SHARP

CNC HIGH SPEED PRECISION LATHE
INSTRUCTION MANUAL AND PARTS LIST

1840TC-FC/ 1840TC-F
2060TC-F
2460TC-F

CONTENT

SAFETY INSTRUCTIONS
FOR
TURNING CENTERS

WARNING

Please read this manual before operation or maintaining the machine, everyone working on the machine must know how to operate it safety and correctly to avoid possible injury.

1. SAFETY INSTRUCTIONS

WARNING:

Do not install, operate, or service this machine unless:

(1) You have to read and understand the safety instructions on the pages that follow.
(2) You have to read and understand the Sharp operator's manual, especially knowing the function and locations of all machine controls andread manuals for any related accessories.
(3) You have to read and understand all safety and instruction plates attached to the machine and its related accessories.
(4) Prior to installing or servicing the machine read and understand the Sharp maintenance manual, servicing the machine must be done onlyby competent and trained personnel.

NOTE:
The Sharp's operation manual and maintenance manual, each containing a copy of these safety instructions, should be keep in the vicinity ofthe machine so they are accessible to the operator and maintenance personnel.
The following safety instructions are general recommendations for most common operations on a turning machine.
Additional safety measures may be required for your particular application,
Sharp therefore, makes no warranty or representation as to the absolutecorrectness or sufficiency of the instructions.

1. 1GENERAL SAFETY INSTRUCTIONS FOR OPERATING THE MACHINE
(1) The best defense against injuries on a turning machine is to be alert, never initiate a machine function unless you completely understand what the function will cause the machine to do.
(2) Never operate the machine with any cover or shield open or removed.
(3) Never reach into the work area when the spindle is turning or if the machine is in automatic mode.
(4) Put the machine in manual mode and be sure last programmed function has be completed before reaching inside of the work area

(5) The function of the machine make it impossible to eliminate all pinch points, be particularly aware of the following pinch points:
-Spindle and chuck rotation
-Indexing of turret and tools
-Carriage and cross slide movement
-Tailstock movement, both quill and body

(6) Never allow chips, coolant or oil remain on the floor, do not leave loose object on or around machine.

(7) Clothing:
*Wear safety glasses with eye shields all times.
*Never use a compressed air hose to remove chips from a machine
*Do not wear rings, watches, tie or loose sleeve clothing.
*Gloves are easily caught in moving parts, take them off before turning machine.
*Always wear safety shoes with steel toes and oil resistance soles.
*Never remove protection for even a short time when operating the machine.
*Know the correct way to wear protective devices.
If operator has long hair, hair should always be tucked under a cap or tied back and up, beware of loose hair near the rotating parts of lathe.

(8) Turning machines are designed to be ran by one person, persons other than the designed operator should stay out of the machine area during operation.

(9) Take care not to bump or accidentally touch any machine control.

(10) Do not paint, alter, deface or remove any warning plates from the machine, replacement plates are available from Sharp.

(11) Do not operate machine while talking.

(12) Never operate the machine after taking strong medication, using non-prescription drugs or consuming alcoholic beverages. Persons with illnesses which might cause dizziness or fainting should never operate this machine.

(13) The electric components are protected from normal moisture resulting from humidity use of water base solubles as coolant, etc., DO NOT use water clean the machine or the are around it.

(14) Never touch a machine control device or electrical component when your hand is wet.

(I5) Keep flammable liquids and materials away from the work area and hot chips.

(16) Never clean up clips while the machine is running or is in automatic mode.

(17) Do not file work pieces being rotated under power.

(18) At the end of work day, the machine should be placed in either "CONTROL OFF" or "POWER OFF" modes.

(19) When restarting machine after it has been shut down always, assume it has been tampered with, recheck all phases of the job as though you were running the first piece.

(20) Never touch spindle start or spindle job control until hands, feet body are well clear of the work area.

(21) Do not stand on any parts of machine while coolant and oil make surface on the machine slippery which present electrical hazard under machine has power on.

(22) Never extend an unsupported bar out of the rear of the spindle or hydraulic cylinder a distance from a concentric support more than 10 times its diameter. Doing so can cause the bar to bend or break. When any bar is extended a large sign should be placed to warn people to stay away from the area.

(23) If you work turning machine with bar feeder together, please keep away from the exit end of the bar feeder when the machine is running.

1.2 SAFETY INSTRUCTIONS FOR WORKHOLDING:

(1) Never running machine until your workpiece was held 100% sure.

(2) A chuck is the most common workholding device used on this machine, some of the factors which affect the holding ability of a chuck are:

*Clamping force of jaws

*Rotational speed of the spindle

*Type of jaw surface (serrated, smooth,etc.,)

*Area of chuck jaws in contact with the workpiece

* Type of chuck

*Configuration of the workpiece ...shape, weight and balance

*Jaw weight and location

(3) Before running machine, make sure the workpiece is gripping internally or internally, since low chuck pressure will diminish jaw gripping force which may allow the workpiece to come out of the jaws. Excessive pressure can damage a power chuck which could cause a loss of jaw force. The gripping force of a power chuck can be ordiminished as much as 50% because of lack of lubrication or lack of periodic cleaning, components of the chuck are subject to wear and damage which also can lessen gripping power. Need support workpiece by steady rest or tailstock center while workpiece length over 200mm.

A. Grease the chuck at the beginning of every shift, use only the chuck manufacturer's recommended lubricant.

B. A weekly examination of the condition of the chuck, this examination should include the measurement of jaw clamping force with a jaw force gage to insure that chuck is functioning as it should.

C. With reference to manufacturer's manual for chuck and cylinder to any other maintenance requirements. As the spindle r.p.m. increase the gripping force of the jaw decreases, various types of top jaws are used on chucks for different applications, the best workholding conditions that need use serrated contact surfaces on work gripping surfaces and use the maximum area of contact between the jaws and the workpiece, improper use cause injury.

(4) If chuck or accessory was not supplied by Sharp with machinetogether, verify the safe operating speed by their manufacturer.
(5) Always be sure the chuck or acccssory is located correctly on the spindle nose and it is securely bolted to the face of spindle.
(6) Be sure any item bolted or clamped to a chuck or fixture is securely fastened before starting the spindle.
(7) The spindle speed could not be high speed during the workpiece too long.
(8) Always be aware that closing chuck jaws can trap fingers or hands.
(9) The same safety instructions apply to power chucks and manual operated chucks, the following additional precautions for manual chuck when you use it.

A. Always use spring-loaded, self-ejecting type safety wrenches.
B. Never put an extension bar on chuck wrench or hit it hammer.
C. Centrifugal force can cause the scroll to unwind if the chuck is empty. the jaws may come out of the chuck while the spindle is turning.

(10) If a workpiece is extend from the chuck, the distance of 3 to 4 times it diameter, without being supported by the tailstock, poor cutting conditions will normally occur, check load capacity of revolving centres for application in hand.

1.3 MAINTENANCE SAFETY INSTRUCTIONS,

(1) WARNING:Only authorized electricians can install or modify any electrical component failure. Disconnect main power and lock in "OFF" position beforeattempting any repair, tag disconnect switch "DO NOT START".
(2) Read and understand safety instructions before servicing this machine.
(3) Know all points were voltages are present on this machine and in electrical boxes.
(4) Residual voltages can exist in the electrical cabinets for a period of time after power has been turned off. Check any component inside cabinet by meter before touching.

1.4 INSTALLATION SAFETY INSTRUCTIONS:

(1) Verify machine weight and make sure lifting equipment, cables, etc., are sufficient capacity, refer to follow Sharp's maintenance manual tolift and move machine.
(2) Sharp machine has transformer tapes for various voltages and powercycles, if machine subsequently moved by user, the transformer taps must be checked and be sure which are wired correctly for new location.

(3) A copper (5/8" minimum diameter) rod must be sunk through foundation into the earth at the machine, length should be sufficient to provide less than 80 ohms resistance between the end of the rod and earth ground, a large copper wire must directly connect this earth ground to the ground connection provided on the machine.

1.5 INSTALLATION PRECAUTIONS

To ensure the safe operation of the NC machine, note the following during installation:

1.5.1 Wiring

(1) Be sure to use electrical conductors with performance ratings equivalent or superior to those described in the maintenance manual.

(2) Do not connect to the power distribution panel any power cables for devices which can cause line noise, such as are welders and high frequency quenching machines.

(3) Arrange for qualified engineer to connect the power lines.

1.5.2 Grounding

Use a grounding wire with a cross section of more than 14mm², for protective earth conditions, please follow the law of each country.

This wire size should be greater than AWG (American Wire Gauge) No.5 and SWG (British Legal Standard Wire Gauge) No.6

Generally, the NC machine should be grounded to a separate grounding rod, if an independent ground can not be provided for the machine, prepare the ground connection as follows:

(1) Connect a single conductor to its own grounding terminal, this will avoid possible serious accidents resulting from ground currents which might otherwise flow in the NC machine if a peripheral device should malfunction.

(2) Be careful when using concrete reinforcing rods as grounding points, these reinforcing rods often are used to ground equipment because they usually offer a resistance to ground of less than 100 ohms, in doing so, makes the connection as following:
This also applies to connecting ground wires to regular grounding terminals.

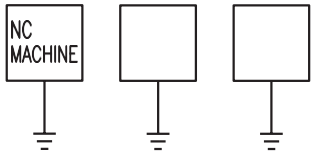
a. Do not use the same grounding reinforcing rod or grounding terminal for the devices since this could lead to line noise such as produced electric welders and high frequency quenching machines.

b. Use a grounding terminal with an adequate electrical performance rating and which is durable.

(3) A separate grounding wire should be used, one whose length is as short as possible.

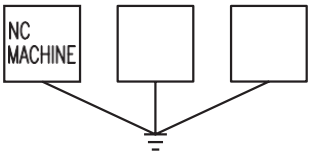
(4) Check the resistance to ground by actual measurement. This should measure less than 100 ohms if the single device is connect to its own grounding rod.

DESIRABLE INDEPENDENT GROUNDING:



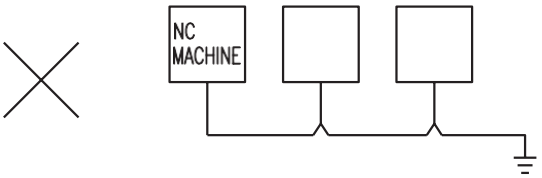
Earth resistance:
Less than 100 ohms

COMMON GROUNDS:



Resistance to ground=100/
the number of devices
connected to the ground (Ω)

NEVER GROUND EQUIPMENT AS SHOWN IN THE FOLLOWING FIGURE:



1.5.3 Environmental Conditions

Generally, the machine will be installed on the following conditions, however these may change over a period of time or in response to reason changes.

(1) Supply voltage :90% to 110% of supply voltage

(2) Source frequency :±2 HZ frequency

(3) Ambient temperature :0°C to 45°C (32°F to 113°F)

(4) Relative humidity :Less than 80%
Temperature changes should not cause condensation.

(5) Atmosphere : Free from excessive dust, acid fumes corrosive gase and salt.

(6) It should be avoided to expose the machine to direct sunlight or heat rays which can change the environmental temperature.

(7) Avoid exposing the NC machine to abnormal vibration, if it is different to observe meet these conditions contact us immediately.

1.6 SAFETY PRECAUTIONS

The operator should not rely solely the safety devices, operator must understand special precautions as following before operate machine.

1.6.1 Basic Operating Practices

DANGER:

(1) Some control panels, transformers, motors, junction boxes and other parts have high voltage terminals, these should not be touched or a severe electric shock will be sustained.

(2) Do not touch switch by wet hands.

WARNING:

(1) The emergency stop push button switch location should be well know and it can be operated at any time without having to look for it.

(2) After switch off machine one minute, the replacing fuse.

(3) Provide sufficient working space to avoid hazardous falls.

(4) Keep the machine and work area neat, clean and orderly.

(5) Before operating switches, always check that they are the right ones.

(6) Never touch a switch accidentally.

(7) Never lay anything on the working surface of the machine, where it may foul with rotating or moving parts.

(8) If job to be done by two or more persons, coordinating signals should be given at each step of the operation, unless a signal is given and acknowledges, the next step should not be taken.

CAUTION:

(1) When power failure, turn off the main circuit breaker immediately.

(2) Dispose of oils CORRECTLY.

(3) Replacement fuses should have the proper current ratings.

(4) Protect the NC unit, operating panel, electric control panel, etc., from shocks, since this could cause a failure or malfunction.

(5) Do not change parameters, values and other electrical settings, if change are un-avoidable, record the values prior that they can be returned to their original settings if necessary.

(6) Do not soil, scratch or remove the caution plate, should it become illegible or be missing, order another caution plate from the supplier shown on machine and suitable place.

1.6.2 Before Switching On:

DANGER:

When cables, cords or electric wire whose insulation is damaged that will cause current leaking and electric shocks, check above before switch on,

WARNING:

(1) Be sure the instruction manual and the programming manual are fully understood, every function and operating procedure should completely clear.

(2) Do not wear oil soaked or contaminated clothing, always wear safety shoes, safety goggles with side covers, safety clothes and other safety protection correctly.

(3) Close all NC unit, operating panel and electric control panel doors and cover.

CAUTION:

(1) The power cable from the factory feeder switch to the machine main circuit breaker should have a sufficient sectional area to handle the electric power used.

(2) Cables which must be laid on the floor must be protected against chips so that short circuits will not occur.

(3) Before first operating the machine after un-packing or keeping the machine idle for a long period (several or more), each sliding parts must be freshly lubricated, keep lubricating oil pump working until oil oozes out from wiper.
(4) Oil reservoirs should be filled to indicated levels, check and add oil, if necessary.
(5) For lubricating points, oil brands and appropriate levels, see the various instruction plates.
(6) Switches And levers should operate smoothly.
(7) When switching machine on, put the factory feeder switch, the machine main circuit breaker and the power switch on the operating panel to the "ON" position in the order.
(8) Check the coolant level, and add coolant, if necessary.

1.6.3 After Control Power Switch Has Been Turned On

CAUTION:

When the power switch on, the operating panel is "ON" position as described is 7 above, the READY lamp should be also be check.

1.6.4 Routine Inspections

WARNING:

When checking belt tensions, keep your fingers away between belt and pulley.

CAUTION:

(1) Check pressure gages for proper readings.
(2) Check motors, headstock and other parts for abnormal noises.
(3) Check the motor lubrication and sliding parts for evidence of proper lubrication.
(4) Check safety covers and safety devices for proper operation.
(5) Check belt tensions, replace any set of belts that has become stretched with a fresh matching set.

1.6.5 Warm Up

CAUTION:

(1) Warm up the machine, especially the spindle and feed shaft by running for 10 to 20 minutes at about half or one third the maximum speed in the automatic operation mode.

(2) This automatic operation program should cause each machine component operate, at the same time, check their operations.

(3) Be particularly careful to warm up the spindle which over maximum speed running.

If the machine is used for actual machining immediately after being started; following a long idle period, sliding parts may be worn due to lack of oil, thermal expansion of the machine components can jeopardize machining accuracy to avoid above condition, always warm machine up.

1.6.6 Preparations

WARNING:

(1) Tooling should conform to the machine specifications, dimensions and types.

(2) Seriously worn tools can cause injuries, replace all such tools with new ones beforehand.

(3) The work area should be adequately lighted to facilitate safety checks.

(4) Tools and other items around machine or equipment should be stored to ensure good footing and clear aisles.

(5) Tools or any items must not be place on the headstock, turret, cover and similar places.

(6) If the center holes of heavy cylindrical workpiece are too small, the workpieces will jump out when loaded, be careful the center holes and angles.

CAUTION:

(1) Too lengths should be within specified tolerances to prevent interference.

(2) Make trail running after installed tool .

1.6.7 Operation

WARNING:

(1) Do not work with long hair that can be caught by machine.

(2) Do not operate switches with gloves on that could cause malfunctions, etc.

(3) Whenever a heavy workpiece must be moved, two or more persons should always work together of there is any risk involved.

(4) Only trained, qualified workers should operate forklift trucks.

(5) Whenever operating a forklift truck, special care should be taken to prevent collisions and damage any surroundings.

(6) Wire ropes or slings should be strong enough to load and lifting should conform to the mandatory previsions.

(7) Grip workpieces securely.

(8) Stop machine before adjusting the coolant nozzle at the tip.

(9) Never touch a turning workpiece, spindle by hands or by any other way.

(10) While a workpiece is turning, do not wipe it off or remove chips by cloth or hand, always stop machine first and then use a brush and sweeper.

(11) Keep all guards and cover plates in place and all machine cabinet doors closed.

(12) Stop the machine whenever installing or removing a tool.

(13) Whenever machining magnesium alloy parts, wear a protective mask.

CAUTION:

(1) During automatic operation, never open the machine door.

(2) When performing heavy duty machining, carefully prevent chips from being accumulate since hot chips can catch fire.

1.6.8 To Interrupt Machining

WARNING:

When leaving the machine temporarily after completing a job, turn off the power switch on the operation panel and the main circuit breaker.

1.6.9 Completing A Job

CAUTION:

(1) Always clean the machine or equipment, remove and dispose of chips and clean cover windows, etc.,

(2) Do not clean the machine or equipment before it had stopped.

(3) Return each machine component to its initial condition.

(4) Check wipers does any breakage, replace broken wipers.

(5) Check coolant, hydraulic oil and lubricant does any contaminate.

(6) Check coolant, hydraulic oil and lubricant levels, add, if necessary.

(7) Clean the oil pan filter.

(8) Before leaving the machine at the end of the shift, turn off the power switch on the operating panel, machine main circuit breaker and factory feeder switch in that order.

1.6.10 Safety Devices

(1) Front cover, rear cover and coolant cover.
(2) Over travel limit switches.
(3) Chuck barrier, tail barrier and tool barrier (NC software).
(4) Stored stroke limit (NC software).
(5) Emergency stop push button switch.

1.6.11 Maintenance Operation Preparations

(1) Do not proceed any maintenance operation unless instructed to do by specialist.
(2) Replacement parts, consumables (packing, oil seals, o-rings, bearing, oil and grease etc.,) should be arranged in advance.
(3) Prepare to record preventive and corrective maintenance operations.

CAUTION:

(1) Thoroughly read and understand the safety precautions from the instruction manual.
(2) Thoroughly read the whole maintenance manual and fully understand the principles, construction and precautions involved.

1.6.12 Maintenance Operation

DANGER:

(1) During maintenance working should not operate the main circuit breaker or the control power ON switch on the operating panel. for this purpose. “Do not touch the switch during maintenance operating in progress”.or similar wording should be indicated on such switches and at any other appropriates locations, such indication should be secured by a semi-premanent means in the reading direction.
(2) With the machine turned on, any maintenance operation can be dangerous, in principle, the main circuit breaker should be turned off throughout the operation.

WARNING:

(1) The electrical maintenance should be done by a qualified person or by others competent person, keep close contact with the responsible person, do not decide byyour-selves.
(2) Overtravel limit and proximity switches and interlock mechanism including functional parts should not be removed or modified.
(3) When maintenance should be use steps or ladders, the safety is very important.
(4) Fuses, cables, etc., made by qualified manufacturers should be employed.

1.6.13 Until Operation Is Begun After Maintenance

WARNING:

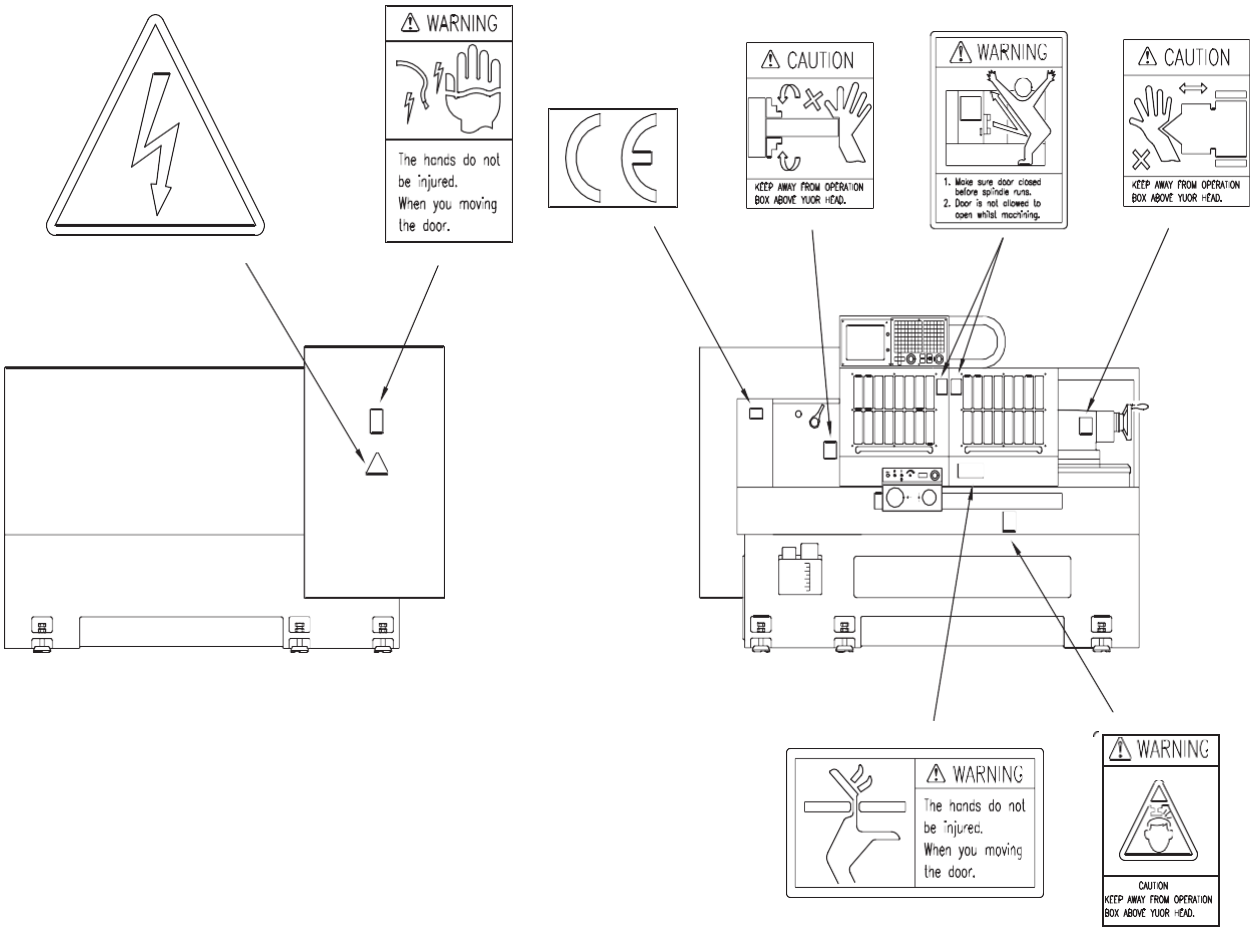
All parts and waste oil should be removed by the operator and placed far enough away from the machine to be safe.

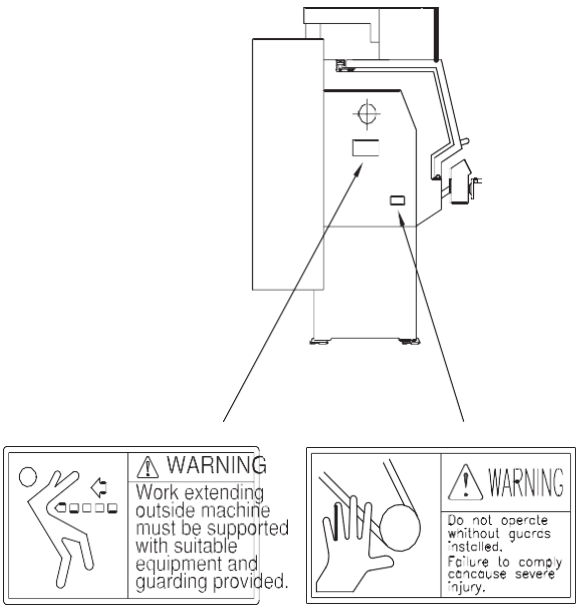
CAUTION:

(1) The maintenance person should check that the machine operates safely.
(2) Maintenance and inspection data should be recorded and kept for reference.

1.7 WARNING SIGNS PLATE ON THE MACHINE

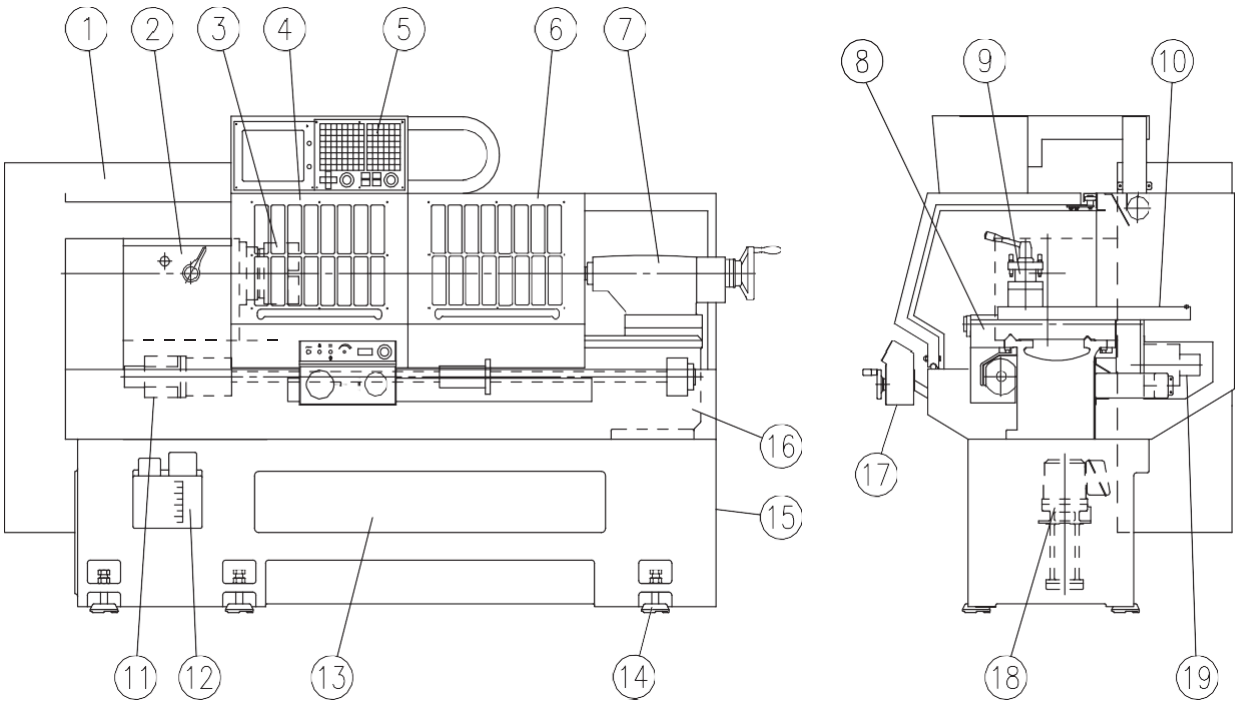
Safety related informatino, with must be strictly ovserved by all machine operators, is given on warning signs plate, these warning signs plate are attached to the machine.





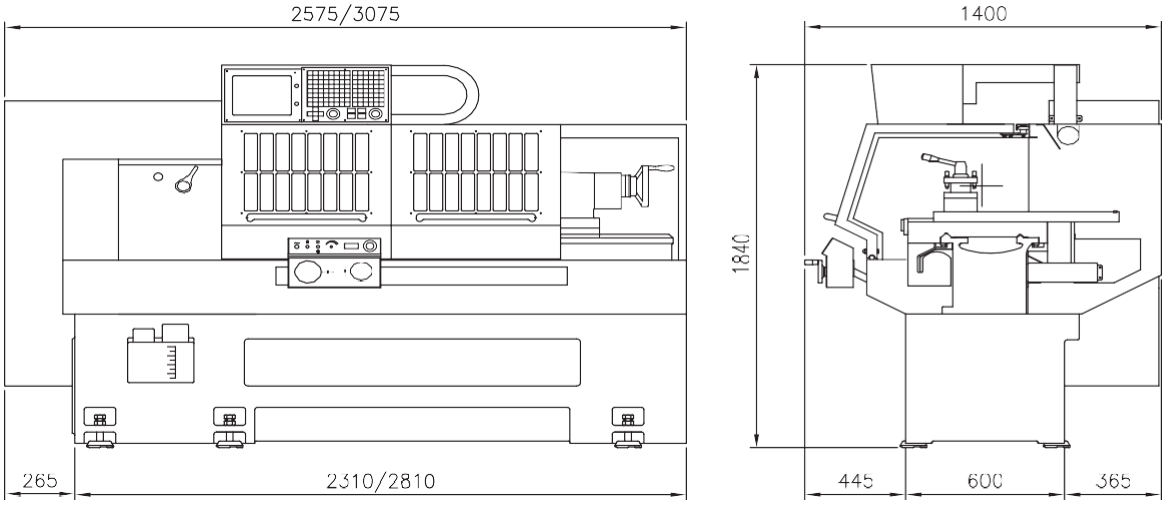
2. SPECIFICATION

2.1 GENERAL LAYOUT OF LATHE



1. Electrical control box
2. Headstock
3. Chuck
4. Left moving door
5. Operation panel
6. Right moving door
7. Tailstock
8. Carriage
9. Fourway tool post
10. Cross slide
11. Z-Axis servo motore
12. Lubrication unit
13. Chip tray
14. Installation block
15. Stand
16. Bed
17. 2 Electrical Handwheels for X,Z axis manual operation
18. Coolant pump
19. X-A xis servo motor

2.2 DIMENSIONAL DRAWING



2.3 MACHINE SPECIFICATION (TY-1840/1860CNC)

Swing over bed.....460 mm (18 “)

Swing over cross slide.....230 mm (9 “)

Center height .....230 mm (9 “)

Bed width .....370 mm (14-1/2“)

Center admits between ..... 980 mm (38-37/64”) / 1180 mm (58-1/4”)

Motor for main spindle/coolant ..... 10 HP Inverter /1/4HP

	(Standard)		(Optional)
H: 125-800	800-2500	H: 175-1120	1120-3500
M: 43-270	270-850	M: 60-380	380-1200
L: 14-90	90-275	L: 20-125	125-385

Spindle taper in nose/sleeve.....MT#6

Spindle bore.....60 mm(2-3/8”)

Longitudinal travel (Z-axis).....1000 mm (40”) /1500(60”)

Cross slide travel (X-axis)..... 270 mm (10-5/8“)

Cross slide dimension .....700 mm (27-1/2“) x210 mm (8-1/4”)

Tailstock Quill diameter.....75 mm (2-15/16“)

Tailstock Quill travel/taper .....160 mm (6-5/16“)MT#5

Ball screw diameter X-axis/Z-axis.....25 mm (62-64“)/32mm(1-1/4”)

Machine weigh dim.(LxWxH)2300kgs/2800kgs/L2575mm(101-3/8”)/3025mm (119-1/8”)/W1400mm(55”)/H1840mm(72-1/2”)

The maximum8” 3-jaw universal chuck under 3500 R.P.M

The maximum8” 3-jaw hydraulic chuck under 2500 R.P.M

The maximum12” 4-jaw independent chuck under 300 R.P.M

The noise level is under 85dB before the machine delivere

2.3.1 MACHINE SPECIFICATION (TY-2040/2060CNC)

Swing over bed ..... 510 mm (20 “)

Swing over cross slide ..... 280 mm (11 “)

Center height..... 255 mm (10 “)

Bed width..... 370 mm (14-1/2“)

Center admits between ..... 980 mm (38-37/64”) / 1180 mm (58-1/4”)

Motor for main spindle/coolant ..... 10 HP Inverter /1/4HP

(Standard)	(Optional)
H: 80-1600	H: 100-2000
L: 30-640	L: 40-800

Spindle taper in nose/sleeve..... MT#6

Spindle bore ..... 86 mm(3-3/8”)

Longitudinal travel (Z-axis)..... 1000 mm (40”) /1500(60”)

Cross slide travel (X-axis) .....270 mm (10-5/8“)

Cross slide dimension..... 700 mm (27-1/2“) x210 mm (8-1/4”)

Tailstock Quill diameter ..... 75 mm (2-15/16“)

Tailstock Quill travel/taper .....160 mm (6-5/16“)MT#5

Ball screw diameter X-axis/Z-axis. ..... 25 mm (62-64“)/32mm(1-1/4”)

Machine weigh dim.(LxWxH)2300kgs/2800kgs/L2575mm(101-3/8”)/3025mm (119-1/8”)/W1400mm(55”)/H1840mm(72-1/2”)

The maximum8” 3-jaw universal chuck under 2000 R.P.M

The maximum8” 3-jaw hydraulic chuck under 2000 R.P.M

The maximum12” 4-jaw independent chuck under 300 R.P.M

The noise level is under 85dB before the machine delivere

2.4 HARDWARE & OPERATION FULL KEY

-11”LCD Monitor with softkey (Half Key)
-Axes module (PLC-56I/32O)
-Conversational turning application software.
-CPU-CNC with 128 Ram memory.
-32K Eeprom memory for PLC and customizing cover.
-Turning jop panel.
-Turning DNC soft floppy disk.
-RS232 Interface (V24), RS-422 Interface.
-USB interface.
-Constant surface speed (CSS)
-2 Electronic handwheel
-PLC with 16/32 bit processor/input/output module

2.5 CONTROL PANEL FUNCTION KEYS

1. Coordinate preset.
2. Tool management (Tool selection, tool calibration, geometry, location codes).
3. Spindle control (Forward, backward, stop, speed enter).
4. Operation at constant surface speed (CSS).
5. Operation with live tools.
6. Operation with axes jog keys.
7. Operation with handwheels.
8. Operation with conversational icons (Facing/turning/taper/rounding/grooving/ threading/drilling/tapping/positioning/profiling cycle).
9. Parts memory storage (P.Prog).
10. Single block mode.
11. Numeric key (A-Z, 0-9).
12. Cycle start & cycle stop.
13. Graphics representation.
14. Recall function.
15. Reset, Esc, Shift.
16. Main menu.
17. Home search.
18. ISO key:Conversational mode insert ISO program.
19. Feedrate enter & feedrate override.
20. Help.
21. Spindle speed override.
22. Shift + ESC :TC Mode (Conversational model) & T Mode (ISO) convert.
23. Video Off:Shift + Clear.
24. PCALL:User defined operation.

2.6 STANDARD ACCESSORIES:

1. Automatic lubrication for all sliding surface.
2. Work light.
3. Coolant system.
4. Splash guard featuring sliding door with inspection window.
5. 4-Way tool post.
6. Operation, programming and maintenance manual.
7. Tool centers.
8. Sleeve.
9. Set of Wrenches.
10. Set of hexagon T-Type wrenches.
11. Spare paint.
12. Wrench for spindle.
13. Leveling bolts and nuts.

2.7 OPTIONAL ACCESSORIES:

1. Steady rest.
2. Follow rest.
3. 5C Lever operated quick change closing collet attachment.
4. 3-jaw scroll chuck.
5. 4-jaw scroll chuck.
6. Face plate.
7. Quick change tool post with 4 tool holders.
8. American type tool post.
9. Live center MT#5.
10. Suck fog equipment.
11. Automatic fourway tool post.

2.8 CHECK LIST

Check list for operation

Item	Job	Description No.
1. Read through operating manual thoroughly		
2. Read through all instruction manual thoroughly		
3. Lifting moving machine		Chapter 3-5
4. Installing machine…		Chapter 3
5. Leveling machine…		Chapter 3-8
6. Lubricating instruction…		Chapter 5
7. Checking electrical circuit connection		Chapter 6-3-2
8. Main switch and button “ON”		
9. Press emergency stop button to stop machine		
10. Learn safety rules…		Chapter 1
11. Simple trouble shooting…		Chapter 6-4
12. Maintenance…		Chapter6

2.9 CHECK LIST

Check list for maintenance

Item	Job	Interval
1. Clean machine (Do not use air compressor)…		Weekly
2. Checking electrical circuit connection…		Every time before operation
3. Replacing coolant and clean coolant tank…		3 months
4. Clean motor…		Annually
5. Slide (X-Axis)…		Annually
6. Slide (Z-Axis)		Semiannually
7. Spindle tip…		Annually
8. Automatic lubrication unit/Add grease…		Weekly

3. MAINTENANCE

3.1 INSTALLATION

3.1.1 General Preparations & Selecting Location

To upgrade the operation efficiency and accuracy of precision machining, a proper foundation is required.

The machine body is not allowed to be exposed to sunshine or rain, please be sure not install the machine adjacent to planing machine (milling machine, molding or punching machine), it will result in poor performance.

It is required at least 20" (500mm) distance from machine to wall and objects or between machines to ensure easy reparation, cleaning and maintenance of machine as well as easy opening of the door of electric cabinet.

3.1.2 Foundation

With special torque resistant capability at the machine base, this machine requires no particular foundation, provide 6" (150mm) thick of concrete on floor and leave space of component for leveling.

Do not use wood foundation which with nature of un-stability, may cause the machine to move gradually.

Install the machine on the first or second floor, careful consideration if machine can be loaded.

3.1.3 Foundation layout

Please dig holes in six places as big as shown in Figure 1 for setting foundation bolts, place the bolts in the holes then fill the holes with cement, lift the machine on the bolts after the cement has turned into solid concrete, then fix the bolts with screw nuts.

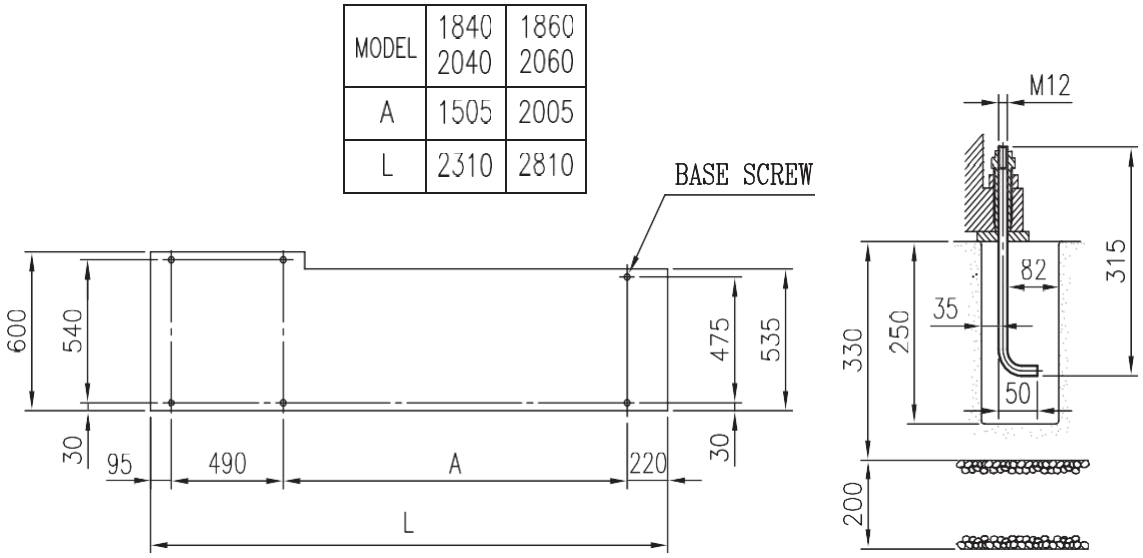


Figure 1

3.2 CONNECTION OF POWER LINE

1. Make sure the voltage of incoming power supply is correct according to required or as marked on the unit.
2. Power wires, grounding and over voltage protector should be comply with the local electricity regulations.

For wiring to other voltages, be sure to rewire the spindle motor, coolant system, dust suction device and transformer to correct voltage, the relevant currents, fuses and overload relays are shown in the electrical manual.

Note:Do not turn on the machine motor when its voltage is different from power voltage and contact electric technician from reparation.

3. For connecting the power supply, the electrical technical valued are provided as following:

400V, 3 – 50HZ

Cable cross section:16mm²

Fuse: 60A

3.3 UNPACKING

Remove the top cover of wooden case first and then the plates on four sides, carefully take out fittings at first, if necessary. Remove the set screw used for holding the machine on the pallet.

Dis-assembling packing crate and remove skids as carefully as possible to avoid damaging the machine, if the machine is damaged during transportation, contact with your local dealer and transportation company who delivered your machine immediately.

3.3.1 Checking for shortage

Be sure to check your machine against the packing list which his shipped with every machine, in case of shortages, note items not received and contact with your local dealer.

3.4 LIFTING MACHINE

3.4.1 Transportation by crane (model TY-3480CNC/ TY-3880CNC/ TY-4280CNC Only)

Notice :

1. Only an authorized technician should be perform work with machine lifting.
2. Capacity of truck must be 3 tons at least.
3. Make sure there is no obstacle or personnel on the move, path and left on the machine.
4. Keep machine's balance and move slowly.

We do not recommend lift and transportation machine by crane.

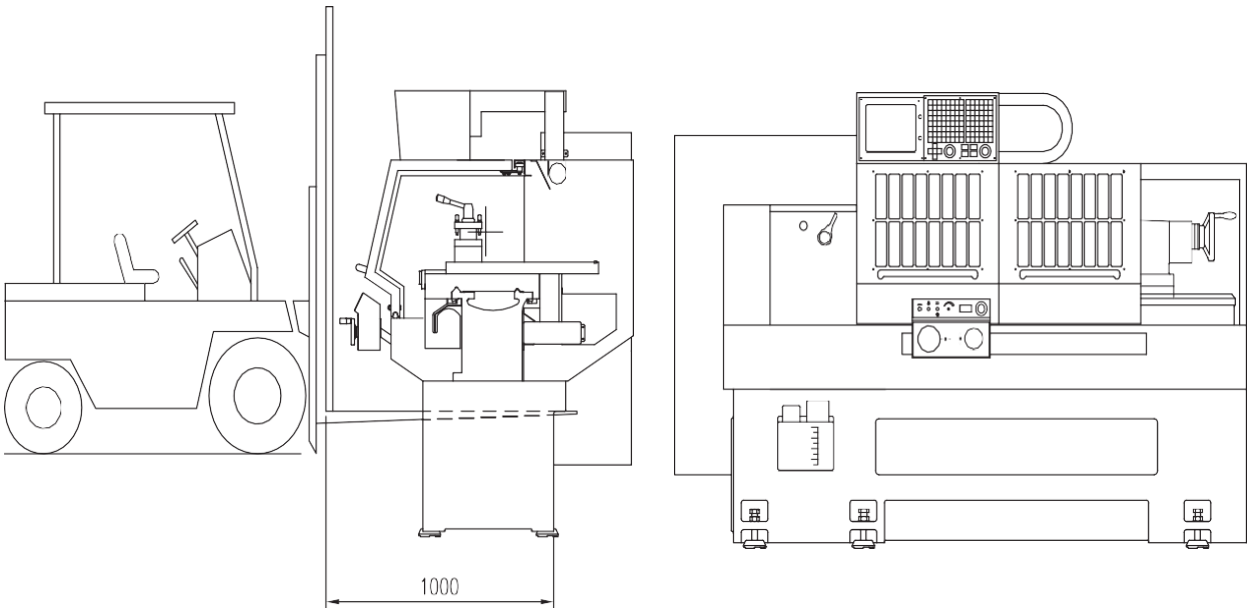


Figure 2

3.5 PLACING THE MACHINE

Before placing the machine, fix the adjusting screw on the base, makes machine as close as possible to the floor and position of leveling pads in their most suitable place, increase the stability of machine.

3.6 CLEAN & LUBRICATING MACHINE

All protective coating must be removed before using machine, do not attempt to move any ways if the coating still exists.

Be cautious while selecting a suitable cleaning agent, paraffin applied with a clean brush to take off protective coating, the protective coating be removed with clean rags.

Note:1. Do not use gasoline or any other flammable solution clean machine.

2. Clean and lubricate all the exposed ways of table and saddle, drive the table and saddle to one end of travel, clean and lubricate ways thoroughly then drive table and saddle to the other end, and clean lubricate ways thoroughly as well, be sure to use a suitable lubricant such as Sunoco Way lube#11180 or Mobil Vactra Oil#2.

3.7 LEVELLING MACHINE

It is necessary to level the machine before starting to operate the machine.

Please prepare the following tools to adjust machine leveling:

1. Accurate spirit leveling gauge (spec. 0.02mm/1000mm or 0.001in/4 ft.).
2. Two adjustable wrench

Clean the table surface thoroughly, set one of the spirit leveling gauge on the longitudinal direction and the other on the cross direction of the slide.

If there is only one leveling gauge available, then use it on both directions alternately.

Adjust the six leveling screws bolts which located the botton of the machine base(as show in Figure 3) until the machine is leveled within 0.02mm/1000mm (0.001”/4ft) in both directions.

Lock the nut “A” on the leveling screws, and re-check the level to see whether the level of machine is still correct.

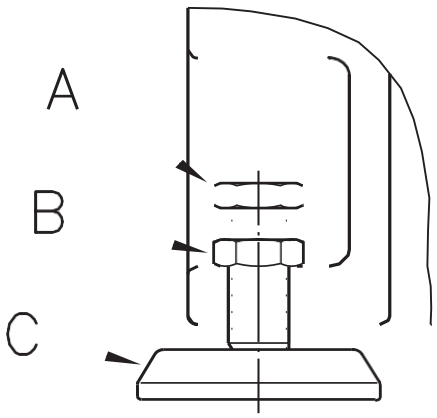


Figure 3

Suggestion:For the newly installed machine, check its level once every week. When the foundation is rigid enough, then you may level the machine once per month.

3.8 ELECTRICAL EQUIPMENTS

3.8.1 Electric Cabinet

The main power cable can be put into the cabinet through the bottom of the cabinet, the main switch is located on the right side of the cabinet and electrical diagram can be inside the cabinet.

3.8.2 Power Line

1. Make sure the voltage of incoming power supply is right type that the machine requires or as marked on the unit.
2. Power wires, ground and over voltage protector should comply with the local electricity regulations.
3. For wiring to other voltages, be sure to rewire the spindle motor, coolant system and transformer to correct voltage, the relevant currents, fuse and overload relays are shown in the electrical manual, see Note 2.

Note:1. Do not turn on the machine motor when its voltage is different from power voltage and contact electric technician for reparation.

2. The spindle drive is 220 volts only and must be replaced for other voltages.

3.9 LUBRICATION

3.9.1 Automatic Lubrication System

This system adopts automatic intermission lubricant supply which includes discharge oil of proportional distribution and an alarm for low fluid level warnint. Still, please check the fluid level before operation, the following recommend lubricant to the reservoir.

1. Shell Spirax HD90
2. Mobil Vactra Oil#2
3. Esso Gear Oil GX90
4. Chinese Petroleum Corp. R32
5. Other equivalent grade lubricant

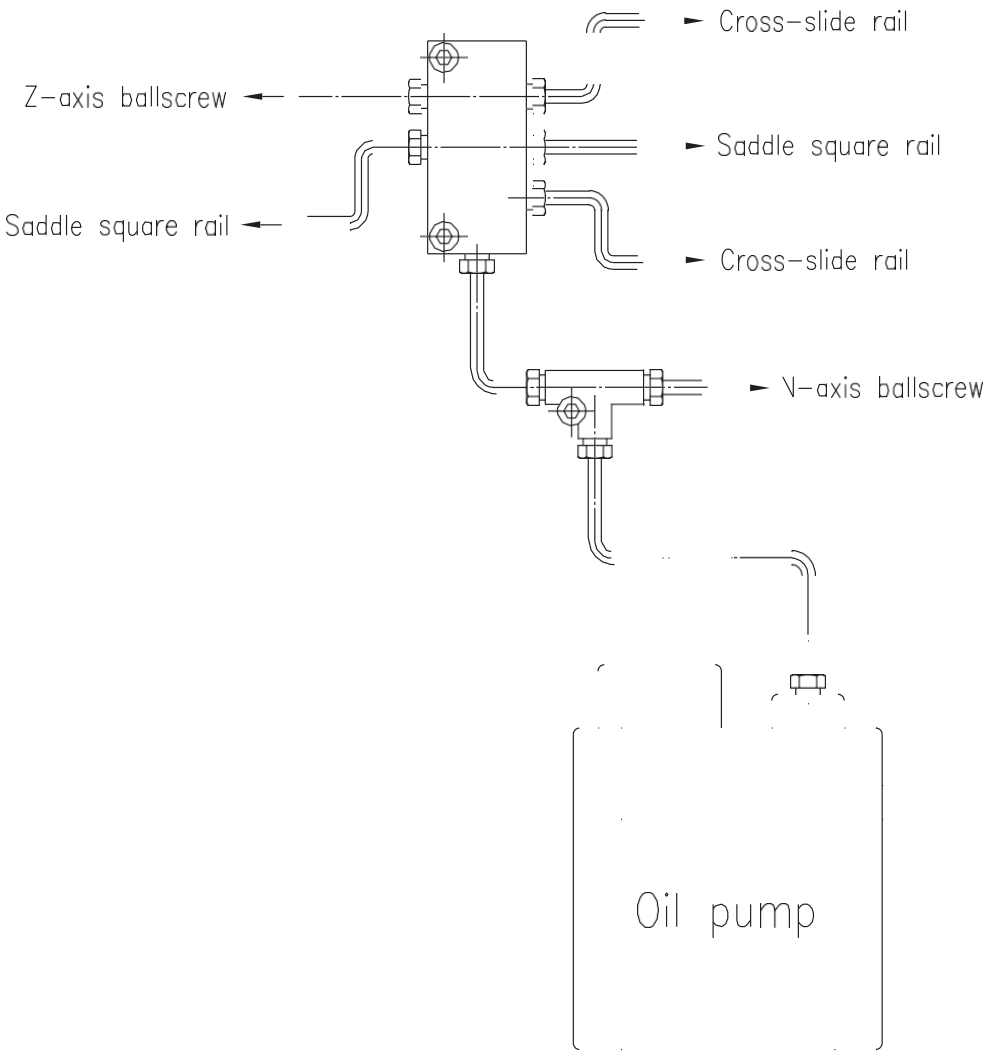


Figure 4

3.9.2 Lubrication System On Headstock

The gear construction in headstock is lubricated by mechanical type of direct drive pump. The pump will supply lubrication during power on.

A: For TY-1840/1860CNC Spindle Speed 2500 R.P.M.

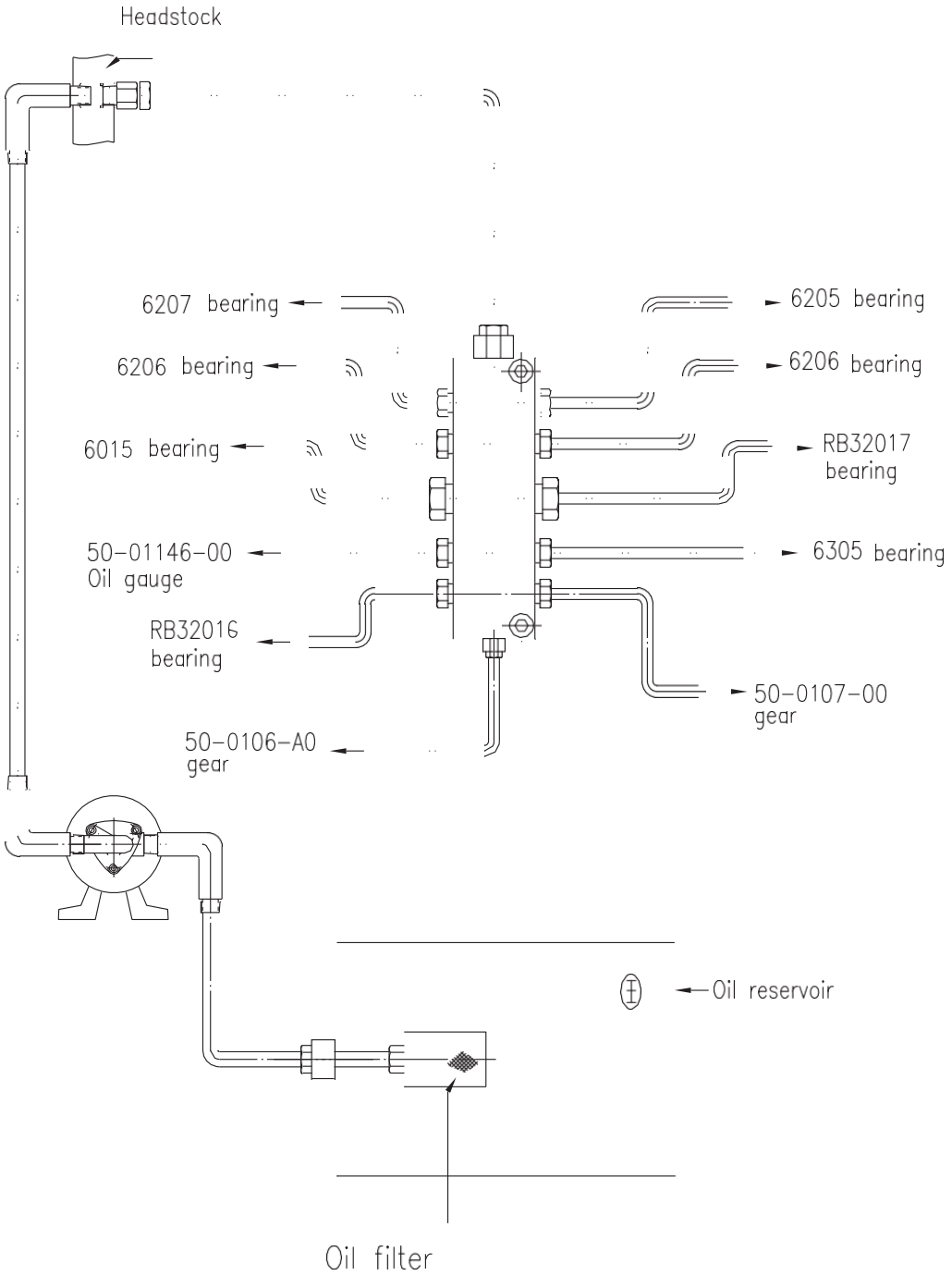


Figure 5-1

B: For TY-1840/1860CNC Spindle Speed 3500 R.P.M.

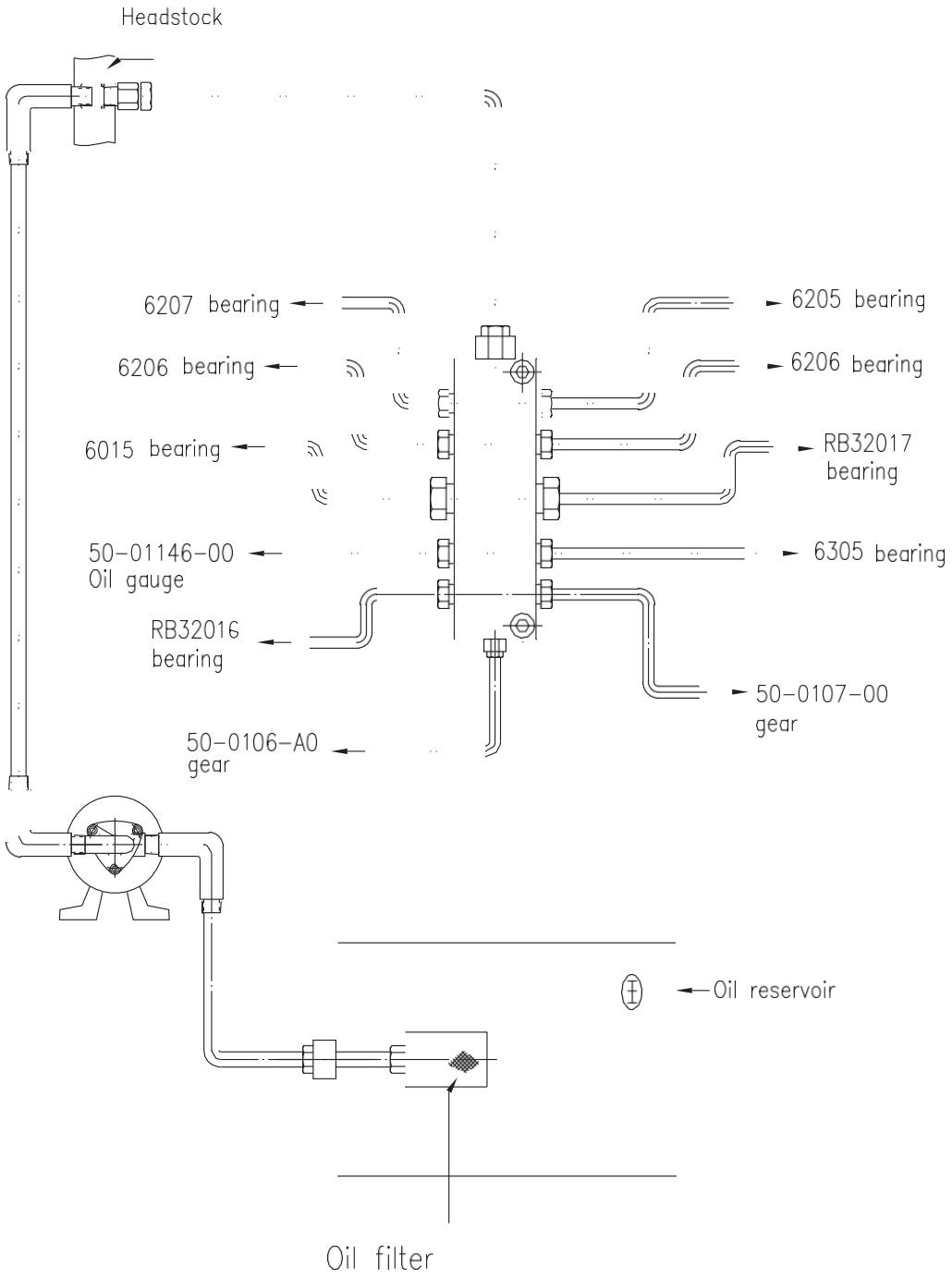


Figure 5-2

C: For TY-2040/2060CNC Spindle Speed 1600/2000 R.P.M.

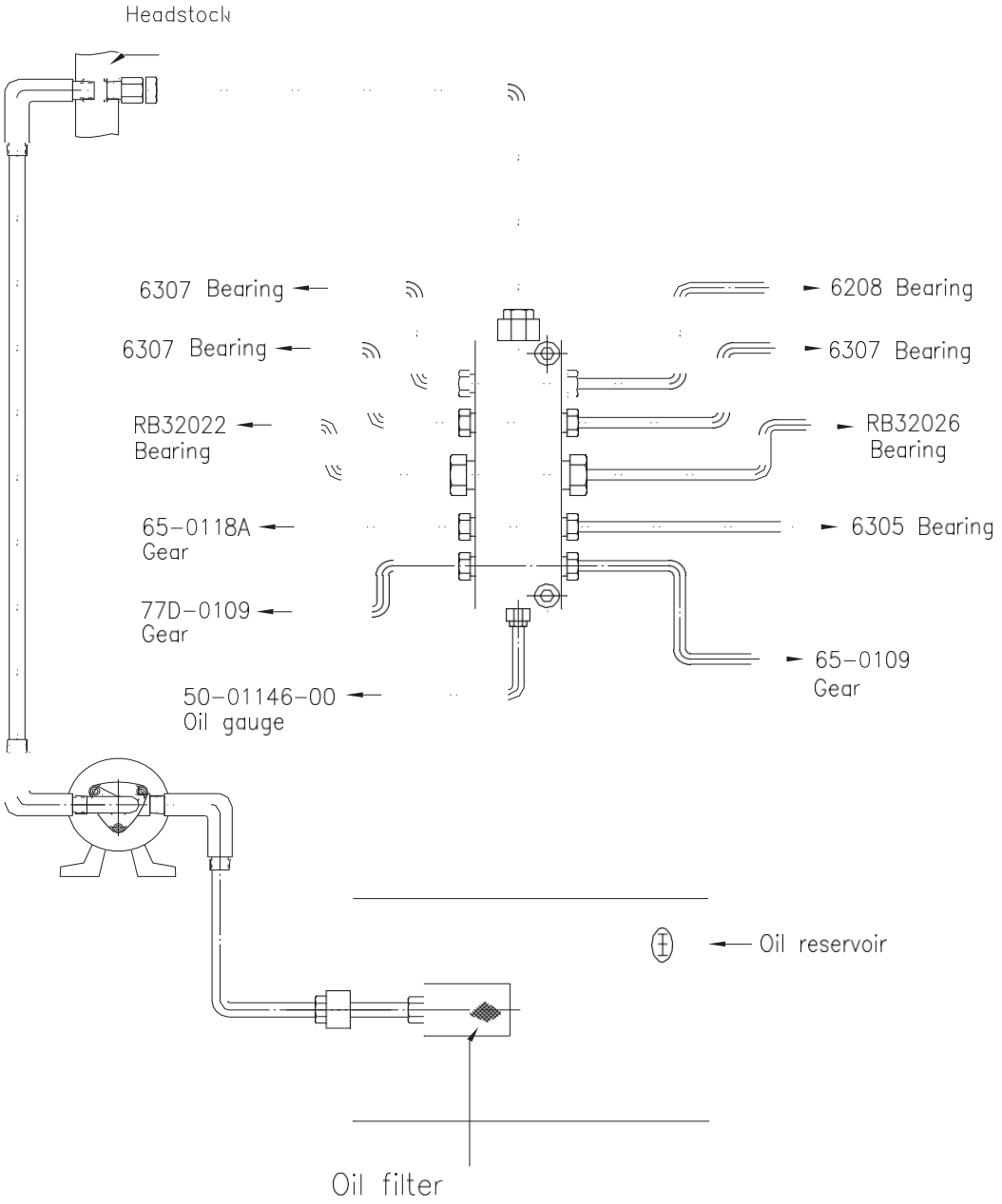


Figure 5-3

3.9.3 THE METHOD OF PERSSURE-ADJUSTING VALUE

1.Take off nut “A”

2.Release nut “C”

3.Use flat head screw driver to adjust screw “B”:C.W. direct increase pressure

4.Use flat head screw driver to adjust screw “B”:C.W. direct decrease pressure

5.Tighten nut “B”

6.Tighten nut “A”

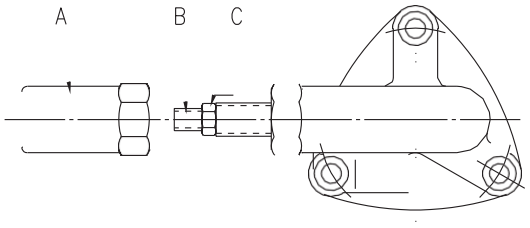


Figure 6

3.9.4 Others

There are three oil balls on the tailstock

Please add 10 drops of recommended lubricant to them respectively every day before operating to ensure the smoothenss of way.

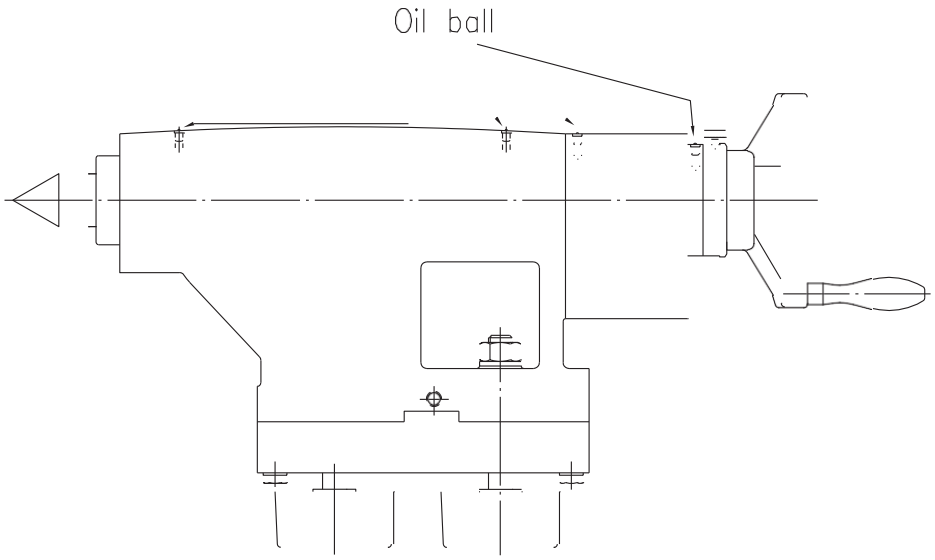


Figure 7

3.9.5 Lubrication System

Check all the fittings of lubrication system under normal operation temperature, if oil leaking is found, tighten the fittings,inspect oil level daily.

3.9.6 Replacing Oil On Headstock

if is necessary to replace the oil for a new machine after one month of operation, after premier replacement, it is recommended to replace the oil every 1500-2000 operation hours.

Pleas change oil from headstock by follow steps:

1. Open end cover of headstock.
2. Prepare one empty tank for old oil from reservoir, use one tube “D”,put this tube into drain adapter “C”.
3. Pull out the drain plug “A”.
4. Turn the hand of adapter “C” to “Open” position, the old oil will drain out to tank through tube.
5. Turn the hand of adapter “C” to “Close” position while the oil is completely empty.
6. Fill in the new lubricant into “A” position.
7. Take care the level of oil glass, stop drain oil while oil amount reach the top level, then lock and tighten drain plug “A”.
8. Take off tube “D”.
9. Fit end cover and lock.

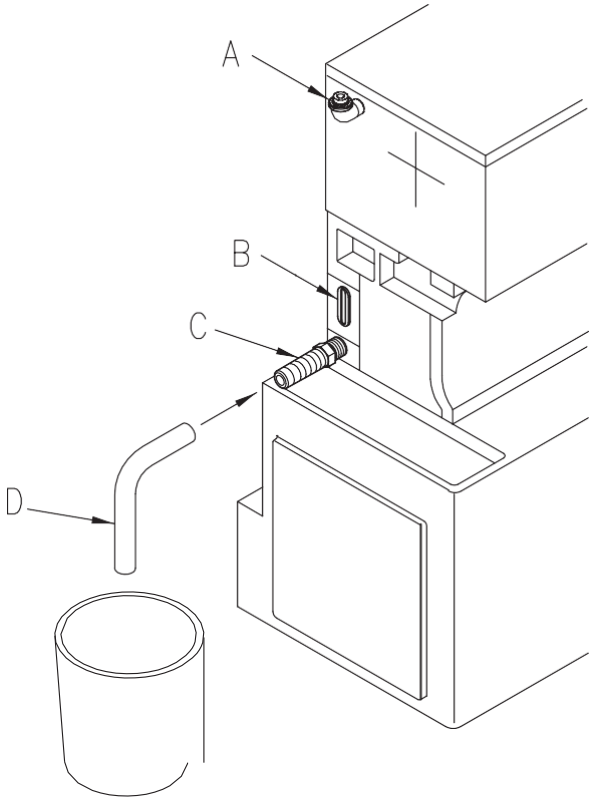


Figure 8

3.9.7 Fittings

Check all the fittings after 50 hours of operation especially their tightness between tubes, regular check every 200 hours.

3.10 Machine body

In order to maximize the machine performance, the accuracy on headstock and all slides have to be re-adjust after three months of operation. After that, re-adjust every six months to one year to keep the machine in best accuracy.

3.10.1 Headstock

Aligning Headstock:

If taper appears on turning workpiece and convex on rounding, adjust the parallel of headstock by the following steps.

1. Insert test bar in the spindle bore, attach the base of test indicator to tool post, apply the stylus of the indicator to the outer diameter of the bar. move the saddle along Z-axis and measure the maximal difference.
2. If indicator needle of swings drastically, release the headstock fixing screws and adjust the adjusting screws to fine the paralled of spindle and Z-axis.
3. After adjustment, tighten the fixing screws and move the saddle to observe the indicator needle.

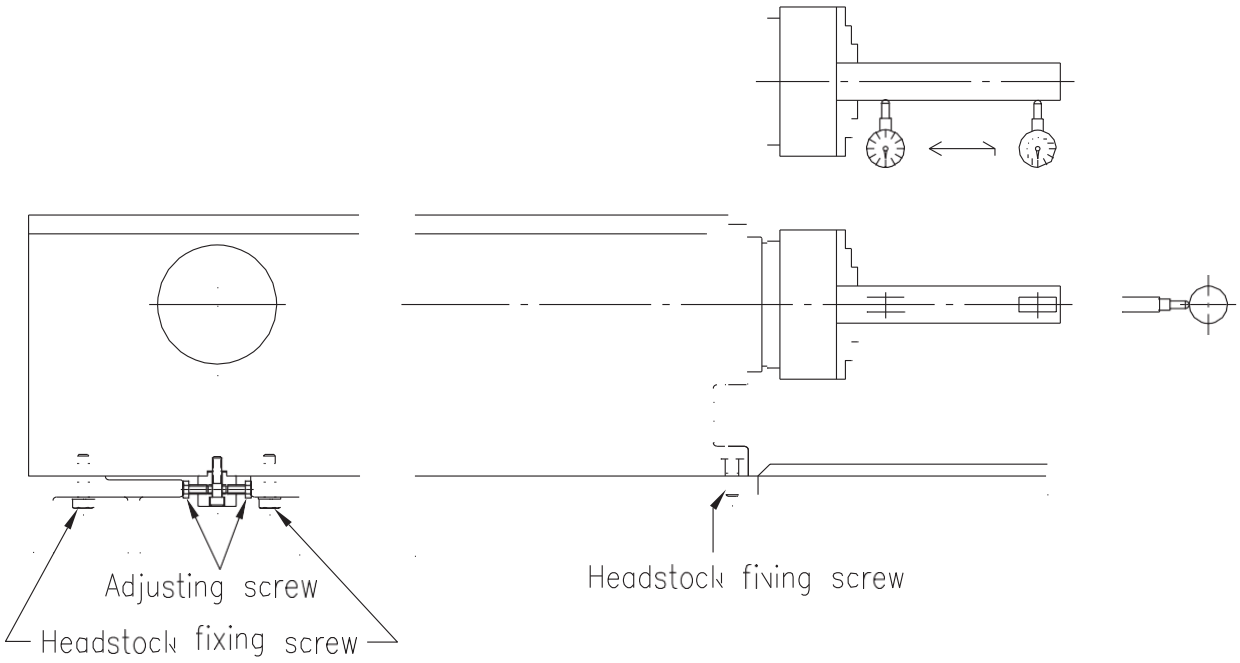


Figure 9

3.10.2 Chuck And Chuck Mounting

WARNING:USE ONLY HIGH SPEED CHUCKS WITH THESE MACHINES

When fitting chucks or face plates, first ensure that spindle and chuck tapers are scrupulously clean and that all cams lock in the correct positions.

Chuck that all cams are in the released position (See Fig.10).

Mount the attachment on to the spindle nose and lock each cam by turning it clock -wise using the key provided.

A reference line R1(Fig.10) should be scribed on each chuck or face plate to coincide with the reference line R on the spindle nose. This assists subsequent re-mounting.

NOTE:

For correct locking conditions each cam must tighten with its index line between the two vee marks on the nose (Fig.11).

DO NOT INTERCHANGE CHUCKS OR OTHER SPINDLE MOUNTING ITENS BETWEEN LATHES WITHOUT CHECKING EACH CAM ROR CORRECT LOCKING.

To adjust “CAMLOCK STUDS”

Romove lockscrew “B” , ture stud “A” one full turn , in or out as required,then re-fit and tighten leadscrew “B”,

NOTE:

A datum ring “C” is marked on each stud as a guide to the original or inital setting.

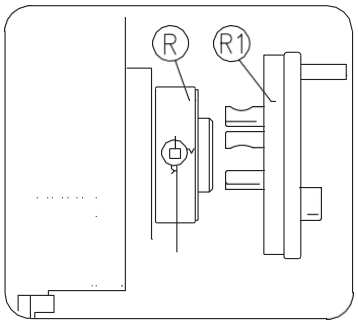
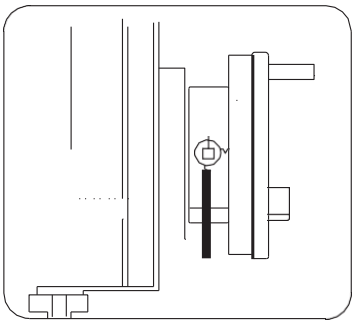


Figure 10



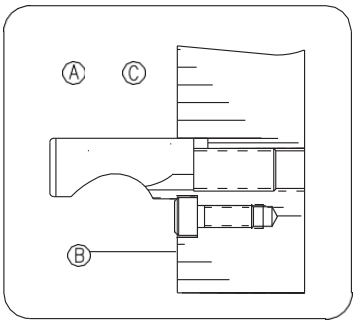


Figure 11

3.10.3 Cross Slide

If the gibs between slide and saddle become loose, it will affect the machining accuracy, you should regularly check and adjust them every six months according to the following steps.

1. Release the screw “A”
2. Remove slide cover “B” as shown in Figure 12 then the gibs can be seen.
3. Use flat head screw driver to release the adjust screw “C” about 1/2 circle CCW.
4. Tighten screw “E” about 1/2 circle CW.
5. Move the slide back and forth to a satisfied smoothness.
6. Re-assemble the cover “B”.

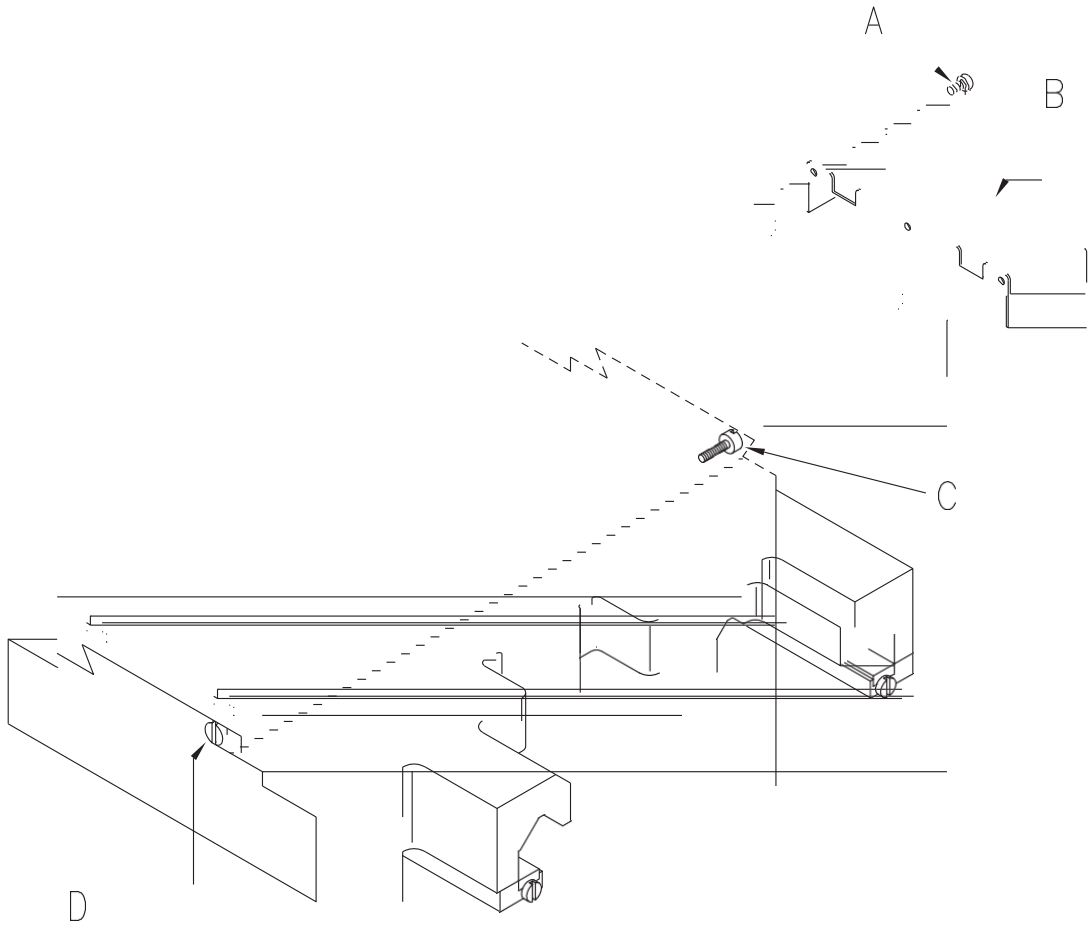


Figure 12

3.10.4 Saddle

If the gibs between saddle and bed become loose, it will affect the accuracy of saddle travel. Check and adjust them every six months according to the following steps.

1. Use flat head screw driver to loose the adjust screw “A” and “B” about 1/2 circle CCW.
2. Appropriately tighten adjust screw “C” and “D” about 1/2 circle CW.
3. Move saddle left and right to a satisfied smoothness.

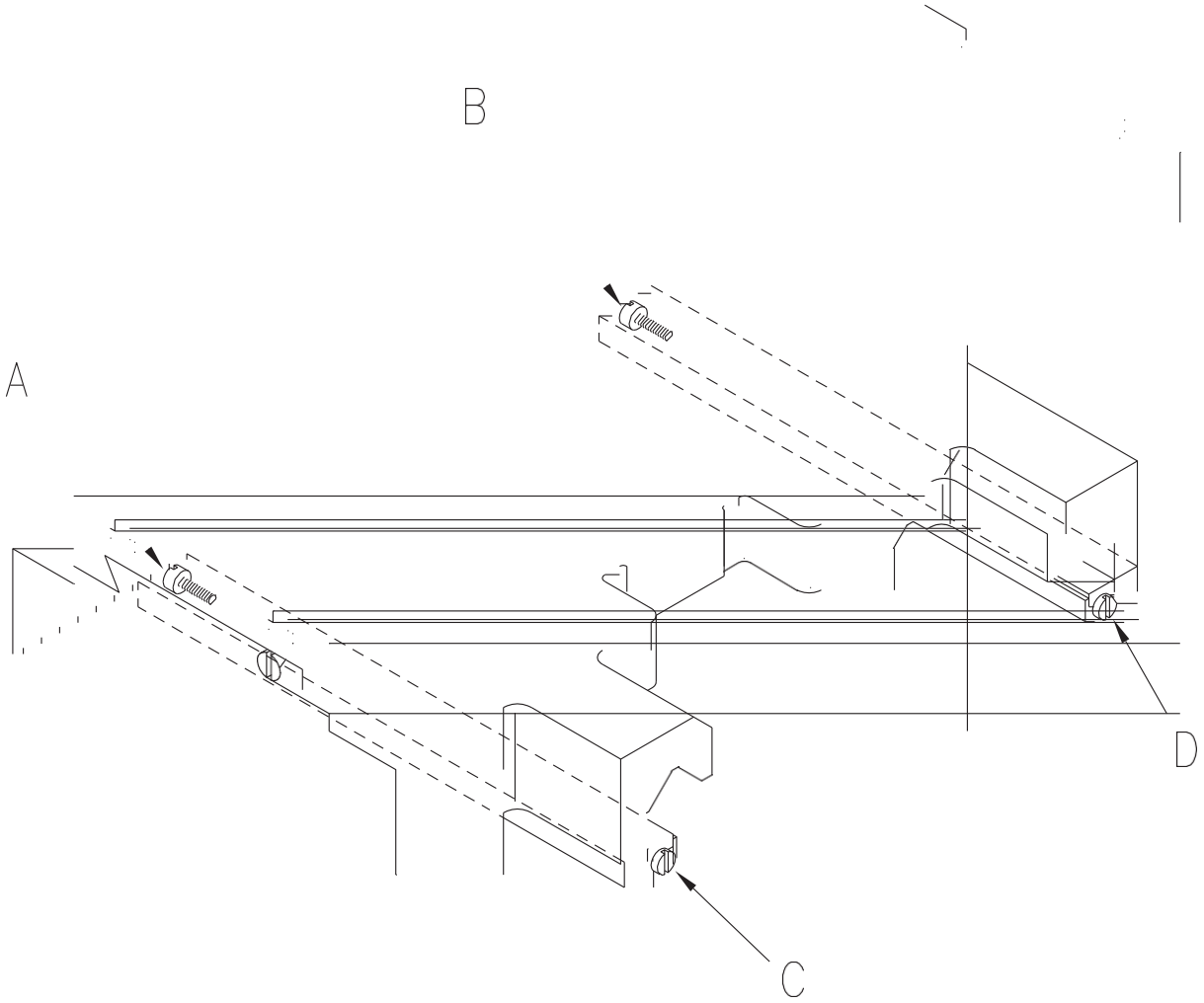


Figure 13

3.10.5 Load & Unload Center Of Tailstock

To unload the center just hold the center and back the tail spindle,
Clean the taper of the center before loading it to the tail spindle.

3.10.6 Aligning Tailstock To Spindle

If there is taper appearing on workpiece while machining by using tailstock, re-align tailstock to the spindle, steps as following:

1. Insert a gauge bar between the spindle and tailstock, attach the base of a test indicator to the saddle, apply the needle of indicator to the surface of the bar, then move the saddle through the full longitudinal travel. Take the measurement of its maximal difference for later adjustment.
2. Release the 4 pcs of fixing screw “A”.
3. Release the screw “B”.
4. Adjust screw “C”, process adjustment.
5. Adjust the adjusting screw “C” until fine alignment.
6. Lock and locking nut “A”.

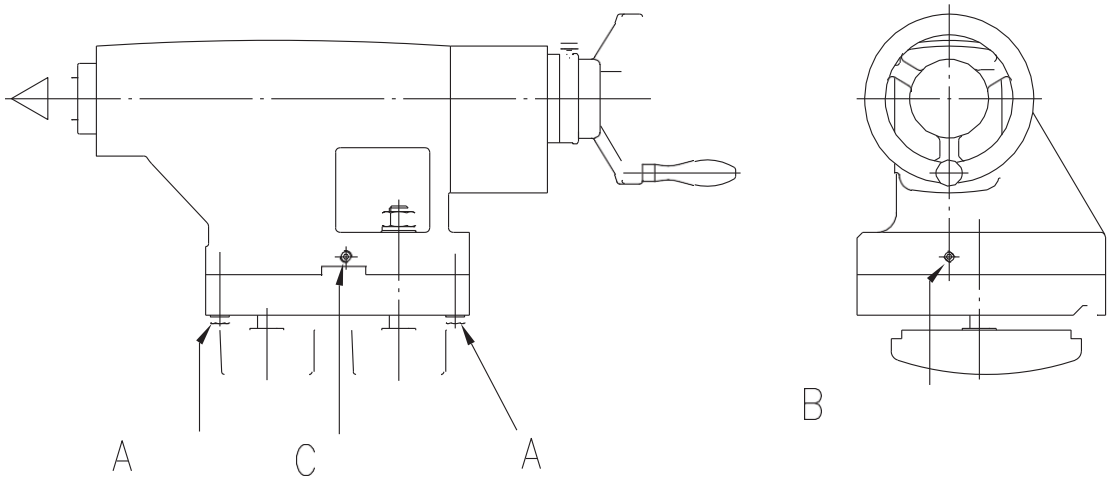


Figure 14

3.10.7 Adjusting Belt Tension

1. Remove motor access cover (rear cover for L.H base under headstock).
2. Loosen adjusting nut “A” till desire tension is achieved.
3. Tighten jumb nut “B”.

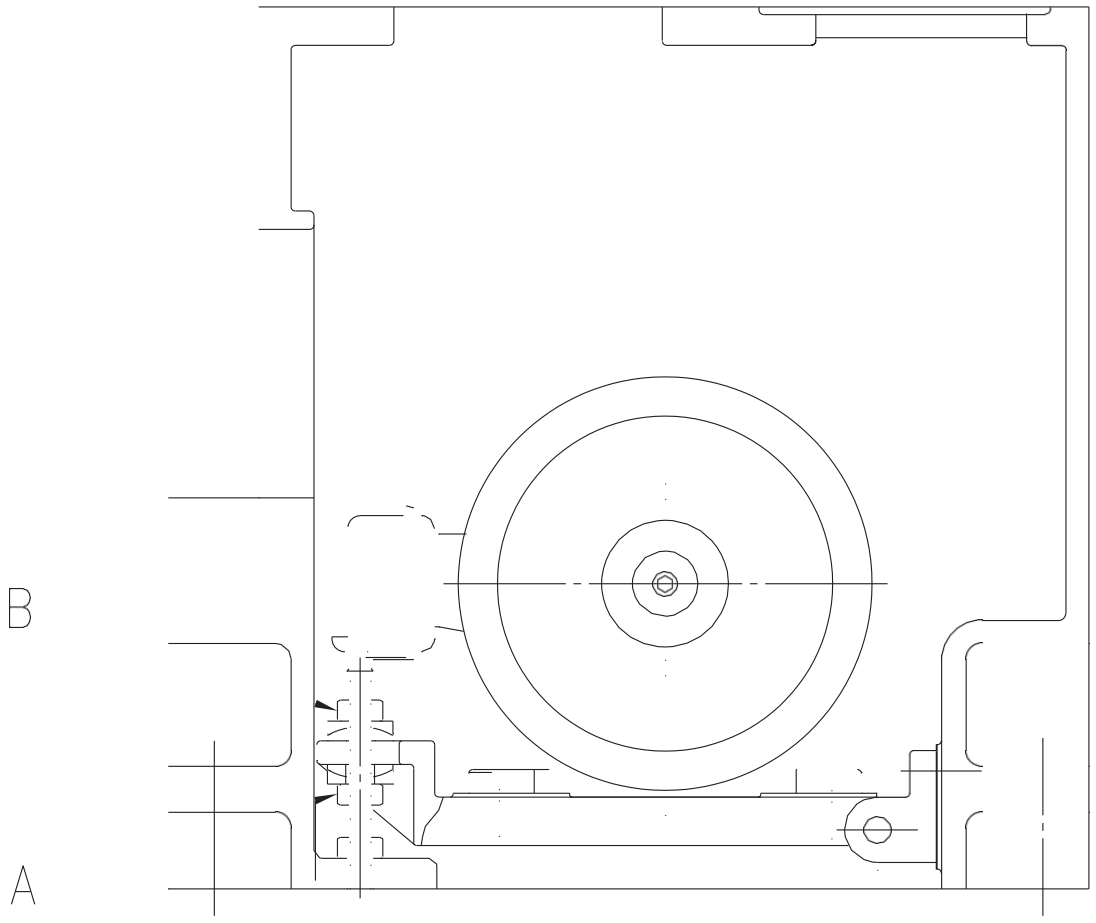


Figure 15

3.11 ELectric Equipment

3.11.1 Motor

Spindle motor is equipped with IP . Therefore, no special care in required. Have qualified technician check and clean it every six months is OK. Other motors should be checked annually.

Spindle speed for 2500 r.p.m.all the bearings in headstock by force lubrication. Spindle speed for 3500 r.p.m.,spindle bearing is already greased before shipping grease amount is able to support 8-10 hours of daily operation up tow years.

Still, it is recommended to check it annually by qualified mechanic, the bearing in other shaft of headstock by force lubrication.

3.11.2 Control Units

No special care is required. Cleaning CRT and key board by using a none detergent soap.

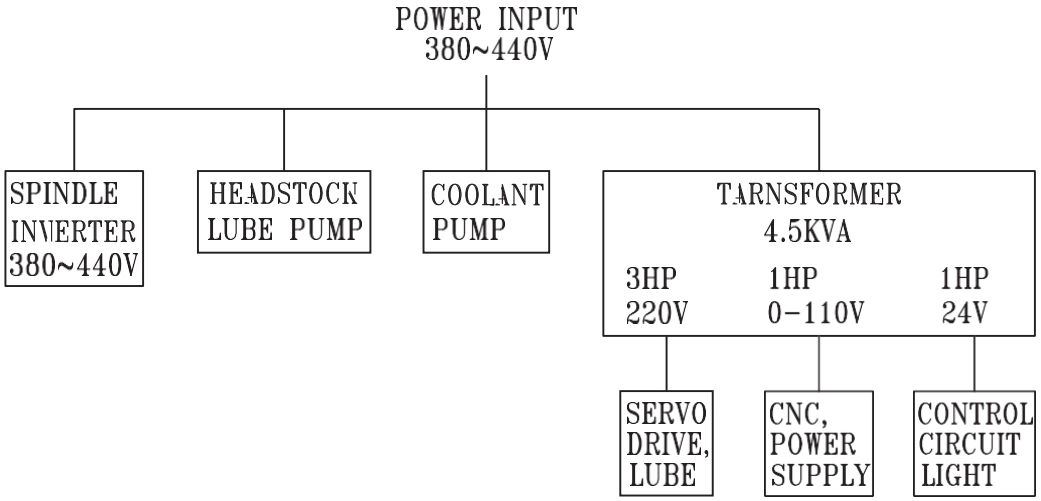
3.11.3 Wire Connectors

Check them annually, and tighten if necessary.

3 11.4 Simple trouble shooting

Description	Possible Cause	Repair Method
Lubricant level down to bottom while spindle is runnmg	Oil insufficient	Add oil into headstock
	Pump path clogged	Remove the object that clogs the pump outlet
Rails on bed tum black	Automatic lubrication system out of lubricant	Add lubricant
	Inappropriate oil proper ties	Immediately replace the oil
	Oil tube clogged	Replace tube or clear the clogged object
Cylindrical machined into conical shape	Spindle head slick	Please refer to Chapter 3.10.1 to adjust the accuracy
Inaccurate machining between two centers	Poor accuracy on centers	Please refer to Chapter 3.10.6 to adjust the accuracy
Step appear on spherical workpiece surface	Inaccurate backlash compensation	Please refer to Chapter backlash Offset and adjustment
Too much temperature rise during spindle running	Invalid greasing	Check if there is oil leaking from the oil gauge

I.Before connecting the power, please notice that the power arrangement of the machine for the spindle requires according to your order to Sharp plus transformer. The way of how to connect the wires is indicated inside the inverter, please input the right voltage then test if the output is exactly 220VAC, then connect to the machine if the output is correct.



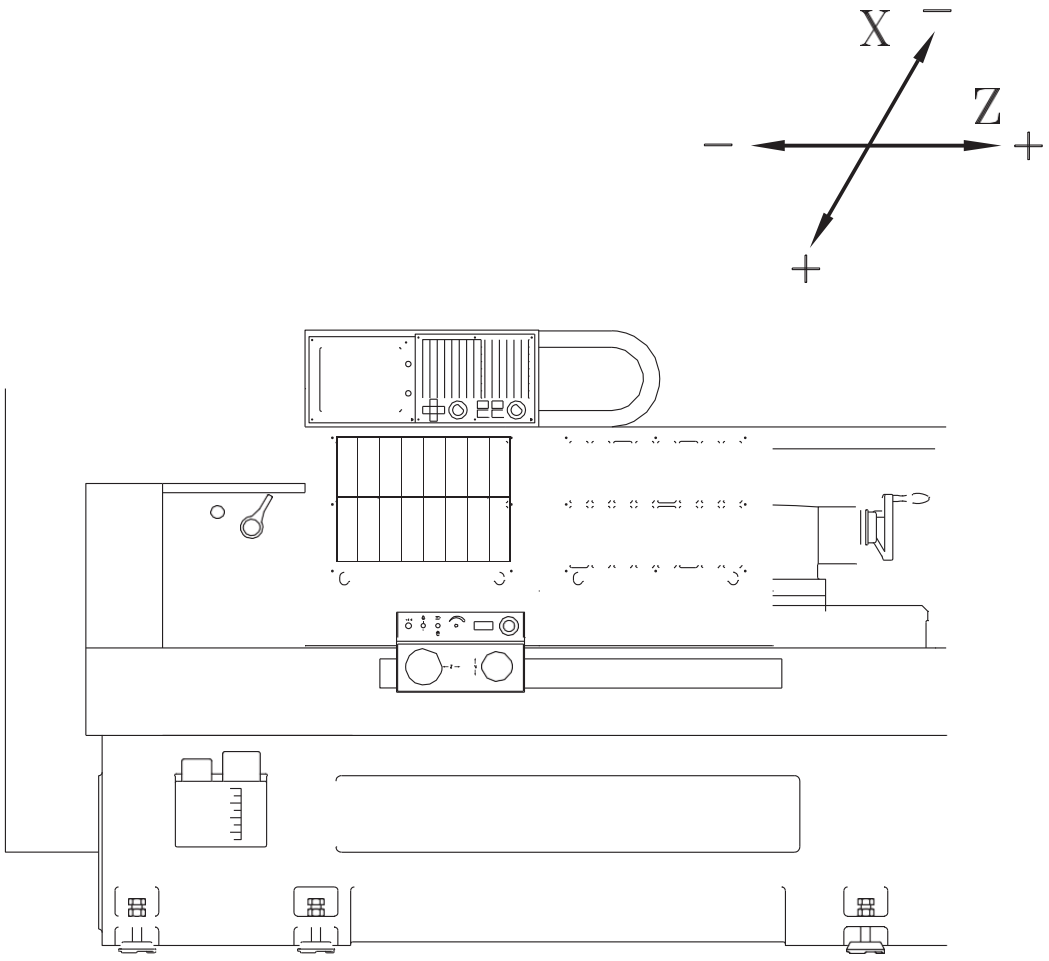
2. Before power on, scrutinize if every equipment is complete and fixed in the proper place.
3. Input the power after everything is checked normal, press down the emergency button before turning on the power switch on, you can release the button if everything come out OK., this is a must procedure for the every first installation.
4. When the power is turned on, press the RESET key to check if the rotating directions of spindle and coolant motor are correct.
5. Check if the lub is functioning and infuse to prevent table from damage.
6. Do not pile stuff within operating range.
7. Before turning the power on, please check:
   (1) Inspect if any external damage on cord, if yes, contact local dealer.
   Inspect if any damage on CNC panel or screen, ·if yes, contact local dealer.
   (2) Fill up the lubrication in the lub tank.
   (3) Check if any wire dropped off.
   (4) Check up the accessories against the list.

8. After power, please check:
   (1) Make sure that the rotation directions of spindle motor and coolant motor are correct.
   (2) Inspect if the lub working properly.
   (3) Check if the machine lamp working.
   (4) Check if the servo motor on 2 axes working properly.
9. Voltages required:
   220VAC/ 35A
   380VAC/ 25A
   415VAC/ 20A
   440VAC/ 20A
   480VAC/ 20A
10. Power rate:
   (1) Spindle : 10HP
   (2) Coolant: 1/4HP
   (3) Lub: 100W
   (4) Machine lamp : 50W
   (5) X & Z axes : 2000W
   (6) Controller : 300W

4. OPERATION

4.1 Mowing Direction

X=Moving direction of cross slide.
Z=Moving direction of saddle.



4.2 MACHINE OPERATION

START MACHINE PROCEDURE

1. Power On
2. Press “ON” switch from control panel
3. Check if the monitor flashed
4. Release “EMERGENCY” stop from control panel
5. Press “ CLEAR” button from control panel

CLOSE MACHINE PROCEDURE

1. Press “EMERGENCY” stop from control panel
2. Turn “OFF” from control panel
3. Power OFF

The spindle speed of this machine is 20 r.p.m. while safety door is opened under manual mode.

The safety door can not open unless change workpiece or manual operation condition.

HOW TO USE DOOR INTERLOCK FUNCTION

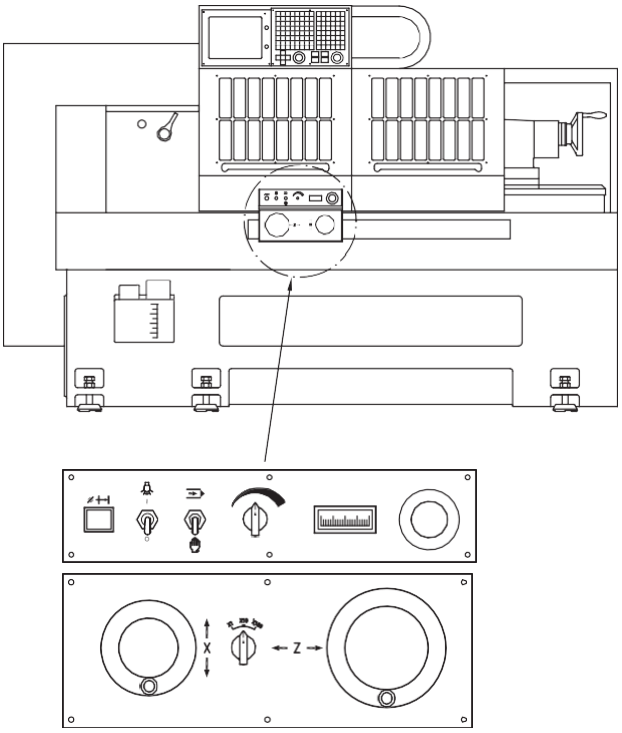
To protect operator while machine is operated, the door can not open to avoid workpiece injury operator.

The operator clamp workpiece into chuck first, then close door next, press “CYCLE START” button from control panel.

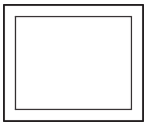
How to close safety door: Press “02”pad from key board, the monitor will shows “door is lock or not”

How to open safety door: Stop machine first, then press“02”from keyboard, the safety door can be opened.

4.3 OPERATIOR PANEL



X-AXIS FEED HANDWHEEL 



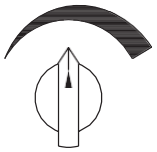
The machine will emergency stop while X,Z axis overtravel,press this button then move manual feed handwheel ,makes tool pust leave overtravel area,then release this switch.

LIGHT 

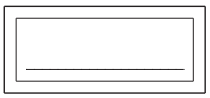
Turn this switch on “NO” position , then light will be open.

AUTOMATIC, MANUAL SELECT SWITCH 

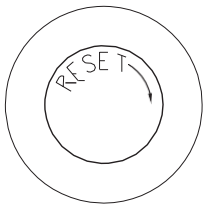
Turn this switch on “AUTOMATIC”position , mcahine operation by control panel.
Turn this switch on “MANUAL”position , mcahine operation by control p

SPINDLE SPEED MANUAL 

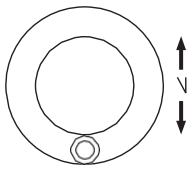
This switch could control spindle speed, the speed change to slow when switch turn left, the speed change to quickly when switch turn right.

SPINDLE LOAD METER 

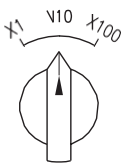
This meter indicates the load applied to the main motor in percent (%),when the spindle speed is in the rated output range, the 100% on the scale d represents continuous rating, 150% represents 30 minutes, do not overload running which will cause spindle motor be damaged.

EMERGENCY STOP 

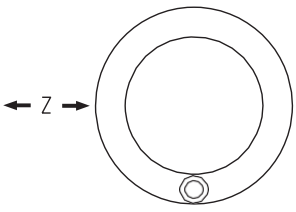
This button is used in case of emergency, if this machine gets any trouble or works in wrong way, push this button immediately.

X AXIS SELECT SWITCH 

Select X axis push +X or -X and the lamp on.

SELECT GRADUATION SWITCH 

X-1 = 0.001mm/pulse
X-10 = 0.01mm/pulse
X-100 = 0.1mm/pulse

Z AXIS SELECT SWITCH 

Select Z axis push +Z or -Z and the lamp on.

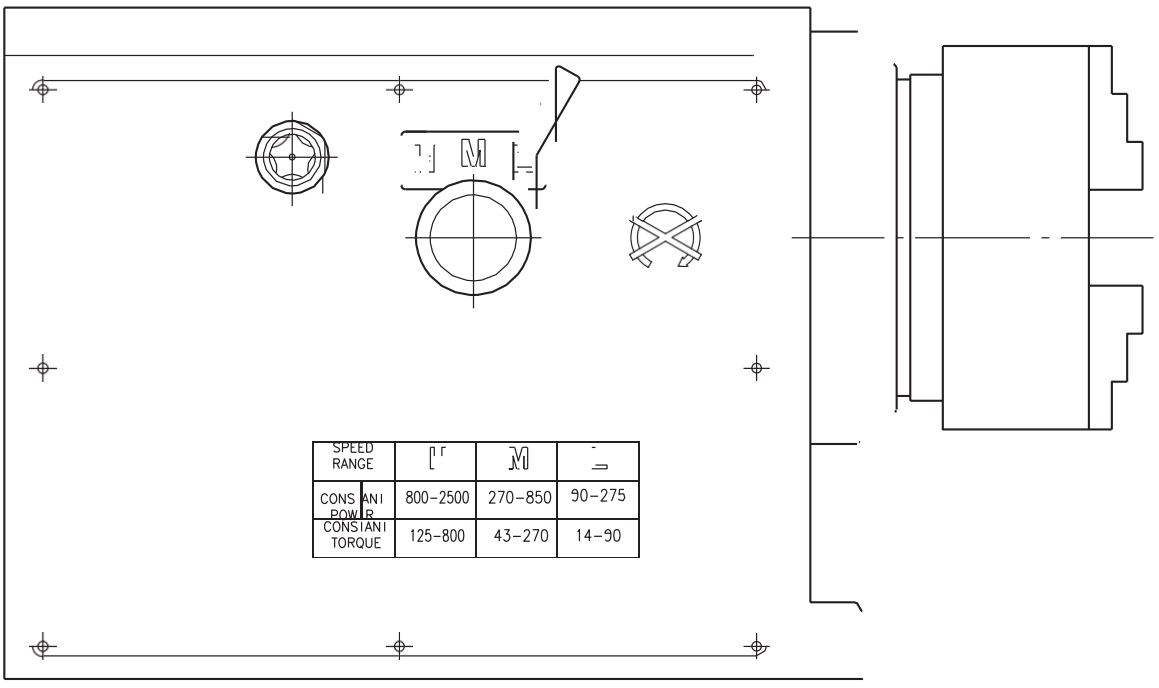
4.4 SELECTION OF SPINDLE SPEEDS

Select the appropriate spindle speed for working from cutting speed chart on the headstock, there are 3 steps in the range of spindle speeds.

CAUTION : DO NOT MOVE SPEED SELECT HANDLE DURING THE SPINDLE RUNNING

1. Stop spindle running.
2. In order to obtain the desired spindle speeds,place the lever at the proper position , be sure not shift the lever when the spindle is running.

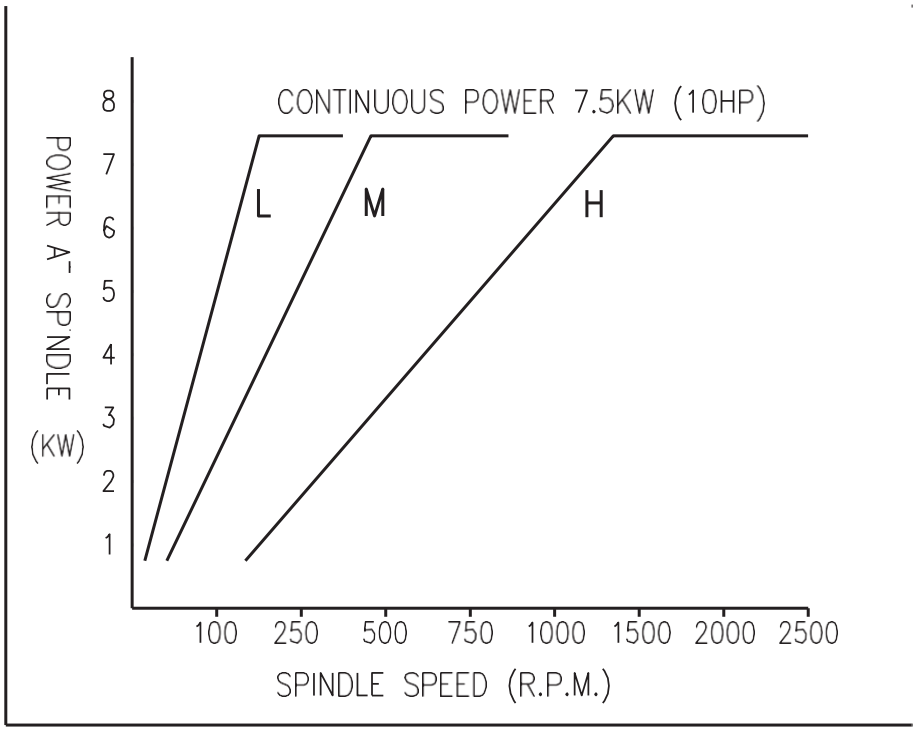
Lever select H.M.L positions



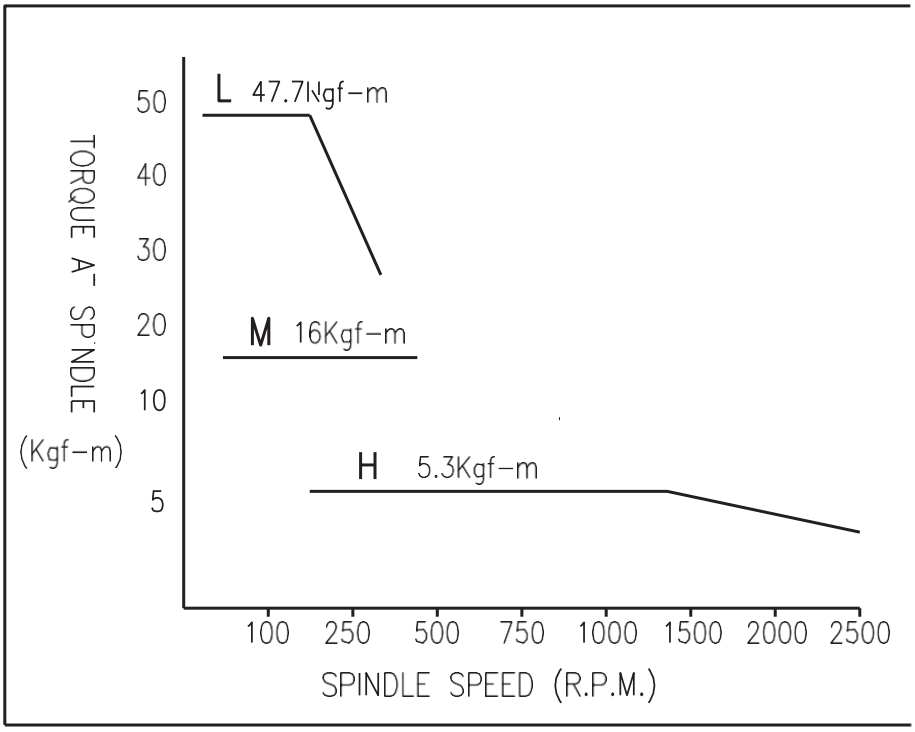
SPEED RANGE	H	M	L
CONSTANT POWER	800-2500	270-850	90-275
CONSTANT TORQUE	125-800	43-270	14-90

TY-1840/1860CNC

SPINDLE POWER CURVED (MAX. 2500 R.P.M.)



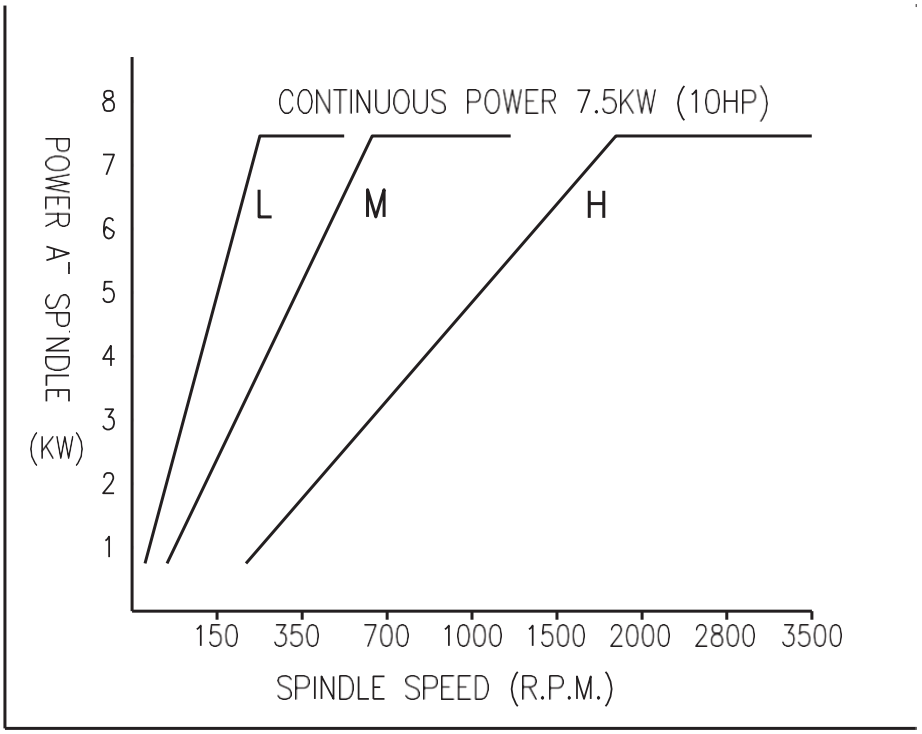
SPINDLE SPEED - POWER CURVED



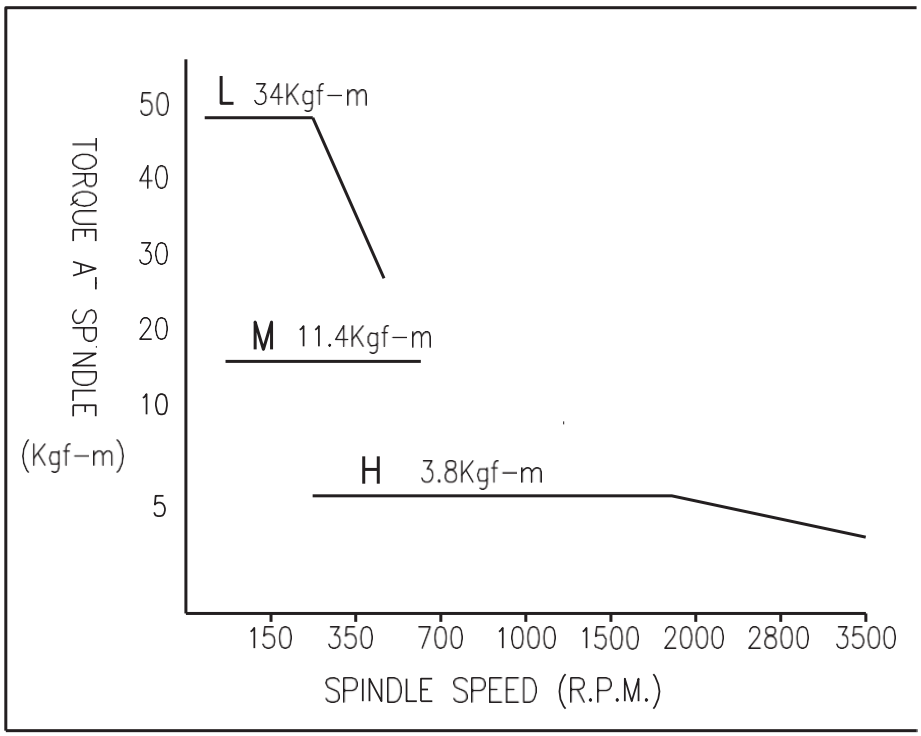
SPINDLE SPEED - TORQUE CURVED

TY-1840/1860CNC

SPINDLE POWER CURVED (MAX. 3500 R.P.M.)



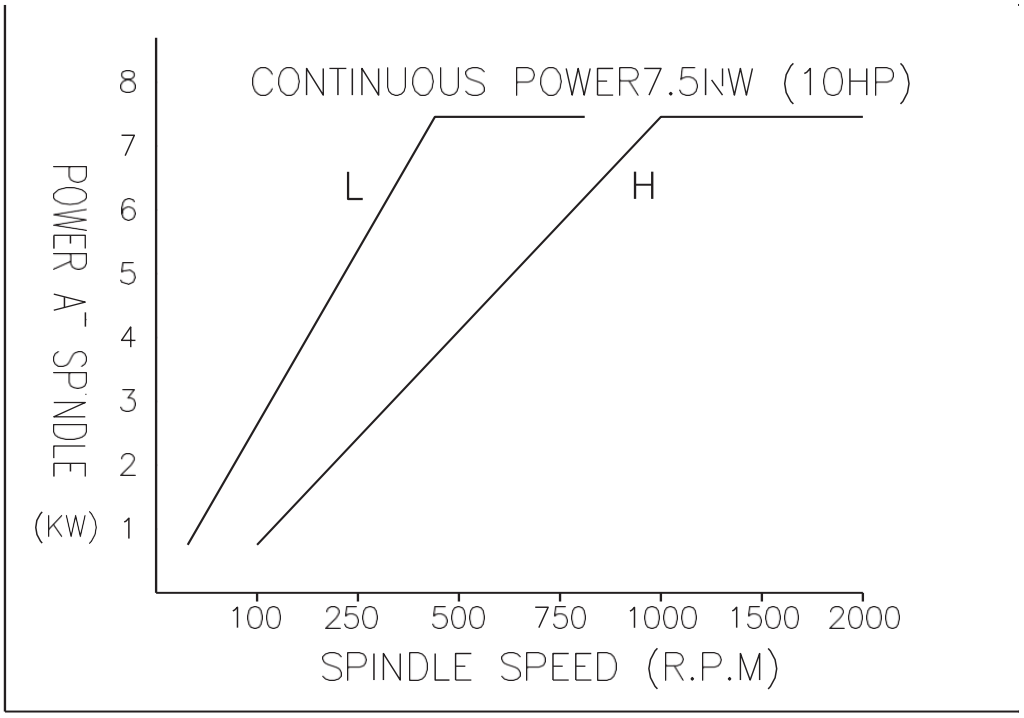
SPINDLE SPEED - POWER CURVED



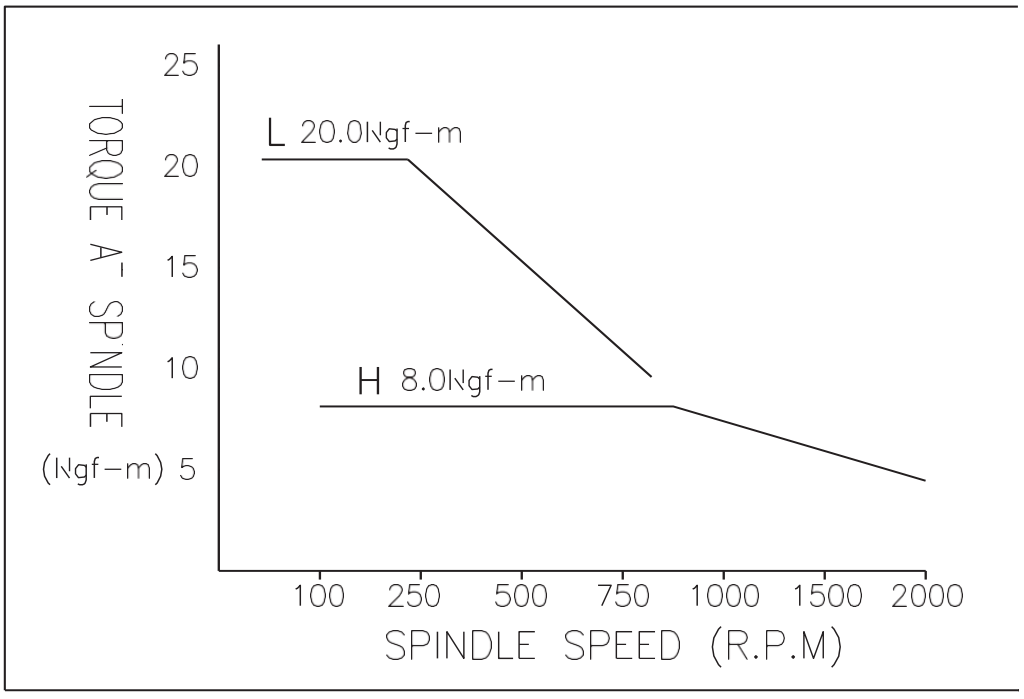
SPINDLE SPEED - TORQUE CURVED

TY-2040/2060CNC

SPINDLE POWER CURVED (MAX. 2000 R.P.M.)



SPINDLE SPEED - POWER CURVED



SPINDLE SPEED - TORQUE CURVED

4.5 MACHINING DATA

4.5.1 Threading Stock Removal & Frequency Comparison Table

Metric Threading		Depth h1 = 0.6495P			P=Pitch			
Pitch		1.0	1.5	2.0	2.5	3.0	3.5	4.0
Depth		0.649	0.974	1.299	1.624	1.949	2.273	2.595
Frequency&Amount	N1	0.7	0.7	0.9	1.0	1.2	1.5	1.5
	X2	0.4	0.6	0.6	0.7	0.7	0.7	0.8
	X3	0.2	0.4	0.6	0.6	0.6	0.6	0.6
	N4		0.16	0.4	0.4	0.4	0.6	0.6
	X5			0.1	0.4	0.4	0.4	0.4
	X6				0.15	0.4	0.4	0.4
	N7					0.2	0.2	0.4
	X8						0.15	0.3
	X9							0.2

Imperia Threading		Depth h1 = 0.6403P			P=Pitch			
Threads per inch		20	18	16	14	12	10	8
Pitch		1.27	1.4111	1.5875	1.8143	2.1167	3.5	3.1750
Depth		0.8248	0.904	1.016	1.162	1.949	2.273	2.595
Frequency&Amount	N1	0.8	0.8	0.8	0.8	1.2	1.5	1.2
	X2	0.4	0.6	0.6	0.6	0.7	0.7	0.7
	X3	0.16	0.3	0.5	0.5	0.6	0.6	0.6
	N4		0.11	0.14	0.3	0.4	0.6	0.5
	X5				0.12	0.4	1.4	0.5
	X6						0.16	0.4
	N7							0.17
	X8							
	X9							

Note:1. Please do your own calculation ,if your requiremen

2.Stock removal and frequency can be changed according to the

3.The numbers in Stock Removal are shown according to

4.5.2 Conditions For Using Ultra-hard Cutter

Material	Code	Feed 0.2–0.5mm/rev		Feed 0.2–0.5mm/rev	
		utting Speed Vm/min	Cutter	utting Speed Vm/min	Cutter
arbon&alloy Steel for machine Structure use	S20C–S30C	140–180	P20	150–230	P10
	S35C–S45C	110–140		120–190	
	S50C	70–100		80–140	
Glossy steel stick	S20CD–S50CD	70–100		80–140	
Alloy steel	SCN1–SCN3	70–100	P10	80–140	M10
Stainless steel	SUS24	60–100	M10	80–140	
	SU27–SUS33	40–70	M20	80–140	
Heat–resistance	SHF1–SFH5	40–70	P40	70–100	
Carbon steel forgings	SF40–SF50	140–180	P20	150–230	P10
	SF55–SF60	100–140	P20	120–190	
Steel castings	SC42–SC49	100–120	P20	120–180	P10
Alloy steel castings	SCA1–SCA23	60–100		70–120	
	SCA31	50–80		70–100	
	SCA41–SCA52	60–100		70–120	
Stainless steel casting	SCS1–SCS15	50–80	M20	70–140	M20
Heat–resistance Steel casting	SCH1–SCH2	60–90		70–120	
	SCH11–SCH13	50–80		60–100	
Gray casting	FC20	70–110	N10	80–130	N10
	FC25–FC30	60–100		80–130	
Bronze casting	BC2–BC7	100–200		200–250	
Aluminum	AC3A–F	200–400		300–500	
Alloy casting	AC4A–F–AC7B–T4	800–900		800–1200	
Artifical leather & Wood		300–600	N10,K20	350–600	N10,K20

4.5.3 Standard Condition For Drilling

4.5.3.1 Drilling Speed Conditions

Material		Speed m/min
Carbon steel	0.4c>	24-33
	0.4c>0.7c	18-24
	0.7c<	12-18
Alloy steel	60-80kg/mm²	9-15
	80kg/mm²	5-9
Stainless steel	Mortensite	10-20
	Ferrite	15-18
	Austensite	5-15
Manganese steel	12-14%	3.5-4.5
Plastic		30-90

Material	Speed m/min.
Aluminum & aluminum alloys	60-90
Bronez	45-75
	22.5-45
Magnesium & Magnesium alloys	60-120
Mone meta	9-15
Nicke stee	9-15
Zice alloy	45-80
Brass	45-90
Bronze	60-75
Cutting steel	8-22
NIMONIC	6-9

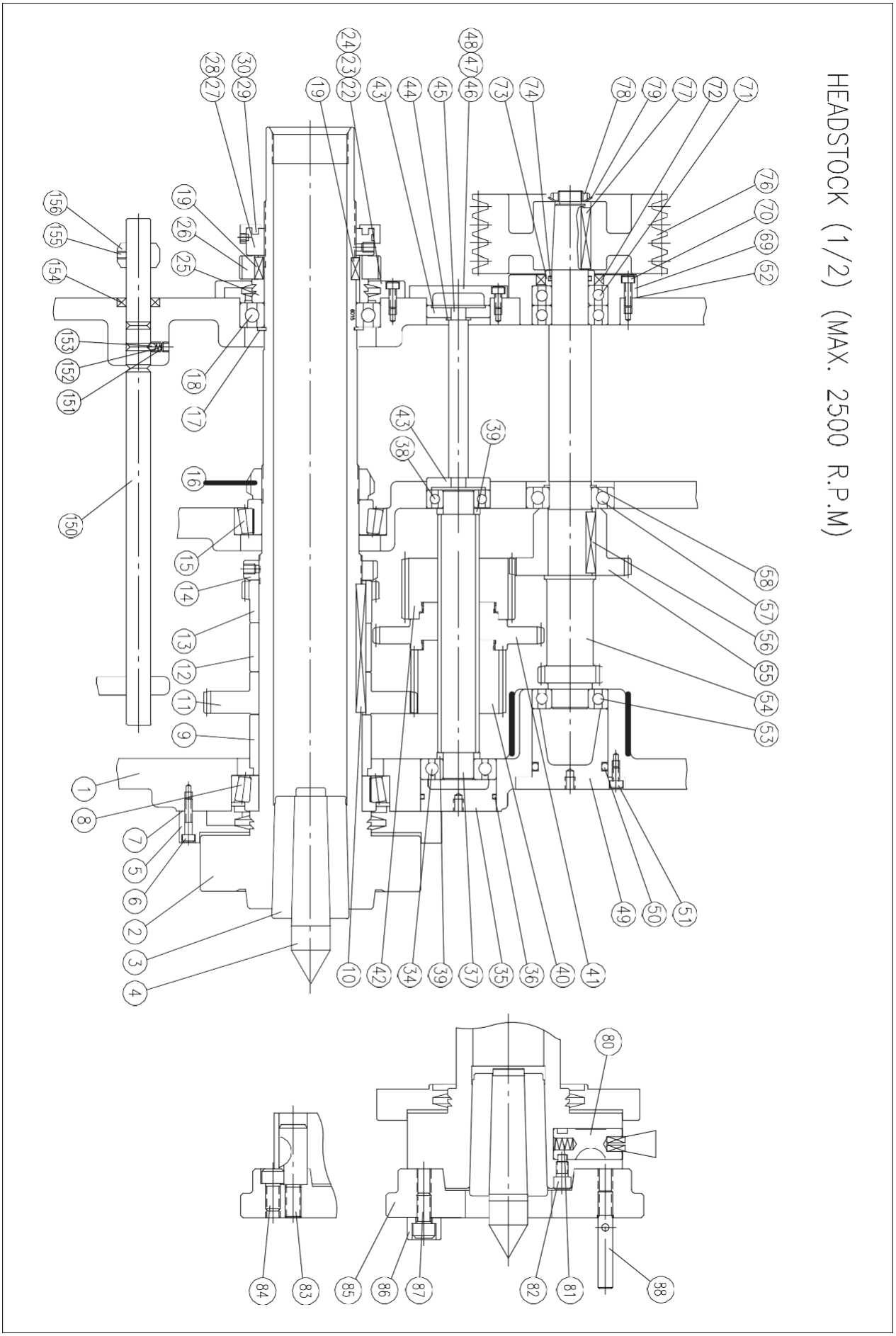
4.6.3.2 Bit Insert Feed Standard

Bit insert diameter mm	Feed mm/rev.	
	Normal steel	Stainless steel
1.6-3	0.05-0.06	0.05-0.08
3-4	0.05-0.1	
4-5.5	0.08-0.15	
5.5-8	0.1-0.2	
8-11	0.15-0.25	
11-14.5	0.2-0.3	
14.5-17.5	0.23-0.33	
17.5-20.5	0.25-0.36	
20.5-24	0.28-0.38	
24-28.5	0.3-0.4	
28.5-38	0.35-0.49	
38<	0.4-0.5	0.3-07

5. PARTS LIST

CONTENT

HEADSTOCK (1/2) (MAX. 2500 R.P.M)



HEADSTOCK (MAX. 2500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77B-0101-01	Headstock Casting		1
2	77B-0102A-01	Spinlde	A1-6	1
2	77B-0102B-01	Spinlde	D1-6	1
3	50-01117-00	Center Sleeve		1
4	50-01118-00	Center		1
5	50-0103A-01	Bearing Cover (Front)	D1-6	1
5	50-0103B-01	Bearing Cover (Front)	A1-6	1
6		Socket Head Cap Screw	M6x30L	6
7	50-0104-00	Packing		1
8		Taper Roller Bearing	#32017XC/P5	1
9	82-0105-00	Spacer		1
10		Double Round Head Key	10x8x105L	1
11	50-0106-A0	Low Speed Gear		1
12	82-0109-00	Spacer		1
13	50-0107-00	High Speed Gear		1
14	50-0108-00	Locking Nut		1
15		Taper Roller Bearing	#32016xC/P5	1
16	50-0110-00	Locking Nut		1
17		Retaining Ring	#STW75	1
18		Taper Roller Bearing	#6015	1
19		Double Round Head Key	8x7x18L	2
22	50-0113-00	Packing		1
23	50-0114-00	Bearing Cover (Rear)		1
24		Socket Head Cap Screw	M6x16L	4
25	77B-0111-00	Spacer		4
26	77B-0112-00	Pulley		1
27	50-01143-01	Dynamic Balancing Collar		1
28		Socket Head Set Screw	M8x8L	2
29	50-01144-00	Dynamic Balancing Block		3
30		Socket Head Set Screw	M6x8L	6

HEADSTOCK (MAX. 2500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77B-0101-01	Headstock Casting		1
2	77B-0102A-01	Spinlde	A1-6	1
2	77B-0102B-01	Spinlde	D1-6	1
3	50-01117-00	Center Sleeve		1
4	50-01118-00	Center		1
5	50-0103A-01	Bearing Cover (Front)	D1-6	1
5	50-0103B-01	Bearing Cover (Front)	A1-6	1
6		Socket Head Cap Screw	M6x30L	6
7	50-0104-00	Packing		1
8		Taper Roller Bearing	#32017XC/P5	1
9	82-0105-00	Spacer		1
10		Double Round Head Key	10x8x105L	1
11	50-0106-A0	Low Speed Gear		1
12	82-0109-00	Spacer		1
13	50-0107-00	High Speed Gear		1
14	50-0108-00	Locking Nut		1
15		Taper Roller Bearing	#32016xC/P5	1
16	50-0110-00	Locking Nut		1
17		Retaining Ring	#STW75	1
18		Taper Roller Bearing	#6015	1
19		Double Round Head Key	8x7x18L	2
22	50-0113-00	Packing		1
23	50-0114-00	Bearing Cover (Rear)		1
24		Socket Head Cap Screw	M6x16L	4
25	77B-0111-00	Spacer		4
26	77B-0112-00	Pulley		1
27	50-01143-01	Dynamic Balancing Collar		1
28		Socket Head Set Screw	M8x8L	2
29	50-01144-00	Dynamic Balancing Block		3
30		Socket Head Set Screw	M6x8L	6

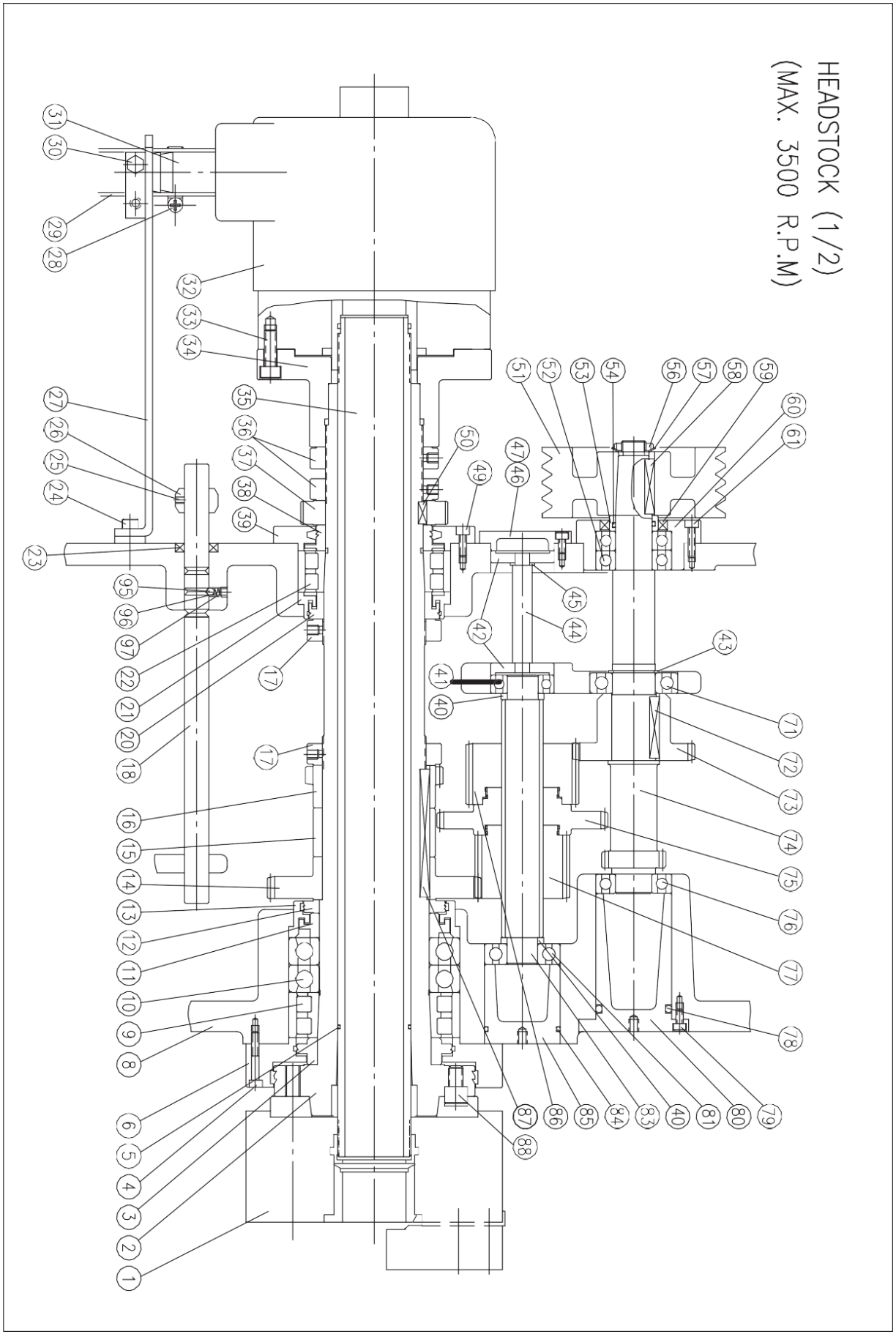
HEADSTOCK (MAX. 2500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
34		Deep Groove Ball Bearing	#6305	1
35	77B-0130-00	Bearing Plug		1
36		O-Ring	G55	1
37	82-0122-00	Shaft		1
38		Deep Groove Ball Bearing	#6205	1
39	82-0123-00	Spacer		2
40	82-0119-00	Gear		1
41	82-0120-00	Gear		1
42	82-0121-00	Gear		1
43	50-0140-00	Spacer		2
44	50-0142-00	Washer		1
45	82-0141-00	Rod		1
46	50-0123-00	Packing		1
47	50-0124-00	Bearing Plug		1
48		Socket Head Cap Screw	M6x12L	3
49	82-0125-00	Bearing Cover		1
50		O-Ring	P52	1
51		Socket Head Cap Screw	M6x12L	3
52	50-0135-01	Packing		1
53		Deep Groove Ball Bearing	#6206	1
54	77B-0131-00	Input Shaft		1
55	82-0126-00	Gear		1
56		Double Round Head Key	8x8x50L	1
57		Deep Groove Ball Bearing	#6207	1
58		Retaining Ring		1
59	17-0173-00	Elbow		1
60	17-0174-00	Drain Plug		1
69	50-0136-01	Cover		1
70		Socket Head Cap Screw	M6x20L	3
71		Deep Groove Ball Bearing	#6206	1

HEADSTOCK (MAX. 2500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
72		Oil Seal	TC38x55x8	1
73	77A-0116-00	Spacer		1
74		O-Ring		1
76	82-0132-01	Pulley		1
77		Double Round Head Key	10x8x50L	1
78		Locking Nut	AN04	1
79		Lock Washer	AN04	1
80	50-01110-00	Cam		6
81	50-01111-00	Detent Spring		6
82	50-01112-00	Detent Screw		6
83	50-01119-00	Cam Stud		6
84		Socket Head Cap Screw	3/8"-16UNCx16L	6
85	50-01120A-00	Driving Plate		1
86	17-0176-00	Driving Collar		1
87		Socket Head Cap Screw	M12x25L	1
88	50-01129-00	Driving Pin		2
89	62-0148-00	Shifting Arm		1
90	17-0629-01	Plug		2
92	82-0149-02	Shifting Fork		1
93	77A-0150-00	Change Speed Shaft		1
94	77A-0151-00	Sleeve		1
95		Steel Ball	φ1/4	1
96		Compression Spring	φ6xφ0.8x30L	1
97		Socket Head Set Screw	M8x8L	1
98		Double Round Head Key	5x15L	1
99		Screw		1
100	50-0167-00	Washer		2
101		O-Ring	P24	1
102		Socket Head Set Screw	M5x12L	2
103	77A-0133	Knob		1

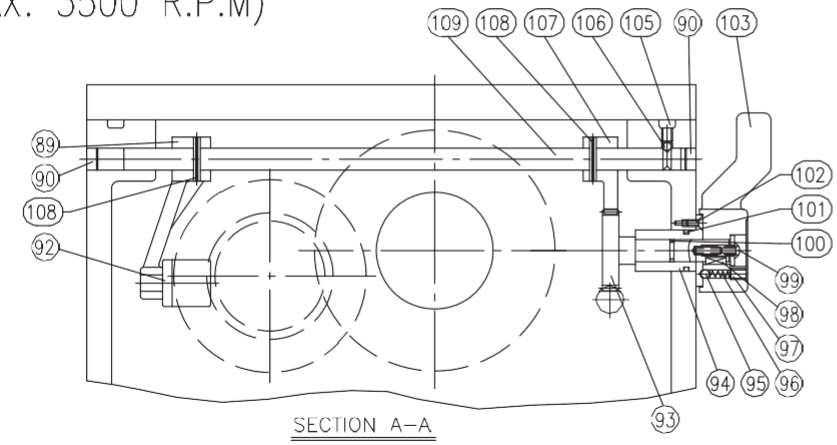
HEADSTOCK (MAX. 2500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
105		Socket Head Set Screw	M8x8L	2
106		Steel Ball		1
107	82-0152-01	Quadrant Gear		1
108		Spring Pin	φ5x30L	2
109	77A-0147-00	Change Speed Rod		1
110	77A-0159-00	Packing		1
111	77A-0160-00	Headstock Cover		1
112		Socket Head Cap Screw	M8x30L	6
113		Socket Head Cap Screw	M12x25L	1
114		Socket Head Cap Screw	M12x55L	1
115	50-01114-00	Adjusting Block		1
116	50-01113-00	Positioning Pin		1
117	77B-01107-00	Headstock Name Plate		1
118		Revit	φ2x5L	8
119	50-01146-00	Oil Sight Glass		1
121	77A-0130-00	Collar		1
122		Double Round Head Key	5x5x20L	1
123		Deep Groove Ball Bearing	#6006ZZ	2
124	77-0128-00	Internal Ring		1
125		Synchronous Belt	270L050	1
126	77-0126-00	Synchronous Pully		1
127		Double Round Head Key	5x5x20L	1
128	77-0131-00	Washer	φ8.5xφ30x3t	1
129		Spring Washer	M8	1
130		Socket Head Cap Screw	M8 x25L	1
131	77-0127-00	Shaft		1
132	77-0129-00	External Ring		1
133	77A-0125-00	Bracket		1
134		Socket Head Cap Screw	M10 x30L	2
135		Flat Washer	M10	2

HEADSTOCK (MAX. 2500 R.P.M)

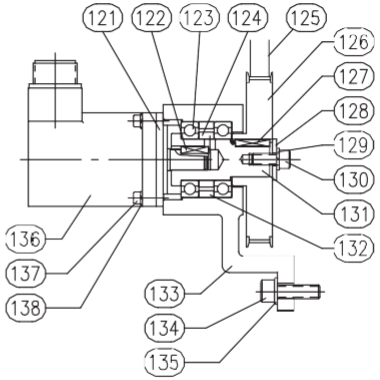
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
136		Speed Coder		1
137		Socket Head Cap Screw	M5x25L	4
138		Spring Washer	M5	4
150	77A-0152-02	Position Check Rod		1
151		Socket Head Set Screw	M8 x8L	1
152		Compression Spring		1
153		Steel Ball	φ1/4	1
154		Oil Seal	TC20x35x7	1
155		Set Screw	M6x8L	1
156	77A-0153-00	Touch Block		1


HEADSTOCK (1/2)
(MAX. 3500 R.P.M)

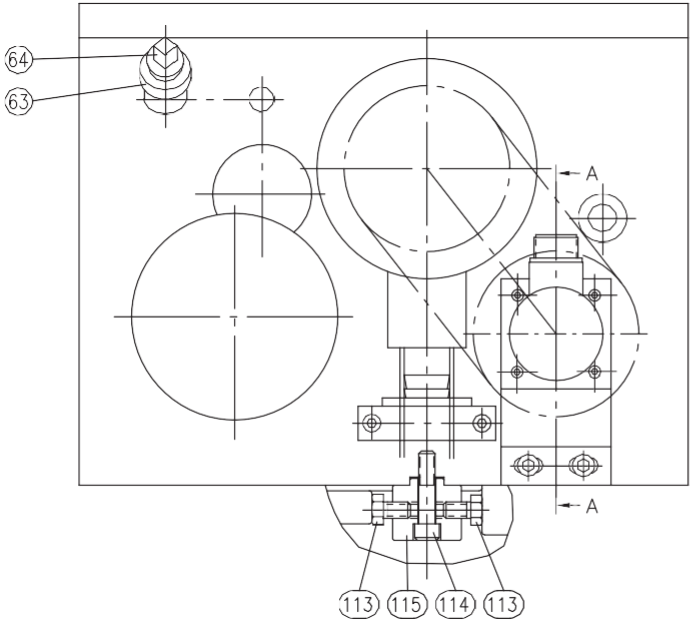
HEADSTOCK (2/2)
(MAX. 3500 R.P.M)

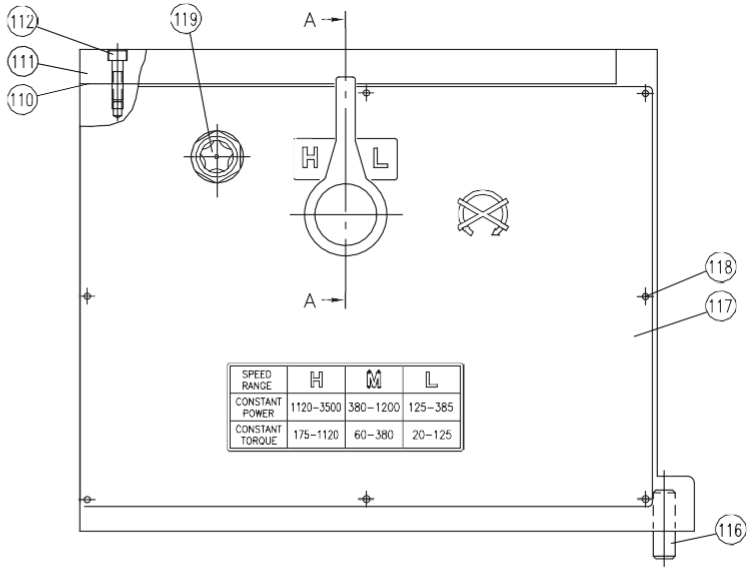


SECTION A–A



SECTION B–B





HEADSTOCK (MAX. 3500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1		Hydraulic Chuck	NT-208A6	1
2	77A-0102A-01	Spindle		1
3	77A-0104-00	Spacer		1
4		Socket Head Cap Screw	M6x40L	6
5		O-Ring	56xφ60xφ2.4	1
6	77A-0103-00	Bearing Cover (Front)		1
8	77A-0101-03	Headstock Casting		1
9		Taper Roller Bearing	NN3018K	1
10		Taper Roller Bearing	BTA90B	1
11	77A-0105-00	Spacer		1
12	77A-0106-00	Spacer		1
13	77A-0107-00	Anti-Leaking Ring		1
14	50-0106-A0	Low Speed Gear		1
15	82-0109-00	Spacer		1
16	50-0107-00	High Speed Gear		1
17	50-0108-00	Locking Nut		2
18	77A-0152-02	Position Check Rod		1
20	77A-0108-00	Spacer		1
21	77A-0109-01	Anti-Leaking Ring		1
22		Taper Roller Bearing	NN3016K	1
23		Oil Seal	TC20x35x7	1
24		Socket Head Cap Screw	M8x20L	2
25		Set Screw	M6x8L	1
26	77A-0153-00	Touch Block		1
27	68-0124-00	Stop Running Plate		1
28		Tube Clamp		1
29		Tobe		1
30		Socket Head Cap Screw	M5x10L	1
31		Coupling	PT3/4"xφ1"	1
32		Cylinder	M1552	1

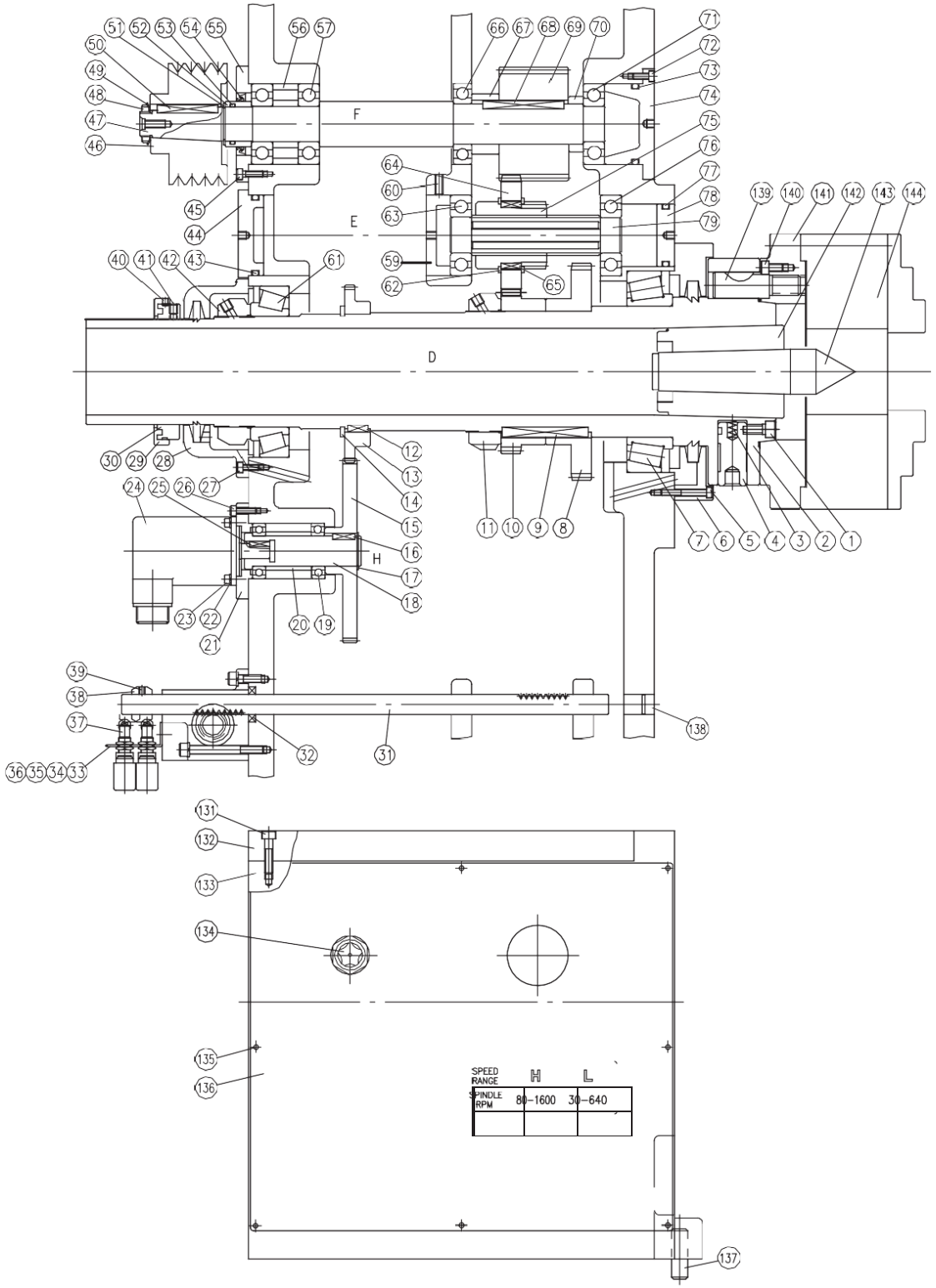
HEADSTOCK (MAX. 3500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
33		Socket Head Cap Screw	M10x30L	6
34	77-0112-00	Cylinder Connect Seat		1
35	77A-0155-00	Draw Tube		1
36	77-0132-00	Nut	FK80	2
37	77-0111-00	Pulley		1
38	77A-0111	Spacer		1
39	77A-0110-00	Bearing Cover (Rear)		1
40	82-0123-00	Spacer		2
41		Deep Groove Ball Bearing	#6205	2
42	50-0140-00	Spacer		2
43		Retaining Ring		1
44	77A-0114-00	Rod		1
45	50-0142-00	Washer		1
46	50-0123-00	Packing		1
47	50-0124-00	Bearing Cover		1
49		Socket Head Cap Screw	M6x16L	2
50		Double Round Head Key	8x7x18L	1
51	77-0120-01	Pulley		1
52		Deep Groove Ball Bearing	#6206	2
53	77A-0116-00	Spacer		1
54		O-Ring	G30	1
56		Locking Nut		1
57		Locking Washer		1
58		Double Round Head Key	10x8x45L	1
59		Oil Seal	TC40x55x8	1
60	50-0136-01	Bearing Cover		1
61		Socket Head Cap Screw	M6x20L	3
63	17-0173-00	Elbow		1
64	17-0174-00	Drain Plug		1
71		Deep Groove Ball Bearing	#6207	1

HEADSTOCK (MAX. 3500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
72		Double Round Head Key	8x8x50L	1
73	82-0126-00	Gear		1
74	77A-0119-01	Input Shaft		1
75	82-0120-00	Gear		1
76		Deep Groove Ball Bearing	#6206	1
77	82-0119-00	Gear		1
78		O-Ring	P52	1
79		Socket Head Cap Screw	M6x12L	3
80	77A-0115-00	Bearing Cover		1
81		Deep Groove Ball Bearing		1
83	82-0122-00	Shaft		1
84		O-Ring	P52	1
85	77A-0113-00	Bearing Cover		1
86	82-0121-00	Gear		1
87		Double Round Head Key	10x8x105L	1
88	50-01133-00	Driving Button		1
89	62-0148-00	Shifting Arm		1
90		Plug		2
92	82-0149-02	Shifting Block		1
93	77A-0150-00	Change Speed Shaft		1
94	77A-0151-00	Sleeve		1
95		Steel Ball	φ1/4"	1
96		Compression Spring	φ6xφ0.8x30L	1
97		Socket Head Set Screw	M8x8L	1
98		Double Round Head Key	5x5x15L	1
99		Screw		1
100	50-0167-00	Washer		1
101		O-Ring	P24	1
102		Cross Recessed Head Screw	M5x12L	2
103	77A-0133	Knob		

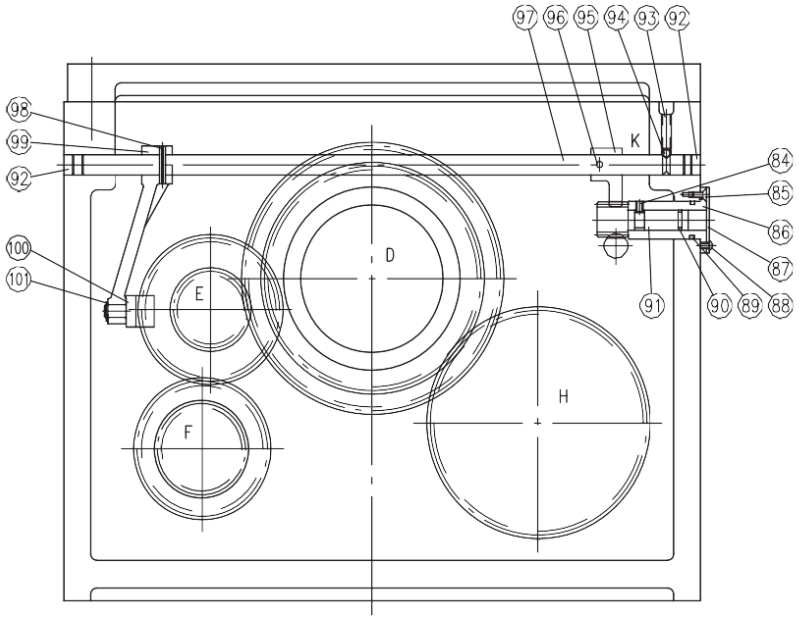
HEADSTOCK (MAX. 3500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
105		Socket Head Set Screw	M8x8L	1
106		Steel Ball	φ1/4"	1
107	82-0152-01	Quadrant Gear		1
108		Spring Pin	φ5x30L	2
109	77A-0147-00	Change Speed Rod		1
110	77A-0159-00	Packing		1
111	77A-0160-00	Headstock Cover		1
112		Socket Head Cap Screw	M8x30L	6
113		Socket Head Cap Screw	M12x25L	2
114		Socket Head Cap Screw	M12 x55L	1
115	50-01114-00	Adjusting Block		1
116	50-01113-00	Positioning Pin		1
117	77B-01107-00	Headstock Name Plate		1
118		Revit	φ2x5L	8
119	50-01146-00	Oil Sight Glass	HFTx22	1
121	77A-0130-00	Collar		1
122		Double Round Head Key	5x5x20L	1
123		Deep Groove Ball Bearing	#6006ZZ	2
124	77-0128-00	Internal Ring		1
125		Belt	270L050	1
126	77-0126-00	Pulley		1
127		Double Round Head Key	5x5x20L	1
128	77-0131-00	Washer	φ8.5xφ30x3t	1
129		Spring Washer	M8	1
130		Socket Head Cap Screw	M8 x25L	1
131	77-0127-00	Shaft		1
132	77-0129-00	External Ring		1
133	77A-0125-00	Bracket		1
134		Socket Head Cap Screw	M10 x30L	2
135		Flat Washer	M10	2

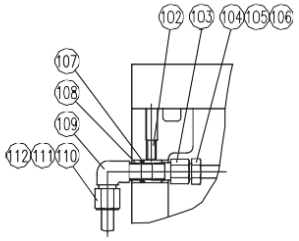
HEADSTOCK (MAX. 3500 R.P.M)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
136		Position Coder		1
137		Socket Head Cap Screw	M5x25L	4
138		Spring Washer	M5	4

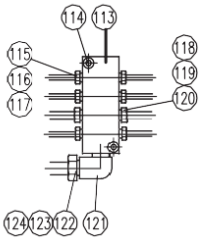
TY-2040/2060 HEADSTOCK (1/2)

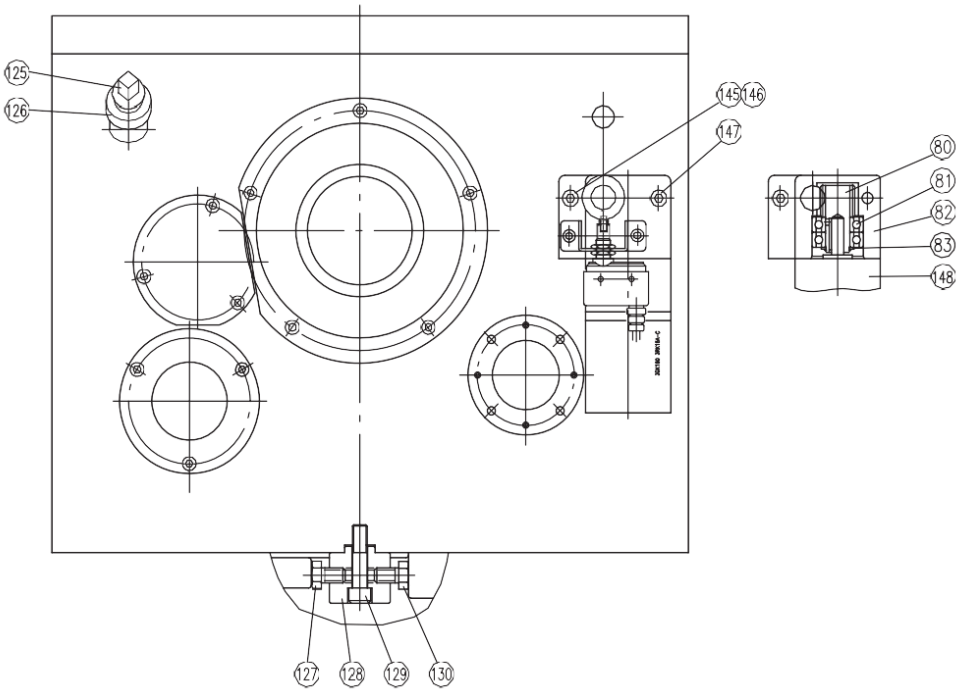


TY-2040/2060 HEADSTOCK (2/2)









TY-2040/2060CNC HEADSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	63-01112-00	Detent Screw		6
2	77D-0102-00	Spindle		1
3	50-01111-00	Detent Spring		6
4	63-01110-00	Cam		6
5		Socket Head Cap Screw	M6xP1.0x40L	6
6	77D-0103-00	Bearing Cover		1
7		Taper Roller Bearing	#32026	1
8	65-0109-00	Gear	DP9x75T	3
9		Key	16x10x85L	1
10	65-0108-00	Gear	DP9x56T	3
11	69-0146-00	Nut	M120xP2.0	1
12		Key	8x7x20L	1
13	77D-0109-00	Gear	M2x89T	1
14		Retaining Ring	S-115	1
15	88-0126-00	Gear	M2x89T	1
16		Key	6x6x20L	1
17		Retaining Ring	S-30	1
18	88-0127-00	Shaft		1
19		Ball Bearing	#6006	2
20	88-0128-00	Collar		1
21	88-0129-00	Support Bracket		1
22		Spring Washer	M5	4
23		Socket Head Cap Screw	M5x16L	4
24		Encoder		1
25		Key	5x5x20L	1
26		Socket Head Cap Screw	M6x20L	4
27		Socket Head Cap Screw	M6x16L	5
28	77D-0140-00	Bearing Cover		1
29	77D-0154-00	Balance Correction Block		3
30	77D-0153-00	Balance Correction Ring		1
31	77D-0152-00	Retaining Ring		1
32		Seal	TC20x35x7	1
33	77D-0151-00	Micro Switch Bracket		1
34		Socket Head Cap Screw	M6x16L	2
35		Washer	M6	2
36		Spring Washer	M6	2
37		Micro Switch		2
38	77A-0153-00	Touch Block		1
39		Socket Head Set Screw	M8x1.25x8L	2
40		Socket Head Set Screw	M6x1.0x8L	6

TY-2040/2060CNC HEADSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
41		Socket Head Set Screw	M8x1.25x12L	2
42	65-0147-00	Nut	M110xP2.0	1
43		O-Ring	G70	1
44	77D-0116-00	Bearing Cover		1
45		Socket Head Cap Screw	M6x16L	3
46	77D-0133-00	Pulley		1
47	77D-0131-00	Gear Shaft		1
48		Locking Nut	AN05	1
49		Locking Washer	AW05	1
50		Key	10x8x60L	1
51		Retaining Ring	S-34	1
52	63-0137-00	Collar		1
53		O-Ring	P34	1
54		Oil Seal	TC45x62x9	1
55	77D-0134-00	Bearing Cover		1
56	77D-0136-00	Collar		1
57		Ball Bearing	#6307	2
59	77D-0114-01	Collar		1
60		Socket Head Set Screw	M8x16L	1
61		Taper Roller Bearing	#32022	1
62		Retaining Ring	S-65	2
63		Ball Bearing	#6307	1
64	65-0118A-00	Gear	DP9x40T	1
65		Key	6x6x20L	3
66		Ball Bearing	#6208	1
67	77D-0128-00	Collar		1
68		Key	10x8x80L	1
69	77D-0127-00	Gear	DP9x38T	1
70	77D-0126-00	Collar		1
71		Ball Bearing	#6307	1
72		Socket Head Cap Screw	M6x1.0x16L	3
73		O-Ring	G70	1
74	77D-0125-00	Plug		1
75	77D-0124-00	Gear	DP9x21T	1
76		Ball Bearing	#6307	1
77		O-Ring	P52	1
78	63-0143-00	Plug		1
79	77D-0112-00	Shaft		1
80	77D-0162-00	Gear		1

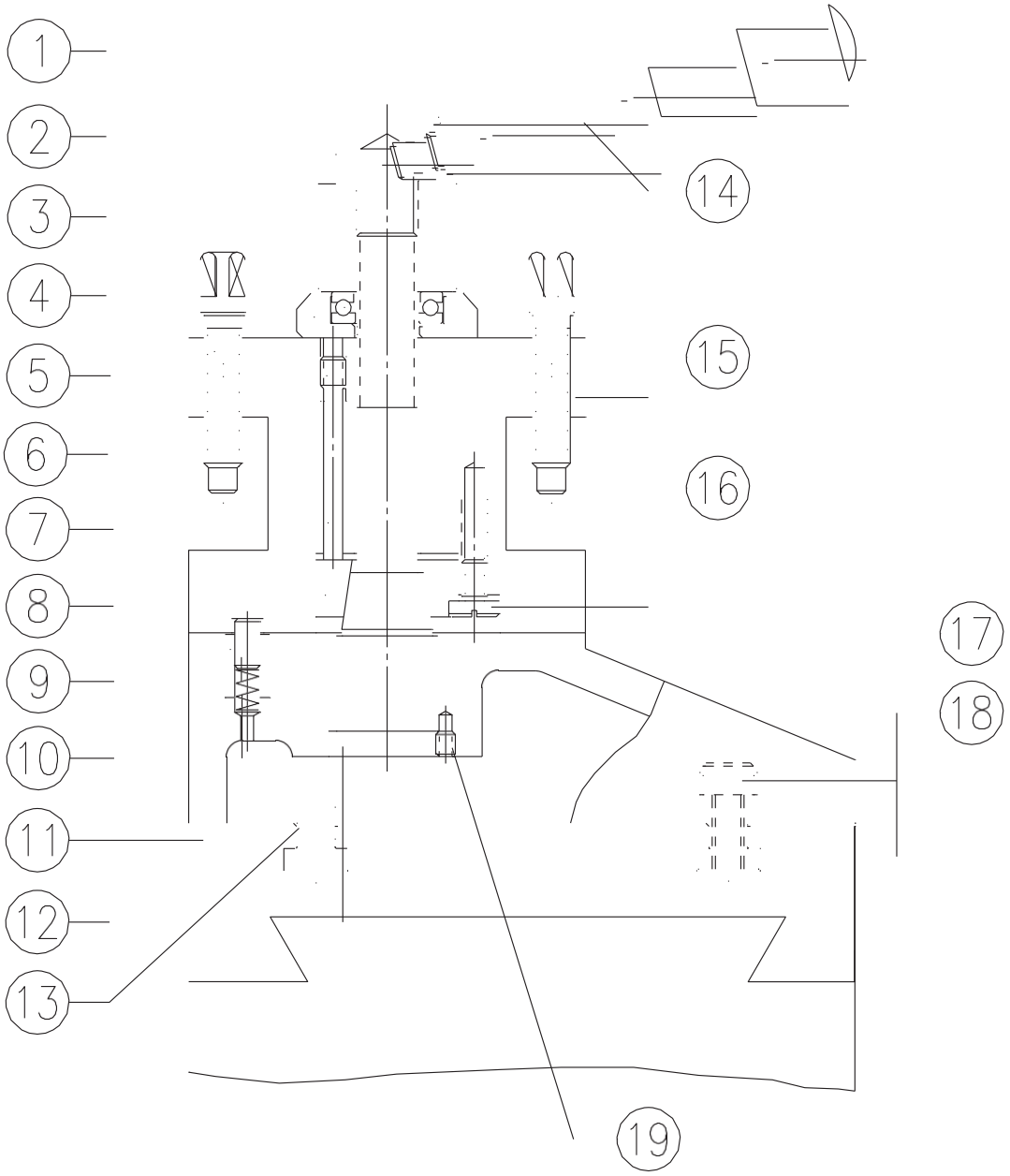
TY-2040/2060CNC HEADSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
81		Ball Bearing	#6004	2
82	77D-0161-00	Motor Bracket		1
83		Retaining Ring	S-20	1
84		Socket Head Set Screw	M6x8L	1
85		Flat Head Screw	M5xP0.8x12L	2
86	65-0193-00	Bushing		2
87	77D-0165-00	Bushing Cover	φ6xφ0.8x30L	1
88		Hexagon Socket Button Head Cap Screw	M5xP0.8x6L	2
89		O-Ring	P24	1
90		O-Ring	P12	1
91	65-0177-00	Gear Shaft		1
92	17-0629-01	Plug		2
93		Socket Head Set Screw	M8x16L	1
94		Steel Ball	φ1/4”	1
95	65-0175-00	Gear		1
96		Spring Pin	φ5x30L	1
97	77D-0147-00	Shifting Rod		1
98		Spring Pin	φ5x30L	1
99	63-0176-01	Shifting Arm		1
100	77D-0149-00	Shifting Block		1
101		Retaining Ring	S-10	1
102		Socket Head Set Screw	M8x16L	1
103		Straight Joint	PT1/4-M16	1
104		Thimble	φ10	1
105		Thimble Nut	φ10	1
106		Oil Pipe	φ10	1
107		O-Ring	P14	1
108	77A-0163-00	Joint		1
109		Quarter Joint	PT1/4-M16	1
110		Thimble	φ10	1
111		Thimble Nu	φ10	1
112		Oil Pipe	φ10	1
113	77A-0164-00	Oil Distributor		1
114		Socket Head Cap Screw	M5x30L	2
115		Thimble	φ4	8
116		Thimble Nut	φ4	8
117		Oil Pipe	φ4	8
118		Thimble	φ6	2
119		Thimble Nut	φ6	2
120		Thimble	φ6	2

TY-2040/2060CNC HEADSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
121		Quarter Joint	PT1/4-M16	1
122		Thimble	φ10	1
123		Thimble Nut	φ10	1
124		Oil Pipe	φ10	1
125	17-0174-00	Plug		1
126	17-0173-00	Elbow		1
127		Hexagon Head Screw	M12x1.75X25L	1
128	50-01114-00	Adjusting Block		1
129		Socket Head Cap Screw	M12x1.75X55L	1
130		Hexagon Head Screw	M12x1.75X25L	1
131		Socket Head Cap Screw	M8x1.25x35L	8
132	77D-0160-00	Upper Cover		1
133	77D-0101-00	Headstock Casting		1
134	50-01146-00	Oil Sight Glass	HFTx22	1
135		Cross Recessed Head Screw	M4x0.7x8L	8
136	77D-0155-01	Name Plate		1
137	50-01113-00	Pin		1
138	77D-0148-00	Plug		1
139	63-01119-00	Cam Lock Stud		6
140		Socket Head Cap Screw	5/16"-18UNCx16L	6
141	63-01122A-00	Back Plate For Chuck		1
142	88-0148A-00	Center Sleeve		1
143		Center	MT#5	1
144		Chuck		1
145		Socket Head Cap Screw	M8x1.25x25L	1
146		Spring Washer	M8	2
147		Socket Head Cap Screw	M8x1.25x75L	2
148		Gear Reducer Motor	GK180 3RK15A-C	1

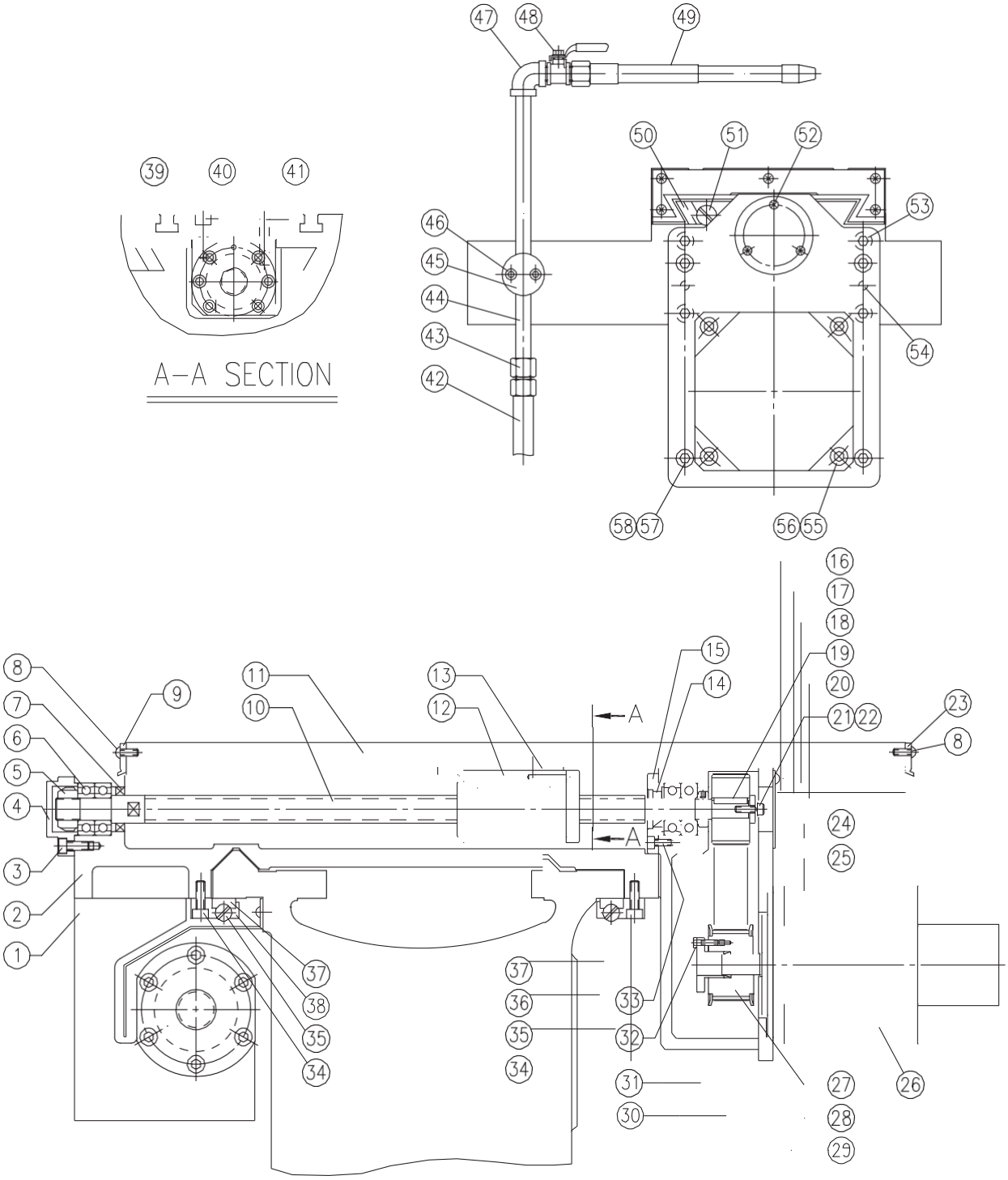
TOOL POST



TOOL POST

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	50-0356S-00	Clamping Head		1
2		Thrust Bearing	#51104	1
3	50-0355S-00	Washer		1
4	50-0370-00	Tool Post Screw		12
5		Socket Head Set Screw		3
6	50-03115S-00	Adjusting Pin		3
7	50-03113S-00	Sleeve		1
8	50-0354S-00	Sleeve		1
9	50-0353S-00	Positioning Pin		1
10	50-03116S-00	Compression Spring		1
11	77A-0240-01	Post Pad		1
12	50-0351BS-00	Tool Post Bolt		1
13	77A-0241-00	Key		2
14	50-0357S-00	Headle		1
15	50-0352S-00	Fourway Tool Post		1
16	50-03114S-00	Adjusting Screw		3
17		Socket Cap Screw	M10x20L	3
18	77A-0242-00	T-Nut		3
19		Socket Head Cap Screw	M6x8L	1

V-AXIS



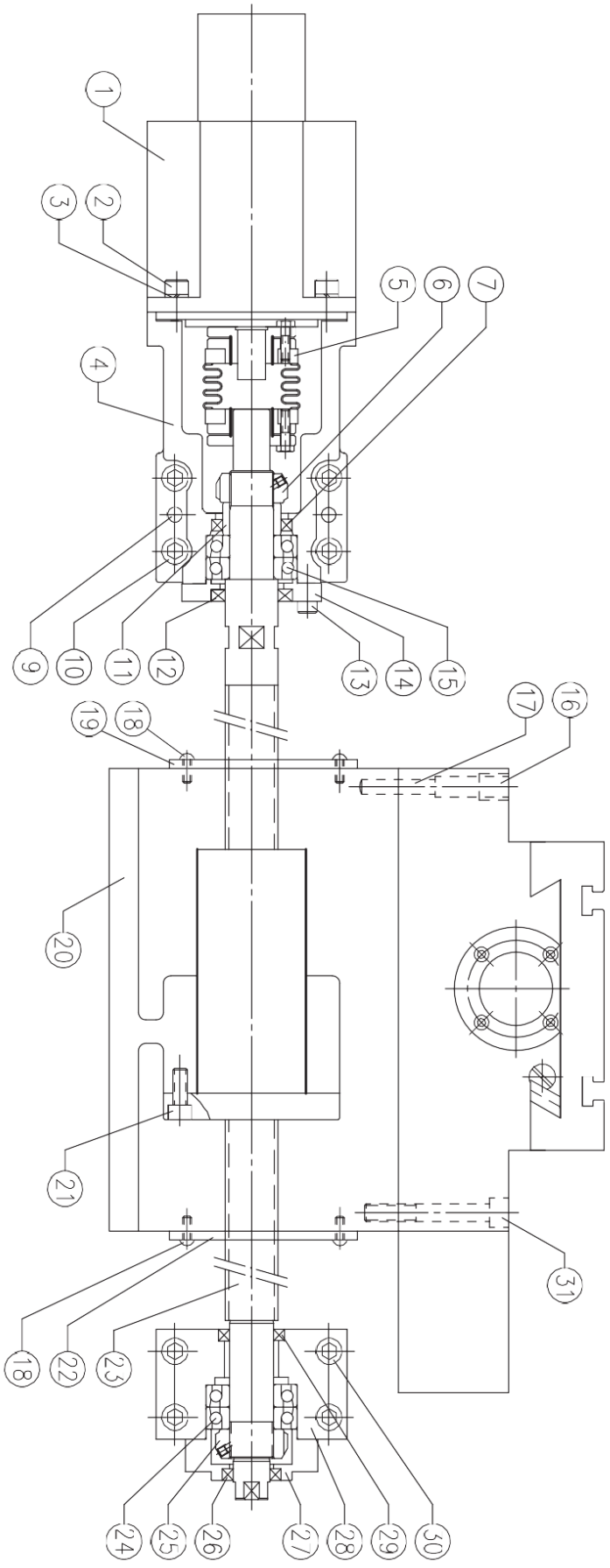
X-AXIS

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77A-0311-01	Apron		1
2	77A-0201-00	Saddle		1
3		Socket Head Cap Screw	M8x20L	3
4	77A-0204-00	Bearing Cover		1
5		Bearing Nut	SK20	1
6		Taper Roller Bearing	20TAC47BDF	1
7		Oil Seal	TC25x40x8	1
8		Round Screw	M6x16L	6
9	77A-0244-00	Bedway Wiper (Front)		1
10	77A-0211-00	X-Axis Ball Screw		1
11	77A-0215-01	Cross Slide		1
12	77A-0213-01	Nut Base		1
13	77A-0214-00	Pad		1
14		Oil Seal	TC20x32x8	1
15	77A-0206-00	Bearing Cover		1
16		Taper Roller Bearing	20TAC447BDF	1
17		Bearing Nut	FK20	1
18	72-0210-00	Pulley		1
19		Double Round Head Key	5x5x30	1
20	72-0211-00	Washer		1
21		Socket Head Cap Screw	M6x16L	1
22		Spring Washer	M6	1
23	77A-0245-00	Bedway Wiper (Rear)		1
24	72-0209-00	Cover		1
25		Belt	480-8M-30	1
26		Servo Motor		1
27	77A-0212G-00	Pulley		1
28	77A-0208G-00	Motor Plate		1
29	77A-0207-00	Transmission Box		1
30		Cone Type Key	22x26	1

X-AXIS

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
31	77A-0203G-00	Packing		1
32		Socket Head Cap Screw	M6x20L	4
33		Socket Head Cap Screw	M6x16L	6
34		Socket Head Cap Screw	M8x25L	10
35	50-0325-00	Set Screw		4
36	77A-0216-00	Locking Block		1
37	72-0216A-00	Taper Gib		1
38	77A-0202-00	Locking Block		1
39		Socket Head Cap Screw	M6x20L	6
40		Socket Head Cap Screw	M8x30L	4
41		Taper Pin	p8x45L	2
42	50-06167-00	Tube		1
43	17-0722B-00	Coupling		1
44	50-06169-00	Coolant Tube		1
45	17-0746-00	Bracket		2
46		Socket Head Cap Screw	M6x30L	1
47	17-0747-00	Adapter		1
48	50-06166-00	Valve		1
49	50-06168-00	Nozzle		1
50	77A-0217-00	Taper Gib		1
51	50-0325-00	Adjusting Screw		2
52		Socket Head Cap Screw	M5x10L	2
53		Socket Head Cap Screw	M10x90L	4
54		Taper Pin	p8x60L	2
55		Socket Head Cap Screw	M8x30L	4
56		Spring Washer	M8	4
57		Socket Head Cap Screw	M10x30L	4
58		Flat Washer	M10	4

Z-AXIS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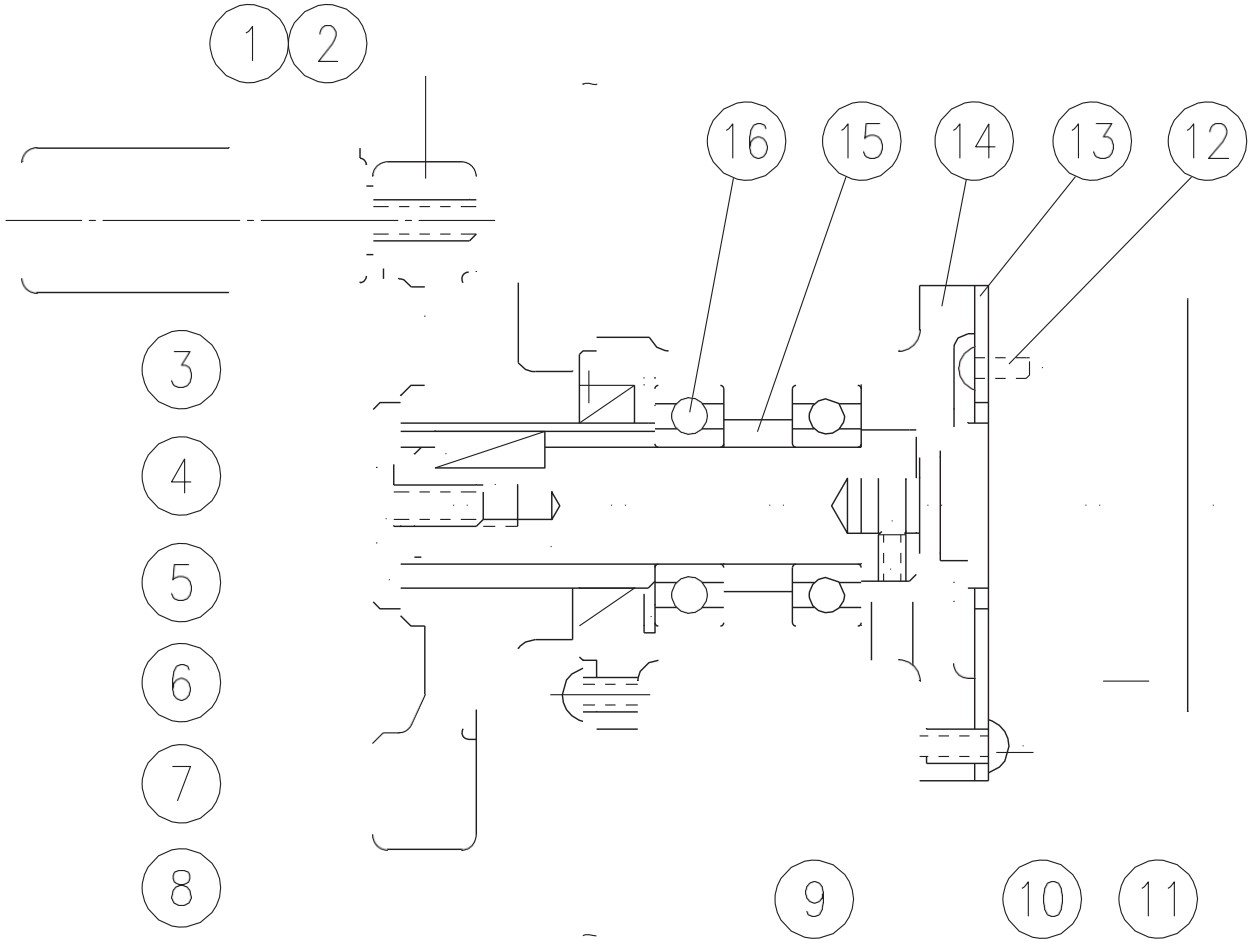
Z-AXIS				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1		Servo Motor		1
2		Socket Head Cap Screw	M10x25L	4
3		Spring Washer	M10	4
4	77A-0304-00	Motor Base		1
5	77-0326-L	Coupling		1
6		Bearing Nut	SK30	1
7		Oil Seal	TC40x55x8	1
9		Taper Pin	φ10x50L	2
10		Socket Head Cap Screw	M12x50L	4
11	77A-0302-00	Spacer		1
12		Oil Seal	TC30x55x10	1
13		Socket Cap Screw	M8x30L	4
14	77A-0305-00	Bearing Cover		1
15		Taper Roller Bearing	30TAC62BDF	1
16		Set Screw	M16x20L	2
17		Taper Pin	φ10x50L	2
18		Round Screw	M6x16L	6
19	77A-0317-00	Bedway Wiper (Left)		1
20	77A-0311-01	Apron		1
21		Socket Head Cap Screw	M10x25L	6
22	77A-0316-00	Bedway Wiper (Right)		1
23	77A-0310A-00 77A-0310-01	Z-Axis Ball Screw (1840) Z-Axis Ball Screw (1860)		1
24		Taper Roller Bearing	30TAC62BDF	1
25		Bearing Nut	SK30	1
26		Oil Seal	TC25x40x8	1
27	77A-0309-00	Bearing Cover		1
28	77A-0308-01	Bearing Seat	TC30x45x8	1
29		Oil Seal	TC30x45x8	1
30		Socket Head Cap Screw	M12x40L	4
31		Socket Head Cap Screw	M12x90L	4

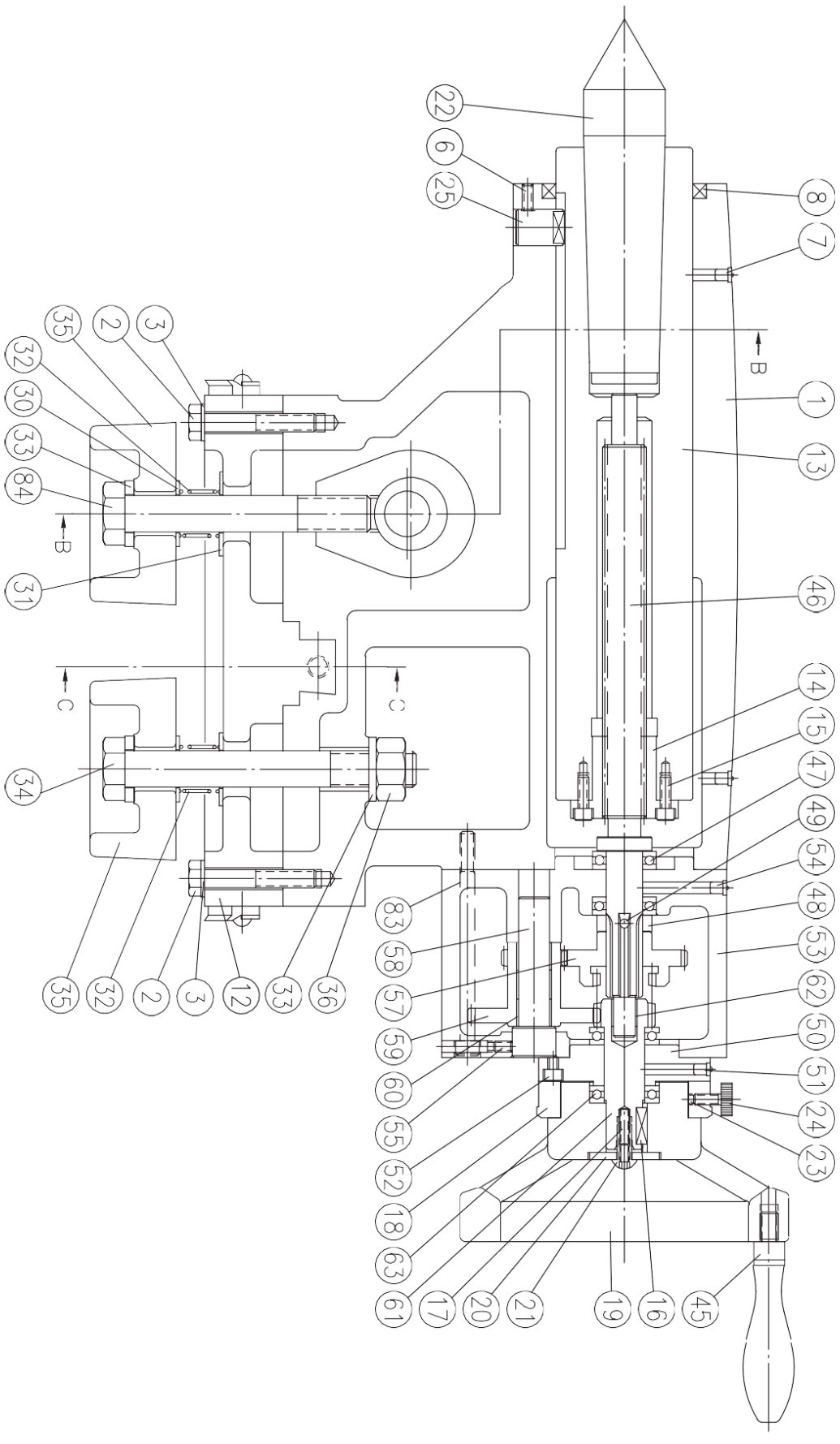
MANUAL PULSE GENERATOR ASSEMBLY



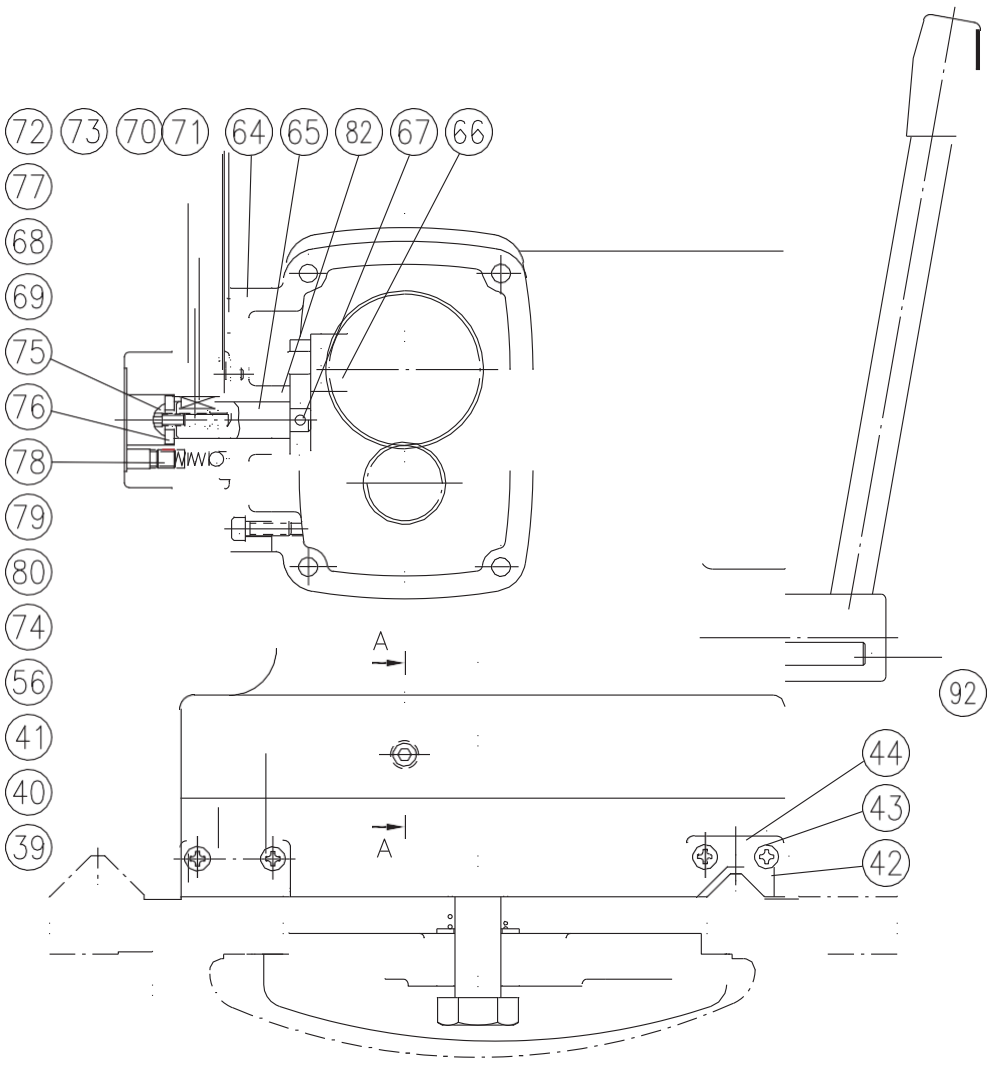
MANUAL PULSE GENERATOR ASSEMBLY

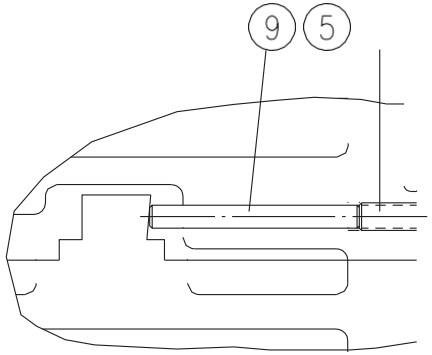
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1		Handwheel		1
2		Handwheel		1
3		Oil Seal	TC24x35x8	2
4		Double Round Head Key	3x3x16L	2
5		Flat Screw	M6x16L	6
6	77A-0667-00	Washer		2
7	77A-0665-00	Shaft		2
8		Retaining Ring	R35	2
9		Set Screw	M4x6L	2
10		Round Screw	M5x10L	6
11		Manual Pulse Generator	OVM-01	2
12		Round Screw	M3x8L	6
13	77A-0664-00	Setting Plate		2
14		Bearing Seat		2
15		Spacer		2
16		Roller Bearing	#6003ZZ	2

TAILSTOCK (1/3)



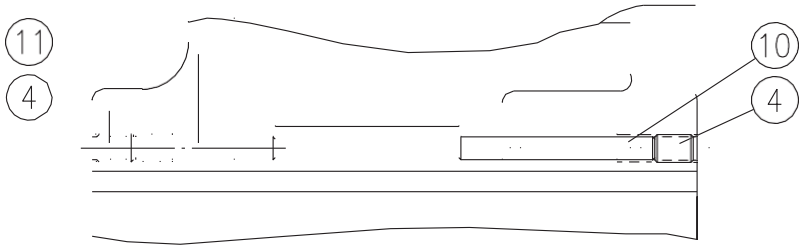
TAILSTOC - (2/3)



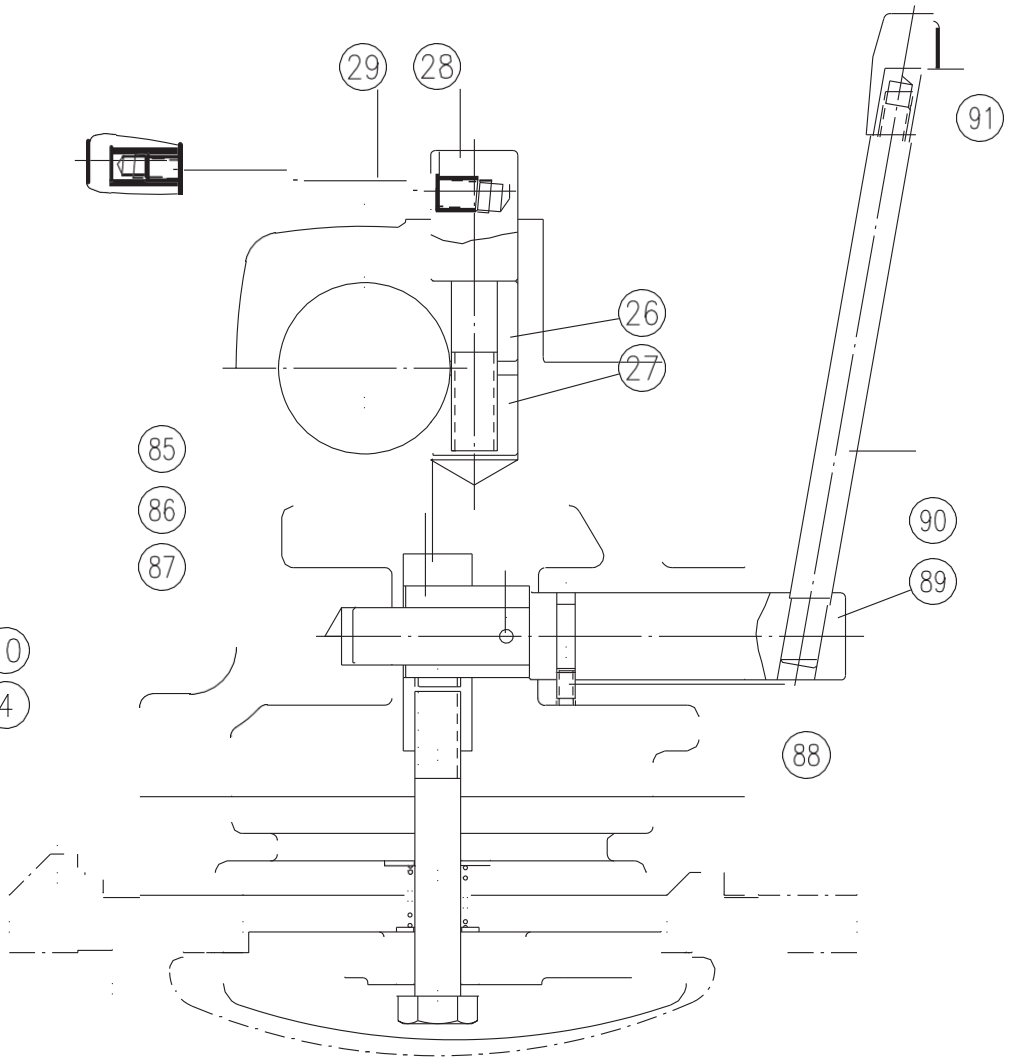


A–A SECTION

TAILSTOC - (3/3)



C-C SECTION



B-B SECTION

TAILSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77A-0501-01	Tailstock Boby		1
2		Socket Head Cap Screw	M10x60L	2
3		Flat Washer	M10	2
4		Socket Head Set Screw	M12x16L	2
5		Socket Head Set Screw	M12x25L	1
6		Socket Head Set Screw	M6x10L	1
7		Ball Cup	1/4"	2
8		Oil Seal	TC75x90x8	1
9		Straight Pin	10 x85L	1
10		Straight Pin	10 x60L	1
11		Straight Pin	10 x90L	1
12	77A-0502-00	Tailstock Base		1
13	63-0503-00	Sleeve		1
14	63-0504-00	Feed Screw Nut	Metric	1
14	63-0505-00	Feed Screw Nut	Imporial	1
15		Socket Head Cap Screw	M6x12L	1
16		Double Round Head Key	6x6x20L	4
17		Socket Head Set Screw	M6x20L	1
18	50-0509-00	Dial	Metric	1
18	50-0510-00	Dial	Imporial	1
19	50-0511-00	Handwheel		1
20	50-0513-00	Washer		1
21	17-0504-02	Screw		1
22	63-01118-00	Center		1
23	50-0538-00	Brass Pad		1
24	50-03111-00	Round Screw		1
25	63-0514-00	Pin		1
26	63-0515-00	Locking Block		1
27	63-0516-00	Clamping Block		1
28	77A-0517-00	Locking Rod		1

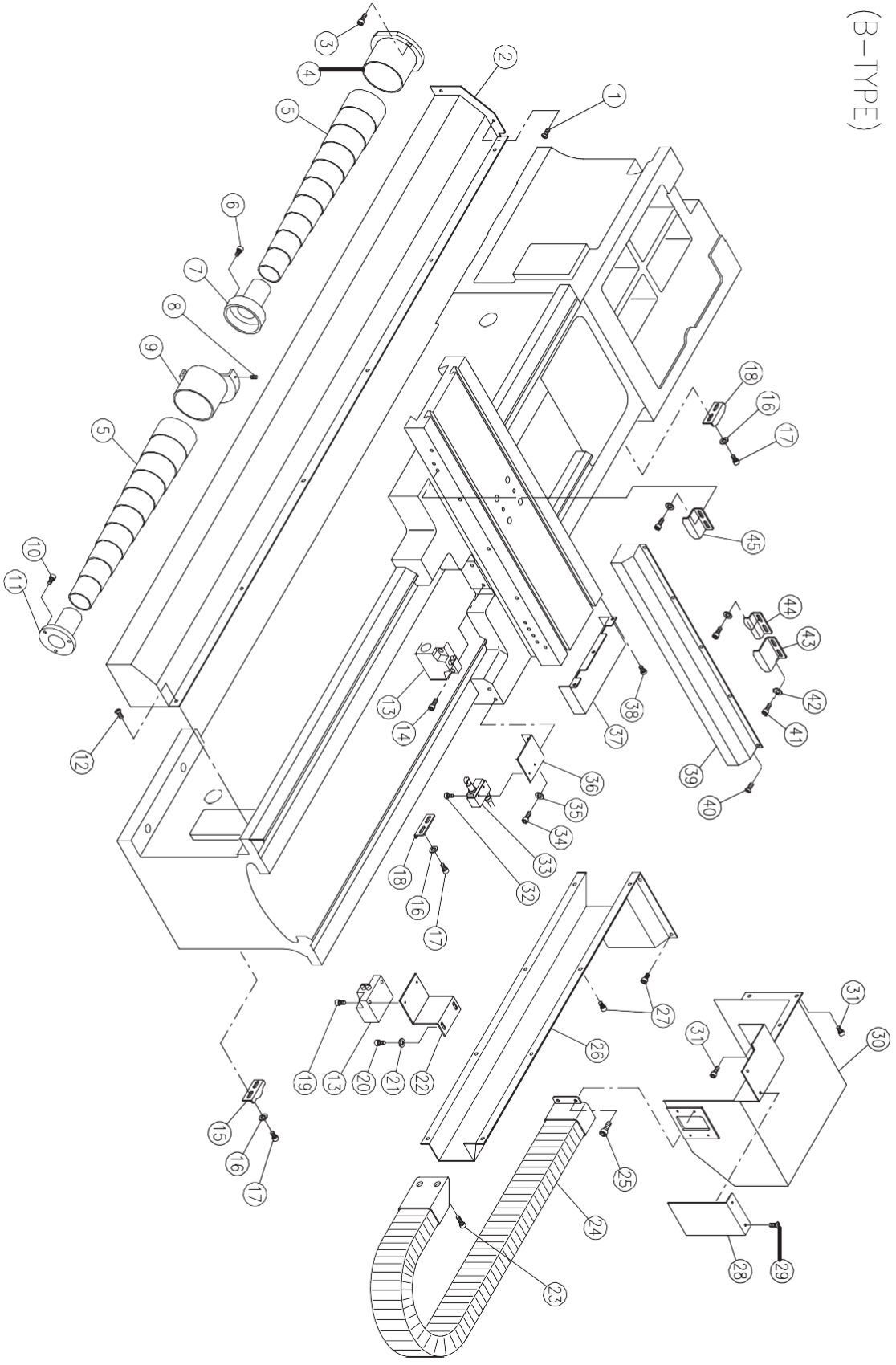
TAILSTOCK				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
29	63-0518-00	Shifting Rod		1
30	50-0523-00	Flat Washer		2
31	50-0524-00	Flat Washer		2
32	50-0525-00	Compression Spring		2
33	50-0526-00	Flat Washer		3
34		Hexagon Screw	M20x160L	1
35	77A-0529-00	Clamping Block		2
36		Hexagon Nut	M20xP2.0	1
39	50-0530-00	Bedway Wiper		2
40	50-0131-00	Bedway Wiper Plate		2
41		Cross Recessed Head Screw	M6x16L	8
42	50-0532-00	Bedway Wiper		2
44	50-0533-00	Bedway Wiper Plate		2
45	50-0431-00	Knob		1
46	63-0506B-00	Feed Screw	Metric	1
46	63-0507B-00	Feed Screw	Imporial	1
47		Thrust Bearing	#51104	2
48	50-0504-00	Spacer	5x80L	1
49		Taper Pin		1
50	80-0508B-00	Bracket		1
51		Ball Cup	1/4"	1
52		Socket Head Cap Screw	M6x16L	4
53	63-0539-00	Change Speed Box		1
54		Ball Cup	1/4"	1
55		Socket Head Set Screw	M6x10L	1
56		Socket Head Cap Screw	M6x16 L	4
57	80-0542-00	Clutch Gear		1
58	80-0543-00	Shaft		1
59	80-0544-00	Gear		1
60		Dry Bearing	12x14 x 15L	1

TAILSTOCK				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
61	63-0519-00	Shaft		1
62		Dry Bearing	17x19x15L	2
63		Thrust Bearing	7/8"x1-1/2'x3/8"	2
64	80-0546-00	Change Speed Box Cover		1
65	80-0548-00	Shaft		1
66	80-0547-00	Shifting Block		1
67		Spring Pin	4x25L	1
68		Double Round Head Key	5x5x15L	1
69		Socket Head Set Screw	M5x20L	1
70	80-0551-00	Indicator		1
71		Revit	2x5L	1
72	80-0552-00	Setting Plate		1
73		Cross Recessed Head Screw	M5x8L	2
74	28-0229-00	Shifting Arm		1
75	17-0504-02	Screw		1
76	50-0167-00	Washer		1
77	50-0246-01	X Feed Selector Konb		1
78		Socket Head Set Screw	M8x20L	1
79		Compression Spring	6x 0.8x 30L	1
80		Steel Ball	1/4"	1
82	65-0549-00	Spacer		1
83	80-0540-00	Socket Head Set Screw		4
84		Hexagon Screw	M20x125L	1
85	80-0522-00	Adjusting Block		1
86	80-0521-00	Eccentric Collar		1
87		Spring Pin	6x40L	1
88		Socket Head Set Screw	M8x12L	1
89	63-0519-00	Shaft		1
90	63-0520-00	Lever		1
91	50-0166-00	Knob		1

TAILSTOCK

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q‘TY
92	50-0534-00	Stud		1

X, Z-AXIS COVER
(B-TYPE)



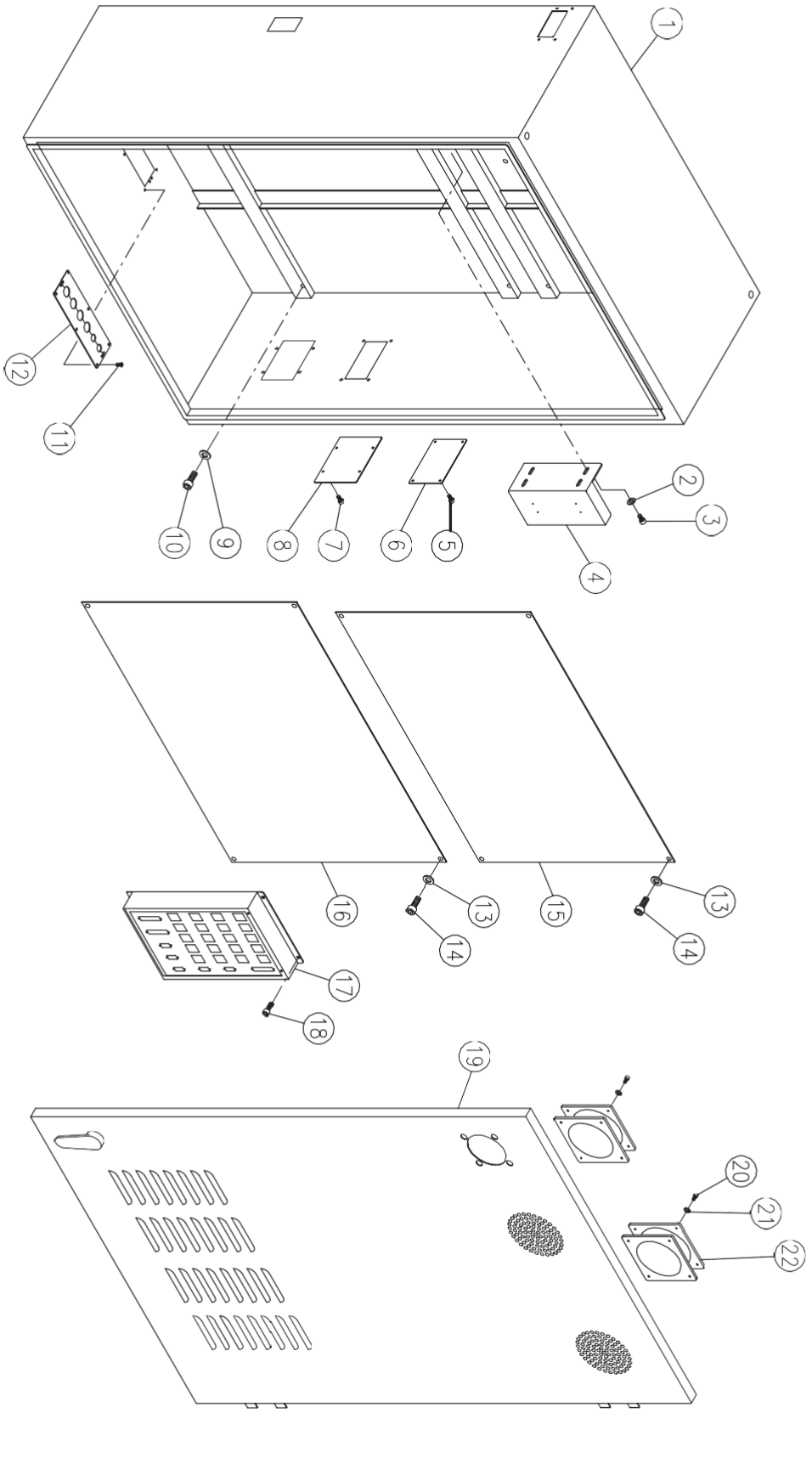
X , Z-AXIS COVER (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1		Round Screw	M5x6L	2
2	77B-0605-00	Cover		1
3		Socket Head Cap Screw	M5x8L	2
4	77A-0644-01	Protector Seat		1
5		Ball Screw Protector	45x1200 x100	2
6		Socket Head Cap Screw	M5x10L	3
7	77A-0645-01	Protector Seat		1
8		Set Screw	M6x6L	1
9	77A-0646-00	Protector Seat		1
10		Socket Head Cap Screw	M6x12L	3
11	77A-0647-00	Protector Seat		1
12		Round Screw	M5x8L	5
13		Micor Switch	BNS543D02D12	2
14		Socket Head Cap Screw	M6x20L	2
15	77B-0697-00	Z-Axis Touch Block		1
16		Flat Washer	M6	6
17		Socket Head Cap Screw	M6x12L	6
18	77B-0698-00	Z-Axis Touch Block		2
19		Socket Head Cap Screw	M6x16L	2
20		Socket Head Cap Screw	M6x12L	2
21		Flat Washer	M6	2
22	77A-0676-01	Micor Switch Set		1
23		Socket Head Cap Screw	M6x12L	2
24		Wire Protector		1
25		Socket Head Cap Screw	M6x10L	4
26	77A-0693-00	Wire Protector Cover		1
27		Round Screw	M6x16L	2
28	77A-0689-00	Cover Plate		1
29		Round Screw	M6x6L	2
30	77A-0660-03	Z-Axis Motor Plate		1

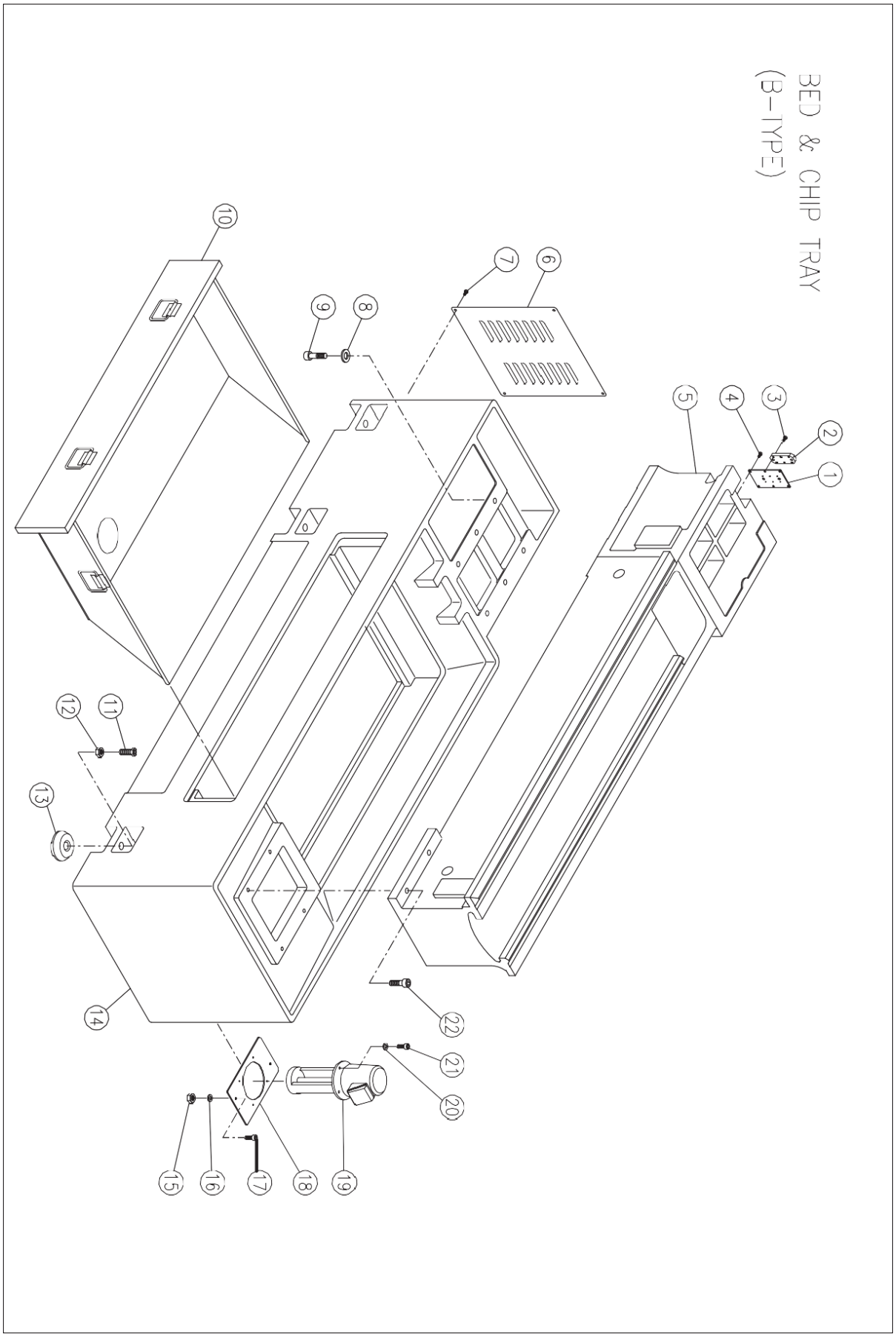
X , Z-AXIS COVER (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
31		Socket Head Cap Screw	M6x8L	6
32		Round Screw	M4x25L	2
33		Micor Switch		1
34		Socket Head Cap Screw	M6x12L	2
35		Flat Washer	M6	2
36	77B-06114-00	Micor Switch Seat		1
37	77A-0659-02	Cross Slide Rear Cover		1
38		Round Screw	M6x8L	3
39	77A-0655-00	Slide Cover		1
40		Round Screw	M6x8L	5
41		Socket Head Cap Screw	M6x12L	6
42		Flat Washer	M6	6
43	77A-0656-00	X-Axis Block		1
44	77A-0658-00	X-Axis Block		1
45	77A-0657-00	X-Axis Block		1

ELECTRICAL CONTROL BOX (3-TYPE)



ELECTRICAL CONTRAL BOX (B-TYPE)				
REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77B-0606-00	Electrical Contorl Box		1
2		Flat Washer	M6	4
3		Socket Head Cap Screw	M6x16L	4
4	77A-0648-01	Switch Seat		1
5		Round Screw	M4x6L	1
6	77A-0678-00	Cover Plate		4
7		Round Screw	M4x6L	1
8	77A-0677-00	Cover Plate		4
9		Flat Washer	M6	4
10		Socket Head Cap Screw	M8x40L	4
11		Round Screw	M4x6L	10
12	77A-0652-00	Setting Plate		2
13		Flat Washer	M8	8
14		Socket Head Cap Screw	M8x10L	8
15	77B-0608-00	Base Plate		1
16	77B-0624-00	Base Plate		1
17	77A-0679-00	Relay Contactor Set Seat		1
18		Socket Head Cap Screw	M6x10L	4
19	77B-0698-00	Electical Contorl Box Door		1
20		Socket Head Cap Screw	M4x6L	8
21		Spring Washer	M4	8
22		Fan		2


BED & CHIP TRAY
(B-TYPE)
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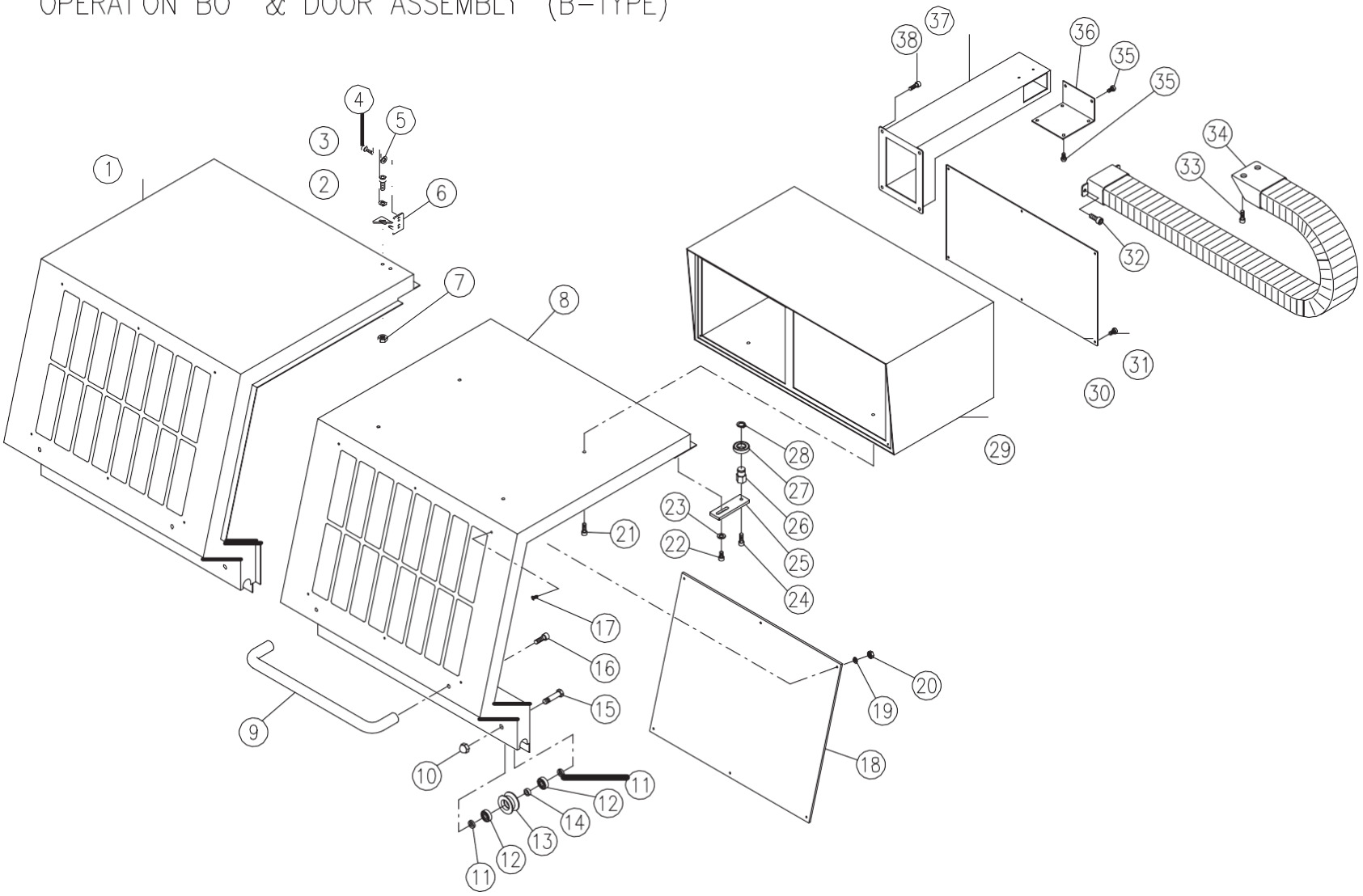
BED & CHIP TRAY (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77A-0694-01	Cover		1
2		Oil Sight Glass		1
3		Round Screw	M5x10L	6
4		Socket Head Cap Screw	M5x10L	6
5	77A-0701-01	Bed(1804)		1
5	77A-0701A-00	Bed(1860)		1
6	50-06113-00	End Cover		1
7		Round Screw	M6x8L	4
8		Spring Washer	M16	6
9		Socket Head Cap Screw	M16x60L	6
10	77A-0635-01	Chip Tray (1840)		1
10	77D-0735-00	Chip Tray (1840)		1
11	50-06121-00	Adjusting Screw		6
12	50-06121-00	Locking Nut		6
13	77A-06122-00	Installation Block		6
14	77A-0674-00	Stand		1
15		Hexagon Nut	M8	2
16		Spring Washer	M8	2
17		Socket Head Cap Screw	M8x30L	2
18	77B-0697-00	Pump Bracket		1
19		Coolant Pump	1/8HP	1
20		Spring Washer	M6	4
21		Socket Head Cap Screw	M6x16L	4
22		Socket Head Cap Screw	M16x50L	4

OPERATION BOX & DOOR ASSEMBLY (B-TYPE)

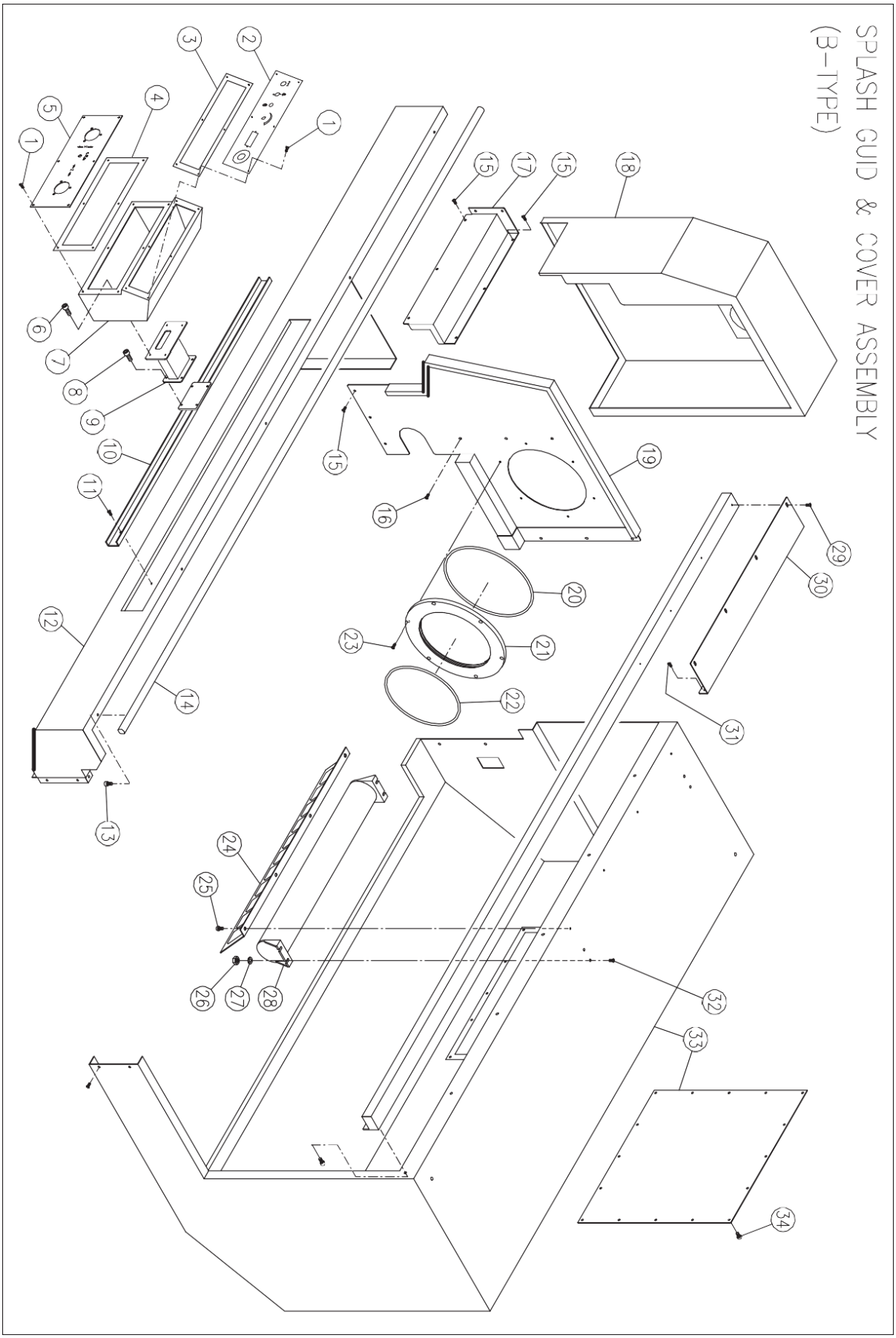


OPERATION BOX & DOOR ASSEMBLY (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1	77B-0621-01	Left Moving Door		1
2		Flat Washer	M6	2
3		Socket Head Cap Screw	M6x16L	2
4		Socket Head Cap Screw	M5x8L	2
5		Flat Washer	M5	2
6	77B-06123-00	Safety Switch Seat		1
7		Hexagon Nut	M6	2
8	77B-06111-00	Right Moving Door		1
9	77A-06103-00	Handle		2
10		Hexagon Nut	M10	4
11	77-0628-00	Spacer		8
12		Deep Groove Ball Bearing	6000ZZ	8
13	77-0626-00	Roller		4
14	77-0627-00	Spacer		4
15	77-0629-00	Roller Shaft		4
16		Socket Head Cap Screw	M8 x12L	4
17		Anti- Round Screw	M4 x12L	12
18	77A-0622-00	Safety Glass		2
19		Flat Washer	M4	12
20		Hexagon Nut	M4	12
21		Socket Head Cap Screw	M6 x10L	4
22		Socket Head Cap Screw	M6 x10L	12
23		Flat Washer	M6	12
24		Socket Head Cap Screw	M6 x10L	6
25	77A-0615-00	Plate		6
26	77A-0614-01	Shaft		1
27		Deep Groove Ball Bearing		6
28		Retaining Ring		8
29	77A-0619G-00	Operation Box		1
30	77A-0620-00	Operation Box Rear Cover		1

OPERATION BOX & DOOR ASSEMBLY (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
31		Round Screw	M4x6L	6
32		Socket Head Cap Screw	M6x16L	2
33		Socket Head Cap Screw	M6x16L	2
34		Wire Protector	80x45SB2000	1
35		Round Screw	M5x6L	6
36	77A-0651-01	Safety Switch Seat		1
37	77B-0650-01	Linking Box		1
38		Socket Head Cap Screw	M6x10L	4


SPLASH GUID & COVER ASSEMBLY
(B-TYPE)

SPLASH GUIDE & COVER ASSEMBLY (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
1		Round Screw	M4x6L	12
2	77B-0628G-00	Name Plate		1
3	77B-06128-00	Rubber Pad		1
4	77B-06129-00	Rubber Pad		1
5	77A-0669G-03	Name Plate		1
6		Socket Head Cap Screw	M6x8L	4
7	77B-0653-01	Operation Box		1
8		Socket Head Cap Screw	M5x8L	4
9	77B-0630-01	Extension Tube		1
10		Slide Way		1
11		Round Screw	M4x6L	10
12	77B-0607-04	Protect Cover (Front)		1
13		Socket Head Cap Screw	M6x10L	5
14	77B-0625-01	Slide Way		1
15		Round Screw	M5x6L	20
16		Round Screw	M6 x10L	5
17	77B-0609-01	Z- Axis Motor Plate		1
18	77B-0640-00	End Cover		1
19	77B-0640-01	Protector Plate		1
20		O-Ring	G250	1
21	77A-0616-01	Anti-Leaking Plate		1
22		O-Ring	G210	1
23		Socket Head Cap Screw	M5 x10L	6
24	77A-0623-00	Plate		1
25		Round Screw	M6 x6L	4
26		Hexagon Nut	M6	4
27		Flat Washer	M6	4
28		Lamp Tube		1
29		Round Screw	M5x6	4
30	77B-0696-01	Supporting Plate		1

SPLASH GUIDE & COVER ASSEMBLY (B-TYPE)

REF NO.	PARTS NO.	PARTS NAME	DIMENSION	Q'TY
31		Hexagon Nut	M5	4
32		Round Screw	M6x16L	4
33	77A-0611-01	Rear Protector Cover		1
34		Round Screw	M5x6L	16

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