ACER

High Speed Precision Engine Lathe

Model: 2140GH～21120GH

Operational Manual

Taiwan：Taiwan Springwood Internation,Inc.

Formosa Springwood Internation,Inc.

No.101,506 Lane,Seng-Tso Road

Seng Karing Sharng,Taichung County,Taiwan R.O.C

Tel：886-4-2520-4120 Fax：886-4-2520-4123

CA：Springwood Internation,Inc.

1062 N. Kraemer Place, Anaheim, CA92806 U.S.A

Tel：714-632-9701 Fax：714-632-9730

NJ：Klim Industrial,Inc.

244 N. Randolphville Rd. Piscataway, NJ 08854 U.S.A

Tel：732-752-9100 Fax：732-752-9101

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Table of Content

Important

Do not operate or repair the machine until you have read this manual thoroughly.

Do not operate or repair the machine until you have read appropriate manual!

Note: A safety manual must remain attached to the machine at all time.

SAFETY OPERATION RULES

1. Secure work! Using chuck to secure work piece whenever it is possible! It is safer than using operator's hand and it allows operator to freely operating the lathe using both hands.
2. Do not over-reach! Keep firm footing and balancing at all times.
3. Maintain tools with care! Keep cutting tools sharp and clean for the best and safest operation. Follow instructions for lubricating and changing accessories.
4. Disconnect tools! Before servicing, please make sure accessories such as cutting tools are disconnected.
5. Reduce the risk of unintentional start! Make sure power switch is in "off" position before intentionally plug-in.
6. Use only recommended accessories! Consult owner's manual for recommended accessories. Usage of improper accessories may increase risk and cause injury to operator.
7. Never stand on tool! Serious injury could occur if the tool or cutting tool is tipped or is unintentional contacted.
8. Check damage parts! Before further using cutting tool, guard or other part that is damaged should be carefully checked to determine that it will operate properly, perform its intended function, check for alignment of moving parts, binding of moving parts, breakage of parts, mounting and other conditions that may affect its operation. A guard or other part that is damaged should be replaced or repaired.
9. Never leave cutting tool running unattended. Please turn power off! Do not leave cutting tool until machine comes to a complete stop.
10. Always use safety glassed! Common eyeglasses only have impact resistant lenses. They are NOT safety glasses!
11. Keep guards in place! And keep them in working order.
12. Remove adjusting keys and wrenches! Form habit of double-checking keys and adjusting wrenches are removed from chuck before power on machine.
13. Keep work area clean! Cluttered areas will invite accidents.
14. Don't use power tools in dangerous environments! Do not use power tools in damp or wet location, or expose them to rain. Keep working area well lighted!
15. Keep children away! All visitors should be kept a safety distance from work area.
16. Make workshop child proof! With pad locks, master switches, or by removing starter keys.
17. Do not miss-use tool! Do not force tool or attachment to do a job for which it was not designed for!
18. Use proper tools! Proper tool will do the job better and safer at the rate which it is designed.

19. Wear proper apparels! No loose clothing, gloves, neckties, rings, bracelets, or other jewelry to get caught within machine moving parts. Nonslip footwear is recommended. Wear protective hair covering to contain long hair.
20. Never use machine in high speed over an hour.
21. Keep cutting tools in turning tight during operation!

SPECIFICATIONS

Model	2140GH / 2540GH	2160GH / 2560GH	2180GH / 2580GH	21120GH / 25120GH
Capacity				
Center height	270/315mm (10.63"/12.4")			
Max swing over bed	540/630mm (21.26"/24.8")			
Max swing over gap	720/810mm (28.35"/31.89")			
Max swing over cross slide	360/450mm (14.17"/17.72")			
Distance between centers mm	1000	1500	2000	3000
inch	39.37	59.06	78.74	118.11
Main spindle				
Spindle nose	D1-8			
Spindle bore	83mm/3.35"			
Spindle speeds	25~1545RPM (18 steps)			
Carriage				
Max slide travel	330mm (132")			
Compound rest travel	150mm (5.91")			
Tailstock				
Tailstock spindle diameter	75mm (2.95")			
Tailstock spindle travel	170mm (6.69")			
Tailstock spindle taper	MT#5			
Bed				
Bed width	350mm (13.78")			
Threading				
Leadscrew	4 TPI or 6mm/pitch			
Metric pitch threads	0.5~7mm/pitch (24 kinds)			
Inch threads	4~56 TPI (36 kinds)			
Module pitch threads	0.25~3.5M (16 kinds)			
DP threads	8~112 P (36 kinds)			
Feeding range				
Range of longitudinal feeds	0.06~0.88mm/rev.			
Range of cross feeds	0.03~0.44mm/rev.			
Motor				
Main spindle	10/15HP (Opt.)			
Coolant pump	1/8HP			
Net weight approx.				
21" series kgs	2400	2700	3100	3200
lbs	5280	5940	6820	7040
25" series kgs	2550	2820	3250	3350
lbs	5610	6204	7150	7370
Gross weight approx.				
21" series kgs	2700	3000	3400	3600
lbs	5940	6600	7480	7920
25" series kgs	2850	3050	3550	3750
lbs	6270	6710	7810	8250

Preparation for operation

Notes before operation

Unpacking:

After unpacking the transportation wooden crate, please inspect the machine carefully. If there is any shortage or damage, please contact your local dealership immediately.

Moving & lifting

Moving & lifting the machine by using a special hang fixture as figure 1 (page 7) shown and insert the special hang fixture into the gap center of the machine bed. Raising and lowering the machine should be careful. Do not touch the leadscrew, spindle or handwheels, etc. Be careful; do not bump the machine against the floor! Before moving, please check the following areas:

1. Lock and clamp the tailstock.
2. Lock the saddle lock.
3. Engage half-nut with leadscrew.

Foundations:

Due to the cutting speed and spindle speed are much higher than before, an incomplete foundation will generate vibration and unstable cutting condition. Please have the foundation done as figure 2 (page 8) shown. Enough space and boundary are necessary. Machine should be installed at least three feet from the wall and other machines.

Leveling the machine:

Anchor bolts and installation blocks must be located steadily into the concrete mix. For alignment of the machine, please place the square precision level on the guideway of the bed (the preciseness of the level is 0.02/100mm or better) and measuring the level of the bed way from left to right, front to back and adjust the leveling bolts until the sensitivity is within 0.04/100mm.

After the leveling procedure is completed, please fasten the foundation nuts. If the flatness deviates when locking foundation nuts, then readjustment of the level is required. Please repeat the procedure until all nuts are tightened.

Clean up

Cosmoline was applied on the machine before transportation. For cleaning up the bed, slideways and leadscrews etc., we can use solvent such as WD 40 to clean off the cosmoline. Please do not use lacquer, varnish, or kerosene! Apply

lubrication oil to all the necessary areas. Check all the handles and levers to see if they are functioning normally, and then set them to neutral positions.

Electrical power connections:

Electrical cabinet is provided at the rear lower part of the headstock. In it, there is a panel with all the electrical components, transformers, and fuses, etc. We also provide the electrical diagram at following pages.

Cautions:

After power connection, please check spindle rotation, using the jogging switch and power on/off lever. If it rotates in counter-clockwise, the wiring is correct. If it is not, please switch two wire terminals at RST position. And then check the rotation again. Spindle rotation must be correct before machine operation.

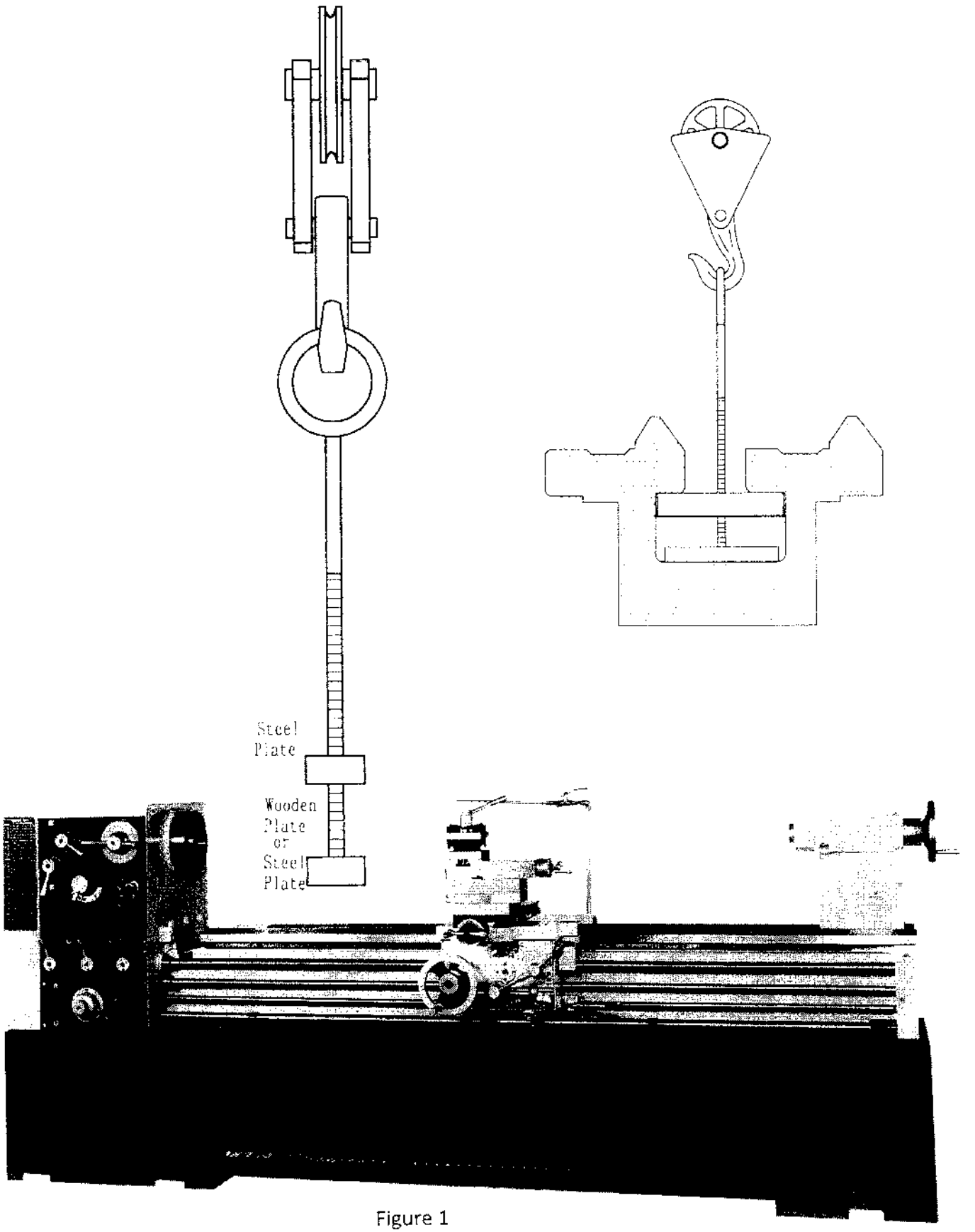
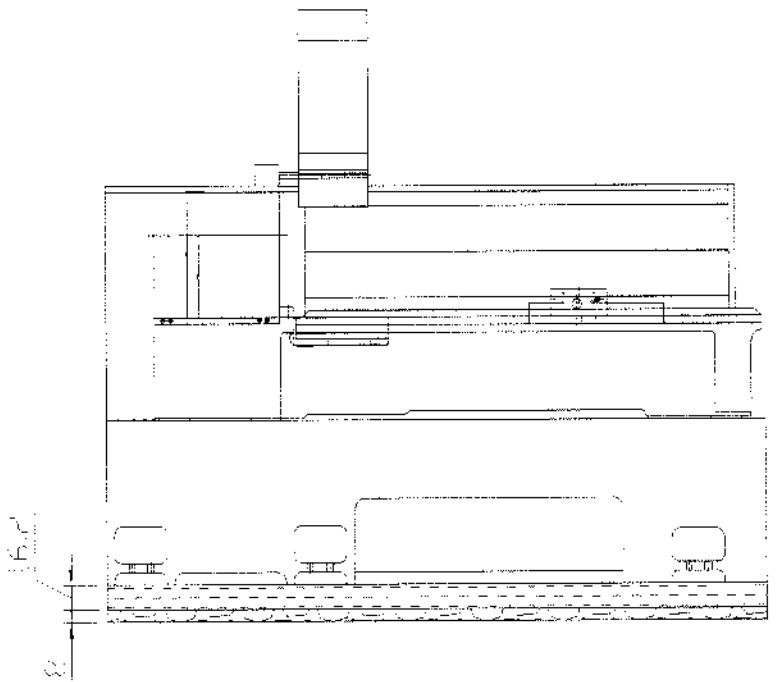
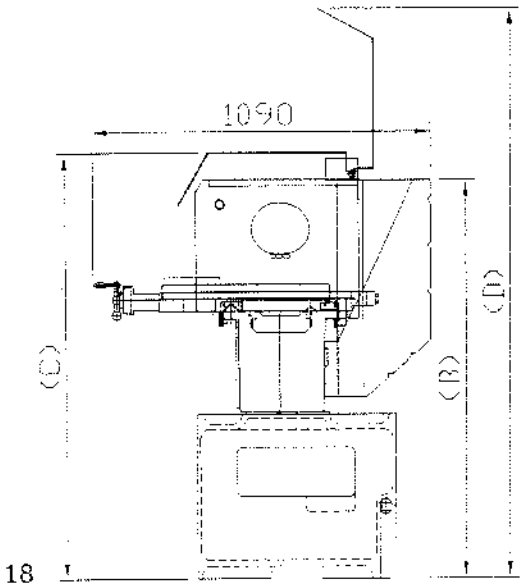


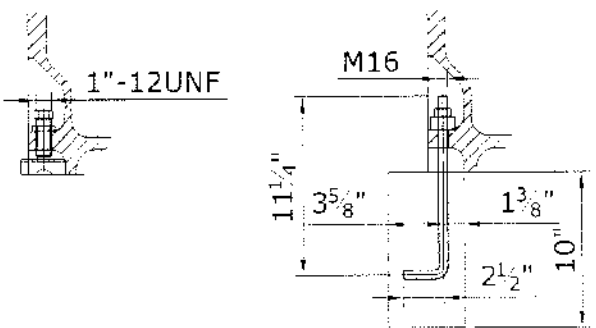
Figure 1

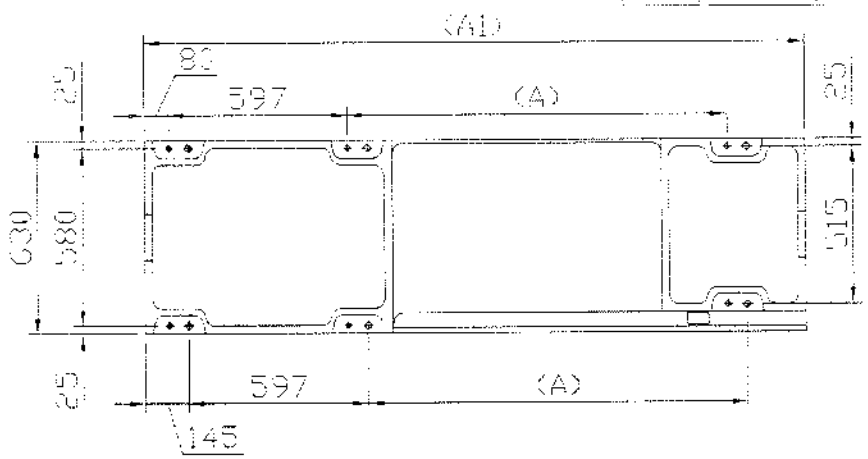




Model	B	C	D
18"	1264	1355	1828
21"	1302	1393	1866
25"	1347	1438	1911

Unit : mm

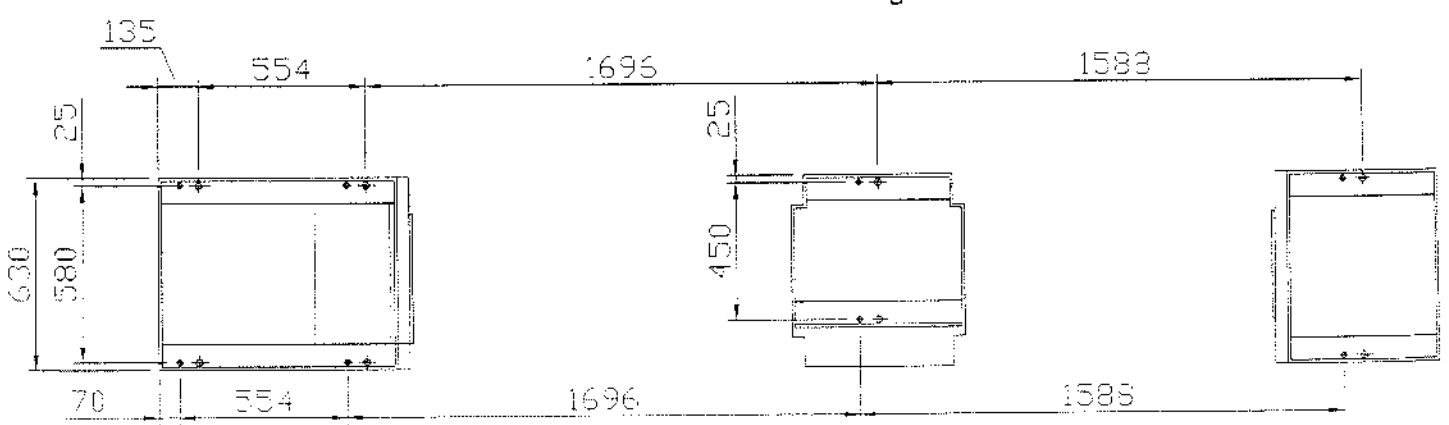




Model	A	A1
1840/2140/2540	1255	2190
1860/2160/2560	1755	2690
1880/2180/2580	2255	3190

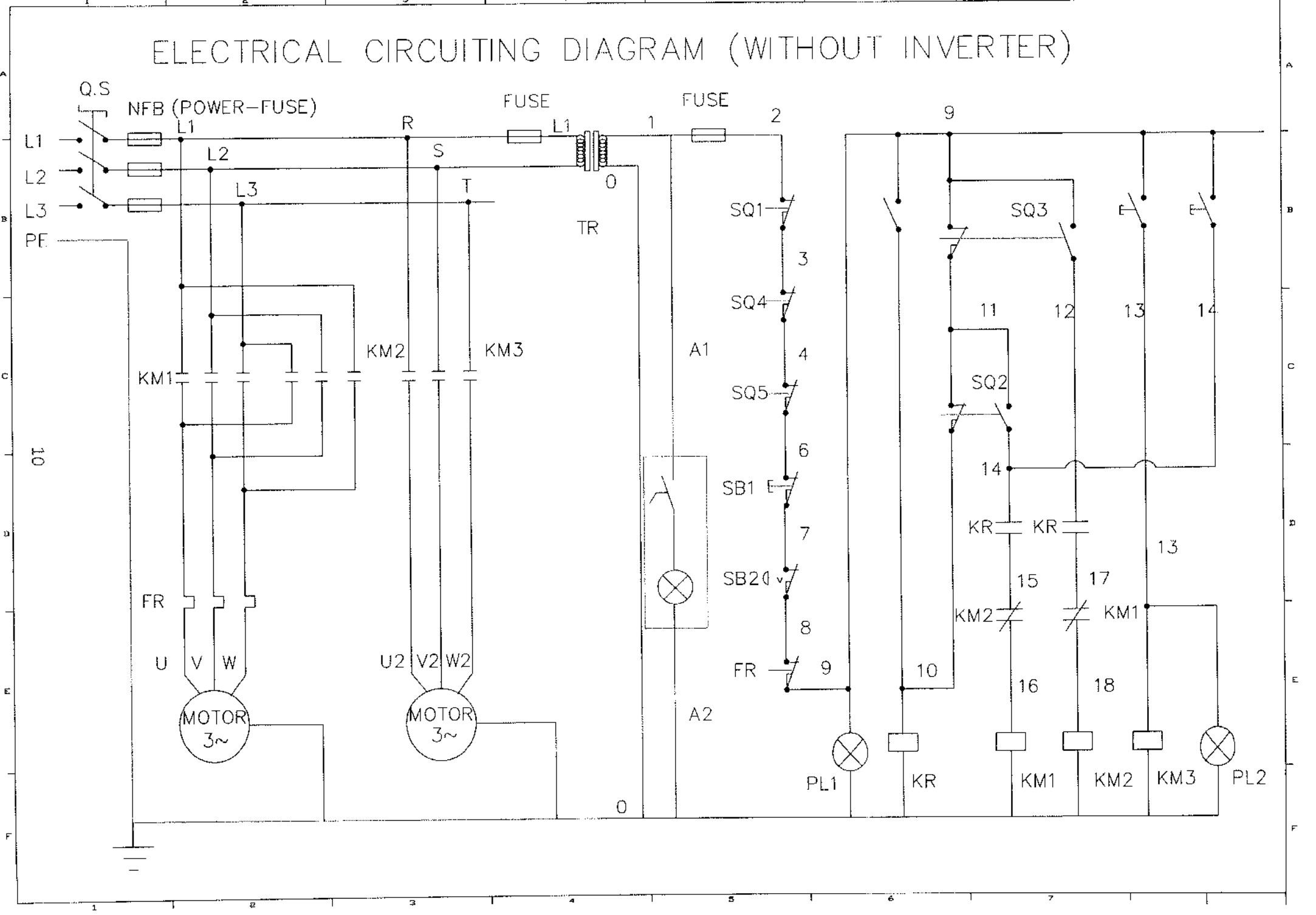
Unit : mm

Figure 2



Electric Circuit, Diagram & Breakdown of Electrical Components

ELECTRICAL CIRCUITING DIAGRAM (WITHOUT INVERTER)



ELECTRICAL CIRCUITING DIAGRAM (WITHOUT INVERTER)

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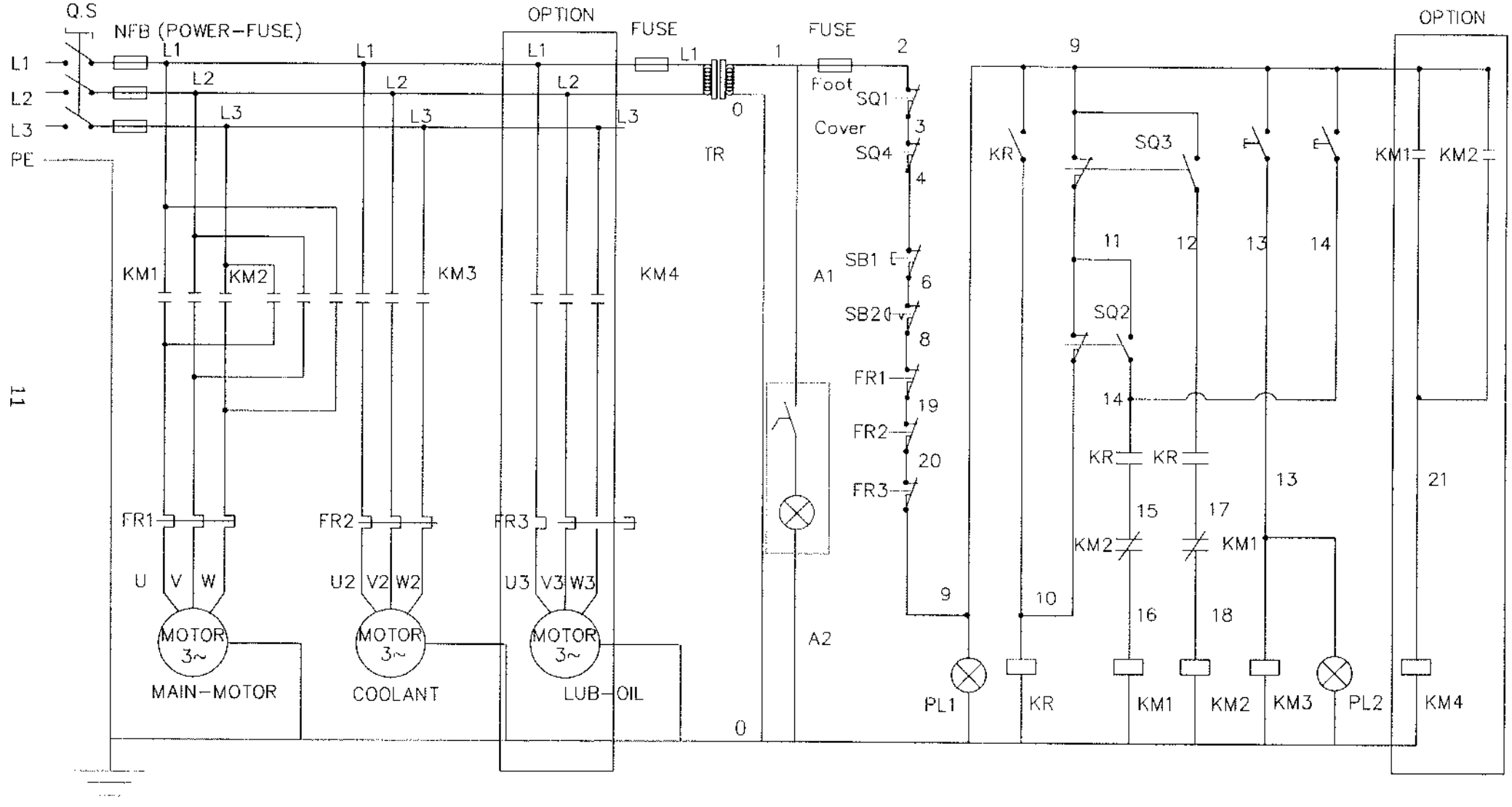
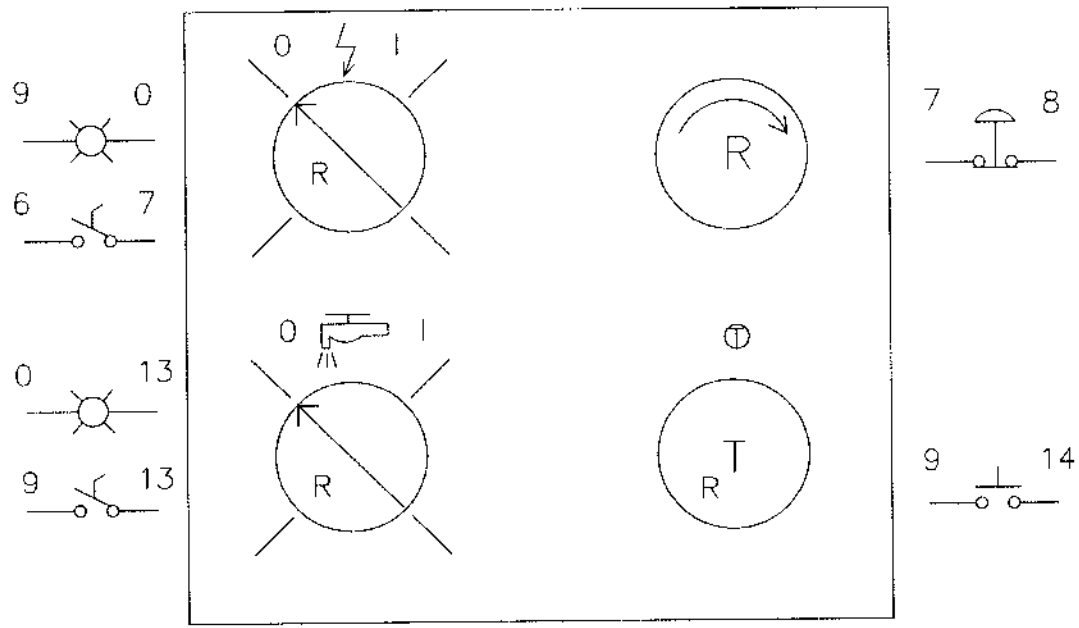
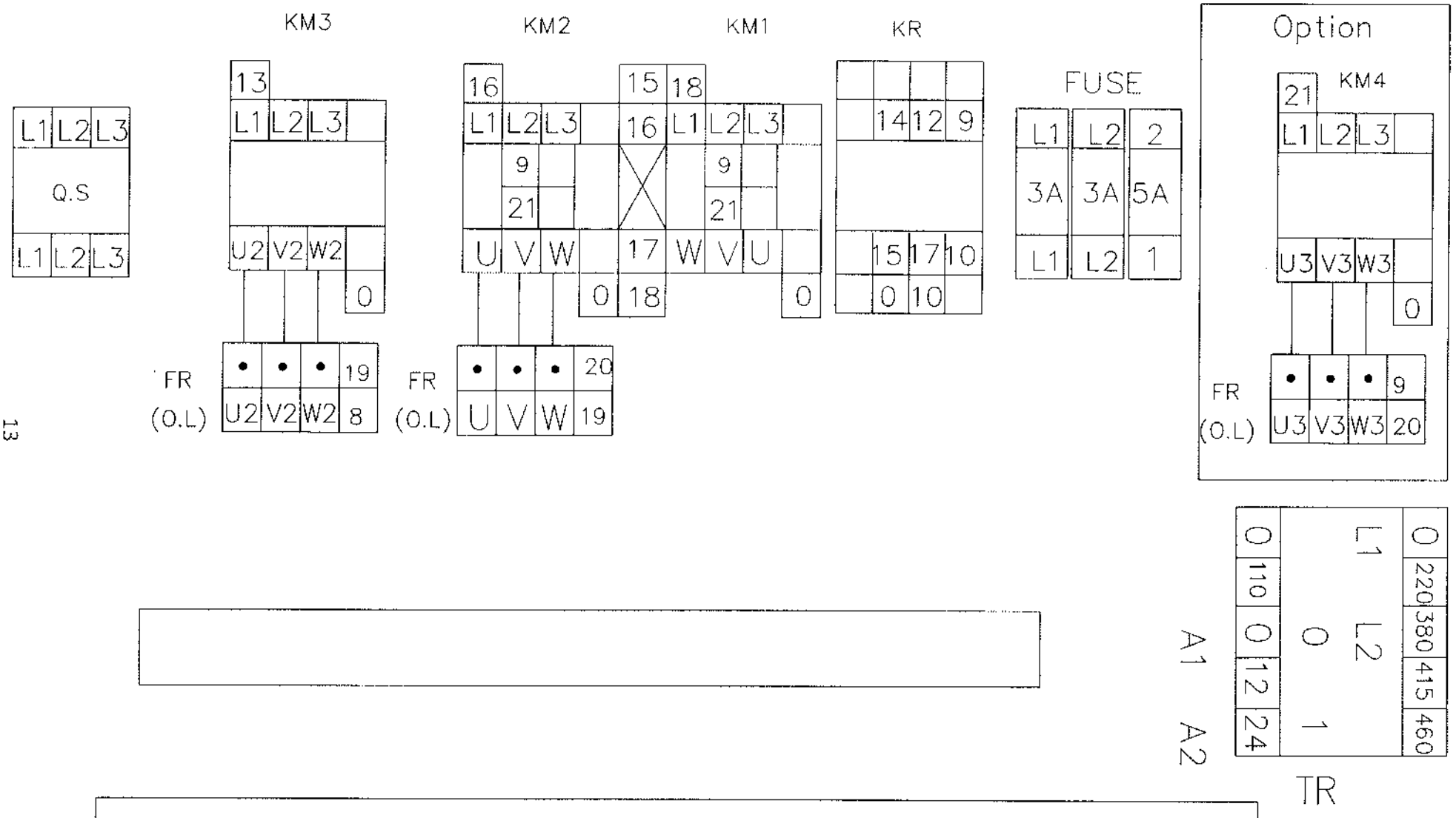


ELECTRICAL CIRCUITING DIAGRAM (WITHOUT INVERTER) FOR CE ONLY



ELECTRICAL CIRCUITING DIAGRAM (WITHOUT INVERTER) FOR C.E ONLY



Manufacturer	SCHEDULE OF ELECTRICAL EQUIPMENT	Sheet
Order		

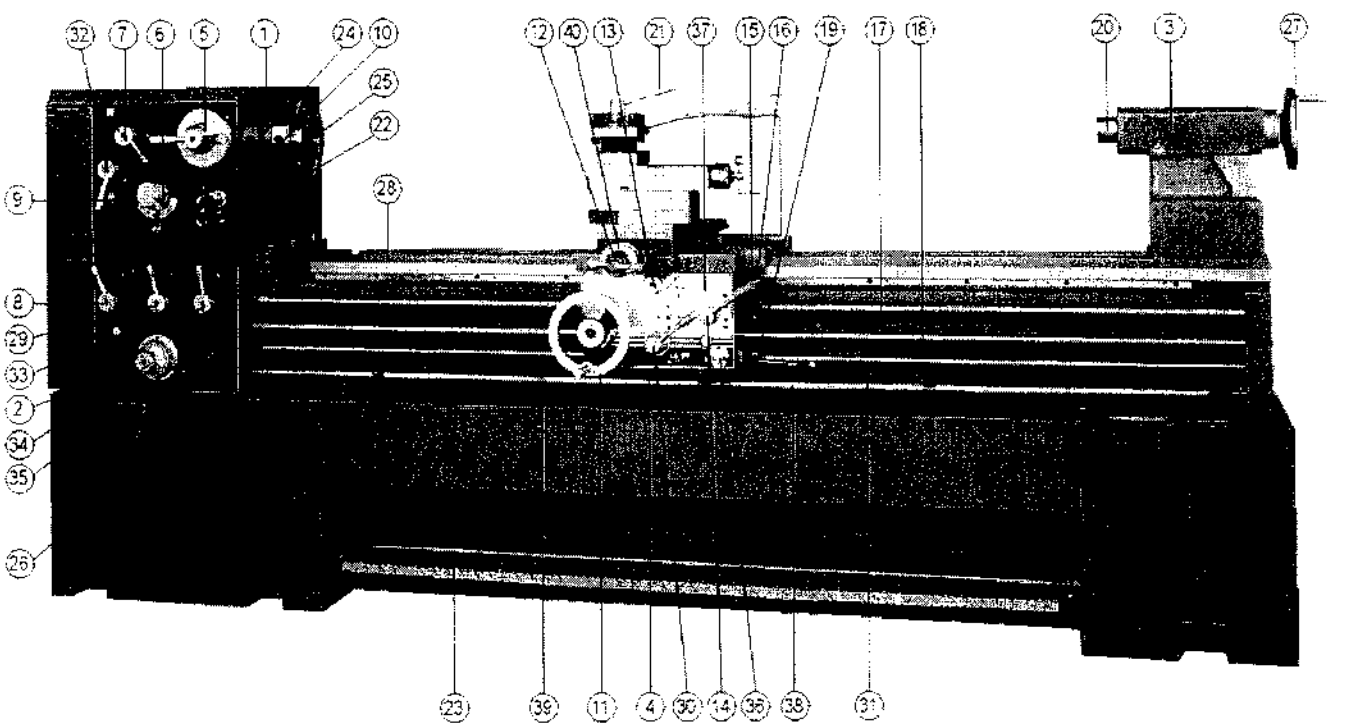
TYPE LATHE MACHINE:	See also list	Drawn		
		Checked		

Item	Description and function	Technical data	Quantity	Supplier	Suppliers reference	
QS	Main Power(Door lock) Switch	AC 600V/50HZ 3P 32A	1	C.H	CH-332	
FU1	AC FUSE	AC 600V	1	SHINING	FS-011	
FU2	TO TRANSFORMER	30MM 3A	1	SHINING	FS-011	
FU3	AC Low Voltage to Transformer	AC 600v 30MM 5A	1	SHINING	FS-011	
KM1	Contactors	3Pia Ri=AC660V Rt=25A	1	N.H.D	C-25D	
KM2		AC3 220V 2.2kW	1		C-25D	
KM3		380V 4.0kW	1		C-12D10	
KM4	(Option)	Coil AC 24V	1		C-12D10	
KM1	Auxiliary contacts	Ui=AC600V Ith=10A	1	N.H.D	CA1-D11	
KM2			1		CA1-D11	
FR1	Over-Load (Realys)	15A	1	N.H.D	NTH	
FR2		1.2A	1			
FR3	(Option)	0.5A	1			
KR	contactors-Realy	Coil=AC 24V AC 240V 5A DC 30V 5A	1	ARITY	MR-2P	
TC	Transformer	AC Hi=380V(220V) LO=24V 300VA	1	SUENN-LIANG	SP-TBS	
TB	Casset Terminal-Block	AC 600V MAX.20A	3	SHINING	TA-020	
		AC 600V MAX.10A	16		TA-010	
PL1	Piolt-Lamps AC Power Lamp	AC 24V 1.5W 22Ø	1	MACK	MK/L-22	
PL2	Piolt-Lamps Pump Lamp		1			
SB1	Power Selector Switch	AC 250V 10A	1	MACK	MK/CF-22	
SB4	Emergency-Stop	MAX.600V	1		MK/B-22	
SB3	Jogging-Botton	1NO*1NC	1		MK/BF-22	
SB2	Pump-Selector	22Ø	1		MK/C-22	
LS4	Safe-Cover	AC 125V 10A 250V 10A MAX.600V	1	MOUJEN	MJ-1701	
LS2	For-Limit.Switch	AC 125V 10A	1	MOUJEN	MJ-1704	
LS3	Rev-Limit.Switch	250V 10A MAX.600V	1			
LS1	Foot-Cut (L.s)		1			
CABLE-LOCK	Cable-Glands		1	AVG	M-16	
LINE	Control-Line	0.75mm² MAX.300V (30/0.18)-7A Ambient Temp (35°C~60°C)	1	TONG-WU		
CABLE	PVC Cable-Wire	2.0mm²*4c(37/0.26)16a 1.25mm²*4c(50/0.18)11A Ambient Temp (35°C~60°C) MAX 600V	1	TONG-WU		

OPERATION

HEAVY DUTY / HIGH SPEED PRICISION LATHE (Conventional Type)

1. Headstock
2. Feed Gear Box
3. Tailstock
4. Apron
5. Spindle Speed Selector
6. Hi, Middle & Low Speed Selector
7. Feed Direction Selector
8. Feed Selector
9. Oil Level Sight Window
10. EMG. Stop Switches
11. Longitudinal Transverse Handwheel
12. Cross Feed Handle
13. Longitudinal Cross Feed Selector
14. Thread Cutting Engagement Lever
15. Threading Indicator Dial
16. Carriage Lock
17. Lead Screw
18. Feed Bar
19. Spindle Control Lever
20. Quill Lock
21. Coolant Pipe
22. Jogging Switches
23. Brake Pedal
24. Power Switches
25. Coolant Pump Switches
26. Foundation Bolts
27. Quill Transverse Handwheel
28. Gap
29. Feed Selector
30. Auto Feed Clutch Lever
31. Starting Bar
32. Feed Selector
33. Feed Selector
34. Feed Selector
35. Engage Lever
36. Hand Oiler
37. Pressure Adjusting Screw
38. Longitudinal Kick-out Device
39. Stopping Bar
40. Carriage Lock Capscrew



SPINDLE SPEED SELECTION, STOP & RE-START : (Conventional Type)

The first turn on the power source switch and then, set the feed direction selecting lever (7) at neutral position, set the spindle speed change lever (5) to the desired speed rate and set the hi-low speed selecting lever (6) to either high or low position, after that, move the spindle start lever (19) upward or downward which will caused the spindle rotates in counter – clockwise or in clockwise direction. (Speed selecting can be referred as Graph 2)

As for to stop the spindle rotation which can be employed your foot leg to foot pedal the foot pedal brake (23).

After the spindle stopped by foot pedal brake and want to restart the spindle rotation, the spindle start lever should be pushed to the neutral position first, and then, followed by the selection of forward / reverse direction.

CAUTIONS

· If want to change the spindle speed which must be stopped the spindle rotating, otherwise, the gear of headstock will be damaged.

· If it is hard to set the lever on position when making speed change, we can push the jogging switch (22) slightly and then, set the selecting lever again.

HOW TO OPERATE THE JOGGING SWITCH

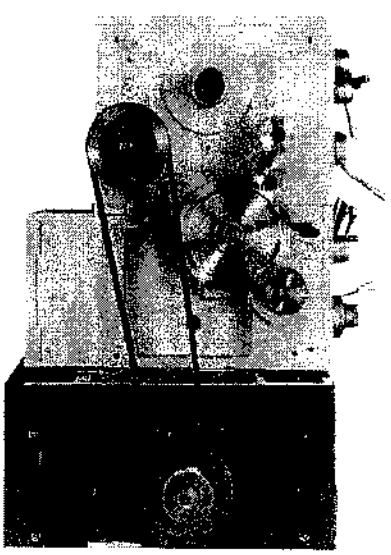
During in operating, if we want to make speed change more easier or adjusting the center for chucking raw material when four jaws chuck is used and then, we can employ couple with the jogging switch (22).

GEAR CHANGE SYSTEM

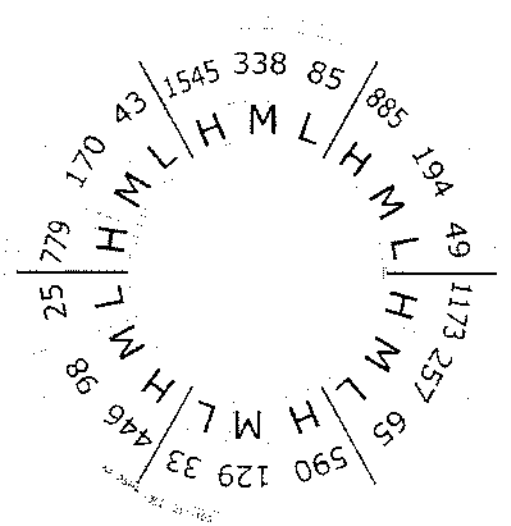
The gear change system is located at the left side of the headstock as fig shown, please refer to thread cutting as Graph 1.

CAUTIONS

· Don't attempt to change gears when the spindle is running.



Graph 1



Graph2

HOW TO OPERATE THE CARRIAGE & APRON:

For longitudinal feed push down the longitudinal-cross feed selector ⑬, But for cross feed, which will pull up the selector ⑬ and refer table 2)。

MANUAL FEED:

Carriage moves longitudinally by turn the longitudinal traverse handwheel ⑪, meanwhile, set the feed direction selecting lever ⑦ the thread cutting engaging lever ⑭ at neutral position and pull up the long-cross feed selector ⑬ up (one graduation of handwheel dial is corresponding to 0.002" and one turn also corresponding to 0.4" travel of carriage.)

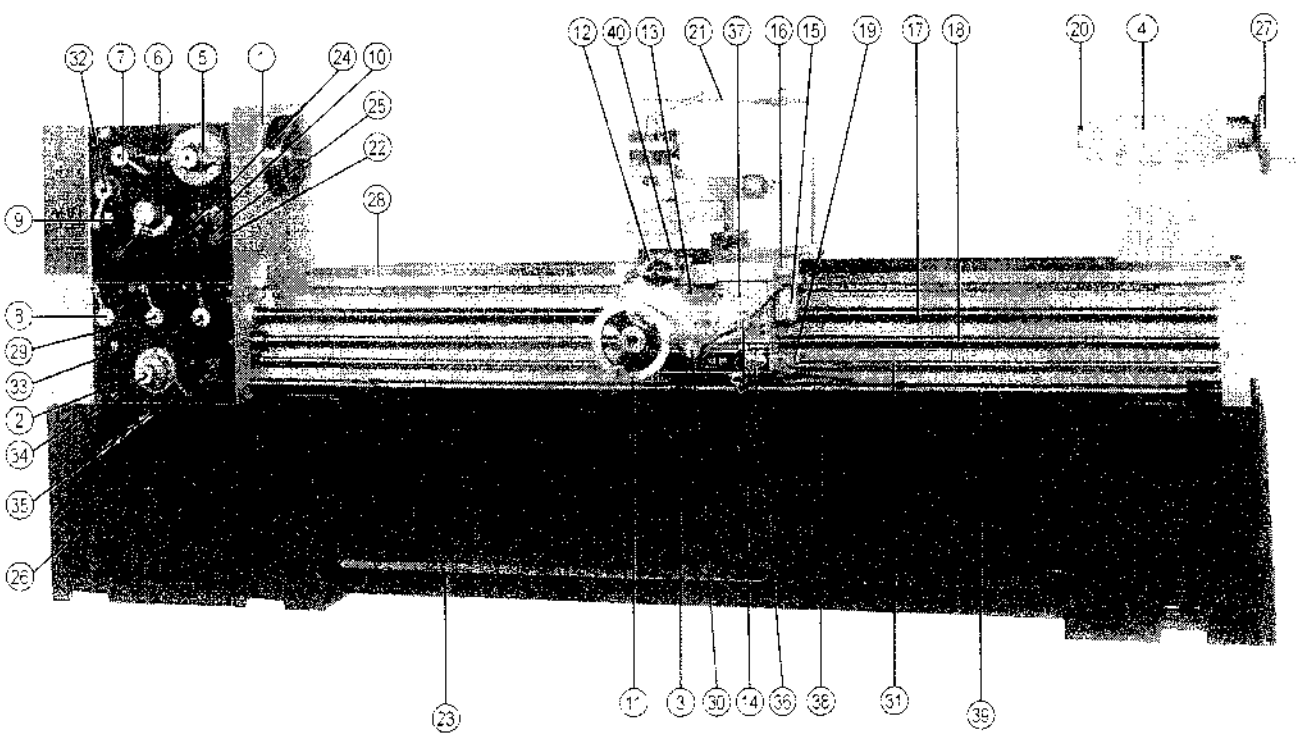
AUTO FEED:

The auto feed is operated as following procedures:

1. Select the feed direction by feed direction selecting lever ⑦
2. Set gear change and shift levers ⑧ & ㉚ to desired feed rate
3. Shift auto feed clutch lever ㉝ to feed direction
4. Pull the thread cutting engaging lever ⑭ up
5. Turn the longitudinal-cross selecting lever to either longitudinal or cross feed position
6. Shift the spindle start lever ⑲ to forward direction
7. When the auto feed clutch lever ⑬ shifted and the auto feed will be processed. But the auto feed clutch lever ⑬ is shifted to the neutral position and the feed will be stopped followingly.

SWIVELLING THE TOOL POST:

If want making swivelling the tool post which must losen tool carriage lock capscrew ㊵ before.



LEVER		Ⓕ MM Feed speed.								
		1	2	3	4	5	6	7	8	9
C	A	0.50	0.57	0.63	0.69	0.70	0.73	0.76	0.82	0.89
	B	0.25	0.28	0.31	0.34	0.35	0.36	0.38	0.41	0.44
D	A	0.12	0.14	0.15	0.17	0.17	0.18	0.19	0.20	0.22
	B	0.06	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.11

Table 2

HOW TO OPERATE THE TAILSTOCK:

There is a center fixed in the sleeve of MT#5 and aligned with the center-line of the headstock. The sleeve can be moved by rotating the handwheel. One graduation of handwheel dial is corresponding to 0.002" and one turn also corresponding to 0.2" travel of tailstock spindle, the total range of movement of the sleeve is 150mm.

In order to accommodate to the length of the workpiece, the tailstock can slide along the bed way by pushing or pulling it to the required position and then, locked it by lifting the tailstock clamp lever up till tighten.

THREADING CHART

LEVER		W FOR CUTTING INCH THREAD								
		1	2	3	4	5	6	7	8	9
D	A	4	4½	4¾	5	5½	5¾	6	6½	7
	B	8	9	9½	10	11	11½	12	13	14
C	A	16	18	19	20	22	23	24	26	28
	B	32	36	38	40	44	46	48	52	56

LEVER		M FOR CUTTING METRIC THREAD								
		1	2	3	4	5	6	7	8	9
C	A	4	4.5	4.75	5	5.5	5.75	6	6.5	7
	B	2	2.25		2.5	2.75		3	3.25	3.5
D	A	1			1.25			1.5		1.75
	B	0.5			0.625			0.75		0.875

LEVER		W FOR CUTTING D.P THREAD								
		1	2	3	4	5	6	7	8	9
D	A	8	9	9½	10	11	11½	12	13	14
	B	16	18	19	20	22	23	24	26	28
C	A	32	36	38	40	44	46	48	52	56
	B	64	72	76	80	88	92	96	104	112

LEVER		M FOR CUTTING MODULE THREAD								
		1	2	3	4	5	6	7	8	9
C	A	2	2.25		2.5	2.75		3	3.25	3.5
	B	1			1.25			1.5		1.75
D	A	0.5			0.625			0.75		0.875
	B	0.25								

HOW TO OPERATE THE LEADSCREW:

When shift the feed direction selecting lever ⑦ to the right or left and so as to the leadscrew will run forward or reverse rotating respectively.

INCH THREAD SYSTEM:

The inch thread cutting is operated as following procedures:

1.The gear change are aligned for ready making inch threading cutting.
2.Thus, shift levers ⑧,⑩,㉗ to the desired position and shift lever to one of 8 position.
3.Shift spindle start lever ⑲ downward to the forward rotating direction.
4.Shift thread cutting engaging lever down (half nut engaged) to start thread cutting.

THREAD CUTTING INDEXING:

The thread cutting indicating is installed on the headstock panel which has eight graduation. For making inch thread cutting. the thread cutting indexing will be prepared to correct position of half nut engaging quickly and convenitntly.

As for the metric thread cutting, the half nut should be engaged with lead screw completely (when the leadscrew is in inch)

Which let tool post back to start position by spindle reversing rotating and then, feeding engaging again, when making metric thread cutting using leadscrew of imperial system or vice versa, the thread cutting engaging lever has to maintain engaged until to the end of thread cutting process.

LUBRICATION

LUBRICATION IN HEADSTOCK & FEED GEAR BOX:

Those are oil bath lubricated for both gear box and headstock, please always beware the oil level is not lower than the minimum level of oil window.

LUBRICATION IN GEAR CHANGE SYSTEM:

Open the protecting cover of gear change system and dip the lubricating oil with drop oiler daily.

LUBRICATION IN CARRIAGE & TOOL POST:

Carriage slides lubricated by hand oil pump and the tool post lubricated with drop oiler daily before starting the machine.

LUBRICATION IN APRON:

The apron itself is served as an oil reservoir, it's rotating parts are dipped into the oil bath, and the other parts are lubricated by splashing. Be sure the oil on proper height of oil window.

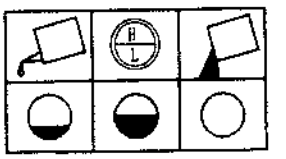
LUBRICATION IN BEDWAY, LEADSCREW, & LEADSCREW POST:

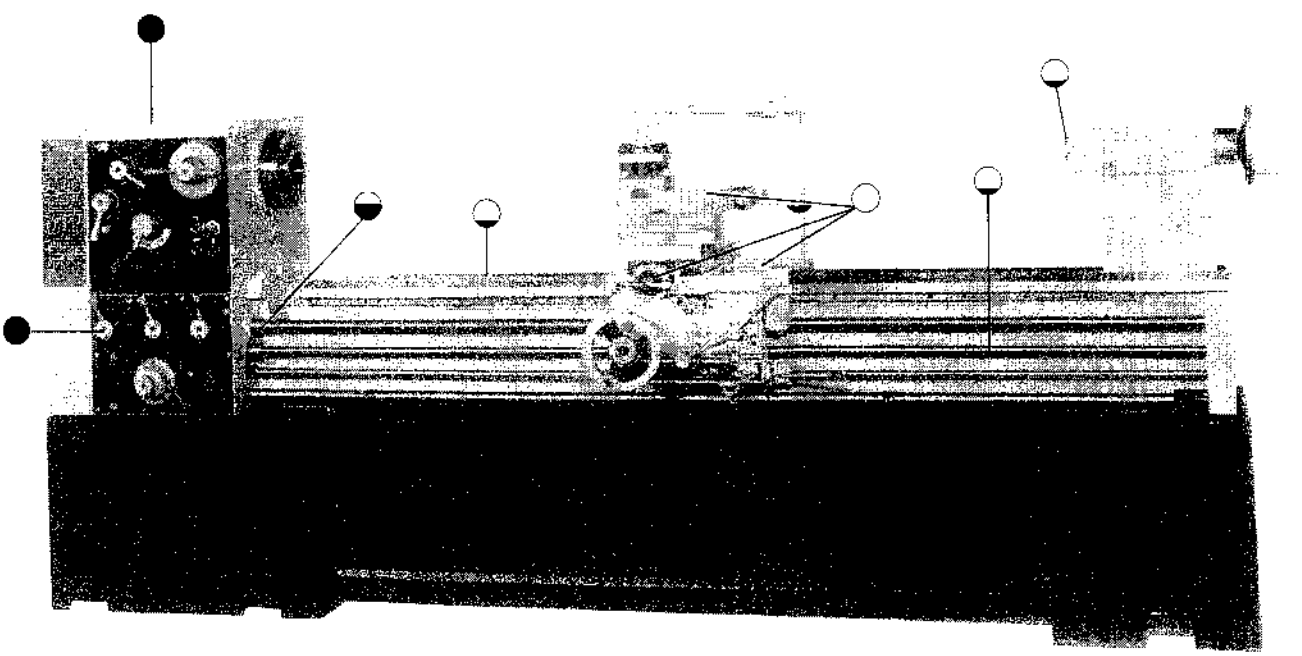
The bed way, leadscrew and leadscrew post which must lubricated with drop oiler oftenly due to operating condition.

FLUID COOLANT FOR CUTTING:

The coolant pump will be employed when the machining work is running and push on the coolant pump switch ㉔.

Service Interval	Daily	When required	Up oil level Window oftenly





TROUBLE CAUSE & TROUBLE SHOOTING

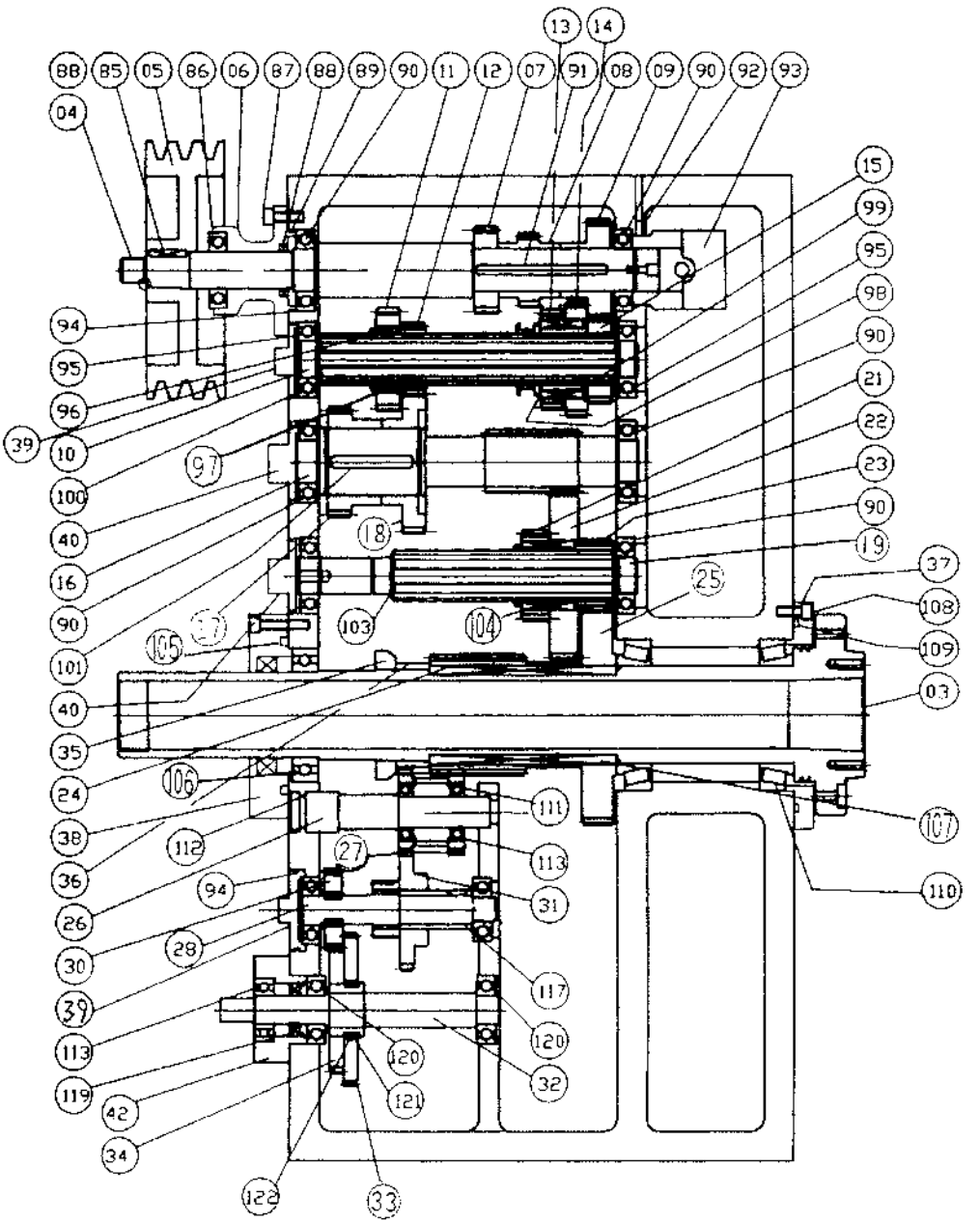
TROUBLE ITEM	CAUSE	REMEADY
Vibration	Loose levelling screws	Set all screws so they bear evenly on leveling plates.
	Torn or mismatched Vee belts	Replace vee belts with matched set, or adjust roll.
	Work or chuck out of balance operating at high spindle speed.	Balance chuck or reduce spindle speed.
	Motor out of balance	Contact local representative or motor manufacturer.
Chatter	Tool bit improperly ground or not on center	Regrind tool bit or adjust tool holder so that area of contact between tool bit and work is decreased. Avoid extreme negative rake angle.
	Tool overhang too great	Keep point of tool bit as close as possible to tool holder.
	Using improper surface feet	Reduce or increase spindle speed.
	Feed rate too high or too low	Reduce or increase feed.
	Gibs of cross slide or pound rest loose	adjust gibs.
	Spindle bearings worn	Adjustspindle bearings.
Chatter (cont'd)	Work imporoperly supported	Adjust tailstock center. Use steady rest or follow rest on long slender shafts. Minimize tailstock barrel extension.
	Vibration	See "Vibration" trouble above.
	Spindle bearing loose	Adjust spindle bearings.
Work not turned straight	Headstock and tailstock centers not aligned	Align tailstock center
	Work improperly supported	Use steady rest of follow rest. Reduce overhang from chuck.
	Bed not level	Relevel bed, using precision level.
	Tool not on center when using taper attachment	Put tool on center.
Work out or round	Work loose between centers or centers are excessively worn--work centers out of round	Adjust tailstock center. regrind centers. Lap work centers.
	Loose headstock spindle bearings	Adjust headstock spindle bearings.
Cross slide or compound rest movement does not coincide with dial movement of respective adjusting screw.	Gib setting too tight or too loose	Adjust gibs.
	Workpiece is too long and slender	Use steady rest or follow rest.

Mechanical Drawings
&
Parts Breakdown List

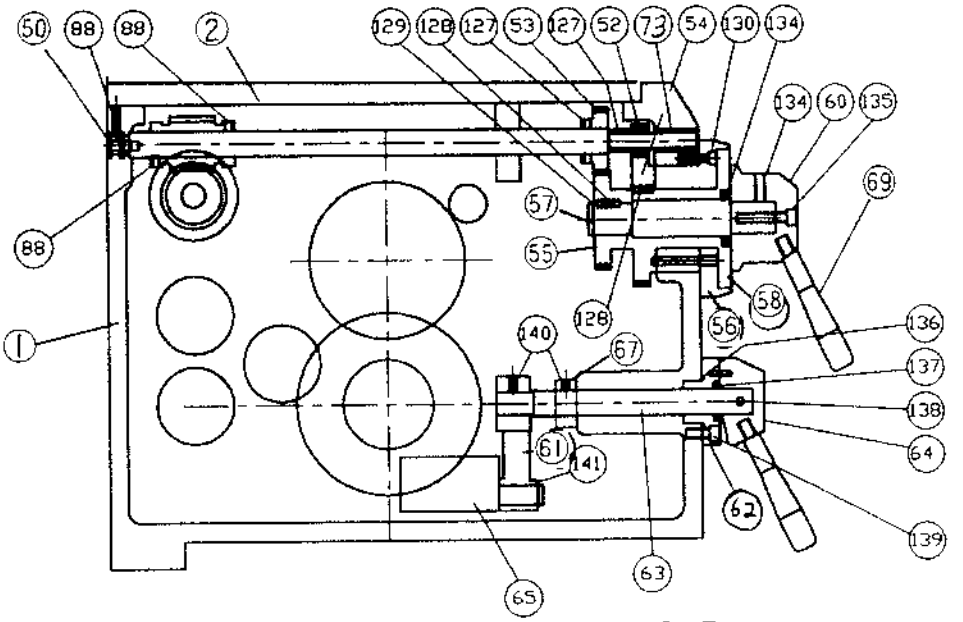
Note: When ordering parts, please be prepared with,

1. Machine model & serial number.
2. Item number.
3. Part number and description.
4. Year of Production.
5. Voltage & horsepower.
6. Quantity

HEADSTOCK (WITHOUT INVERTER)



Headstock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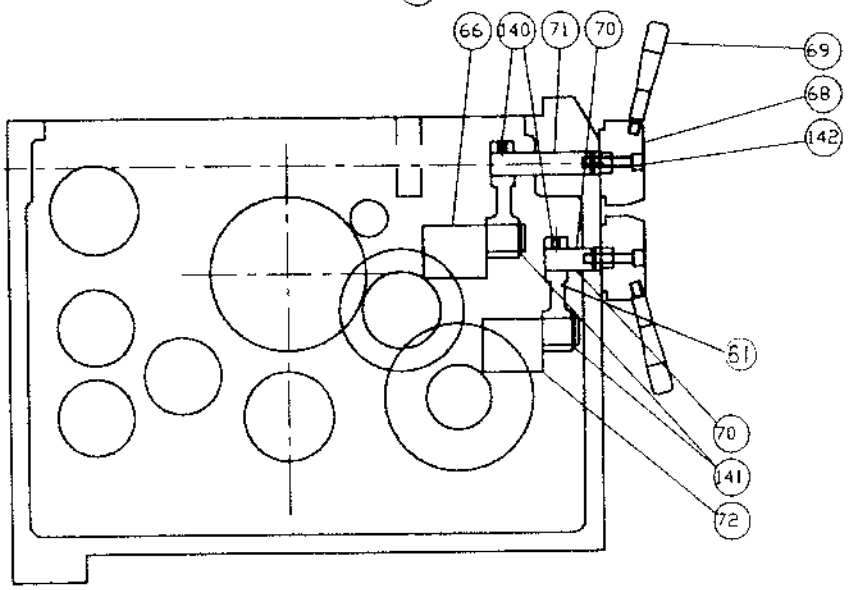
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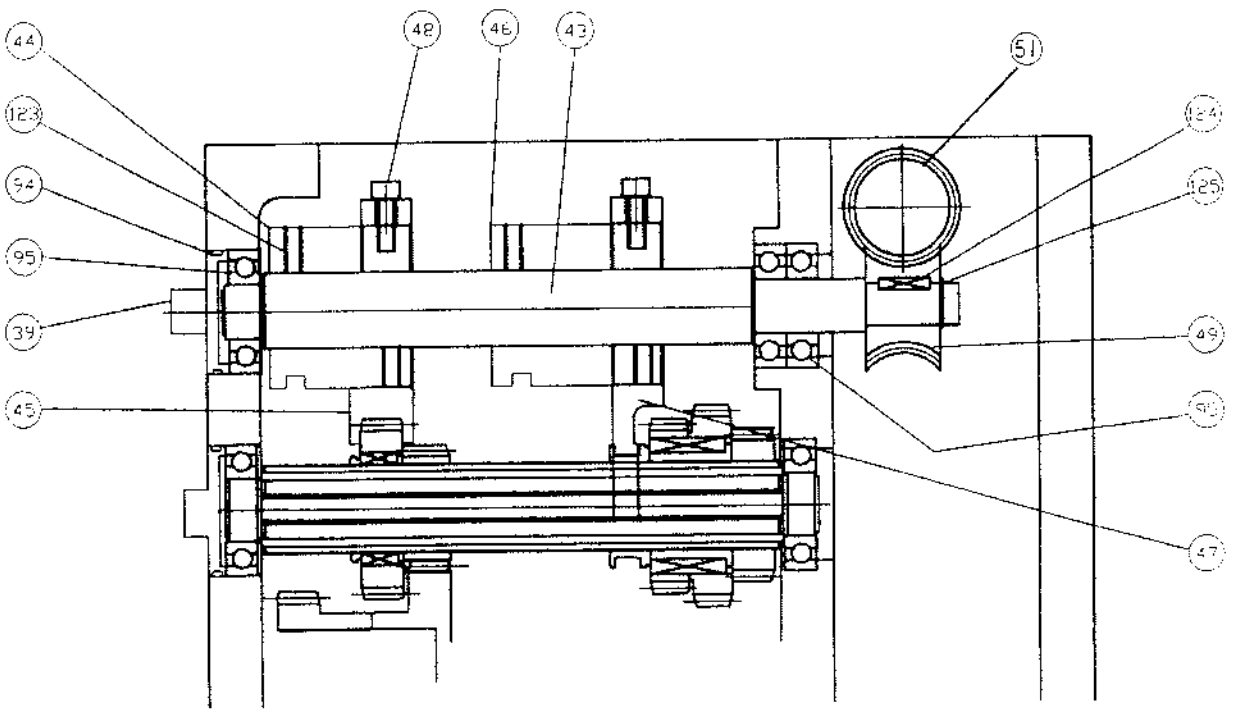
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HEADSTOCK (WITHOUT INVERTER)

SERIAL NO.	PARTS No.	DESCRIPTION	Q'TY
1	25HA-001	Headstock	1
2	25HA-002	Cover	1
3	25HA-003	Spindle	1
4	25HA-004	Shaft	1
5	25HA-005	V-Pulley	1
6	25HA-006	Cover	1
7	25HA-007	Spur Gear	1
8	25HA-008	Spur Gear	1
9	25HA-009	Spur Gear	1
10	25HA-010	Keyway Shaft	1
11	25HA-011	Spur Gear	1
12	25HA-012	Spur Gear	1
13	25HA-013	Spur Gear	1
14	25HA-014	Spur Gear	1
15	25HA-015	Spur Gear	1
16	25HA-016	Spur Gear	1
17	25HA-017	Spur Gear	1
18	25HA-018	Spur Gear	1
19	25HA-019	Keyway Shaft	1
20			
21	25HA-021	Spur Gear	1
22	25HA-022	Spur Gear	1
23	25HA-023		1
24	25HA-024		1
25	25HA-025		1
26	25HA-026	Shaft	1
27	25HA-027	Spur Gear	1
28	25HA-028	Shaft	1
29			
30	25HA-030	Spur Gear	1
31	25HA-031	Spur Gear	1
32	25HA-032	Keyway Shaft	1
33	25HA-033	Spur Gear	1
34	25HA-034	Spur Gear	1
35	25HA-035	Master Nut	1
36	25HA-036	Spacer Ring	1
37	25HA-037	Snap Cover	1
38	25HA-038	Snap Cover	1
39	25HA-039	Snap Cover	1
40	25HA-040	Snap Cover	1

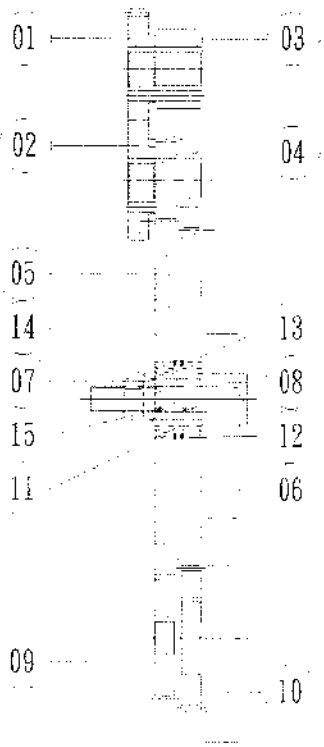
SERIAL NO.	PARTS No.	DESCRIPTION	Q'TY
41			
42	25HA-042	Snap Cover	1
43	25HA-043	Cam Shaft	1
44	25HA-044	Cam	1
45	25HA-045	Speed Change Fork	1
46	25HA-046	Cam	1
47	25HA-047	Speed Change Fork	1
48	25HA-048	Counter-Sink Screw	2
49	25HA-049	Worm Gear	1
50	25HA-050	Pinion Shaft	1
51	25HA-051	Worm Gear	1
52			
53	25HA-053	Spur Gear	1
54	25HA-053	Spur Gear	1
55	25HA-053	Spur Gear	1
56	25HA-056	Locking Post	1
57	25HA-057	Shaft	1
58	25HA-058	Snap Cover	1
59			
60	25HA-060	Lever Boss	1
61	25HA-061	Rocker Arm	1
62	25HA-062	Snap Cover	1
63	25HA-063	Shaft	1
64	25HA-064	Lever Boss	1
65	25HA-065	Speed Change Fork	1
66	25HA-066	Speed Change Fork	1
67	25HA-067	Rocker Arm	1
68	25HA-068	Lever Boss	1
69	25HA-069	Handle	2
70	25HA-070	Shaft	1
71	25HA-071	Shaft	1
72	25HA-072	Speed Change Fork	2
73	25HA-073	Sleeve	1
74			1
75			1
76			1
77			1
78			1
79			1
80			1

SERIAL NO.	PARTS No.	DESCRIPTION	Q'TY
81			
82			
83			
84			
85	25HA-085	Key (8×7×29)	1
86	25HA-086	Bearings (6206ZZ)	1
87	25HA-087	Screw (CAP6×30)	7
88	25HA-088	Oil Seal (45×30×8)	1
89	25HA-089	Oil Ring (P65)	4
90	25HA-090	Bearings (6207)	7
91	25HA-091	Key (8×7×128)	2
92	25HA-092	Screw (M8×25)	1
93	25HA-093	Pump	1
94	25HA-094	Bearings (6306)	1
95	25HA-095	Bearings (6206)	4
96	25HA-096	Key (8×7×30)	2
97	25HA-097	C Locker (S50)	1
98	25HA-098	C Locker (S55)	1
99	25HA-099	Key (8×7×35)	2
100	25HA-100	O Ring (P55)	3
101	25HA-101	Key (10×7×76)	2
102	25HA-102	C Locker (s52)	1
103	25HA-103	C Locker (S35)	1
104	25HA-104	C Locker (S50)	1
105	25HA-105	O Ring (G115)	1
106	25HA-106	Bearings (6020Z)	1
107	25HA-107	Key (10×8×70)	4
108	25HA-108	Screw (Cap6×25)	15
109	25HA-109	O Ring (P170)	1
110	25HA-110	Bearings (32021/32022)	2
111	25HA-111	C Locker (R47)	2
112	25HA-112	O Ring (P25)	1
113	25HA-113	Bearings (6005)	3
114	25HA-114	Bearings (6305)	1
115	25HA-115	Key (8×7×18)	2
116			
117	25HA-117	Key (8×7×30)	1
118	25HA-118	Screw (Cap6×35)	3
119	25HA-119	Oil Seal (38×25×8)	1
120	25HA-120	Bearings (6205)	3

SERIAL NO.	PARTS No.	DESCRIPTION	Q'TY
121	25HA-121	Key(6×6×10)	2
122	25HA-122	C Locker (S45)	1
123	25HA-123	Screw (M10×15)	9
124	25HA-124	Key (6×6×30)	1
125	25HA-125	C Locker (S20)	1
126	25HA-126	Screw (M6×P10)	2
127			
128	25HA-128	Key (8×7×25)	2
129	25HA-129	C Locker (S20)	1
130	25HA-130	Screw (Cap M6×1)	3
131	25HA-131	(M10×10)	1
132	25HA-132	(ϕ8×30)	1
133	25HA-133	Steel Ball (ϕ8)	1
134	25HA-134	Oil Seal (38×25×8)	1
135	25HA-135	Screw (Cap M8×25)	3
136	25HA-136	Oil Seal (P40)	1
137	25HA-137	Oil Seal (38×22×8)	1
138	25HA-138	Spring Pin (ϕ6×70)	1

GEAR TRAIN FOR 21" SERIES

METRIC UNITS

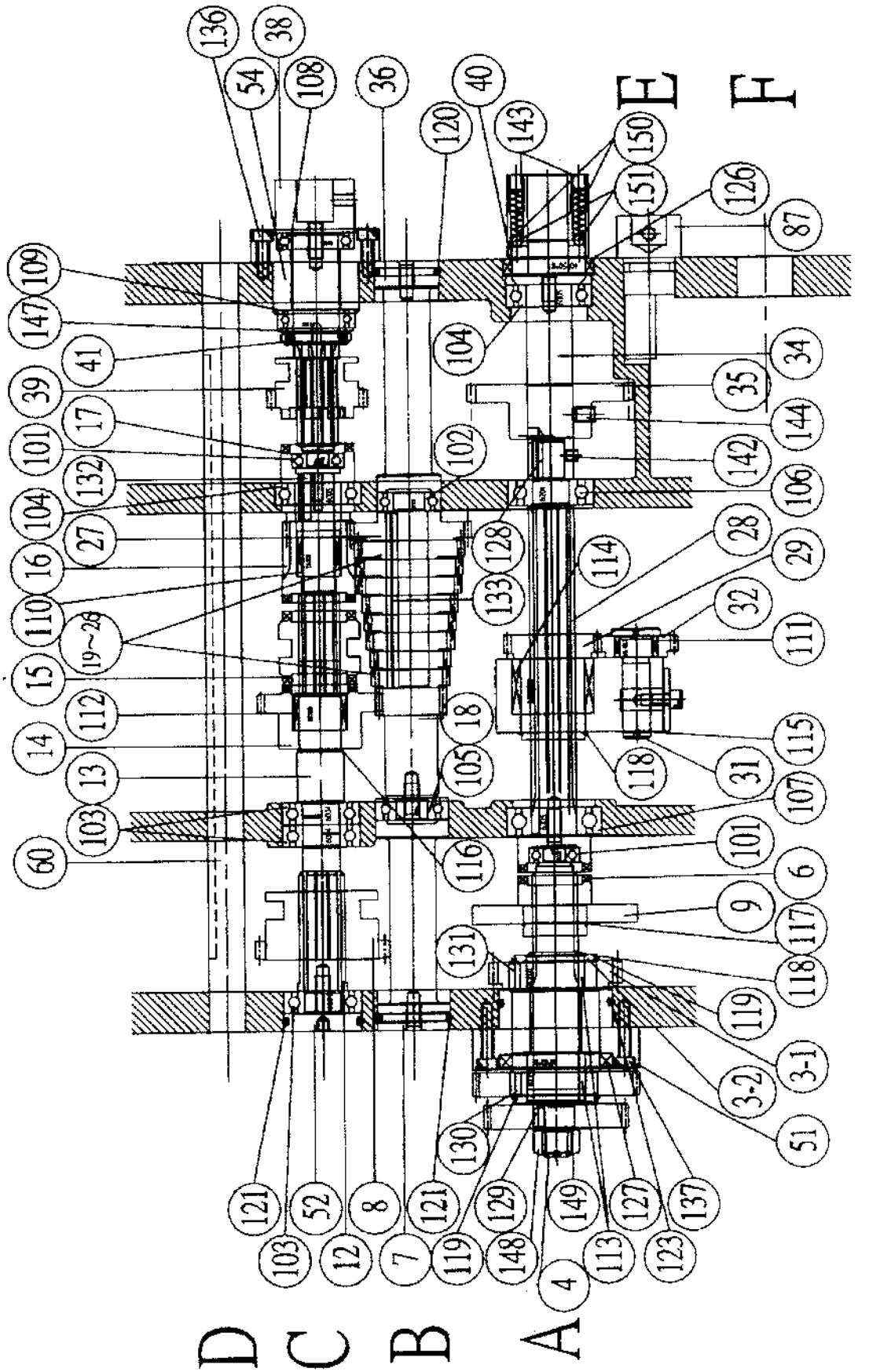


IMPERIAL UNITS

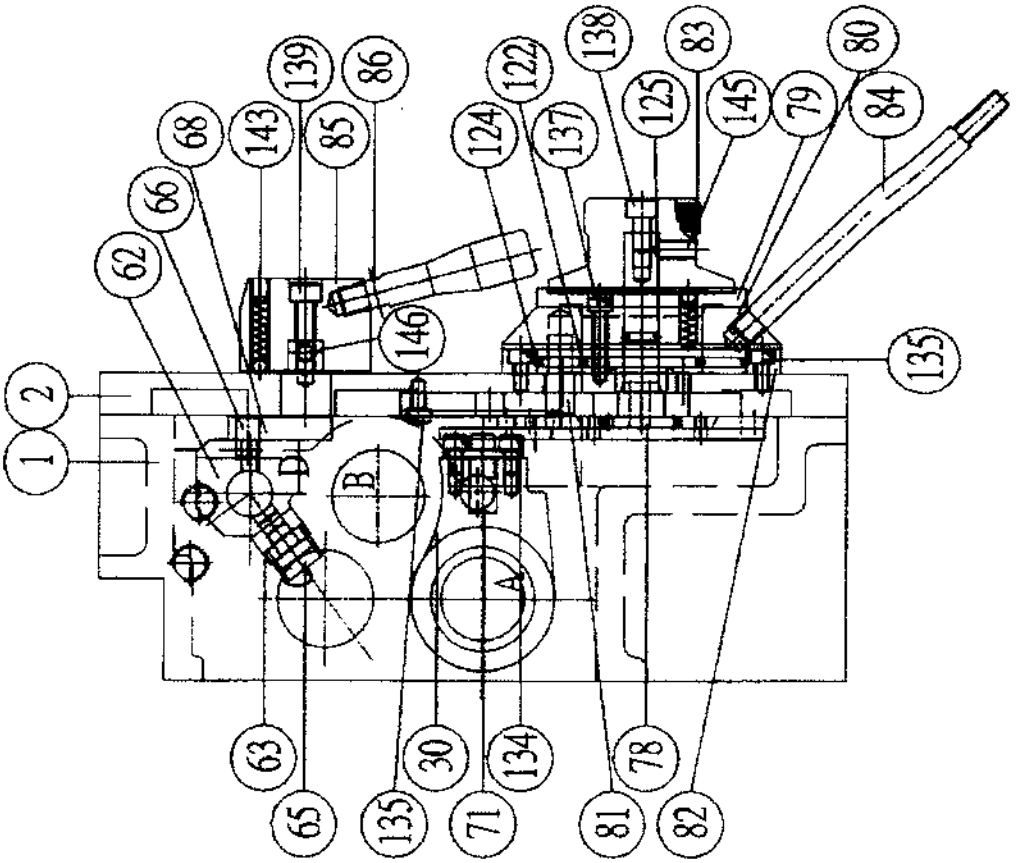
GEAR TRAIN FOR 21" SERIES, SPINDLE BORE 85MM (3")

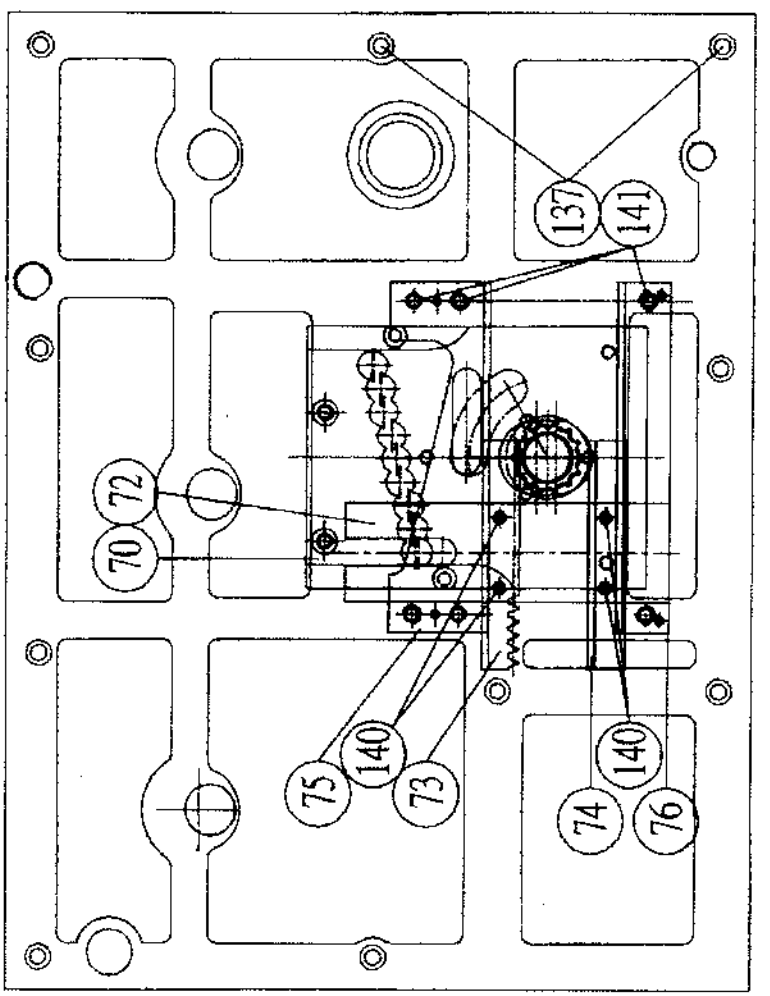
NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARK
01	25HA-081000	GEAR 42T, M2.5	1	
02	25HA-082000	GEAR 56T, M2.5	1	
03	18HA-080000	SAFE PIN BASE	1	
04	16B-031000	GEAR 28T, M1.75	1	
05	20B-033000	HAVING TWO LAYERS END GEAR 128T, M1.75 HAVING TWO LAYERS END GEAR 120T, M1.75	1	
06	20B-038A00	BRACKET	1	
07	20B-037000	SHAFT	1	
08	20B-036000	SHAFT	1	
09	20B-035000	END GEAR 42T, M1.75	1	
10	20B-034000	END GEAR 49T, M1.75	1	
11		BEARING 6005	2	
12		C LOCKER R47	2	
13		C LOCKER S25	1	
14		SPRING WASHER M16	1	
15		NUT M16	1	

Feed Gear Box



Feed Gear Box





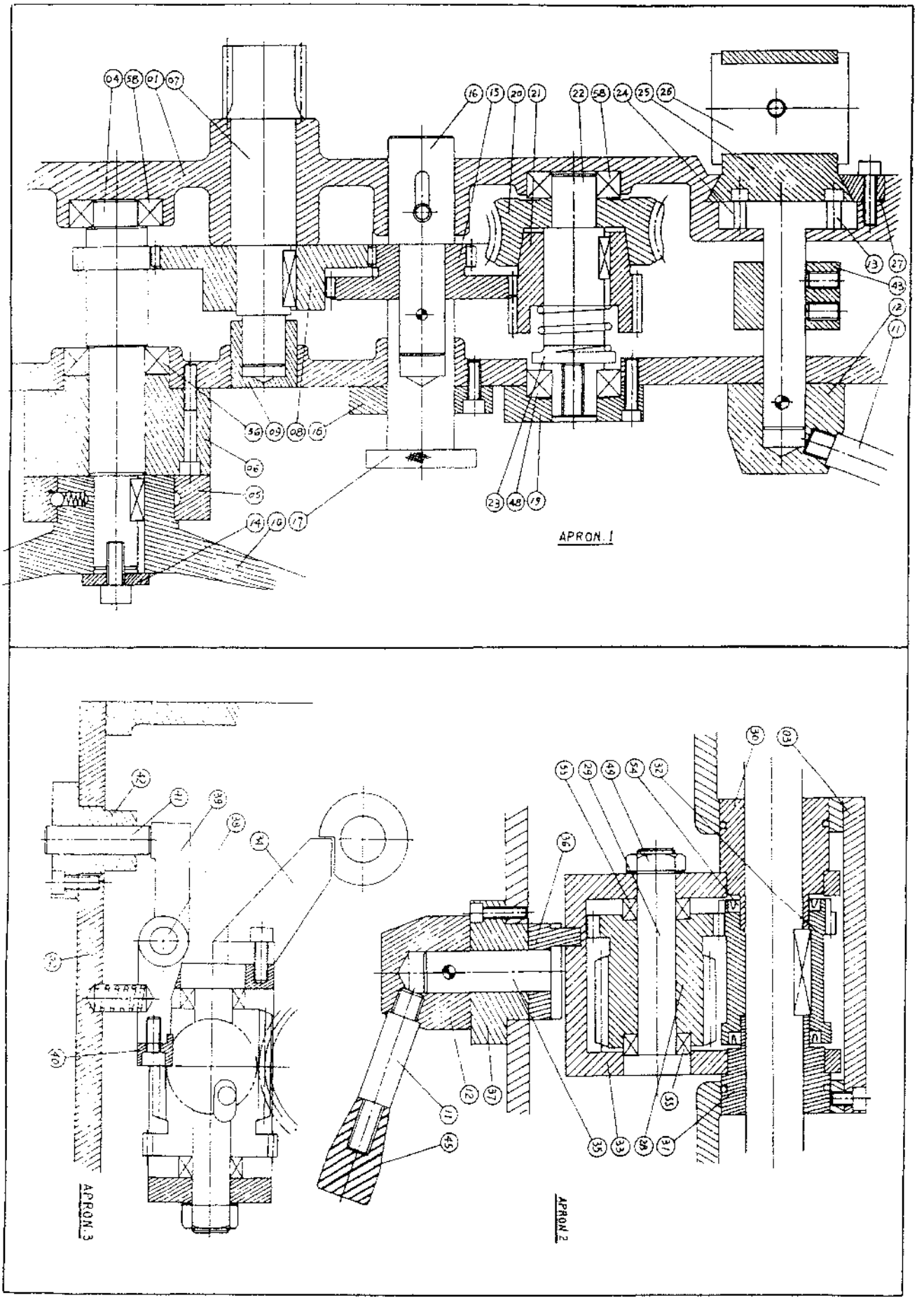
LIST OF 21" FEED GEAR BOX REV. DEC. 03, 2009

NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARK
01	20G-001000	GEAR BOX BODY	1	
02	20G-002000	FRONT COVER	1	
03-1	20G-003100	GEAR	1	
03-2	20G-003200	SLEEVE	1	
04	20G-004000	SHAFT	1	
06	20G-006000	CLUTCH	1	
07	20G-007000	SHAFT	1	(SECOND)
008	20G-008000	GEAR OF CLUTCH	1	
09	20G-009000	COLLAR	1	
12	20G-012000	GEAR	1	
13	20G-013000	SHAFT	1	(THIRD)
14	20G-014000	GEAR	1	
15	20G-015000	CLUTCH	1	
16	20G-016000	GEAR OF CLUTCH	1	
17	20G-017000	GEAR OF CLUTCH	1	
18	20G-018000	SHAFT	1	(FOUR)
19	20G-019000	GEAR	1	NINE STEP
20	20G-020000	GEAR	1	NINE STEP
21	20G-021000	GEAR	1	NINE STEP
22	20G-022000	GEAR	1	NINE STEP
23	20G-023000	GEAR	1	NINE STEP
24	20G-024000	GEAR	1	NINE STEP
25	20G-025000	GEAR	1	NINE STEP
26	25G-026000	GEAR	1	NINE STEP
27	20G-027000	GEAR	1	
28	20G-028000	SHAFT	1	
29	20G-029000	GEAR	1	
30	20G-030000	SHELF OF ROCKER ARM / HOUSING	1	
31	20G-031000	SHAFT	1	
32	20G-032000	GEAR	1	
34	20G-034000	SHIFT FORK	1	
35	20G-035000	FEED SHAFT	1	
36	20G-036000	MIDDLE SHAFT	1	
38	20G-038000	LEAD SCREW SHAFT	1	
39	20G-039000	GEAR	1	
40	20G-040000	COUPLING SOCKET	1	
41	20G-041000	NUT	1	
51	20G-051000	COVER	1	

NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARK
52	20G-052000	STUFF	1	
54	20G-054000	COVER	1	
60	20G-060000	SHAFT	1	
62	20G-062000	CHANGE SPEED SHIFT BLOCK	1	
63	20G-063000	CHANGE SPEED SHIFT BLOCK	2	
65	20G-065000	CHANGE SPEED SHIFT FORK	3	
66	20G-066000	CHANGE SPEED SHIFT FORK	3	
68	20G-068000	ROCKER	3	
70	20G-070000	SETTING PLATE	1	
71	20G-071000	SHIFT SHAFT	1	
72	20G-072000	SHIFT FORK	1	
73	20G-073000	SHIFT RACK	1	
74	20G-074000	SHIFT PIN	1	
75	20G-075000	SLIDE WEDGE	1	
76	20G-076000	SLIDE WEDGE	1	
78	20G-078000	TURNTABLE GEAR	1	
79	20G-079000	SHELF / HOUSING	1	
80	20G-080000	SHAFT BASE	1	
81	20G-081000	SHORT PILLAR	1	
82	20G-082000	COVER	1	
83	20G-083000	SPEED CHANGE DISC	1	
84	20G-084000	ROCKING LEVER	1	
85	18HA-068000	SPEED CHANGE LINK BASE	3	
86	18HA-069000	SPEED CHANGE SHAFT	3	
87	20B-017000	SHORT SHAFT	1	
88	20B-034000	GEAR	1	
101		BEARING 6001	2	
102		BEARING 6003	1	
103		BEARING 6004	3	
104		BEARING 6005	2	
105		BEARING 6203	1	
106		BEARING 6204	1	
107		BEARING 6205	1	
108		BEARING 6905ZZ	1	
109		BEARING 51105	1	
110		BEARING TA1725	1	
111		BEARING HK1812	1	
112		BEARING HK2220	1	
113		BEARING HK2520	1	

NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARK
114		BEARING TA3530	1	
115		C LOCKER S15	1	
116		C LOCKER S22	1	
117		C LOCKER S25	1	
118		C LOCKER S35	2	
119		C LOCKER S45	2	
120		O RING G30	1	
121		O RING G35	2	
122		O RING G45	1	
123		O RING G55	1	
124		O RING G85	1	
125		O RING P11	1	
126		OIL SEAL 40*55*8	1	
127		OIL SEAL 48*62*8	1	
128		KEY 5*5*20	1	
129		KEY 6*6*10	1	
130		KEY 6*6*12	1	
131		KEY 6*6*14	1	
132		KEY 6*6*25	1	
133		KEY 6*6*95	1	
134		CAP SCREW M6*10	2	
135		CAP SCREW M6*12	5	
136		CAP SCREW M6*20	4	
137		CAP SCREW M6*30	16	
138		CAP SCREW M8*14	1	
139		CAP SCREW M8*30	3	
140		SEMICIRCLE SCREW M5*10	4	
141		SEMICIRCLE SCREW M6*20	6	
142		SETSCREW M6*6	1	
143		SETSCREW M8*8	5	
144		SETSCREW M8*10	1	
145		SETSCREW M8*16	1	
146		SETSCREW M8*20	3	
147		SPACER	1	
148		NUT M16	1	
149		SPRING SPACER M16	1	
150		SPRING DIA.6MM	6	
151		STEEL BALL DIA.6MM	6	

Apron

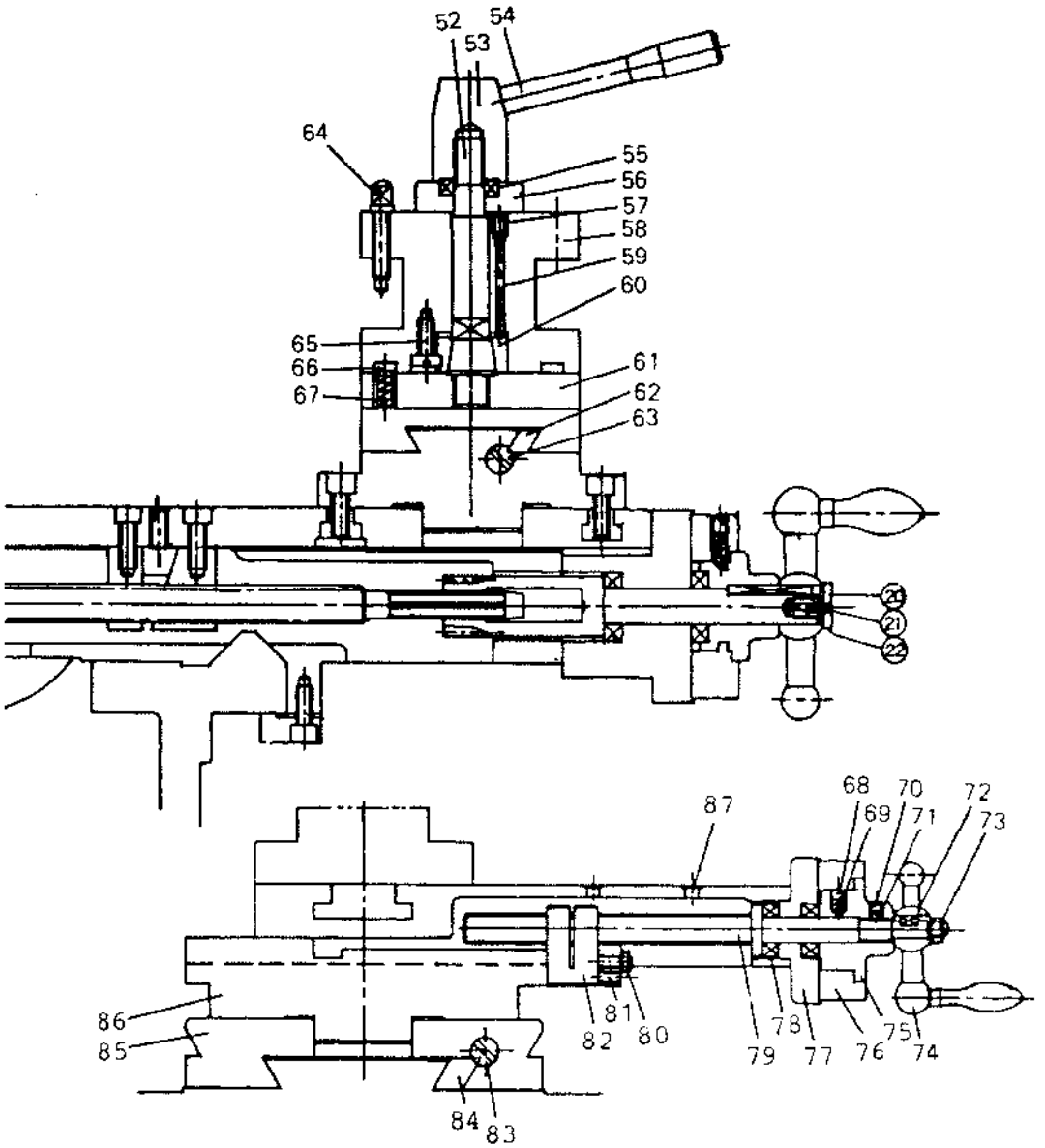


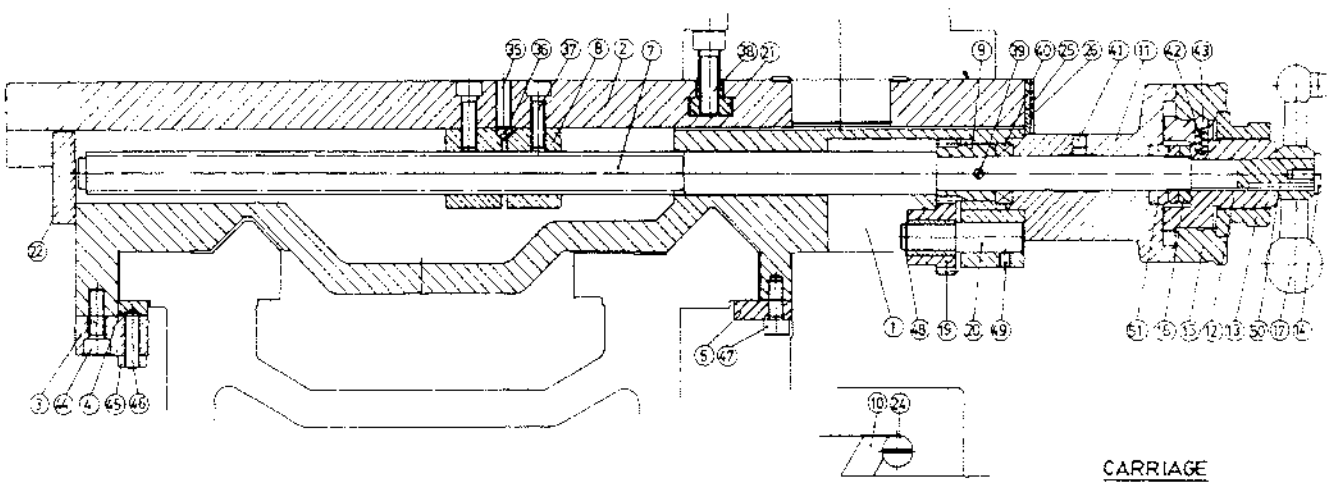
APRON

SERIAL NO.	PARTS NO.	DESCRIPTION	Q'TY
1	20A-001	Apron Body	1
2	20A-002	Cover	1
3	20A-003	Cover	1
4	20A-004	Shaft	1
5	20A-005	Graduated Collar	1
6	20A-006	Housing	1
7	20A-007	Pinion Shaft	1
8	20A-008	Spur Gear	1
9	20A-009	Housing	1
10	20A-010	Handwheel	1
11	20A-011	Handle Grip	2
12	20A-012	Lever Boss	2
13	20A-013	Shaft	2
15	20A-015	Gear	1
16	20A-016	Shaft	1
17	20A-017	Shaft	1
18	20A-018	Housing	1
19	20A-019	Housing	1
20	20A-020	Worm Gear	1
21	20A-021	Gear	1
22	20A-022	Shaft	1
23	20A-023	Shaft	1
24	20A-024	Shaft	1
25	20A-025	Half Nut Support	1
26	20A-026	Half Nut	1
27	20A-027	Gib	1
28	20A-028	Gear	1
29	20A-029	Axle	1
30	20A-030	Bush	1
31	20A-031	Bush	1
32	20A-032	Gear	1
33	20A-033	Worm Box	1
34	20A-034	Buffle	1
35	20A-035	Shaft Gear	1
36	20A-036	Collar	1
37	20A-037	Housing	1
38	20A-038	Shaft	1
39	20A-039	Rocking Arm	1
40	20A-040	Safety Block	1
41	20A-041	Stick Bar	1

42	20A-042	Housing	1
43	20A-043	Shaft	1
45	20A-045	Hand Knob	1
48		Bearing 51104	1
49	20A-049	Lock Nut	1
54	20A-054	Oil Seal (30×40×5)	1
55	20A-055	Thrust Bearing 51103	2
56	20A-056	Bearing 6005	1
58	20A-058	Bearing 6004	2

Carriage & Tool Post



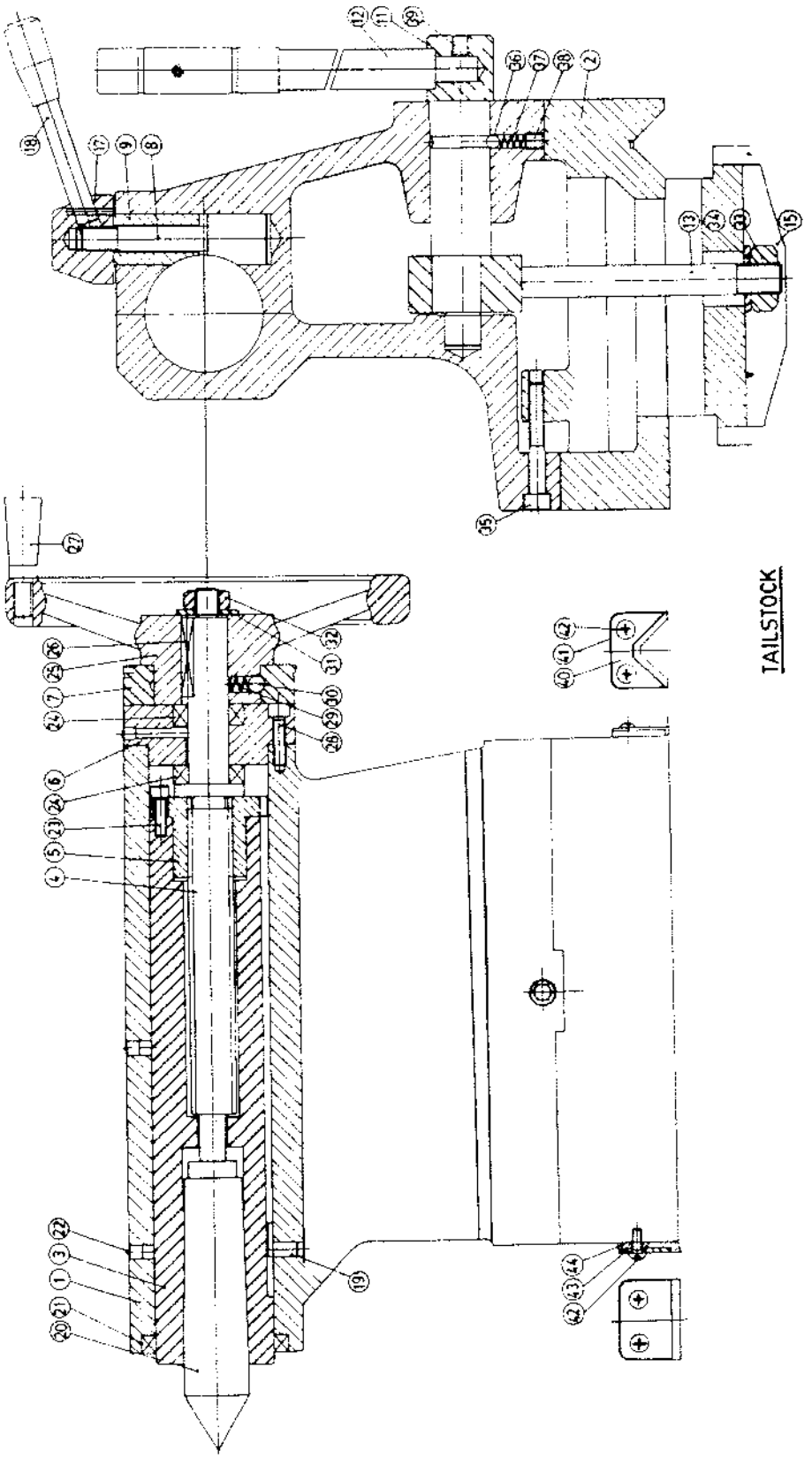


CARRIAGE AND TOOL POST

SERIAL NO.	PARTS NO.	DESCRIPTION	Q'TY
1	20S-001	Carriage	1
2	20S-002	Cross Slide	1
3	20S-003	Plate	1
4	20S-004	Lock Gib	1
5	20S-005	Plate	2
6	20S-006	Lock Plate	1
7	20S-007	Screw	1
8	20S-008	Nut	1
9	20S-009	Gear	1
10	20S-010	Gib	1
11	20S-011	Bracket	1
12	20S-012	Screw Boss	1
13	20S-013	Lock Nut	1
14	20S-014	Screw	1
15	20S-015	Graduated Collar	1
16	20S-016	Nut	2
17	20S-017	Handle	1
18	20S-018	Handle Grip	1
19	20S-019	Gear	1
20	20S-020	Shaft	1
21	20S-021	Nut	2
22	20S-022	Bracket	1
23	20S-023	Lock Screw	1
24	20S-024	Adjusting Bolt For Gib	2
25	20S-025	Wiper	1
26	20S-026	Plate	1
27	20S-027	Wiper	2
28	20S-028	Plate	2
29	20S-029	Wiper	2
30	20S-030	Plate	2
33	20S-033	Screw	1
34	20S-034	Plate	1
35	20S-035	Set Screw M8×25	1
36	20S-036	Key	1
37	20S-037	Cap Screws M8×25	3
38	20S-038	Cap Screws M10×35	2
39	20S-039	Spring Pin Φ5×28	1
40	20S-040	Thrust Bearing 51103	1
41	20S-041	Oiler Φ 1/4"	1
42	20S-042	Spring Φ 1/4"	2

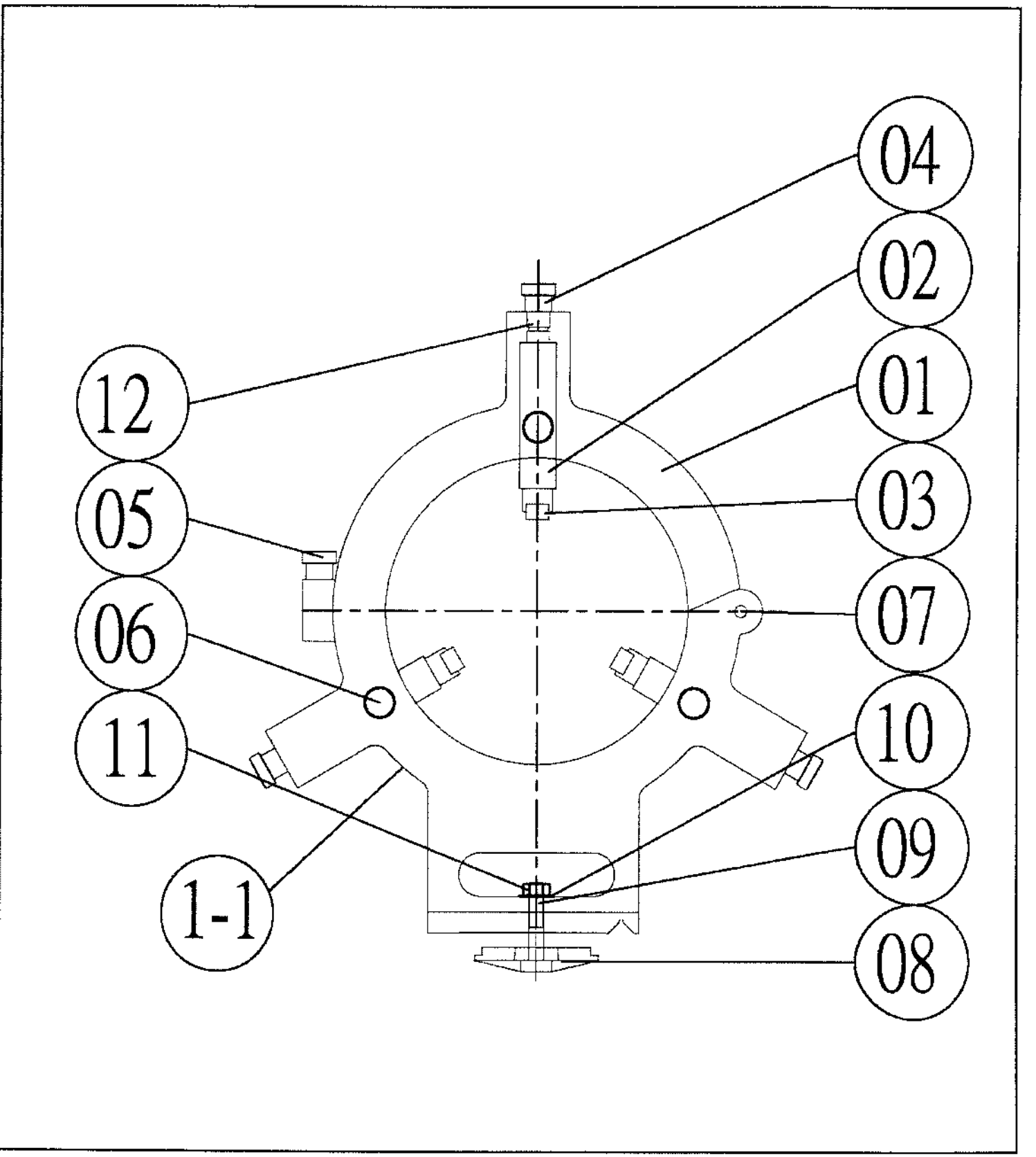
SERIAL NO.	PARTS NO.	DESCRIPTION	Q'TY
43	20S-043	Steel Ball φ 1/4"	2
44	20S-044	Cap Screws M8×20	5
45	20S-045	Nuts M8	5
46	20S-046	Set Screws M8×30	5
47	20S-047	Cap Screws M8×16	4
48	20S-048	Snap Screws S13	1
49	20S-049	Set Screws M6×6	1
50	20S-050	Key 4×4×25	1
51	20S-051	Thrust Bearing 51103	1
52	20S-052	Clamping Bolt	1
53	20S-053	Hcnolle Boss	1
54	20S-054	Seven	1
55	20S-055	Thrust Bearing 51104	1
56	20S-056	Washer	1
57	20S-057	Hex. Set Screw	3
58	20S-058	Turret Tool Post	1
59	20S-059	Pin	3
60	20S-060	Sleeve	1
61	20S-061	Locking Block	1
62	20S-062	Gib	1
63	20S-063	Cam Screw	1
64	20S-064	Sacating Screw	12
65	20S-065	Screw	3
66	20S-066	Pin	1
67	20S-067	Spring φ.5/12	1
68	20S-068	Steel Ball φ 3/16"	1
69	20S-069	Spring φ 3/16"	1
70	20S-070	Hex. Set Screw M6×91×61	1
71	20S-071	Wasker	1
72	20S-072	Key	1
73	20S-073	Nut	1
74	20S-074	Lever	1
75	20S-075	Indexing Base	1
76	20S-076	Indexing Ring	1
77	20S-077	Bracket	1
78	20S-078	Thrust Bearing 51102	2
79	20S-079	Locking Screw 20S-079	1
80	20S-080	Nut M6×P1	1
81	20S-081	Hex. Set Screw M6×P1×201	
82	20S-082	Screw Nut	1
83	20S-083	Adjusting Screw	1
84	20S-084	Gib	1
85	20S-085	Cover	1
86	20S-086	Tool Slide	1
87	20S-087	Aiier	2

Tailstock



SERIAL NO.	PARTS NO.	DESCRIPTION	Q'TY
1	20T-001	Tailstock	1
2	20T-002	Tailstock Base	1
3	20T-003	Quill	1
4	20T-004	Screw	1
5	20T-005	Nut	1
6	20T-006	Bracket	1
7	20T-007	Dial	1
8	20T-008	Nipping Stud	1
9	20T-009	Nipping Bush	1
11	20T-011	Eccentric Lock Stud	1
12	20T-012	Locking Lever	1
13	20T-013	Clamping Bolt	1
14	20T-014	Clamping Bolt	1
15	20T-015	Holding Down Plate	1
16	20T-016	Stop Pin	1
17	20T-017	Nipping Nut	1
18	20T-018	Locking Handle	1
19	20T-019	Key	1
20	20T-020	Center	1
21	20T-021	Oil Seal (58×72×9)	1
22	20T-022	Oiler	1
23	20T-023	Cap Screws	3
24	20T-024	Thrust Bearing 51104	2
25	20A-010	HandWheel	1
26	20T-026	Key	1
27	20A-057	Handle	1
28	20T-028	Cap Screws	4
29	20T-029	Spring	1
30	20T-030	Steel Ball	1
31	20T-031	Washer	1
32	20T-032	Nut	1
33	20T-033	Nut	1
34	20T-034	Washer	1
35	20T-035	Cap Screw	2
36	20T-036	Steel Ball	1
37	20T-037	Spring	1
38	20T 038	Set Screw	1
39	20T-039	Set Screw	1
40	20T-040	Plate	2
41	20T-041	Wiper	2
42	20T-042	Screw	8
43	20T-043	Plate	2
44	20T-044	Wiper	2

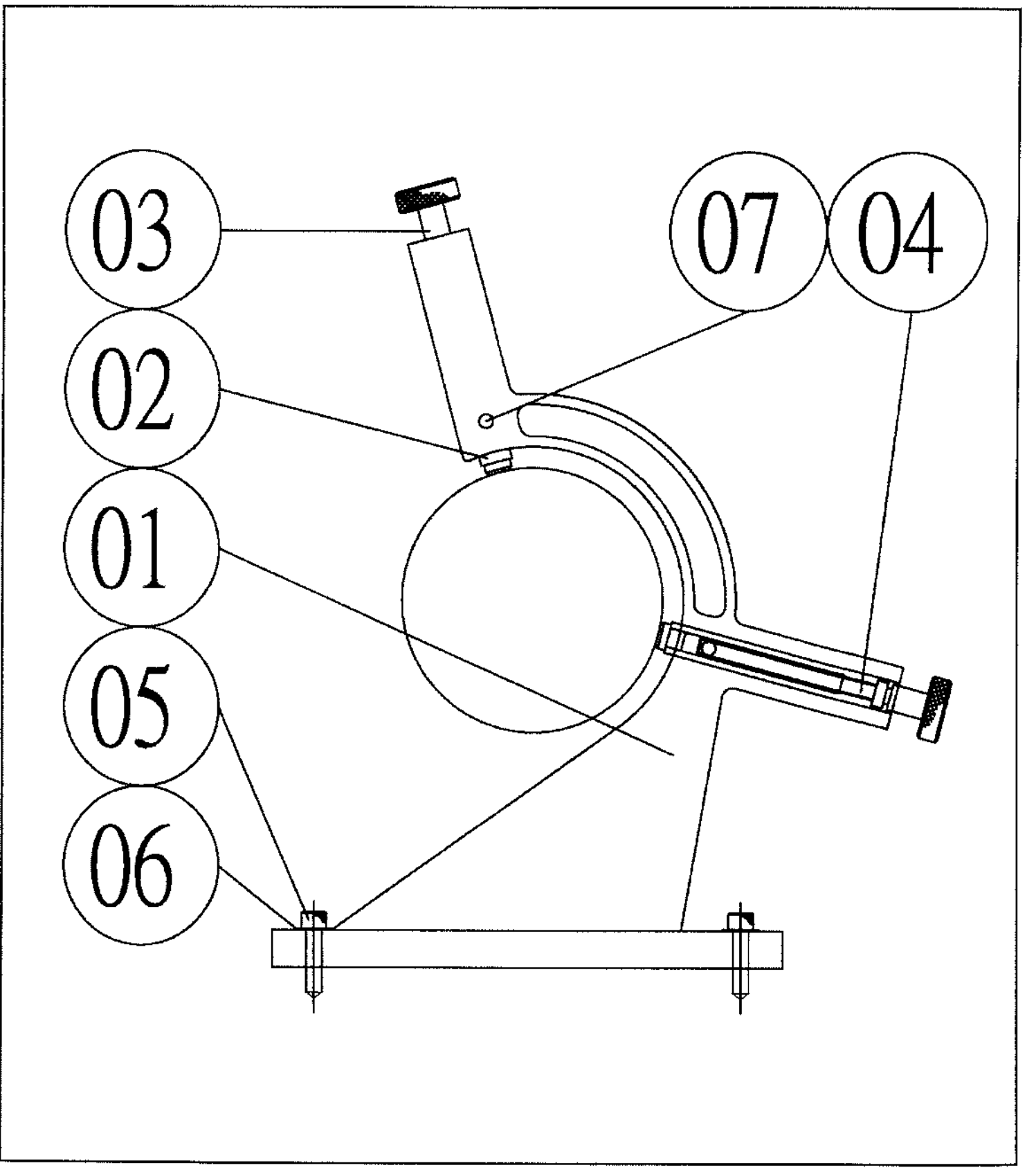
Steady Rest



Steady Rest

Serial No.	Part No.	Description	Q'ty
1	21SR-001	Steady rest housing-top	1
1-1	21SR-002	Steady rest housing-lower	1
2	21SR-003	Roller shaft	3
3	21SR-004	Shaft roller	3
4	21SR-005	Adjusting knob	3
5	21SR-006	Housings tighten knob	1
6	21SR-007	Shaft locating screw	3
7	21SR-008	Housings connecting screw	1
8	25T-015100	Locating plate	1
9		Square head cap screw	1
10		Square washer	1
11		Hex nut	1
12	21SR-009	Adjusting shaft	1

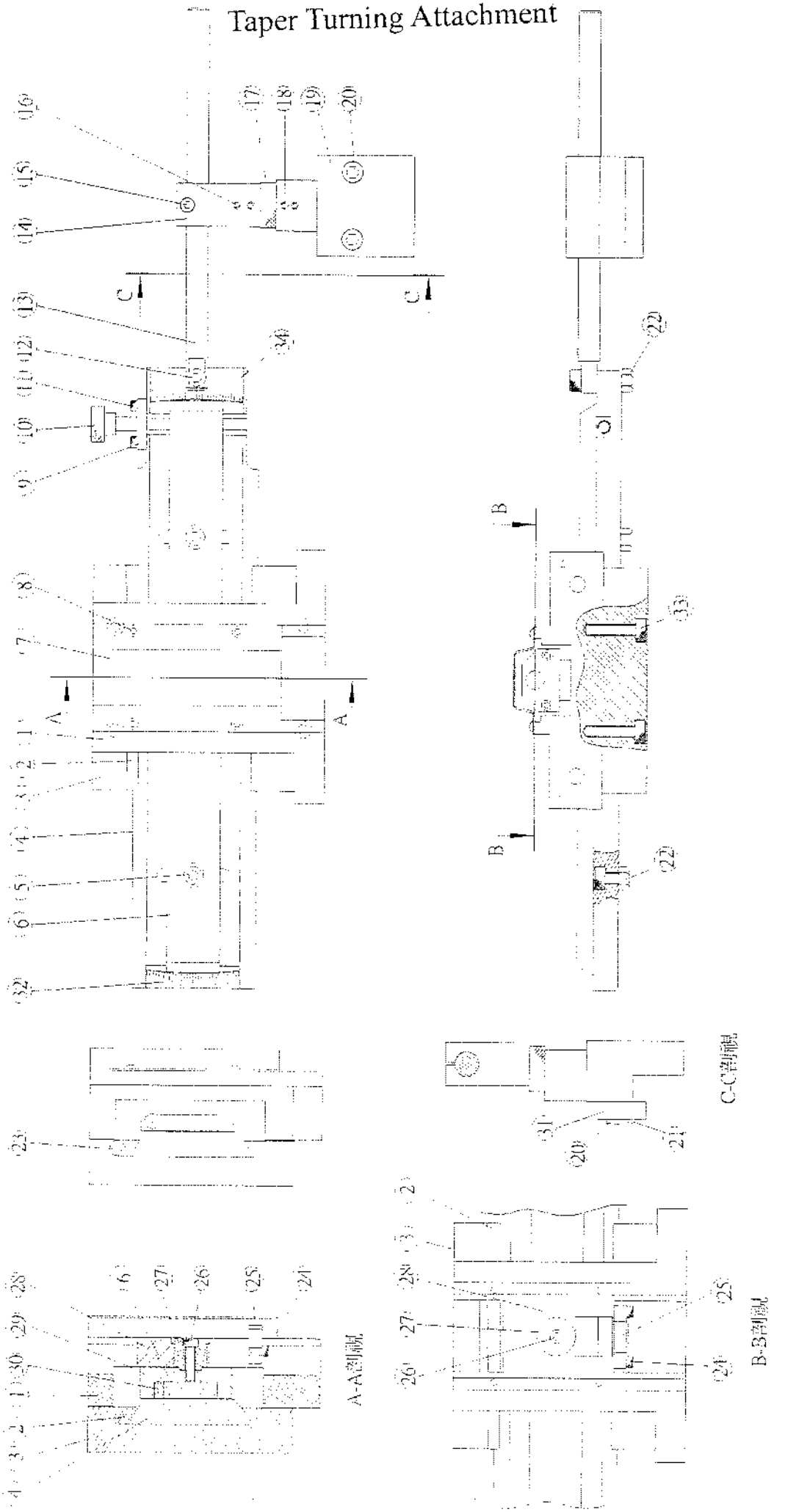
Follow Rest



Follow Rest

Serial No.	Part No.	Description	Q'ty
1	21FR-001	Follow rest housing	1
2	21FR-002	Shaft with brass tip	2
3	21FR-003	Adjust knob	2
4	21FR-004	Shaft screw	2
5		Socket head cap screw	2
6		Washer	2
7		Socket head set screw	2

Taper Turning Attachment



Taper Turning Attachment

Serial No.	Part No.	Description	Q'ty
1	21TA-001	Taper attachment body	1
2	21TA-002	Gib-taper turning attachment	1
3	21TA-003	Top slide casting	1
4	21TA-004	Sliding body	1
5	21TA-005	Socket head cap screw	2
6	21TA-006	Rotating/sliding plate	1
7	21TA-007	Top cover	1
8	21TA-008	Round head cap screw +	4
9	21TA-009	Locating plate	1
10	21TA-010	Screw with knob	1
11	21TA-011	Socket head cap screw	2
12	21TA-012	Socket head cap screw	1
13	21TA-013	Connecting shaft	1
14	21TA-014	Connecting bracket	1
15	21TA-015	Socket head cap screw	1
16	21TA-016	Socket cap set screw	2
17	21TA-017	Dual side connecting shaft	1
18	21TA-018	Socket cap set screw	2
19	21TA-019	Shaft locating bracket	1
20	21TA-020	Socket head cap screw	2
21	21TA-021	Socket cap set screw	1
22	21TA-022	Hex nut	2
23	21TA-023	Gib screw-taper attachment	2
24	21TA-024	Socket head cap screw	4
25	21TA-025	Screw connecting bracket	1
26	21TA-026	Socket head cap screw	1
27	21TA-027	Sleeve	1
28	21TA-028	Connecting plate	1
29	21TA-029	Plate	1
30	21TA-030	Gib	1