

A Series CNC BED MILL

OPERATION MANUAL

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Introduction

1、 Before installing and operating your machine please read the manual in detail.

2、 This manual will teach you the installation, operation and basic maintenance of the machine. It teaches you how to operate this machine safely and correctly.

3、 It's very important to understand each label and machine warning label in this manual.

4、 About the programming, please read the introduction of controller programming.

5、 About the operation of CNC control panel, setting up parameter and function, please read the introduction of controller operation.

6. Please don't discard this manual, if lost please contact us for a replacement.

CHAPTER 1

Safety Precautions

*** * THIS MACHINE MUST NOT BE SERVICED, REPAIRED OR MAINTAINED BY UNQUALIFIED AND UNTRAINED PERSONNEL. * ***

This machine is equipped with a number of safety devices to protect personnel and equipment from injury and damage. Operators should not, however, rely solely upon these safety devices but should operate the machine after fully understanding the following paragraphs.

Moreover, improper operation and maintenance of any CNC machine increases the likelihood of serious personal injury and greatly reduces the service life of this machine. Your attention to this manual, in combination with common sense and good machining practice, can positively affect productivity by reducing downtime and promoting safe operation of this machine unless they are explicitly stated in this instruction manual.

Additional safety considerations may be required for your particular application. Please refer to safety information for additional information and reference publications.

1.1 Regulation :

1. Only qualified personnel are permitted to maintain and operate this machine.
2. Do not operate or attempt to repair the machine until you have read and understood all manuals that pertain to the machine, plus all warning and instruction plates/decals mounted on the machine.
3. Be mentally alert on the job and keep safety in mind. Never attempt to operate or repair a machine if you are under medication or alcohol influence.
4. Wear safety shoes and eye protection within the work area. Safety shoes should be oil-resistant and safety glasses with side shields are strongly recommended.
5. Remove watches, jewelry and other accessories to avoid getting them caught in moving parts.
6. Maintain a clean and orderly workspace around machine.
7. Store tools and miscellaneous parts properly. Be sure there are no articles around the machine.
8. Do not use compressed air to blow chips from the machine spindle or table, controls, cabinets, or the floor around the machine. Use a brush or chip scraper to remove chips. Do not remove chips by hand or while the spindle is turning. Make sure that the cutter has completely stopped before attempting to remove chips. Dispose of chips frequently.
09. Never start the machine when the cutter is in contact with the workpiece. Make sure the direction of spindle rotation is correct to prevent cutter breakage.
10. Know where all the EMERGENCY STOP push buttons are located. Keep all machine doors closed while the machine is in operation, including those on the console and the electrical cabinets.
11. In the event of power failure, turn off main circuit breaker immediately.

12. Do not start the machine unless all units contain the proper amount and type of hydraulic oils, lubricant or acceptable equivalents.
13. Fuses replacement should have the proper current ratings.
14. Do not change parameters, volumes and other electrical setting unnecessarily. If such changes are unavoidable, record the values prior to any adjustments for future reference.
15. Do not soil, scratch or remove the caution plate. Should it become illegible to read or missing, order another caution plate from the supplier.
16. Whenever operating a forklift truck, crane or similar equipment, special care should be taken to prevent collisions and damage to surroundings.
17. Do not leave machine unattended, but stand away while it is running.
18. Turn off the power source before leaving for the day.

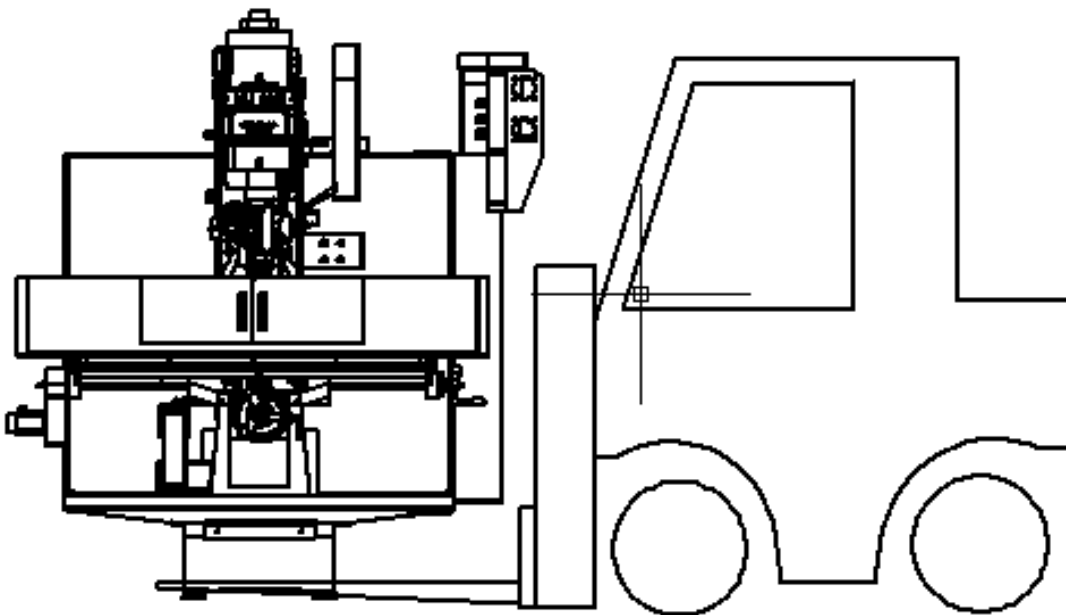
1.2 Safety Warning

Be sure your installation conforms to applicable electrical codes. Inspect all electrical connections before installing, operating or servicing machine. Be sure power supply voltage matches machine voltage.

Disconnect all power to the machine before installing or servicing machine. Disconnect all power before opening electrical or control box. Service should be only performed by a qualified engineer.

1.3 Moving Instructions

1. Make sure when moving the machine that you have a support block from the working table to the mill head, because the spindle head may shake while moving.
2. When transporting the machine using a crane or forklift make sure you have a trained/certified personnel operating the forklift/crane. Make sure to move the machine slowly and keep it balanced to avoid damage to machine or collision.

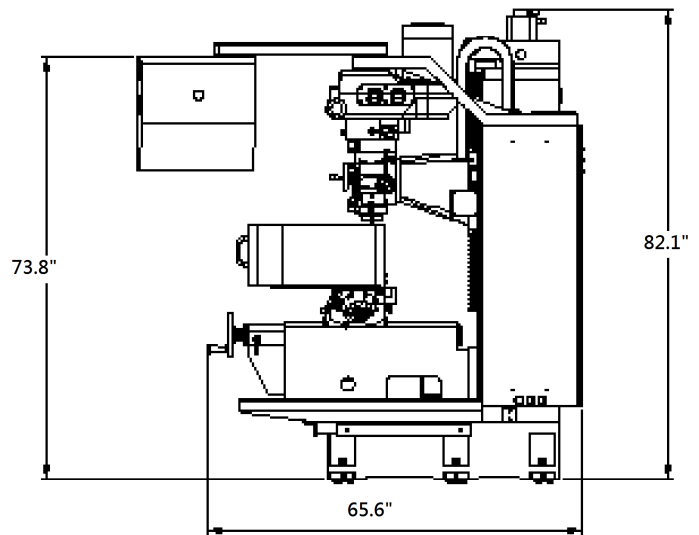
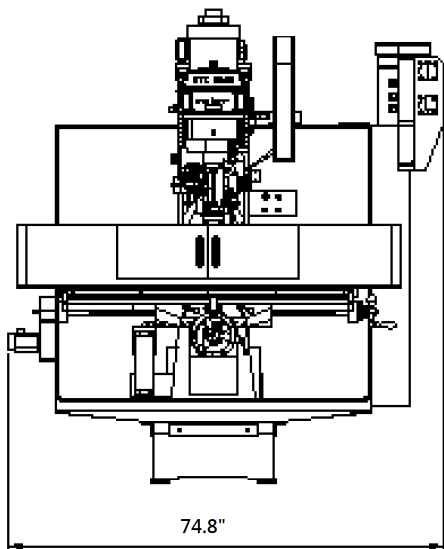
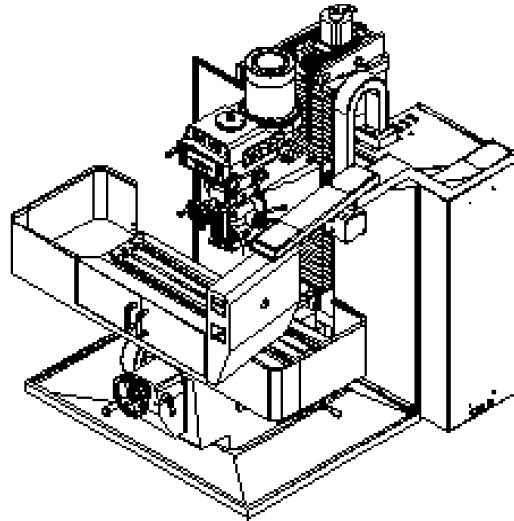
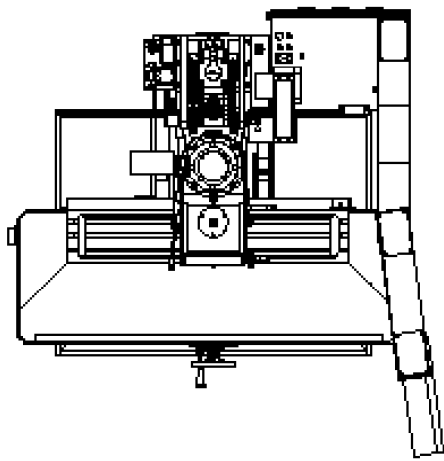


CHAPTER 2

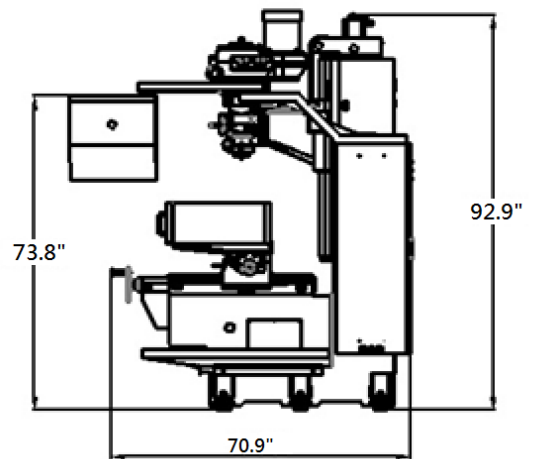
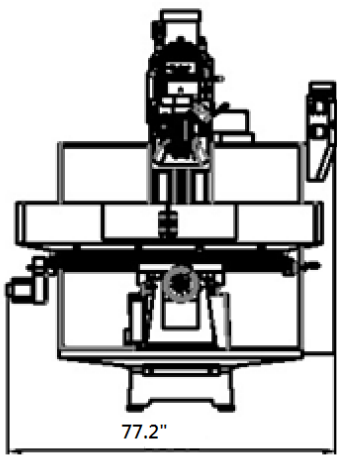
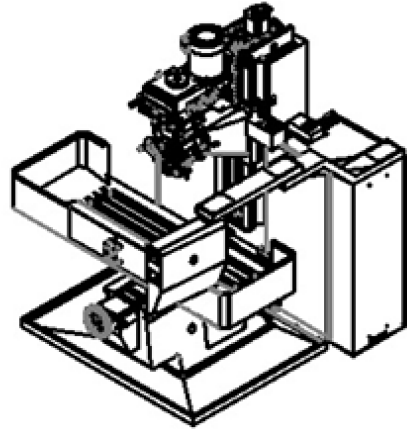
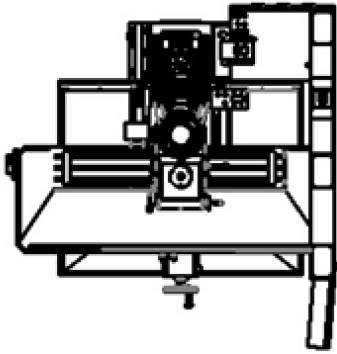
Machine Specification

2.1 Machine Dimension

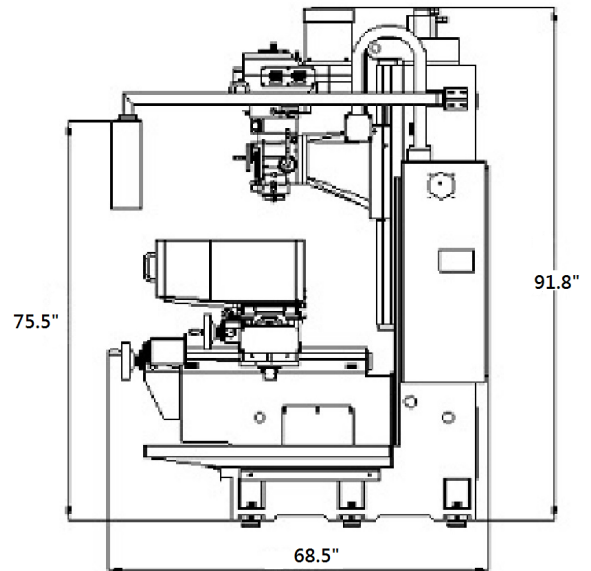
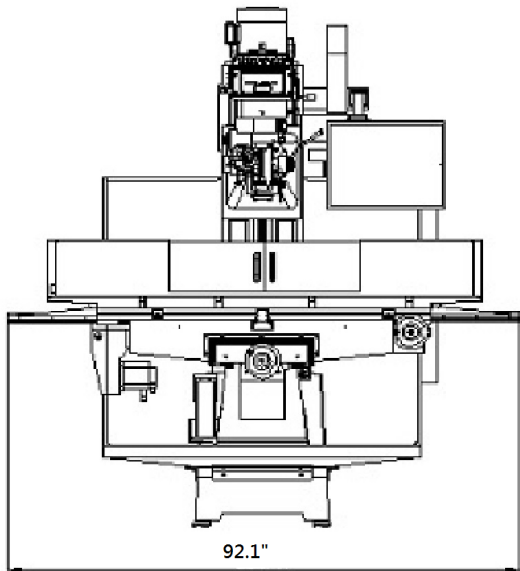
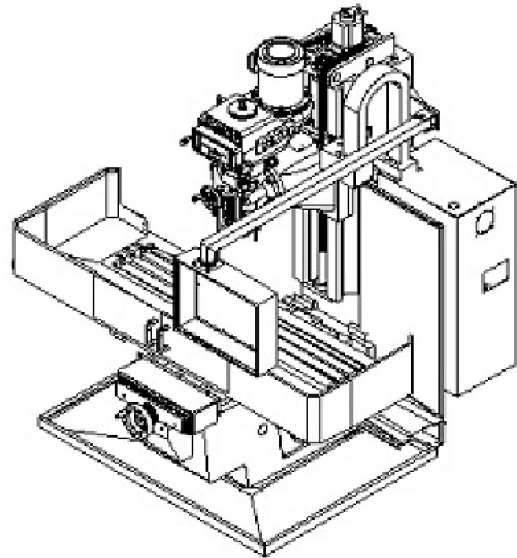
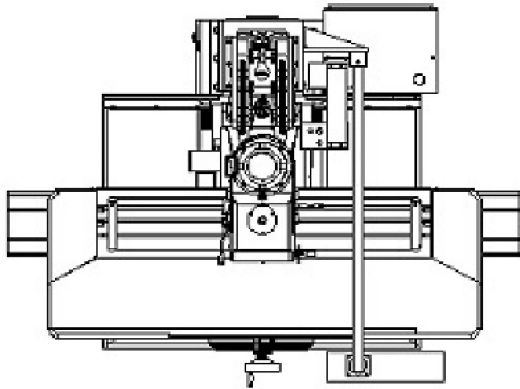
A1-3T/5T Machine Dimension



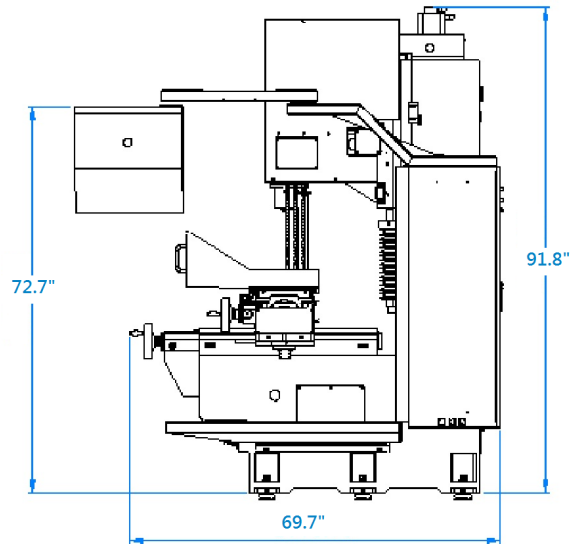
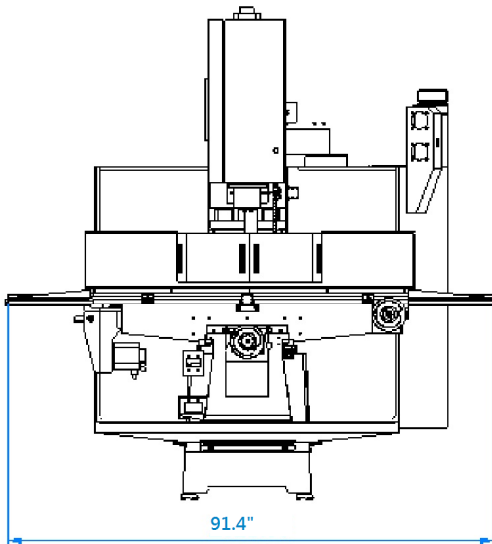
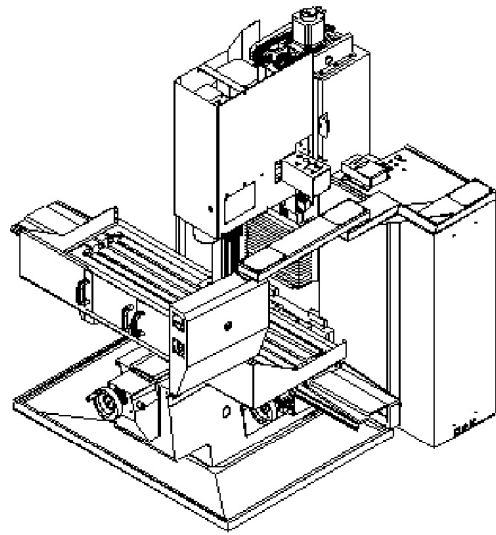
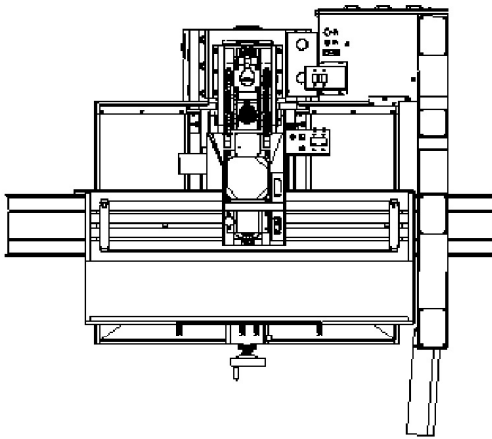
A2-5T Machine Dimension



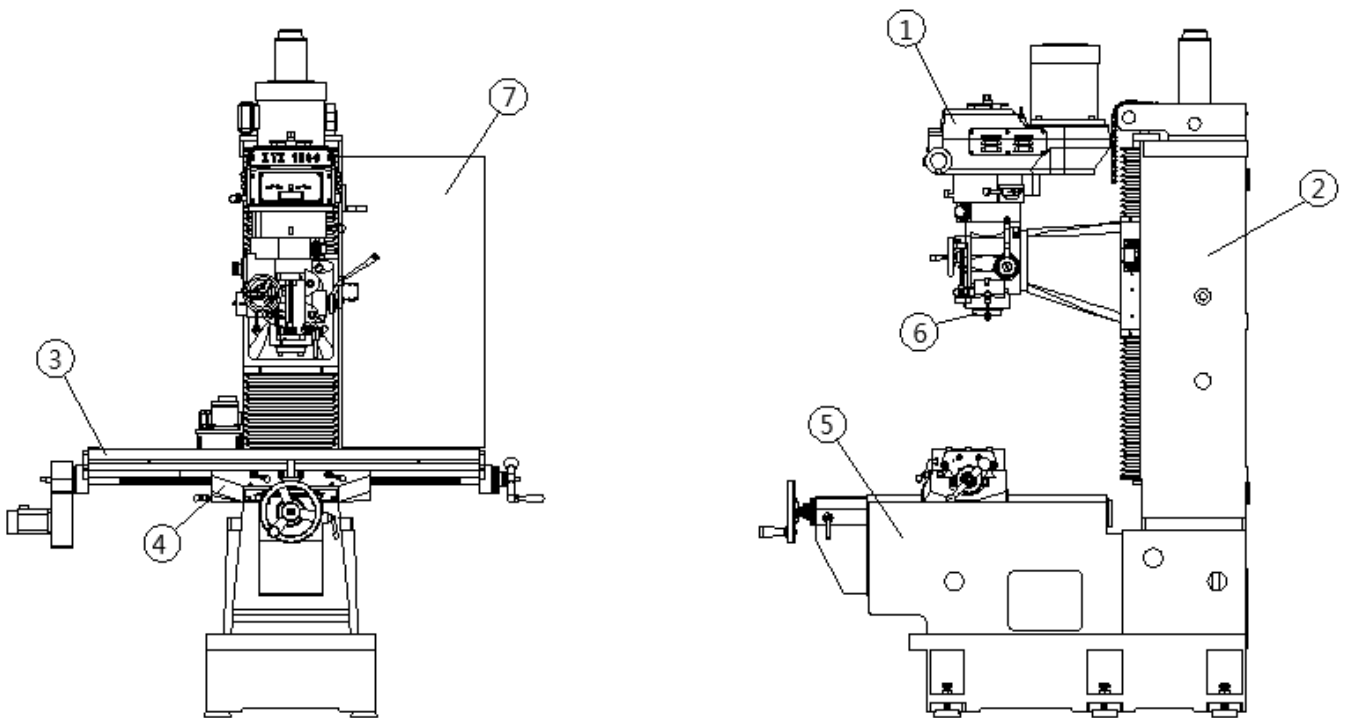
A3-5T Machine Dimension



A3-10H Mahine Dimension



2.2 The Main Parts Of Machine

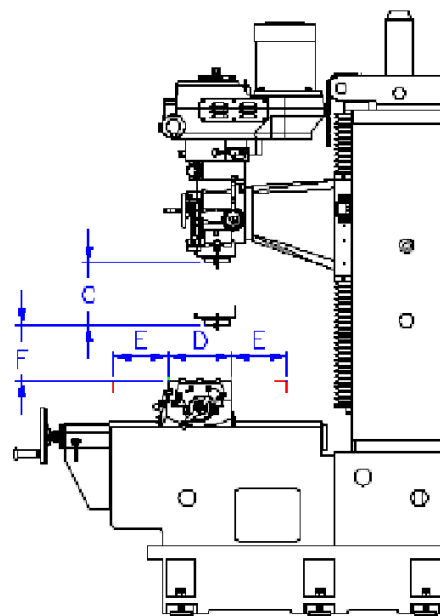
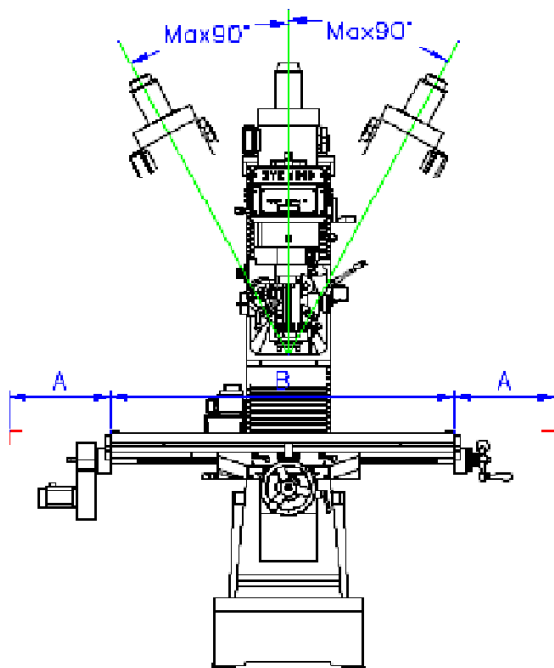
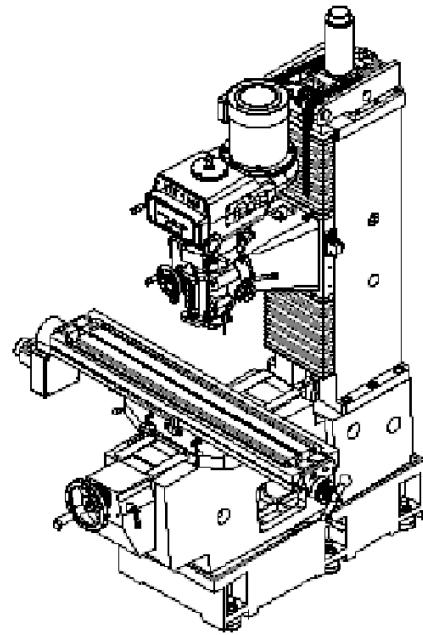


| No. | Description | QTY |
|-----|----------------|-----|
| 1 | Mill Head | 1 |
| 2 | Column | 1 |
| 3 | Table | 1 |
| 4 | Saddle | 1 |
| 5 | Base | 1 |
| 6 | Spindle | 1 |
| 7 | Electrical Box | 1 |

2.3 Machine Travel:

A1-3T/5T XYZ axis Travels

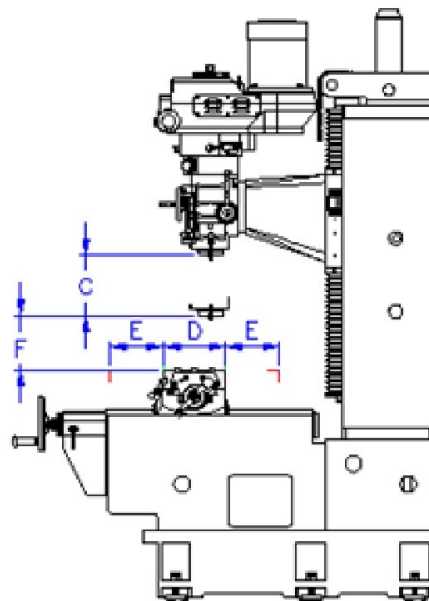
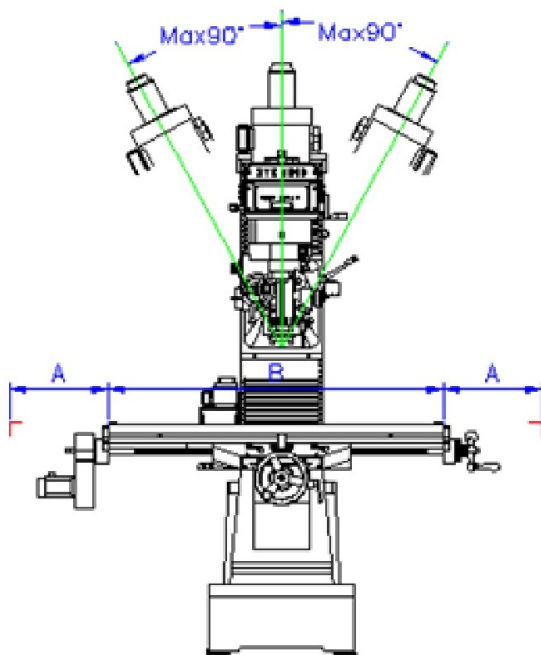
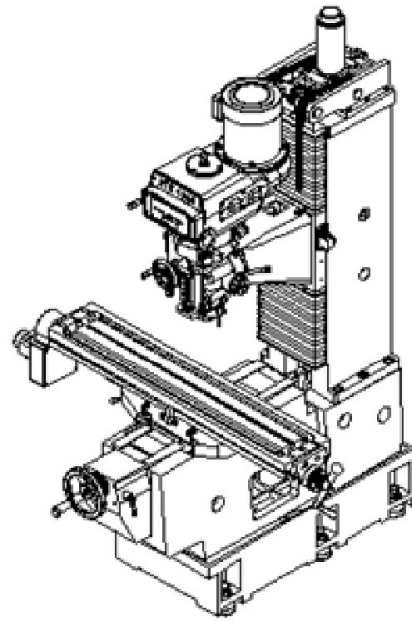
| | |
|--------|--------|
| X-axis | 28" |
| Y-axis | 15.74" |
| Z-axis | 19.68" |



| | |
|---|--------|
| A | 14.37" |
| B | 49" |
| C | 19.68" |
| D | 9.05" |
| E | 7.87" |
| F | 3.94" |

A2 XYZ axis Travels

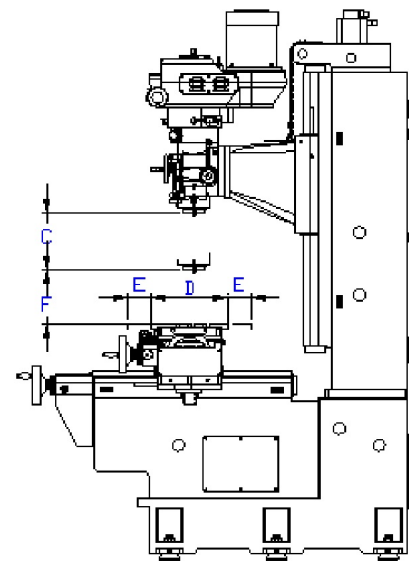
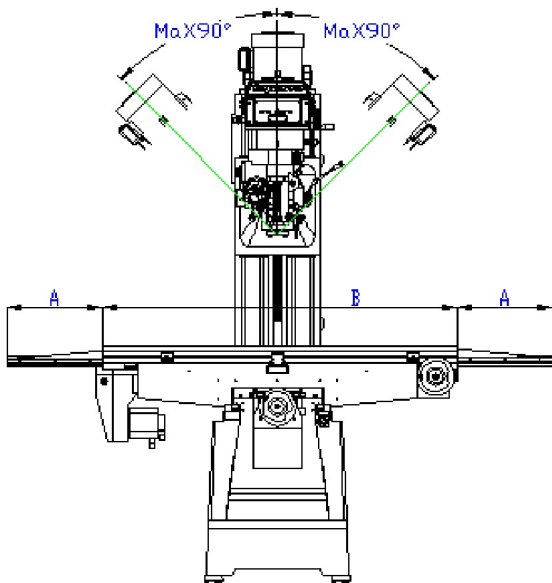
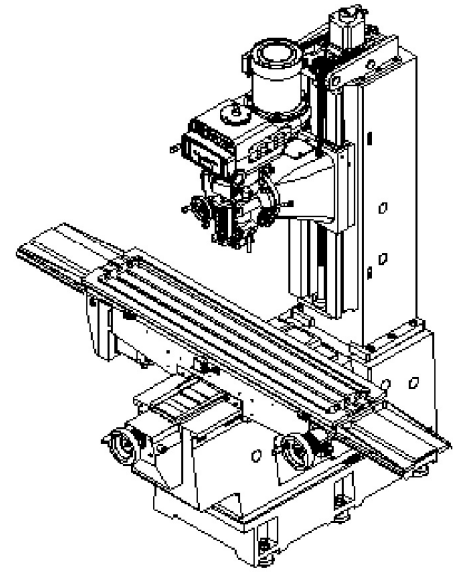
| A2-5T | |
|--------|-------|
| X-axis | 39.9" |
| Y-axis | 18.5" |
| Z-axis | 24" |



| | A2-5T |
|---|--------|
| A | 16.93" |
| B | 54" |
| C | 24" |
| D | 10" |
| E | 9.25" |
| F | 3.94" |

A3-5T XYZ axis Travel

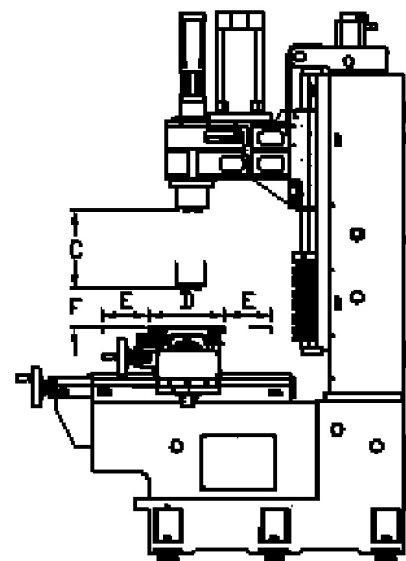
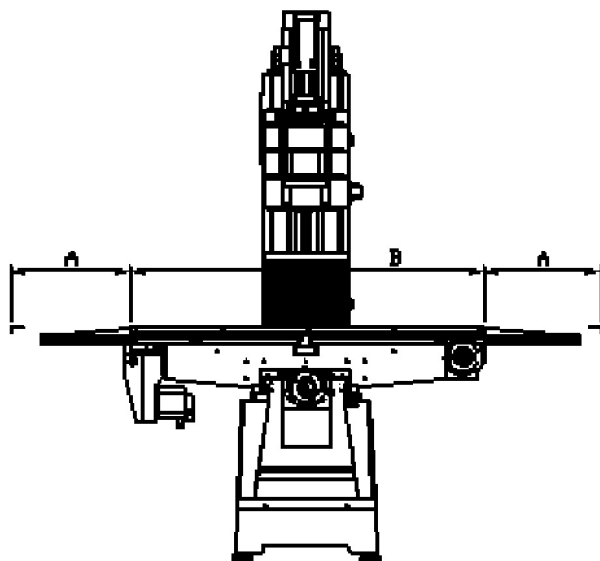
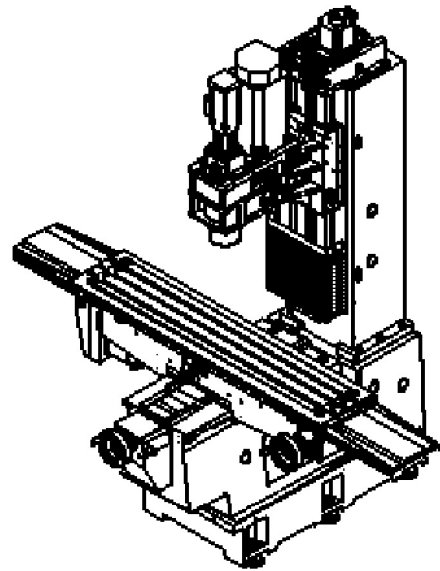
| A3-5T | |
|--------|-------|
| X-axis | 39.9" |
| Y-axis | 18.5" |
| Z-axis | 24" |



| | A3-5T |
|---|--------|
| A | 19.68" |
| B | 60" |
| C | 24" |
| D | 13" |
| E | 9.84" |
| F | 3.94" |

A3-10H XYZ axis Travel

| A3-10H | |
|--------|-------|
| X-axis | 39.9" |
| Y-axis | 18.5" |
| Z-axis | 19.6" |



| | |
|---|--------|
| A | 19.68" |
| B | 60" |
| C | 19.68" |
| D | 13" |
| E | 9.84" |
| F | 3.94" |

CHAPTER 3

Installation

3.1 Precaution

1. Only trained and qualified workers should operate forklift trucks, cranes or similar equipment and apply slings.
2. Use only wires of dimensions specified in the manual. They must be strong enough to support machine weight.
3. Before hoisting the machine, fixed each unit securely.
4. Maintain a clean and orderly surrounding around the machine.
5. "POWER ON" on the control panel can be pressed only after the complete installation.
6. Be sure electrical cables and wires are not damaged during installation.
7. After installation, proper capacity should be checked before connection the wire to the power source.
8. Removing the anti-rusty oil by rags with paraffin or fuel oil before operating. Toluene compounds must not be used.
9. Never leave the control boxes open while the power is on. A deadly high voltage is present which can cause serious injury.

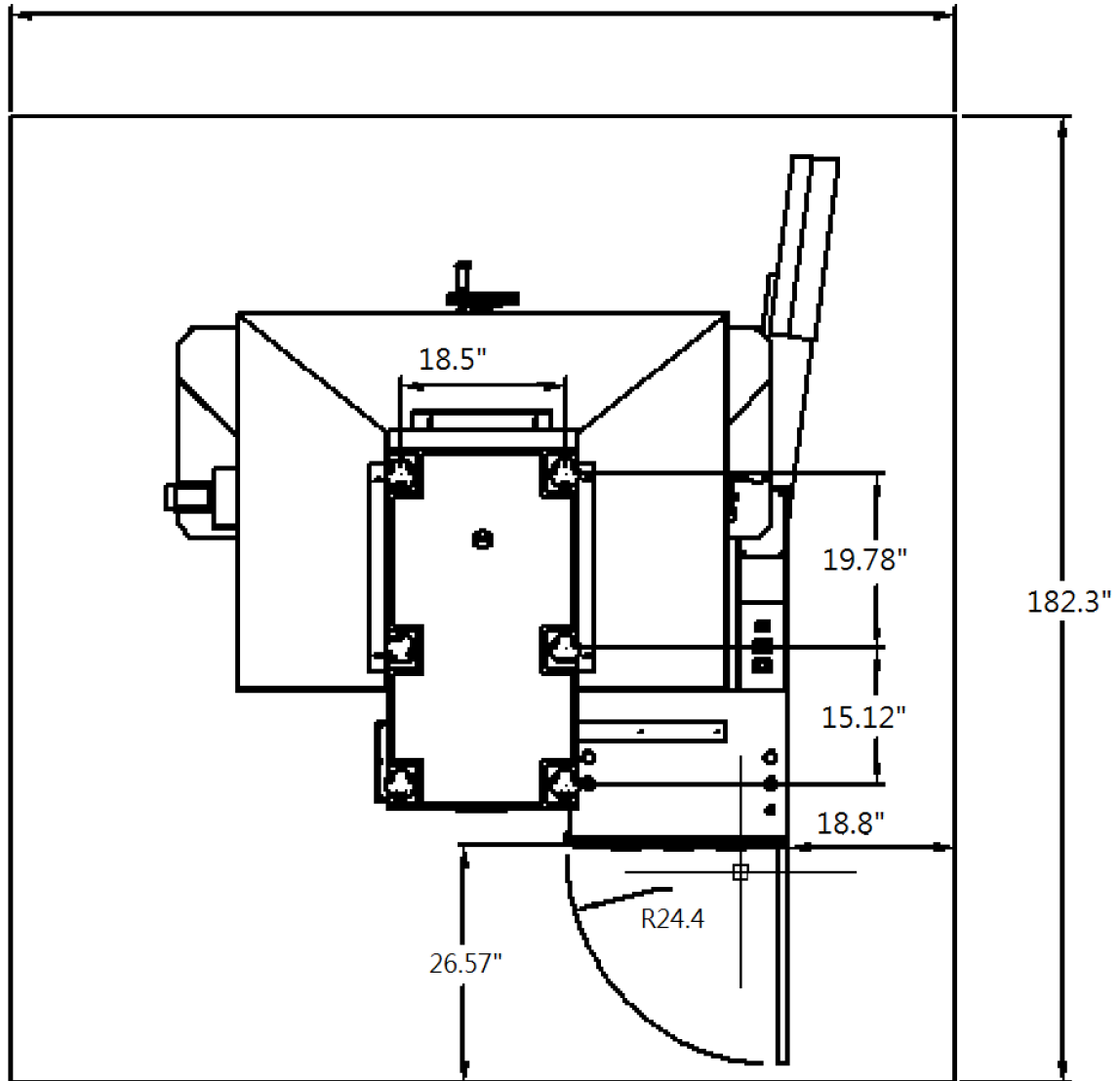
3.2 Machine unwrapped:

1. Remove support blocks from the mill head, column (for counterweight), tool changer and axes travel cover.
2. Inspect all piping is connected, including the tank's water pipes
3. Check all limit switches and stop blocks are not loose
4. Check whether the sheet metal door is installed properly.

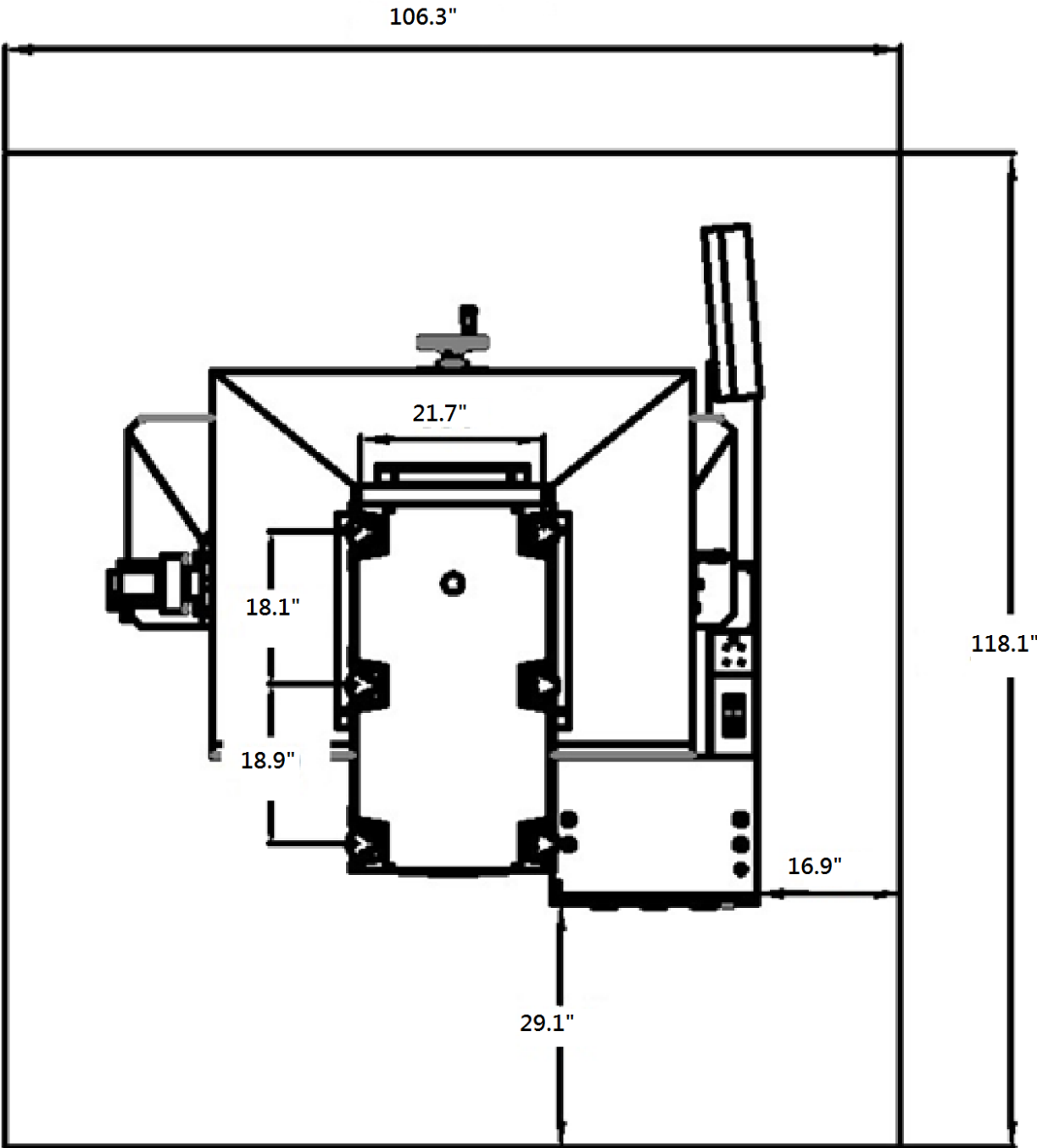
3.3 Workplace Environment Factors

1. Avoid exposure to direct sunlight and/or near a heat source, etc. Room temperature during operation should be 0 through 40°C
2. Avoid installing machines in a location where the humidity fluctuates considerably and/or highly humid.
3. Avoid installing machines in a dusty, misty location.
4. Install machines where there is no vibration sources in surroundings areas.
5. Install machines in a flat and smooth surface and make sure the area is clean. The minimum bearing pressure of the floor is 5000 kg/cm²
6. The machine must be protected from electrical waves, such as electric welders and an electric discharge machine (EDM).
7. Always ground machine independently. The ground resistance should be 100 ohms or less and the length of ground cable should be as short as possible.
8. The noise level at the operator's position should be under 85 dbA.
9. Make sure that the site is large enough to accommodate the machine, refer to the machine's brochure for maximum floor space size chart. Machine floor Space required for each model, please refer to following drawings.

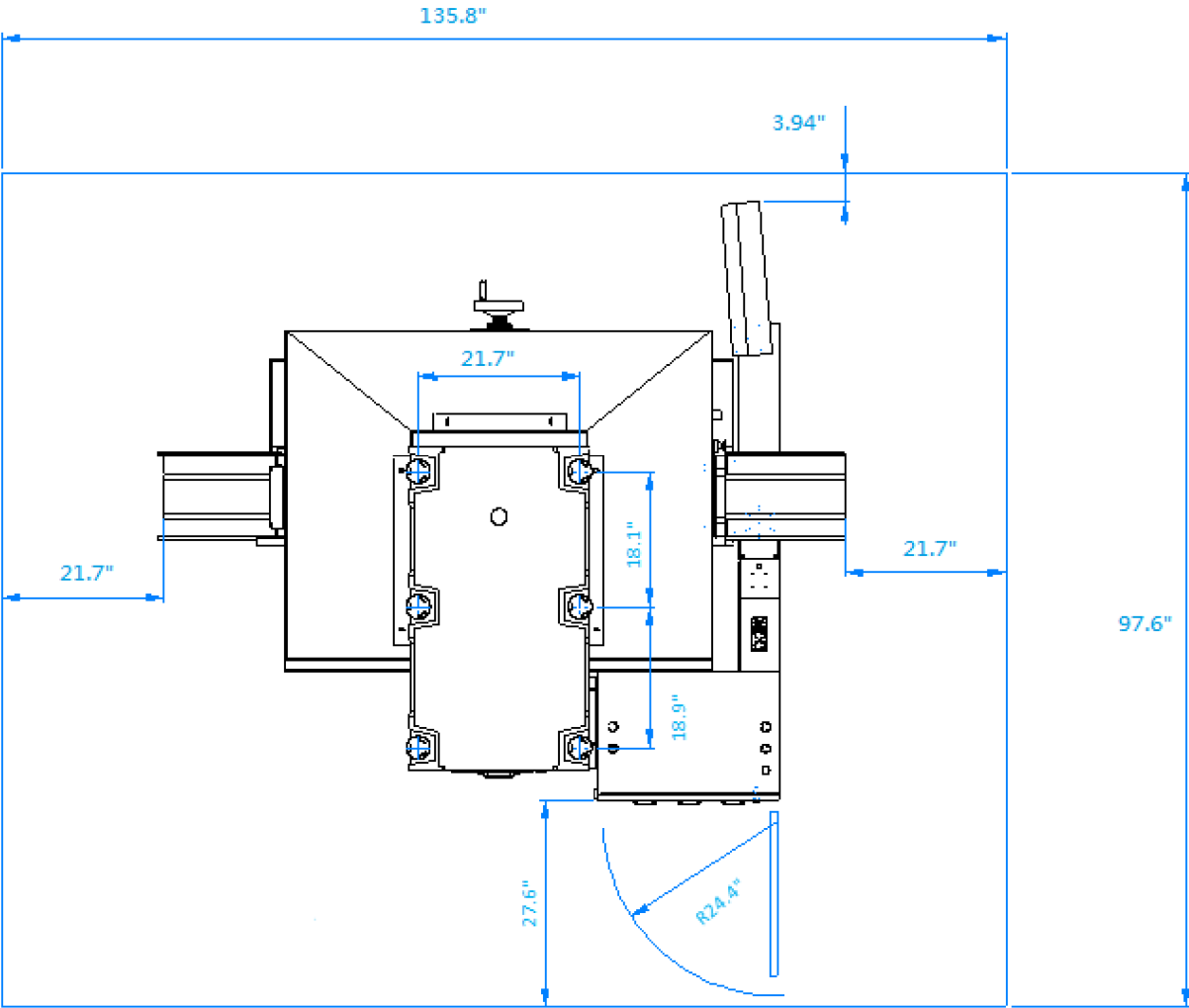
A1 Floorspace



A2 Floorspace



A3 Floorspace



3.4 Machine Leveling

1. Home machine on 3 axes, X, Y, Z. Move table to center.
2. Install the leveling bolts and screws and put the leveling pad under the machine. Make sure the leveling bolts are located in the indent of leveling pad.
3. Clean the table surface and put the levels on it. (Ref. Fig. 3.6)

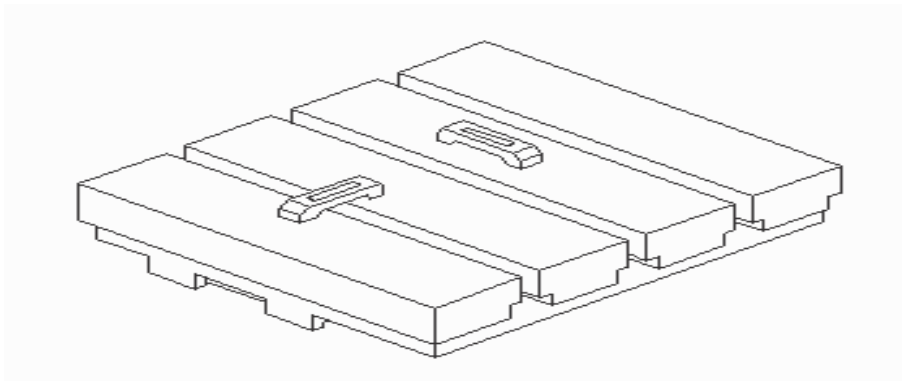


圖 fig 3.6 機器水平調整 Adjusting Level

4. Adjust 4 corner leveling screws ensure air bubbles of 2 levels stay in the middle.
5. Move the saddle to the front (Y axis), adjust front leveling screws and then move the saddle to the back, adjust the back screws. Repeat this step if necessary and ensure all the travel (front to back) difference is within +/- half degree ($\pm 0.05\text{mm}$)
6. Move the table (X-axis) to left, adjust left foundation screws. Move Table (X-axis) to right (See Fig. 4), adjust right foundation screws. . Repeat this step if necessary and ensure all the travel (Left & Right) difference is within +/- half degree ($\pm 0.05\text{mm}$)
7. Adjust the center leveling screws to touch the level pad.
8. Tighten all leveling bolts and screws.

3.5 Power Installation

1. Make sure machine is unwrapped properly and remove all support blocks.
2. Make sure all cables are connected correctly.
3. Check all motors (Spindle Motor and Servo Motor) are installed.
4. Make sure the voltage of power supply is correct.

CHAPTER 4

Maintenance

4.1 Maintenance Schedule

This machine has been equipped with switches, buttons and meters for adjustment. Please read the machine manual carefully to understand any device functions which are shown below:

| Periodically | ITEMS |
|--------------|--|
| DAILY | <ul style="list-style-type: none"> ▲ Keep the working area clear before and while operating. ▲ Please run all 3 axes full travel in low RPM for 10~20 minutes and check if there is any unusual noise sound and situation. ▲ Check lube pump and airregulator oil tank level. ▲ Check automatic drain water at air regulator unit (The tank should be empty.) ▲ Clean chips from way covers, Splash pan, and tool changer. ▲ Wipes spindle taper with clean cloth and apply light oil. ▲ Check the oil of spindle chiller is sufficient or not. ▲ Check the oil pump apply sufficient way oil and pump properly for all slide way. If machine sit for long time not operate, make sure the oil pump work properly. |

| | |
|------------|---|
| WEEKLY | <ul style="list-style-type: none"> ▲ Check and clean filters on heat exchanger ▲ Perform necessary cleaning of machine. Do not use solvents ▲ Apply a little grease on the Geneva cam and rails for |
| MONTHLY | <ul style="list-style-type: none"> ▲ Check way covers work properly and lubricate with light oil. Clean up the upper filter of the coolant tank if needed. ▲ Use grease for fingers and pocket of tools for ATC system. |
| SIX MONTHS | <ul style="list-style-type: none"> ▲ Replace coolant and clean up the coolant tank ▲ Check coolant is sufficient by the flowmeter on the tank. ▲ Apply Mobil Vactra #2 oil on full length of chain for counterweight. ▲ Check the chain on the counterweight condition, if there is wear out or cracks ▲ Inspect if there is any chips attached on 3 axis sliding way. |
| ANNUALLY | <ul style="list-style-type: none"> ▲ Make sure the ground bond test resistor value meet standard. ▲ Drain out oil from spindle chiller tank, and then refill new oil. (if applicable) |

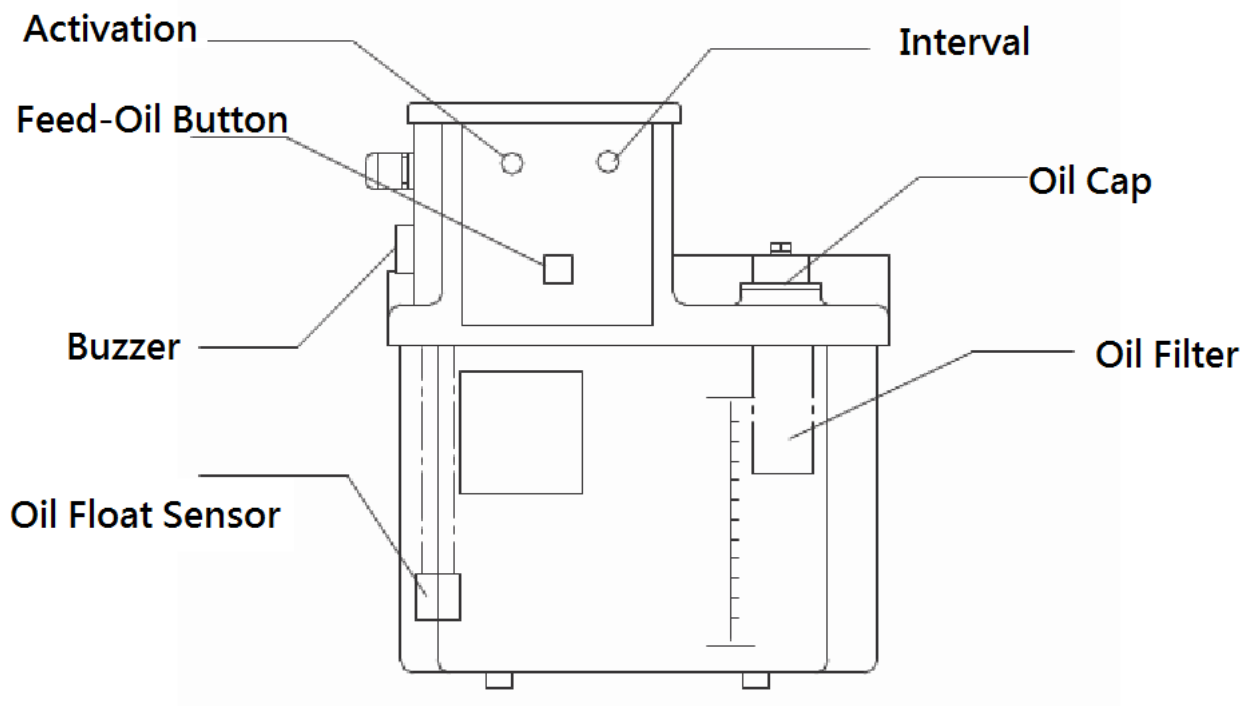
4.2 Lubrication system

The lube pump supplies oil for the table (X axis), saddle (Y axis), mill head (Z axis) and ballscrews. When the machine is powered on, the oil pump starts pumping oil.

- 1 When you hear the warning sound the oil is low, add oil immediately.

(Oil requirement: ISO-68cst, Mobile Vactra 2, Shell Tonna Oil 68, Exxon Febis 68)

- 2 Oil tank and filter should be cleaned once every six months.
- 3 When the machine uses oil less than normal, immediately shut down the machine. Check the oil outlet and tube. Manually pump the oil and see if the oil pumps properly. If oil pumps too slow, check if the filter is clogged then clean the filter if necessary.



CHAPTER 5

Troubleshooting Guide

5.1 Introduction:

This chapter is to help you to diagnose the problems and to use the information provided by this manual, so as to assist you to repair the mechanical issues and restore the machine to working condition. There are some useful information you may need to know.

Furthermore, the exact information will be helpful if you need to call your local dealer for service.

**** Precaution ****

Unless you are well-trained electrician engineer, otherwise, please do not do any inspection or troubleshooting action on this machine.

When the machine is power ON status, please be cautious to do any checks. Please wait at least 3 minutes after the main switch turn off, because there is some power left in the power supply, then you are able to do any modification and correction.

5.2 Machine Diagnosis

Some of error messages can be eliminated quickly by RESET button, however, some error messages need to be diagnosed. You can find out if the problems remain or been repair by operating the machine.

You can refer to machine parts list and schematic drawing of wiring to find out any related problems

If any "Error Message" appears on the screen during operation process. Please record the error message correctly. It will help engineer to solve the problems quickly.

In the process of troubleshooting, you may need to execute emergency stop for urgent situations. Press down the EMERGENCY STOP BUTTON (the red button) to turn off power. The screen will show emergency stop message.

To release the Emergency Stop Button, just turn and pull the button, the power will recover automatically.

5.3 Survey of the problems:

When problem has occurred, inform the service technician of the following information. Ask the operator to list details of the information like message code, problems and etc., such as:

- ※ What machining job when the problem happened?
- ※ What error message showed on the screen?
- ※ Besides present problem, is there any other situation happened ?
- ※ Before the breakdown occurs, is there any other unusual motion happened ?
- ※ Test NC operation mode.
- ※ In AUTO mode : List the program file name, number and content while the breakdown occurs.
- ※ Test MANUAL mode and list the operation procedure.
- ※ List all details of "Alarm Diagnosis" that showed on the display screen.

Procedures for enter to "Alarm Diagnosis"

(1) Press function key "DIAGN" in to "Alarm diagnosis"

(2) Press "Alarm" from the menu that is in the bottom of screen

Then, it will display all alarm messages.

Do not disassemble machines right away. You should start troubleshooting by checking and testing operation procedures.

Deal one problem at the time. Be sure to record alarm signal and content and startup the system again. Please pay attention whether the same breakdown occurs again or not.

Determine the correct cause while breakdown occurs, Check the information provided by operator, after the test and inspection if these are not the principal factor to cause the problem, it is necessary to research the exact cause again

otherwise the same error will occur repeatedly. Absolutely, every breakdown has its own cause. Even a small simple part is worn-out, that may cause some other parts broken and lead the system malfunction and stop.

5.4 Help & Support:

If you are a well-trained engineer, please be cautious while you do the machine inspection. Do not damage circuit and electronic components.

If you are not well-trained, please contact with your local dealers for service.

Before you contact with your local dealers, please have ready machine's Information.

MODEL NO.

MACHINE SERIAL NO.

CONTROL SERIAL NO.

You can see the above information on name plate or inspection report.

Also prepare schematic drawing and parameter info.

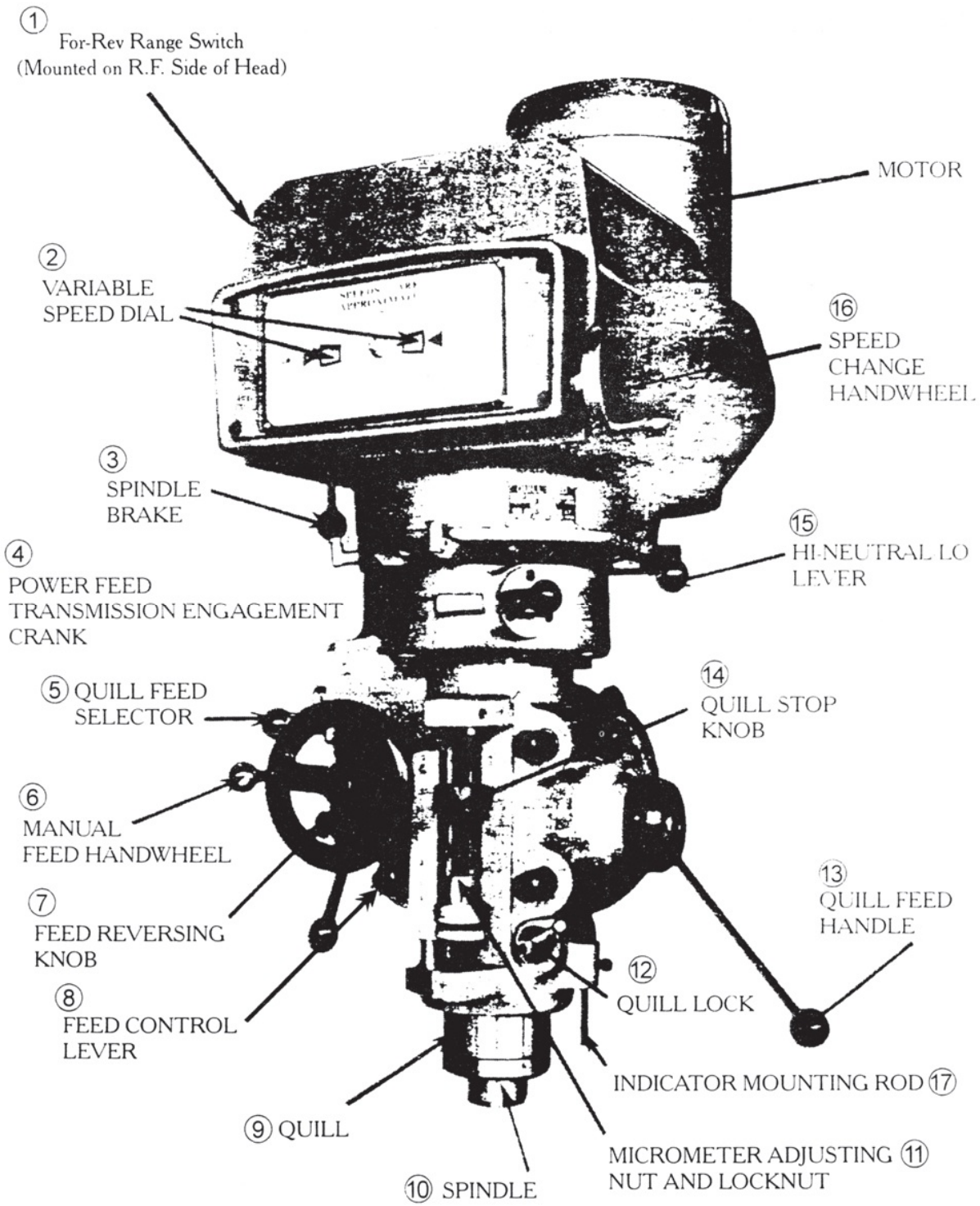
- Please record the error messages correctly that showed on your control screen. Some messages are quite similar, but possibly refer to different machine parts.
- Observe when did the problems occur. For example : whether this problem occurred in a specific program or when a specific tool was used? Whether the problem occurred after a specific operation or occurred in a specific period of a day? Such information is useful for us to discover why the problem occurred.
- Check the LED on circuit board and understand the meaning of LED signal. Some LED on circuit board can provide useful messages for trouble shooting. When the machine is down, please pay attention to LED signal in order to shorten the trouble shooting process.

5.5 Other Problems:

| Issues | Reason | Solution |
|--|--|---|
| Machine misalignment | The ground leveling bolt is not set properly | Adjust the leveling bolt again, please refer chapter 3.4 "Machine Leveling" |
| | Leveling blocks defected more than 2 pieces. | Replace leveling blocks and do not exceed pieces. |
| | The floor foundation is not reinforced. | Rebuild foundation. |
| Air regulator drain out water too often | There is too much water from air compressor. | Install an air dryer or filter unit. |
| Air pressure is not enough to cause machine shot down often. | Air pressure from compressed air is lower than 6 kg/cm^2 | Replace larger capacity of air compressor. |

| | | |
|---|---|--|
| | Filter unit or dryer unit (sometime is built in) is clog or poor drainage. | <ol style="list-style-type: none"> 1. Check the filter unit. 2. Repair or replace the dryer. |
| | Tube for air is too long that loss too much air. | <ol style="list-style-type: none"> 1. Enlarge the OD for air tube, or shorten the tube length. 2. Add an air-reserve tank. |
| The electronic components damage frequently | The area is too humid. | Always keep the door of electrical control box closed. |
| | There is too much dust on the electronic components that cause malfunction. | Always keep the door of electrical control box closed. |
| | When the main power is not stable. | Install a voltage stabilizer. |

Mill Head Operation Instructions (for 3T/5T milling head)



1 FORWARD-REVERSE SWITCH

This is the motor reversing switch. When the head is in direct drive (High Range), the motor and spindle are turning the same direction. When the head is in "Back Gear"(Low Range), the spindle runs backwards unless the motor direction is reversed.

In high speed (Direct Drive), the spindle is driven by tapered clutch teeth. If the clutch is not meshed tightly, clutch rattle will be heard. This can be corrected by moving the detent plate upward as the clutch wears. This is also the reason for possible loss of neutral, requiring the reversal of the detent plate.

3 SPINDLE BRAKE

Brake lever can be moved in either direction to stop spindle. When locking spindle, lever should be moved right or left and then raised. There are no adjustments on brake so it must be replaced when worn out.

4 POWER FEED ENGAGEMENT CRANK

Engages power feed worm gear. When lever is in right hand hole, power feed is engaged. To disengage, pull knob out and turn crank in clockwise or down direction and move to opposite position.

IMPORTANT: It is recommended that the Power Feed worm gear be disengaged whenever the power feed is not required. This will avoid unnecessary wear on power feed worm gear.

5 QUILL FEED SELECTOR

This crank used to select the feed rate to be used. It is shifted by pulling knob out and turning from one position to another, Feed rates are stamped on cover below each hole. Feed is more readily engaged with spindle running.

6 MANUAL FEED HANDWHEEL

Feed reversing knob should be in neutral position and feed control lever engaged. Clockwise rotation of handwheel moves quill down. Manual Feed Handwheel and quill feed handwheel may be disengaged by moving them outward approximately 1/8".

7 FEED REVERSE KNOB

Position of this knob depends upon direction of spindle rotation. If boring with right hand cutting tools, pull feed handle towards operator until clutch becomes engaged.

Neutral position is between forward and reverse position. It is recommended that the handle be left in neutral position when in use.

8 FEED CONTROL LEVER

Engages over-load clutch on pinion shaft when moved left will stay engaged until either quill stop comes in contact with micrometer adjusting nut forcing feed control lever to disengage automatically, or released manually by moving lever to right.

11 MICROMETER NUT

This nut is used for setting of depth. Each graduation on nut indicates 0.001" of depth, it reads directly to scale mounted along side of it. Depths may be obtained by setting micrometer nut in conjunction with quill stop.

12 QUILL LOCK

This is a friction lock to be used when quill is in stationary position such as for milling. It is recommended this lock be used whenever quill movement is not desired.

13 QUILL FEED HANDLE

May be removed by simply pulling handle off. It is recommended that handle be disengaged when using power feed.

14 QUILL STOP KNOB

It used to disengage power feed in either direction as well as acting as depth stop when working to a given depth.

15 HI-NEUTRAL-LO LEVER

The lever is used to put the head into either direct driver or backgear. Rotate the spindle by hand to facilitate meshing of clutch or gears.

Neutral can be obtained at mid-way position, and is provided to permit free spindle rotation for indicating and set-up.

After an extended period of use, the neutral position may cause noise by allowing the clutch teeth to rub each other. This can be corrected by loosening get screw, and reversing the position of the detent plate.

16 SPEED CHANCH HAND WHEEL

DO NOT attempt to change spindle RPM unless the motor is running. Dial speeds will only be approximate. Belt wear will cause a slight variation in speeds from what is indicated on the dial.

When tightening or loosening the drawbar, it is necessary to lock the spindle. To do this, use the spindle brake (3) which is located on the left side of the belt housing, turning it either right or left until it binds. Make sure the quill is raised all the way.

Drawbar has 7/16-20 right hand thresd and should be tightened with normal pressure using wrench furnished with machine. To loosen collet, back of drawbar and if collet does not open, given top of drawbar a slight tap. Spindle has non-sticking taper and collet should release readily.

This manual should be studied and understood by each operator before they install, use, or, maintain this machine tool. It is solely the responsibility of the purchaser to properly train and educate each machine operator. And the employer has total responsibility to provide point of operation safeguarding.

Please place this manual near the machine, and take care of it in any time. If you have any troubles or question about the machine, please welcome to connect to us or to our appropriate overseas agent.