2		BALL	M8	1
	33		SPRING	M8	1
	34		SCREW	M10	1
	3 5		OIL SEAL	TC25357	1
	36		SCREW	M8	1
	37	HL- 4041	SHAFT		1
	38		KEY	8 x 7 x 65L	1
	39	15	SNAP RING	S42	1
	4 0	Ó	TAPER ROLL	32008	1
	41	HL- 2072	HANDLE		1
	4 2	HL- 4024	COVER		1
	43		SCREW	M8	4
	44		SNAP RING	S40	1
2)	4 5		MOTOR	1 / 8HP	1

# TAILSTOCK



TAILSTOCK						
REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY		
01		CENTER	MT#6	1		
0 2		OIL SEAL	TC-10513013	1		
03	HL- 7019	T-KEY		1		
04		OILER	3 / 8"	1		
0 5	HL- 7004	BARREL		1		
06	HL- 7005	NUT		1		
07		SCREW	M8	3		
0 8	HL- 7009	LEAD SCREW		1		
09		BEARING	51106	2		
10	HL- 7008	COVER		1		
11		NUT	AN06	2		
12		KEY	5 x 5 x 16L	1		
13	HL- 7010	GEAR		1		
14		KEY	5 x 5 x 50L	1		
15	HL- 7012	GEAR		1		
16		BEARING	6005RS	1		
17	HL- 7011	SHAFT		1		
18	HL- 7014	HANDLE WHEEL		1		
19	HL- 5064	WASHER		1		
20		SCREW	M8	1		
21		SCREW	M8	4		
2 2	HL- 7016	SHAFT		1		
23	HL- 7017	GEAR		1		
24	HL- 7007	COVER		1		
2 5	HL- 7006	GEAR BOX		1		
26	HL- 7013	BRACKET		1		

			TAILSTOCK		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	27		SCREW	M8	2
	28		SET SCREW	M10	1
	29	HL- 7015	INDEX RING	9	1
	30		KEY	5 x 5 x 25L	1
	31		HANDLE		1
	3 2	HL- 7026	NUT		2
	33	HL- 7025	BOLT		2
	34	HL- 7024	CLAMP		2
	3 5		SET SCREW	M16	1
	36	HL- 7003	GIB		1
	37	HL- 7002	BASE		1
	38	HL- 7001	CASTING		1
	39	HL- 7029	BRACKET		1
	40	HL- 7032	PIN		1
	41	HL- 7030	BRACKET		1
	4 2	HL- 7031	GEAR		1
	43	HL- 7033	LEVER		1
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			TAILSTOCK		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01	HL- 2056	HANDLE		1
	0 2	HL- 2073	LEVER BOSS	4	1
	03		SCREW	M8	2
	04	HL- 2074	BUSH		1
	05	HL- 7018	LEVER		1
	06	HL- 7023	SCREW	30	1
	07	HL- 7022	HANDLE		1
	08		SCREW	M8	1
	09		SET SCREW	M10	1
	10		STEEL BALL	ø8	1
	11	HL- 7007	COVER		1
	12	HL- 7028	WIPER		2
	13	HL- 7027	WIPER		2
	14		SCREW	M5	8
	15	HL-7021	STUD		1
	16	HL- 7020	BUSH & NUT		1
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## STEADY REST


			STEADY REST		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
	01	HL- 8003	HANDLE		3
	0 2	HL- 8004	COVER		3
	03		BEARING	51103	3
	04		SCREW	M8	9
	05	HL- 8005	ADJUSTMENT SCREW		3
	06	HL- 8006	SHAFT	30	3
	07		BEARING	0	3
	08	HL- 8007	SHAFT		3
	09		SET SCREW	M8	3
	10	HL- 8001	CASTING	0	1
	11		NUT		2
	12	HL- 8009	BOLT		2
	13	HL- 8002	CASTING		1
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Γ			FOLLOW REST		
	REF NO.	PART NO.	DESCRIPTION	PARTS NAME	Q'TY
F	01	HL- 8003	HANDLE		2
F	0 2		SET SCREW	S	2
	03	HL- 8004	COVER		2
	04		BEARING	51103	2
	0 5	HL- 8005	ADJUSTMENT		2
	06	HL- 8102	SHAFT	2 01	2
	07		SCREW		6
	08	HL- 8103	PAD	XY.	2
	09	HL- 8101	FOLLOW REST		1
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