



High Speed Precision Lathes

PRINCE

INSTRUCTION & PARTS MANUAL

(Original Instructions)

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OPERATOR WITH WELL TRAINING AND SKILLED OPERATOR

Requirements as following:

Just the one whom had read the operation manual and really understand it thoroughly or the one whom had under the training by original manufacturer are authorized to operating this machine.

Please read and understand the operating manual before work on this machine.

This operating manual must always be available for operator at any time.

Make sure that only authorized personnel work on the machine.

Just well-trained technicians can operate the "hydraulic", "pneumatic" & "electrical" control system.

Environmental protection

Local environmental safety regulations must be observed when handling dangerous substances.

Observe respective safety regulation for products when using oils, grease and other chemical substances. Special care and attention must be taken to prevent any damage to the environment when topping up or changing oils.

Dangerous substances (such as oil, grease batteries etc.) must be disposed of correctly.

EXPECTED USE AND LIMITS OF USE

The machine is designed only for cold metal cutting. Other purpose of working is prohibited. The materials, such as wood, glass, metal powder, ceramic and poisonous materials, etc are not allowed to be used on this machine.

The machine can cut the material like cast iron, steel, copper, aluminum, doing the turning, boring, drilling and tapping etc. jobs.

In addition, it is informed in operation manual for maintenance, setting and cleaning etc.

NOTE: The machine is NOT allowed to work with flammable metal working fluids or materials as aluminum or magnesium, which can cause fire and explosion or noxious dust.

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PHYSICAL ENVIRONMENT AND OPERATING CONDITIONS

The machine is designed for not using at the potentially explosive environment. Generally, the machine should be installed under the following conditions:

- a. The minimum requirement for all electrical equipment is correct operation between air temperature of $+5^{\circ}\text{C}$ and $+45^{\circ}\text{C}$.
- b. Electrical equipment is capable of operating correctly when the relative humidity does not exceeding 50% at a maximum temperature of $+45^{\circ}\text{C}$.
- c. Electrical equipment is capable of operating correctly at altitudes up to 1000 m above mean sea level.
- d. Electrical equipment is designed to withstand to protected against the effects of transportation, and storage temperature within a range of -25°C to $+55^{\circ}\text{C}$ and for short periods not exceeding 24h at up to $+70^{\circ}\text{C}$.
- e. Atmosphere: Free from excessive dust, acid fume, corrosive gases and salt.
- f. Avoid exposing to direct sunlight or heat rays.
- g. Avoid exposing to vibration environmental.
- h. Have to connect to the factory grounding system correctly.
- i. Away from electric magnetic interference source sites, such welding, discharge machine.

ELECTRICALLY SUPPLY

The following AC supply information:

- a. Voltage Steady state voltage: 0.9 to 1.1 of nominal voltage.
- b. Frequency 0.99 to 1.01 of nominal frequency continuously; 0.98 to 1.02 short time.
- c. Harmonic distortion not exceeding 10 % of the total r.m.s. voltage between live conductors for the sum of the 2nd through to the 5th harmonic.
- d. Voltage interruption Supply interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle with more than 1 s between successive interruptions.
- e. Voltage dips Voltage dips not exceeding 20 % of the peak voltage of the supply for more than one cycle with more than 1 s between successive dips.

MAIN SPECIFICATIONS

PRINCE 1330/1340

MODEL		1330	1340
Height of center		165mm (6 5")	
Swing over bed		330mm(13")	
Distance between centers		750mm(30")	1000mm. (40")
Swing over cross slide		190mm(7 5")	
Swing in gap		495mm. (19 5")	
Width of gap in front of faceplate		150mm. (6")	
Spindle nose		Camlock D-1-4	
Spindle bore		35mm (1 3/8")	
Spindle bore taper		M T. No. 4-1/2	
Taper of center		M T. No. 3	
Spindle speed, Steps.		8(optional 16)	
Ranges. (8)		105, 175, 260, 395, 610, 915, 1320 2000 rpm.	
Ranges (16)		53, 88, 105, 130, 175, 198, 260, 305, 395, 458	
		610, 660, 915, 1000, 1320, 2000 rpm	
VS-model, Steps.		2 Infinitely variable, Forward/Reverse	
Low speed ranges.		40-500 rpm	
High speed ranges.		200-2500 rpm.	
Main motor, Standard model,		2.25kw (3HP)	
Optional model,		2.25/1.12kw (3/1.5HP)	
Varispeed model		1.5kw(2HP)	
Width of bed		190mm. (7 5")	
Length of bed		1380mm. (54 25")	1650mm. (65")
Cross slide travel		190mm. (7 5")	
Top slide travel		90mm. (3 5")	
Tailstock travel		110mm.	(4 3/8")
Tailstock barrel diameter		40mm.	(1 5/8")
Leadscrew diameter		22 22mm (7/8")	
Leadscrew pitch		4mm. or 8TPI. Optional 6mm or 4TPI	
Number & range of Metric threads	Inch Gearbox	14 & 0.5-6mm	
	Metric Gearbox	18&0.45-7.0mm	
	Universal Gearbox	31 & 0.2-7.0mm	
Number & range of Imperial threads	Inch Gearbox	32 & 4-56TPI	
	Metric Gearbox	24 & 4-28TPI	
	Universal Gearbox	36 & 4-72TPI	
Number & range of Module threads	Universal Gearbox	18 & 0.3~3.5mm	
Number & range of DP threads	Universal Gearbox	21 & 8-44 D. P.	
Range of longitudinal feeds		0.038~0.254mm, 0.0015"~0.01", Opt. 0.02-0.52 mm, 0.0008"-0.0205"	
Range of cross feeds		0.012~0.090mm, 0.0005"~0.0035", Opt. 0.006-0.170 mm, 0.00023"-0.0067"	
Approx. Net/Gross weight		620/750kgs (1364/1650 Lbs.)	670/820kgs (1474/1804 Lbs.)
Packing sizes (L x W x H.)		1624 x 760 x 1473mm (64" x 30" x 58")	1930 x 760 x 1473mm (76" x 30" x 58")

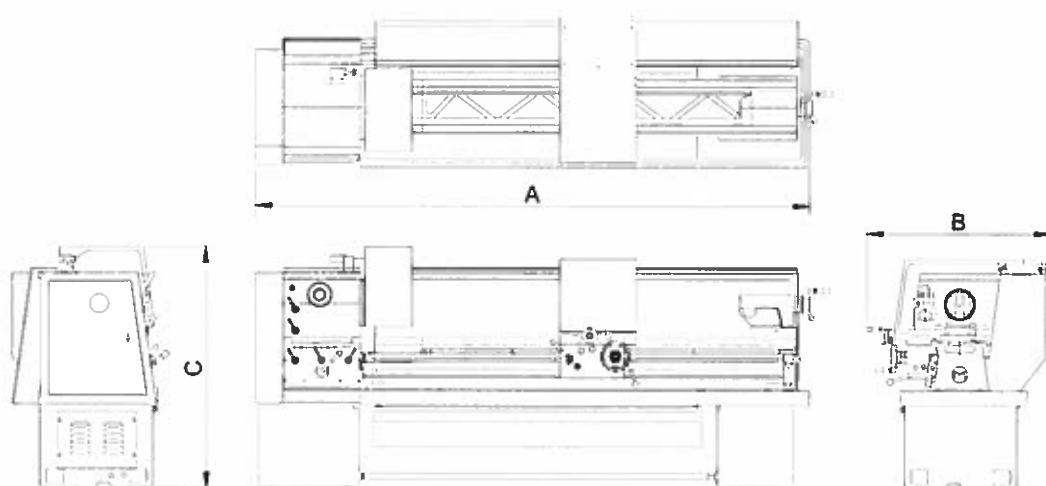
STANDARD EQUIPMENT & ACCESSORIES SUPPLIED WITH LATHE:

- Motor and relative electric control system.
- Speed meter of spindle (Varispeed only).
- Coolant system.
- 4-way toolpost, Max. toolholder size 13x13 mm. (1/2" x 1/2")
- Threading dial indicator (Metric or Imperial one only).
- Centers sleeve and two centers.
- Levelling blocks and screws.
- Service tools and toolbox
- Instruction and spare parts manual

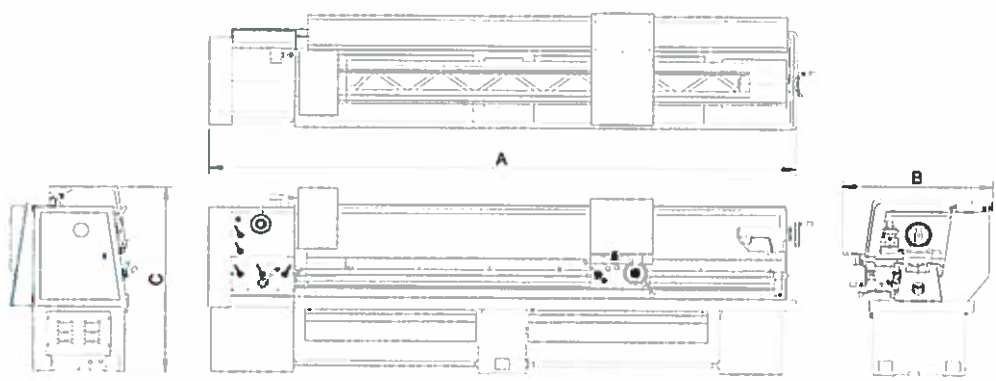
OPTIONAL EQUIPMENT & ACCESSORIES MAY BE SUPPLIED AS ORDERS:

- 3-jaw universal chuck.
- Full length splash guard.
- 4-jaw independent chuck.
- Quick change toolpost.
- Steady rest
- Chip safety guard.
- Follow rest.
- Dual Inch/Metric dials for cross and top slides.
- Slotted faceplate.
- Rotating center.
- Chuck safety guard.
- Halogen worklamp.
- Leadscrew cover.
- Micrometer bedstop.
- Chip Tray

CONVENTIONAL LATHE Overall drawing



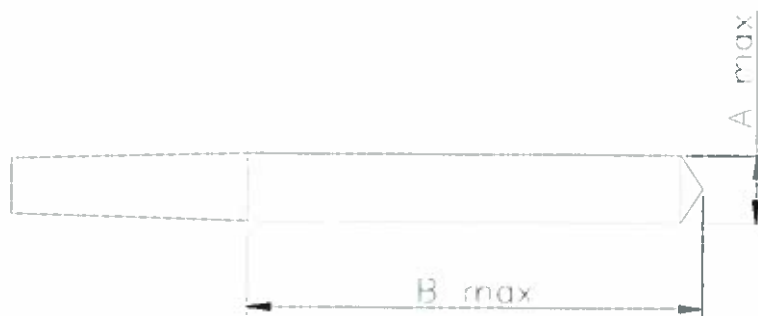
Model		A	B	C
Prince 1330	Prince 750	1550	724	1175
Prince 1340	Prince 1000	1800	724	1175
Studturn 1430	Studturn 750	1610	888	1223
Studturn 1440	Studturn 1000	1864	888	1223
Champion 1530	Champion 760	1955	1031	1232
Champion 1540	Champion 1000	2205	1031	1232
Champion 1550	Champion 1250	2455	1031	1232
Major 1840	Major 1800-1000	2237	1086	1325
Major 1860	Major 1800-1500	2745	1086	1325
Major 1880	Major 1800-2000	3254	1086	1325
Major 2040	Major 2000-1000	2237	1086	1349
Major 2060	Major 2000-1500	2745	1086	1349
Major 2080	Major 2000-2000	3254	1086	1349
Major 2240	Major 2200-1000	2237	1086	1375
Major 2260	Major 2200-1500	2745	1086	1375
Major 2280	Major 2200-2000	3254	1086	1375
General 2660	General 2600-1500	3900	2000	1700
General 2680	General 2600-2000	4425	2000	1955
General 3060	General 3000-1500	3900	2000	1700
General 3080	General 3000-2000	4425	2000	1955
Trainer 1330	Trainer 1330	1640	1060	1580
Trainer 1340	Trainer 1340	1940	1060	1580
Trainer 1430	Trainer 1430	1640	1060	1900
Trainer 1440	Trainer 1440	1940	1060	1900



Major 18120	Major 1800-3000	4265	1086	1325
Major 20120	Major 2000-3000	4265	1086	1349
Major 22120	Major 2200-3000	4265	1086	1375
General 26120	General 2600-3000	5425	2000	1955
General 26160	General 2600-4000	6425	2000	1955
General 30120	General 3000-3000	5425	2000	1955
General 30160	General 3000-4000	6425	2000	1955

TOOL INFORMATION

MODEL	Tool shank(mm)	Tailstock drill A(mm)	Tailstock drill B(mm)	Tailstock drill Max. Weight(kg)
PRINCE	20	18	100	3.5
STUDTURN	20	18	100	3.5
CHAMPION	25	24	120	5
MAJOR	25	24	120	7
GENERAL	25	31	150	10
TRAINER	20	18	100	3.5
KNIGHT	25	24	120	5



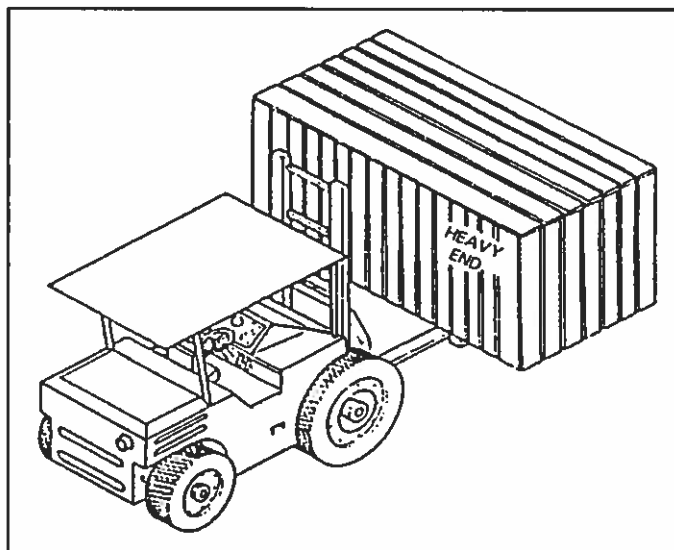
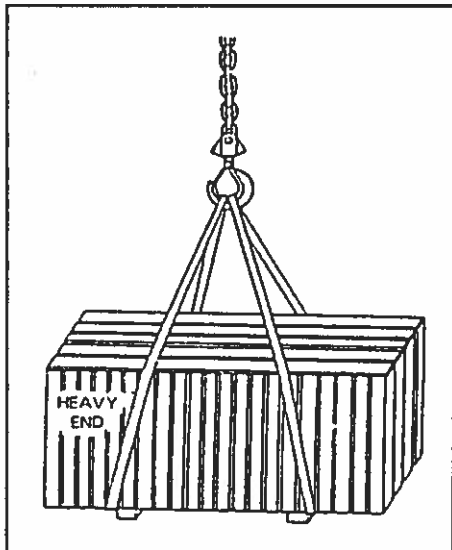
LIFTING MACHINE BEFORE UNPACKING

Normally, each lathe was packed with seaworthy strong wooden case. Before unpacking the wooden case to lifting or unloading the lathe, must be ensure the following notes:

1. the capacity of lift equipment is adequate for the machines.
2. keep the heavy end fully supported and balanced when lifting.
3. the MACHINE WEIGHTS (Approx. Gross weights):

1330 750KGS. (1650LBS); 1340 820KGS. (1800LBS)

4. the only recommended lifting equipments are hoist/crane and forklift as shown below:



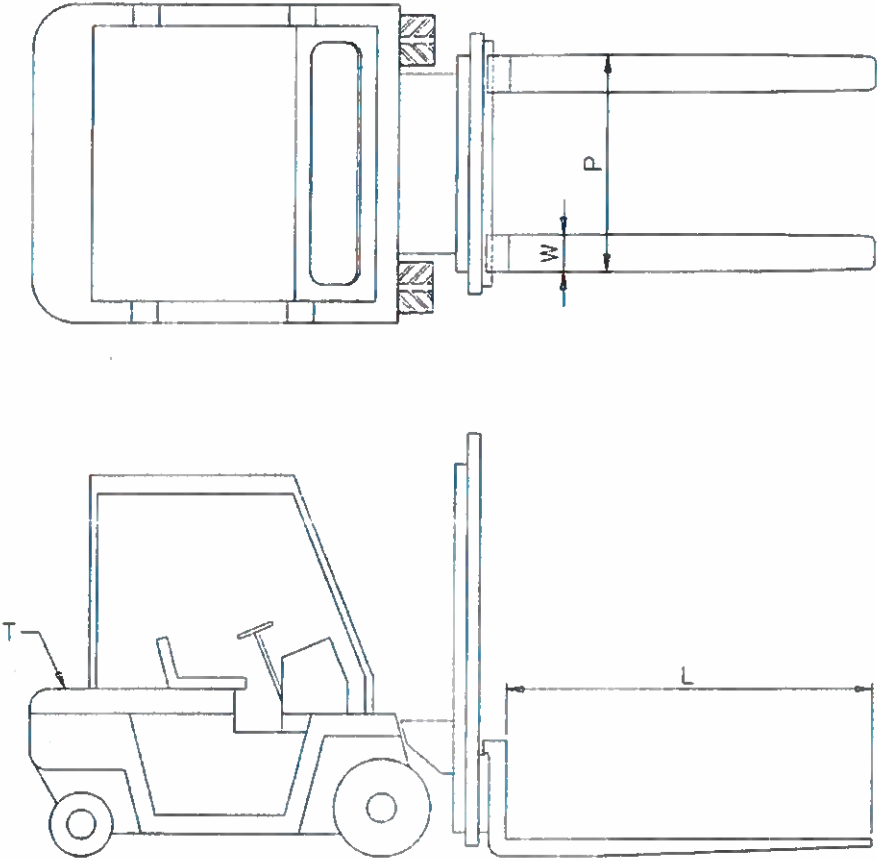
WARN ING: Headstock end of Lathe is "HEAVY END". Make sure this end is fully supported.

UNPACKING AND LIFTING

UNPACKING THE WOODEN CASE

1. Locate the wooden case on a flat and sufficient area for easy working.
2. Clean the area and space.
3. Wear gloves and suitable safety equipments.
4. Use the claw hammer or nail extractor to pull out nails, especially the nails on sheet bands at four top corners.
5. Open the top cover first.
6. Pull down the four side covers carefully. **WARNING:** Be careful of sharp nails.
7. Remove any broken wood pieces that might cause damage to the lathe.
8. Remove all the accessories packed on the wooden base.
9. Loosen and remove all the nuts mounted to the thru bolts, holding the lathe to the wooden shipping skid.
10. Clean all the nails and packing materials around the area.

THE FORKLIFT TRUCK CAPACITY



T(ton)	L	W	P
2.5	1350	1200	1100
4.5	1820	1500	1250
8	2450	1800	1850
12	2450	1800	2000

Please pay attention to transport and lift this high precision machine for avoiding any strong extrusions or collisions. The lifting capacity of forklift truck must be sufficient for the machine. Table shows the forklift truck capacity.

LIFTING

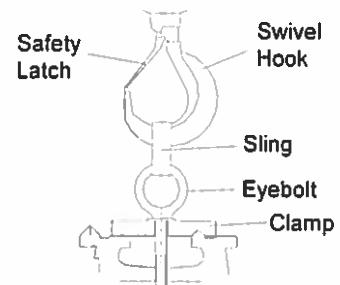
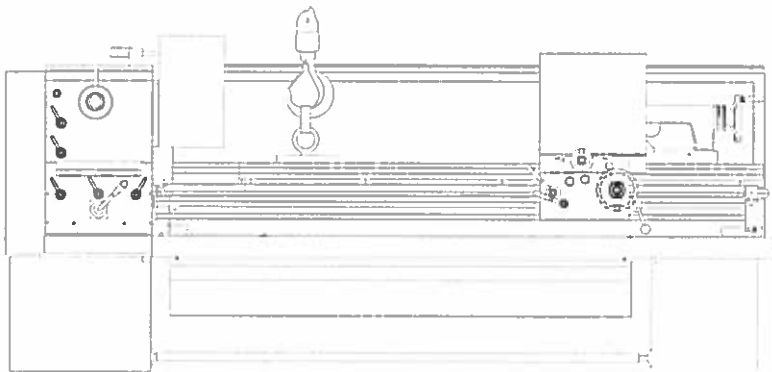
PREPARATION AND SAFETY CHECK

1. Remove all loose items of equipment and accessories from lathe.
2. Move the tailstock and carriage assembly to the far end of the lathe and clamp them in place. (see drawing below)
3. Make sure that the eyebolt and clamp are tightened on the bed correctly.
4. "NEVER" used a damaged sling and "DO-NOT" use more than one(1) sling.
5. "NEVER" wrap the sling around the bed to lift the machine; the leadscrew, feedshaft and control rod will become bent or damaged negating the warranty on the machine.
6. Only a hoist or crane is recommended for lifting the lathe. Fork lift blades should never be put under the lathe for lifting.
7. Make sure that the lifting hook is a "Swivel" type with safety latch.
8. Just before making the final lift, make sure one (1) person makes a final examination all around the lathe double checking everything.
9. Lift cleanly of all ground obstacles and do not drag the machine across the floor.
10. Remember that vibration during transport can cause friction between the sling and the machine.

LIFTING THE MACHINE

1. Lift the lathe by hoist/crane as shown in the drawing 6. below.
 2. Make sure that a safety-latch type swivel hook is used and that the eyebolt clamp was tightened properly to the bed.
 3. If the larger swivel hook can not fit into the eyebolt, an intermediate sling can be used as shown in the drawing below.
 4. Carefully and slowly lift the lathe clear of the wooden base or ground and, if necessary, reposition the carriage or tailstock to achieve a better balance before lifting any higher or further.
 5. If you reposition the carriage or tailstock, make sure you re-tighten and lock them in place.
- After a full load is on the main hook, check to make sure that the lifting hook swivels freely and not putting any twisting stress on the eyebolt which might loosen it up.
7. Lift and move the lathe very slowly to avoid tilting or rocking the machine which could become dangerous.
 8. Keep the lathe low to the ground with only the necessary ground clearance to move the machine freely over the surface.
 9. For transshipping the lathe without repacking onto a skidbase, it is recommended to lift the machine straight up to the desired height and drive a flat bed truck underneath it for loading. This is a safer method of moving the machine than moving with a crane.

BEFORE LIFTING: Help balance the load by sliding the tailstock to the extreme opposite end of the bed ways and lock it in place. If necessary, move carriage assembly to tailstock end for balance position and lock it.



WARNING

UNAUTHORIZED LIFTING OF THE MACHINE BY NON-CERTIFIED RIGGERS AND ANY NEGLECT caused BY SUCH ACTION MAY CAUSE SERIOUS DAMAGE TO PERSONS AND PROPERTY. MANUFACTURER AND DISTRIBUTORS SHALL NOT BE LIABLE FOR ANY DAMAGES RESULTING FROM THE FAILURE TO USE LICENSED AND CERTIFIED RIGGERS TO LIFT AND/OR MOVE THIS EQUIPMENT.

OPERATING SAFETY PRECAUTIONS

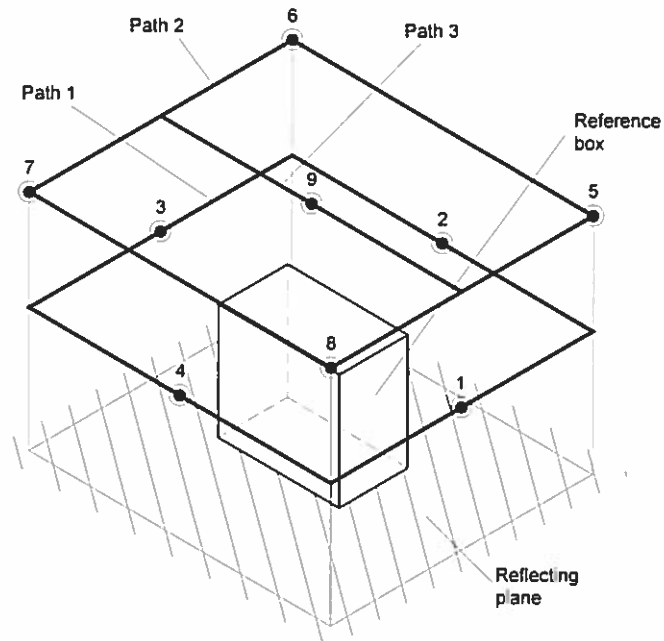
1. ARE YOU PROPERLY TRAINED PERSONNEL TO USE THIS LATHE?
2. READ THIS INSTRUCTION MANUAL CAREFULLY BEFORE OPERATION.
3. ENSURE YOU KNOW HOW TO STOP THE LATHE BEFORE STARTING IT
4. ENSURE YOU ARE IN GOOD HEALTH AND SPIRIT TO OPERATE THE LATHE.
5. KEEP ALL GUARDS, COVERS AND DOORS IN PLACE AND CLOSED.
6. KEEP THE LATHE AND WORK AREA NEAT, CLEAN AND ORDERLY.
7. WEAR AND UTILISE SUITABLE PROTECTIVE CLOTHING AND EQUIPMENT.
8. DO NOT WEAR RINGS, WATCHES, TIES OR LOOSE SLEEVED CLOTHING.
9. NEVER LAY ANYTHING ON THE WORKING SURFACE OF THE LATHE.
10. STOP LATHE IMMEDIATELY ANYTHING UNEXPECTED HAPPENS.
11. DO NOT TOUCH OR REACH OVER ROTATING OR MOVING PARTS.
12. DO NOT PERFORM ANY SET-UP WORK WHILE LATHE IS RUNNING.
13. DO NOT OPERATE THE LATHE IN EXCESS OF ITS RATED CAPACITY.
14. DO NOT INTERCHANGE CHUCKS OR OTHER SPINDLE MOUNTING ITEMS WITHOUT CHECKING FOR CORRECT LOCKING.
15. DO NOT USE OTHER WORKHOLDING DEVICE WITHOUT CHECKING WITH ITS MANUFACTURER.
16. DISCONNECT LATHE FROM POWER SOURCE BEFORE PERFORMING ANY MAINTANENCE OR CHANGING TOOLING.
17. ISOLATE LATHE WHEN LEAVING IT UNATTENDED.
18. **THE MACHINE IS NOT ALLOWED TO WORK WITH FLAMMABLE METAL WORKING FLUIDS OR MATERIALS AS ALUMINUM OR MAGNESIUM, WHICH CAN CAUSE FIRE AND EXPLOSION OR NOXIOUS DUST.**
19. **DON'T WEAR GLOVES DURING OPERATION, ONLY WHEN LOADING AND UNLOADING WORKPIECE COULD WEAR GLOVES.**
20. BALANCE REQUIREMENTS ON WORKPIECE CLAMPING DEVICE SHALL BE FOLLOWED: WORKPIECE CLAMPING DEVICES SHALL ONLY BE MODIFIED IN ACCORDANCE WITH THE CLAMPING DEVICE MANUFACTURER'S RECOMMENDATIONS.
21. SHALL BE PROVIDED THAT MACHINING UNBALANCED WORKPIECE MAY CREATE AN EJECTION HAZARD AND THAT MEANS OF MINIMING THE RISK IS COUNTER BALANCING OR MACHINING AT REDUCED SPEED.
22. **CHUCK GUARD AND CHIP GUARD ARE ABLE TO REDUCE MOST OF RISKS, BUT UNAVAILABLE TO PREVENT 100% RISK.**
23. Machine can't be started if safety device is opened.

THE EXPECTED LIFE OF THE MACHINE IS COUNTED AS:
8 HRS X 5.5 DAYS X 45 WEEKS X 10 YEARS = 19800 HRS
WHICH TO BE UNDER NORMAL OPERATION AND WELL MAINTENANCE.

IT IS NOT NECESSARY TO REPLACE MANY COMPONENTS EXCEPT THOSE ARE CONSUMABLE.

NOISE LEVEL

Equivalent A-weighted Sound pressure level according to EN ISO 3746: 75.6 dB(A) for MJ 2260

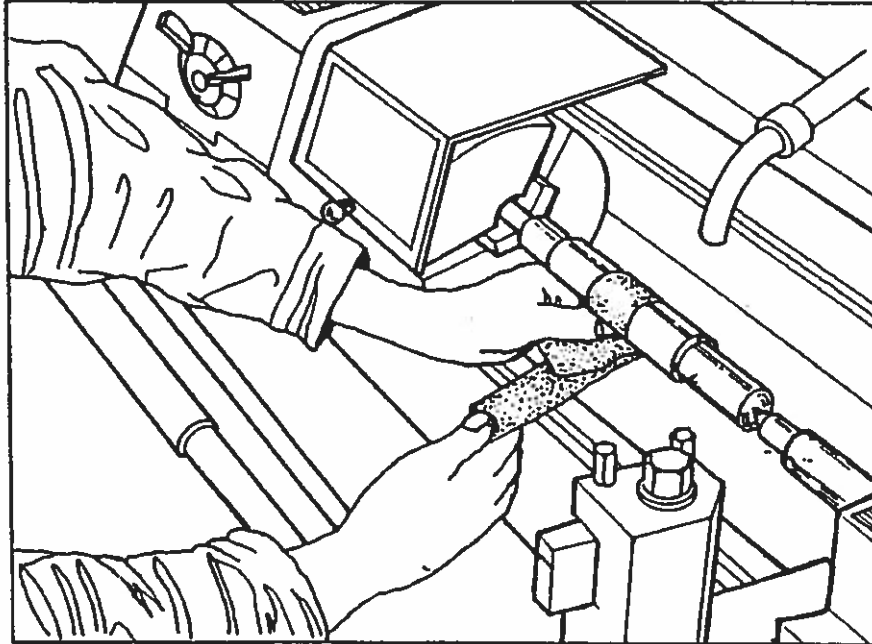


NOTE:

Uncertainty, K in decibels: 4.0 dB (A) according to EN ISO 4871

The figure quoted is emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of the workforce include characteristics of the workroom, the other sources of noise, etc. i.e. the number of machines and other adjacent processes. Also the permissible exposure level can vary from country to country. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk.

ACCIDENTS AT LATHES BY USING EMERY CLOTH



DANGER: Any strips of Emery Cloth there is a Danger of Trapping.

HAZARDS

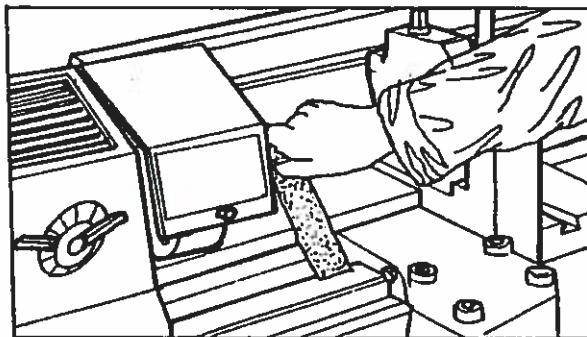
A high proportion of all accidents at metalworking lathes involve the use of Emery Cloth and result in injuries such as broken occasionally amputated fingers. Emery Cloth is used to deburr, polish or size a wide range of cylindrical, tapered and threaded metal components while they are rotating in lathes. Most accidents happen when each end of a strip of Emery Cloth is held in separate hands and passed around the back of the component being finished. If the Cloth is wrapped around the fingers and/or becomes snagged on the component while it is tightly gripped, then a serious injury is the likely result.

PRECAUTIONS

Emery cloth should NEVER be used at CNC lathes. Employers should assess the need to use emery cloth on components in a lathe.

Such operations may not be necessary if:

- (a) the finish being sought is only cosmetic. For such finishes the component may be held in one hand and polished by Emery Cloth held in the other. Alternatively a finishing belt or machine be used.
- (b) a sizing operation can be successfully performed either by turning or by further operations machine. In a dedicated polishing, finishing or grinding machine.



DANGER: Emery Cloth should never be held loose in the hand.

If the required tolerance is only achievable by the use of Emery Cloth against rotating components, then the Emery Cloth should be applied using either:

(a) A backing board of good quality wood as figure (a)

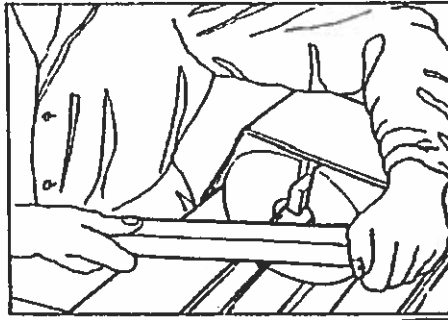


Fig a

(b) A toolpost onto which the Emery Cloth may be placed as figure (b);

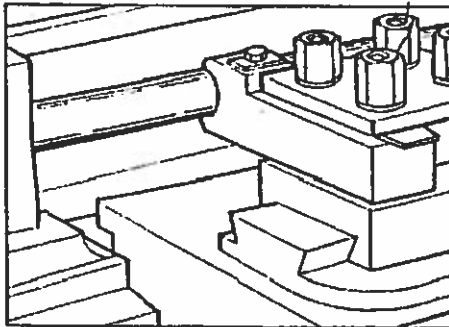


Fig b

(c) A 'nutcracker' consisting of two backing boards which are lined with Emery Cloth and joined at end and shaped so that they may encompass the surface to be finished as figure (c) ;

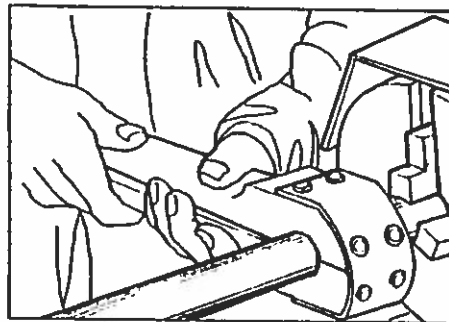


Fig c

(d) Or hand-held abrasive-impregnated wire brushes.

WARNING

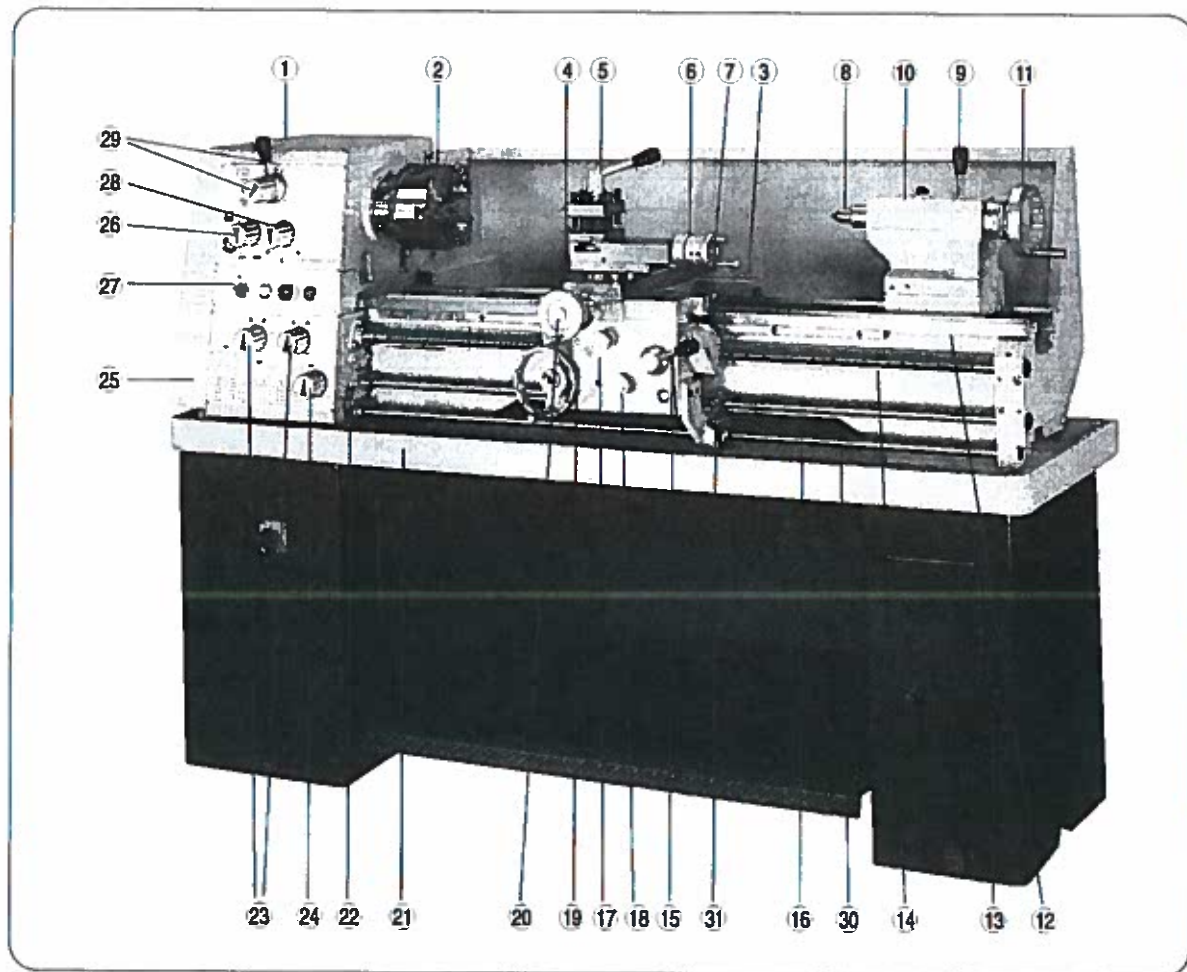
Gloves should never be worn when polishing is being carried out.

Where none of the above methods is reasonably practicable and it is necessary to use Emery Cloth for polishing the outside diameters of components, the Emery Cloth should be used in long strips with one end passed beneath the component.

Force should be applied by pulling both ends of the cloth upwards, never allowing the cloth to go slack or to wrap around either the operator's finger or the components.

For polishing the ends of components, only very short lengths or pads of cloth should be used which are incapable of causing entanglements.

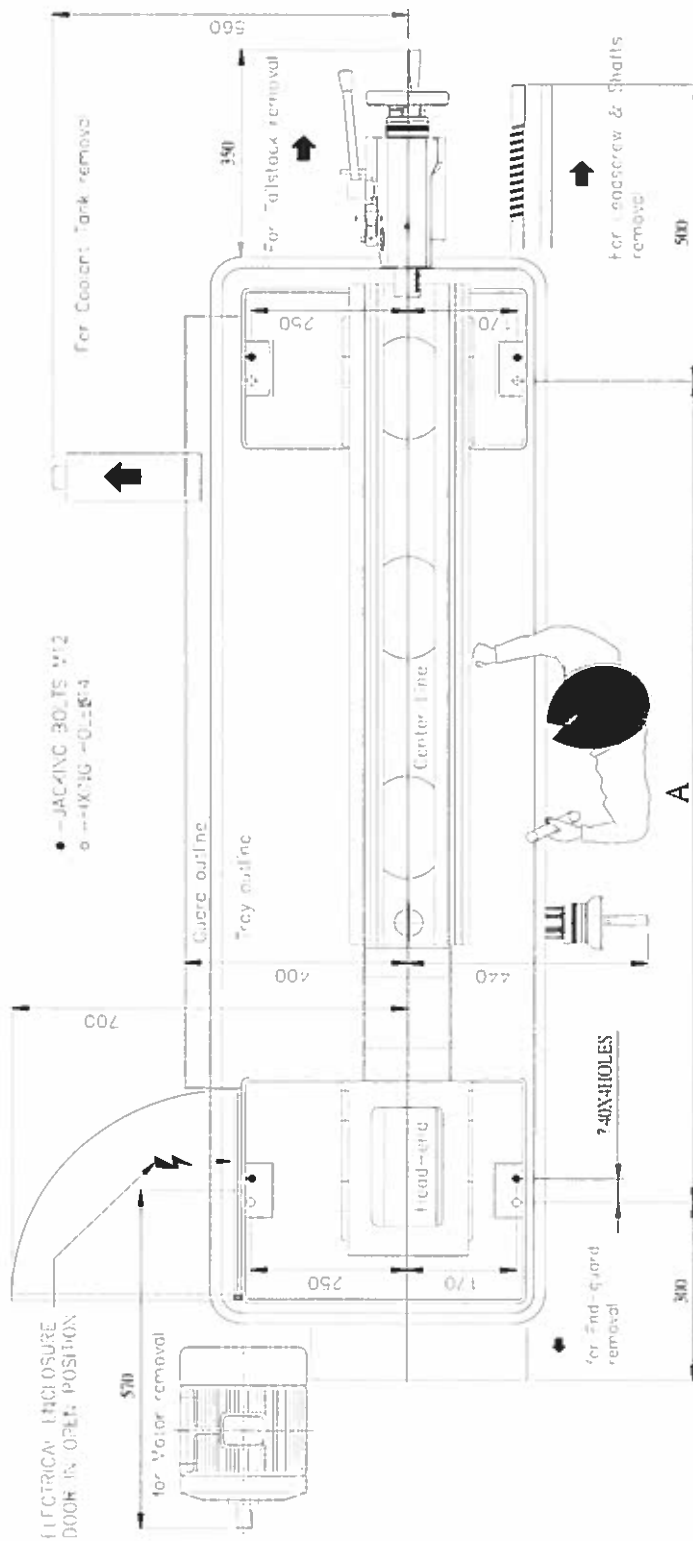
OPERATION



LEGEND

- | | |
|-------------------------|------------------------------------|
| 1. HEADSTOCK | 17. CROSS/LONGITUDINAL FEED KNOB |
| 2. MAIN SPINDLE & CHUCK | 18. FEED ENGAGEMENT KNOB |
| 3. CARRIAGE | 19. CARRIAGE HANDWHEEL |
| 4. CROSS SLIDE | 20. CROSS SLIDE HANDWHEEL |
| 5. TOOLPOST | 21. CHIP PAN |
| 6. COMPOUND SLIDE | 22. QUICK CHANGE GEAR BOX |
| 7. THREADING DIAL | 23. GEAR SHIFT KNOB |
| 8. TAILSTOCK CENTER | 24. FEED OR THREAD CHANGE KNOB |
| 9. TAILSTOCK LOCK LEVER | 25. QUADRANT COVER |
| 10. TAILSTOCK | 26. FEEDING DIRECTION SELECT KNOB |
| 11. TAILSTOCK HANDWHEEL | 27. ELECTRICAL CONTROL PANEL |
| 12. BED | 28. FEED & THREAD SELECTOR KNOB |
| 13. CABINET | 29. SPINDLE SPEED SELECTOR |
| 14. LEADSCREW | 30. FOR /OFF/REV. CONTROL SHAFT |
| 15. HALF NUT LEVER | 31. SPINDLE ROTATION CONTROL LEVER |
| 16. FEED ROD | |

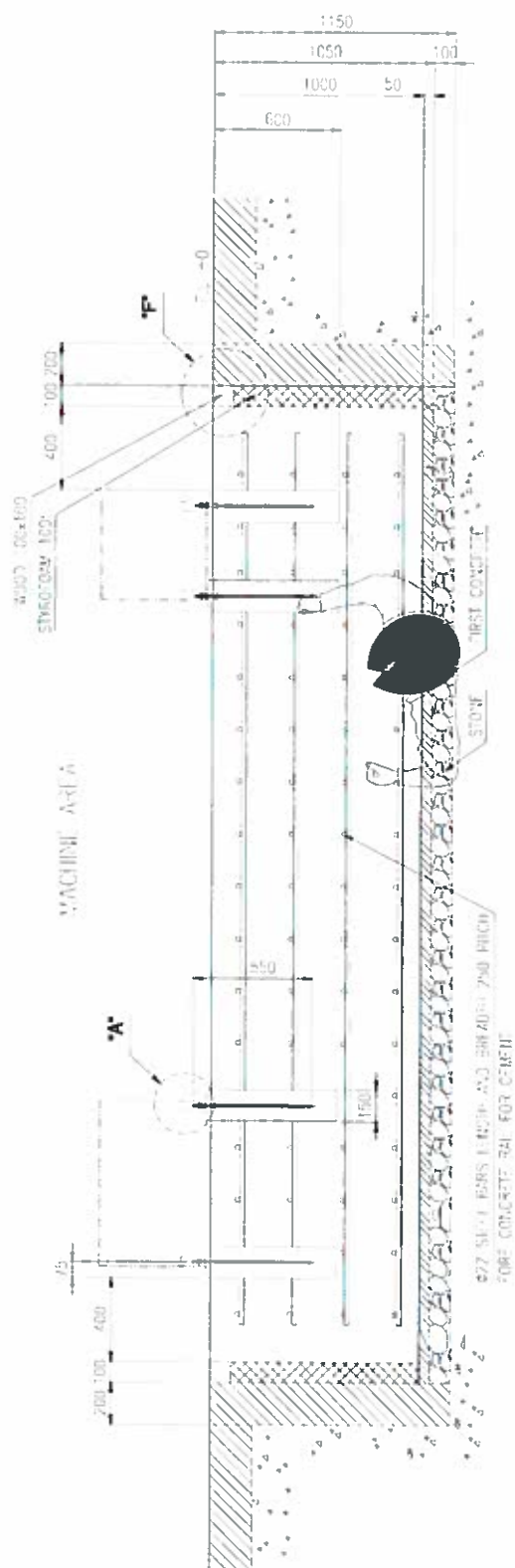
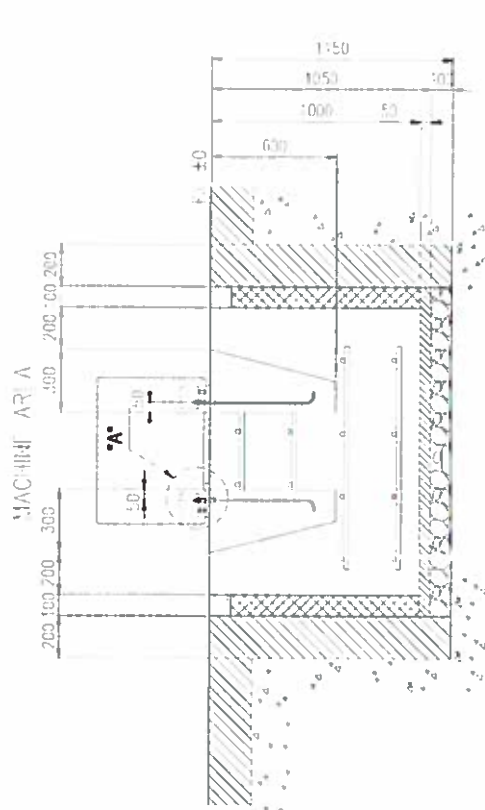
FOUNDATION PLAN



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FOUNDATION PLAIN

ANCHOR BOLT DIAGRAM



CONNECTION OF EXTRACTION SYSTEM

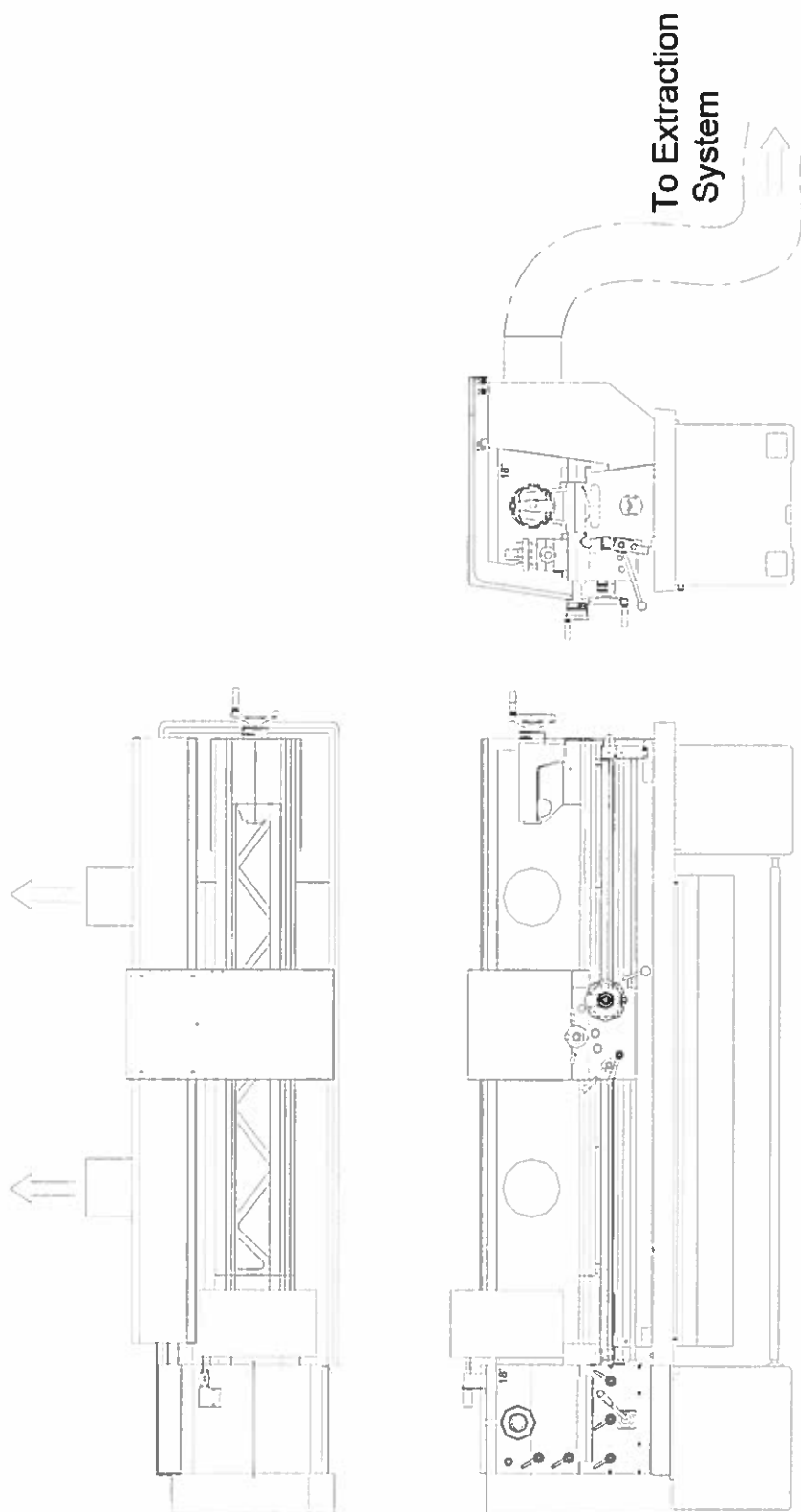


ILLUSTRATION OF HAZARD REGION

Arrow shows the directions of movement in the danger area.

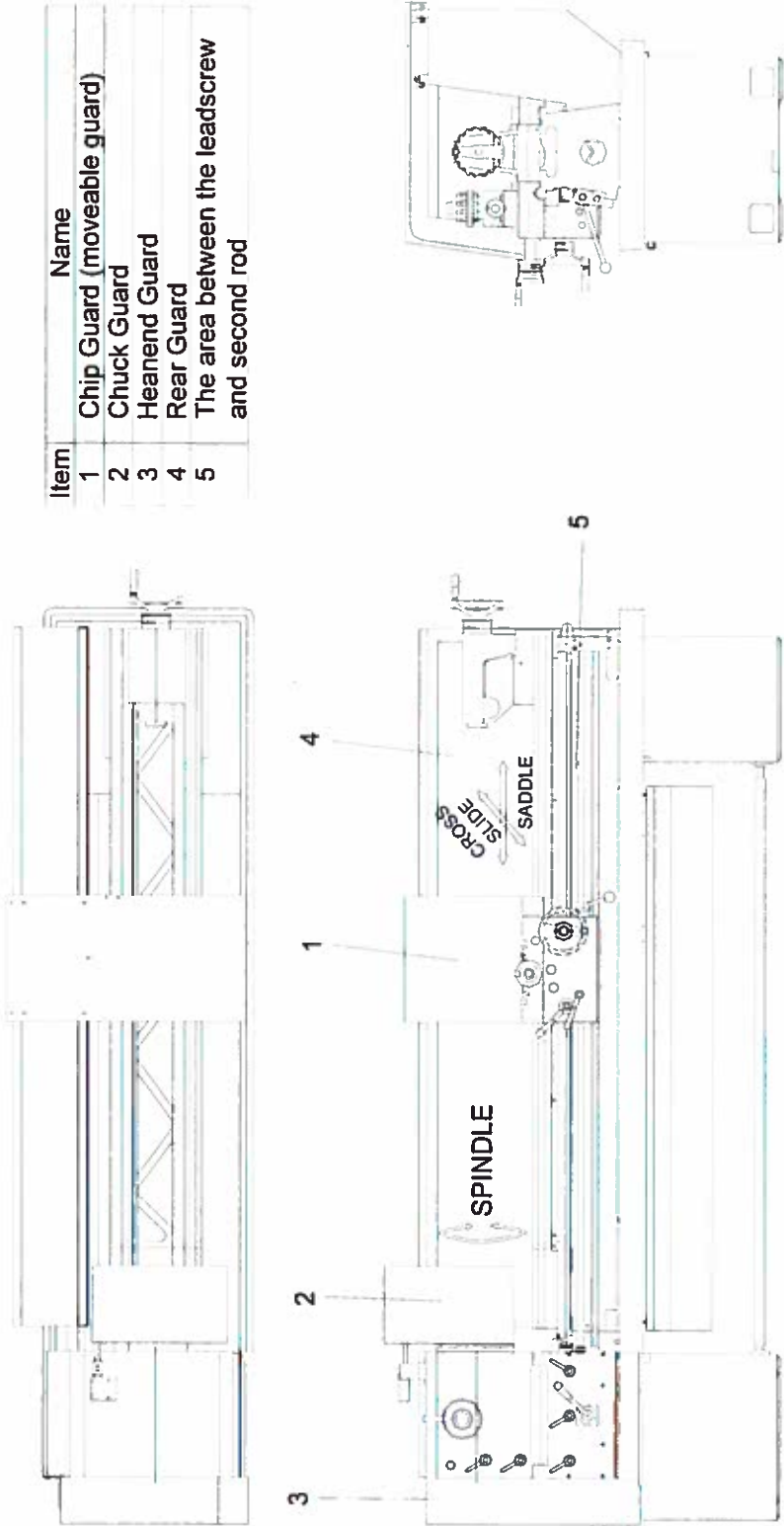
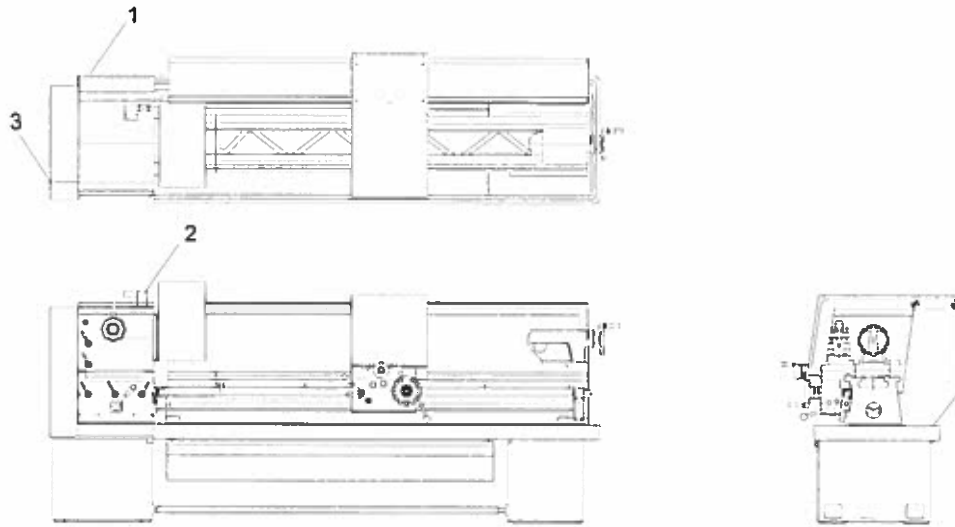


ILLUSTRATION OF SAFETY DEVICE POSITION



| Item | Name | Description |
|------|-------------------------------|--|
| 1 | Power switch door (interlock) | Switch on: Power is supplied, and machine will be in a controlled condition.
Switch off: Power is not supplied, and machine will stop at once. Safety door lock switch. Machine can't be started if door is opened. |
| 2 | Chuck guard (limit switch) | Machine can't be started if door is opened. |
| 3 | Left side door (interlock) | Safety door lock switch. Machine can't be started if door is opened. |

SAFTY OF MACHINE TOOL GUARDS

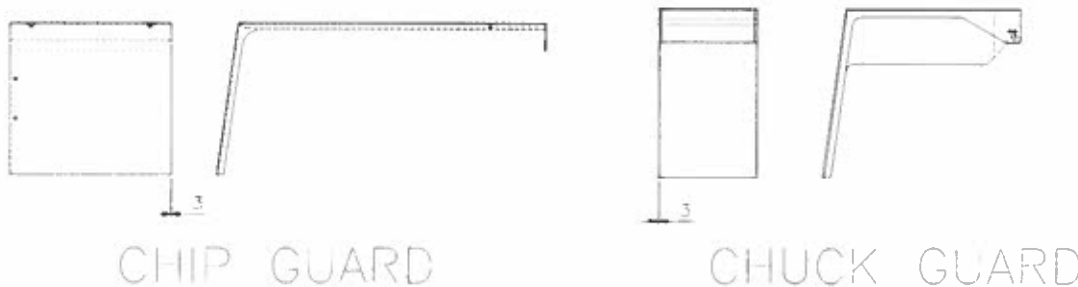
NOTE: CHUCK GUARD AND CHIP GUARD ARE ABLE TO REDUCE MOST OF RISKS, BUT UNAVAILABLE TO PREVENT 100% RISK.

Turning machine must now comply with the following European Safety Standard:

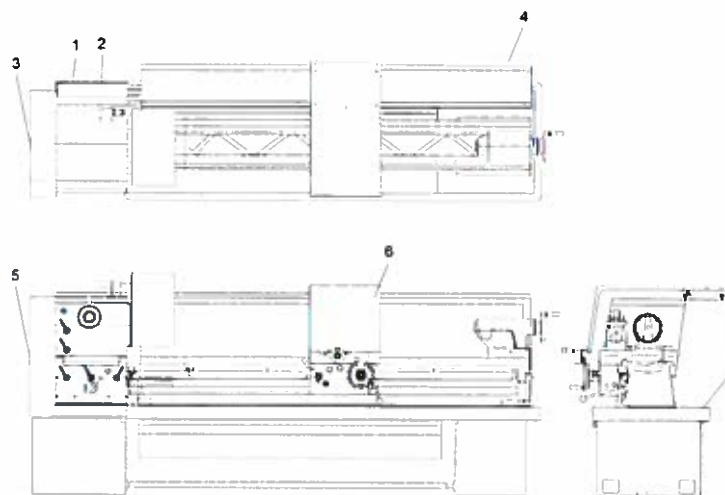
EN12840 Safety-Manually Controlled Turning machines with or without automatic control







The machine is supplied as standard with 3mm mild steel chuck guard and chip guard.

Note: The strength of the machine guarding have been calculated to contain the ejection of a chuck jaw when running at the maximum speed of the machine spindle with chuck diameter and jaw weights as specified above.



THE POSITION OF WARNING AND SIGN



| Label & Plates | |
|----------------|---|
| 1 |  <p>JESCO CE nameplate</p> |
| 2 |  <p>Electric shock! Operate carefully.</p> |
| 3 |  <p>On the whipping hazard and stating that exposed stock bars shall be guarded.</p> |
| 4 |  <p>Coolant drain port</p> |
| 5 |  <p>Please don't open it when operation.</p> |
| 6 |  <p>High speed! Do not put hands near it when machine operation.</p> |

CLEANING OR LEVELLING LATHE

WARNING: DISCONNECT ALL ELECTRIC POWER BEFORE CLEANING, LEVELLING OR MAINTENANCE LATHE.

CLEANING

Before operating any controls, remove the anticorrosion coating from all slideways and the end gear train; see Fig. 1, using white spirit or Kerosene.

DO NOT USE CELLULOSE SOLVENTS FOR CLEANING AS THEY WILL DAMAGE THE PAINT FINISH.

Oil all bright machined surfaces immediately after cleaning, using machine oil or slideway lubricant; use heavy oil or grease on the end gears.

INSTALLING

Locate the machine on a solid foundation, allowing sufficient area all round for easy working and maintenance (see Foundation Plan). The lathe may be used free-standing or bolted to the foundation.

FREE-STANDING

Position lathe on foundation and adjust each of the eight/ten mounting feet to take equal share of the load. Then using a machinist's precision level on the bedways (as in Fig 2) adjust the feet to level up machine. Periodically at least every six (6) months check bed level to ensure continued lathe accuracy.

FIXED-INSTALLATION

Position lathe over four bolts (1/2 in. or 13mm. diam.) set into the foundation to correspond with holes in the mounting feet. dimensions are shown on foundation plan. Accurately level the machine, as in Fig. 2 then tighten hold-down bolts. Re-check bed level.

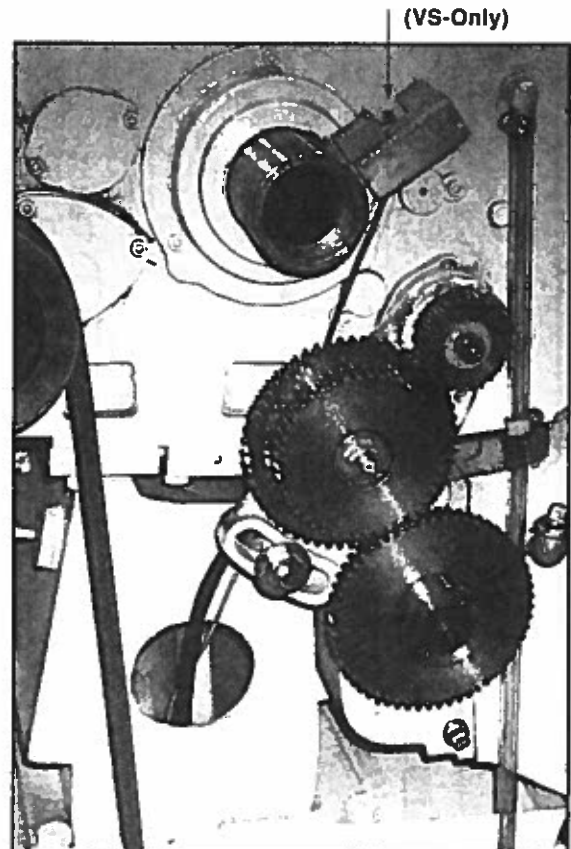


Fig 1

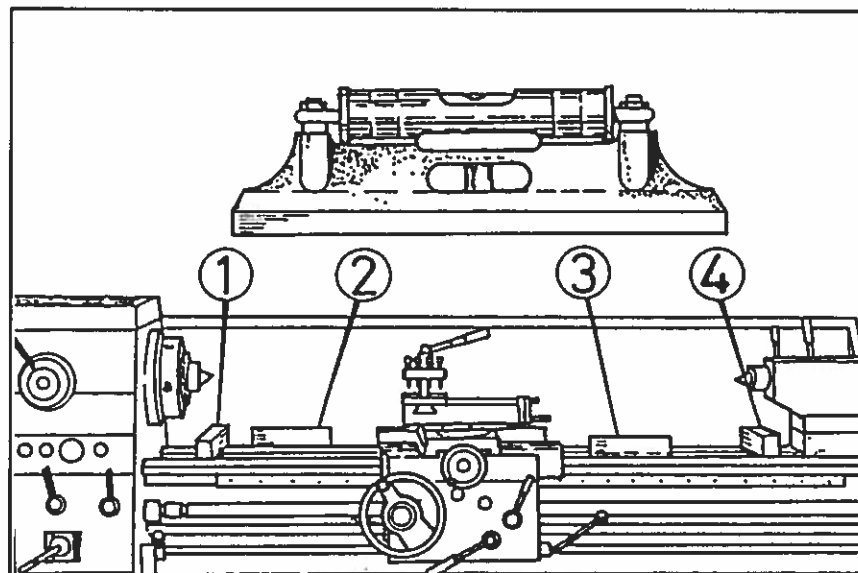


Fig. 2

ELECTRIC SUPPLY CONNECTION

Input wires should be connected to main terminal box below the electrical box in back of headstock on headend plinth. The connecting wires/cable should be big enough for more than 3HP motor as well as short from the power source. Main motor rotation must be clockwise viewed from the pulley end. Should motor run in wrong direction, interchange any two of the three phase leads. Appropriate wiring diagrams are included in this manual.

WARNING:

All electrical power connections must be provided by a qualified electrician. Proper grounding and fused main disconnects are necessary.

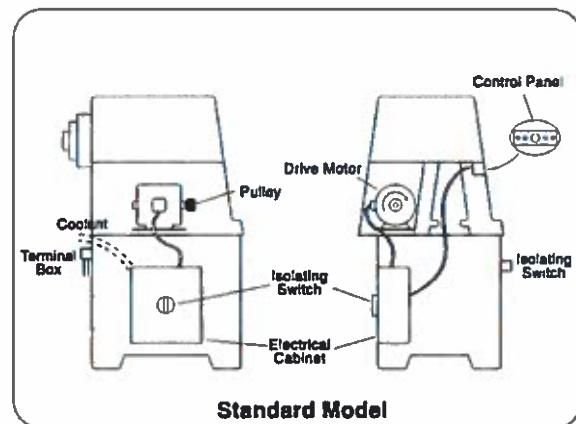


Fig.3

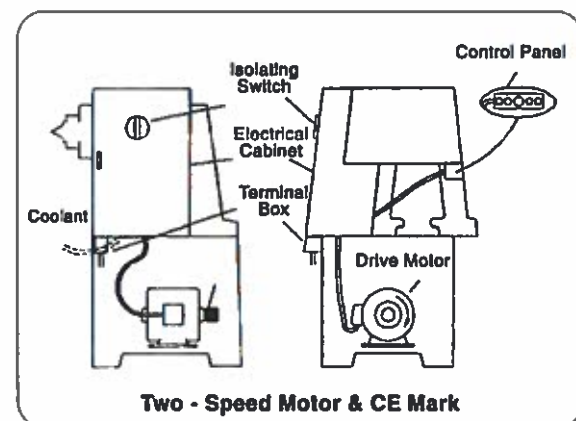


Fig 4

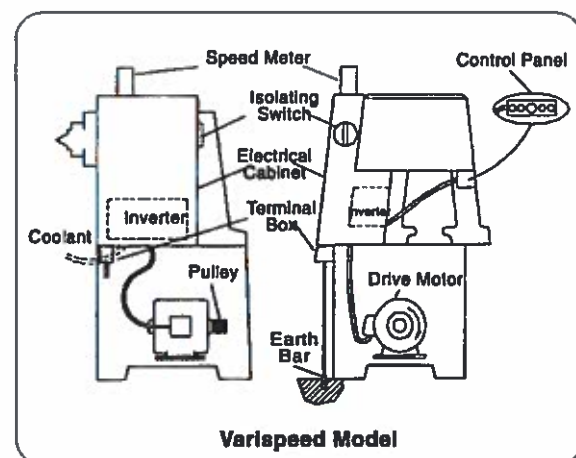


Fig 5

LUBRICATION CHECKS

Before operating the machine and trouble-free operation keep the lathe clean and regularly lubricated are very important.

The oil bath designed headstock, feed gearbox and apron; the self-splash lubricated all the spindle, shafts, gears and bearing. The reservoirs contained oil should be reach to the level mark on oil sight windows. The headstock and feed gearbox recommend with ISO V.G. 32 or equivalent. The apron recommends with ISO V.G 68 or equivalent.

To replenish or exchange the oil in headstock and feed gear box by open the end gear cover; to replenish the oil from both filler elbows (F) and to drain the oil from both drain plug (D) (Fig. 6). For the apron, to replenish the oil from the oil cap on saddle and to drain the oil from drain plug at the bottom of apron.

To the slideways, leadscrew, feed rod and all the oilers located on saddle, cross slide, top slide, tailstock and end bracket etc. Apply an oil can to all the points shown on lubrication chart which require daily oiling. Use light machine oil or way lubricants.

DO NOT MIX LUBRICANTS: When alternative lubricants are to be used, the oil reservoir should be drained and flushed out before refilling with new oil.

NOTE: RECOMMENDS AN OIL CHANGE IN THE HEADSTOCK, FEED GEARBOX & APRON WITHIN THE FIRST 3 MONTHS FOR A NEW MACHINE.

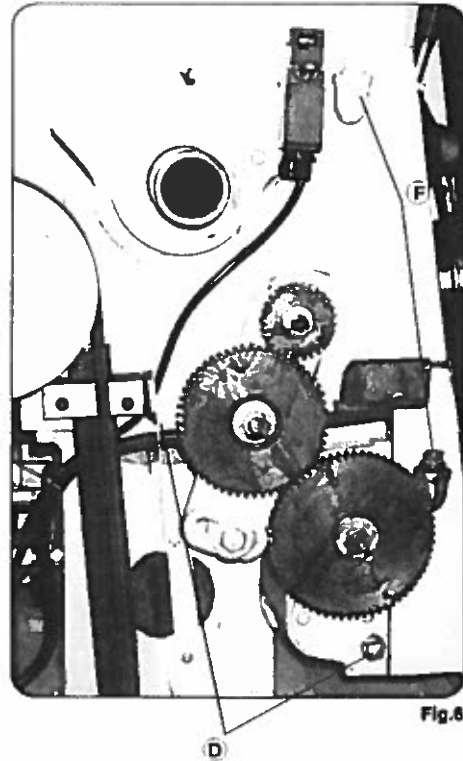
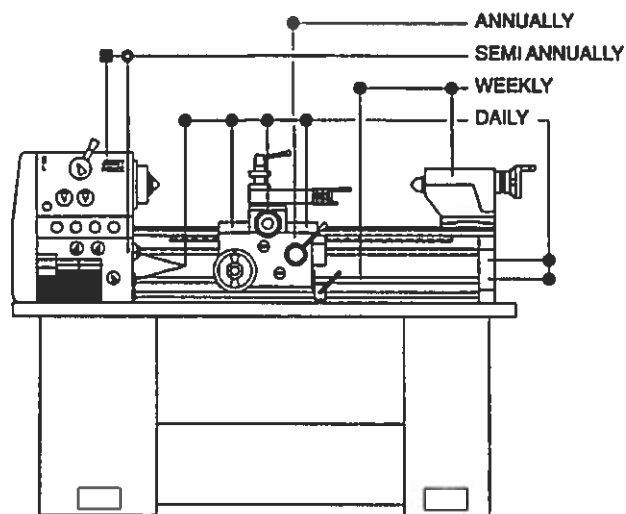


Fig.6

| LUBRICATION POSITIONS | REPLENISH OR EXCHANGE | VISCOSITY |
|---|-----------------------|-----------|
| HAEDSTOCK & FEED GEARBOX | EXCHANGE | ISO VG 32 |
| APRON | EXCHANGE | ISO VG 68 |
| LEAD-SCREW, FEED ROD, END BRACKET, SLIDEWAYS, TAILSTOCK | REPLENISH | ISO VG 68 |

LUBRICATION CHART



CHUCKS AND CHUCK MOUNTING

When fitting chucks or faceplates, ensure that the spindle and chuck tapers are scrupulously clean and that all cams lock in the correct positions; see Fig.7. It may be necessary when mounting a new chuck to re-set the camlock studs (A). To do this, remove the cap-head locking screws (B) and set each stud so that the scribed ring (C) is flush with the rear face of the chuck-with the slot lining up with the locking screw hole (see inset, Fig.7.)

Now mount the chuck or faceplate on the spindle nose and tighten the three cams in turn. When fully tightened, the cam lock line on each cam should be between the two V marks on the spindle nose.

If any of the cams do not tighten fully within these limit marks, remove the chuck or faceplate and readjust the stud as indicated in the illustration. Fit and tighten the locking screw (B) at each stud before remounting the

chuck for work.

A reference mark should be made on each correctly fitted chuck or faceplate to coincide with the reference mark scribed on the spindle nose.

This will assist subsequent remounting.

DO NOT INTERCHANGE CHUCKS OR FACE PLATES BETWEEN LATHES WITHOUT CHECKING FOR CORRECT CAM LOCKING.

WARNING

Chuck should be CE approval of EN 1550, the relevant required markings in it. Take careful note of speed limitations when using chucks and faceplates.

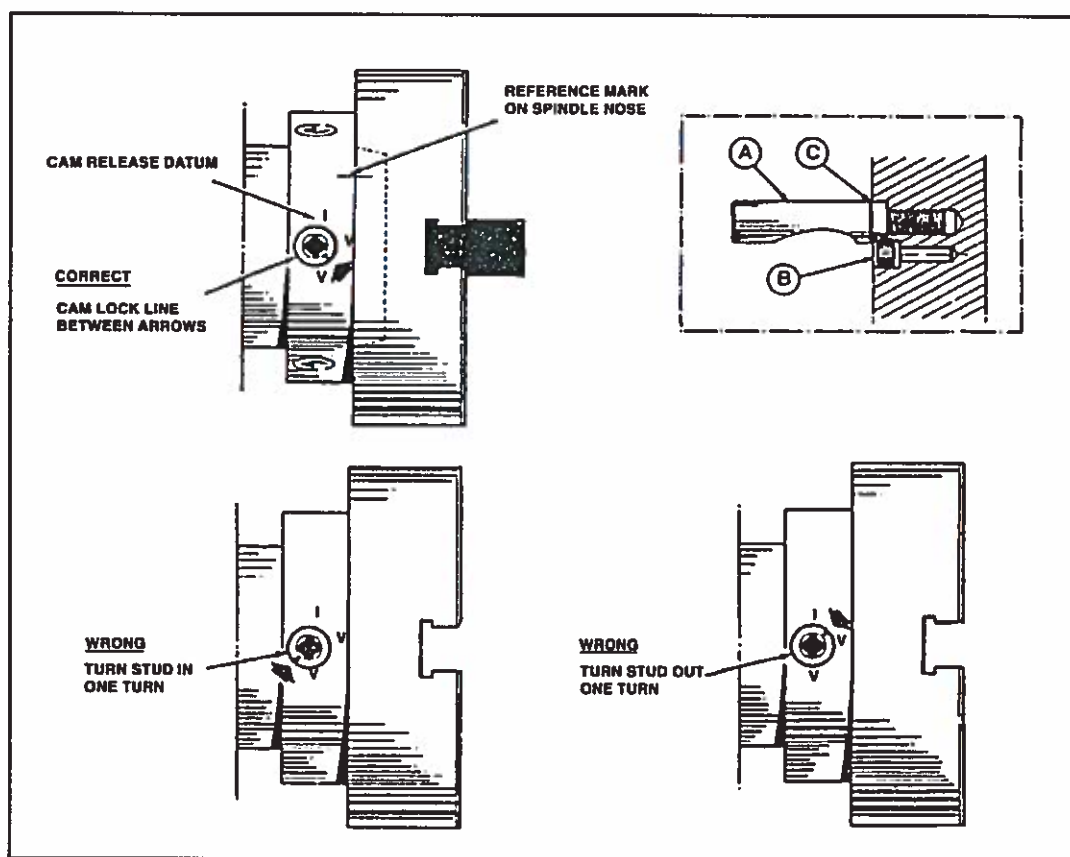


Fig.7

NOTE:

1. Balance requirements on workpiece clamping device shall be followed: Workpiece clamping devices shall only be modified in accordance with the clamping device manufacturer's recommendation.
2. Shall be provided that machining unbalanced workpiece may create an ejection hazard and that means of minimizing the risk is counter balancing or machining at reduced speed.
3. The machine is not allowed to machine the aluminum or magnesium alloy, which can cause additional, hazards e.g. fire and explosion or noxious dust.
4. Take careful note of speed limitations when using faceplates; 10 in. (250mm) faceplates should not be run at speeds greater than 1200 RPM.

CHUCK JAW DETAIL

Top jaws should be designed to hold the workpiece as close to the chuck face as possible. Excessive jaw height reduces the effective gripping force available and is detrimental to accuracy. As a general rule, the height of the grip point above the chuck face should not exceed one quarter of the chucks' diameter.

Large, heavy top jaws should be avoided if possible since the loss of gripping force due to centrifugal effects at high spindle speeds is increased. If heavy jaws are unavoidable, it may be necessary to restrict the spindle speed below the chucks' maximum recommended speed to ensure that sufficient gripping force is retained to hold the workpiece.

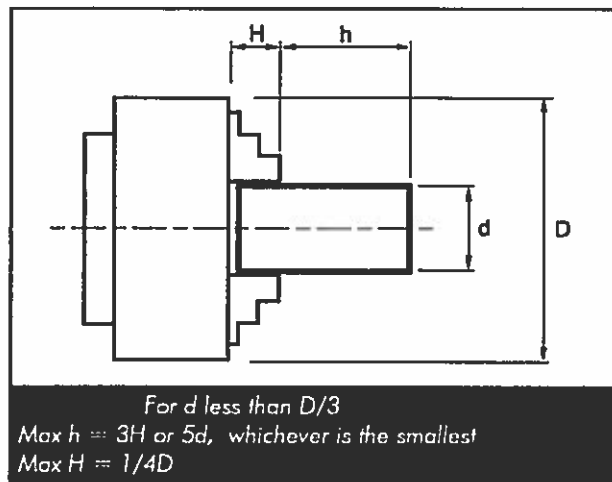
All top jaws in a set should be of equal weight to ensure that no out-of-balance forces occur. In the case of workpieces with a residual out-of-balance, this may be corrected by designing the top jaws to counteract the imbalance component. Alternatively, it may be necessary to restrict the machine to low speeds to avoid possible vibration problems.

Ideally, top jaws should not extend beyond the chuck periphery. If this is unavoidable, the amount of projection should be restricted within safe limits bearing in mind that the loss in gripping force due to centrifugal effect is a function of the product of top jaw mass and the distance to the jaws' centre of mass about the chucks' rotational axis. Precautions should also be taken to ensure that projecting top jaws will not collide with tooling during the machining cycle.

Care should be exercised in machining workpieces whose length protrudes excessively beyond the chuck jaws. As a general guide, for workpieces up to approximately one third of the chuck diameter whose inner end face is located close to the chuck, machining should not be carried out at a distance greater than five times the workpiece diameter or three times the axial length gripped by the jaws measured from the outer end of the jaws.

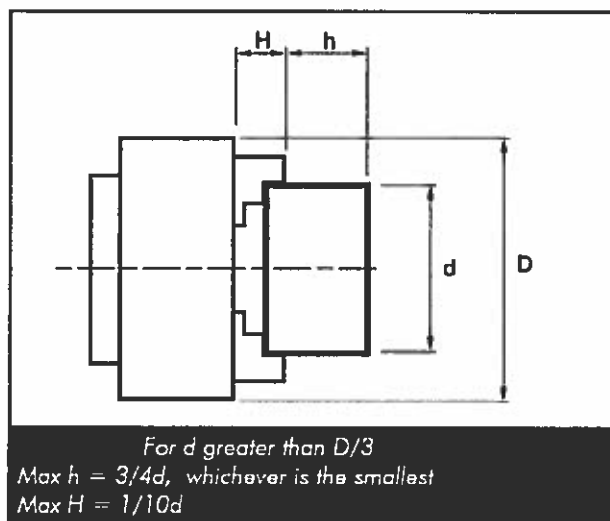
The lesser of these values should be used and the maximum height of the top jaws should be restricted to one quarter of the chuck diameter.

The proportions for this condition are shown below.



When the workpiece diameter is greater than approximately one third of the chuck diameter and the workpiece is well supported axially close to its outer periphery, the distance to the machine point from the outer end face of the jaws should not normally exceed three quarters of the workpiece diameter. This is based on the assumption that the axial length of the workpiece gripped by the jaws is not less than one tenth of the workpiece diameter.

The proportions for this condition are shown below.



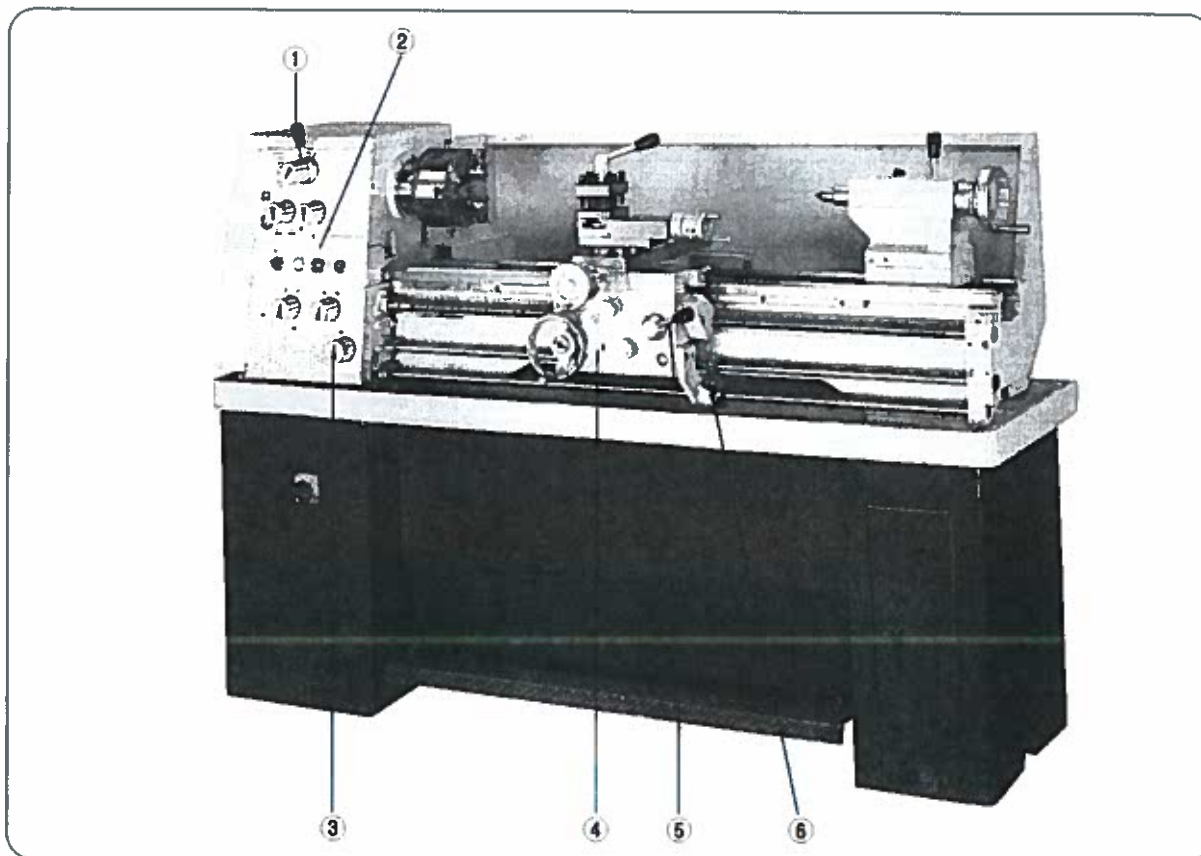


Fig 8

LATHE CONTROLS (See Fig. 8)

1. Spindle speed select levers.
2. Control panel.
3. Gearbox, threads and feed.
4. Apron, sliding & surfacing feeds
5. Footbrake.
6. Spindle rotation control lever

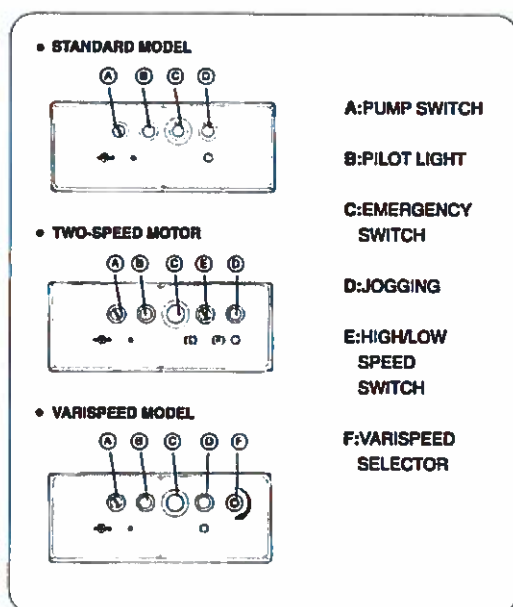


Fig 9

CONTROL PANEL (See Fig.9)

Except the lathe isolator switch, all the electrical controls are fitted into front face between headstock and gearbox. The control knobs & button switches functions as follows:

1. The BLACK select knob--A for coolant pump switch ON/OFF.
2. The WHITE pilot lamp--B glows to show the main supply ON.
3. The RED mushroom-head button--C to stop all the electrical supply.
4. The GREEN push button--D to press for spindle jogging.
5. The BLACK select knob--E for two speed motor High/Low selection.
6. The BLACK turning knob--F for spindle speed control on Varispeed model.

NOTE: The speed meter reflects the main spindle speed, which is controlled by the turning knob on varispeed model.

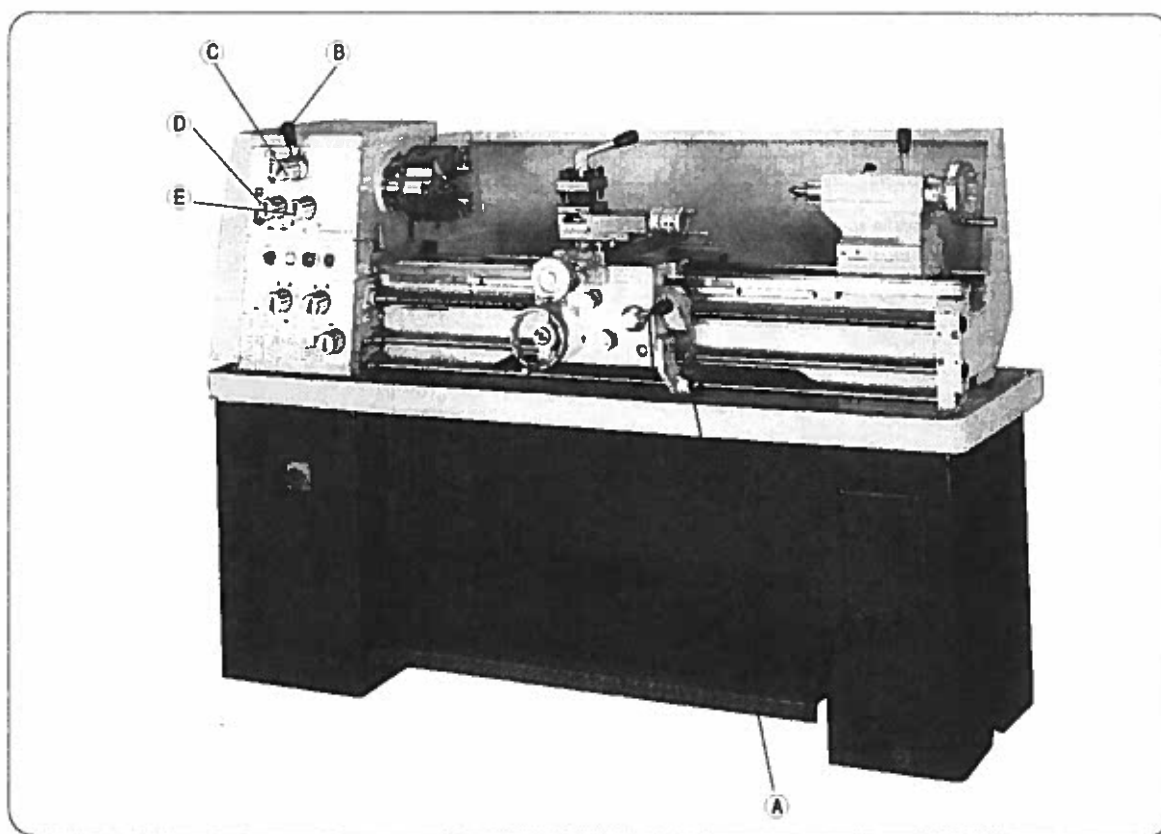


Fig10

SPEED CONTROLS (Standard lathes)

SPINDLE ROTATION

Selected by the controls lever-A (Fig. 10). The apron gated lever-A for Forward-off-Reverse selections

After started the main motor running, to move gate lever-A out and downward to engage forward rotation of spindle, or upward to engage reverse rotation. Return to natural position for spindle stop.

FOOTBRAKE

A foot pedal located between machine base plinths operates the spindle brake and cut off the power to the drive motor. After the foot-brake is applied, the lever-A should be returned to the neutral position to re-start the spindle rotation.

WARNING: NEVER SHIFT SPEED CONTROL LEVERS B&C AND FEED LEVERS D&E ON THE HEADSTOCK WHILE THE SPINDLE IS ROTATING. RECOMAND TO PRESS THE JOGGING BUTTON ON PANEL FOR HELPFUL THE LEVER CHANGES.

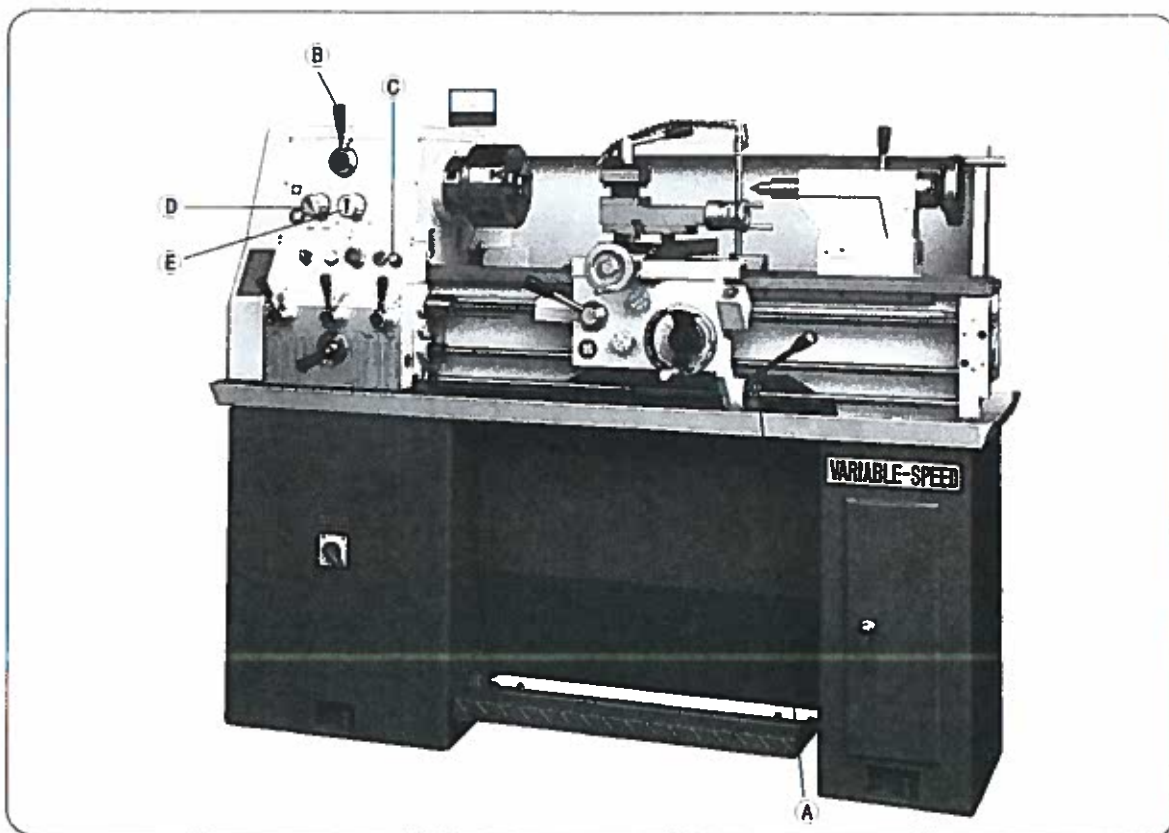


Fig 11

VARISPEED LATHES

SPEED ROTATION

Same as the standard model selected by the control lever-A, which provided Forward-off-Reverse selection. To move the lever-A out and downward to engage forward rotation of spindle, or upward to engage reverse rotation. Return to neutral position for the spindle stop within very few seconds depends on its own Inverter preset parameter braking function.

FOOTBRAKE

Same as standard model, after the footbrake is applied, operates the spindle braking and cut off the power to the drive motor. The control lever-A should be returned to neutral position for restart the spindle rotation.

SPINDLE SPEEDS

A spindle speed select lever-B on the headstock provides High and Low speed ranges selection. STOP THE SPINDLE first and then rotates the select lever-B to engage "HIGH" or "LOW" speed range. Rotate the select turning knob-C on control panel to the minimum position by counter clockwise. Then, to operate the control lever-A for spindle rotation, and turning the select turning knob-C clockwise from minimum to the desire constant speed slowly. The speed meter built on the top of the electrical box will display the spindle speed. Both of the two speed ranges provides the best torque characteristics of the drive motor for full lathe function. A complete set of special parameter has been pre-set by the keyboard into the digital Inverter. DO NOT change or ALTER these parameter setting without the written consent of MANUFACTURER, as to do so will automatically void the machine warranty.

WARNING: NEVER SHIFT SELECT LEVER-B AND FEEDS LEVER-D & E ON THE HEADSTOCK WHILE THE SPINDLE IS ROTATING.

QUICK CHANGE GEAR BOX

The quick change gear mechanism determines the rate or rotation of the lead screw and the feed rod in relation to the spindle speeds for threading, turning and facing operations.

The range of feeds and threads, their selection and the positions of the knobs for each feed or thread are shown on the machine chart.

According to requirement, there are three types for Quick Change Gear Box. One is Inch Gear Box Fig 12, second is Metric Gear Box Fig 13, Third is Universal Gear Box Fig 14.

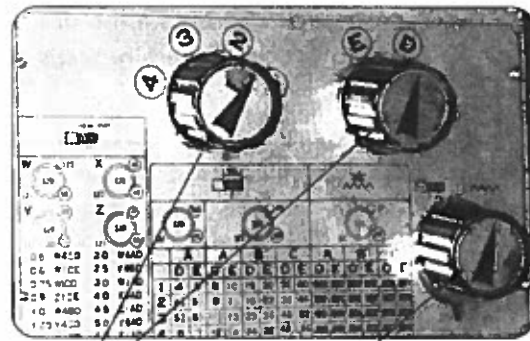


Fig.12

③ Selector knob

⑤ Feed or thread change knob

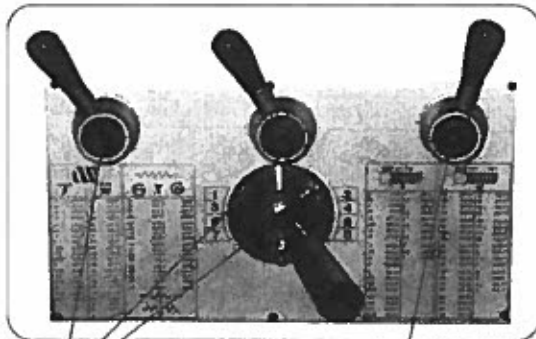


Fig.14

⑥ Selector Levers

⑤ Feed or thread change Lever

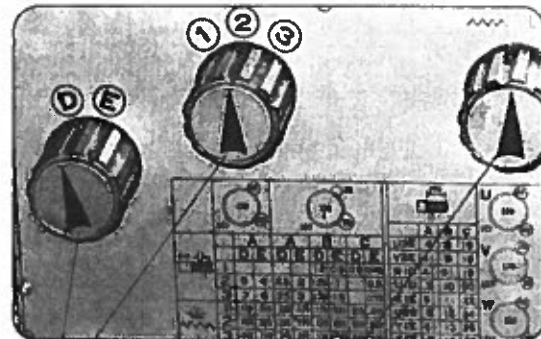


Fig.13

③ Selector knob

⑤ Feed or thread change knob

FOR INCH GEAR BOX. According to chart Fig 15, turn the selector knob (D) on headstock and (6) on gear box to obtain the desired threads of feeds cutting, then turn the change knob (5) on gear box to choose threads or feeds cutting. Meantime, ensure the end gear train engagement W, X, Y, Z, according to chart also.

| mm | | | |
|------|------|-----|------|
| W | 25 | X | 40 |
| 120 | 50 | 120 | 40 |
| 127 | | 127 | |
| Y | 40 | Z | 30 |
| 120 | 32 | 120 | 40 |
| 127 | | 127 | |
| 0.5 | W4CD | 2.0 | W4AD |
| 0.6 | W1CE | 2.5 | Y4BD |
| 0.75 | W1CD | 3.0 | W1AD |
| 0.9 | Z1CE | 4.0 | X4AD |
| 1.0 | W4BD | 4.5 | Z1AD |
| 1.25 | Y4CD | 5.0 | Y4AD |
| 1.5 | W1BD | 6.0 | X1AD |

| INS | | | | | | | | INS | | | | | | | |
|-----|----|-----|-----|-----|----|-----|----|-----|-------|-------|-------|-------|-------|-------|----|
| 120 | 40 | 120 | 25 | 120 | 50 | 120 | 50 | 120 | 25 | 120 | 50 | 120 | 50 | 120 | 50 |
| 127 | 40 | 127 | | 127 | | 127 | | 127 | | 127 | | 127 | | 127 | |
| A | | A | | B | | C | | A | | B | | C | | D | |
| D | E | D | E | D | E | D | E | D | E | D | E | D | E | D | E |
| 1 | 4 | 5 | 8 | 10 | 16 | 20 | 32 | 40 | .0100 | .0083 | .0050 | .0042 | .0025 | .0021 | |
| 2 | 4½ | 5½ | 9 | 11 | 18 | 22 | 36 | 44 | .0092 | .0076 | .0046 | .0038 | .0023 | .0019 | |
| 3 | 5¾ | 6½ | 11½ | 13 | 23 | 26 | 46 | 52 | .0073 | .0064 | .0036 | .0032 | .0018 | .0016 | |
| 4 | 6 | 7 | 12 | 14 | 24 | 28 | 48 | 56 | .0069 | .0060 | .0034 | .0030 | .0017 | .0015 | |

Fig.15

FOR METRIC GEAR BOX.

According to chart Fig 16, turn the selector knob (D) on headstock and (6) on gear box to obtain the desired threads or feeds cutting, then the change knob (5) on gear box to choose thread or feeds cutting.

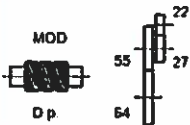
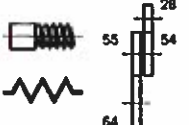
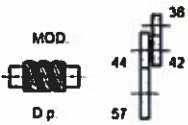
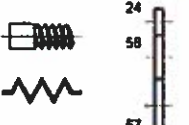
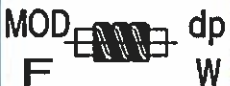

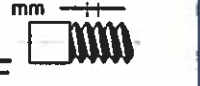
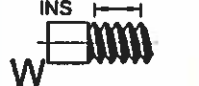
Meantime, ensure the end gear train engagement U,V,W,X,Y,Z, according to chart also.

| | | | | | | | | | | | |
|--|-------|--|-------|--|-------------|--|--|---|--|---|--|
| | | | | | | | | | | | |
| | A | | A | | A B C | | | U | | X | |
| | D E | | D E | | D E D E D E | | | V | | Y | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | A | | A | | A B C | | | U | | X | |
| | D E | | D E | | D E D E D E | | | V | | Y | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | A | | A | | A B C | | | U | | X | |
| | D E | | D E | | D E D E D E | | | V | | Y | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | A | | A | | A B C | | | U | | X | |
| | D E | | D E | | D E D E D E | | | V | | Y | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |
| | 1 2 3 | | 1 2 3 | | 1 2 3 | | | W | | Z | |

Fig 16

FOR UNIVERSAL GEAR BOX (OPTIONAL)

Both of INCH AND METRIC threads and feeds cutting available to obtain from the universal gear box directly. According to chart Fig 17 and turn selectors correspond to chart for the desired threads or feeds cutting. Also, beware the end gear trains engagement and F/W selectors on chart accordingly.

| METRIC LEADSCREW | | | | IMPERIAL LEADSCREW | | | | | | | |
|---|------|---|------|--|------|---|--|--|--|--|--|
|  | |  | |  | |  | | | | | |
|  | |  | |  | |  | | | | | |
| 3 | BT6X | 44 | AE4R | .02 | CFT2 | .0008 | | | | | |
| 4 | AT1X | 40 | AE3R | .03 | CFT7 | .0012 | | | | | |
| 5 | AT3X | 36 | AE2R | .05 | BFT4 | .0020 | | | | | |
| 6 | AT6X | 32 | AE1R | .06 | BFT7 | .0024 | | | | | |
| 7 | AT8X | 30 | AD3S | .08 | BFS2 | .0031 | | | | | |
| 8 | AS1X | 28 | AE8S | .10 | BFS4 | .0039 | | | | | |
| 9 | AS2X | 26 | AE7S | .12 | BFS7 | .0047 | | | | | |
| 1 | AS1X | 24 | AE6S | .15 | BFR1 | .0059 | | | | | |
| 1.25 | AS3Z | 22 | AE4S | .18 | BFR3 | .0071 | | | | | |
| 1.5 | AS6Z | 20 | AE3S | .21 | AFS5 | .0083 | | | | | |
| 1.75 | AS8Z | 19 | AF8S | .25 | AFS8 | .0098 | | | | | |
| 2 | AR1Z | 18 | AE2S | .30 | AFR1 | .0118 | | | | | |
| 2.25 | AR2Z | 16 | AE1S | .35 | AFR3 | .0138 | | | | | |
| 2.5 | AR3Z | 15 | AD3T | .40 | AFR4 | .0157 | | | | | |
| 2.75 | AR4Z | 14 | AE8T | .45 | AFR6 | .0177 | | | | | |
| 3 | AR6Z | 13 | AE7T | .48 | AFR7 | .0189 | | | | | |
| 3.25 | AR7Z | 12 | AE6T | .52 | AFR8 | .0205 | | | | | |
| 3.5 | AR8Z | 11 | AE4T | | | | | | | | |
| | | 10 | AE3T | | | | | | | | |
| | | 9 | AE2T | | | | | | | | |
| | | 8 | AE1T | | | | | | | | |
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CARRIAGE

The function of the carriage is to rigidly support the cutting tool and move it along or across the bed for turning, facing, boring or threading operations.

POWER FEED

For longitudinal power feed pull out the CROSS/LONGITUDINAL FEED KNOB and pull the FEED ENGAGEMENT KNOB IN THE APRON towards you. The direction of the carriage traverse is selected from the headstock.

For cross feed push in CROSS/LONGITUDINAL KNOB, and pull out FEED ENGAGEMENT KNOB.

While the FEED & ENGAGEMENT SELECTOR KNOB is in out position, the half-nut lever cannot be engaged. The built-in safety interlock mechanism will prevent simultaneous engagement of feed engagement knob and the half-nut lever. HALF-NUT LEVER engages the half nuts with the leadscrew for threading. See Fig. 18, to engage, push FEED ENGAGEMENT knob IN and engage the half-nut lever downwards in mesh with the threads of the leadscrew.

CAUTION: DO NOT FORCE THE HALF-NUT LEVER WHILE ENGAGING WITH THE LEAD SCREW.

THREADING DIAL

The threading dial is located on the right side of the apron. It performs the important function of indicating the proper time to engage the half-nut lever so that the tool will enter the same groove of the thread on each successive cut. The dial is marked with lines numbered 1,2,3,4 and in between is lines with no numbers. These are half lines and are called unnumbered lines.

The dial when engaged with the leadscrew will cause the rotation of the dial. A single line is marked on the guard of the threading dial (fixed line). The instruction plate riveted on the end guard shows the selection and sequence of matching the lines the revolving lines with the fixed line.

For thread cutting engage – the half-nuts at the appropriate numbers shown on the scale column of the threading dial plate 1-4 on the scale means, the half-nuts can be engaged on any of the numbered lines 1-2-3-4 for each successive cut.

If the numbered lines are used for the first cut, for successive cuts only numbered lines must be used 1-3, 2-4 on the scale means the half-nuts can be engaged on 1 and 3 or 2 and 4 for successive cuts. 1-8 on the scale means the half-nuts can be engaged on any line, numbered and unnumbered.

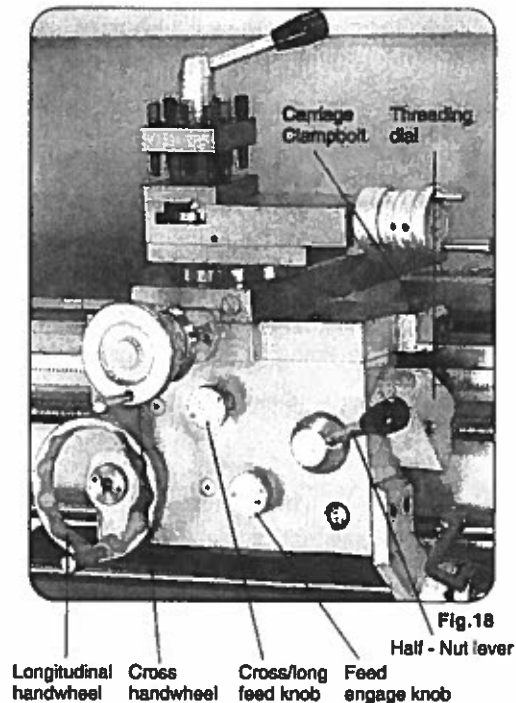


Fig.18

Longitudinal handwheel Cross handwheel Cross/long feed knob Feed engage knob

THREADING DIAL INDICATOR

| INDICATOR TABLE | | | |
|-----------------|-------|------|-------|
| GEAR | PITCH | | SCALE |
| 18T | 0.45 | 0.9 | 1.4 |
| | 0.6 | 1.2 | 1,3,5 |
| | 0.5 | 0.75 | |
| | 1 | 1.5 | |
| | 2 | 3 | 1-6 |
| | 4 | 6 | |
| 20T | 1.25 | 2.5 | |
| | 5 | | 1,4 |
| 21T | 1.75 | 3.5 | |
| | 7 | | 1,3,5 |

**METRIC GEARBOX FOR
METRIC THREADS
CUTTING ONLY**

| INDICATOR TABLE | | | | | |
|-----------------|-----------------|-----------------|-----------------|--------|-----------------|
| T.P.I. | SCALE | T.P.I. | SCALE | T.P.I. | SCALE |
| 4 | 1-4 | 11 | 1 | 26 | $\frac{13}{24}$ |
| $4\frac{1}{2}$ | | $11\frac{1}{2}$ | | 28 | 1-4 |
| $4\frac{3}{4}$ | | 12 | 1-4 | 32 | 1-8 |
| 5 | 1 | 13 | 1 | 36 | $\frac{13}{24}$ |
| $5\frac{1}{2}$ | | 14 | $\frac{13}{24}$ | 40 | 1-8 |
| 6 | $\frac{13}{24}$ | 16 | 1-8 | 44 | 1-4 |
| $6\frac{1}{2}$ | | 18 | $\frac{13}{24}$ | 46 | 1 |
| 7 | 1 | 20 | 1-4 | 48 | 1-8 |
| 8 | 1-8 | 22 | $\frac{13}{24}$ | 52 | 1-4 |
| 9 | 1 | 23 | 1 | 56 | 1-8 |
| 10 | $\frac{13}{24}$ | 24 | 1-8 | | |

**INCH GEARBOX FOR
INCHES THREADS
CUTTING ONLY**

Fig.19

The threading dial may not be used for Module, D.P. and metric threads cutting on Imperial Leadscrew lathe or imperial threads cutting on Metric Leadscrew lathe. To cut these threads, the half-nut must be kept closing on the leadscrew from the start of the thread until the end. When the end of the thread is reached, the tool must be quickly withdrawn from the workpiece, while stopping the spindle. Then while half-nut are still engaged, reverse the spindle, which will move the carriage backwards towards the starting point. When the starting point is reached, re-engage the motor forward and move the cutting tool into the workpiece at the desired spot.

UNIVERSAL GEAR BOX (OPTIONAL)

| INDICATOR | | | | | | | | | | | |
|-----------|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| 2 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |

INCH LEADSCREW FOR
INCHES THREADS
CUTTING ONLY

| INDICATOR | | | | | | | | | | | |
|-----------|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| 2 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 | 9 | 1-8 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |
| 2 | 1 | 9 | 1 | 4 | 7 | 8 | 1 | 9 | 1 | 4 | 7 |

METRIC LEADSCREW FOR
METRIC THREADS
CUTTING ONLY

Fig 20

FOUR WAY TOOLPOST

Release the tool post clamp lever counter clockwise and turning the toolpost for change, then re-tighten clamp lever.

TAILSTOCK

The tailstock slide along the bedways and may be anchored in any position by press the clamp lever. To slide the quill from rotating the tailstock handwheel, the quill lock lever can lock the quill. For small tapers the tailstock can be set over by loosening the clamp lever and both fixed screws under the front and the rear of the tailstock base. Then to adjust the both sides set over screw to the desire position.

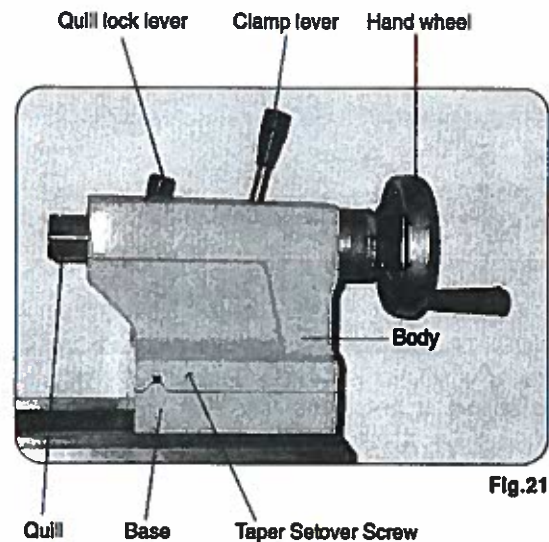


Fig.21

TAPER ATTACHMENT

For taper turning guide (A) is set to the required angle and the nuts (N) are tightened so the guide is clamped securely. The screw (E) holding the cross feed screw nut is removed so as to give the cross slide free movement. Swivel the compound to 90° so it is perpendicular to the work. The compound is used for depths of cut.

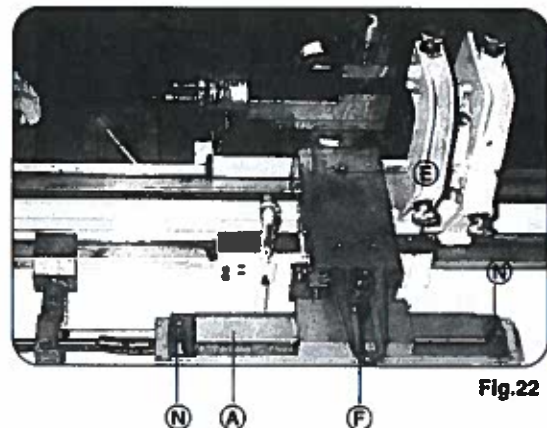


Fig.22

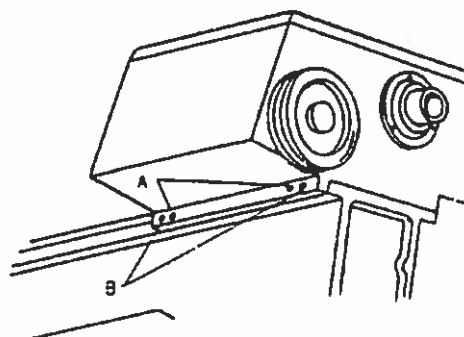
ADJUSTMENT

1.ADJUSTMENT OF HEADSTOCK

When the centerline of main spindle not alignment with the bedway, it could be adjusted by fixing bolts (A) and adjusting bolts (B) shown as follow figure. If the headstock is needed to move forward, loose the fixing bolt (B), fasten the adjusting bolts (B) to proper position, then, fasten the fixing bolts (A) again. If the headstock is needed to move backward, loose the adjusting bolts (B), fasten the fixing bolts (A) to proper position, then, fasten the adjusting bolts (B) again.

Beware to release four fixed screw of the headstock to the bed before adjustment and re-tighten it after adjustment.

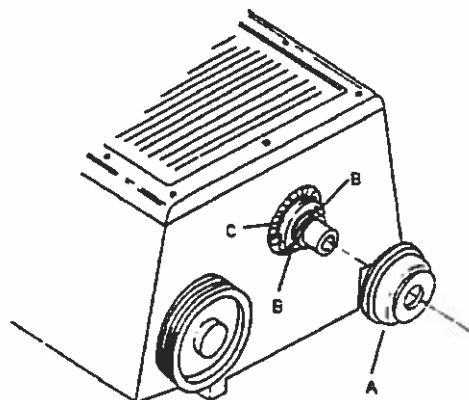
1



2.SPINDLE BEARING ADJUSTMENT

When we find the spindle bearings are too tight or loose open the rear bearing cover (A) and loose the set screw (B) on the spindle bearing thrust nut (C) and then adjust the thrust nut by loosening or fastening. The proper adjustment is finished by fastening the set screw again.

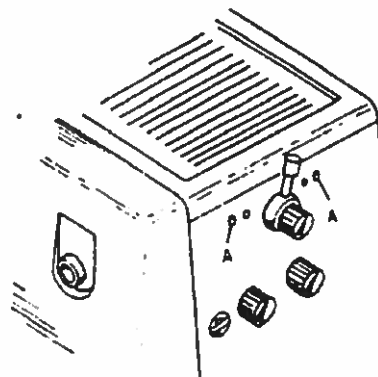
2



3.STRENGTH ADJUSTMENT OF KNOB POSITIONING SET SPRINGS

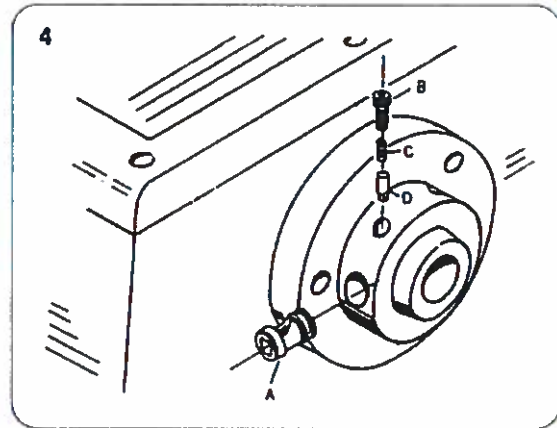
When changing speed of Headstock spindle, sometimes you could find the knob cannot be operated smoothly and accurately. The correction for this trouble is to loose or fasten the cap screw (A) to keep the internal spring tension properly.

3



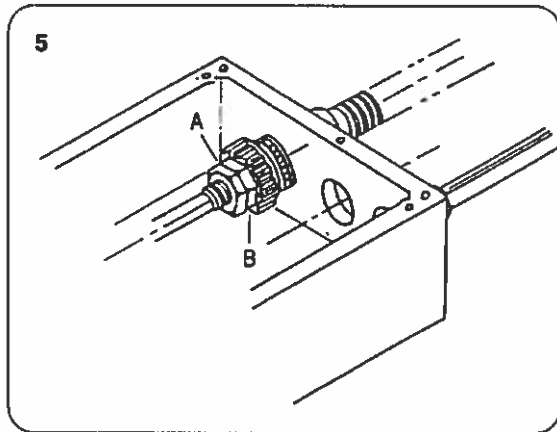
4.REPLENISHMENT OF CAMLOCK

When the Camlock (A) is broken, dismantle the cap screw (B), springs (C) and camlock set pin (D), and take out the damaged camlock and renew it. After completion of repair work, assemble them again.



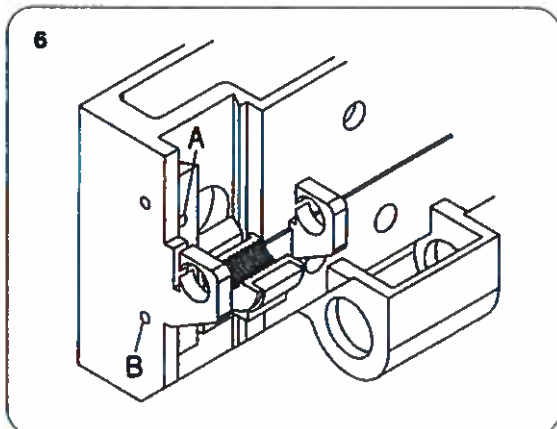
5.ADJUSTMENT OF AXIAL DISPLACEMENT OF LEAD SCREW

As you discover the leadscrew is in loose status, you should first loose the external end nut (A) which are located on the sleeve of lead screw, then tighten the internal nuts (B) to proper fit. The correction work will be completed by refastening external end nuts.



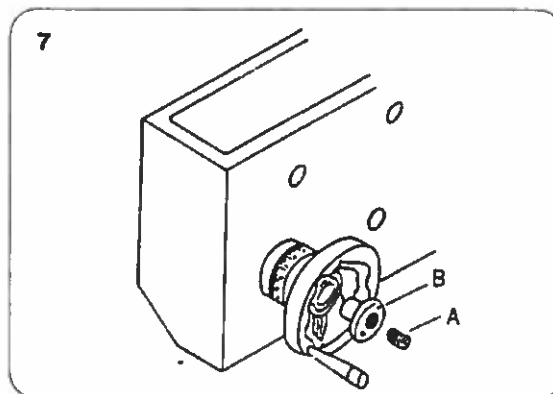
6.ADJUSTMENT OF HALF-NUT

When half-nut has been worn out for long service and caused loose, dismantle the apron body from carriage, loose the screw (A) and adjust the gib to proper position, then tighten the half-nut set screw. (B)



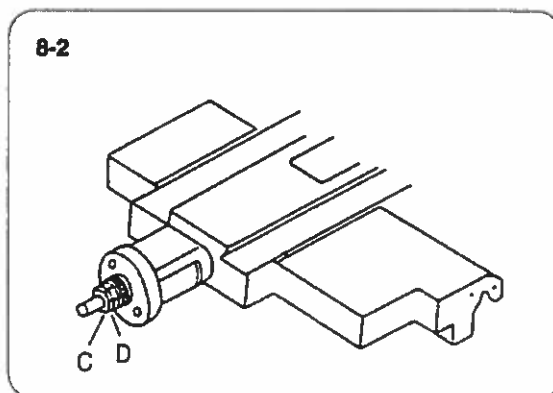
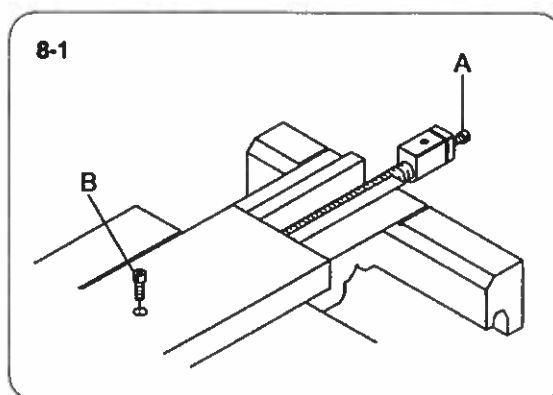
7.ADJUSTMENT OF THE CLEARANCE OF HAND WHEEL ON THE APRON

Loose the screw (A) first and adjust hand wheel set bushing (B) to proper position, then re-tighten the set screw.



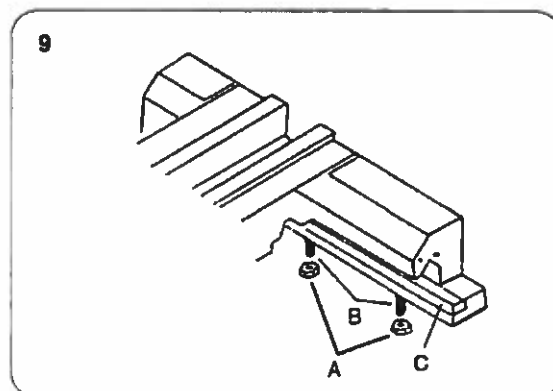
8.ADJUSTMENT OF THE BACKLASH OF CROSS SLIDE SCREW

- (1) Loosen off the cross slide nut fixing screw (B), free turning the cross slide handwheel clockwise to move out the nut as shown on (8-1), then adjustable screw (A) on the cross feed nut will be adjusted and fastened again.
- (2) Loosen the external thrust nut © which is located at the end of cross feed screw as shown on (8-2) thrust nut (D) to proper position. The adjustment work will be completed by re-tighten the external thrust nut.



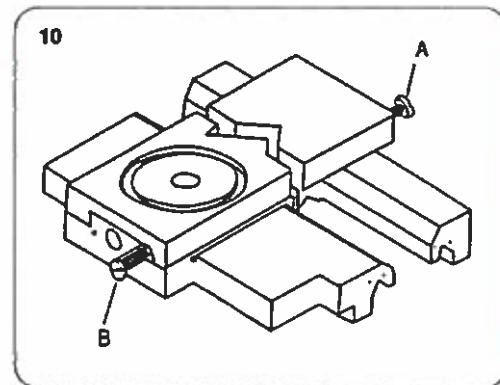
9.ADJUSTMENT OF CARRIAGE BACK CLAMP

In order to keep leveling accurate, the excess clearance between carriage and bedways must be closely adjusted. First, loose the fixing nut (A) and fasten the adjusting bolt (B). Secondly, move the plane bolts (B) and fasten the fixing nut (A) again.



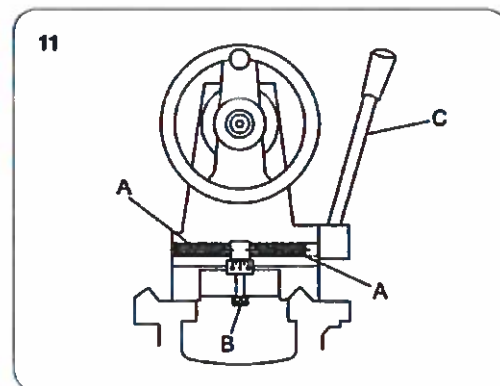
10.ADJUSTMENT OF CROSS SLIDE (COMPOUND SLIDE ALSO)

In order to eliminate the excess clearance caused by the friction of relative motion between carriage and cross slide, or gib adjusting screw in loose status. First loose the adjusting screw (b) at the front. When gib has been adjusted to proper position, complete the adjustment work by re-tightening both adjusting screws.



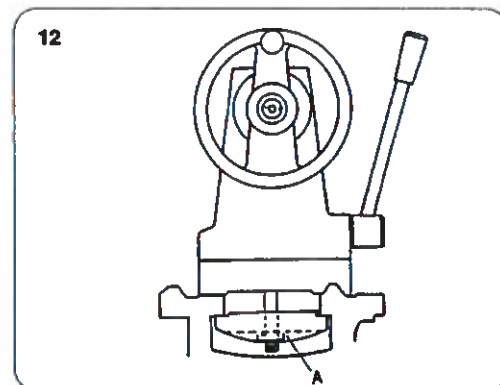
11.CENTERLINE ALIGNMENT OF TAILSTOCK AND MAIN SPINDLE

The centerline alignment of tailstock and main spindle should be adjusted by two opposite adjusting screws (A) to move the tailstock to the centerline position. Beware to loose two set screws (B) and clamp lever (C) between base and body before adjustment. Complete the adjustment by re-tighten two set screws (B).



12.ADJUSTMENT OF THE CLAMP HANDLE LEVER OF THE TAILSTOCK

If the tailstock clamp is fixed to the bed unstable, you should readjust the adjusting nut (A) to proper fit.



13.COOLANT LEVEL

Make a regular check of the coolant tank level (this can be seen clearly from the rear of the machine). Replenish coolant as necessary.

e.g. BOTION S-525V, B-3EP
or the equivalent.

WARNING: Prohibiting using of flammable working fluids or flammable workpiece.



PREVENTIVE MAINTENANCE

DAILY INSPECTION

In principle, the daily inspection of lathe is carried out on basis of each shift. The inspection work should be done as the following:

1. Check before starting the motor.

- (A) Clean up of machine: Dust, chip and any other articles should be removed from sliding ways of machine. To make sure the rotating and sliding parts performing easy and smoothly operation. All the other static parts have to clean often to avoid the corrosion.
- (B) Greasing and oiling: Regular oiling should be done every day to keep the machine properly lubricated
- (C) Check running parts: The main spindle, leadscrew, feed rod and cross slide etc., would be examined and adjusted to proper fitness without too tight or loose.
- (D) Check the sensitivity and reliability of all manual controls: to try the function of spindle speed changing levers, feeds select levers, feeds and threads engaging levers and rotation control lever all with sensitive and reliable action.
- (E) Check the fixture and fig: To examine the headstock, tailstock, tool holder etc., all the mounting fixtures and figs with correct lock and clamp.

2. Check after starting the motor.

- (A) To check electrical control system: To examine all the buttons, pilot lamp, switches and rotation control lever operate sensitively and strictly.
- (B) To check mechanical control devices: To examine the spindle speed change, feeds and threads change, automatic stop and foot braking should be sensitive, security and reliable.
- (C) To check noise and vibration: To start the lathe with maximum spindle speed at no load basics, check the noise and vibration should be lower than the lever.
- (D) Lubrication check: To examine all the lubricating reservoirs with enough oil on the lever mark of oil sight. To oiling all the oilers on sideways and end gear train, leadscrew and feed rod.
- (E) Coolant system check: To examine the quantity of coolant oil in tank and switch on the pump for inspecting its function and leakage.

3. Caution on operation

- (A) Temperature of bearing: After half hour running, to examine the main spindle bearing temperature by hand feeling with normal warm up.
- (B) Abnormal noise and vibration: To stop the lathe immediately for inspection and adjustment.
- (C) Miss accuracy of products: When the product is out of limit accuracy, to stop the lathe at once for finding the causes of defects.

- (D) Safety affairs: ISOLATE MACHINE WHEN LEAVING IT UNATTENDED. STOP RUNNING FOR CHANGING SPINDLE SPEEDS. NOT ALLOWED TO LEFT ANY TOOLS AND PRODUCTS ON LATHE.

4. Check after operation

- (A) Release all engaging device: To switch off the isolate and emergency switches and placed the spindle speed lever, feeds lever, half- nut lever, rotation control lever etc., in neutral position.
- (B) Tool collection: All the tools should be returned to original position such as tool box and tool cabinet.
- (C) Proper location: The tailstock, carriage, saddle, cross and top slide should be placed on proper location.
- (D) Clean up machine: To remove the chips and coolants completely from the machine and oiling the slide ways and bright surface to prevent any corrosion.

WEEKLY INSPECTION

1. Lubricating system.

- (A) Check oil reservoirs and replenish with fresh oil to the level.
- (B) Clean up the end gear train, leadscrew and feed rod then lubricate with fresh oil.

2. Coolant system

Clean up the whole system including the chip tray, filter, hopper, chutes and tank, removal chips and dirt. Replenish with new coolants.

3. Transmission system

- (A) Check the v-belts and adjust its tension from motor plate.
- (B) Check the end gear train with proper engagement and adjustment.

MONTHLY INSPECTION

- 1. Clean up exactly: Removal all the dust, chips and any other matters from lathe.
- 2. Check electrical system: To examine all the connection wires, cables, switches and terminals which may damaged by chips occasionally or loosen on vibration.
- 3. Check the vibration and leveling: To examine the abnormal vibration, which may cause on lost leveling, adjusted and tighten leveling screws.

SEMI-YEARLY INSPECTION

1. Exchange oil in headstock, feed gearbox and apron: To drain and cleanup the mentioned oil reservoirs and replenish with fresh recommend lubricating oil. (Recommend an oil change within 3 months for new machine)
2. Check the oil leakage: The oil reservoirs gaskets (packing) may damaged and leaking, replace it.
3. Check and adjust the backlash: To examine the backlash on cross slide, and the clearance on leadscrew and other handwheels. To adjust and tighten the relative screws or nuts according to the instructions listed in the previous chapters.
4. Check the leveling : To examine the leveling by adjusting and tighten the leveling screws.
5. Check the accuracy: To examine and adjust (if necessary) the alignment, clearance etc., as the accuracy test record accordingly.
6. Check the gears and bearings : The abnormal noise may cause on worn gears and bearings, if necessary replace it.

YEARLY INSPECTION

More carefully to do the semi-yearly inspections as the above mentioned.

1. Repaint: After one-year operation, recommend repainting the machine with the same color.
2. Check the exposed parts: Which may damaged, corroded or deformed, to repair or replace it , if necessary.

TROUBLE SHOOTING

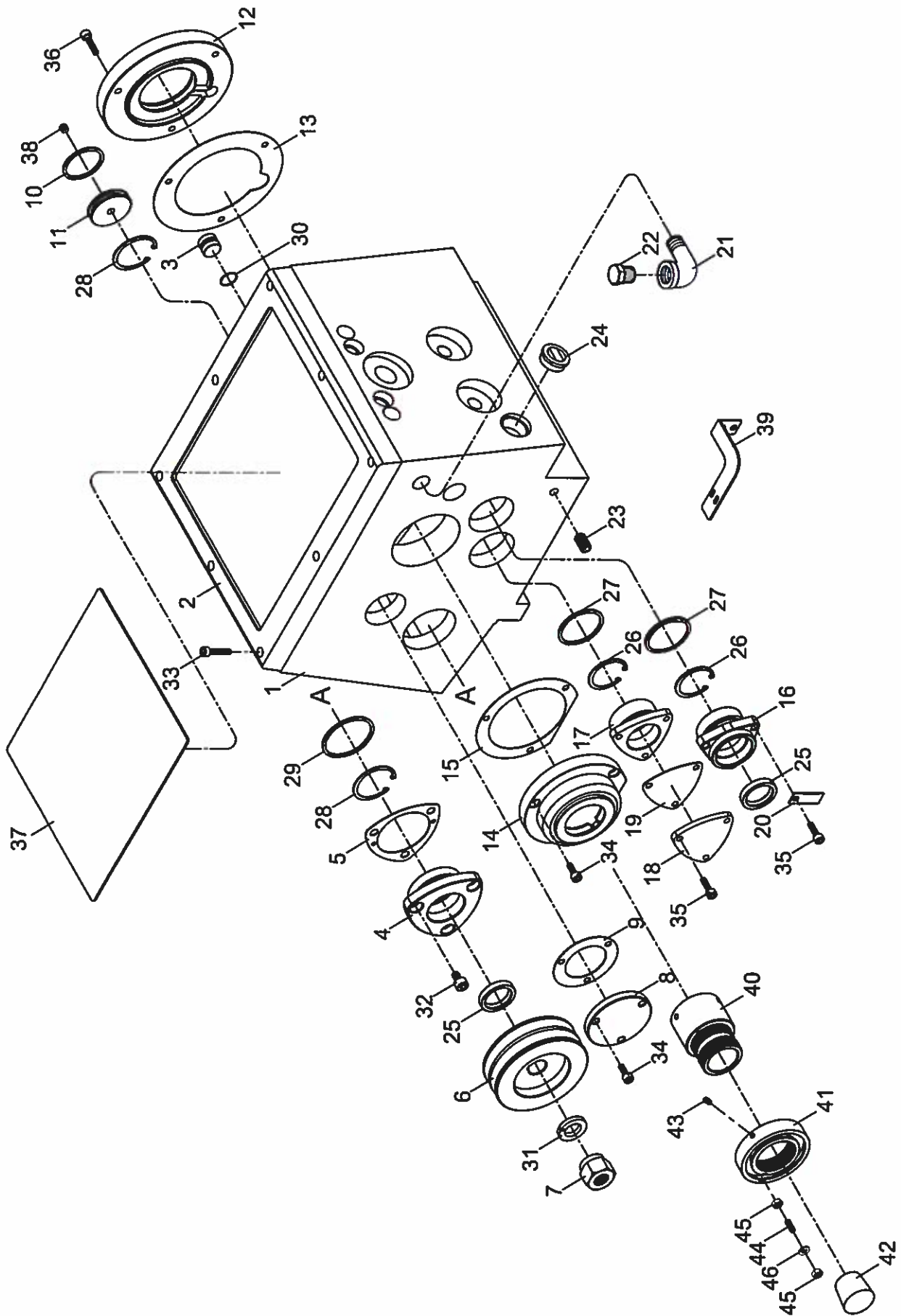
| TROUBLE | PROBABLE CAUSES | REMEDY |
|--------------------------------------|--|---|
| Overheat of headstock bearings | <ol style="list-style-type: none"> 1 .Oil level In headstock Is too low or too much. 2.Quality and viscosity of oil is wrong. 3.Oil is too dirty. 4.Oil hole in bearing is obstructed by dirt. 5. Bearing obstructed by dirty. 6.Badly worn bearing. 7. Bearing is not in proper position. 8. Bent or sprung main spindle. 9.Too much end thrust. | <p>Replenish or discharge the oil to the proper level.</p> <p>Replace the oil with recommended type.</p> <p>Replace the oil..</p> <p>Remove the dirt from the oil hole</p> <p>Clean the bearing and renew oil.</p> <p>Replace bearing.</p> <p>Dismantle and reassemble it.</p> <p>Straighten or replace it.</p> <p>Adjust thrust nut.</p> |
| Oil leakage | <ol style="list-style-type: none"> 1.Plug of drain not tight. 2.Case cracking. 3.Leakage from overflow. 4.Packing or gasket damaged. 5.Leakage from overflow on spindle bearing housing. | <p>Resealing and tighten.</p> <p>Repaired by special welding.</p> <p>Tighten cover screws.</p> <p>Replace packing or gasket.</p> <p>Less oil flow to bearing or enlarge oil return flow.</p> |
| Excess noise or vibration of machine | <ol style="list-style-type: none"> 1. Badly worn bearing. 2. Lost levelling. 3. Badly worn V belts. 4. Loose belt tension. 5. Badly worn gear. 6. Bent or sprung shaft. 7. Pulley loosened 8. Clamp of workpiece in loose status. 9. Bearing thrust too loose. 10. Headstock not tighten on bed. 11. Excess clearance between the carriage and bed. 12. Excess clearance in cross or compound slide. 13. Cutting tool failure. 14. Tool holder not tight enough. 15. Weak tool shank or too long. 16. Unbalance of workpiece while high speed running. | <p>Replace bearing.</p> <p>Recheck levelling & tighten.</p> <p>Replace V belts.</p> <p>Adjust belt tension.</p> <p>Replace gear.</p> <p>Straighten or replace shaft.</p> <p>Tighten pulley set screw.</p> <p>Tighten clamp.</p> <p>Tighten end thrust nut.</p> <p>Tighten fixed screws.</p> <p>Adjust the gib and tighten back clamp.</p> <p>Adjust taper gib.</p> <p>Replace correct cutting tool or regrind it</p> <p>Tighten again check for debris..</p> <p>Replace with rigid tool or reset.</p> <p>Balance workpiece or reduce spindle speed.</p> |

| TROUBLE | PROBABLE CAUSES | REMEDY |
|---|--|--|
| Bending on long workpiece cutting. | 1. Feed value too large.
2. Workpiece too thin or too long. | Reduce feed value.
Use follow rest to support and adjust tool position. |
| Failure on products accuracy. | Accuracy fails on machine.
(Ref. to inspection record) | Recheck the accuracy of machine and adjust. |
| Uneasy to hold change levers. | Set spring broken or too weak. | Adjust set screw or replace the spring. |
| Misalignment of chuck with spindle nose. | Incorrect position of cam. | Adjust the cam and lock it in proper position. |
| Uneasy to cut thread. | 1. Excess clearance of leadscrew in axial direction.
2. Excess clearance on carriage or cross-slide.
3. Worn thread or nut in cross-slide.
4. Worn leadscrew or halfnut.
5. Worn end gear or incorrect engagement
6. Bent leadscrew.
7. Incorrect threading tool and wrong positioning.
8. Incorrect engage the halfnut.
9. Threading dial indicator not properly engaging with leadscrew.
10. Too much infeed per cut or too fast spindle speed. | Adjust the thrust nut at the end of leadscrew.
Adjust the gib.
Adjust the backlash or replace it.
Replace it.
Replace or adjust the end gear.
Straighten it.
Replace threading tool and reset it.
Engage the halfnut exactly.
Adjust the indicator engagement on leadscrew.
Reduce the infeed per cut or spindle speed. |
| Tailstock clamp not stable. | The eccentric clamping height too long or too short. | Adjust the nut on clamp bolt. |
| Failure on foot brake. | 1. Badly worn brake shoes.
2. Fails on controlled limit switch. | Replace brake shoes.
Adjust the limit switch position or replace it. |
| Failure on power feeding. | 1. The half-nut lever not disengage at all.
2. Feeds change lever incorrect positioning.
3. The safety latch and interlock pin failure. | Disengage half-nut lever exactly.
Push-in or pull-out the lever exactly.
Replace the safety latch or interlock pin. |
| Fail lubricant on slide way. | Oilers obstructed by dirty or damaged | Replace the oilers. |

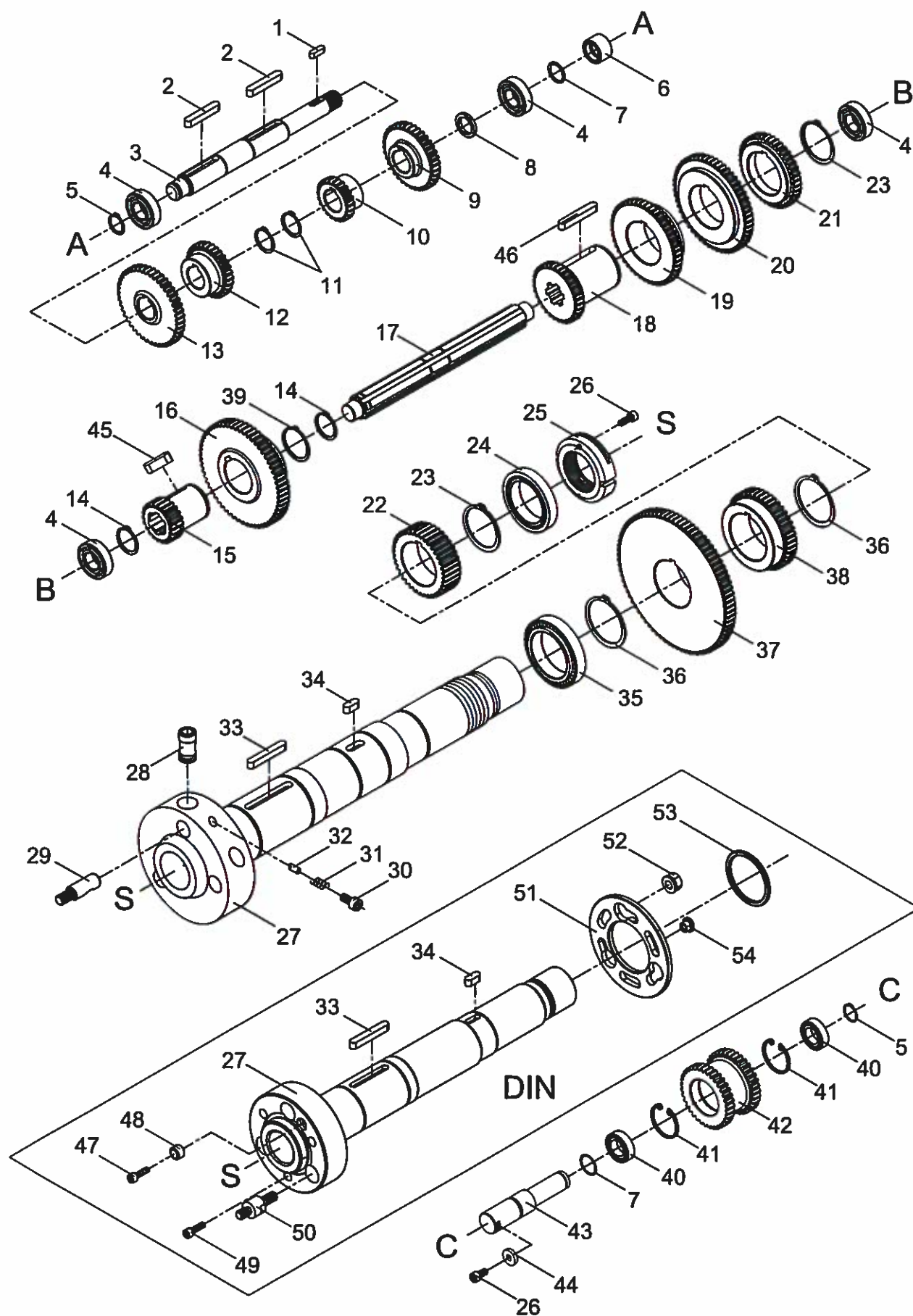
| TROUBLE | PROBABLE CAUSES | REMEDY |
|----------------------------|--|---|
| Fails to start. | 1. Circuit not complete.
2. Power may be off.
3. Overload relay off. | Check switch, leads, fuse etc, replace or reconnect properly.
Check cable connection.
Reset overload relay. |
| Incorrect Spindle speed. | 1. Voltage below what is rated.
2. Connecting cable too small.
3. Improper or loose connection of lead.
4. Failure on spindle select knob.
5. Overload. | Check power source voltage. Reset input voltage of parameter according to power supply. (VS-model)
Enlarge connecting cable.
Recheck all leads connecting.
Replace it.
Reduce cutting speed and depth or feed rate. |
| Wrong rotation. | Wrong sequence of phases. | Reverse any two leads connecting for motor. |
| Motor noisy and vibration. | 1. Motor loosely mounted.
2. Strained mounting frame.
3. Bent or sprung motor shaft.
4. Foundation inadequate or motor feet uneven. | Tighten mounting bolts.
Shim to motor feet for equal mounted.
Straighten or replace it.
Stiffen mounting place or add shims under foot pad. |
| Overheat in motor. | 1. Excess belt tension.
2. Cooling fan failure.
3. Badly worn on bearing.
4. Short grease in bearing.
5. Overload.
6. Incorrect speed range running continuous. | Adjust belt tension.
Check the fan in proper work.
Replace bearing.
Replenish grease.
Reduce cutting speed or feed rate.
Change speed range and adjust speed select knob. |
| Coolant pump failure. | 1. Wrong rotation.
2. Coolant not enough or return filter obstructed.
3. Overload relay off. | Reverse any two leads to pump.
Replenish coolant or clean return filter in chip tray.
Reset overload relay |
| Inverter alarm. (VS-model) | 1. Operation error.
2. Wrong set of parameter.
3. Circuit not complete
4. Footbrake switch keep in touch.
5. Inverter problems | Switch off for 20 seconds and switch on again as reset.
Referring to instruction manual of Inverter or contact with manufacturer.
Check the power source and reconnect properly.
Re-positioning the switch and tighten it.
Return the inverter to manufacturer for repair or replace. |

PRINCE SERIES

SPARE PARTS LIST

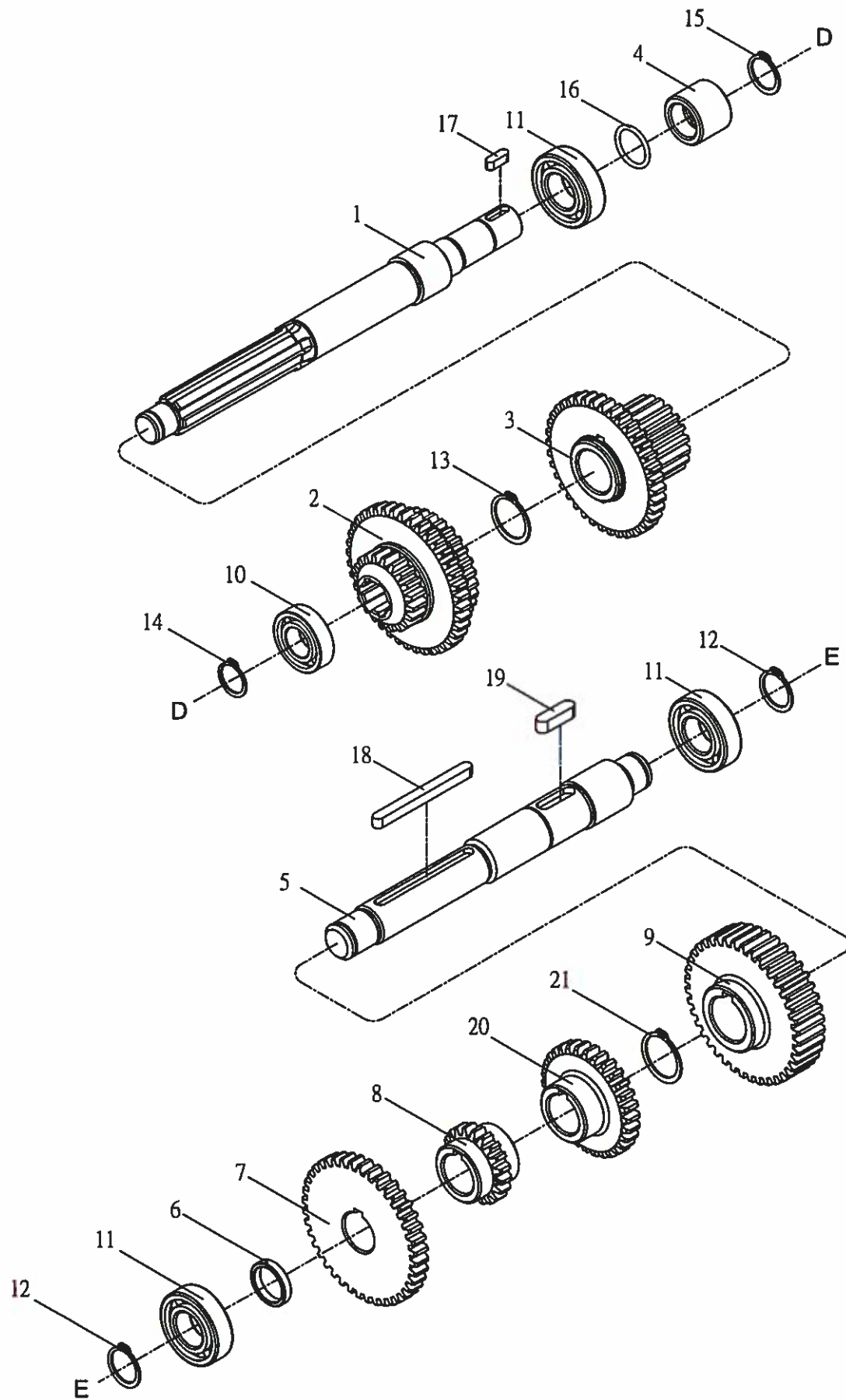


| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> | <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|-----------------------------------|-----------------|------------|-----------------|--|-----------------|
| 1. | R-1201 | Headstock Case | 1 | 36. | A-1205 | Socket Head Cap Screw (M6 x 25) | 3 |
| | R-1201-1 | Headstock Case (VS Optional) | 1 | 37. | R-1002-1 | Sponge Cover | 1 |
| 2. | R-1002 | Cover | 1 | 38. | A-1106 | Socket Headless Set Screw (M8 x 8) | 1 |
| 3. | R-1003 | Plug | 2 | 39. | R-1156 | Frame (VS) | 1 |
| 4. | R-1005 | Flange Bearing | 1 | 40. | R-9076-2 | Sleeve (VS) | 1 |
| 5. | R-1005-1 | Gasket | 1 | | | | |
| | | | | 41. | R-1077 | Balance Block (VS) | 1 |
| 6. | R-1006-3 | Pulley 2000rpm 60 CS | 1 | 42. | R-1079 | Plug | 1 |
| | R-1006-4 | Pulley 2200rpm 50 CS | 1 | 43. | A-1101 | Socket Headless Set Screw (M6x10) | 6 |
| 7. | R-1007 | Locking Nut | 1 | 44. | A-1103 | Socket Headless Set Screw (M6 x 1~3
16) | |
| 8. | R-1014 | Cover | 1 | 45. | A-1700 | Nut (M6) | 2~6 |
| 9. | R-1014-1 | Gasket | 1 | | | | |
| 10. | A-6025 | O-Ring (P41) | 1 | 46. | A-1812 | Spring Washer (ψ6) | 2~6 |
| | | | | | | | |
| 11. | T-1022 | Plug | 1 | | | | |
| 12. | R-1022 | Front Bearing Cover | 1 | | | | |
| 13. | R-1022-1 | Gasket | 1 | | | | |
| 14. | R-1023 | Rear Bearing Cover | 1 | | | | |
| 15. | R-1023-1 | Gasket | 1 | | | | |
| | | | | | | | |
| 16. | R-1033 | Flange Bearing | 1 | | | | |
| 17. | R-1039 | Flange Bearing | 1 | | | | |
| 18. | T-1039 | Cover | 1 | | | | |
| 19. | T-1039-1 | Gasket | 1 | | | | |
| 20. | R-1076 | Plate | 1 | | | | |
| | | | | | | | |
| 21. | A-0489 | Elbow (1/2PT) | 1 | | | | |
| 22. | A-0488 | Plug (1/2PT) | 1 | | | | |
| 23. | A-1121 | Socket Headless Set Screw (3/8PT) | 1 | | | | |
| 24. | A-9501 | Oil Sight | 1 | | | | |
| 25. | A-5007 | Oil Seal (TC28 x 42 x 10) | 2 | | | | |
| | | | | | | | |
| 26. | A-3203 | Circlip (R42) | 2 | | | | |
| 27. | A-6019 | O-Ring (P46) | 2 | | | | |
| 28. | A-3024 | Circlip (R47) | 2 | | | | |
| 29. | A-6021 | Oil Ring (G55) | 1 | | | | |
| 30. | A-6030 | Oil Ring (P16) | 2 | | | | |
| | | | | | | | |
| 31. | A-1811 | Spring Washer | 1 | | | | |
| 32. | A-1211 | Socket Head Cap Screw (M8 x 12) | 3 | | | | |
| 33. | A-1206 | Socket Head Cap Screw (M6 x 30) | 8 | | | | |
| 34. | A-1203 | Socket Head Cap Screw (M6 x 16) | 6 | | | | |
| 35. | A-1204 | Socket Head Cap Screw (M6 x 20) | 6 | | | | |



| NO | PART NO | DESCRIPTION | QUANTITY | NO | PART NO | DESCRIPTION | QUANTITY |
|----|----------|----------------------------------|----------|----|---------|--------------------------------|----------|
| 1 | A-7214 | Key (6 x 6 x 20) | 1 | 36 | A-3318 | Circlip (S55) | 2 |
| 2 | A-7247 | Key (8 x 8 x 50) | 2 | 37 | R-1025 | Gear (82T) | 1 |
| 3 | R-1004 | Shaft (A) | 1 | 38 | R-1026 | Gear (44T) | 1 |
| 4 | A-2034 | Bearing (#6204) | 4 | 39 | A-3328 | Circlip (S40) | 1 |
| 5 | A-3306 | Circlip (S20) | 2 | 40 | A-2026 | Bearing (#6004) | 2 |
| 6 | R-1008 | Bush | 1 | 41 | A-3203 | Circlip (R42) | 2 |
| 7 | A-6008 | O-Ring (P20) | 2 | 42 | R-1031 | Gear (35T x 35T) | 1 |
| 8 | C-2045 | Washer | 1 | 43 | R-1029 | Shaft (C) | 1 |
| 9 | R-1010A | Gear (37T) | 1 | 44 | R-1030 | Washer | 1 |
| 10 | R-1010B | Gear (23T) | 1 | 45 | A-7227 | Key (10x8x35) | 1 |
| 11 | A-3309 | Circlip (S25) | 2 | 46 | A-7247 | Key (8x8x50) | 1 |
| 12 | R-1012B | Gear (30T) | 1 | | | DIN (Optional) | |
| 13 | R-1012A | Gear (45T) | 1 | 47 | A-1203 | Socket Head Cap Screw (M6x16L) | 1 |
| 14 | A-3310 | Circlip (S28) | 2 | 48 | R-1048 | Pad | 1 |
| 15 | R-1017A | Gear (22T) | 1 | 49 | A-1204 | Socket Head Cap Screw (M6x20L) | 3 |
| | | | | 50 | R-1049 | Pivot | 3 |
| 16 | R-1017B | Gear (60T) | 1 | | | | |
| 17 | R-1013 | Shaft (B) | 1 | 51 | R-1046 | Retainer | 1 |
| 18 | R-1016D | Gear (33T) | 1 | 52 | R-1050 | Nut | 3 |
| 19 | R-1016C | Gear (48T) | 1 | 53 | R-1028 | Spacer | 1 |
| 20 | R-1016B | Gear (55T) | 1 | 54 | R-1047 | Stud | 3 |
| 21 | R-1016A | Gear (41T) | 1 | | | | |
| 22 | R-1027 | Gear (38T) | 1 | | | | |
| 23 | A-3317 | Circlip (S50) | 2 | | | | |
| 24 | A-2011 | Bearing (#30210) | 1 | | | | |
| 25 | R-1021 | Locking Nut | 1 | | | | |
| 26 | A-1202 | Socket Head Cap Screw (M6 x 12L) | 3 | | | | |
| 27 | R-1018 | Main spindle (S) | 1 | | | | |
| | R-1018-3 | DIN Main spindle (S) | 1 | | | | |
| 28 | F-1215NC | Camlock | 3 | | | | |
| 29 | R-9001 | Camlock Stud | 3 | | | | |
| 30 | A-1212 | Socket Head Cap Screw (M8 x 16L) | 3 | | | | |
| 31 | A-8206 | Spring | 3 | | | | |
| 32 | R-1020 | Camlock Set Pin | 3 | | | | |
| 33 | A-7222 | Key (8 x 8 x 55) | 1 | | | | |
| 34 | A-7221 | Key (8 x 8 x 20) | 1 | | | | |
| 35 | A-2013 | Bearing (#32211) | 1 | | | | |

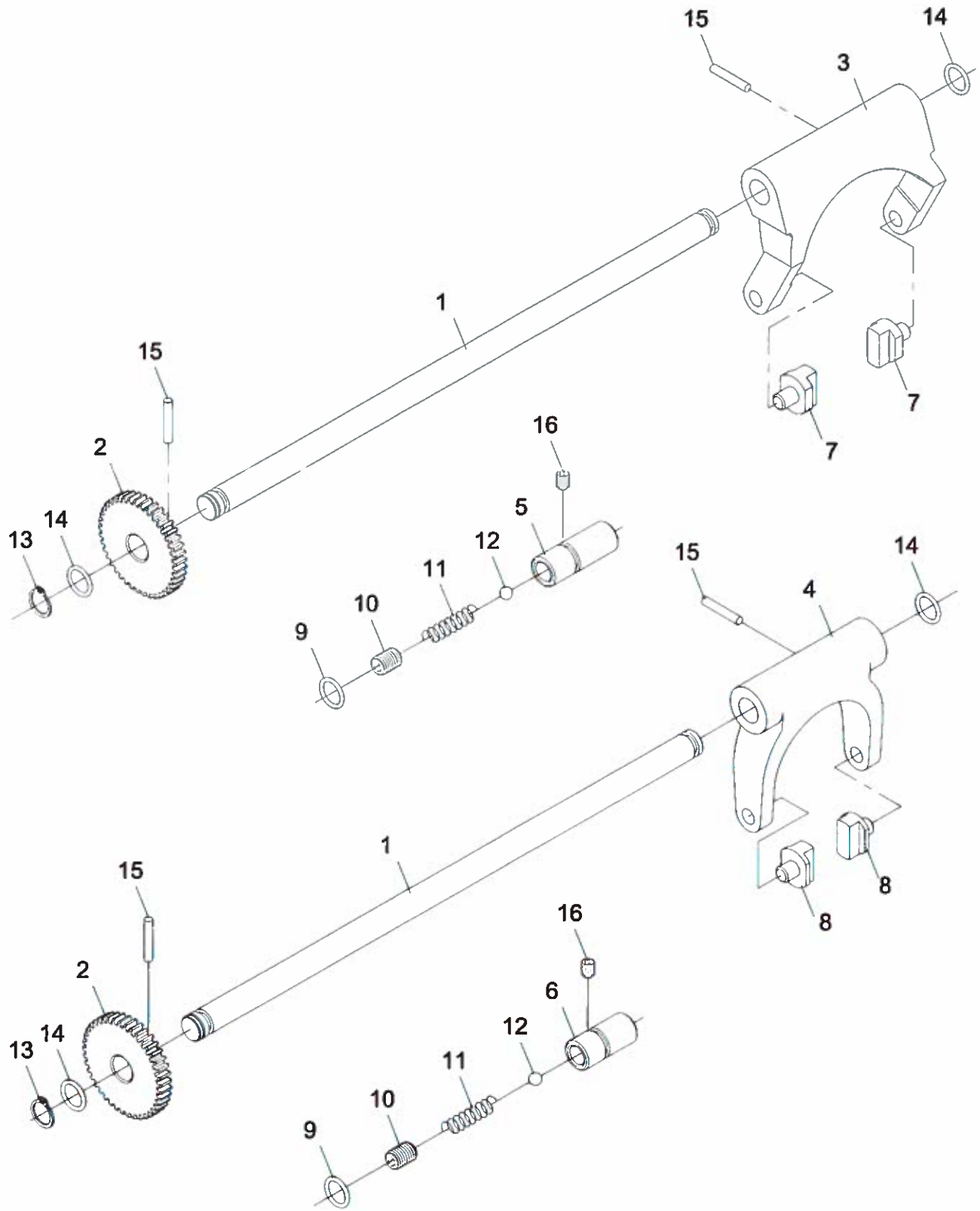
HEADSTOCK SHAFTS & GEARS



HEADSTOCK SHAFTS & GEARS

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---------------------------------|----------|
| 1. | R-1032 | D-Shaft | 1 |
| 2. | R-1034 | Compound Gear (20T x 40T x 30T) | 1 |
| 3. | R-1035 | Compound Gear (20T x 38T) | 1 |
| 4. | R-1036 | Bush | 1 |
| 5. | R-1038 | E-Shaft | 1 |
| 6. | R-1041 | Washer | 1 |
| 7. | R-1042 | Gear (40T) | 1 |
| 8. | R-1043B | Gear (20T) | 1 |
| 9. | R-1045 | Gear (40T) | 1 |
| 10. | A-2033 | Bearing (#6203) | 1 |
| 11. | A-2026 | Bearing (#6004) | 3 |
| 12. | A-3306 | Circlip (S20) | 2 |
| 13. | A-3308 | Circlip (S24) | 1 |
| 14. | A-3303 | Circlip (S17) | 1 |
| 15. | A-3305 | Circlip (S19) | 1 |
| 16. | A-6008 | O-Ring (P20) | 1 |
| 17. | A-7205 | Key (5 x 5 x 15) | 1 |
| 18. | A-7219 | Key (6 x 6 x 70) | 1 |
| 19. | A-7248 | Key (7 x 7 x 25) | 1 |
| 20. | R-1043A | Gear (30T) | 1 |
| 21. | A-3309 | Circlip (S25) | 1 |

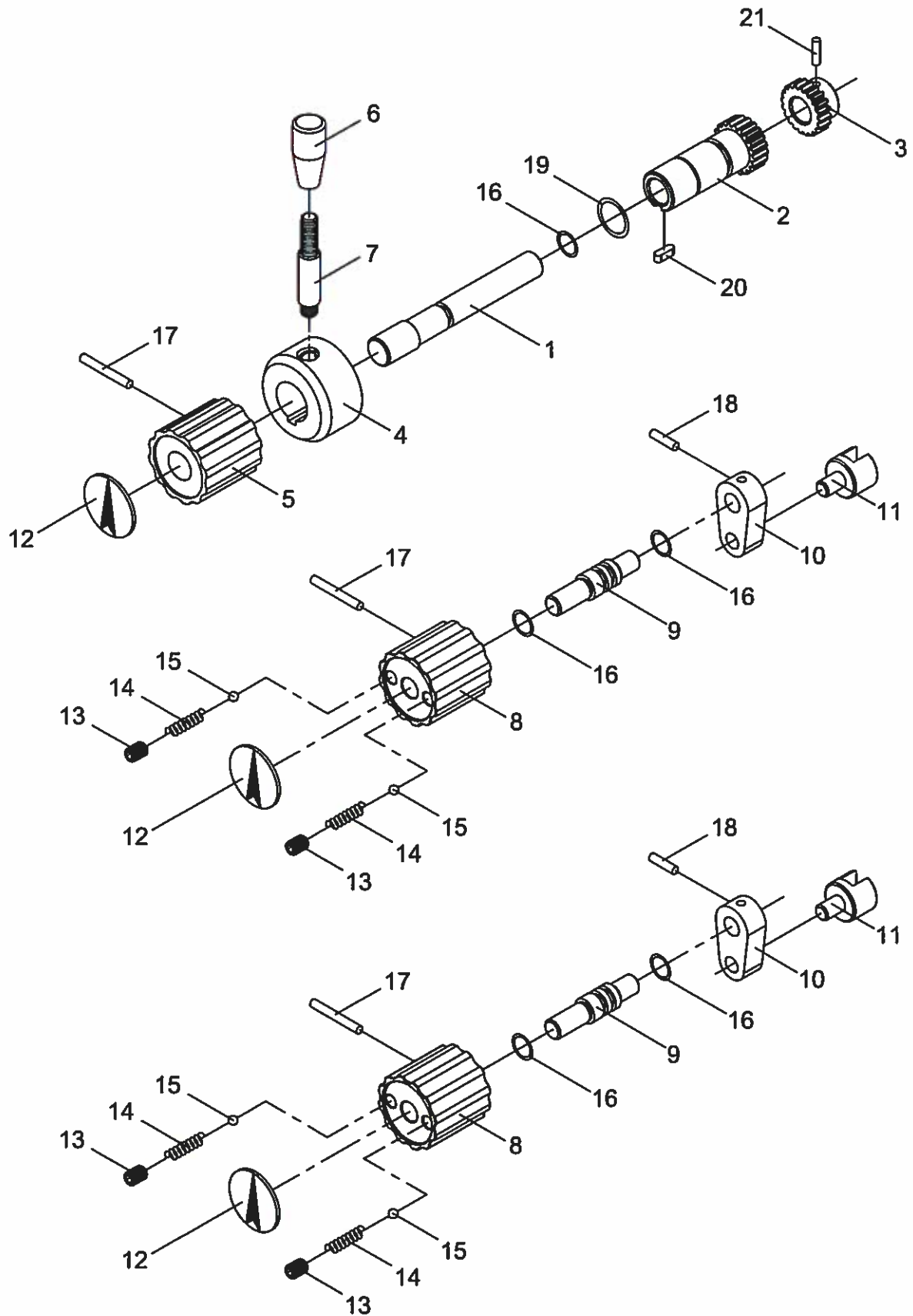
HEADSTOCK CONTROLS



HEADSTOCK CONTROLS

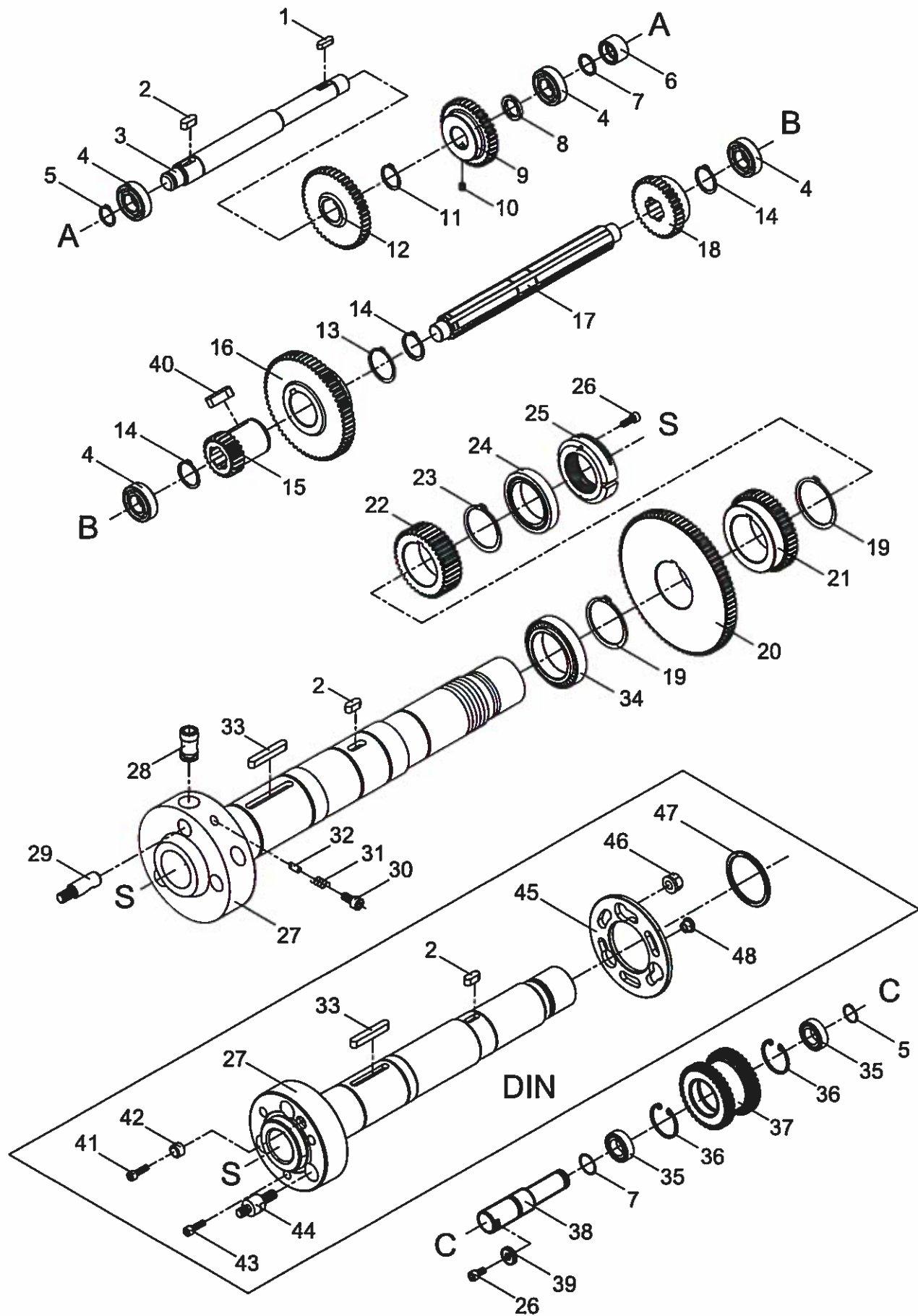
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--------------------------------------|----------|
| 1. | R-1059 | Rod | 2 |
| 2. | R-1058 | Gear (41T) | 2 |
| 3. | R-1062 | Lever | 1 |
| 4. | R-1063 | Lever | 1 |
| 5. | R-1061 | Bush | 1 |
| 6. | R-1060 | Bush | 1 |
| 7. | R-1064 | Fork | 2 |
| 8. | R-1065 | Fork | 2 |
| 9. | A-6006 | O-Ring (P15) | 2 |
| 10. | A-1112 | Socket Headless Set Screw (M12 x 12) | 2 |
| 11. | A-8202 | Spring | 2 |
| 12. | A-9205 | Ball (3/8") | 2 |
| 13. | A-3301 | Criclip (S15) | 2 |
| 14. | A-6029 | Oil Ring (AN62279) | 4 |
| 15. | A-4007 | Pin (5 x 30L) | 4 |
| 16. | A-1108 | Socket Headless Set Screw (M8 x 8) | 2 |

HEADSTOCK CONTROLS



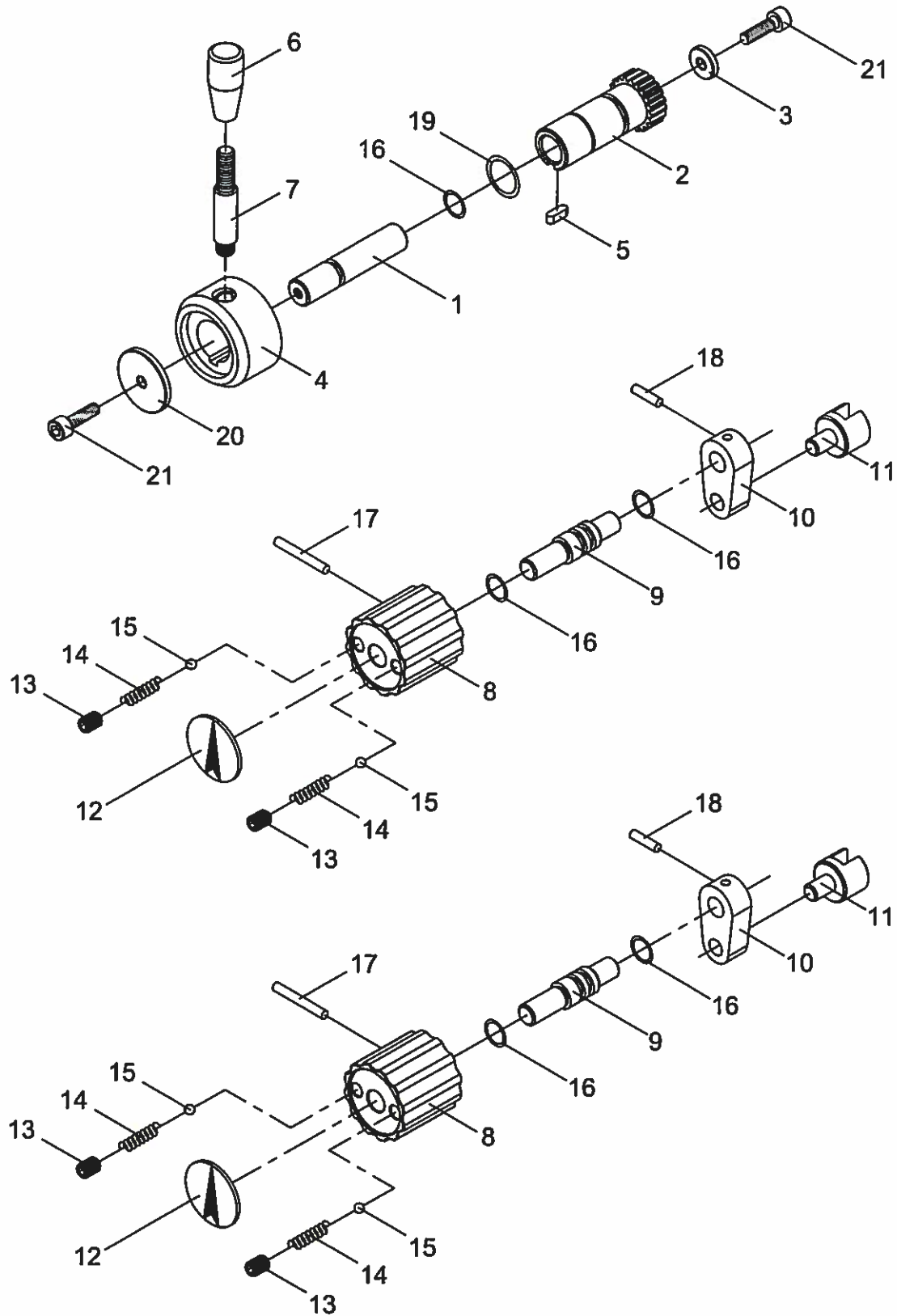
HEADSTOCK CONTROLS

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------------|----------|
| 1. | R-1053 | Rod | 1 |
| 2. | R-1056 | Pinion (20T) | 1 |
| 3. | R-1057 | Gear (20T) | 1 |
| 4. | R-1154 | Boss | 1 |
| 5. | R-1151 | Knob | 1 |
| 6. | A-9101 | Handle | 1 |
| 7. | C-1087-3 | Lever | 1 |
| 8. | R-2136 | Knob | 2 |
| 9. | R-1070 | Rod | 2 |
| 10. | R-1072 | Lever | 2 |
| 11. | R-1073 | Fork | 2 |
| 12. | NR-26 | Arrow Plate | 3 |
| 13. | A-1106 | Socket Headless Set Screw (M8 x 8) | 4 |
| 14. | A-8207 | Spring | 4 |
| 15. | A-9202 | Ball (1/4") | 4 |
| 16. | A-6004 | O-Ring (P12) | 5 |
| 17. | A-4009 | Pin (Φ5 x 40L) | 3 |
| 18. | A-4007 | Pin (Φ5 x 30L) | 2 |
| 19. | A-6009 | O-Ring (P21) | 1 |
| 20. | A-7213 | Key (6 x 6 x 15) | 1 |
| 21. | A-4020 | Pin (Φ5 x 25L) | 1 |



| <u>NO</u> | <u>PART NO</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> | <u>NO</u> | <u>PART NO</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|-----------|----------------|------------------------------------|-----------------|-----------|----------------|--------------------------------|-----------------|
| 1 | A-7214 | Key (6 x 6 x 20) | 1 | 36 | A-3203 | Circlip (R42) | 2 |
| 2 | A-7221 | Key (8 x 8 x 20) | 2 | 37 | R-1031 | Gear (35T x 35T) | 1 |
| 3 | R-1004-1 | Shaft (A) | 1 | 38 | R-1029 | Shaft (C) | 1 |
| 4 | A-2034 | Bearing (#6204) | 4 | 39 | R-1030 | Washer | 1 |
| 5 | A-3306 | Circlip (S20) | 2 | 40 | A-7227 | Key (10x8x35) | 1 |
| | | | | | | DIN (Optional) | |
| 6 | R-1008 | Bush | 1 | 41 | A-1203 | Socket Head Cap Screw (M6x16L) | 1 |
| 7 | A-6008 | O-Ring (P20) | 2 | 42 | R-1048 | Pad | 1 |
| 8 | C-2045 | Washer | 1 | 43 | A-1204 | Socket Head Cap Screw (M6x20L) | 3 |
| 9 | R-1010-1 | Gear (37T) | 1 | 44 | R-1049 | Pivot | 3 |
| 10 | A-1106 | Socket Headless Set Screw (M8 x 8) | 1 | 45 | R-1046 | Retainer | 1 |
| 11 | A-3309 | Circlip (S25) | 1 | 46 | R-1050 | Nut | 3 |
| 12 | R-1012A | Gear (45T) | 1 | 47 | R-1028 | Spacer | 1 |
| 13 | A-3328 | Circlip (S40) | 1 | 48 | R-1047 | Stud | 3 |
| 14 | A-3310 | Circlip (S28) | 3 | | | | |
| 15 | R-1017A | Gear (22T) | 1 | | | | |
| 16 | R-1017B | Gear (60T) | 1 | | | | |
| 17 | R-1013 | Shaft (B) | 1 | | | | |
| 18 | R-1016E | Gear (33T) | 1 | | | | |
| 19 | A-3318 | Circlip (S55) | 2 | | | | |
| 20 | R-1025 | Gear (82T) | 1 | | | | |
| 21 | R-1026 | Gear (44T) | 1 | | | | |
| 22 | R-1027 | Gear (38T) | 1 | | | | |
| 23 | A-3317 | Circlip (S50) | 1 | | | | |
| 24 | A-2011 | Bearing (#30210) | 1 | | | | |
| 25 | R-1021 | Locking Nut | 1 | | | | |
| 26 | A-1202 | Socket Head Cap Screw (M6 x 12L) | 3 | | | | |
| 27 | R-1018 | Main spindle (S) | 1 | | | | |
| | R-1018-3 | DIN Main spindle (S) | 1 | | | | |
| 28 | F-1215NC | Camlock | 3 | | | | |
| 29 | R-9001 | Camlock Stud | 3 | | | | |
| 30 | A-1212 | Socket Head Cap Screw (M8 x 16L) | 3 | | | | |
| 31 | A-8206 | Spring | 3 | | | | |
| 32 | R-1020 | Camlock Set Pin | 3 | | | | |
| 33 | A-7222 | Key (8 x 8 x 55) | 1 | | | | |
| 34 | A-2013 | Bearing (#32211) | 1 | | | | |
| 35 | A-2026 | Bearing (#6004) | 2 | | | | |

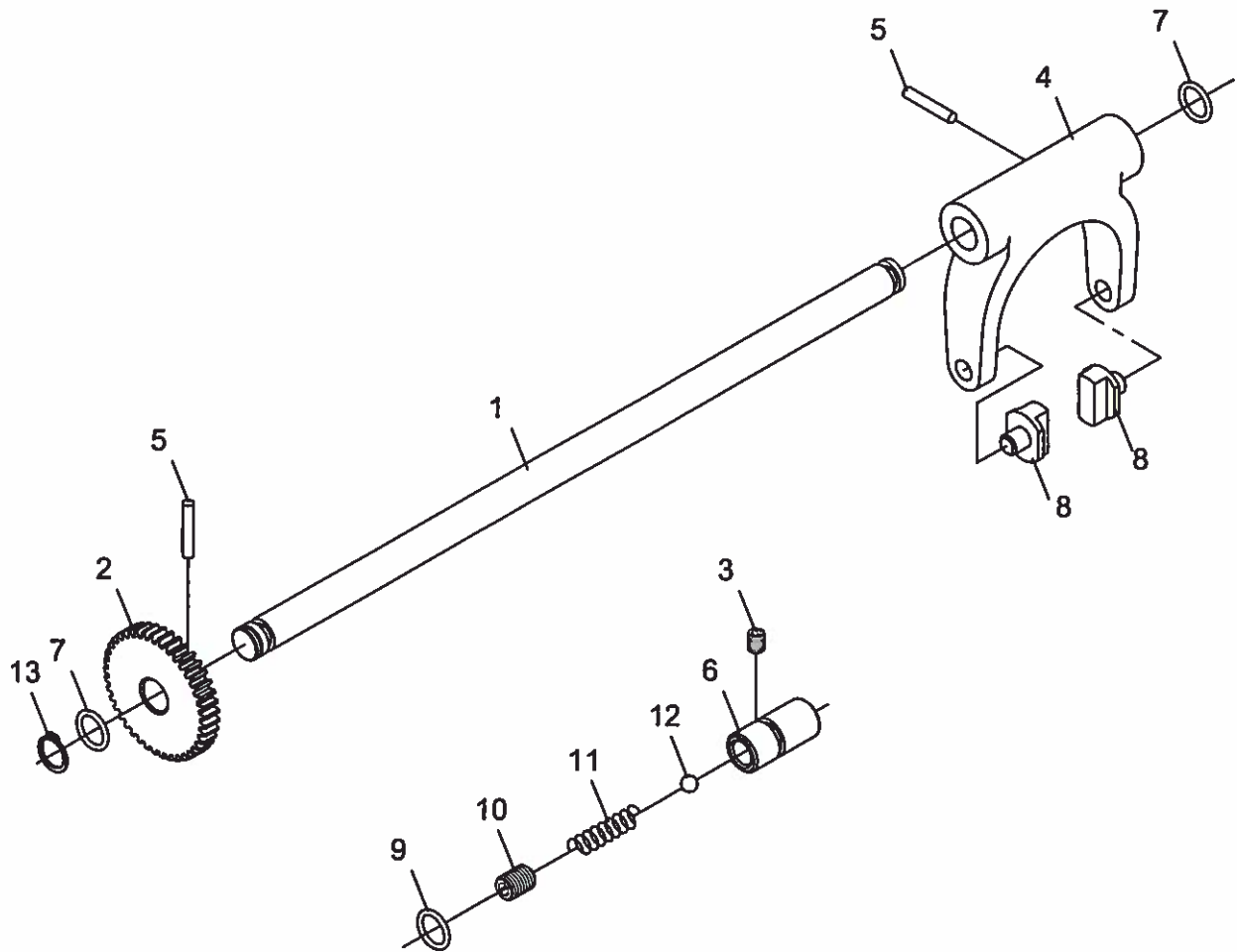
CONTROL LEVER ASSEMBLY (VARIABLE SPEED)



CONTROL LEVER ASSEMBLY (VARIABLE SPEED)

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---------------------------------------|----------|
| 1. | R-1053-1 | Rod | 1 |
| 2. | R-1056 | Pinion (20T) | 1 |
| 3. | R-1030 | Washer | 1 |
| 4. | R-1154-2 | Boss | 1 |
| 5. | A-7213 | Key (6 x 6 x 15) | 1 |
| 6. | A-9101 | Handle | 1 |
| 7. | C-1087-3 | Lever | 1 |
| 8. | R-2136 | Knob | 2 |
| 9. | R-1070 | Rod | 2 |
| 10. | R-1072 | Lever | 2 |
| 11. | R-1073 | Fork | 2 |
| 12. | NR-26 | Arrow Plate | 2 |
| 13. | A-1106 | Socket Headless Set Screw (M8 x 8) | 4 |
| 14. | A-8207 | Spring | 4 |
| 15. | A-9202 | Ball (1/4") | 4 |
| 16. | A-6004 | O-Ring (P12) | 5 |
| 17. | A-4009 | Pin (Φ5 x 40L) | 2 |
| 18. | A-4007 | Pin (Φ5 x 30L) | 2 |
| 19. | A-6009 | O-Ring (P21) | 1 |
| 20. | C-1028 | Washer | 1 |
| 21. | A-1510 | Round Socket Head Cap Screw (M6 x 12) | 2 |

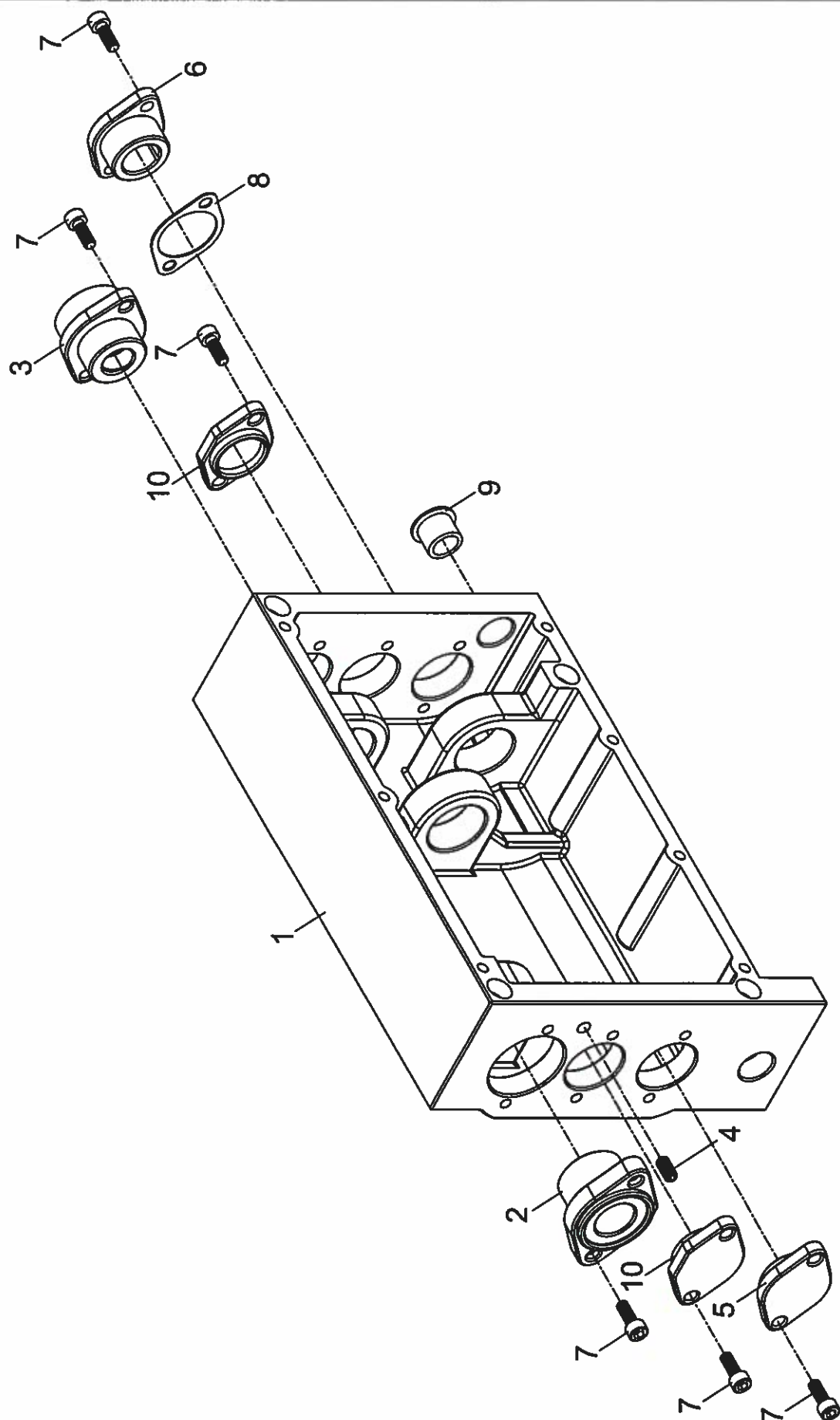
HEADSTOCK CONTROLS (VARIABLE SPEED)



HEADSTOCK CONTROLS (VARIABLE SPEED)

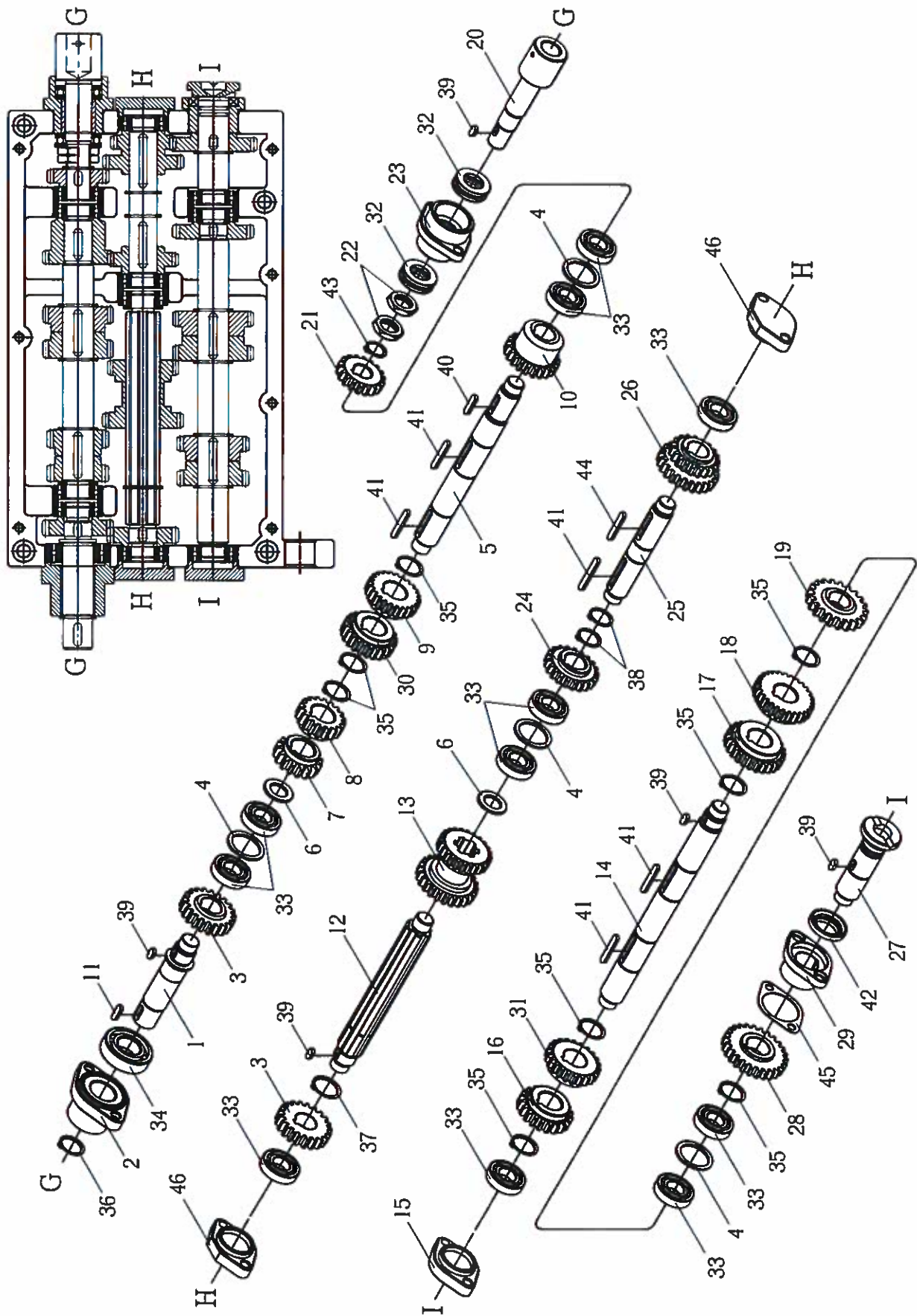
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--------------------------------------|----------|
| 1. | R-1059 | Rod | 1 |
| 2. | R-1058 | Gear (41T) | 1 |
| 3. | A-1106 | Socket Headless Set Screw (M8 x 8) | 1 |
| 4. | R-1063 | Lever | 1 |
| 5. | A-4007 | Pin (5 x 30L) | 2 |
| 6. | R-1060 | Bush | 1 |
| 7. | A-6029 | Oil Ring (AN62279) | 2 |
| 8. | R-1065 | Fork | 2 |
| 9. | A-6006 | O-Ring (P15) | 1 |
| 10. | A-1112 | Socket Headless Set Screw (M12 x 12) | 1 |
| 11. | A-8202 | Spring | 1 |
| 12. | A-9205 | Ball (3/8") | 1 |
| 13. | A-3301 | Criclip (S15) | 1 |

INCH GEARBOX CASING



INCH GEAR BOX CASING

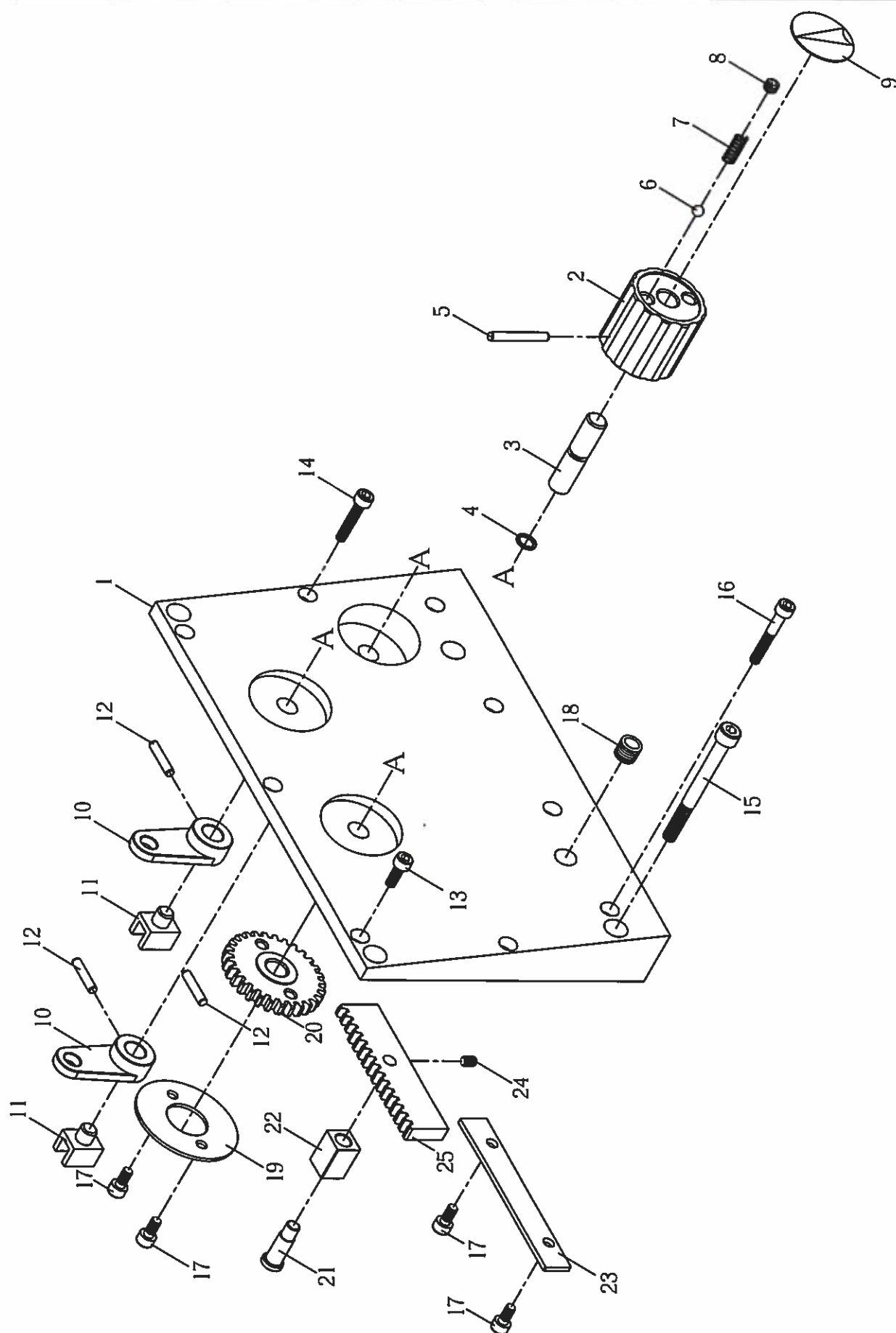
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-----------------------------------|----------|
| 1. | R-2101 | Inch Gearbox Case | 1 |
| 2. | R-2104 | Flange Bearing | 1 |
| 3. | R-2129 | Flange Bearing | 1 |
| 4. | R-2115 | Cover | 2 |
| 5. | R-2119 | Cover | 1 |
| 6. | R-2135 | Flange Bearing | 1 |
| 7. | R-2115-1 | Gasket | 2 |
| 8. | R-2119-1 | Gasket | 2 |
| 9. | A-9500 | Oil Sight | 1 |
| 10. | A-1118 | Socket Headless Set Screw (1/4PT) | 1 |
| 11. | A-1203 | Socket Head Cap Screw (M6 x 16) | 12 |



INCH GEAR BOX GEARS & SHAFTS

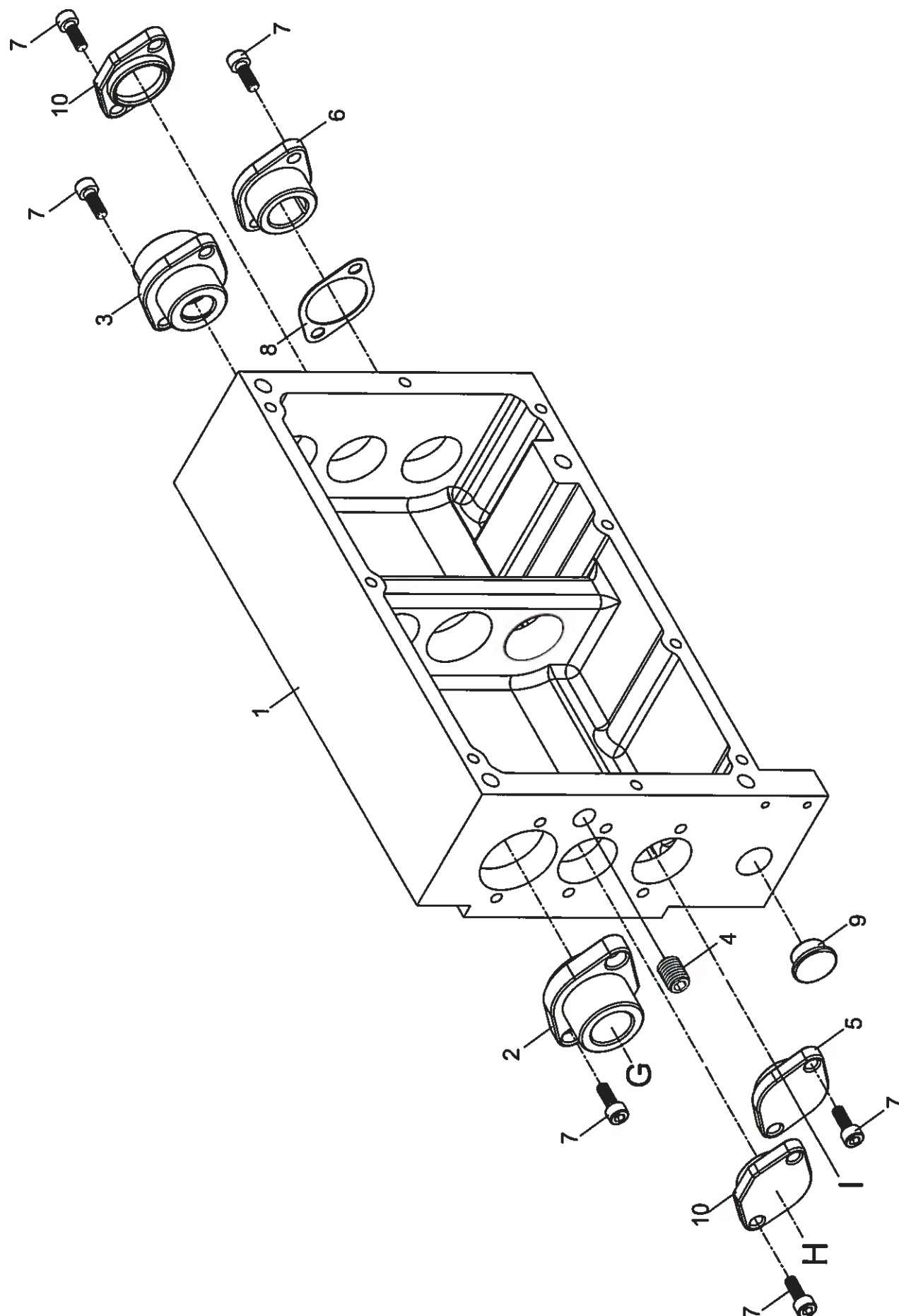
| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------|----------|-----|----------|--------------------------|----------|
| 1. | R-2103 | Drive Shaft (G) | 1 | 36. | A-3305 | Circlip (S19) | 1 |
| 2. | R-2104 | Flange Bearing | 1 | 37. | A-3307 | Circlip (S22) | 1 |
| 3. | R-2105 | Gear (21T) | 2 | 38. | A-3304 | Circlip (S18) | 2 |
| 4. | R-2106 | Washer | 4 | 39. | A-7204 | Key (5 x 5 x 10) | 5 |
| 5. | R-2107 | Top Shaft (G) | 1 | 40. | A-7206 | Key (5 x 5 x 20) | 1 |
| 6. | R-2108 | Washer | 2 | 41. | A-7208 | Key (5 x 5 x 30) | 5 |
| 7. | R-2109 | Gear (16T) | 1 | 42. | A-5028 | Oil Seal (TC20 x 32 x 5) | 1 |
| 8. | R-2110 | Gear (18T) | 1 | 43. | A-3301 | Circlip (S15) | 1 |
| 9. | R-2113 | Gear (24T) | 1 | 44. | A-7209 | Key (5 x 5 x 35) | 1 |
| 10. | R-2114 | Gear (21T) | 1 | 45. | A-7205 | Key (5 x 5 x 15) | 1 |
| 11. | R-2115 | Cover | 2 | 46. | R-2115-1 | Gasket | 2 |
| 12. | R-2116 | Spline Shaft (H) | 1 | 47. | R-2119-1 | Gasket | 2 |
| 13. | R-2117 | Gear (24T x 24T) | 1 | | | | |
| 14. | R-2118 | Bottom Shaft (I) | 1 | | | | |
| 15. | R-2119 | Cover | 1 | | | | |
| 16. | R-2121 | Gear (20T) | 1 | | | | |
| 17. | R-2123 | Gear (26T) | 1 | | | | |
| 18. | R-2124 | Gear (28T) | 1 | | | | |
| 19. | R-2125 | Gear (21T) | 1 | | | | |
| 20. | R-2126 | Driven Shaft (G) / Leadscrew | 1 | | | | |
| 21. | R-2127 | Gear (18T) | 1 | | | | |
| 22. | R-2128 | Nut | 2 | | | | |
| 23. | R-2129 | Flange Bearing | 1 | | | | |
| 24. | R-2130 | Gear (21T) | 1 | | | | |
| 25. | R-2131 | H-Shaft | 1 | | | | |
| 26. | R-2132 | Gear (24T x 19T) | 1 | | | | |
| 27. | R-2133 | Driven Shaft (I) / Feed rod | 1 | | | | |
| 28. | R-2134 | Gear (26T) | 1 | | | | |
| 29. | R-2135 | Flange Bearing | 1 | | | | |
| 30. | R-2147 | Gear (23T) | 1 | | | | |
| 31. | R-2148 | Gear (22T) | 1 | | | | |
| 32. | A-2021 | Bearing (#51103) | 2 | | | | |
| 33. | A-2040 | Bearing (#6002) | 11 | | | | |
| 34. | A-2026 | Bearing (#6004) | 1 | | | | |
| 35. | A-3306 | Circlip (S20) | 8 | | | | |

INCH GEARBOX CONTROLS



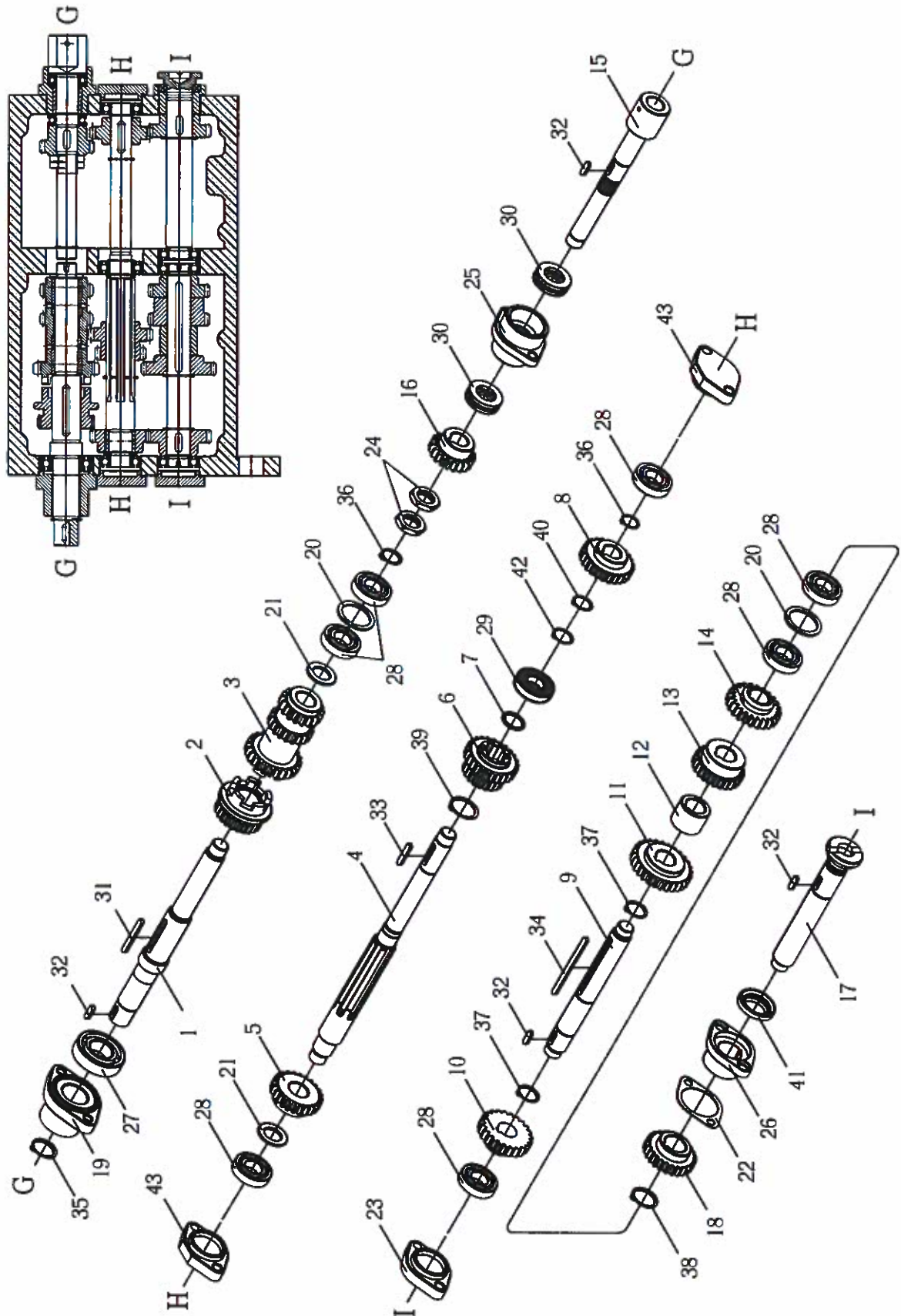
INCH GEAR BOX CONTROLS

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------------|----------|
| 1. | R-2102 | Inch Gearbox Cover | 1 |
| 2. | R-2136 | Handle Knob | 3 |
| 3. | R-2137 | Knob Shaft | 3 |
| 4. | A-6002 | O-Ring (P10) | 3 |
| 5. | A-4009 | Pin (Φ5 x 40) | 3 |
| 6. | A-9202 | Steel Ball (Φ1/4") | 6 |
| 7. | A-8207 | Spring | 6 |
| 8. | A-1142 | Socket Headless Set Screw (M8 x 6) | 6 |
| 9. | NR-26 | Arrow Plate | 3 |
| 10. | R-2145 | Lever | 2 |
| 11. | R-2146 | Fork | 2 |
| 12. | A-4006 | Pin (Φ5 x 24) | 3 |
| 13. | A-1203 | Socket Head Cap Screw (M6 x 16) | 3 |
| 14. | A-1206 | Socket Head Cap Screw (M6 x 30) | 2 |
| 15. | A-1208 | Socket Head Cap Screw (M6 x 40) | 4 |
| 16. | A-1263 | Socket Head Cap Screw (M8 x 90) | 4 |
| 17. | A-1202 | Socket Head Cap Screw (M6 x 12) | 4 |
| 18. | A-1118 | Socket Headless Set Screw (1/4PT) | 1 |
| 19. | R-2139 | Plate | 1 |
| 20. | R-1238 | Gear 29T | 1 |
| 21. | R-2142 | Pivot | 1 |
| 22. | R-2141 | Fork | 1 |
| 23. | R-2143 | Guide Plate | 1 |
| 24. | A-1139 | Socket Headless Set Screw (M6 x 8) | 1 |
| 25. | R-2140 | Rack | 1 |



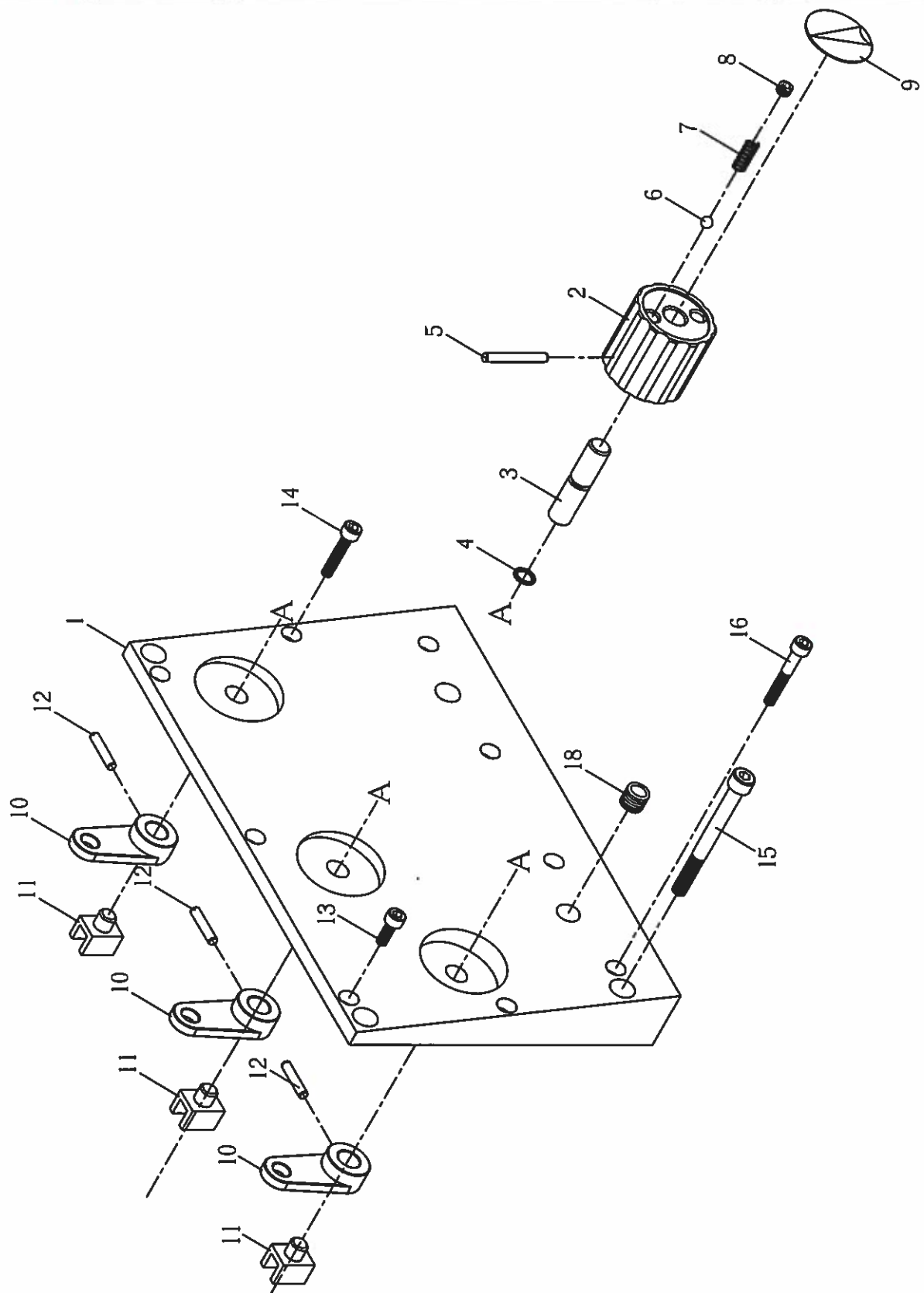
METRIC GEAR BOX CASING

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|------------|-----------------|-----------------------------------|-----------------|
| 1. | R-2301 | Metric Gearbox Case | 1 |
| 2. | R-2104 | Flange Bearing | 1 |
| 3. | R-2129 | Flange Bearing | 1 |
| 4. | R-2115 | Cover | 2 |
| 5. | R-2119 | Cover | 1 |
| 6. | R-2135 | Flange Bearing | 1 |
| 7. | R-2115-1 | Gasket | 2 |
| 8. | R-2119-1 | Gasket | 2 |
| 9. | A-9500 | Oil Sight | 1 |
| 10. | A-1118 | Socket Headless Set Screw (1/4PT) | 1 |
| 11. | A-1203 | Socket Head Cap Screw (M6 x 16) | 12 |



METRIC GEAR BOX GEARS & SHAFTS

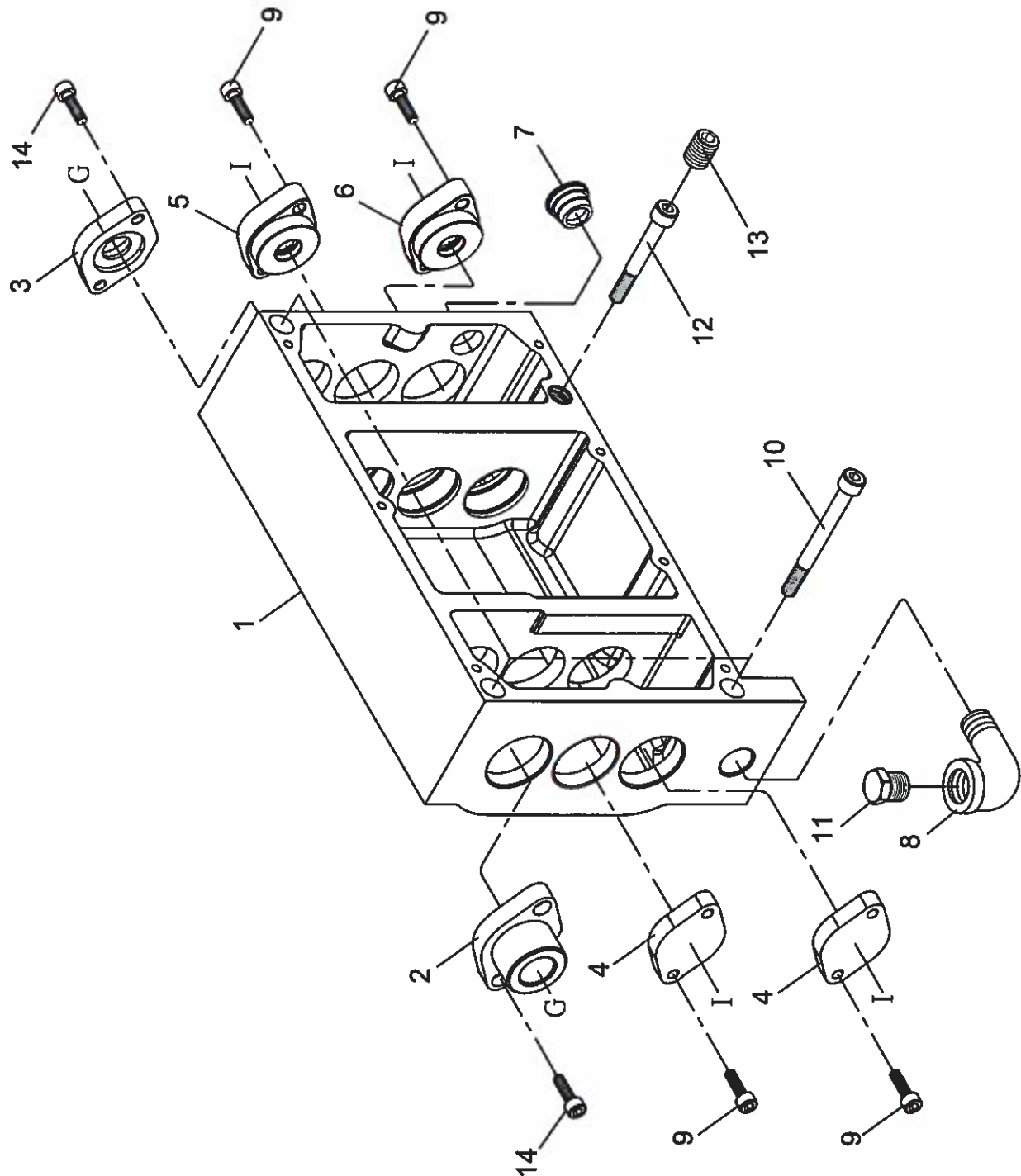
| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|----------------------------|----------|-----|----------|--------------------------|----------|
| 1. | R-2303 | Top Shaft (G) | 1 | 36 | A-3301 | Circlip (S15) | 2 |
| 2. | R-2305 | Gear (23T) | 1 | 37 | A-3304 | Circlip (S18) | 2 |
| 3. | R-2306 | Gear (24T x 20T x 18T) | 1 | 38 | A-3306 | Circlip (S20) | 1 |
| 4. | R-2309 | Spline Shaft (H) | 1 | 39 | A-3307 | Circlip (S22) | 1 |
| 5. | R-2310 | Gear (24T) | 1 | 40 | A-3302 | Circlip (S16) | 1 |
| 6. | R-2311 | Gear (20T x 25T) | 1 | 41 | A-5028 | Oil Seal (TC20 x 32 x 5) | 1 |
| 7. | R-2312 | Washer | 1 | 42 | A-3303 | Circlip (S17) | 1 |
| 8. | R-2313 | Gear (25T) | 1 | 43 | R-2115-1 | Gasket | 2 |
| 9. | R-2315 | Bottom Shaft (I) | 1 | 44 | R-2119-1 | Gasket | 2 |
| 10. | R-2316 | Gear (23T) | 1 | | | | |
| 11. | R-2317 | Gear (28T) | 1 | | | | |
| 12. | R-2318 | Bushing | 1 | | | | |
| 13. | R-2319 | Gear (25T) | 1 | | | | |
| 14. | R-2320 | Gear (24T) | 1 | | | | |
| 15. | R-2321 | Driven Shaft (G)/Leadscrew | 1 | | | | |
| 16. | R-2323 | Gear (20T) | 1 | | | | |
| 17. | R-2325 | Driven Shaft (I)/Feed rod | 1 | | | | |
| 18. | R-2326 | Gear (25T) | 1 | | | | |
| 19. | R-2104 | Flange Bearing | 1 | | | | |
| 20. | R-2106 | Washer | 2 | | | | |
| 21. | R-2108 | Washer | 2 | | | | |
| 22. | R-2115 | Cover | 2 | | | | |
| 23. | R-2119 | Cover | 1 | | | | |
| 24. | R-2128 | Nut $\Phi 5/8"$ -18NF | 2 | | | | |
| 25. | R-2129 | Flange Bearing | 1 | | | | |
| 26. | R-2135 | Flange Bearing | 1 | | | | |
| 27. | A-2026 | Bearing (#6004) | 1 | | | | |
| 28. | A-2040 | Bearing (#6002) | 6 | | | | |
| 29. | A-2024 | Bearing (#6003) | 1 | | | | |
| 30. | A-2021 | Bearing (#51103) | 2 | | | | |
| 31. | A-7210 | Key (5 x 5 x 40) | 1 | | | | |
| 32. | A-7205 | Key (5 x 5 x 15) | 3 | | | | |
| 33. | A-7207 | Key (5 x 5 x 25) | 1 | | | | |
| 34. | A-7211 | Key (5 x 5 x 70) | 1 | | | | |
| 35. | A-3305 | Circlip (S19) | 1 | | | | |



METRIC GEAR BOX CONTROLS

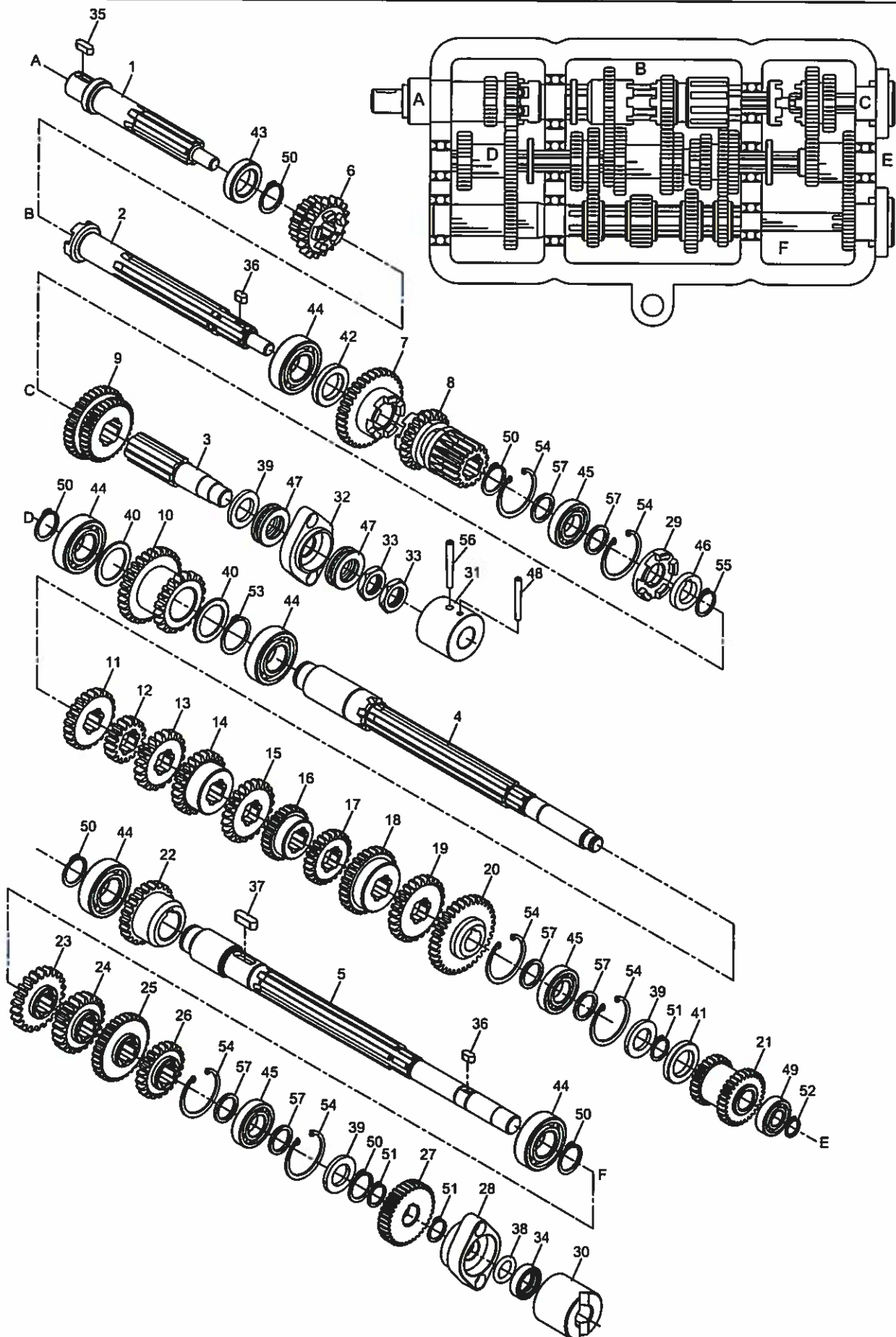
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|------------|-----------------|------------------------------------|-----------------|
| 1. | R-2302 | Metric Gearbox Cover | 1 |
| 2. | R-2136 | Handle Knob | 3 |
| 3. | R-2137 | Knob Shaft | 3 |
| 4. | A-6002 | O-Ring (P10) | 3 |
| 5. | A-4009 | Pin (Φ5 x 40) | 3 |
| 6. | A-9202 | Steel Ball (Φ1/4") | 6 |
| 7. | A-8207 | Spring | 6 |
| 8. | A-1142 | Socket Headless Set Screw (M8 x 6) | 6 |
| 9. | NR-26 | Arrow Plate | 3 |
| 10. | R-2145 | Lever | 3 |
| 11. | R-2332 | Fork | 2 |
| 12. | A-4006 | Pin (Φ5 x 24) | 3 |
| 13. | A-1203 | Socket Head Cap Screw (M6 x 16) | 3 |
| 14. | A-1206 | Socket Head Cap Screw (M6 x 30) | 2 |
| 15. | A-1208 | Socket Head Cap Screw (M6 x 40) | 4 |
| 16. | A-1263 | Socket Head Cap Screw (M8 x 90) | 4 |
| 17. | R-2331 | Fork | 1 |
| 18. | A-1118 | Socket Headless Set Screw (1/4PT) | 1 |

UNIVERSAL GEARBOX CASING (Optional)

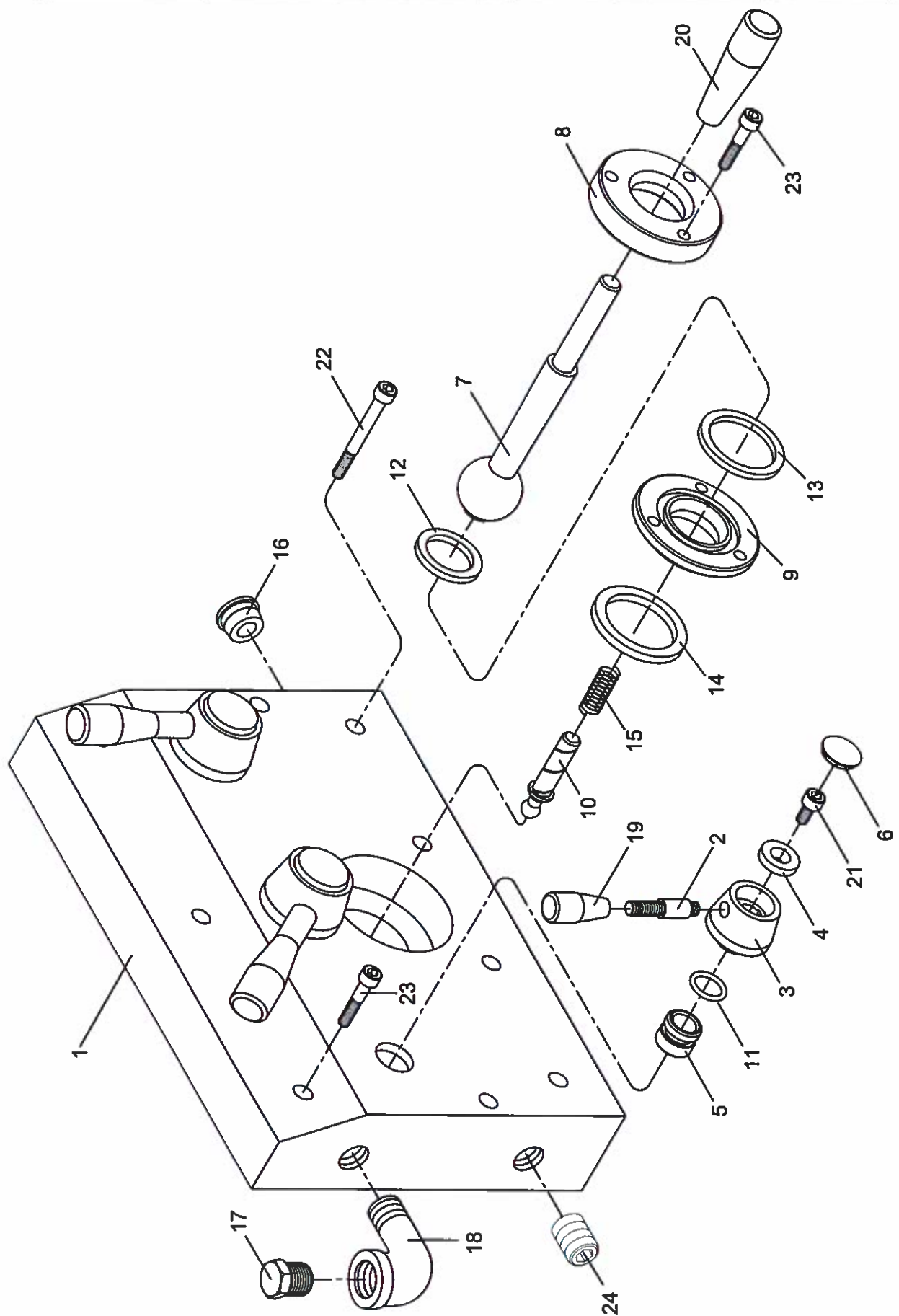


UNIVERSAL GEAR BOX CASING (OPTIONAL)

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--------------------------------------|----------|
| 1. | R-2401 | Gearbox Casting | 1 |
| 2. | R-2404 | Flange Bearing | 1 |
| 3. | R-2416 | Flange Bearing | 1 |
| 4. | R-2418 | Cover | 2 |
| 5. | R-2435 | Flange Bearing | 1 |
| 6. | R-2445 | Flange Bearing | 1 |
| 7. | A-9500 | Oil Sight | 1 |
| 8. | A-0507 | Elbow (3/8PT) | 1 |
| 9. | A-1203 | Socket Head Cap Screw (M6 x 16) | 8 |
| 10. | A-1256 | Socket Head Cap Screw (M8 x 85) | 3 |
| 11. | A-0578 | Plug (3/8PT) | 1 |
| 12. | A-1242 | Socket Head Cap Screw (M8 x 60) | 1 |
| 13. | A-1172 | Socket Headless Set Screw (M16 x 16) | 1 |
| 14. | A-1202 | Socket Head Cap Screw (M6 x 12) | 4 |

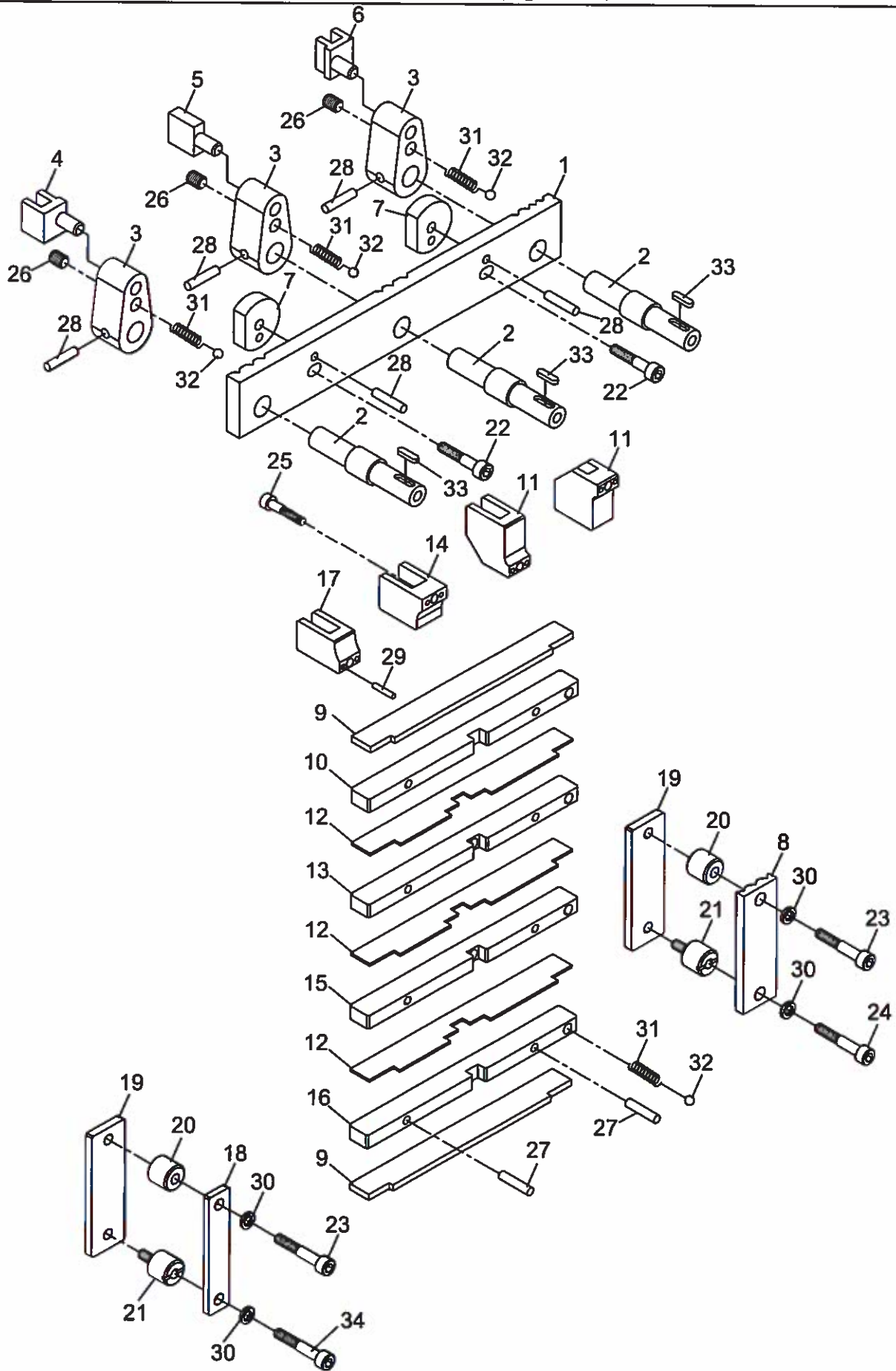


| <u>NO</u> | <u>PART NO</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> | <u>NO</u> | <u>PART NO</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|-----------|----------------|-----------------------------|-----------------|-----------|----------------|----------------------|-----------------|
| 1 | R-2403 | Driver Shaft (A) | 1 | 36 | A-7204 | Key (5 x 5 x 10) | 2 |
| 2 | R-2407 | Top Shaft (B) | 1 | 37 | A-7214 | Key (6 x 6 x 20) | 1 |
| 3 | R-2413 | Drive Shaft (C) / Leadscrew | 1 | 38 | A-6006 | O-Ring (P15) | 1 |
| 4 | R-2419 | Middle Shaft (E) | 1 | 39 | T-2043 | Washer | 3 |
| 5 | R-2437 | Bottom Shaft (F) | 1 | 40 | R-2421 | Washer | 2 |
| 6 | R-2406 | Gear (19T x 19T) | 1 | 41 | R-2108 | Washer | 1 |
| 7 | R-2409 | Gear (34T) | 1 | 42 | R-2408 | Washer | 1 |
| 8 | R-2410 | Gear (23T x 17T) | 1 | 43 | T-2005 | Washer | 1 |
| 9 | R-2414 | Gear (35T x 35T) | 1 | 44 | A-2041 | Bearing (#6904) | 5 |
| 10 | R-2420 | Gear (30T x 20T) | 1 | 45 | A-2003 | Bearing (#16003) | 3 |
| 11 | R-2422 | Gear (22T) | 1 | 46 | T-2012 | Washer | 1 |
| 12 | R-2423 | Gear (17T) | 1 | 47 | A-2021 | Bearing (#51103) | 2 |
| 13 | R-2424 | Gear (20T) | 1 | 48 | R-2415-1 | Taper Pin (Ø5 x 45) | 1 |
| 14 | R-2425 | Gear (24T) | 1 | 49 | A-2046 | Bearing (#6001) | 1 |
| 15 | R-2426 | Gear (23T) | 1 | 50 | A-3306 | Circlip (S20) | 6 |
| 16 | R-2427 | Gear (27T) | 1 | 51 | A-3301 | Circlip (S15) | 1 |
| 17 | R-2428 | Gear (24T) | 1 | 52 | A-3322 | Circlip (S12) | 1 |
| 18 | R-2429 | Gear (28T) | 1 | 53 | A-3309 | Circlip (S25) | 1 |
| 19 | R-2430 | Gear (26T) | 1 | 54 | A-3200 | Circlip (R35) | 6 |
| 20 | R-2431 | Gear (34T) | 1 | 55 | A-3303 | Circlip (S17) | 1 |
| 21 | R-2434 | Gear (24T x 30T) | 1 | 56 | A-4008 | Spring Pin (Ø5 x 36) | 1 |
| 22 | R-2438 | Gear (22T) | 1 | 57 | R-2477 | Spacer | 6 |
| 23 | R-2439 | Gear (22T) | 1 | | | | |
| 24 | R-2440 | Gear (22T) | 1 | | | | |
| 25 | R-2441 | Gear (33T) | 1 | | | | |
| 26 | R-2442 | Gear (22T) | 1 | | | | |
| 27 | R-2444 | Gear (36T) | 1 | | | | |
| 28 | R-2445 | Flange Bearing | 1 | | | | |
| 29 | R-2411 | Clutch | 1 | | | | |
| 30 | R-2436 | Coupling | 1 | | | | |
| 31 | R-2415 | Coupling | 1 | | | | |
| 32 | R-2416 | Flange Bearing | 1 | | | | |
| 33 | R-2128 | Nut | 2 | | | | |
| 34 | A-5017 | Oil Seal (TC32 x 15 x 7) | 1 | | | | |
| 35 | A-7205 | Key (5 x 5 x 15) | 1 | | | | |



| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|---------------------------------|-----------------|
| 1. | R-2402 | Gearbox Cover | 1 |
| 2. | R-2448 | Lever | 3 |
| 3. | R-2449 | Boss | 3 |
| 4. | R-1030 | Washer | 3 |
| 5. | C-2029 | Bush | 3 |
| 6. | R-9505 | Plug | 3 |
| 7. | C-2035 | Lever | 1 |
| 8. | C-2033 | Cover | 1 |
| 9. | C-2032 | Seating | 1 |
| 10. | C-2034 | Selector | 1 |
| 11. | A-6006 | O-Ring (P15) | 3 |
| 12. | A-6015 | O-Ring (P29) | 1 |
| 13. | A-6017 | O-Ring (P36) | 1 |
| 14. | A-6018 | O-Ring (P38) | 1 |
| 15. | A-8407 | Spring | 1 |
| 16. | A-9500 | Oil Sight 19 | 1 |
| 17. | A-0507 | Plug(3/8PT) | 1 |
| 18. | A-0578 | Elbow (3/8PT) | 1 |
| 19. | A-9100 | Handle | 3 |
| 20. | A-9107 | Handle | 1 |
| 21. | A-1202 | Socket Head Cap Screw (M6 x 12) | 3 |
| 22. | A-1247 | Socket Head Cap Screw (M6 x 55) | 6 |
| 23. | A-1207 | Socket Head Cap Screw (M6 x 35) | 6 |
| 24. | A-1121 | Plug (3/8PT) | 1 |

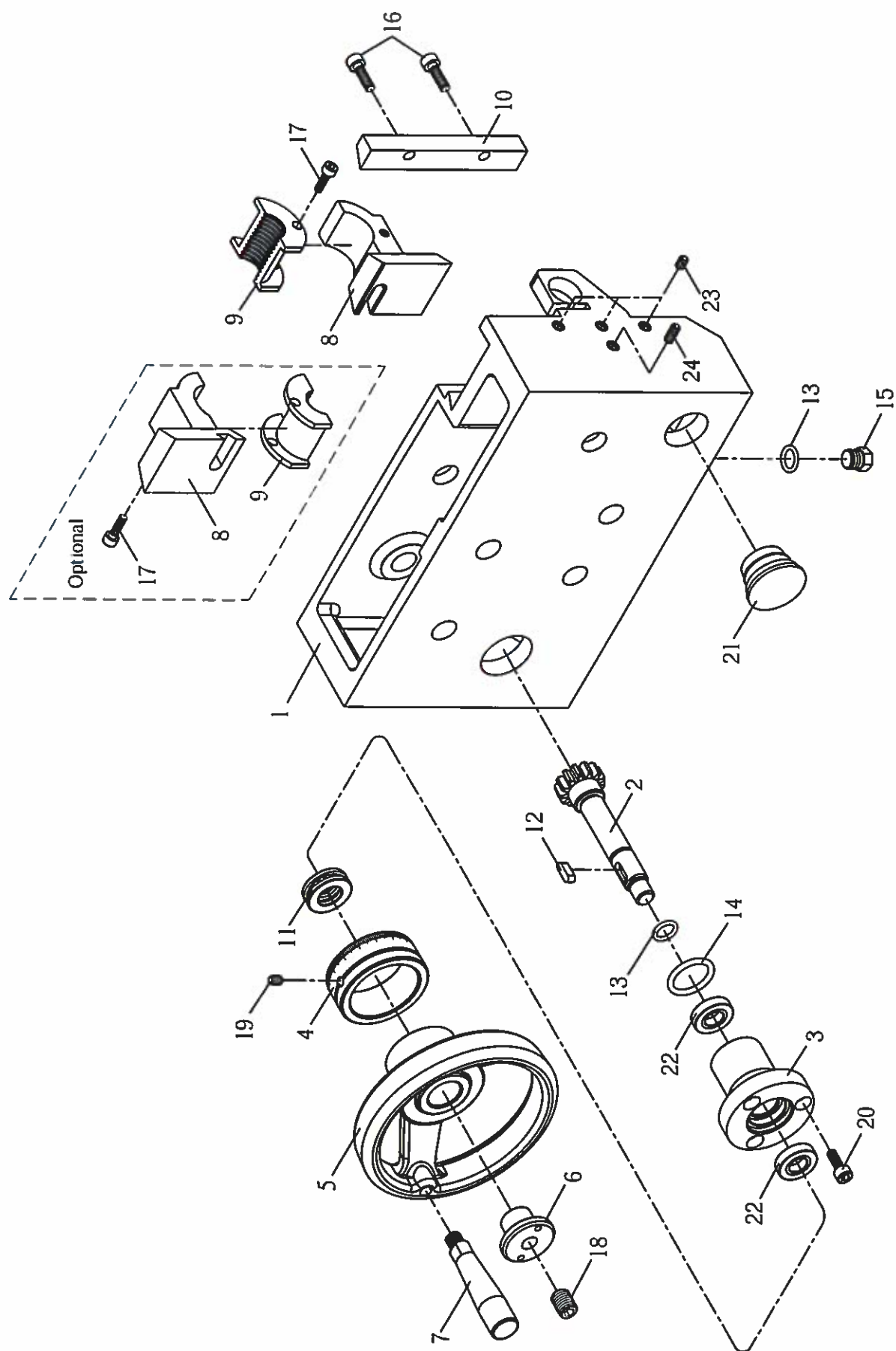
UNIVERSAL GEARBOX CONTROLS (Optional)



UNIVERSAL GEAR BOX CONTROLS (OPTIONAL)

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------------|----------|
| 1. | R-2447 | Selector Bar | 1 |
| 2. | R-2451 | Selector Shaft | 3 |
| 3. | T-2053 | Levers | 3 |
| 4. | R-2454 | Shift Fork | 1 |
| 5. | R-2455 | Shift Pad | 1 |
| 6. | R-2456 | Shift Fork | 1 |
| 7. | T-2057 | Pad | 2 |
| 8. | R-2467 | Detent Plate | 1 |
| 9. | R-2468 | Top & Bottom Plate | 2 |
| 10. | R-2469 | Guide Plate | 1 |
| 11. | R-2470 | Fork | 2 |
| 12. | R-2471 | Dividing Plate | 3 |
| 13. | R-2472 | Gear Bar | 1 |
| 14. | R-2473 | Fork | 1 |
| 15. | R-2474 | Gear Bar | 1 |
| 16. | R-2475 | Gear Bar | 1 |
| 17. | R-2476 | Fork | 1 |
| 18. | R-2466 | Plate | 1 |
| 19. | R-2465 | Bar | 2 |
| 20. | R-2463 | Spacer | 2 |
| 21. | R-2464 | Spacer | 2 |
| 22. | A-1206 | Socket Head Cap Screw (M6 x 30) | 2 |
| 23. | A-1207 | Socket Head Cap Screw (M6 x 35) | 2 |
| 24. | A-1203 | Socket Head Cap Screw (M6 x 16) | 1 |
| 25. | A-1292 | Socket Head Cap Screw (M5 x 20) | 4 |
| 26. | A-1142 | Socket Headless Set Screw (M8 x 6) | 3 |
| 27. | A-4004 | Pin (Φ5 x 10) | 8 |
| 28. | A-4006 | Pin (Φ5 x 24) | 5 |
| 29. | A-4000 | Pin (Φ3 x 10) | 8 |
| 30. | A-1801 | Spring Washer | 4 |
| 31. | A-8506 | Spring | 7 |
| 32. | A-9202 | Ball | 7 |
| 33. | A-7202 | Key (4 x 4 x15) | 3 |
| 34. | A-1202 | Socket Head Cap Screw (M6 x 12) | 1 |

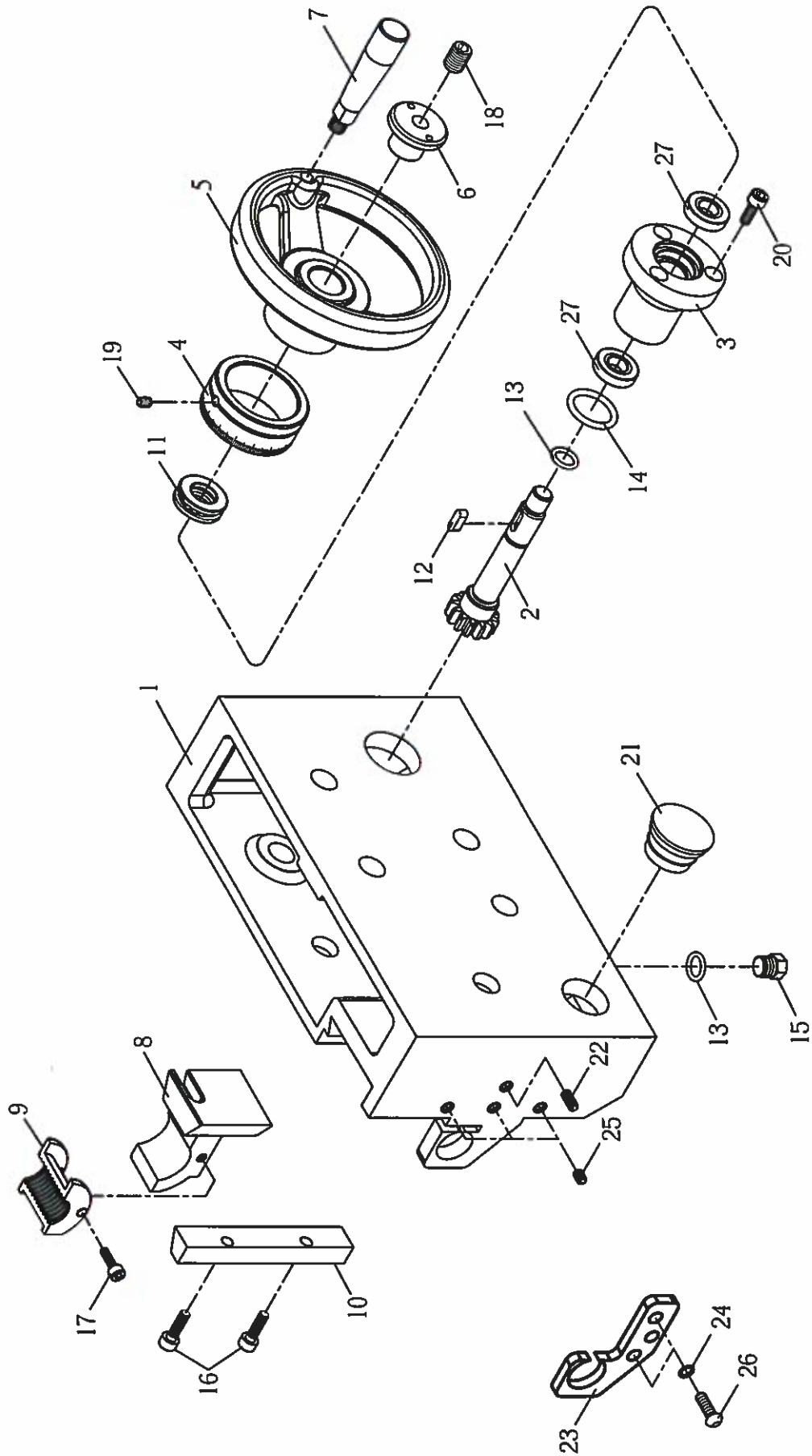
APRON (LEFT HAND)



APRON (LEFT-HAND)

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--|----------|
| 1. | R-3301-2 | Apron Case (L.H.) | 1 |
| 2. | R-3006 | Gear Shaft (13T) | 1 |
| 3. | R-3005 | Bushing | 1 |
| 4. | R-3004 | Index Ring (Metric) | 1 |
| | R-3035 | Index Ring (Inch) | 1 |
| 5. | R-3003 | Handwheel | 1 |
| 6. | R-3033 | Plug | 1 |
| 7. | T-4007 | Handle | 1 |
| 8. | R-3027-2 | { Half-Nut Bracket Set | 1 |
| | | { Half-Nut Bracket Set (Optional USA) | 2 |
| 9. | R-3026 | { Half-Nut Set (Inch) | 1 |
| | | { Half-Nut Set (Inch) (Optional USA) | 2 |
| | R-3326 | { Half-Nut Set (Metric) | 1 |
| | | { Half-Nut Set (Metric) (Optional USA) | 2 |
| | R-3426-1 | { Half-Nut Set (Universal-Metric) | 1 |
| | | { Half-Nut Set (Universal-Metric) (Optional USA) | 2 |
| | R-3426-2 | { Half-Nut Set (Universal-Inch) | 1 |
| | | { Half-Nut Set (Universal-Inch) (Optional USA) | 2 |
| 10. | R-3028 | Strip | 1 |
| 11. | A-2000 | Bearing (#1528) | 1 |
| 12. | A-7205 | Key (5 x 5 x 15) | 1 |
| 13. | A-6004 | O-Ring (P12) | 2 |
| 14. | A-6012 | O-Ring (P24) | 1 |
| 15. | A-1426 | Plug (M12 x 16) | 1 |
| 16. | A-1204 | Socket Head Cap Screw (M6 x 20) | 2 |
| 17. | A-1239 | { Socket Head Cap Screw (M5 x 15) | 1 |
| | | { Socket Head Cap Screw (M5 x 15) (Optional USA) | 2 |
| 18. | A-1112 | Socket Headless Set Screw (M12 x 12) | 1 |
| 19. | A-1100 | Socket Headless Set Screw (M6 x 6) | 1 |
| 20. | A-1203 | Socket Head Cap Screw (M6 x 16) | 3 |
| 21. | A-9501 | Oil Sight (Φ29) | 1 |
| 23. | A-1102 | Socket Headless Set Screw (M6 x 12) | 3 |
| 24. | A-1812 | Spring Washer (Φ6) | 4 |
| 25. | A-1512 | Cross Recessed Head Screw (M6 x 10) | 2 |
| 26. | A-1105 | Socket Headless Set Screw (M6 x 30) | 1 |
| 27. | A-2207 | Bearing (#6802ZZ) | 2 |

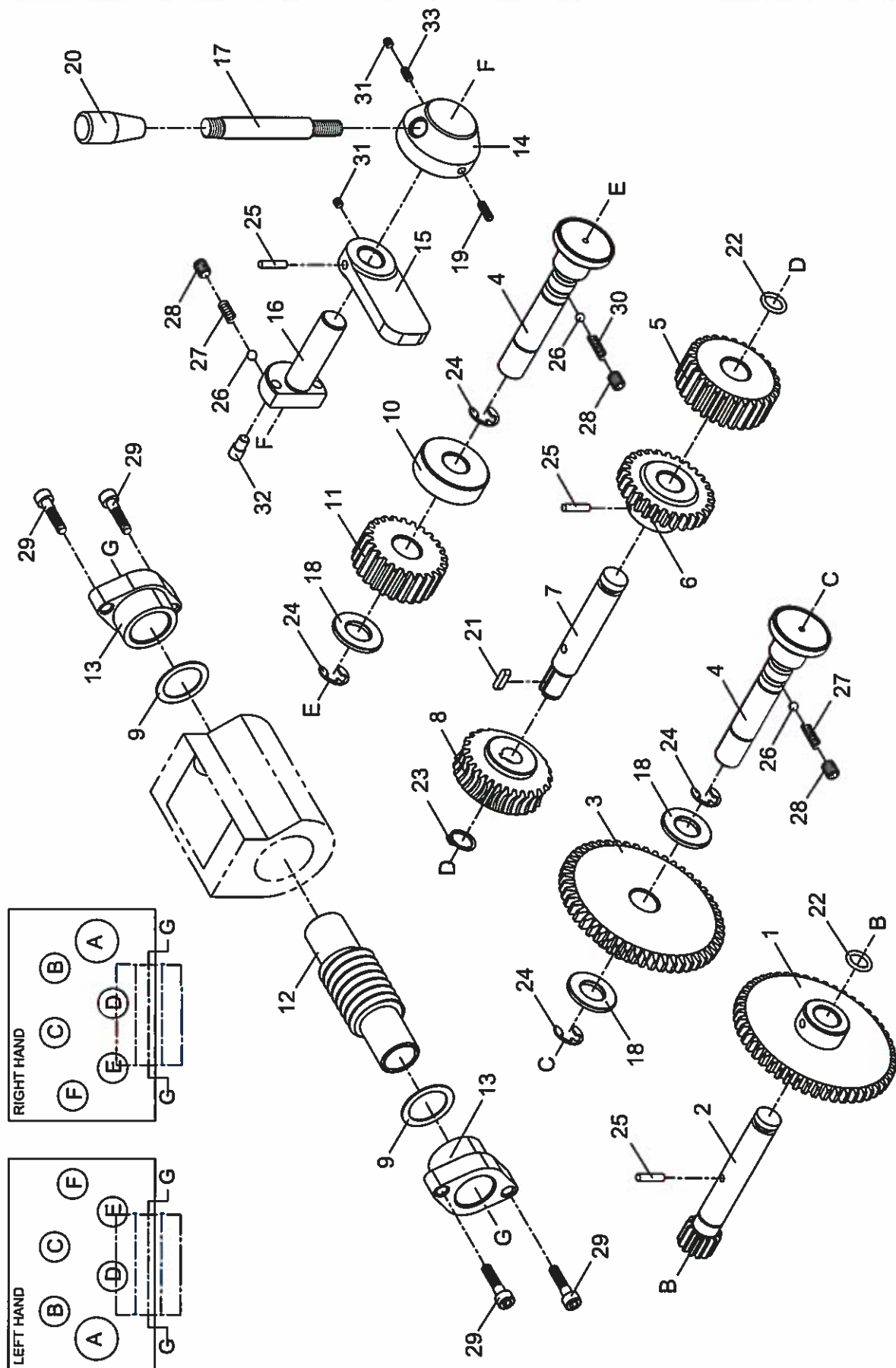
APRON (RIGHT HAND)



APRON (RIGHT-HAND)

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--------------------------------------|----------|
| 1. | R-3301-1 | Apron Case (R.H.) | 1 |
| 2. | R-3006 | Gear Shaft (13T) | 1 |
| 3. | R-3005 | Bushing | 1 |
| 4. | R-3004 | Index Ring (Metric) | 1 |
| | R-3035 | Index Ring (Inch) | 1 |
| 5. | R-3003 | Handwheel | 1 |
| 6. | R-3033 | Plug | 1 |
| 7. | T-4007 | Handle | 1 |
| 8. | R-3027-1 | Half-Nut Bracket Set | 1 |
| 9. | R-3026 | Half-Nut Set (Inch) | 1 |
| | R-3326 | Half-Nut Set (Metric) | 1 |
| | R-3426-1 | Half-Nut Set (Universal-Metric) | 1 |
| | R-3426-2 | Half-Nut Set (Universal-Inch) | 1 |
| 10. | R-3028 | Strip | 1 |
| 11. | A-2000 | Bearing (#1528) | 1 |
| 12. | A-7205 | Key (5 x 5 x 15) | 1 |
| 13. | A-6004 | O-Ring (P12) | 2 |
| 14. | A-6012 | O-Ring (P24) | 1 |
| 15. | A-1426 | Plug (M12 x 16) | 1 |
| 16. | A-1204 | Socket Head Cap Screw (M6 x 20) | 2 |
| 17. | A-1239 | Socket Head Cap Screw (M5 x 15) | 1 |
| 18. | A-1112 | Socket Headless Set Screw (M12 x 12) | 1 |
| 19. | A-1100 | Socket Headless Set Screw (M6 x 6) | 1 |
| 20. | A-1203 | Socket Head Cap Screw (M6 x 16) | 3 |
| 21. | A-9501 | Oil Sight (Φ29) | 1 |
| 22. | T-7057 | Cover | 1 |
| 23. | R-3038-1 | Bracket | 1 |
| 24. | A-1812 | Spring Washer (Φ6) | 4 |
| 25. | A-1512 | Cross Recessed Head Screw (M6 x 10) | 2 |
| 26. | A-1510 | Cross Recessed Head Screw (M6 x 12) | 2 |
| 27. | A-2207 | Bearing (#680ZZ) | 2 |
| 28. | A-1102 | Socket Headless Set Screw (M6 x 12) | 3 |
| 29. | A-1105 | Socket Headless Set Screw (M6 x 30) | 1 |

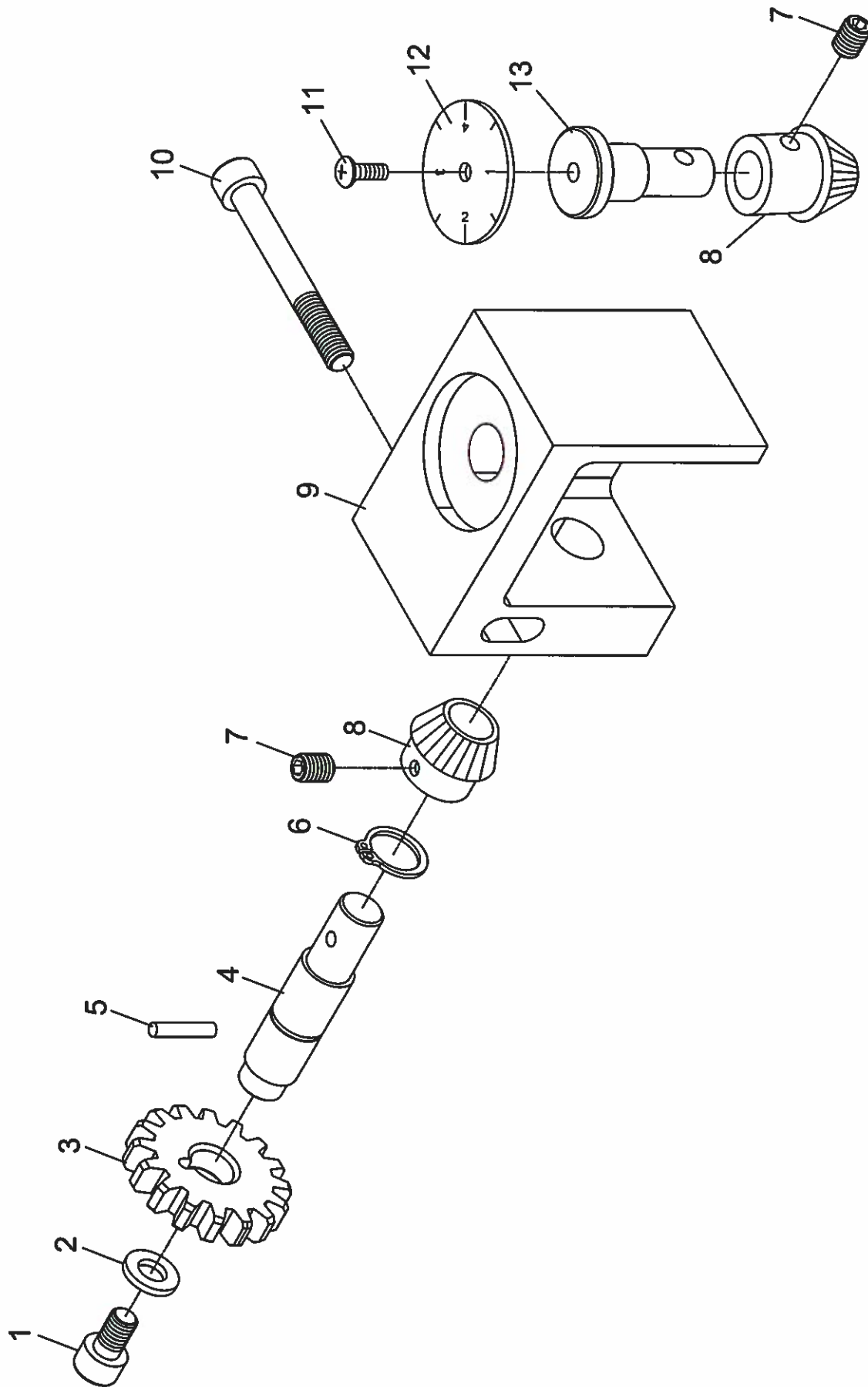
APRON CONTROLS



APRON CONTROLS

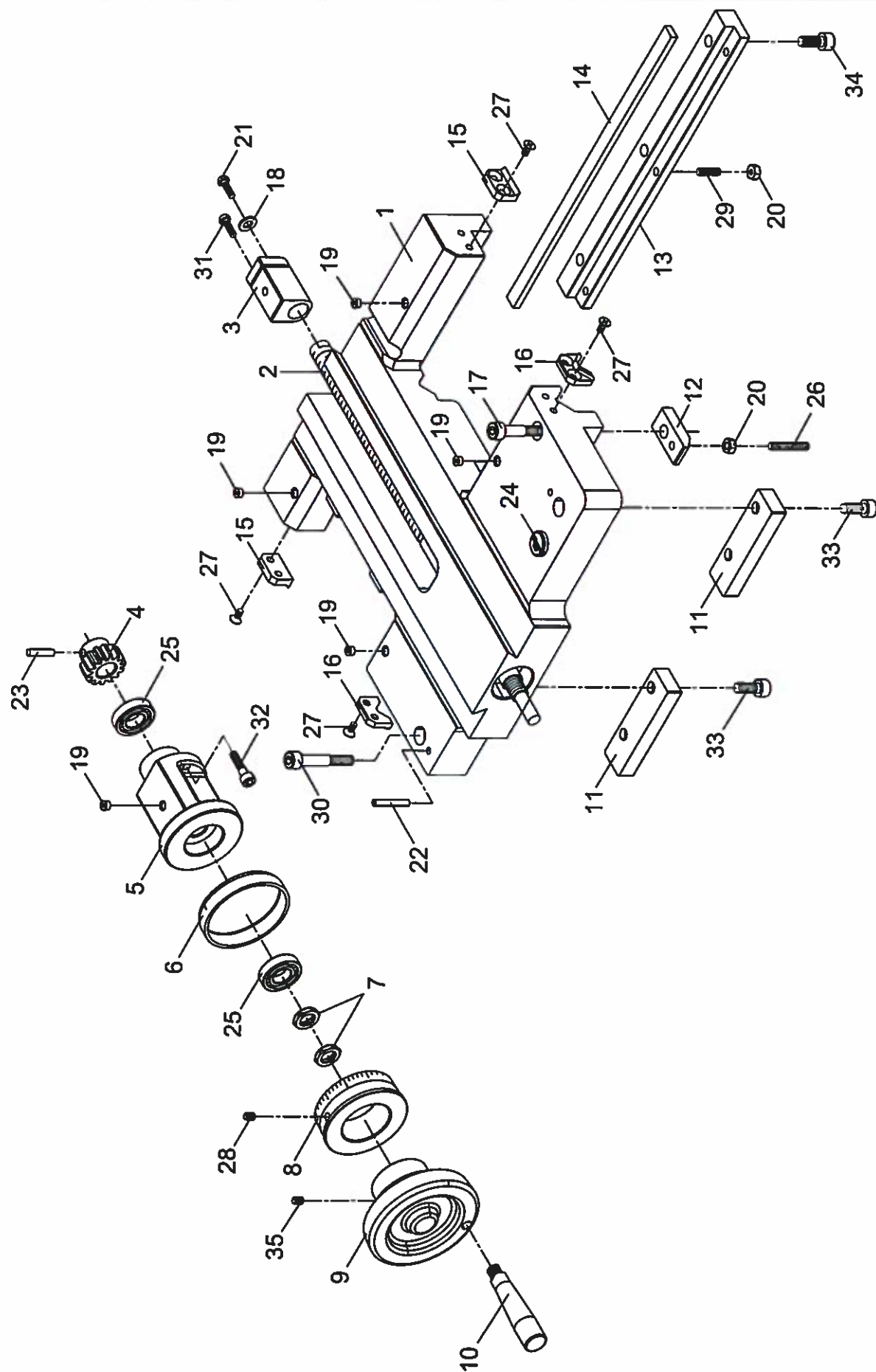
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-------------------------------------|----------|
| 1. | R-3007 | Gear (50T) | 1 |
| 2. | R-3008 | Gear Shaft (13T) | 1 |
| 3. | R-3009 | Gear (20T x 51T) | 1 |
| 4. | R-3019 | Pull-Push Lever (C.E) | 2 |
| 5. | R-3014 | Gear (28T) | 1 |
| 6. | R-3015 | Gear (28T) | 1 |
| 7. | R-3013 | Shaft (D) | 1 |
| 8. | R-3016 | Worm Gear (28T) | 1 |
| 9. | R-3017-1 | Washer | 2 |
| 10. | R-3020 | Collar | 1 |
| 11. | R-3021 | Gear (25T) | 1 |
| 12. | R-3017 | Worm | 1 |
| 13. | R-3018 | Bushing | 2 |
| 14. | R-3024 | Handle Boss | 1 |
| 15. | R-3022 | Lever | 1 |
| 16. | R-3025 | Cam Shaft | 1 |
| 17. | R-3023 | Lever | 1 |
| 18. | R-3011 | Washer | 3 |
| 19. | A-1130 | Socket Headless Set Screw (M6 x 15) | 1 |
| 20. | A-9101 | Handle | 1 |
| 21. | A-7202 | Key (4 x 4 x 150) | 1 |
| 22. | A-6004 | O-Ring (P12) | 2 |
| 23. | A-3300 | Circlip (S14) | 1 |
| 24. | A-3104 | Circlip (E12) | 4 |
| 25. | A-4007 | Pin (Φ5 x 30) | 3 |
| 26. | A-9202 | Ball (Φ1/4") | 3 |
| 27. | A-8406 | Spring | 2 |
| 28. | A-1106 | Socket Headless Set Screw (M8 x 8) | 3 |
| 29. | A-1204 | Socket Head Cap Screw (M6 x 20) | 4 |
| 30. | A-8207 | Spring | 1 |
| 31. | A-1100 | Socket Headless Set Screw (M6 x 6) | 2 |
| 32. | R-3025-2 | Bush | 1 |
| 33. | A-1102 | Socket Headless Set Screw (M6 x 12) | 1 |

THREADING DIALS



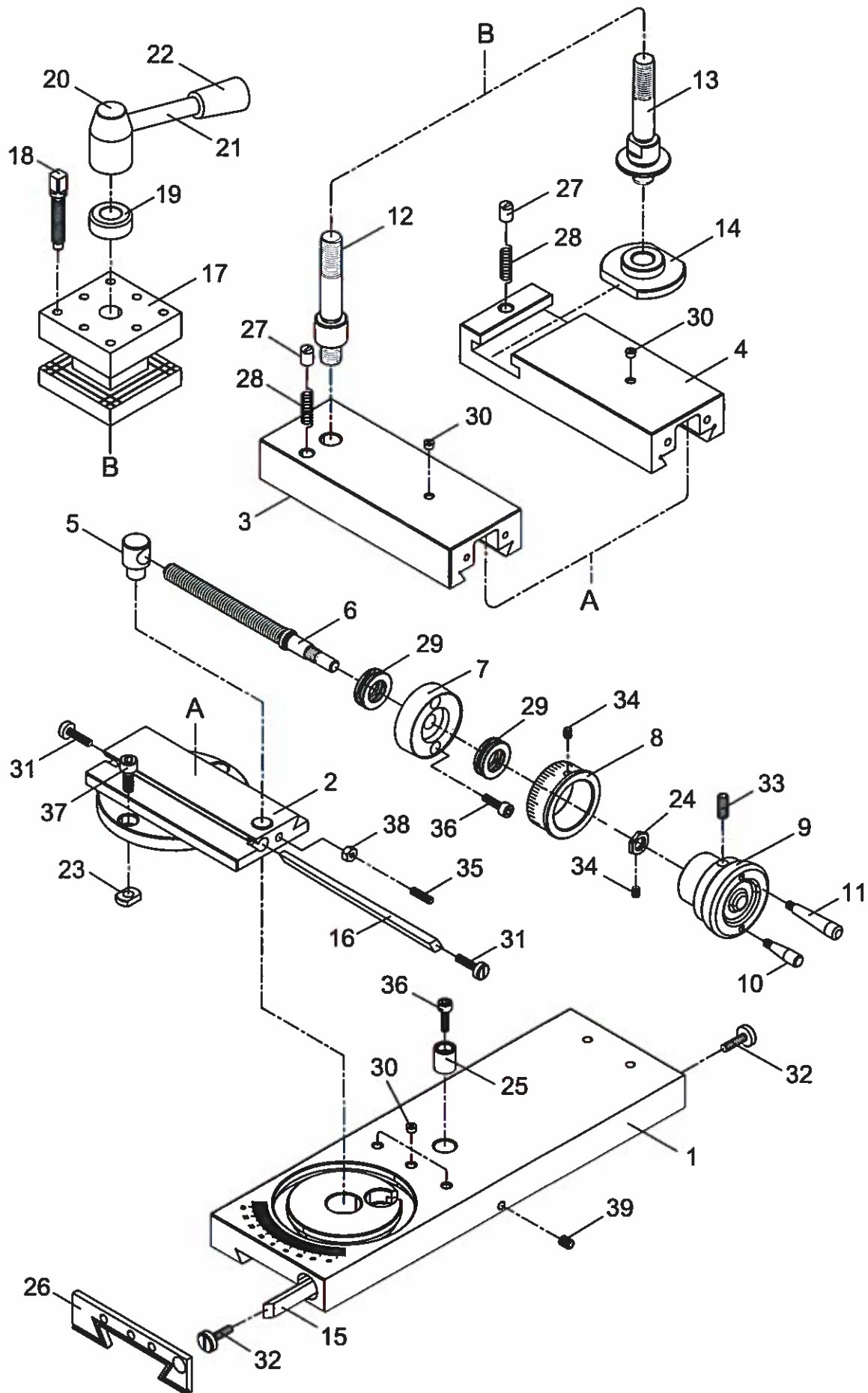
THREADING DIALS

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------------|----------|
| 1. | A-1231 | Socket Head Cap Screw (M6 x 10) | 1 |
| 2. | A-1901 | Washer (Φ6) | 1 |
| 3. | R-3031 | Gear 24T (Imperial) | 1 |
| | R-3331-1 | Gear 18T (Metric) | 1 |
| | C-3082 | Gear 18T (Universal / Metric) | 1 |
| 4. | R-3430 | Gear Shaft | 1 |
| 5. | A-4018 | Pin (Φ3 x 5) | 1 |
| 6. | A-3322 | Circlip (S12) | 1 |
| 7. | A-1100 | Socket Headless Set Screw (M6 x 6) | 2 |
| 8. | R-3437 | Bevel Gear | 2 |
| 9. | R-3029 | Guard | 1 |
| 10. | A-1248 | Socket Head Cap Screw (M6 x 50) | 1 |
| 11. | A-1526 | Cross Recessed Head Screw (M4 x 6) | 1 |
| 12. | NR-30 | Metric Dial | 1 |
| | NR-29 | Imperial Dial | 1 |
| 13. | R-3330 | Stem | 1 |



CARRIAGE

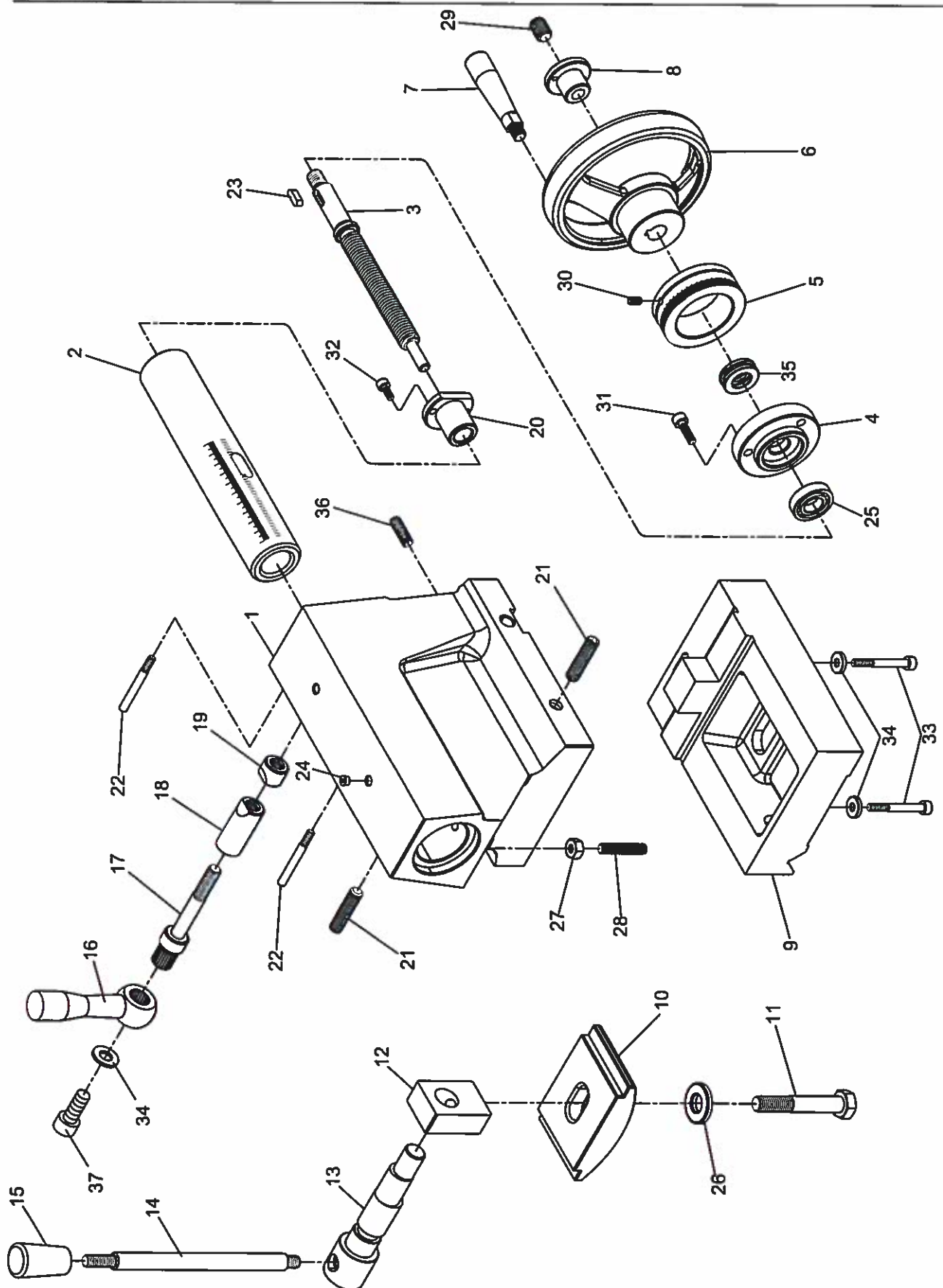
| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-------------------------------------|----------|-----|----------|-------------------------------------|----------|
| 1. | R-4401 | Carriage Casting | 1 | 31. | A-1510 | Button Head Cap Screw (M6 x 12) | 1 |
| 2. | R-4003-1 | Cross Feed Screw (Metric) | 1 | 32. | A-1204 | Socket Head Cap Screw (M6 x 20) | 2 |
| | R-4003-2 | Cross Feed Screw (Imperial) | 1 | 33. | A-1212 | Socket Head Cap Screw (M8 x 16) | 4 |
| 3. | R-4004-1 | Cross Feed Nut (Metric) | 1 | 34. | A-1213 | Socket Head Cap Screw (M8 x 20) | 3 |
| | R-4004-2 | Cross Feed Nut (Imperial) | 1 | 35. | A-1123 | Socket Headless Set Screw (M8 x 16) | 1 |
| 4. | R-4005 | Cross Feed Pinion | 1 | | | | |
| 5. | R-4006 | Cross Feed Keeper | 1 | | | | |
| 6. | R-4023 | Collar | 1 | | | | |
| 7. | R-4007 | Thrust Nut | 2 | | | | |
| 8. | R-4008 | Index Ring (Metric) | 1 | | | | |
| | R-4020 | Index Ring (Imperial) | 1 | | | | |
| | R-4025-1 | Dual Dial (Metric) | 1 | | | | |
| | R-4025 | Dual Dial (Imperial) | 1 | | | | |
| 9. | R-4024 | Handwheel | 1 | | | | |
| 10. | T-4007 | Handle | 1 | | | | |
| 11. | R-4013 | Front Strip | 2 | | | | |
| 12. | R-4016 | Clamp | 1 | | | | |
| 13. | R-4014 | Rear Strip | 1 | | | | |
| 14. | R-4022 | Rear Gib | 1 | | | | |
| 15. | R-4015-1 | Flat Wiper | 2 | | | | |
| 16. | R-4015 | Vee Wiper | 2 | | | | |
| 17. | A-1238 | Socket Head Cap Screw (M10 x 55) | 1 | | | | |
| 18. | A-1917 | Washer (Φ6) | 1 | | | | |
| 19. | A-9300 | Oiler | 5 | | | | |
| 20. | A-1700 | Nut (M6) | 4 | | | | |
| 21. | A-1614 | Button Head Cap Screw (M6 x 8) | 1 | | | | |
| 22. | A-4008 | Pin (Φ5 x 36) | 2 | | | | |
| 23. | A-4006 | Pin (Φ5 x 24) | 1 | | | | |
| 24. | F-4008 | Oil Cap | 1 | | | | |
| 25. | A-2006 | Bearing (#2902) | 2 | | | | |
| 26. | A-1105 | Socket Headless Set Screw (M6 x 30) | 1 | | | | |
| 27. | A-1605 | Cross Recessed Head Screw (M5 x 10) | 8 | | | | |
| 28. | A-1101 | Socket Headless Set Screw (M6 x 10) | 1 | | | | |
| 29. | A-1104 | Socket Headless Set Screw (M6 x 20) | 3 | | | | |
| 30. | A-1216 | Socket Head Cap Screw (M8 x 40) | 2 | | | | |



CROSS & COMPOUND SLIDES

| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|------------------------------|----------|-----|----------|-------------------------------------|----------|
| 1. | R-4002 | Cross Slide | 1 | 31. | R-5010 | Gib Screw | 2 |
| 2. | R-5001 | Swivel Base | 1 | 32. | C-4032 | Gib Screw | 2 |
| 3. | R-5002 | Top Slide | 1 | 33. | A-1129 | Socket Headless Set Screw (M8 x 20) | 1 |
| 4. | R-5021 | Slotted Top Slide (Optional) | 1 | 34. | A-1100 | Socket Headless Set Screw (M6 x 6) | 2 |
| 5. | R-5004-1 | Nut (Metric) | 1 | 35. | A-1104 | Socket Headless Set Screw (M6 x 20) | 1 |
| | R-5004-2 | Nut (Imperial) | 1 | | | | |
| 6. | R-5003-1 | Lead Screw (Metric) | 1 | 36. | A-1204 | Socket Head Cap Screw (M6 x 20) | 3 |
| | R-5003-2 | Lead Screw (Imperial) | 1 | 37. | A-1278 | Socket Head Cap Screw (M8 x 18) | 2 |
| 7. | R-5006 | Keeper | 1 | 38. | A-1728 | Nut (M6) | 1 |
| 8. | R-5007 | Index Ring (Metric) | 1 | 39. | A-1123 | Socket Headless Set Screw (M8 x 16) | 1 |
| | R-5020 | Index Ring (Imperial) | 1 | | | | |
| | R-5025-1 | Index Ring (Dual /Metric) | 1 | | | | |
| | R-5025 | Index Ring (Dual /Imperial) | 1 | | | | |
| 9. | R-5024 | Hand wheel | 1 | | | | |
| 10. | R-5019 | Handle (Short) | 1 | | | | |
| 11. | R-5009 | Handle (Long) | 1 | | | | |
| 12. | R-5015 | Stud | 1 | | | | |
| 13. | R-5022 | T-Slot Stud (Optional) | 1 | | | | |
| 14. | R-5023 | T-Slot Clamp (Optional) | 1 | | | | |
| 15. | R-4011 | Gib | 1 | | | | |
| 16. | R-5011 | Gib | 1 | | | | |
| 17. | R-5013-1 | 4-Ways Toolpost | 1 | | | | |
| 18. | R-5014-1 | Toolpost Screw | 8 | | | | |
| 19. | R-5016 | Washer | 1 | | | | |
| 20. | R-5017 | Handle Boss | 1 | | | | |
| 21. | R-3023 | Handle Lever | 1 | | | | |
| 22. | A-9101 | Handle | 1 | | | | |
| 23. | R-4019 | Clamp Nut | 2 | | | | |
| 24. | R-5005 | Nut | 1 | | | | |
| 25. | R-4018 | Bush | 1 | | | | |
| 26. | R-4029 | Wiper | 1 | | | | |
| 27. | R-5012 | Stopper | 1 | | | | |
| 28. | A-8205 | Spring | 1 | | | | |
| 29. | A-2021 | Bearing (# 51103) | 2 | | | | |
| 30. | A-9300 | Oiler | 4 | | | | |

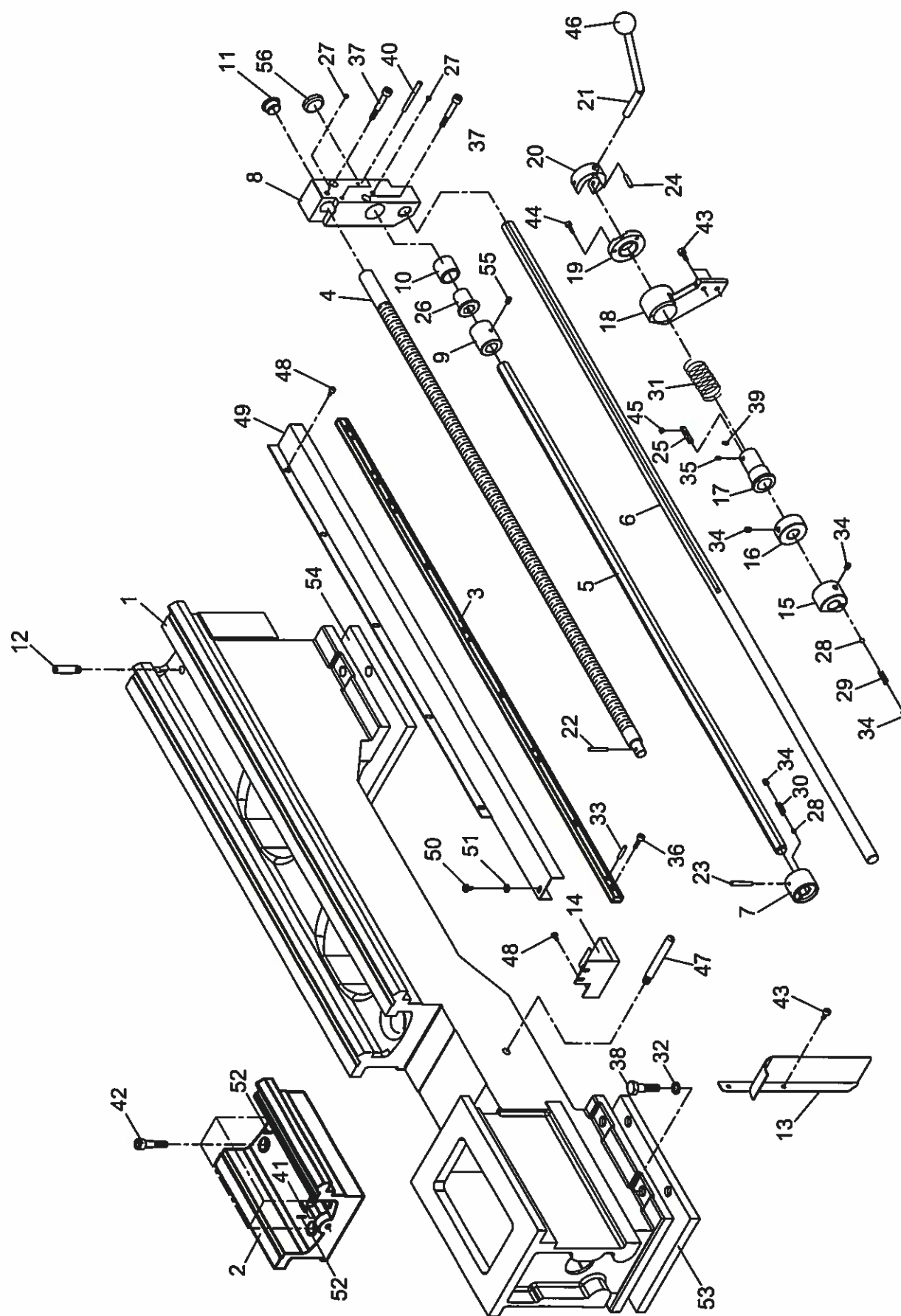
TAILSTOCK



TAILSTOCK

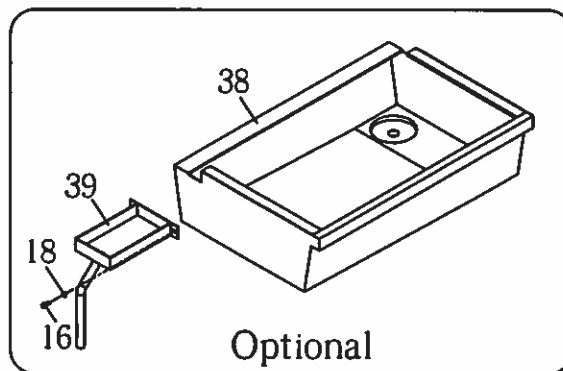
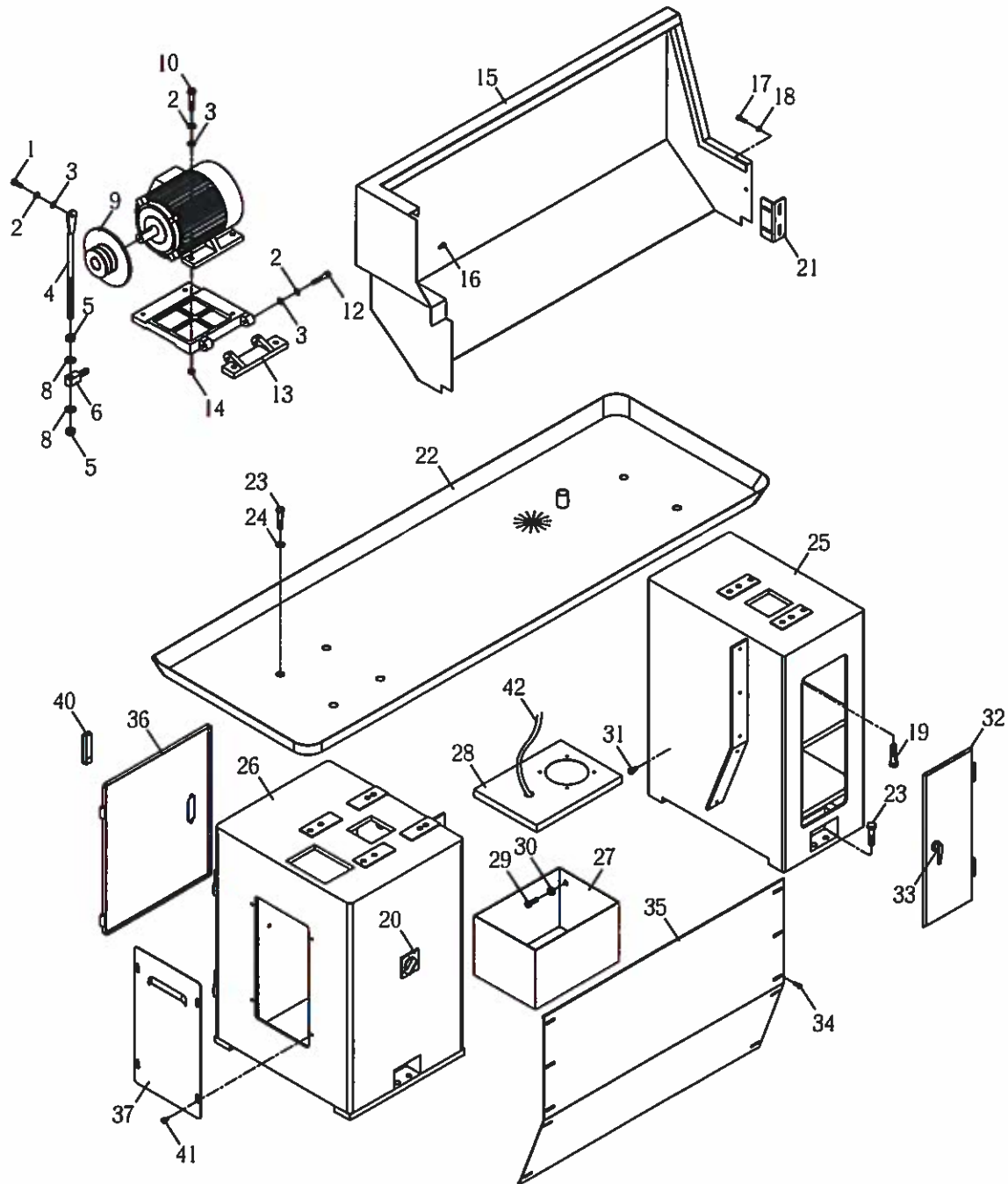
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--------------------------------------|----------|
| 1. | R-6001-1 | Tailstock Body | 1 |
| 2. | R-6002 | Tailstock Barrel | 1 |
| 3. | R-6003-1 | Lead Screw (Metric) | 1 |
| | R-6003-2 | Lead Screw (Imperial) | 1 |
| 4. | R-6004 | Keeper | 1 |
| 5. | R-6020-1 | Index Ring (Metric) | 1 |
| | R-6020 | Index Ring (Imperial) | 1 |
| 6. | R-3003 | Hand Wheel | 1 |
| 7. | T-4007 | Handle | 1 |
| 8. | R-3033 | Plug | 1 |
| 9. | R-6217-1 | Tailstock Base | 1 |
| 10. | R-6018 | Clamp | 1 |
| 11. | A-1449 | Hexagon Bolt (M12 x 75) | 1 |
| 12. | R-6015 | Pivot Block | 1 |
| 13. | R-6012-1 | Crank Shaft | 1 |
| 14. | R-6011 | Lever | 1 |
| 15. | A-9100 | Handle | 1 |
| 16. | R-6006 | Lever | 1 |
| 17. | R-6007 | Clamp Shaft | 1 |
| 18. | R-6009 | Clamp Bushing | 1 |
| 19. | R-6008 | Clamp Bushing | 1 |
| 20. | R-6022-1 | Nut (Metric) | 1 |
| | R-6022-2 | Nut (Imperial) | 1 |
| 21. | A-1132 | Socket Headless Set Screw (M10 x 40) | 2 |
| 22. | C-6026 | Stop Pin | 2 |
| 23. | A-7205 | Key (5 x 5 x 15) | 1 |
| 24. | A-9300 | Oiler (1/4") | 2 |
| 25. | A-2006 | Bearing (#2902) | 1 |
| 26. | R-6024 | Washer (M12) | 1 |
| 27. | A-1701 | Nut (M8) | 1 |
| 28. | A-1134 | Socket Headless Set Screw (M8 x 40) | 1 |
| 29. | A-1112 | Socket Headless Set Screw (M12 x 12) | 1 |
| 30. | A-1101 | Socket Headless Set Screw (M6 x 10) | 2 |
| 31. | A-1204 | Socket Head Cap Screw (M6 x 20) | 3 |
| 32. | A-1246 | Socket Head Cap Screw (M5 x 12) | 2 |
| 33. | A-1288 | Socket Head Cap Screw (M6 x 50) | 2 |
| 34. | R-1030 | Washer | 3 |
| 35. | A-2000 | Bearing (Wtb/As1528) | 1 |
| 36. | A-1178 | Socket Headless Set Screw (M10 x 30) | 1 |
| 37. | A-1525 | Round Head Cap Screw (M6 x 16) | 1 |

BED ASSEMBLY



| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> | <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|---------------------------------------|-----------------|------------|-----------------|-------------------------------------|-----------------|
| 1. | R-7701 | Gap Bed (750) | 1 | 29. | A-8207 | Spring | 2 |
| | R-7701 | Gap Bed (1000) | 1 | 30. | A-8209 | Spring | 2 |
| | R-7701-1 | Straight Bed (750) | 1 | | | | |
| | R-7701-1 | Straight Bed (1000) | 1 | 31. | A-8208 | Spring | 1 |
| 2. | R-7701-P | Gap Piece | 1 | 32. | F-8054 | Washer (M12) | 6 |
| 3. | R-7711 | Rack (750) | 1 | 33. | A-4005 | Pin (Φ5 x 20) | 6 |
| | R-7711 | Rack (1000) | 1 | 34. | A-1169 | Socket Headless Set Screw (M8 x 10) | 5 |
| 4. | R-7412-1 | Leadscrew (750 Metric) (Universal) | 1 | 35. | A-1100 | Socket Headless Set Screw (M6 x 6) | 2 |
| | R-7412-1 | Leadscrew (1000 Metric) (Universal) | 1 | | | | |
| | R-7412-2 | Leadscrew (750 Imperial) (Universal) | 1 | 36. | A-1204 | Socket Head Cap Screw (M6 x 20) | 8-9 |
| | R-7412-2 | Leadscrew (1000 Imperial) (Universal) | 1 | 37. | A-1261 | Socket Head Cap Screw (M8 x 55) | 2 |
| | R-7312-750 | Leadscrew (750 Metric) | 1 | 38. | A-1462 | Hexagon Head Screw (M12 x 45) | 6 |
| | R-7312-1000 | Leadscrew (1000 Metric) | 1 | 39. | A-1101 | Socket Headless Set Screw (M6 x 10) | 2 |
| | R-7012-750 | Leadscrew (750 Imperial) | 1 | 40. | A-4012 | Pin (Φ5 x 55) | 2 |
| | R-7012-1000 | Leadscrew (1000 Imperial) | 1 | | | | |
| 5. | R-7013RA | Feed Rod (750) | 1 | 41. | A-1136 | Socket Headless Set Screw (M8 x 25) | 1 |
| | R-7013RA | Feed Rod (1000) | 1 | 42. | A-1265 | Socket Head Cap Screw (M10 x 45) | 4 |
| | | | | 43. | A-1202 | Socket Head Cap Screw (M6 x12) | 2 |
| 6. | R-7050 | Switch Rod (750) | 1 | 44. | A-1239 | Socket Head Cap Screw (M5 x 15) | 3 |
| | R-7050 | Switch Rod (1000) | 1 | 45. | A-1526 | Cross Recessed Head Screw (M4 x 6) | 1 |
| 7. | R-2133-2RA | Coupling | 1 | | | | |
| 8. | R-7031RA | End Bracket | 1 | 46. | A-9110 | 3/8" Handle | 1 |
| 9. | F-8014 | Stop Sleeve | 1 | 47. | C-3096 | Stop Pin | 1 |
| 10. | F-8053 | Bush | 1 | 48. | A-1509 | Cross Recessed Head Screw (M5 x 10) | 7-8 |
| | | | | 49. | R-7070 | Leadscrew Cover (750) | 1 |
| 11. | C-2075 | Plug | 1 | | R-7070 | Leadscrew Cover (1000) | 1 |
| 12. | C-8007 | Stop Pin | 1 | 50. | A-1512 | Cross Recessed Head Screw (M6 x 10) | 1 |
| 13. | R-7005 | Guard | 1 | | | | |
| 14. | R-7071 | Switch Cover | 1 | 51. | A-1901 | Washer (M6) | 1 |
| 15. | R-7044 | Cam Assy | 1 | 52. | T-7055 | Taper Pin | 2 |
| | | | | 53. | R-7072 | Riser Block (Optional/Higher) | 1 |
| 16. | R-7036 | Collar | 1 | 54. | R-7073 | Riser Block (Optional/Higher) | 1 |
| 17. | R-7033 | Sleeve | 1 | 55. | FS-0800 | Cup Pnt Nylock (M6x10) | 1 |
| 18. | R-7032-1 | Bracket | 1 | | | | |
| 19. | R-7032-2 | Gap Ring | 1 | 56. | F-8027 | Plug Tailend Bracket | 1 |
| 20. | R-7034 | Lever Assembly | 1 | | | | |
| | | | | | | | |
| 21. | C-8020 | Lever | 1 | | | | |
| 22. | R-2415-1 | Taper Pin | 1 | | | | |
| 23. | A-4009 | Pin (Φ5 x 40) | 1 | | | | |
| 24. | A-4021 | Pin (Φ5 x 15) | 1 | | | | |
| 25. | A-7209 | Key (5 x 5 x 35) | 1 | | | | |
| | | | | | | | |
| 26. | F-8035 | Stop Bush | 1 | | | | |
| 27. | A-9300 | Oiler | 2 | | | | |
| 28. | A-9202 | Ball (Φ1/4") | 4 | | | | |

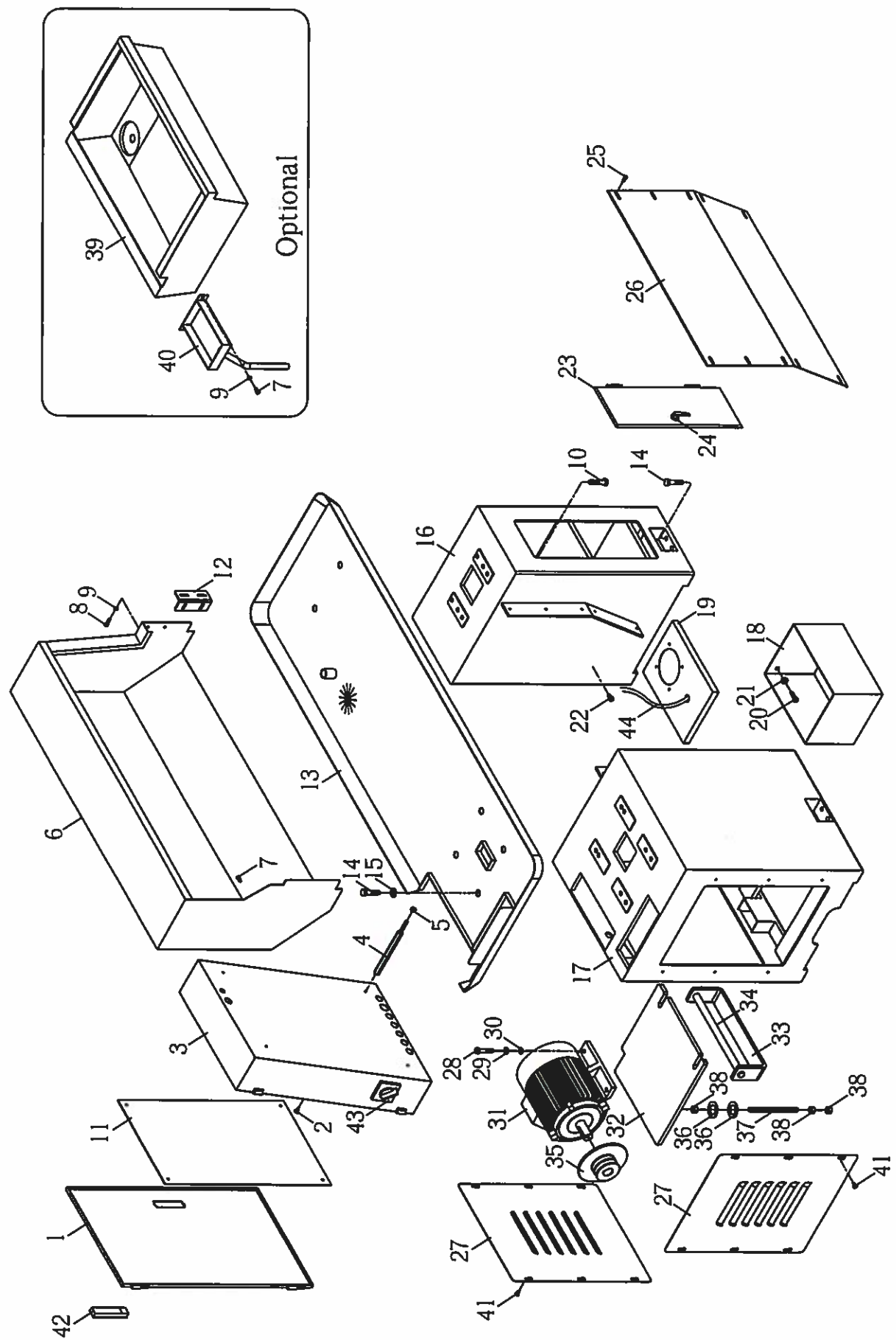
PLINTH & SHEET METAL



PLINTH & SHEET METAL

| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--|----------|-----|----------|---|----------|
| 1 | A-1213 | Socket Head Cap Screw (M8 x 20) | 1 | 31 | A-1211 | Socket Head Cap Screw (M8 x 12) | 1 |
| 2 | A-1802 | Spring Washer (Φ8) | 7 | 32 | R-7104-1 | Plinth Door | 1 |
| 3 | A-1902 | Washer (Φ8) | 7 | 33 | A-9010 | Handle | 1 |
| 4 | R-7021 | Linkage | 1 | 34 | A-1525 | Button Head Cap Screw (M6 x 16) | 10 |
| 5 | A-1703 | Nut (M12) | 2 | 35 | R-7105 | Pedestal Plate (750/1000) | 1 |
| | | | | | R-7105-1 | Pedestal Plate (750/1000) (Optional/Higher) | 1 |
| 6 | R-7026 | Pivot | 1 | 36 | R-7203-1 | Electric Cabinet Door | 1 |
| 7 | R-7018 | Platform | 1 | 37 | R-7203-2 | Cover | 1 |
| 8 | A-1905 | Washer (Φ12) | 2 | 38 | R-7130 | Chip Tray (Optional) | 1 |
| 9 | R-7016 | Motor Pulley | 1 | 39 | R-9048-2 | Receiver (Optional) | 1 |
| 10 | A-1461 | Hexagon Head Screw (M8 x 35) | 4 | 40 | A-9011 | Door Lock | 1 |
| 11 | A-0288 | Motor (VS model) | 1 | 41 | A-1607 | Cross Round Head Screw (M6 x 12) | 4 |
| | A-0293 | Motor (Single phase) | 1 | 42 | A-4136 | Hose (1/2") | 1 |
| | A-0298 | Motor (Three phase) | 1 | 43 | A-1443 | Hexagon Head Screw (M12 x 30) | 8 |
| 12 | A-1217 | Socket Head Cap Screw (M8 x 45) | 2 | 44 | A-8837 | Main Switch | 1 |
| 13 | R-7017 | Hinge | 1 | | | | |
| 14 | A-1701 | Nut (M8) | 4 | | | | |
| 15 | R-7010-2 | Splash Guard (750/1000) | 1 | | | | |
| | R-7010-4 | Splash Guard (750/1000) (Optional/Deeper) | 1 | | | | |
| | R-7010-5 | Splash Guard (750/1000) (Optional/Sliding Guard) | 1 | | | | |
| 16 | A-1202 | Socket Head Cap Screw (M6 x 12) | 4 | | | | |
| 17 | A-1204 | Socket Head Cap Screw (M6 x 20) | 1 | | | | |
| 18 | A-1901 | Washer (Φ6) | 3 | | | | |
| 19 | R-7030 | Cap | 1 | | | | |
| 20 | A-8013 | O-Ring (P25) | 1 | | | | |
| 21 | A-1718 | Nut (7/8" x 14NF) | 1 | | | | |
| 22 | R-7102 | Chip Pan (750/1000) | 1 | | | | |
| | R-7128 | Chip Pan (750/1000) (Optional/Chip tray) | 1 | | | | |
| 23 | A-1429 | Hexagon Head Screw (M12 x 45) | 10 | | | | |
| 24 | F-8054 | Washer | 6 | | | | |
| 25 | R-7104 | Plinth (R.H.) | 1 | | | | |
| | R-7104-2 | Plinth (L.H.) (Optional/Higher) | 1 | | | | |
| | R-7131 | Plinth (R.H.) (Optional/Chip tray) | 1 | | | | |
| 26 | R-7203 | Plinth (L.H.) | 1 | | | | |
| | R-7203-3 | Plinth (L.H.) (Optional/Higher) | 1 | | | | |
| | R-7132 | Plinth (L.H.) (Optional/Chip tray) | 1 | | | | |
| 27 | R-9047 | Coolant Tank | 1 | | | | |
| 28 | R-9048 | Tank Cover | 1 | | | | |
| 29 | A-1214 | Socket Head Cap Screw (M8 x 25) | 2 | | | | |
| 30 | A-1702 | Nut (M10) | 2 | | | | |

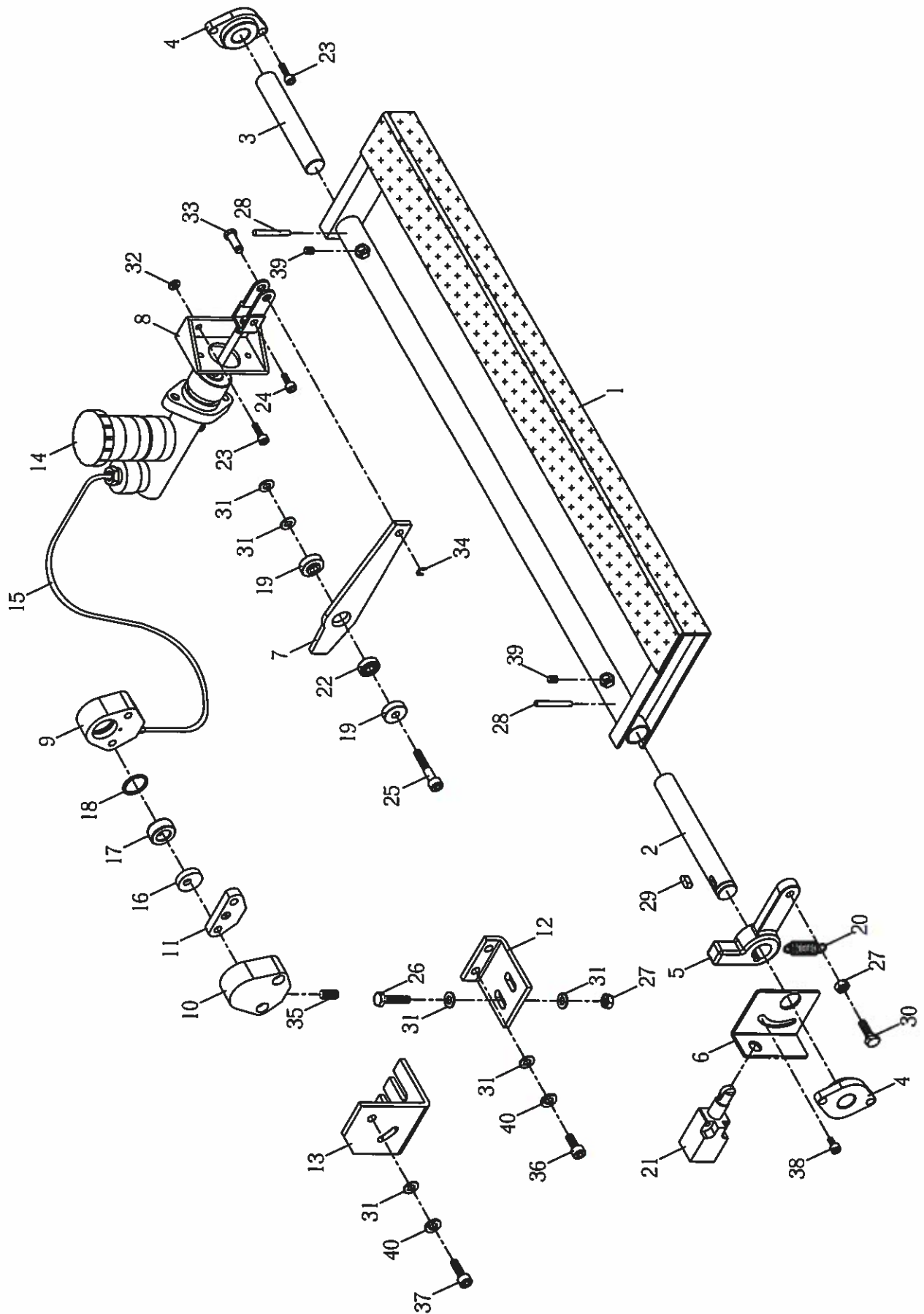
PLINTH & SHEET METAL (Optional)



PLINTH & SHEET METAL (OPTIONAL)

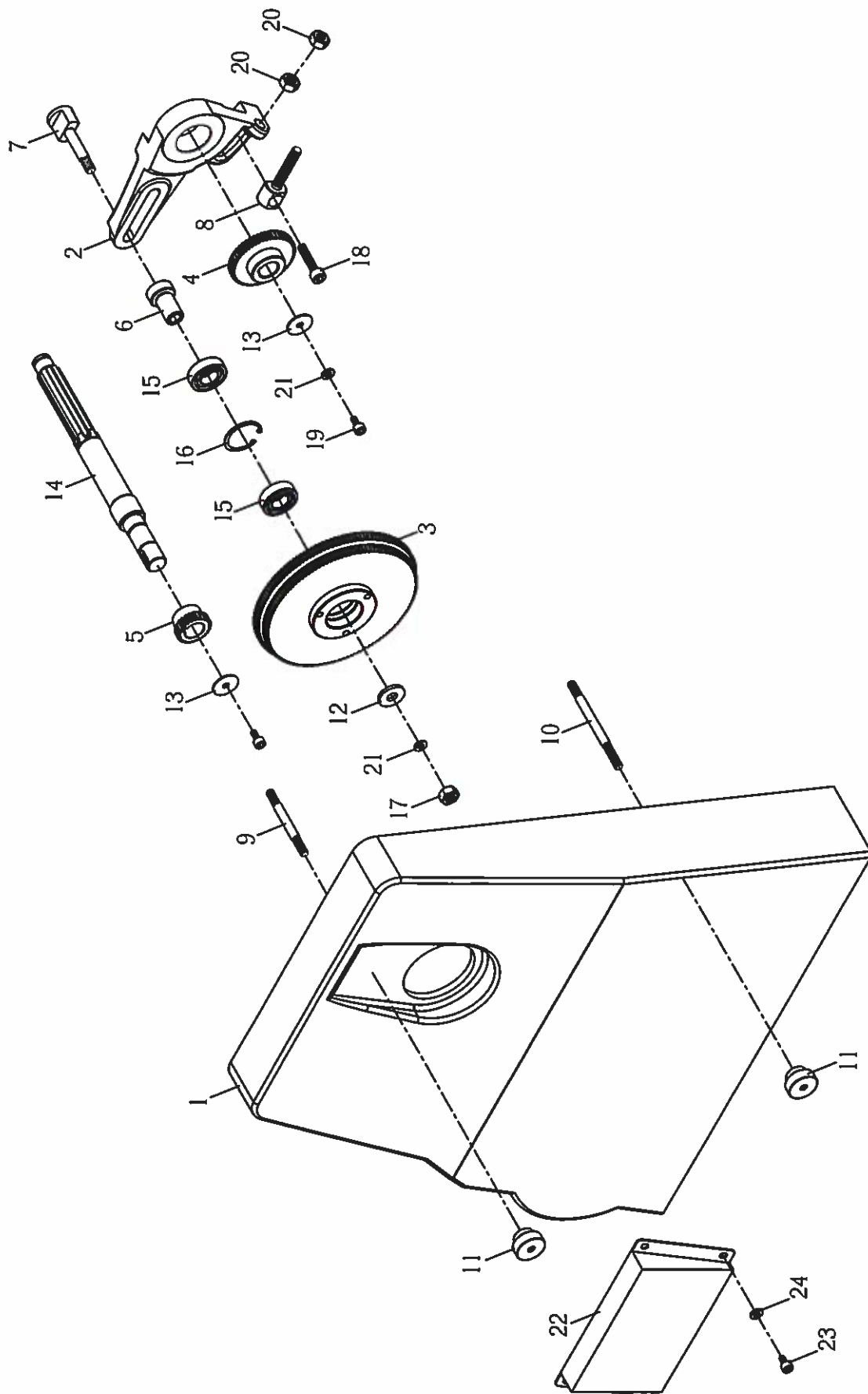
| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---|----------|-----|----------|---|----------|
| 1. | R-7458 | Electric Cabinet Door | 1 | 26. | R-7405 | Pedestal Plate (750/1000) | 1 |
| 2. | A-1510 | Button Head Cap Screw (M6 x 12) | 2 | | R-7405-1 | Pedestal Plate (750/1000) (Optional/Higher) | 1 |
| 3. | R-7457 | Electrical Cabinet | 1 | 27. | R-7452 | Cover | 2 |
| | R-7457-2 | Electrical Cabinet (VS model) | 1 | 28. | A-1452 | Hexagon Head Screw (M10 x 50) | 4 |
| 4. | T-7034 | Stud | 2 | 29. | A-1807 | Spring Washer (Φ10) | 4 |
| | R-7459 | Stud (VS model) | 2 | 30. | A-1908 | Washer (Φ10) | 4 |
| 5. | A-1701 | Nut (M8) | 2 | 31. | A-0288 | Motor (VS model) | 1 |
| | | | | | A-0293 | Motor (Single phase) | 1 |
| 6. | R-7010 | Splash Guard (750/1000) (Sliding Guard) | 1 | | A-0298 | Motor (Three phase) | 1 |
| | R-7010-1 | Splash Guard (750/1000) (Optional/Deeper) | 1 | 32. | R-7418 | Platform | 1 |
| | R-7010-3 | Splash Guard (750/1000) (Optional) | 1 | 33. | R-7454 | U Support | 1 |
| | R-7010-6 | Splash Guard (750/1000) -Optional/Higher&Deeper | 1 | 34. | R-7455 | Rod | 1 |
| 7. | A-1202 | Socket Head Cap Screw (M8 x 12) | 4 | 35. | R-7018 | Motor Pulley | 1 |
| 8. | A-1204 | Socket Head Cap Screw (M8 x 20) | 1 | 36. | C-7006 | Washer | 4 |
| 9. | A-1901 | Washer (Φ6) | 3 | 37. | C-7005 | Stud | 2 |
| 10. | R-7030 | Cap | 1 | 38. | A-1712 | Nut (1/2") | 8 |
| 11. | A-8013 | O-Ring (P25) | 1 | 39. | R-7130 | Chip Tray (Optional) | 1 |
| 12. | A-1718 | Nut (7/8" x 14NF) | 1 | 40. | R-9048-2 | Receiver (Optional) | 1 |
| 13. | R-7402 | Chip Pan (750/1000) | 1 | 41. | A-1807 | Cross Round Head Screw (M6 x 12) | 12 |
| | R-7129 | Chip Pan (750/1000) (Optional/Chip tray) | 1 | 42. | A-9011-1 | Door Lock | 1 |
| 14. | A-1429 | Hexagon Head Screw (M12 x 45) | 10 | 43. | A-8637 | Main Switch | 1 |
| 15. | F-8054 | Washer | 6 | 44. | A-4136 | Hose (1/2") | 1 |
| 16. | R-7104 | Plinth (R.H.) | 1 | 45. | A-1443 | Hexagon Head Screw (M12 x 30) | 8 |
| | R-7104-2 | Plinth (R.H.) (Optional/Higher) | 1 | | | | |
| | R-7131 | Plinth (R.H.) (Optional/Chip tray) | 1 | | | | |
| 17. | R-7403 | Plinth (L.H.) | 1 | | | | |
| | R-7403-1 | Plinth (L.H.) (Optional/Higher) | 1 | | | | |
| | R-7133 | Plinth (L.H.) (Optional/Chip tray) | 1 | | | | |
| 18. | R-9047 | Coolant Tank | 1 | | | | |
| 19. | R-9048 | Tank Cover | 1 | | | | |
| 20. | A-1214 | Socket Head Cap Screw (M8 x 25) | 2 | | | | |
| 21. | A-1702 | Nut (M10) | 2 | | | | |
| 22. | A-1211 | Socket Head Cap Screw (M8 x 12) | 1 | | | | |
| 23. | R-7104-1 | Plinth Door | 1 | | | | |
| 24. | A-9010 | Handle | 1 | | | | |
| 25. | A-1525 | Button Head Cap Screw (M6 x 16) | 10 | | | | |

HYDRAULIC BRAKING SYSTEM

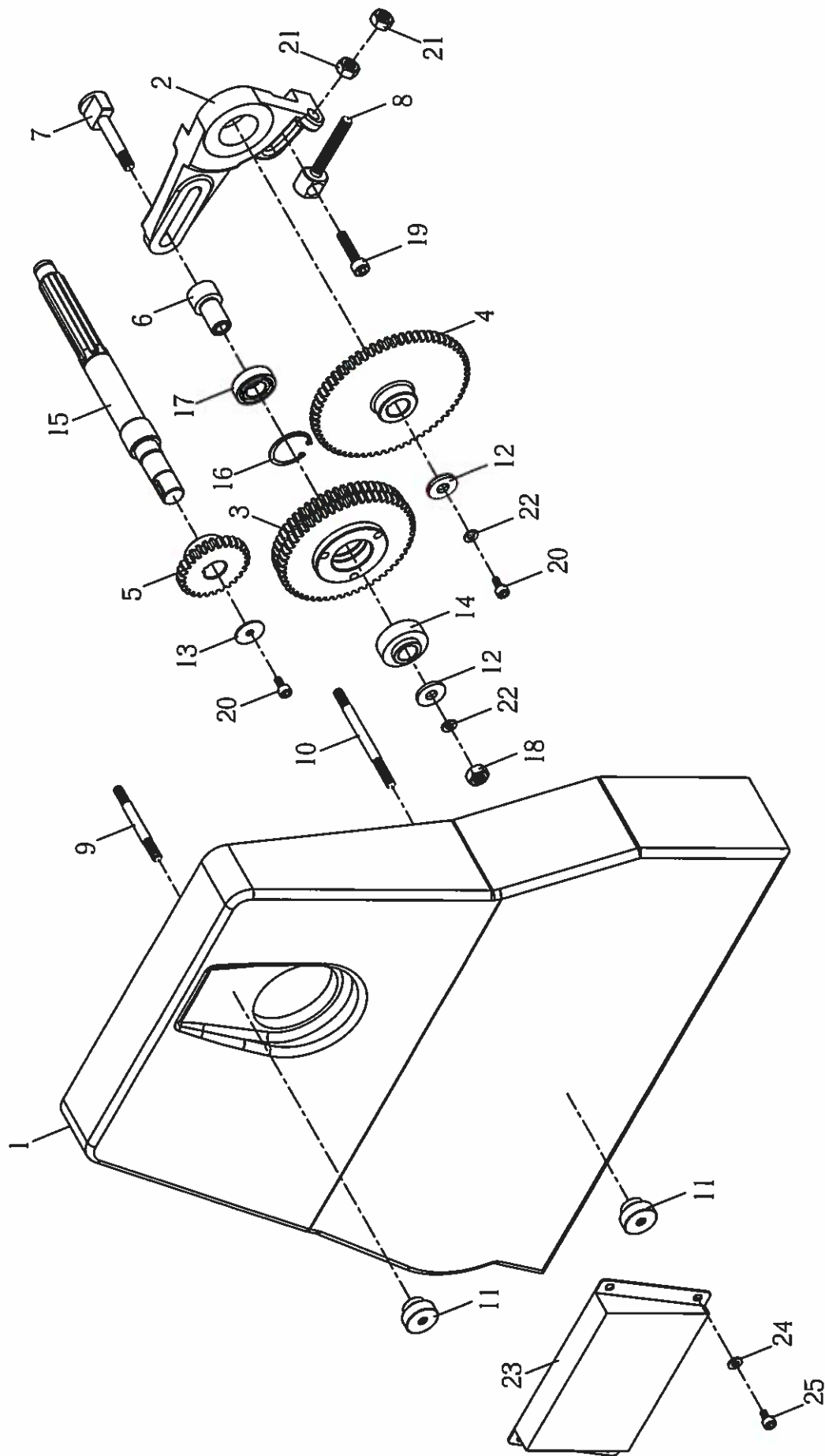


HYDRAULIC BRAKING SYSTEM

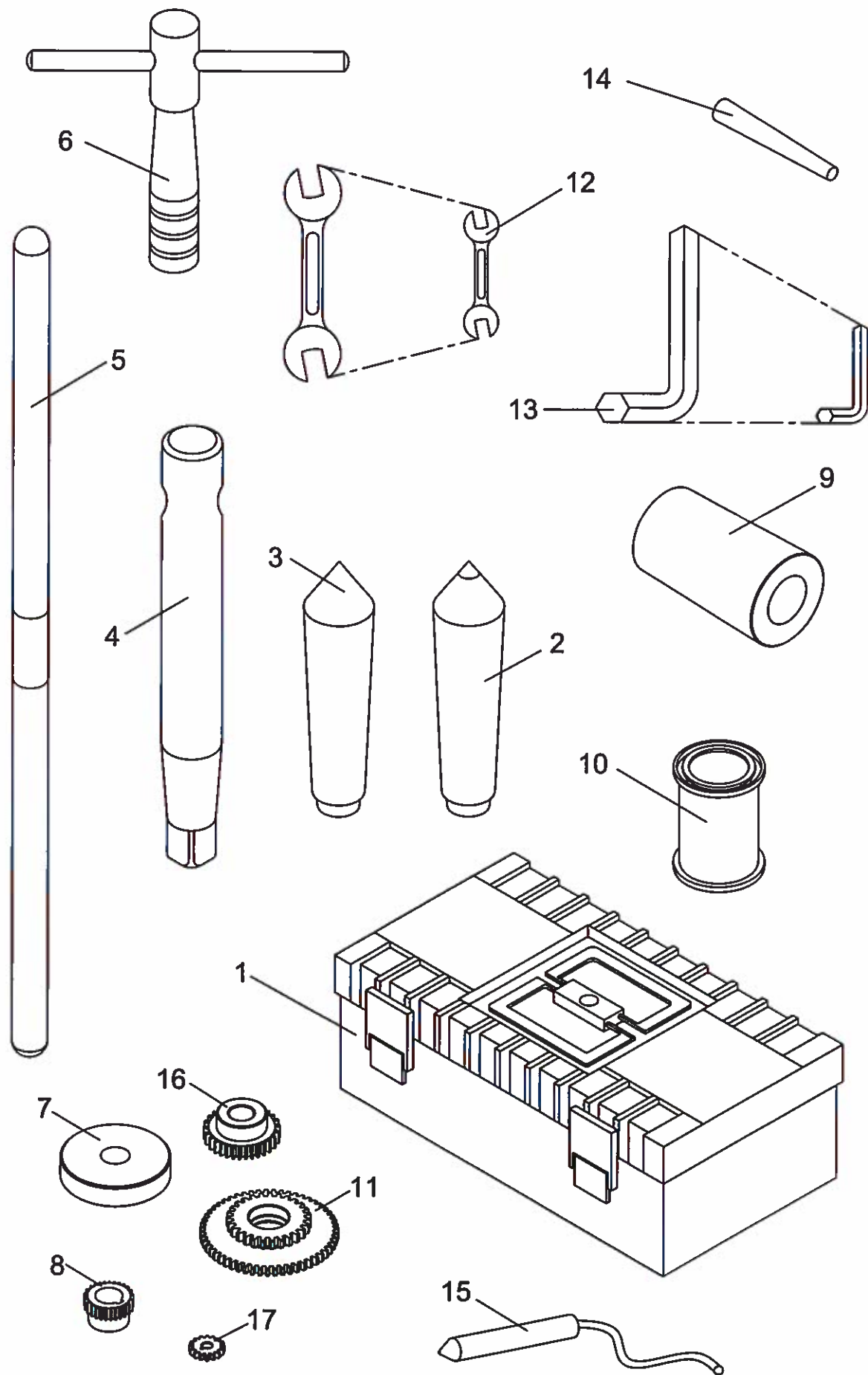
| NO. | PART NO. | DESCRIPTION | QUANTITY | NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--|----------|-----|----------|-------------------------------------|----------|
| 1. | R-7022 | Foot Brake Pedal (750/1000) | 1 | 36. | A-1213 | Socket Head Cap Screw (M8 x 20) | 2 |
| | R-7422 | Foot Brake Pedal (A-Type/Optional) | 1 | 37. | A-1214 | Socket Head Cap Screw (M8 x 25) | 2 |
| 2. | R-7023 | Shaft | 1 | 38. | A-1202 | Socket Head Cap Screw (M6 x 12) | 1 |
| 3. | C-7010 | Connector | 1 | 39. | A-1169 | Socket Headless Set Screw (M8 x 10) | 2 |
| 4. | C-7009 | Bushing | 2 | 40. | A-1802 | Spring Washer (Φ8) | 3 |
| 5. | R-7024 | Crank | 1 | | | | |
| 6. | R-7052 | Support | 1 | | | | |
| 7. | R-7058 | Lever | 1 | | | | |
| 8. | R-7056 | Mounting plate | 1 | | | | |
| 9. | R-7062 | Brake Assy. | 1 | | | | |
| 10. | R-7061 | Brake Assy. | 1 | | | | |
| 11. | R-7066 | Brake Assy. | 1 | | | | |
| 12. | R-7069 | Support | 1 | | | | |
| 13. | R-7068 | Support | 1 | | | | |
| 14. | A-9305 | Hydraulic Pump | 1 | | | | |
| 15. | R-9316 | Oil Tube | 1 | | | | |
| 16. | R-7063 | Brake pad | 2 | | | | |
| 17. | R-7057 | Piston | 2 | | | | |
| 18. | A-6014 | O-Ring (P28) | 2 | | | | |
| 19. | R-7059 | Bushing | 2 | | | | |
| 20. | A-8501 | Spring | 1 | | | | |
| 21. | A-9306 | Micro Switch | 1 | | | | |
| 22. | A-2044 | Bearing (#608ZZ) | 1 | | | | |
| 23. | A-1204 | Socket Head Cap Screw (M6 x 20) | 5 | | | | |
| 24. | A-1203 | Socket Head Cap Screw (M6 x 16) | 1 | | | | |
| 25. | A-1217 | Socket Head Cap Screw (M8 x 45) | 1 | | | | |
| 26. | A-1461 | Hexagon Head Screw (M8 x35) | 2 | | | | |
| 27. | A-1701 | Nut (M8) | 3 | | | | |
| 28. | A-4214 | Taper Pin (#3 x 45) | 2 | | | | |
| 29. | A-7213 | Key (6 x 6 x 15) | 1 | | | | |
| 30. | A-1471 | Hexagon Head Screw (M8 x 25) | 1 | | | | |
| 31. | A-1918 | Washer (Φ8) | 10 | | | | |
| 32. | A-1917 | Washer (Φ6) | 1 | | | | |
| 33. | T-7018 | Pivot | 1 | | | | |
| 34. | A-3100 | Circlip (E6) | 1 | | | | |
| 35. | A-1179 | Socket Headless Set Screw
(3/8" x 1/4" UNF) | 1 | | | | |



| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|-------------------------------------|-----------------|
| 1. | R-8201 | End Cover | 1 |
| 2. | R-8112 | End Gear Quadrant | 1 |
| 3. | R-8009 | Idler Gear 127T x 120T (Inch) | 1 |
| | R-8309 | Idler Gear 120T x 127T (Metric) | 1 |
| 4. | R-8017 | Driven Gear 50T (Inches / Metric) | 1 |
| 5. | R-8016 | Drive Gear 25T (Inches / Metric) | 1 |
| 6. | R-8010 | Bushing | 1 |
| 7. | R-8011 | Bolt | 1 |
| 8. | R-8015 | Quadrant Holding Bolt | 1 |
| 9. | R-8002 | Cover Stud | 1 |
| 10. | T-8002 | Cover Stud | 1 |
| 11. | C-1138 | Knob | 2 |
| 12. | R-8014 | Washer | 1 |
| 13. | R-8013 | Washer | 2 |
| 14. | R-1032 | Gear Train Shaft | 1 |
| 15. | A-2025 | Bearing (#6003ZZ) | 2 |
| 16. | A-3200 | Circlip (R35) | 1 |
| 17. | A-1708 | Nut (3/8") | 1 |
| 18. | A-1258 | Socket Head Cap Screw (M8 x 35) | 1 |
| 19. | A-1202 | Socket Head Cap Screw (M6 x 12) | 2 |
| 20. | A-1709 | Nut (3/8"-24NF) | 2 |
| 21. | A-1812 | Spring Washer (Φ6) | 2 |
| 22. | R-7465 | Cover (CE) | 1 |
| 23. | A-1231 | Socket Head Cap Screw (M6 x 10)(CE) | 4 |
| 24. | A-1812 | Spring Washer (φ 6)(CE) | 4 |



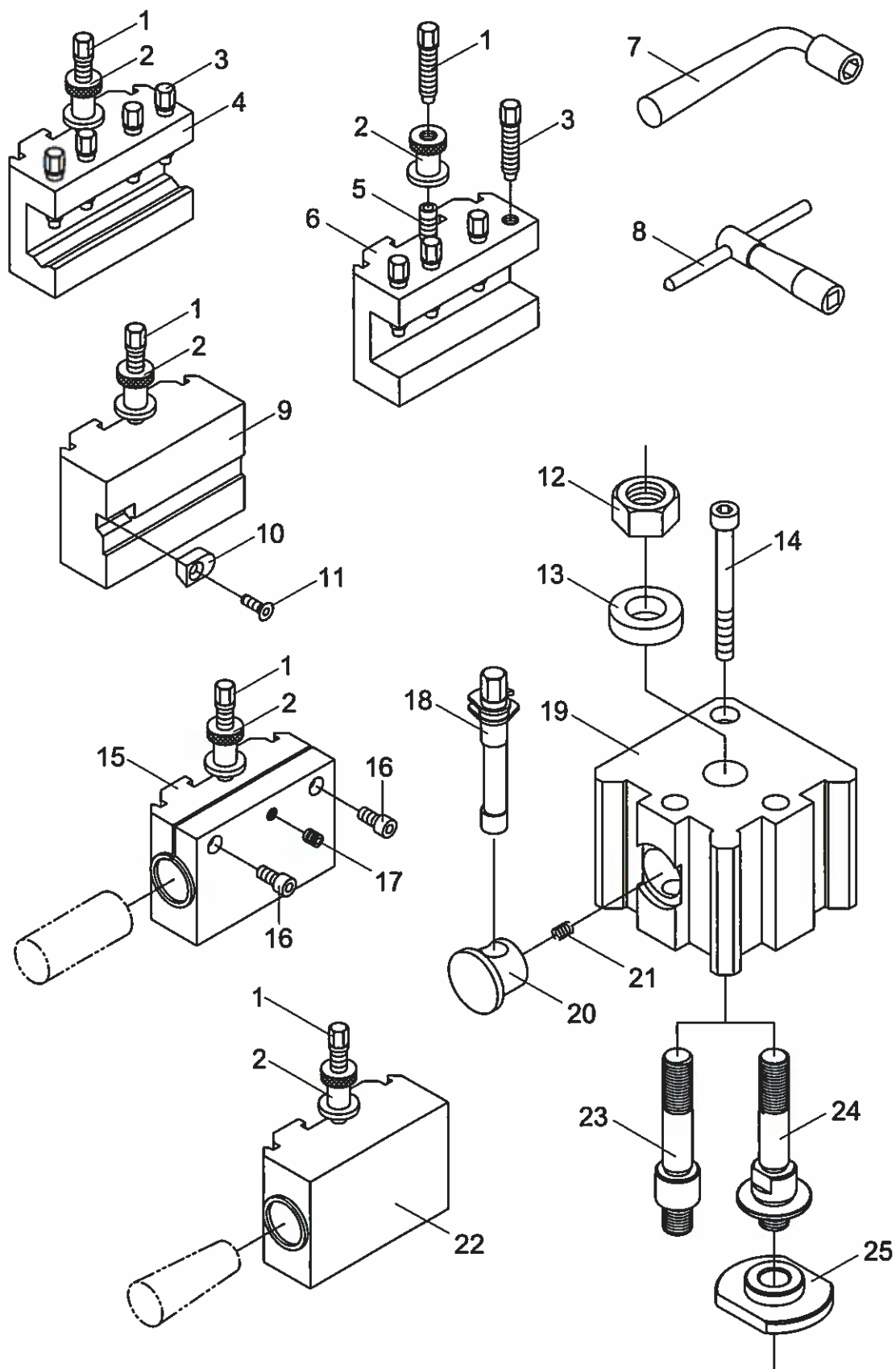
| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|---------------------------------|-----------------|
| 1. | R-8401 | End Cover | 1 |
| 2. | R-8112 | End Gear Quadrant | 1 |
| 3. | R-8408-1 | Idler Gear (Metric) (55T x 54T) | 1 |
| | R-8408-2 | Idler Gear (Inches) (56T) | 1 |
| 4. | R-8405-1 | Driven Gear (Metric) (64T) | 1 |
| | R-8405-2 | Driven Gear (Inches) (57T) | 1 |
| 5. | R-8406-1 | Drive Gear (Metric) (28T) | 1 |
| | R-8406-2 | Drive Gear (Inches) (24T) | 1 |
| 6. | R-8410 | Bushing | 1 |
| 7. | R-8411 | Bolt | 1 |
| 8. | R-8415 | Quadrant Holding Bolt | 1 |
| 9. | R-8002 | Cover Stud | 1 |
| 10. | T-8002 | Cover Stud | 1 |
| 11. | C-1138 | Knob | 2 |
| 12. | R-8014 | Washer | 2 |
| 13. | R-8013 | Washer | 1 |
| 14. | R-8404 | Bushing | 1 |
| 15. | R-1032 | Gear Train Shaft | 1 |
| 16. | A-3200 | Circlip (R35) | 1 |
| 17. | A-2025 | Bearing (#6003ZZ) | 1 |
| 18. | A-1708 | Nut (3/8") | 1 |
| 19. | A-1258 | Socket Head Cap Screw (M8 x 35) | 1 |
| 20. | A-1202 | Socket Head Cap Screw (M6 x 12) | 2 |
| 21. | A-1709 | Nut (3/8"-24NF) | 2 |
| 22. | A-1812 | Spring Washer (Φ6) | 2 |



SERVICE TOOLS

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|--|----------|
| 1. | Z-9000 | Tool Box | 1 |
| 2. | A-4517 | Tailstock Center | 1 |
| 3. | A-4518 | Headstock Center | 1 |
| 4. | A-4527 | Camlock Key | 1 |
| 5. | A-4528 | Key Handle | 1 |
| 6. | A-4529 | Toolscrew Wrench | 1 |
| 7. | T-9086 | Levelling Block | 4 |
| 8. | R-8006 | Gear 40T (Inches / Metric) | 1 |
| | R-8007 | Gear 30T (Inches) | 1 |
| | R-8407-1 | Gear 22T (Metric Universal GearBox , Optional) | 1 |
| | R-8407-2 | Gear 36T (Inches Universal GearBox , Optional) | 1 |
| 9. | R-9011 | Center Sleeve (M.T.#4-1/2 x M.T.#3) | 1 |
| 10. | A-4513 | Touch Paint | 2 |
| 11. | R-8409-1 | Gear 27T x 55T (Metric Universal GearBox , Optional) | 1 |
| | R-8409-2 | Gear 42T x 44T (Inches Universal GearBox , Optional) | 1 |
| 12. | A-4507-2 | Spanner (17 x 19) | 1 |
| | A-4507-3 | Spanner (12 x 14) | 1 |
| | A-4507-4 | Spanner (13 x 11) | 1 |
| 13. | A-4508-1 | Allen Key (3mm) | 1 |
| | A-4508-2 | Allen Key (4mm) | 1 |
| | A-4508-3 | Allen Key (5mm) | 1 |
| | A-4508-4 | Allen Key (6mm) | 1 |
| | A-4508-5 | Allen Key (8mm) | 1 |
| 14. | C-1145 | Taper Pin | 2 |
| | R-2415-1 | Taper Pin (Universal GearBox , Optional) | 2 |
| 15. | C-1098 | Earth Bar With Cable (VS Model , Optional) | 1 |
| 16. | R-8006 | Gear 40T (Inches / Metric) | 1 |
| | R-8008 | Gear 32T (Inches) | 1 |
| | R-8007 | Gear 30T (Metric) | 1 |
| | R-8319 | Gear 33T (Metric) | 1 |
| | R-8320 | Gear 38T (Metric) | 1 |
| | R-8321 | Gear 39T (Metric) | 1 |
| | R-8322 | Gear 42T (Metric) | 1 |
| 17. | R-3331-2 | Gear 20T (Metric) | 1 |
| | R-3331-3 | Gear 21T (Metric) | 1 |
| | C-3080 | Gear 14T (Universal GearBox , Optional) | 1 |
| | C-3081 | Gear 13T (Universal GearBox , Optional) | 1 |
| | C-3083 | Gear 20T (Universal GearBox , Optional) | 1 |
| | C-3084 | Gear 22T (Universal GearBox , Optional) | 1 |

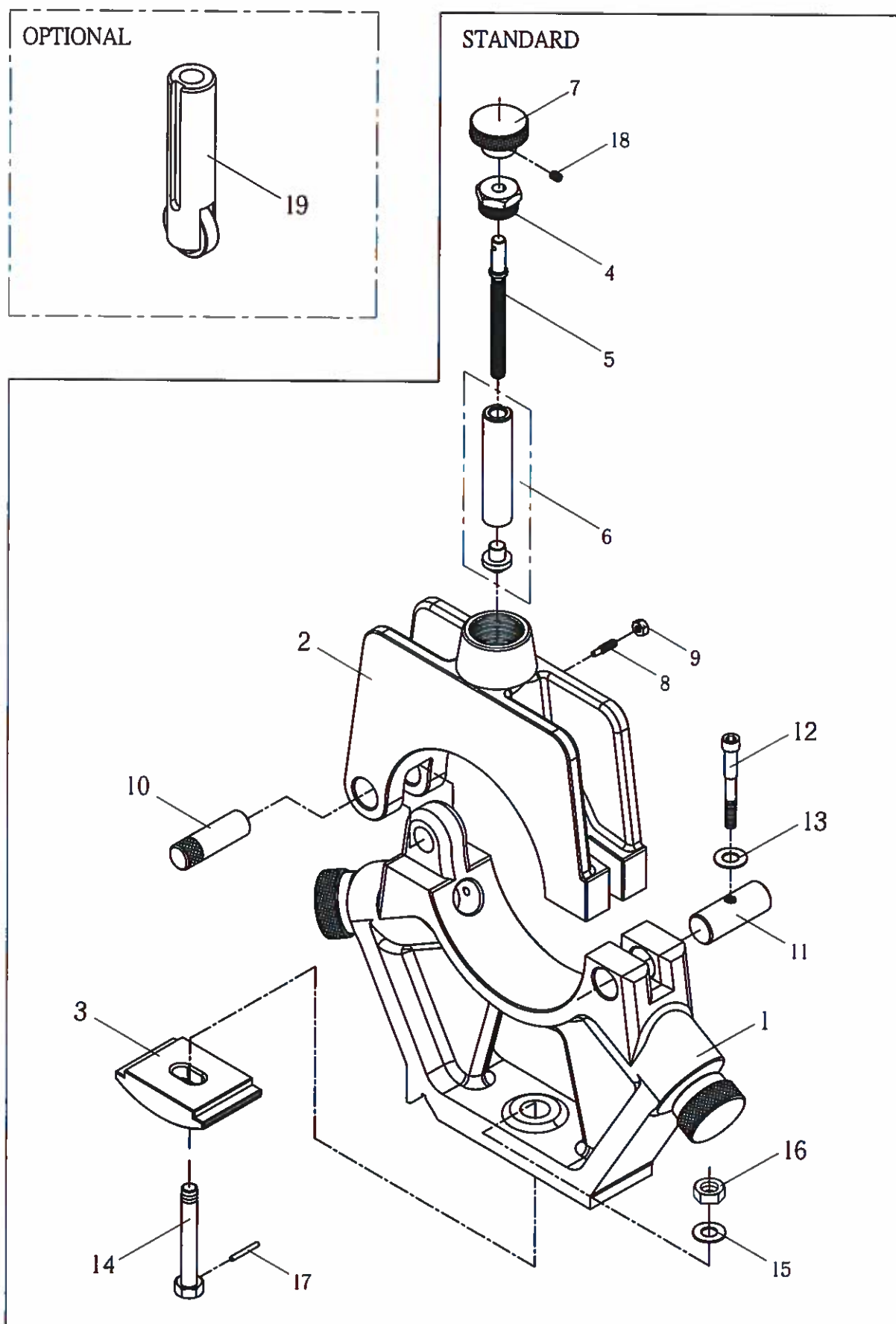
QUICK CHANGE TOOLPOST



ACCESSORIES INDEX

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| 5. | TAPER TURNING ATTACHMENT | 102 |
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STEADY REST

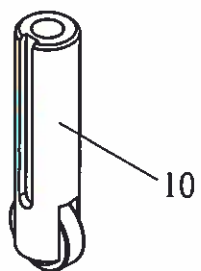


QUICK CHANGE TOOLPOST

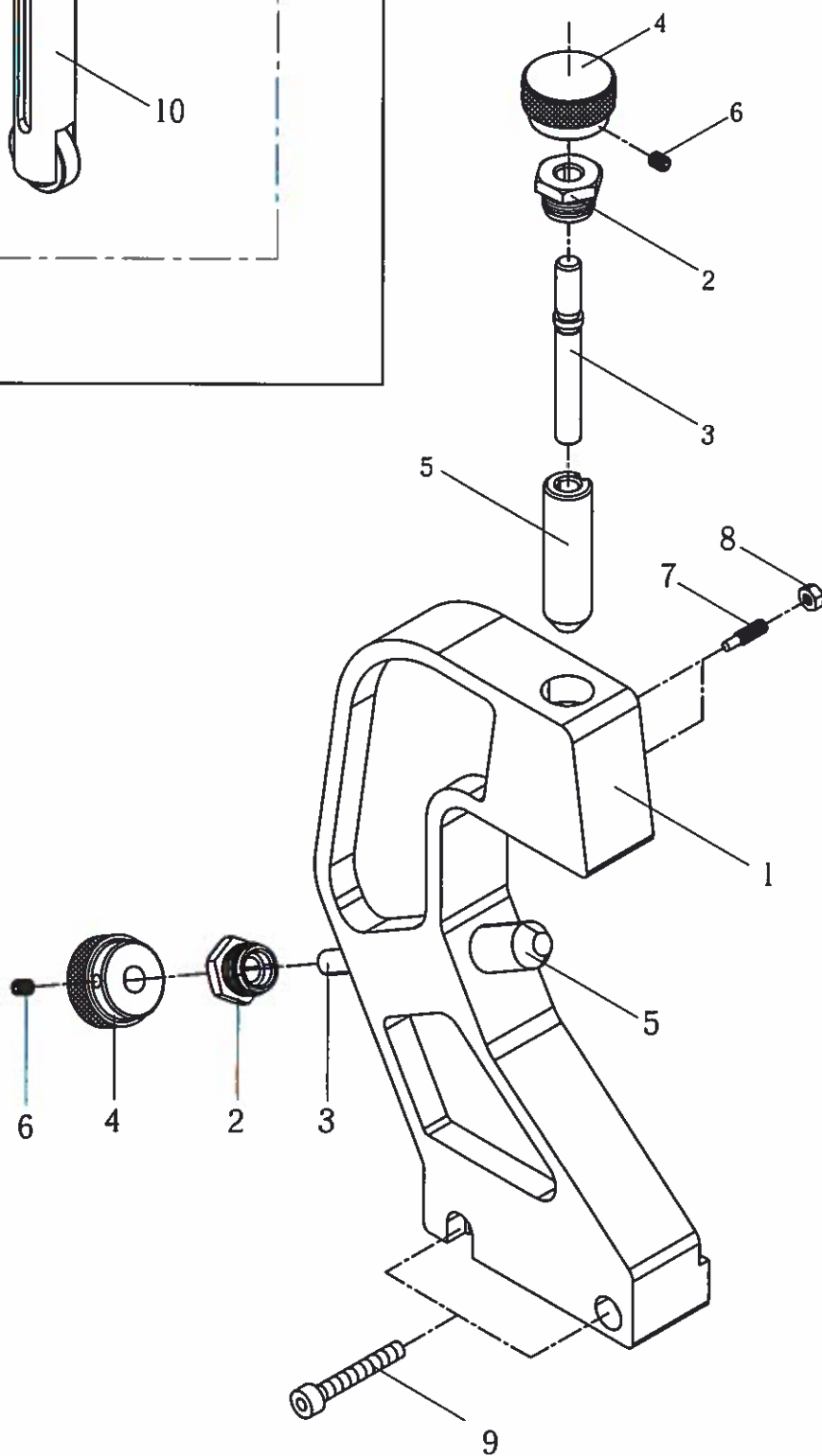
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---|----------|
| 1. | R-9134 | Height Adj. Screw (On Each Toolholder) | 1 |
| 2. | R-9135 | Adjusting Stop (On Each Toolholder) | 1 |
| 3. | R-9134 | Tool Clamp Screw (On No. 4/6 Toolholder) | 4 |
| 4. | R-9137 | Boring (Vee) Toolholder | 1 |
| 5. | A-1107 | Socket Headless Set Screw (M8 x 35L) (On Each Toolholder) | 1 |
| 6. | R-9136 | Standard Toolholder | 1 |
| 7. | A-8527 | Cam Clamp Wrench | 1 |
| 8. | A-8528 | Toolscrew Wrench | 1 |
| 9. | R-9139 | Part-off Toolholder (Optional) | 1 |
| 10. | C-9113 | Blade Clamp (Optional) | 1 |
| 11. | A-1611 | Socket Flat Head Screw (M6 x 20L) (Optional) | 1 |
| 12. | A-1720 | Nut (M16) | 1 |
| 13. | C-6037 | Washer | 1 |
| 14. | A-1306 | Locating Screw (M8 x 75L) | 1 |
| 15. | R-9138 | Plain Bore Toolholder (Optional) | 1 |
| 16. | A-1212 | Socket Head Cap Screw (M8 x 16L) (Optional) | 2 |
| 17. | A-1169 | Socket Headless Set Screw (M8 x 10) (Optional) | 1 |
| 18. | R-9132 | Toolholder Cams | 2 |
| 19. | R-5026 | Q.C.T. Body | 1 |
| 20. | R-9133 | Toolholder Pads | 2 |
| 21. | A-8428 | Spring | 2 |
| 22. | R-9140 | M.T.2 Taper Toolholder (Optional) | 1 |
| 23. | R-5015 | Stud | 1 |
| 24. | R-5022 | T-Slot Stud (Optional) | 1 |
| 25. | R-5023 | T-Slot Clamp (Optional) | 1 |

FOLLOW REST

OPTIONAL



STANDARD

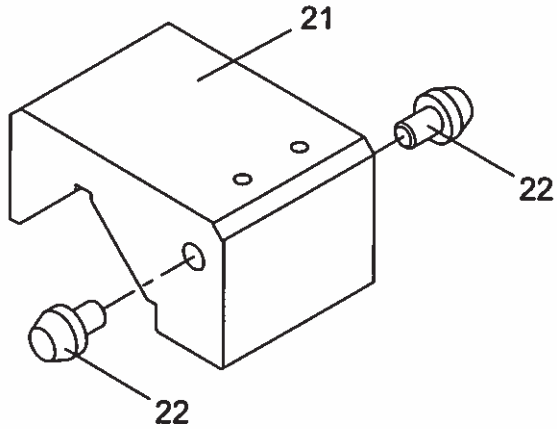


STEADY REST

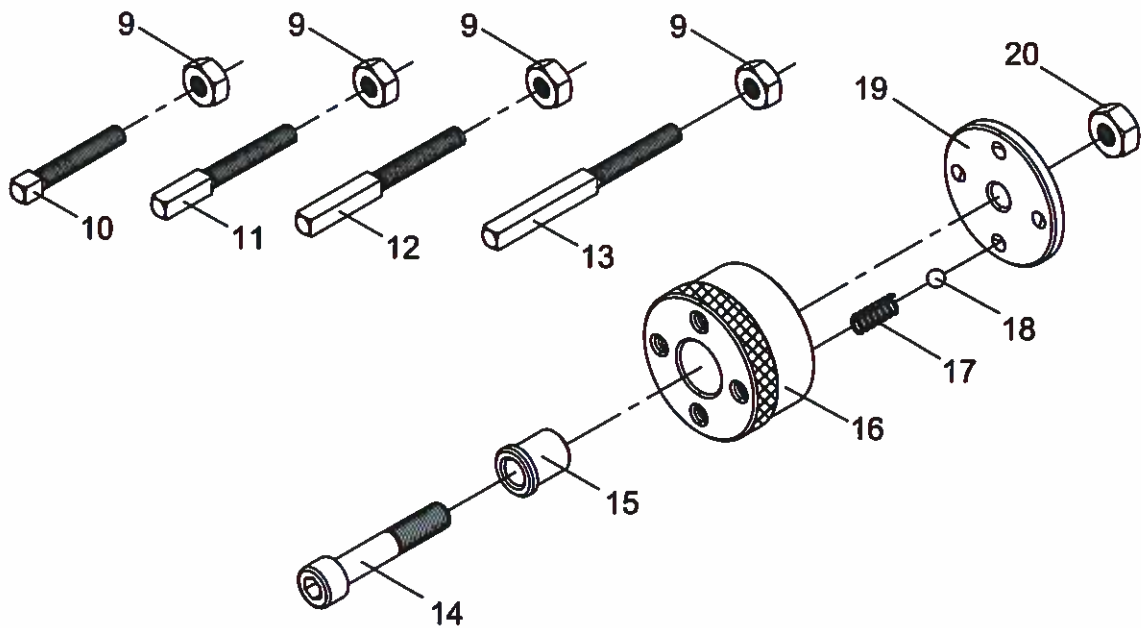
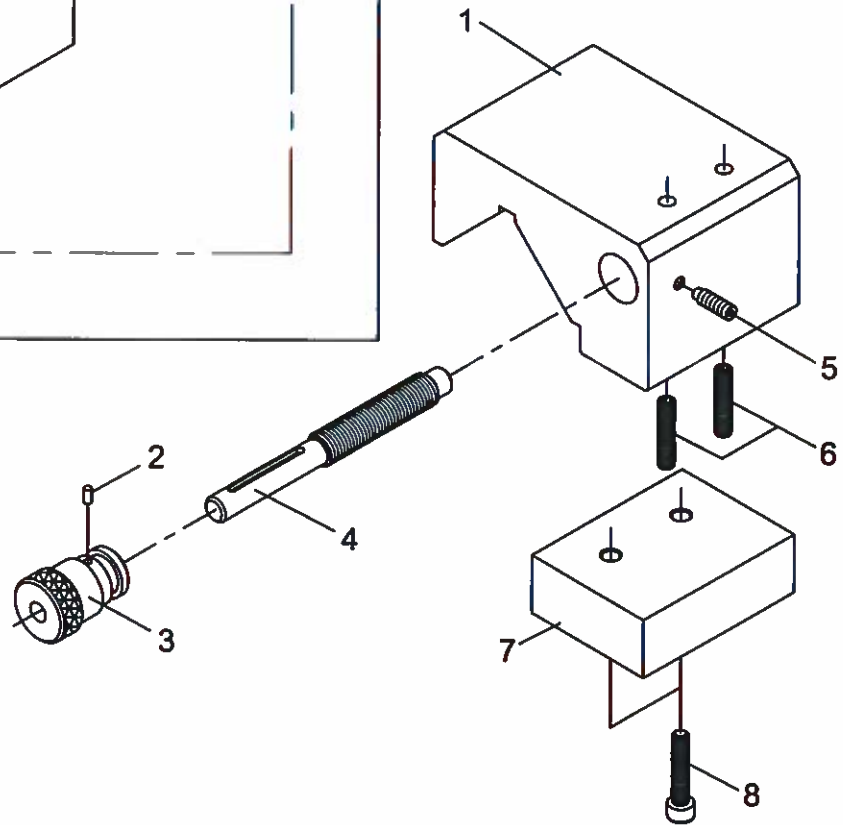
| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-------------------------------------|----------|
| 1. | R-9032 | Bottom Body | 1 |
| 2. | R-9031 | Top Body | 1 |
| 3. | R-6018 | Clamp | 1 |
| 4. | R-9035 | Fixture | 3 |
| 5. | R-9036 | Adjusting Stud | 3 |
| 6. | ZA2501-1 | Finger With Pad | 3 |
| 7. | R-9034 | Turning Knob | 3 |
| 8. | A-1003 | Dog Point Set Screw (M6 x 20) | 3 |
| 9. | A-1700 | Nut (M6) | 3 |
| 10. | R-9038-1 | Pivot | 1 |
| 11. | R-9038 | Pivot | 1 |
| 12. | A-1218 | Socket Head Cap Screw(M8 x 50) | 1 |
| 13. | A-1902 | Washer (Φ8) | 1 |
| 14. | A-1442 | Hexgon Head Bolt (M12 x 100) | 1 |
| 15. | A-1911 | Washer (Φ12) | 1 |
| 16. | A-1703 | Nut (M12) | 1 |
| 17. | A-4011 | Pin (Φ5 x 50) | 1 |
| 18. | A-1100 | Socket Headless Set Screw (M6 x 6) | 6 |
| 19. | ZA2541-1 | Roller Finger (Optional) | 3 |
| 20. | R-9033 | Finger (Optional) | 3 |
| 21. | R-9039 | Pin (Optional) | 3 |
| 22. | R-9040 | Pivot (Optional) | 3 |
| 23. | A-2220 | Bearing (609ZZ) (Optional) | 3 |

BEDSTOPS (Optional)

OPTIONAL

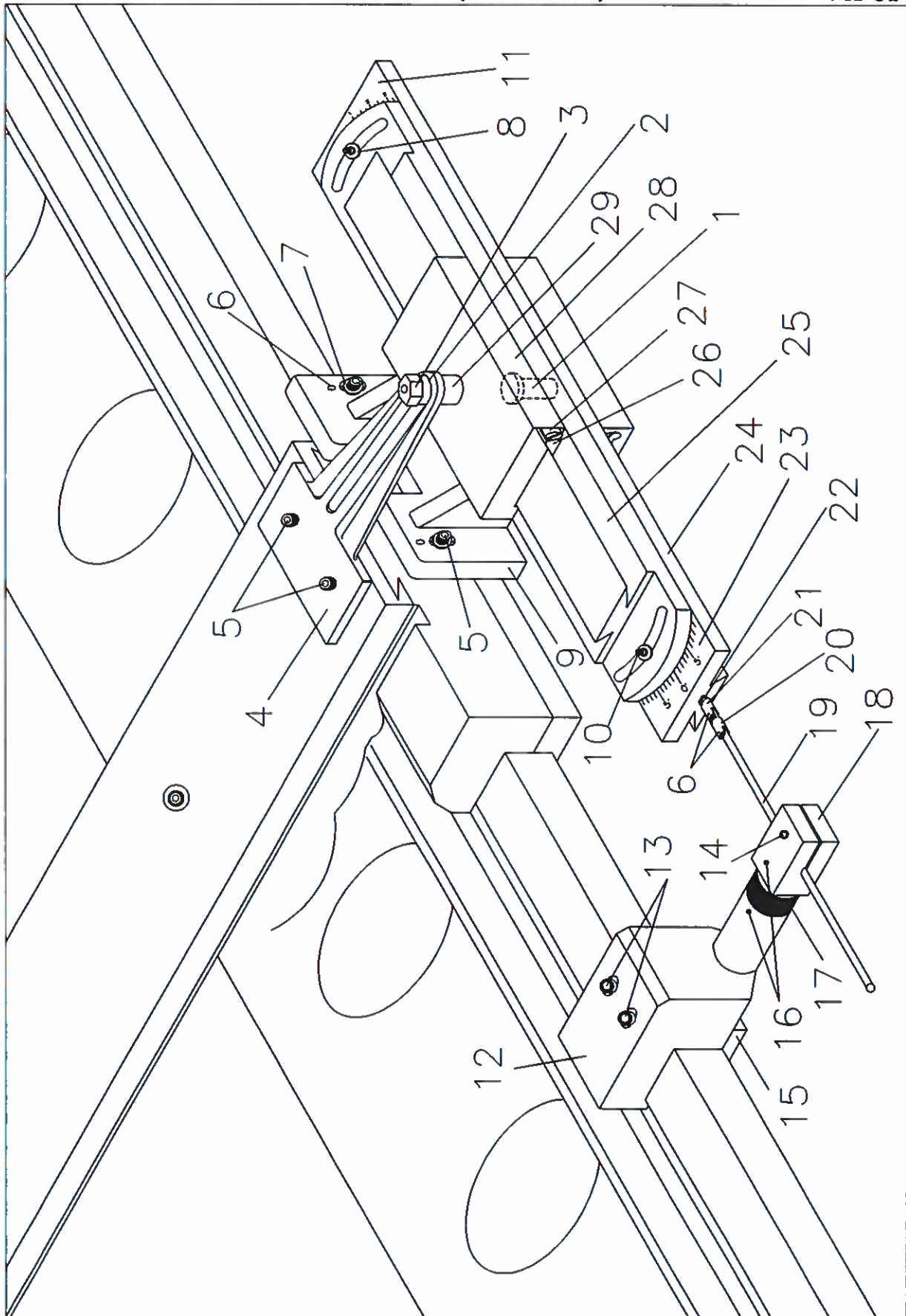


STANDARD

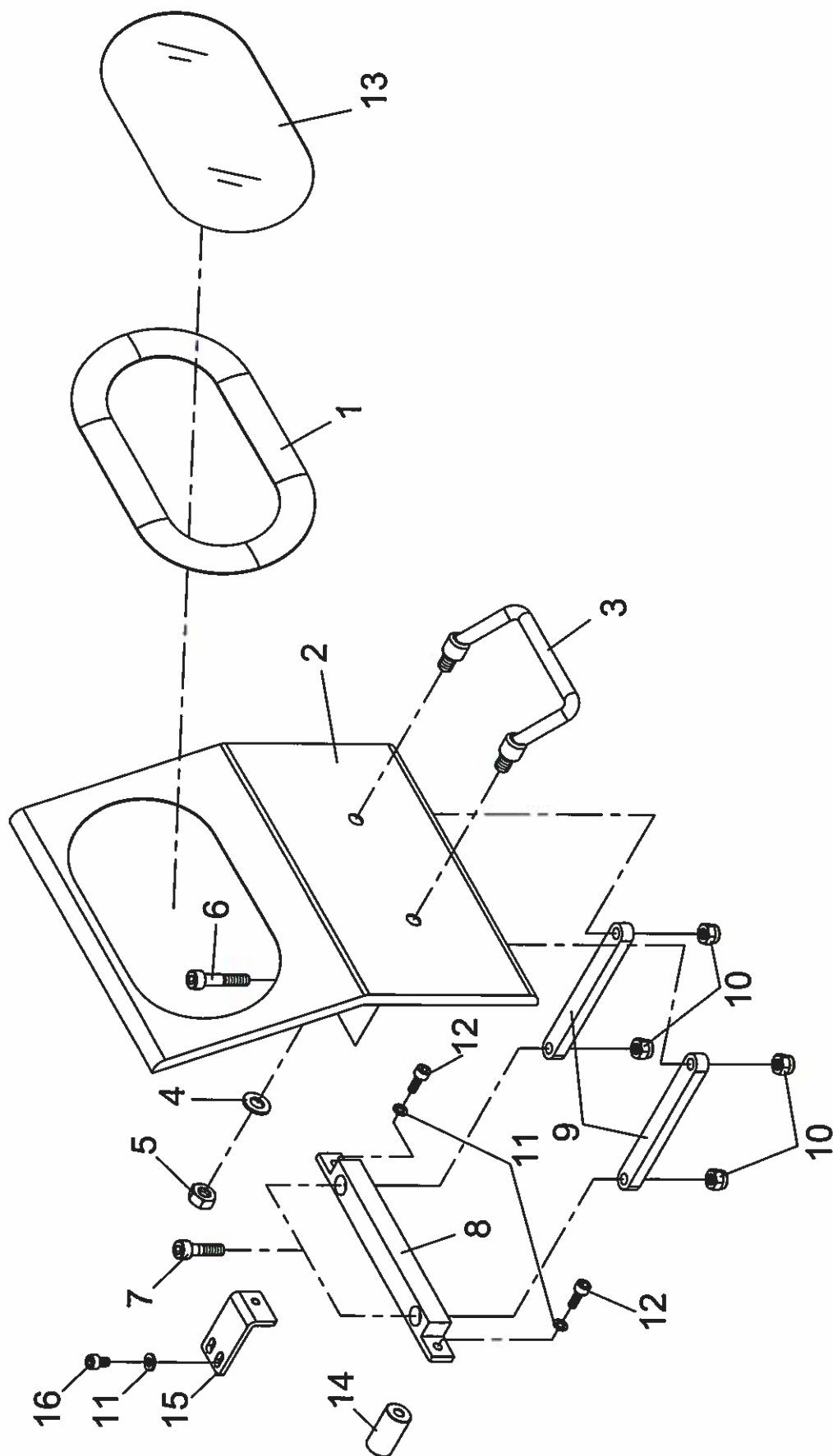


FOLLOW REST

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-------------------------------------|----------|
| 1. | R-9003 | Body | 1 |
| 2. | R-9035 | Fixture | 2 |
| 3. | R-9036 | Adjusting Stud | 2 |
| 4. | R-9034 | Turning Knob | 2 |
| 5. | ZA2501-1 | Finger With Pad | 2 |
| 6. | A-1100 | Socket Headless Set Screw (M6 x 6) | 4 |
| 7. | A-1003 | Dog Point Set Screw (M6 x 20) | 2 |
| 8. | A-1700 | Nut (M6) | 2 |
| 9. | A-1217 | Socket Head Cap Screw (M8 x45) | 2 |
| 10. | ZA2541-1 | Roller Finger (Optional) | 2 |
| 11. | R-9033 | Finger (Optional) | 2 |
| 12. | R-9039 | Pin (Optional) | 2 |
| 13. | R-9040 | Pivot (Optional) | 2 |
| 14. | A-2220 | Bearing (609ZZ) (Optional) | 2 |

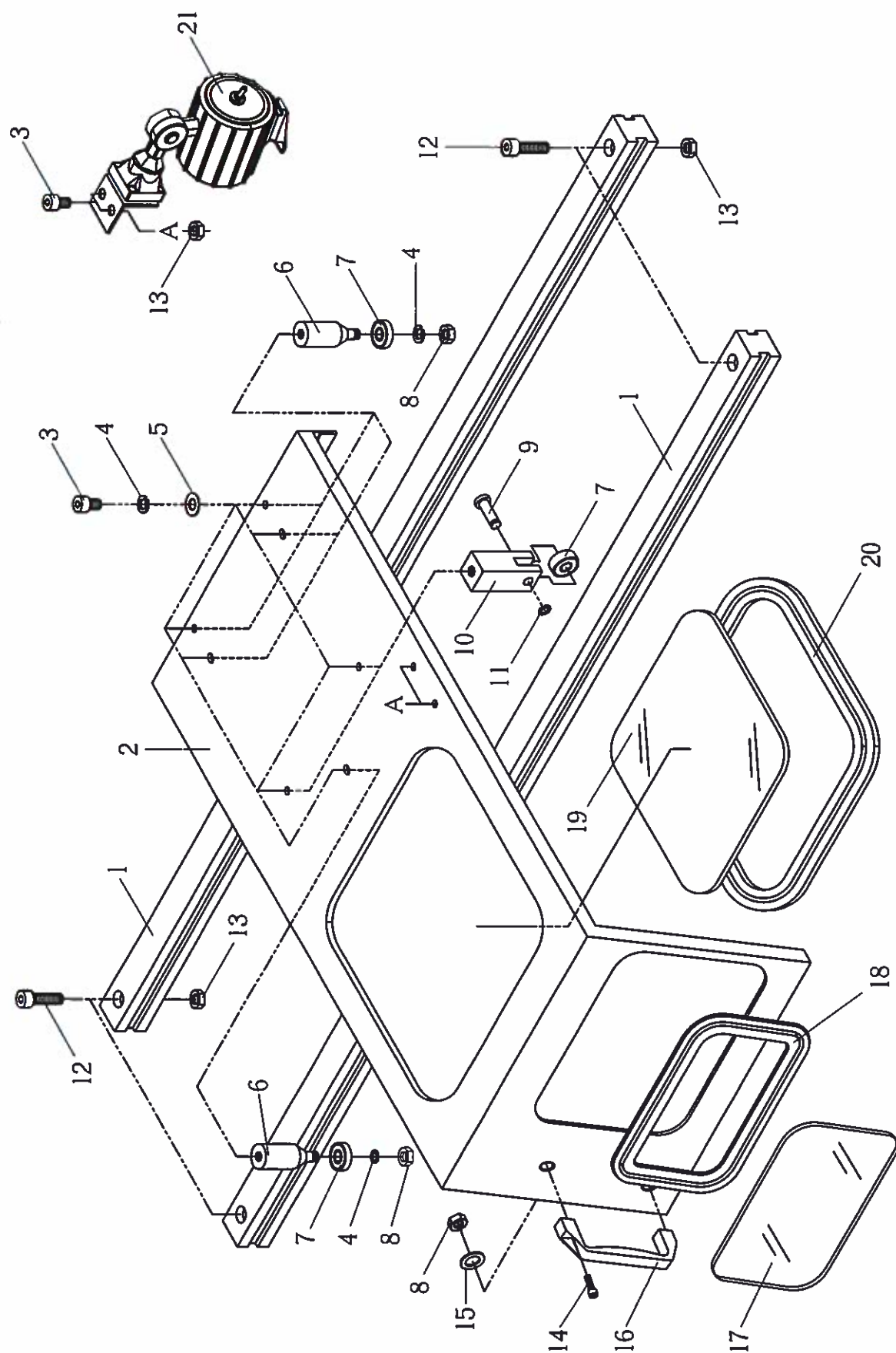


| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|--------------------------------------|-----------------|
| 1. | R-9095 | Shaft | 1 |
| 2. | R-9097-1 | Bush | 1 |
| 3. | A-1720 | Nut (M16) | 1 |
| 4. | R-9096 | Guide Plate | 1 |
| 5. | A-1215 | Socket Head Cap Screw (M8 x 30L) | 4 |
| 6. | A-4005 | Pin (Φ5 x 20L) | 4 |
| 7. | A-1802 | Washer (Φ8) | 2 |
| 8. | R-9105 | Washer | 2 |
| 9. | R-9090 | Bracket | 1 |
| 10. | A-1221 | Socket Head Cap Screw (M10 x 30L) | 2 |
| 11. | NR-107 | Graduated Plate | 1 |
| 12. | R-9103 | Clamp | 1 |
| 13. | A-1216 | Socket Head Cap Screw (M8 x 40L) | 2 |
| 14. | A-1213 | Socket Head Cap Screw (M8 x 20L) | 1 |
| 15. | R-9104 | Strip | 1 |
| 16. | A-1169 | Socket Headless Set Screw (M8 x 10L) | 2 |
| 17. | R-9098 | Connector | 1 |
| 18. | R-9099 | Holder | 1 |
| 19. | R-9101 | Draw Bar | 1 |
| 20. | R-9106 | Jointer | 1 |
| 21. | R-9107 | Jointer | 1 |
| 22. | A-1702 | Nut (M10) | 1 |
| 23. | NR-108 | Graduated Plate | 1 |
| 24. | R-9091 | Frame | 1 |
| 25. | R-9093 | Swivel Guide | 1 |
| 26. | R-9092 | Gib | 2 |
| 27. | A-1102 | Set Screw(M6x12L) | 6 |
| 28. | R-9094 | Taper Slide | 1 |
| 29. | R-9097 | Pivot | 1 |



| <u>NO.</u> | <u>PART NO.</u> | <u>DESCRIPTION</u> | <u>QUANTITY</u> |
|------------|-----------------|--------------------------------|-----------------|
| 1. | A9118 | Strap | 1 |
| 2. | R5031 | Chip Guard | 1 |
| 3. | A9117 | Handle | 1 |
| 4. | A1807 | Washer (ϕ 10) | 2 |
| 5. | A1702 | Nut (ϕ 10) | 2 |
| 6. | A1216 | Socket Head Cap Screw (M8x40L) | 2 |
| 7. | A1215 | Socket Head Cap Screw (M8x30L) | 2 |
| 8. | R5038 | Frame | 1 |
| 9. | R5030 | Swivel Arm | 2 |
| 10. | A1743 | Locking Nut | 4 |
| 11. | A1203 | Washer (ϕ 1/4") | 4 |
| 12. | A1801 | Socket Head Cap Screw (M6x16L) | 2 |
| 13. | A9121 | Window | 1 |
| 14. | C5043 | Spacer (DRO) | 1 |
| 15. | C5044 | Frame (DRO) | 1 |
| 16. | A1231 | Socket Head Cap Screw (M6x10L) | 2 |

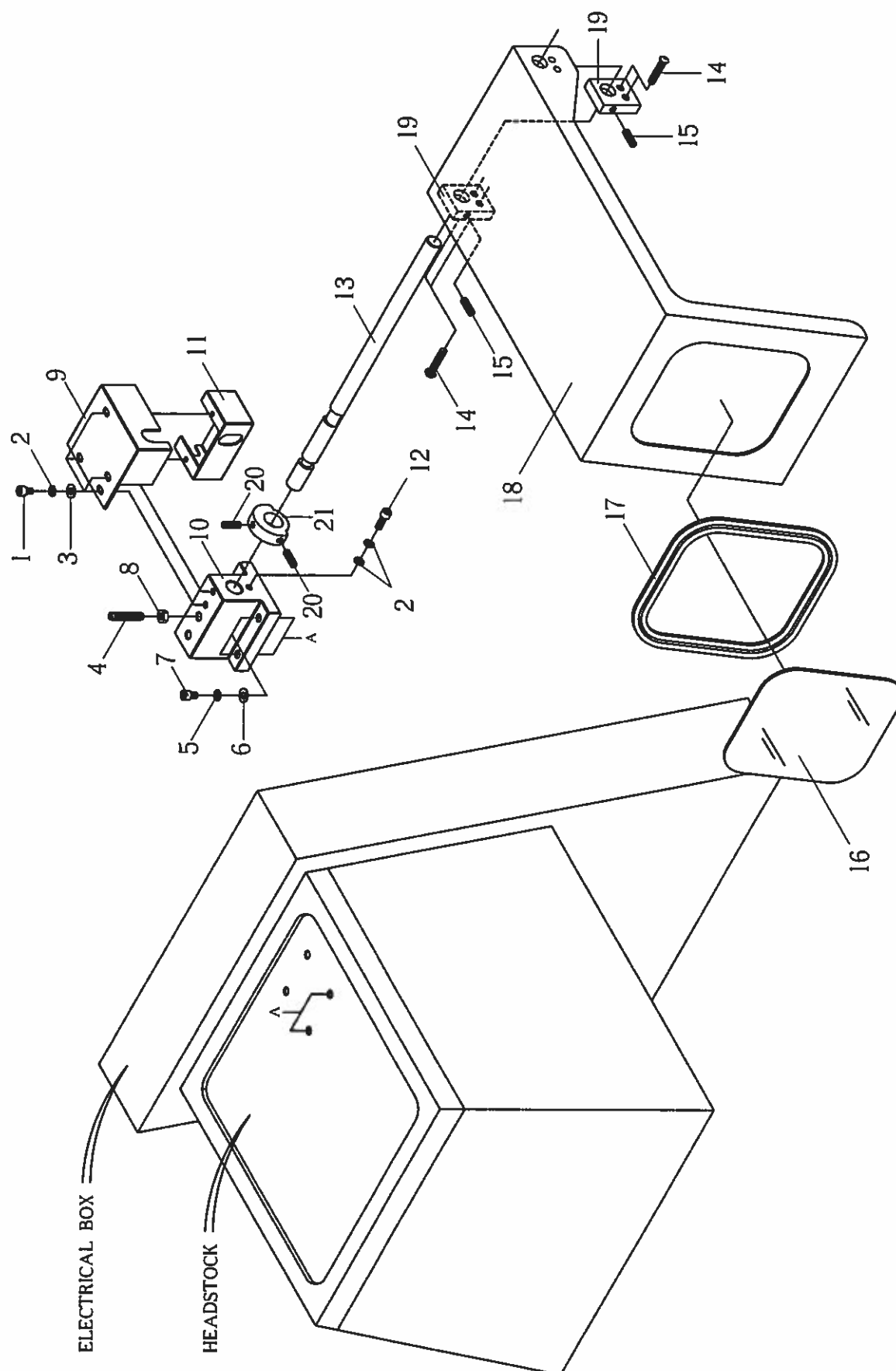
FULL LENGTH SLIDING CHIP SAFETY GUARD (OPTIONAL)



FOLLOWING CHIP GUARD

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---------------------------------|----------|
| 1. | A-9118 | Strap | 1 |
| 2. | R-5031 | Chip Guard | 1 |
| 3. | A-9117 | Handle | 1 |
| 4. | A-1807 | Washer (Φ10) | 2 |
| 5. | A-1702 | Nut (M10) | 2 |
| 6. | A-1216 | Socket Head Cap Screw (M8 x 40) | 2 |
| 7. | A-1215 | Socket Head Cap Screw (M8 x 30) | 2 |
| 8. | R-5038 | Frame | 1 |
| 9. | R-5030 | Swivel Arm | 2 |
| 10. | A-1743 | Locking Nut | 4 |
| 11. | A-1203 | Washer (Φ1/4") | 2 |
| 12. | A-1801 | Socket Head Cap Screw (M6 x 16) | 2 |
| 13. | A-9121 | Window | 1 |

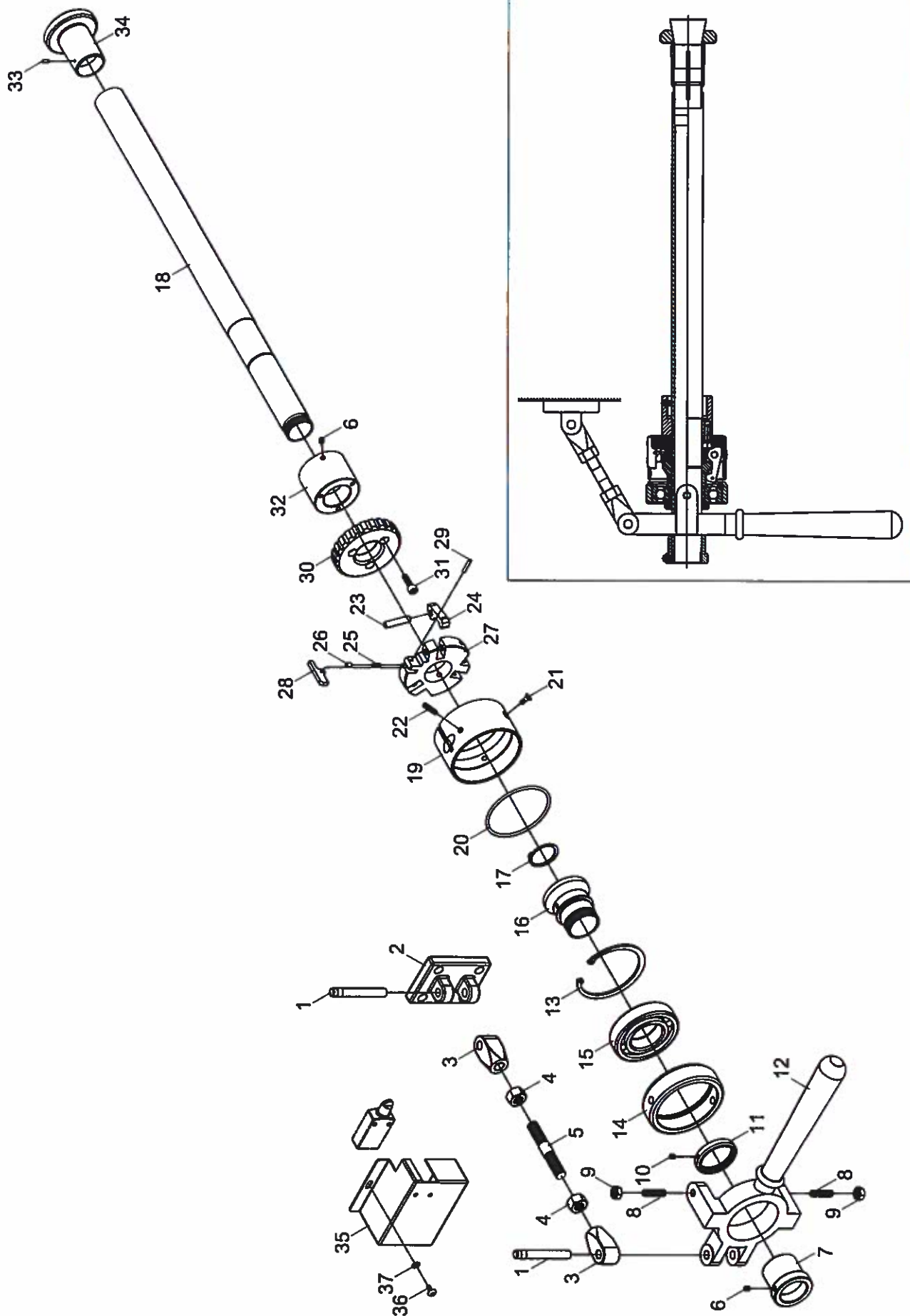
CHUCK SAFETY GUARD (OPTIONAL)



FULL LENGTH SLIDING CHIP SAFETY GUARD

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---------------------------------|----------|
| 1. | R-7113 | Guidance | 2 |
| 2. | R-7111 | Chip Safety Guard | 1 |
| 3. | A-1203 | Socket Head Cap Screw (M6 x 16) | 9 |
| 4. | A-1812 | Spring Washer (Φ8) | 12 |
| 5. | A-1917 | Washer (Φ6) | 7 |
| 6. | C-8116 | Pivot | 5 |
| 7. | A-2044 | Bearing#608ZZ | 7 |
| 8. | A-1701 | Nut (M8) | 3 |
| 9. | M-8022 | Pivot | 2 |
| 10. | C-8115 | Guide Block | 2 |
| 11. | A-3101 | Circlip (E6) | 2 |
| 12. | A-1208 | Socket Head Cap Screw (M6 x 40) | 4 |
| 13. | A-1700 | Nut (M6) | 6 |
| 14. | A-1211 | Socket Head Cap Screw (M8 x 12) | 2 |
| 15. | A-1918 | Washer (Φ8) | 2 |
| 16. | A-9124 | Handle | 1 |
| 17. | A-9135 | Window | 1 |
| 18. | A-9136 | Strap | 1 |
| 19. | A-9137 | Window | 1 |
| 20. | A-9138 | Strap | 1 |
| 21. | ZA2702 | Halogen Lamp (Optional) | 1 |

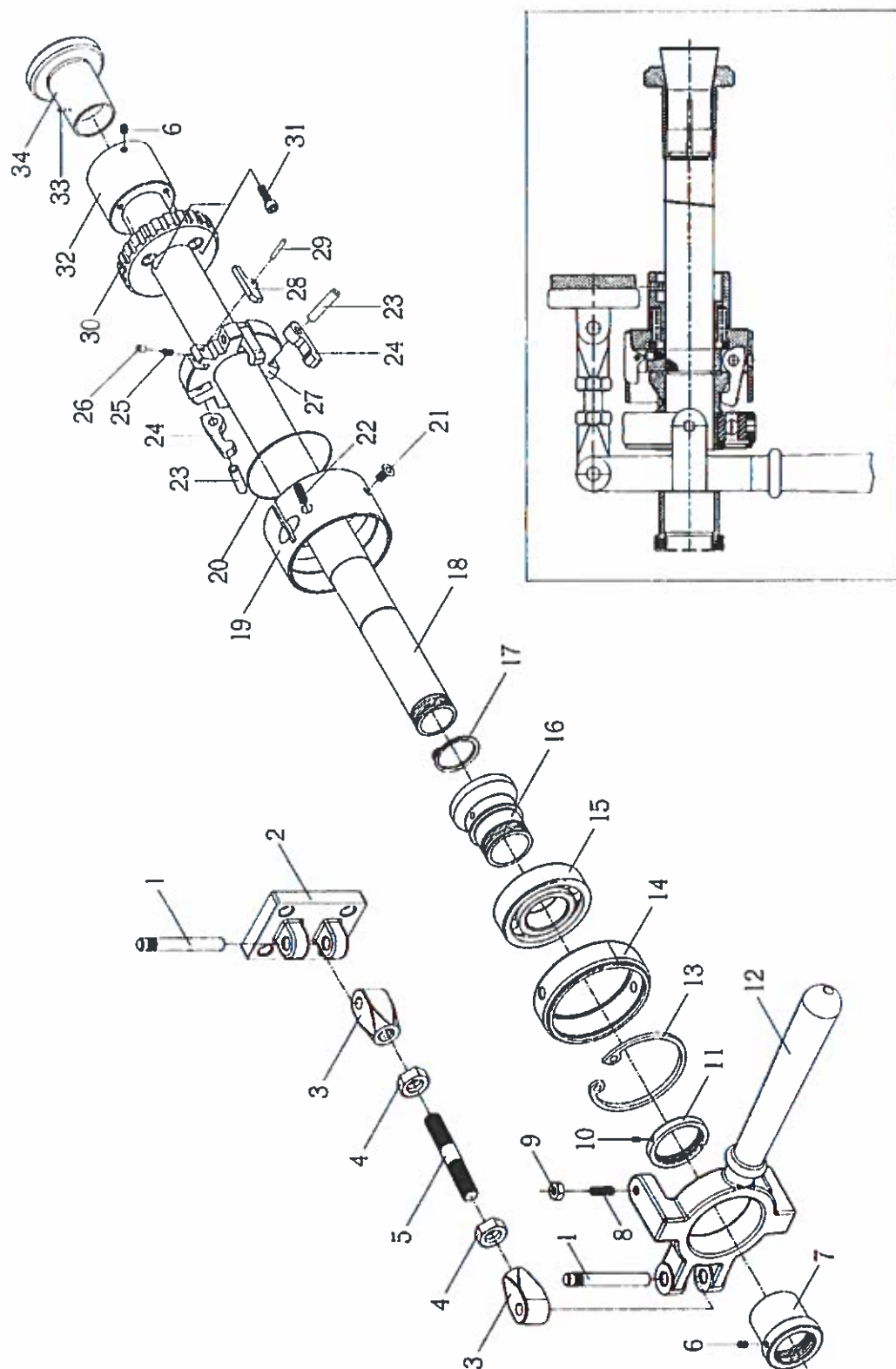
5C COLLECT ATTACHMENT (OPTIONAL)



CHUCK SAFETY GUARD

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|---------------------------------|----------|
| 1. | A-1509 | Button Head Cap Screw (M5 x 10) | 4 |
| 2. | A-1813 | Spring Washer (Φ5) | 6 |
| 3. | A-1909 | Washer (Φ5) | 4 |
| 4. | A-1148 | Set Screw (M8 x 30) | 1 |
| 5. | A-1812 | Spring Washer (Φ1/4") | 4 |
| 6. | A-1917 | Washer (Φ6) | 4 |
| 7. | A-1205 | Socket Head Cap Screw (M6 x 25) | 4 |
| 8. | A-1701 | Nut (M8) | 1 |
| 9. | C-8142 | Switch Cover | 1 |
| 10. | T-8040 | Seat | 1 |
| 11. | C-8141 | Switch Box | 1 |
| 12. | A-1234 | Socket Head Cap Screw (M5 x 10) | 1 |
| 13. | R-7127 | Shaft | 1 |
| 14. | A-1525 | Button Head Cap Screw (M6 x 16) | 4 |
| 15. | A-1102 | Set Screw (M6 x 12) | 2 |
| 16. | A-9133 | Window | 1 |
| 17. | A-9134 | Strap | 1 |
| 18. | R-7126 | Chuck Safety Guard | 1 |
| 19. | C-8139 | Supporter | 2 |
| 20. | A-1101 | Set Screw (M6 x 10) | 2 |
| 21. | C-8138-1 | Limit Dog | 1 |

5C COLLET ATTACHMENT (OPTIONAL)



5C COLLET ATTACHMENT

| NO. | PART NO. | DESCRIPTION | QUANTITY |
|-----|----------|-------------------------------------|----------|
| 1. | R-9077 | Pivot | 2 |
| 2. | R-9080 | Bracket | 1 |
| 3. | R-9078 | Jointer | 2 |
| 4. | A-1713 | Nut (1/2" UNF) | 2 |
| 5. | R-9079 | Stud | 1 |
| 6. | A-1100 | Socket Headless Set Screw (M6 x 6) | 4 |
| 7. | R-9066 | Bushing | 1 |
| 8. | A-1148 | Socket Headless Set Screw (M8 x 30) | 2 |
| 9. | A-1701 | Nut (M8) | 2 |
| 10. | A-1146 | Socket Headless Set Screw (M5 x 5) | 1 |
| 11. | R-9064 | Locking Nut | 1 |
| 12. | R-9061 | Hand Lever | 1 |
| 13. | A-3211 | Circlip (R80) | 1 |
| 14. | R-9062 | Locking Ring | 1 |
| 15. | A-2120 | Bearing (6208ZZ) | 1 |
| 16. | R-9063 | Sleeve | 1 |
| 17. | A-3313 | Circlip (S32) | 1 |
| 18. | R-9067 | Draw Bar | 1 |
| 19. | R-9068 | Collet Sleeve | 1 |
| 20. | A-8224 | Spring | 1 |
| 21. | A-1609 | Flat Head Cap Screw (M5 x 12) | 2 |
| 22. | A-1131 | Socket Headless Set Screw (M6 x 25) | 1 |
| 23. | R-9071 | Pin | 3 |
| 24. | R-9070 | Latch | 3 |
| 25. | A-8225 | Spring (Φ3/16 ") | 1 |
| 26. | R-9074 | Position Pin | 1 |
| 27. | R-9069 | Chuck Assembly | 1 |
| 28. | R-9072 | Fork | 1 |
| 29. | R-9073 | Pin | 1 |
| 30. | R-9075 | Chuck | 1 |
| 31. | A-1204 | Socket Head Cap Screw (M6 x 20) | 3 |
| 32. | R-9076 | Adapter | 1 |
| 33. | A-4023 | Pin (Φ3 x 6) | 1 |
| 34. | R-9055 | Collet (Per Size) | 1 |

INSPECTION RECORD

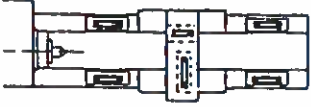


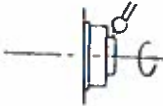
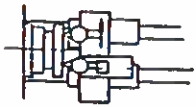
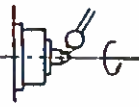
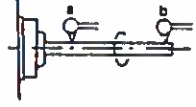

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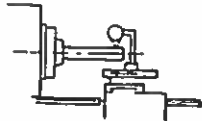
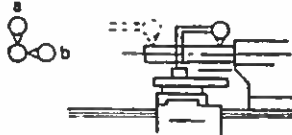
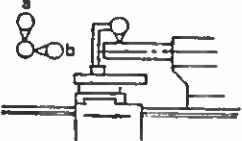
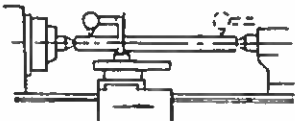

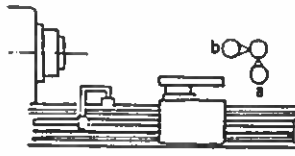
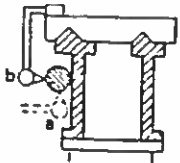
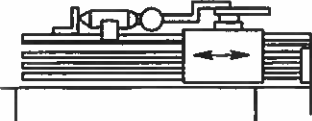
Series NO.

Date:

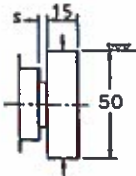
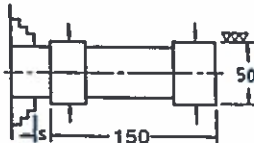

1.ACCURACY TEST.

UNIT: MM.

| NO | INSPECTION TIME | | DIAGRAM | TOLERANCE | |
|----|---|---|--|-------------|--------|
| | | | | PERMISSIBLE | ACTUAL |
| 1 | Straightness of bed slideway | a.Longitudinal direction
(In Vertical plane) |  | 0.02 | |
| | | b.Transverse direction
(In vertical plane) |  | 0.02 | |
| 2 | Parallelism of bed slideways. | |  | 0.02 | |
| 3 | Spindle nose runout | |  | 0.01 | |
| 4 | Main spindle for axial slip, mearsured at 2 points,displaced by 180 | |  | 0.015 | |
| 5 | True running of center point of main spindle. | |  | 0.015 | |
| 6 | Spindle taper hole runout | a.Nearest spindle nose |  | 0.01 | |
| | | b.At a distance of 300mm | | 0.02 | |
| 7 | Parallelism of center line of main spindle to longitudinal motion of carriage | a.In vertical plane |  | 0.025 | |
| | | b.In horizontal plane | | 0.025 | |

| NO | INSPECTION TIME | | DIAGRAM | TOLERANCE | |
|----|---|--|--|-------------|--------|
| | | | | PERMISSIBLE | ACTUAL |
| 8 | Movement of compound slide parallel with main spindle in vertical plane (Hand feed) | |  | 0.01/150 | |
| 9 | Parallelism of tailstock spindle with bed ways. | a.In Vertical plane (Front end rising) |  | 0.015/100 | |
| | | b.In horizontal plane (Front end inclined to wards the direction of tool presure.) | | 0.015/100 | |
| 10 | Parallelism of bed ways with center line of tailstock spindle hole. | a.In Vertical plane (Free end of mandrel rising) |  | 0.02/300 | |
| | | b.In horizontal plane (Free end of mandrel inclined to wards tailstock end) | | 0.02/300 | |
| 11 | Difference in center hight between headstock and tailstock (Mandrel rising towards tailstock end) | |  | 0.025 | |
| 12 | Squareness of motion of cross slide with center line of main spindle | |  | 0.02/300 | |
| 13 | Parallelism of center line of lead screw end bearing to carriage slide ways | a.In vertical plane |  | 0.1 | |
| | | b.In horizontal plane | | 0.1 | |
| 14 | Diviations in alignment of center line of lead screw end bearing with center line of half nut. | a.In vertical plane |  | 0.15 | |
| | | b.In horizontal plane | | 0.15 | |
| 15 | Pitch error of lead screw | |  | 0.03/300 | |

2.PRACTICAL

| NO | TESTING ITEM | DIAGRAM | TOLERANCE | |
|----|---------------------------------|--|-------------|--------|
| | | | PERMISSIBLE | ACTUAL |
| 1 | Accuracy of outside turning |  | 0.01 | |
| 2 | Accuracy of cylindrical turning |  | 0.025 | |
| 3 | Accuracy of face turning |  | 0.02 | |

3.MAIN ELECTRIC SPECIFICATIONS

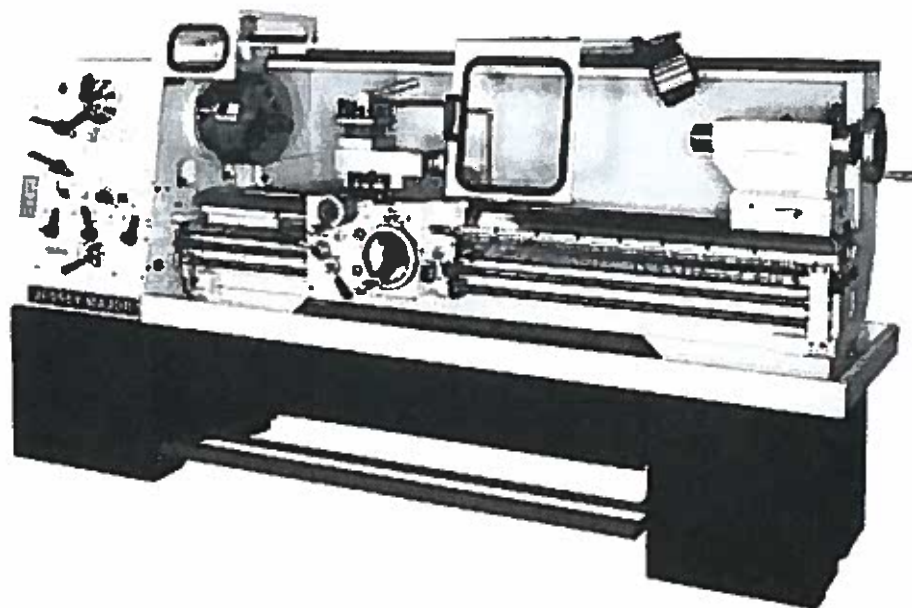
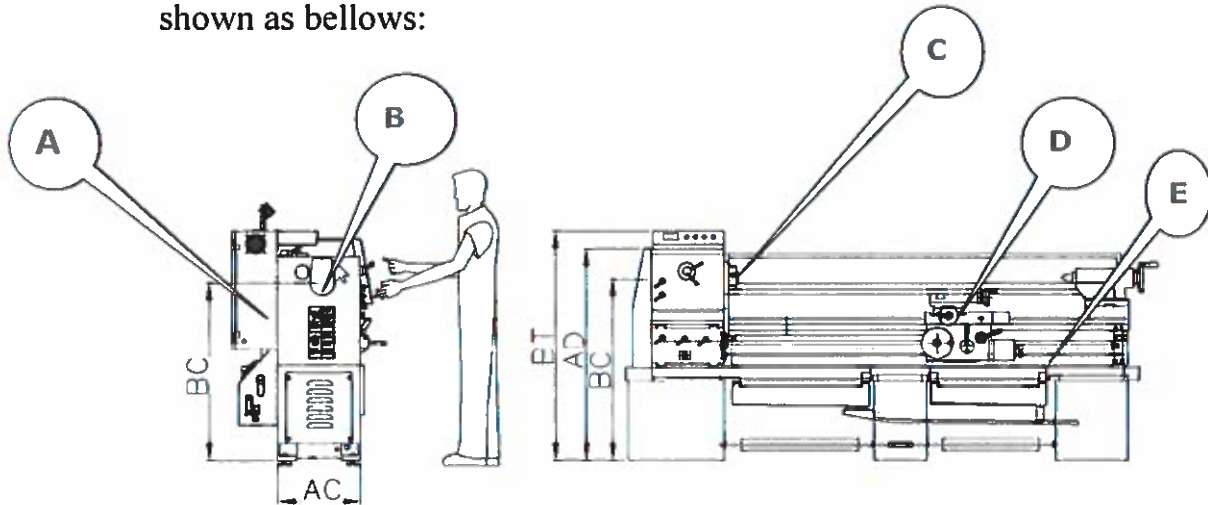
| ITEM | H.P | VOLTAGES | FREQUENCY | R.P.M | RATED CURRENT |
|-------------------------------------|-------|--------------------------|------------------|----------------------|--------------------------|
| INVERTER
(VS MODEL) | 3 | 200--240V.
280--460V. | 0--400 HZ. | ---- | 11A.
5.5A. |
| DRIVE MOTOR
(VS MODEL) | 2 | 220V.
440V. | 50/60 HZ. | 940/1140 | 6.8A-220V.
3.4A-440V. |
| DRIVE MOTOR
STANDARD | 3 | 220V.
440V. | 50/60 HZ. | 1420/1710 | 8.7A-220V.
4.4A-440V. |
| DRIVE MOTOR
2-SPEED | 3/1.5 | 220V.
440V. | 50 HZ.
60 HZ. | 1420/710
1720/860 | 8A-220V.
4A-440V. |
| DRIVE MOTOR
SINGLE PHASE | 3 | 220V. | 50/60 HZ. | 1420/1710 | 14A |
| COOLANT PUMP | 0.125 | 220V.
440V. | 50/60 HZ. | 2850/3420 | 0.6A.
0.3A. |

Approved by:

Inspected by:

RISK AREA:

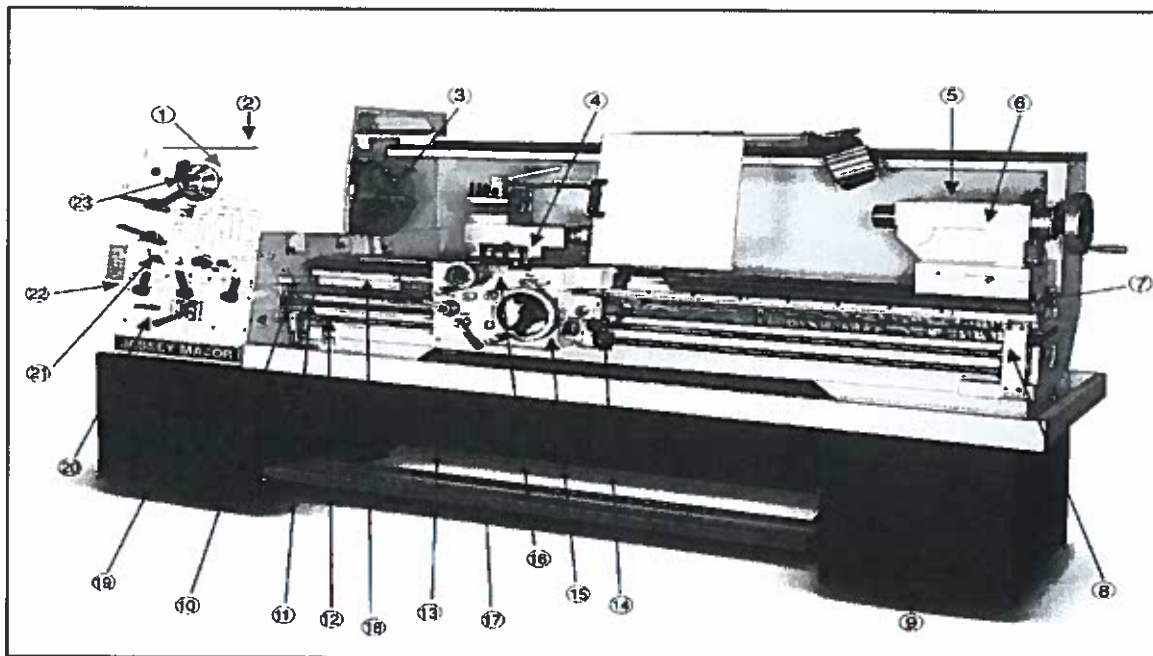
The risk area (Dangerous zone) of machine during operation is shown as bellows:



Introduction of RISK AREA (DANGEROUS ZONE):

| RISK CATEGORY | RISK PART | AREA | DANGER CONDITION | ADVERTENCE |
|------------------|--------------------|------|---|---|
| Electrical Shock | Control Cabinet | A | During the machine power on, possibility of electrical shock is accompanying. | Keep workers away from electrical cabinet before/during machine running. |
| | Control Cabinet | A | During the machine maintenance, possibility of electrical shock is accompanying. | Remove and disconnect power source from electrical cabinet before/during machine repair servicing |
| Entanglement | Gear Box with Belt | B | During the Chuck is turning and running, possibility of entanglement is accompanying. | Keep workers away from gear box with belt before/during machine is running. Fixed Guard and interlock device applied. |
| | Spindle & Chuck | C | During the Chuck is turning and running, possibility of entanglement is accompanying. | Keep worker's hand away from Chuck before/ during lathe running. Movable chuck guard with interlock device applied. |
| | Slide | D | During the machine Slide is moving, possibility of entanglement is accompanying. | Keep workers hand away from chuck and Slide before/during it is moving. Especially for rapid movement |

| | | | | |
|-----------------|-------------------|---|---|---|
| Entanglement | FEED & Switch ROD | E | During the machine running and Slide moving, | Keep workers hand away from rod before/during machine running. |
| Injection chips | Spindle & Chuck | C | During the chuck of machine turning and machining the working device, | Keep workers hand away from rod before/during machine running. Chuck Guard Cover with interlock device , slide cover and Splash guard applied |



LEGEND

- | | |
|-----------------------|----------------------------|
| 1. HEADSTOCK | 13. CHIP TRAY |
| 2. ELECTRICAL CABINET | 14. ROTATION CONTROL LEVER |
| 3. SPINDLE & CHUCK | 15. APRON |
| 4. TOP SLIDE | 16. SADDLE & CROSS SLIDE |
| 5. SPLASH GUARD | 17. FOOT BRAKE |
| 6. TAILSTOCK | 18. GAP PIECE |
| 7. BED | 19. HEAD-END PLINTH |
| 8. END BRACKET | 20. FEED GEAR BOX |
| 9. TAIL-END PLINTH | 21. CONTROL PANEL |
| 10. LEADSCREW | 22. END COVER (GEAR TRAIN) |
| 11. FEED ROD | 23. SPINDLE SPEED SELECTOR |
| 12. SWITCH ROD | |