



Milling and Drilling Machine OWNER'S MANUAL



WARNING:

Read carefully and understand all ASSEMBLY AND OPERATION INSTRUCTIONS before operating. Failure to follow the safety rules and other basic safety precautions may result in serious personal injury.

Item# 49564



Milling and Drilling Machine OWNER'S MANUAL

Thank you very much for choosing a Klutch product. For future reference, please complete the owner's record below:

Serial Number/Lot Date Code: _____ Purchase Date: _____

Save the receipt, warranty and these instructions. It is important that you read the entire manual to become familiar with this product before you begin using it.

This Milling and Drilling Machine is designed for certain applications only. Northern Tool and Equipment cannot be responsible for issues arising from modification or use of this product in an application for which it was not designed. We strongly recommend that this product not be modified and/or used for any application other than that for which it was designed.

For technical questions please call 1-800-222-5381.

Table of Contents

Table of Contents.....	1
Intended Use.....	1
Technical Specifications.....	2
Important Safety Information.....	2
Specific Operation Warnings.....	5
Grounding.....	5
Extension Cords.....	6
Unpacking Instructions.....	6
The Machine Assembly.....	8
The Transmission System.....	8
The Electrical System.....	8
Controls.....	9
Before Each Use.....	10
Operating Instructions.....	10
Lubricating the Machine.....	11
The Drilling and Milling Feed.....	12
Longitudinal and Transverse Feeds.....	12
The Tailstock.....	12
The Tool Post.....	13
Changing the Speed of the Drilling/Milling Spindle.....	13
Changing the Speed of the Turning Spindle.....	14
Installing/Removing a Drilling/Milling Tool.....	14
Installing/Removing the Spindle Chuck.....	16
Machine Adjustments.....	18
After Each Use.....	20
Maintenance.....	20
Parts Diagram.....	21
Parts List	28
Replacement Parts.....	33
Limited Warranty.....	33

Intended Use

This milling and drilling machine is a light-duty multipurpose machine designed for turning, drilling, and milling metal and other materials. It can be widely applied for single part and mass production in all kinds of small-sized enterprises and repair industries.

Technical Specifications**Turning**

Property	Specification
Max. Swing over Bed:	14"
Max. Turning Diameter (for medium carbon steel):	1-1/2"
Max. Distance between Centers:	11-13/16"
Max. longitudinal Stroke:	8-1/4"
Max. Transverse Stroke:	5-3/4"
Morse Taper of Spindle Hole:	No. 3
Bore Diameter of Spindle:	3/4"
Morse Taper of Tailstock Hole:	No. 2
Spindle Speed:	500, 900, 1600 RPM
Turning Motor:	370W

Drilling and Milling

Property	Specification
Max. Drilling Diameter:	5/8"
Morse Taper of Drilling and Milling Spindle Hole:	No. 2
Max. Diameter of End Mill:	1/2"
Max. Diameter of Facer:	2-1/2"
Max. Stroke of Milling Quill:	3"
Spindle Speeds:	5 steps 430 – 2000RPM (220V)
	4 steps 430 – 1500RPM (110V)
Drilling and Milling Motor:	370W

Other

Property	Specification
Area of Bench (L x W):	6" x 8"
Turn-Round of Drilling – Milling Box:	±90°
Overall Dimensions (L x W x H):	35" x 22-3/4" x 31-3/4"
Net Weight:	326 lbs.
Shipping Weight:	387 lbs.

Important Safety Information**WARNING:**

- Read and understand all instructions. Failure to follow all instructions may result in serious injury or property damage.
- The warnings, cautions, and instructions in this manual cannot cover all possible conditions or situations that could occur. Exercise common sense and caution when using this tool. Always be aware of the environment and ensure that the tool is used in a safe and responsible manner.
- Do not allow persons to operate or assemble the product until they have read this manual and have developed a thorough understanding of how it works.
- Do not modify this product in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the product. There are specific applications for which the product was designed.

- Use the right tool for the job. DO NOT attempt to force small equipment to do the work of larger industrial equipment. There are certain applications for which this equipment was designed. It will do the job better and more safely at the capacity for which it was intended. DO NOT use this equipment for a purpose for which it was not intended.
- Industrial or commercial applications must follow OSHA requirements.

**WARNING:**

- This product may contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.
- Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Some examples of these chemicals are:
 - lead from lead-based paints,
 - crystalline silica from bricks and cement and other masonry products, and
 - arsenic and chromium from chemically-treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well-ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

- Handling power cords on corded products may expose you to lead, a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. Wash your hands after handling.

**WARNING:****WORK AREA SAFETY**

- Inspect the work area before each use. Keep work area clean, dry, free of clutter, and well lit. Cluttered, wet, or dark work areas can result in injury. Using the milling and drilling machine in confined work areas may put you dangerously close to other cutting tools and rotating parts.
- Do not use the milling and drilling machine where there is a risk of causing a fire or an explosion; e.g., in the presence of flammable liquids, gases, or dust. The product can create sparks, which may ignite the flammable liquids, gases, or dust.
- Do not allow the milling and drilling machine to come into contact with an electrical source. The tool is not insulated and contact will cause electrical shock.
- Keep children and bystanders away from the work area while operating the tool. Do not allow children to handle the milling and drilling machine.
- Be aware of all power lines, electrical circuits, water pipes, and other mechanical hazards in your work area. Some of these hazards may be hidden from your view and may cause personal injury and/or property damage if contacted.

**WARNING:****PERSONAL SAFETY**

- Stay alert, watch what you are doing, and use common sense when operating the tool. Do not use the tool while you are tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating the tool may result in serious personal injury.
- Dress properly. Do not wear loose clothing, dangling objects, or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts. Air vents on the tool often cover moving parts and should be avoided.
- Wear the proper personal protective equipment when necessary. Use ANSI Z87.1 compliant safety goggles (not safety glasses) with side shields, or when needed, a face shield. Use a dust mask in dusty work conditions. Also use non-skid safety shoes, hardhat, gloves, dust collection systems, and hearing protection when appropriate. This applies to all persons in the work area.
- Do not overreach. Keep proper footing and balance at all times.

- Do not use the tool when tired or under the influence of drugs, alcohol or medication.
- Ensure the power switch is off prior to plugging in the tool.
- Remove keys or wrenches before connecting the tool to an air supply, power supply, or turning on the tool. A wrench or key that is left attached to a rotating part of the tool may cause personal injury.
- Secure the work with clamps or a vise instead of your hand when practical. This safety precaution allows for proper tool operation using both hands.

WARNING: **ELECTRICAL SAFETY**

- Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
- Double insulated tools are equipped with a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician to install a polarized outlet. Do not change the plug in any way. Double insulation eliminates the need for the three wire grounded power cord and grounded power supply system.
- Do not allow the product to come into contact with an electrical source. The tool is not insulated and contact will cause electrical shock.
- Avoid body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerators. There is an increased risk of electric shock if your body is grounded.
- Do not expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.
- Do not abuse the power cord. Never use the power cord to carry the tools or pull the plug from an outlet. Keep the power cord away from heat, oil, sharp edges, or moving parts. Replace damaged power cords immediately. Damaged power cords increase the risk of electric shock.
- When operating a power tool outside, use an outdoor extension cords marked "W-A" or "W". These extension cords are rated for outdoor use, and reduce the risk of electric shock.

CAUTION: **MILLING AND DRILLING MACHINE USE AND CARE**

- Do not force the product. Products do a better and safer job when used in the manner for which they are designed. Plan your work, and use the correct product for the job.
- Check for damaged parts before each use. Carefully check that the product will operate properly and perform its intended function. Replace damaged or worn parts immediately. Never operate the product with a damaged part.
- Do not use a product with a malfunctioning switch. Any power tool that cannot be controlled with the power switch is dangerous and must be repaired by an authorized service representative before using.
- Disconnect the power/air supply from the product and place the switch in the locked or off position before making any adjustments, changing accessories, or storing the tool. Such preventive safety measures reduce the risk of starting the tool accidentally.
- Store the product when it is not in use. Store it in a dry, secure place out of the reach of children. Inspect the tool for good working condition prior to storage and before re-use.
- Use only accessories that are recommended by the manufacturer for use with your product. Accessories that may be suitable for one product may create a risk of injury when used with another tool. Never use an accessory that has a lower operating speed or operating pressure than the tool itself.
- Keep guards in place and in working order. Never operate the product without the guards in place.
- Do not leave the tool running unattended.

Specific Operation Warnings

WARNING:

- To prevent serious injury or property damage read owner's manual before operating.
- DO NOT wear loose clothing, jewelry, gloves, or unrestrained hair that may get caught in moving parts of the machine.
- Wear the proper safety gear including ANSI Z87.1 compliant eye protection.
- Moving Parts Hazard. Keep hands clear of spindle chuck and rotating bit or work piece.
- Remove keys and adjusting wrenches before starting the machine.
- Feed cutter into work piece against direction of rotation.
- Always secure work piece before machining operation.
- DO NOT operate without guards in place.
- Electric shock hazard. Be sure equipment is properly grounded.
- Turn power OFF before servicing.
- Not for use by or around children.

Grounding

WARNING:

- This machine must be grounded while in use to protect the operator from electrical shock. This drill press is equipped with an electric cord that has an equipment-grounding conductor and a grounding plug. The plug **MUST** be plugged into a matching receptacle that is properly installed and grounded in accordance with ALL local codes and ordinances.
- DO NOT MODIFY THE PLUG PROVIDED. If it will not fit the receptacle, have the proper receptacle installed by a qualified electrician.
- CHECK with a qualified electrician or service person if you do not completely understand the grounding instructions, or if you are not sure the tool is properly grounded.

Grounded Tools: Tools with 3-Prong Plugs

Tools marked with Grounding Required have a 3-wire cord and 3-prong grounding plug. The plug must be connected to a properly grounded outlet. If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user, reducing the risk of electric shock. (See Figure A.)

The grounding prong in the plug is connected through the green wire inside the cord to the grounding system in the tool. The green wire in the cord must be the only wire connected to the tool's grounding system and must never be attached to an electrically live terminal. Your tool must be plugged into an appropriate outlet, properly installed and grounded in accordance with all codes and ordinances. The plug and outlet should look like those in the following illustration.

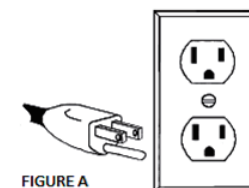


FIGURE A

Double Insulated Tools: Tools with Two-Prong Plugs

Tools marked Double Insulated do not require grounding. They have a special double insulation system which satisfies OSHA requirements and complies with the applicable standards of Underwriters Laboratories, Inc., the Canadian Standard Association, and the National Electrical Code. (See Figure B.)

Double insulated tools may be used in either of the 120 volt outlets shown in the following illustration.

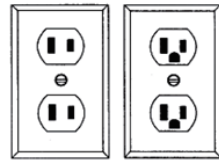


FIGURE B

Extension Cords

⚠ WARNING:

- **USE A PROPER EXTENSION CORD.** Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage, resulting in loss of power and cause overheating.
- Be sure your extension cord is properly wired and in good condition. Always replace a damaged extension cord or have it repaired by a qualified person before using it. Protect your extension cords from sharp objects, excessive heat and damp or wet areas.
- Grounded tools require a 3-wire extension cord. Double Insulated tools can use either a 2- or 3-wire extension cord.
- As the distance from the supply outlet increases, you must use a heavier gauge extension cord. Using extension cords with inadequately sized wire causes a serious drop in voltage, resulting in loss of power and possible tool damage.
- The smaller the gauge number of the wire, the greater the capacity of the cord. For example, a 14-gauge cord can carry a higher current than a 16-gauge cord. Minimum extension cord wire size is shown in the following table:

Minimum Wire Size Of Extension Cords				
Nameplate AMPS	Cord Length			
	25'	50'	100'	150'
0-6	18 AWG	16 AWG	16 AWG	14 AWG
6-10	18 AWG	16 AWG	14 AWG	12 AWG
10-12	16 AWG	16 AWG	14 AWG	12 AWG
12-16	14 AWG	12 AWG	NOT RECOMMENDED	

- When using more than one extension cord to make up the total length, make sure each cord contains at least the minimum wire size required.
- If you are using one extension cord for more than one tool, add the nameplate amperes and use the sum to determine the required minimum cord size.
- If you are using an extension cord outdoors, make sure it is marked with the suffix W-A (W in Canada) to indicate it is acceptable for outdoor use.
- Make sure your extension cord is properly wired and in good electrical condition. Always replace a damaged extension cord or have it repaired by a qualified electrician before using it.
- Protect your extension cords from sharp objects, excessive heat, and damp or wet areas.

Unpacking Instructions

This machine has been inspected and tested before delivery. Once it is properly installed it can be operated immediately. The machine is covered with water-proof and oil-resisting cloth, fixed tightly on a pallet and packed in wooden crate. In the crate, there is also a box of accessories. The steel fastening straps around the crate are under tension. Cut off the straps with shears. When removing the straps, the workers should wear eye-protecting glasses and gloves. Please take care since the sheared edges are very sharp. After taking off the straps, remove the nails and unpack the wooden crate.

Open the box of accessories and check the accessories according to the photo shown below (Fig.1). Check them with the Packing List.

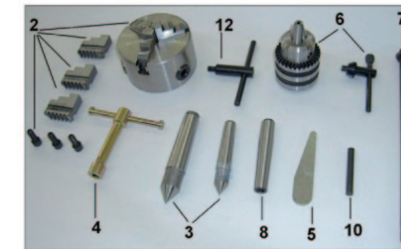


Fig. 1: Accessories

No.	Description	Specification	Qty.
1	Milling/Drilling Machine	L-H007	1
2	Spindle chuck, jaws (3), set screws (3)	Ø100	1
3	Dead Centers	Morse No. 2 & 3	1 each
4	Pressing Cutter Wrench		1
5	Wedge		1
6	Drilling Chuck & Key	JS16	1
7	Draw Bar		1
8	Drill Taper Shank	MT #2	1
9	Flange (on machine)		1
10	Locking Lever		1
11	Owner's Manual (this manual)		1
12	Chuck Key		1

When installing the machine, the user should provide a solid pedestal to support the machine. The pedestal should be level and well adjusted. The installation location should allow enough area for operating. On the left of the machine, there should be enough area for turning rod material.

On the surface of the machine, there is a protective layer of oil which can be cleaned with noncorrosive kerosene or petroleum solvent. After installation and cleaning, the machine should be lubricated (see Operating Instruction/Lubrication).

For shipping reasons, the feeding handle of the Transverse Wheel (9) was installed inwards. Before operation, it should be reinstalled outwards as shown in Fig. 2.



Fig. 2

The Machine Assembly The Transmission System

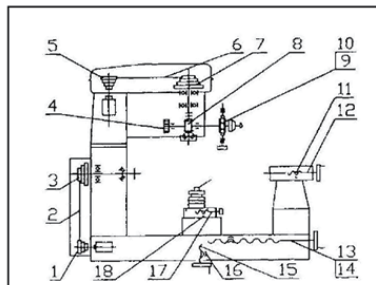


Fig. 3: Diagram of Transmission System

REF	Description	Part No.	Description
1	Motor Pulley	10	Worm
2	V-Belt A—1000	11	Nut
3	Pulley	12	Tailstock Thread
4	Coiled Spring	13	Longitudinal Thread
5	Motor Pulley	14	Longitudinal Nut
6	V-Belt A-710	15	Transverse Thread
7	Big Pulley	16	Transverse Nut
8	Gear	17	Toolpost Thread
9	Worm Gear	18	Nut

Transmission of the Spindle: The spindle motor drives the belt pulley (1), and through the Belt (2), drives the belt pulley (3) to realize the spindle transmission.

Transmission of Drilling and Milling: The drilling and milling motor drives the motor pulley (5), and through the belt (6), drives the belt pulley (7) to realize the spindle transmission.

Longitudinal and Transverse Transmission: The longitudinal feed transmission is carried out by longitudinal thread (13) and nut (14); the transverse feed transmission is carried out by transverse thread (15) and nut (16).

Transmission of the Tool Post: The tool post feed transmission is performed by tool post thread (17) and nut (18).

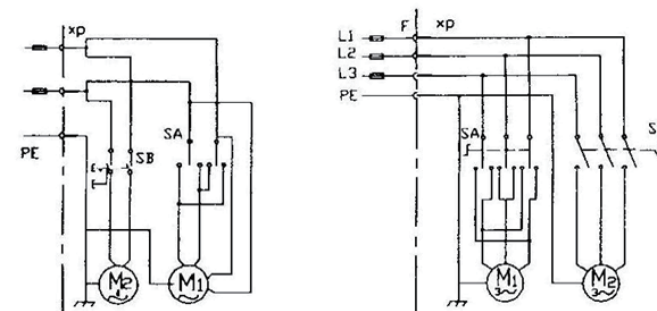
Transmission of the Tailstock: The tailstock feed transmission is achieved by tailstock thread (12) and nut (11).

The Electrical System

This machine is powered by two separate AC motors. The motion of turning motor is controlled by a combination switch SA, and the motion of drilling and milling motor by a button switch SB (Fig. 4).

For safety purposes, the machine should be grounded.

A 10A fuse should be fixed in front of the supply socket to maintain short circuit protection.



Single phase

3 phases

Fig. 4: Diagram of the Electrical System

Controls

Note: The controls shown below in Fig. 5 and listed in the table are referred to by these numbers in the Before Each Use and Operating Instructions sections.

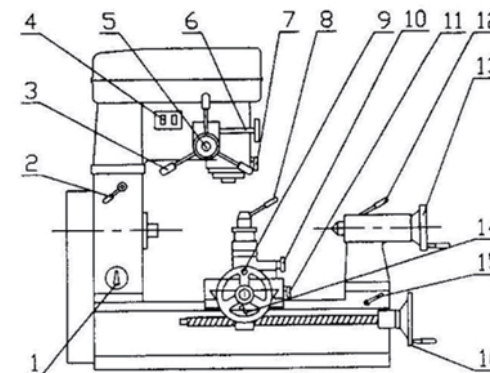


Fig. 5: Machine Controls

REF	Description	Part No.	Description
1	Combination Switch	9	Transverse Wheel
2	Handle for Locking Box	10	Tool Post Handle Wheel
3	Drilling/Milling Feed Handle	11	Transverse Lock Handle
4	Button Switch	12	Tailstock Quill Lock Handle
5	Clutch Handle	13	Tailstock Hand Wheel
6	Fine-Feed Handle	14	Longitudinal Lock Handle
7	Handle for Locking Quill	15	Handle for Locking Tailstock
8	Handle for Locking Tool Post	16	Longitudinal Handle Wheel

Controls Operation

The combination switch (1) controls the spindle for forward rotation, reverse rotation and stop. Turn the handle in the right direction for forward rotation of the spindle; keep it in middle position for stop; turn it in the left direction for reverse rotation. **WARNING:** Only when the spindle stops completely can the rotational direction be reversed. The button switch (4) is to control the motion of the drilling/milling motor. The green button (right side) is for starting and the red button (left side) for stopping. The operation of the mechanical controls (feed handles etc.) is described in the Operating Instructions section.

Before Each Use

⚠ WARNING:

- Check for damaged parts before each use. Carefully check that all the controls operate properly and the machine will perform its intended function. Replace damaged or worn parts immediately. Never operate the machine with any damaged part.
- Do not use the machine with a malfunctioning switch. Any power tool that cannot be controlled with the power switch is dangerous and must be repaired by an authorized service technician before use.

Note: The control numbers given below in parentheses refer to Fig. 5 in the Controls section above.

Before each use, loosen all the locking handles:

- Turn the Handle for Locking Box (2) counter-clockwise to turn the drilling/milling head
- Loosen the Handle for Locking Quill (7) to lift or lower the quill
- Loosen the Longitudinal Lock Handle (14) to perform the longitudinal motion of the lower slide
- Loosen the Transverse Lock Handle (11) to adjust the transverse motion of the bench
- Loosen the Handle for Locking Tailstock (15) to move the tailstock
- Loosen the Tailstock Quill Lock Handle (12) and turn the Tailstock Hand Wheel (13) to adjust the quill forward and backward

While operating, be sure the relevant locking handles are locked.

While moving the lower slide, bench and tailstock, adjust relevant fix screws and locking handles to their proper positions so that the sliding parts can be moved steadily and reliably, and the hand wheels turn easily.

Operating Instructions

⚠ WARNING:

Principles

- Before operating the machine, make sure you are familiar with the transmission system (see page 10) and all the functions of the controls of the machine (see page 12).
- Do not force the machine. Tools do a better and safer job when used in the manner for which they are designed. Plan your work, and use the correct tool for the job.
- Keep children and bystanders away from the work area while operating the machine. Do not allow children to operate the machine.
- Never move or damage the warning plates on the machine.
- Use only recommended accessories with this machine. Accessories that may be suitable for one machine may create a risk of injury when used with a different machine. Never use an accessory that has a lower maximum operating speed than this machine.

Operational

- Remove adjusting keys or wrenches before turning on the machine. A wrench or key that is left attached to a rotating part of the machine may cause personal injury.
- Never put wrenches, cutters, files or other tools on the guide rails, where notches or burrs can affect its accuracy.

- Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally.
- Changing speed, direction, or any parts should be performed only after the machine is completely stopped. Never touch the running spindle, workpiece, or other moving parts with your hands or other methods. Be extremely careful when removing or reinstalling any pivotal parts.
- Do not leave the machine running unattended.
- The workpiece must be tightly clamped to prevent personal injury or damage to the machine.

Periodic

- To ensure the service life of the guiding rails, pay attention to the cleanliness and lubrication of the rail surface. Especially when processing cast workpieces, it is necessary to regularly clean the scrapers on the rails.
- Periodically check the tension of belt, making proper adjustment to reduce any vibration.

Lubricating the Machine

As shown in an example in Fig. 6, all oil points should be oiled manually with #30 engine oil according to the requirements in Fig. 7. Lubricate the machine once at the beginning of each shift and again half-way through the shift according to the Diagram of Lubrication.

- The surfaces of rails and quill, and leading thread, tool post, and tailstock should be oiled according to their operation conditions.
- All bearings should be cleaned and greased once per year.

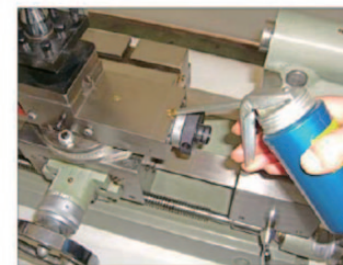


Fig. 6

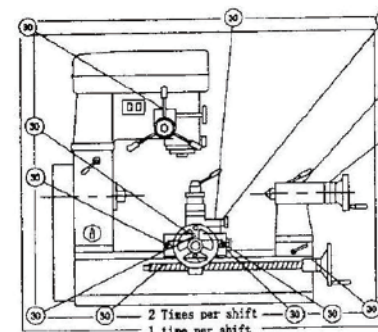


Fig. 7: Lubrication Diagram

Note: The control numbers given below in parentheses refer to Fig. 5 in the Controls section above.

The Drilling and Milling Feed

The drilling and milling feeds are performed manually.

- For the vertical directions of drilling and milling, there is a fine-feed mechanism. Pull out the Clutch Handle (5) (Fig. 8) and turn the Drilling/Milling Feed Handle (3) to achieve quick feed.
- Push in the Clutch Handle (5) (Fig. 9) and use the Fine-Feed Handle (6) for fine-feed applications (Fig. 10)



Fig. 8



Fig. 9



Fig. 10

Longitudinal and Transverse Feeds

- Turn the Longitudinal Handle Wheel (16) to perform left-right feed motions of lower slide.
- Turn the Transverse Wheel (9) to perform frontward-backward feed motions of the bench.

Note: The control numbers given below in parentheses refer to Fig. 5 in the Controls section above.

The Tailstock

As shown in Fig. 11, the tailstock (on the right) can provide support to a workpiece from the right side. It can move along the bed and stop at any position providing support to the center, drill, reamer, tapping head or other tools.

- After loosening the Handle for Locking Tailstock (15), the tailstock can be moved to the left or right. After positioning the tailstock, it should be relocked with the handle.
- After loosening the Tailstock Quill Lock Handle (12), the forward and backward functions of the quill can be performed by turning the Tailstock Hand Wheel (13). After positioning the Tailstock Quill, it should be relocked with the handle.

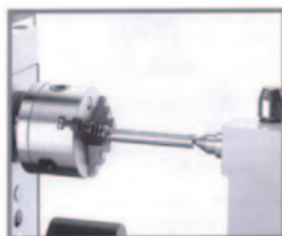


Fig. 11

ATTENTION: When the speed of spindle is too high, a live center should be used.

The Tool Post

The compound tool post mounted on the bench (Fig. 12) can be rotated to an angle with the turning axis for machining a bevel face or cone surface. The graduations on the front of the base of the tool post are from left 60° to right 60°.

- By turning the Tool Post Handle Wheel (10), fine feed can be achieved.
- By rotating the Handle for Locking Tool Post (8) counter-clockwise, the upper section of the compound tool post can be moved to the right and the lower section can be used as a bench clamp (as in Fig. 13).
- When clamping the workpiece with the bench clamp, the locking lever in the accessories (#10 in Fig. 1) can be used for clamping or releasing the workpiece by inserting the rod into the round hole of Tool Post Handle Wheel (10).



Fig. 12



Fig. 13

Changing the Speed of the Drilling/Milling Spindle

⚠ WARNING:

Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally.

The speed of Drilling/Milling Spindle is changed by adjusting the belt pulley.

- When using 220V power, the speed is 5 steps of 430 – 2000 RPM
- When using 110V power, the speed is 4 steps of 430 – 1500 RPM.

Refer to the speed plate on the drilling/milling box cover. (as shown in Fig. 14)



Fig. 14

Loosening the middle pushing bolt and the fixing bolt of the motor (as shown in Fig. 15) allows shifting the position of the belt to change the speed.

After shifting the belt position, retighten the pushing bolt and the motor fixing bolt in turn.



Fig. 15

Changing the Speed of the Turning Spindle



WARNING:

Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally.

The speed of turning spindle can be changed through the belt pulley on the left end of the machine.

The speed is 3 steps of 500, 900 and 1600 RPM. Please refer to the speed plate on bedstock cover on the left end of the machine (shown in Fig.16).



Fig. 16

Open the cover of turning spindle (Fig. 17). Loosen the motor fixing nut (Fig.18) to loosen the belt, allowing a change of its position on the pulley, then retighten the nut.



Fig. 17



Fig. 18

Installing/Removing a Drilling/Milling Tool

Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally.

The taper hole of the drilling/milling spindle is Morse No.2 so, a drill, drill chuck, milling cutter, and cutter chuck with Morse No.2 shank can be used, but tools with R8 shank cannot be used. This machine is supplied with a Morse Taper No.2 shank (#8 in Fig. 1, Accessories) and a drill chuck with key (#6), which can be directly installed on the taper hole of the drilling/milling spindle.

Note: Before installing a chuck, center, connecting rod, or draw bar onto the spindles, or to the mandrel of the tailstock, first wipe them with clean oilcloth. At the same time, clean the inside surfaces of spindles with a long rod wrapped with oilcloth. Cutting chips and dust on the center or on the top end of the spindle can scrape their surfaces and affect the linearity of their mating parts.

Installing/Removing Procedures

1. Insert the taper shank into the drill chuck as shown in Fig.19 and tighten with the chuck key.



Fig.19

2. Put the taper shank of chuck into the taper hole of spindle as in Fig. 20.



Fig. 20

3. Pass the draw bar in the accessories (#7 in Fig. 1, Accessories) through the drilling/milling spindle from the top (Fig. 20), and tighten it into the taper shank. Then, fasten the nut of the draw bar with a wrench, as shown in Fig. 21.



Fig. 21

4. When removing a tool from the drilling/milling spindle, lightly tap the draw bar downward with a hammer (Fig. 22) to remove the chuck, or milling cutter. **CAUTION:** Wear gloves and be ready to safely catch the chuck or milling cutter so it isn't damaged.



Fig. 22

5. If using a taper shank with a flat end (Fig. 23), the shank can be directly inserted into the taper hole of the spindle taking care that its flat end is aligned with the long slot in the spindle.

When removing, move the quick-moving handle to lower the sliding sleeve until the long slot comes out, then lock the sliding sleeve as shown in Fig. 24.

Put the tool-withdrawing wedge, included in the accessories (#5 in Fig. 1, Accessories), into the long slot of the sliding sleeve, and lightly knock it with a hammer as shown in Fig. 25.

Take care to catch the taper shank so it does fall and get damaged.



Fig. 23



Fig. 24



Fig. 25

Installing/Removing the Spindle Chuck

Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally.

The spindle chuck is supplied with two sets of positive and negative clamping jaws on which 1, 2, and 3 are indicated (Fig. 26 below and #2 in Fig. 1, Accessories).

Each of the positive and negative clamping jaws of the spindle chuck has four ways to clamp a workpiece, as shown in Fig. 27.

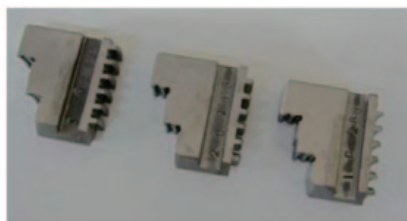


Fig. 26

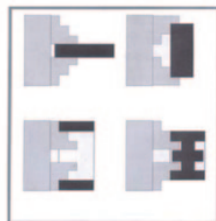


Fig. 27

Note: Before installing a chuck, center, connecting rod, or draw bar onto the spindles, or to the mandrel of the tailstock, first wipe them with clean oilcloth. At the same time, clean the inside surfaces of spindles with a long rod wrapped with oilcloth. Cutting chips and dust on the center or on the top end of the spindle can scrape their surfaces and affect the linearity of their mating parts.

Installing/Removing Procedures

1. With a screwdriver, remove the screw on the flange (#9 in Fig. 1, Accessories), and then, unscrew the flange as shown in Fig. 28. With an inner-hexagon L-key, fasten the flange on to the spindle chuck (#2 in Accessories Fig. 1) tightly, as shown in Fig. 29, using the three set screws provided (also #2 in Fig. 1).



Fig. 28



Fig. 29

2. Install the spindle chuck along with the flange on to the spindle (as shown in Fig. 30), then refasten the pushing screw with a screwdriver.



Fig. 30

3. Install the clamping jaws of the spindle chuck (Fig. 26 above and #2 in Fig. 1, Accessories):
 - a. Loosen the set screws of the clamping slots with the chuck key (Fig. 31 below and #12 in Accessories Fig. 1) until the lead thread appears.
 - b. Put jaw No. 1 into jaw guide rails (Fig.32).
 - c. Turn the chuck key clockwise until the lead thread comes into view again (while watching the counter-clockwise direction of the chuck).
 - d. Install jaws No.2 and No. 3 into the jaw guide rails in the same way.



Fig. 31



Fig. 32

4. Remove the clamping jaws by reversing the process in step 3 above.
5. When removing the spindle chuck by reversing steps 2 then 1, place a wooden cradle on the rail below the chuck as a support (Fig. 34). DO NOT to catch the chuck with your hands (Fig. 33), which can result in injury.



Fig. 33

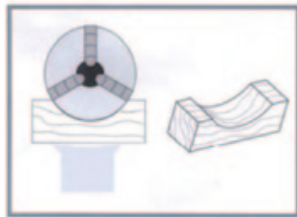


Fig. 34

Machine Adjustments

Adjusting the Turning and Drilling/Milling Spindle Clearances

After operating the machine for a long period of time, clearances will drift on the turning and milling/drilling spindles.

- Turning spindle: Adjustment is made by readjusting the round nut with locking slot on the end of the spindle.



- Drilling/milling spindle: The big belt pulley and the spline sleeve assembly should be removed first, then the round nut with locking slot on the top end of the spindle should be readjusted, then the removed assemblies reinstalled.



Adjusting the Lower Slide Beveled Gib

After lengthy operation, the beveled gib will be worn. Therefore, the tightening screw of the beveled gib should be adjusted, as shown in Fig. 35, with a screwdriver until the lower slide can move evenly and freely.



Fig. 35

Adjusting the Bench Beveled Gib

As shown in Fig. 36, make the adjustment until the bench can move evenly and freely.



Fig. 36

Adjusting the Tailstock Beveled Gib

As shown in Fig. 37, use a flat-head screwdriver to make the adjustment until the tailstock can move on the bed evenly and freely.



Fig. 37

Adjusting the Tool Post Beveled Gib

As shown in Fig. 38, with an inner-hexagon L-key, adjust the tightening screw of tool post until the post can be fed evenly and freely.



Fig. 38

After Each Use

Remove all metal shavings from the machine and thoroughly clean all surfaces. The machine should be cleaned with a clean oilcloth. For parts that rust easily, especially the finely ground parts, keep a layer of oil or grease film on them for protection.

Make sure that the compound switch and the pushbutton switch are both in the off position. Such preventive measures reduce the risk of starting the machine accidentally when used next.

Store the machine when it won't be used for a long time. Store it in a dry, secure place out of the reach of children. Inspect the machine for good working condition prior to storage and before re-use.

Components should be dry, and all machined surfaces should be lightly oiled. Always remove cutting tools and chucks before storage. Store them separately but with the machine.

Maintenance



WARNING:

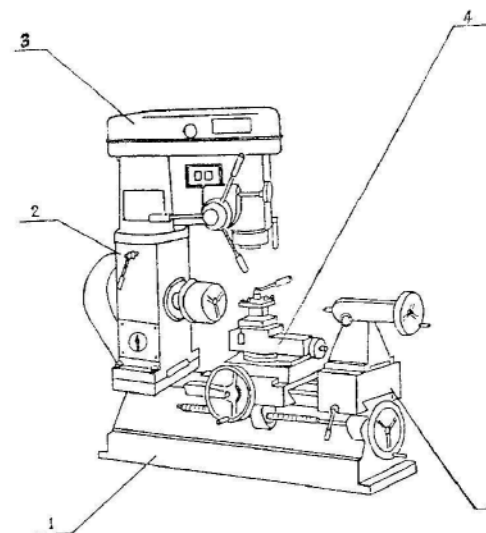
Put the power switches in the off positions before making any adjustments or changing accessories. Such preventive safety measures reduce the risk of starting the machine accidentally. Maintain the milling and drilling machine by adopting a program of conscientious repair and maintenance in accordance with the following recommended procedures. It is recommended that the general condition of any tool be examined before it is used. Keep your tool in good repair. Keep all cutting tools sharp and clean. Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control. Keep handles dry, clean, and free from oil and grease. The following chart is based on a normal operation schedule.

Maintenance Interval	Maintenance Point
Daily Maintenance	<ol style="list-style-type: none"> 1. Check the tightness of the mounting bolts holding the head in place. 2. If overheating is observed, or unusual noises are produced, stop the machine immediately to check for lack of lubrication, faulty adjustments, dull tool bits, or other deficiencies. Correct any problems before resuming work. 3. Keep the work area clean. If chips or shavings accumulate on the table or fixtures, shut off the power and clean the chips away with a stiff bristle brush. Re-check the lubrication before continuing.
Weekly Maintenance:	<ol style="list-style-type: none"> 1. Clean and coat the lead screws with oil. 2. Check the lubrication of the sliding parts of the table. Apply light grease if needed.
Monthly Maintenance	<ol style="list-style-type: none"> 1. Adjust the accuracy of the slides on both the cross and longitudinal feeds. 2. Lubricate the bearings, worm gear and worm shaft with light grease.
Yearly Maintenance	<ol style="list-style-type: none"> 1. Adjust the table to assure that it is level in all directions. 2. Check the electrical cord, plug, circuit breakers and related connections to assure that they are secure and safe.

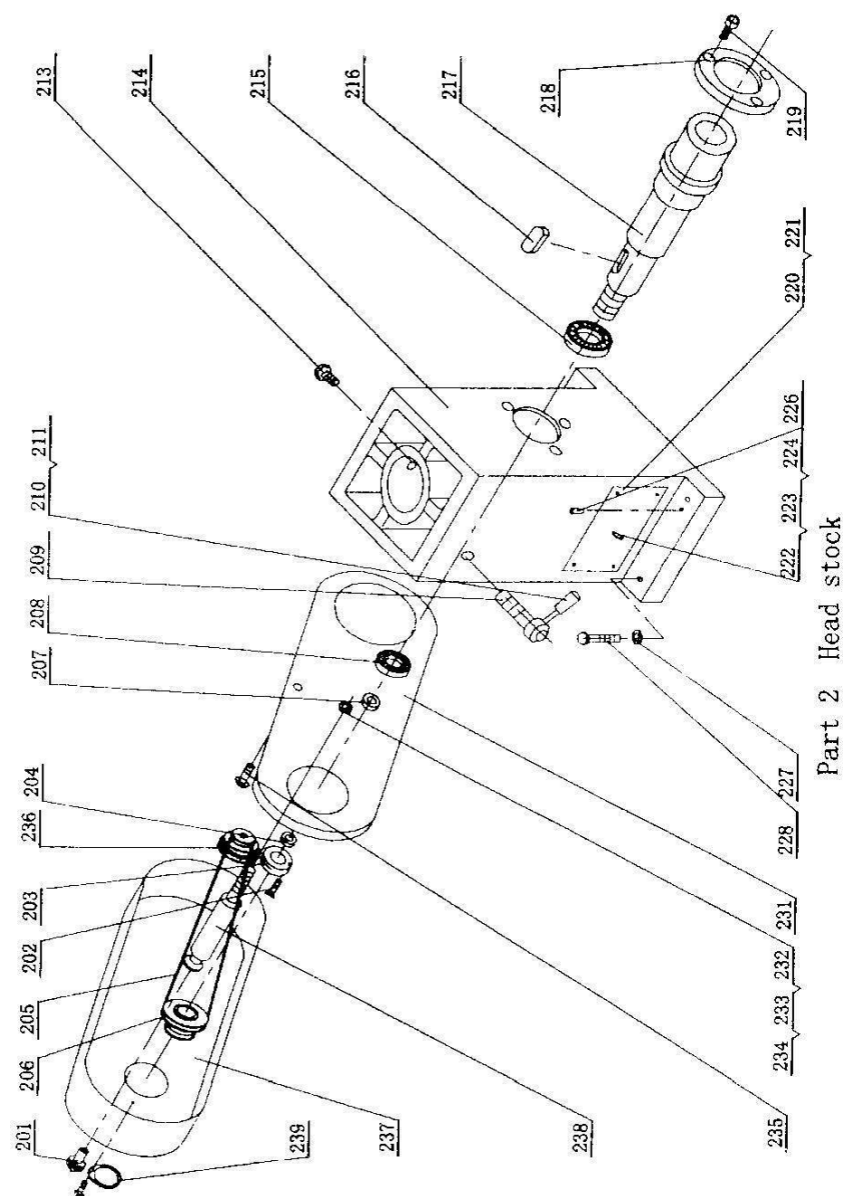
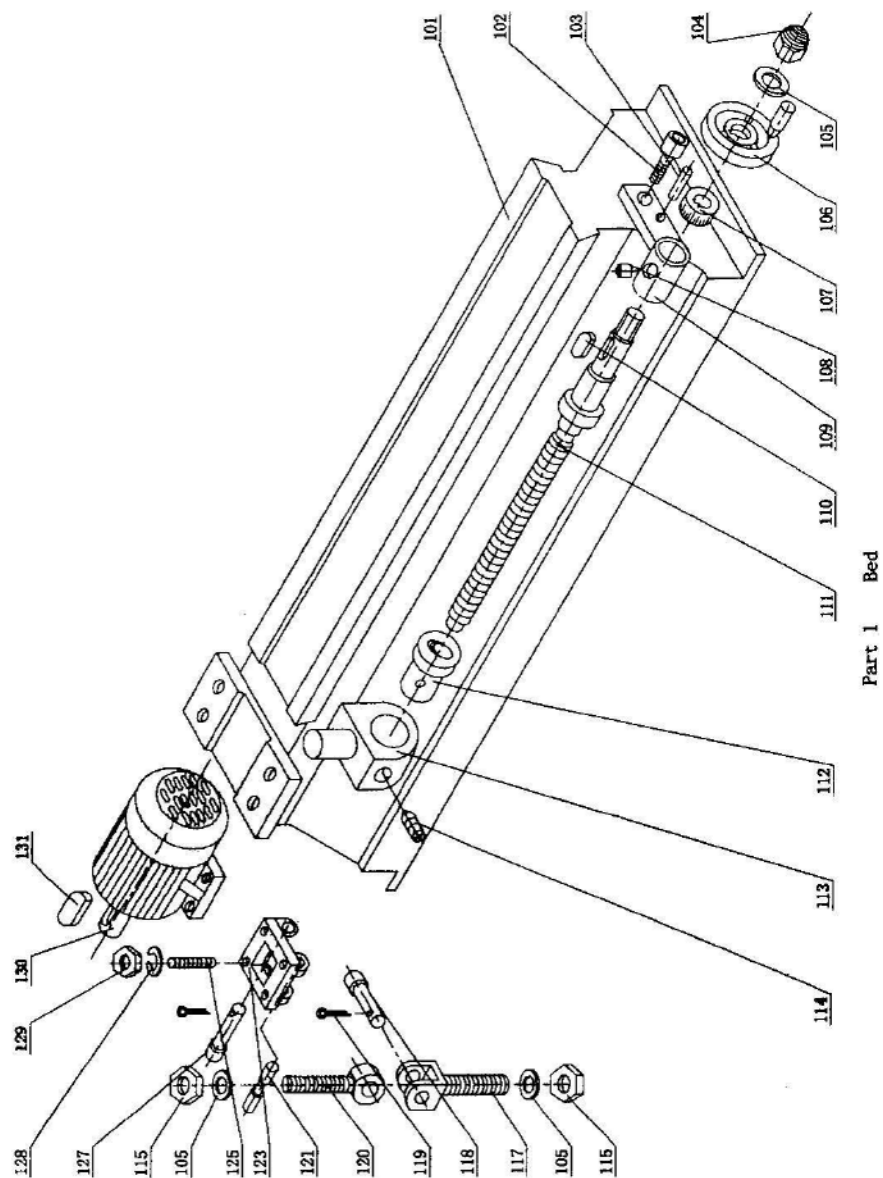
Note: This machine is a highly finished precision tool. The bearing surfaces of the bench and below the lower slide are hand-lapped. If there are any rusty spots or knock-out on the rails, or any cutting chips deposited between the closely jointing sections, the precision accuracy of the machine can be affected.

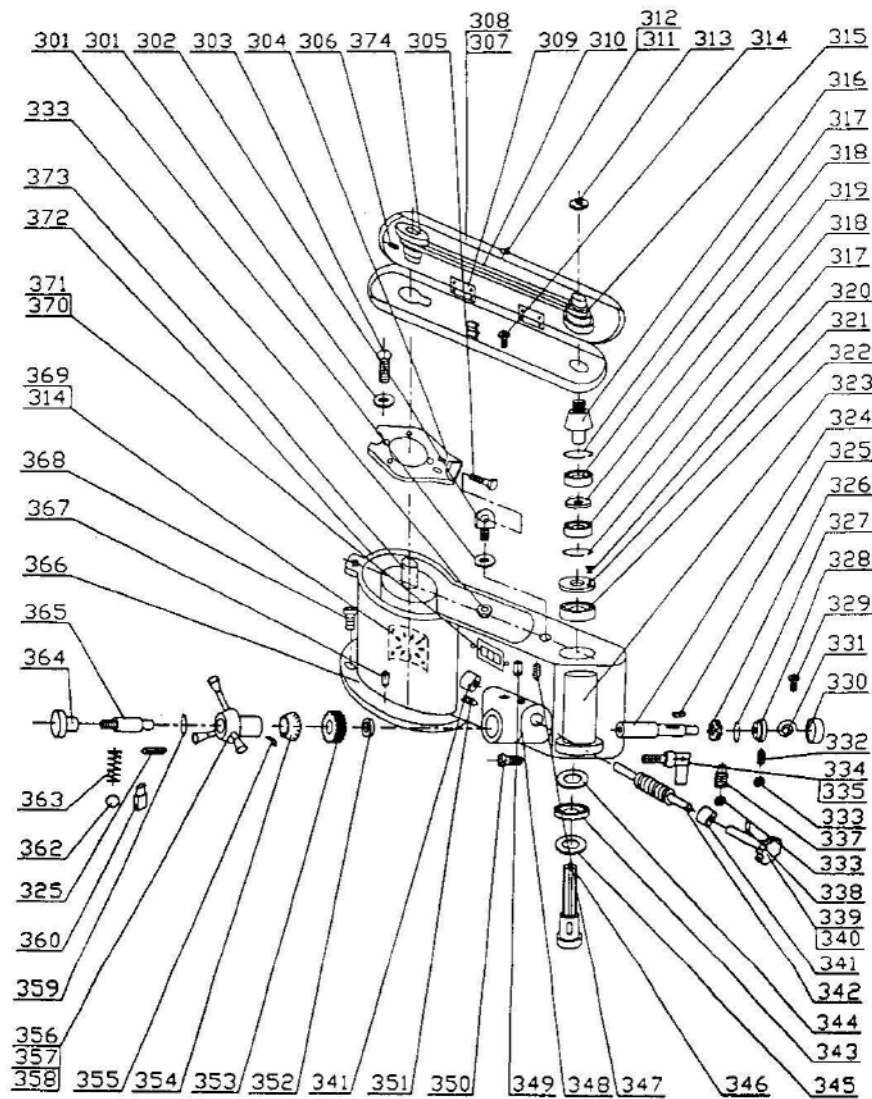
Parts Diagram

The parts diagrams and lists that follow are divided into the different machine areas as shown below.

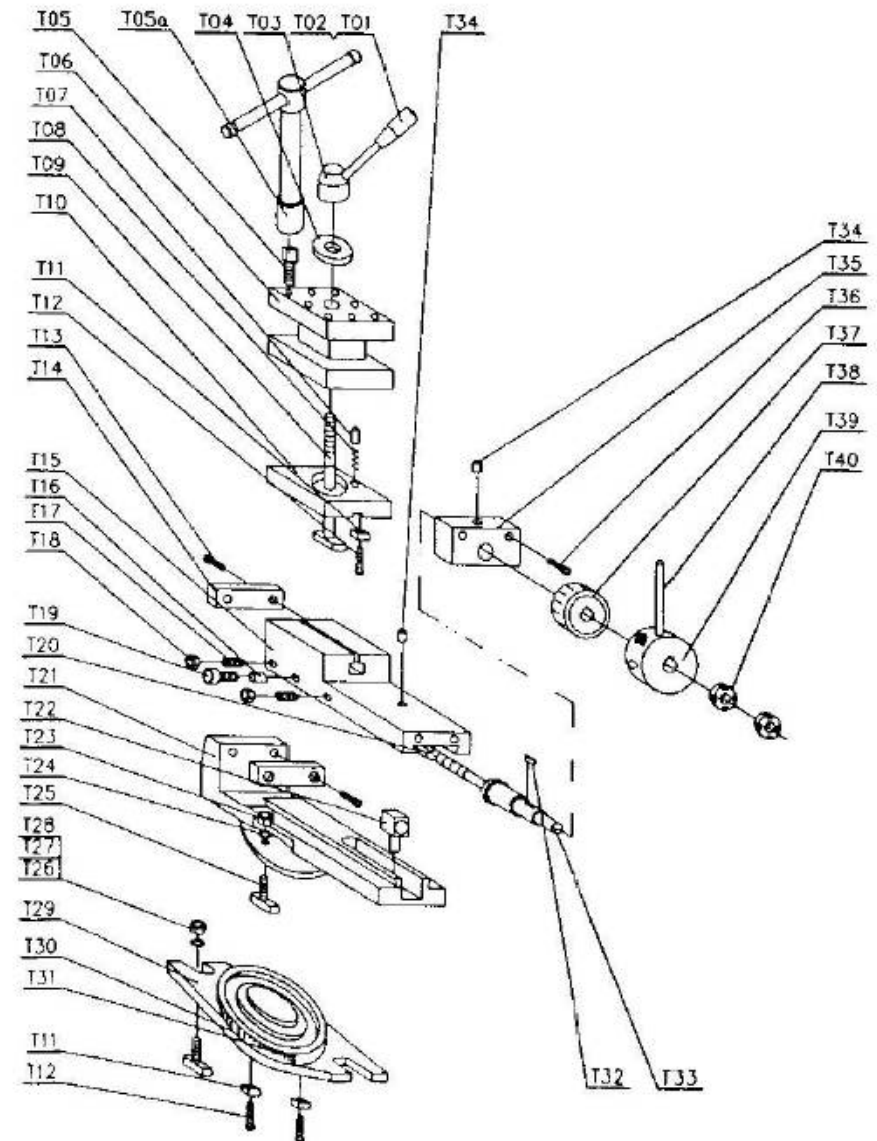


Item No.	Description
1	Bed
2	Headstock
3	Drilling/Milling Box
4	Work Bench
5	Tailstock

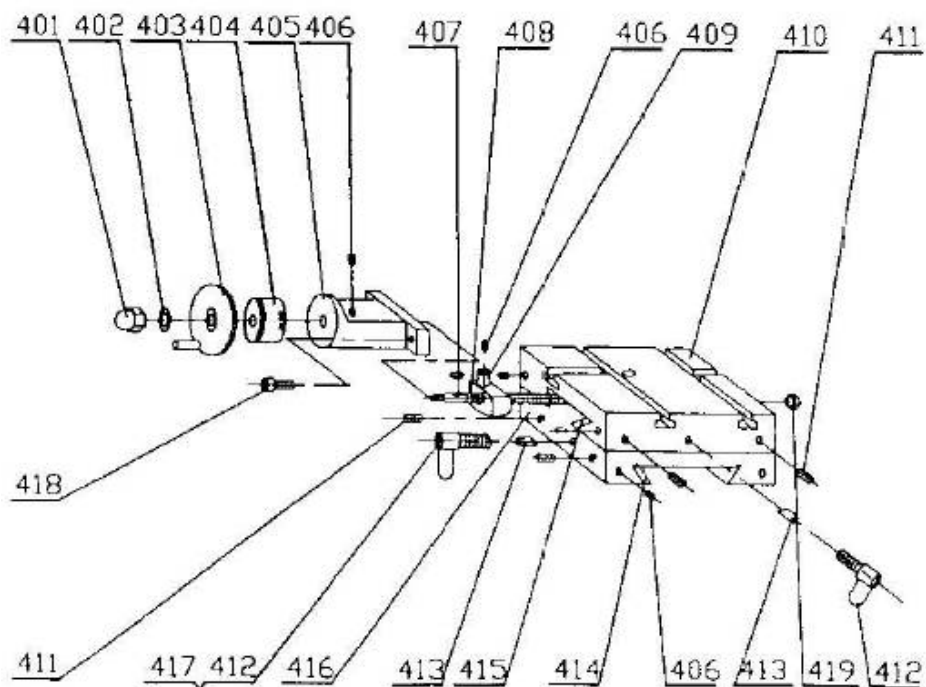




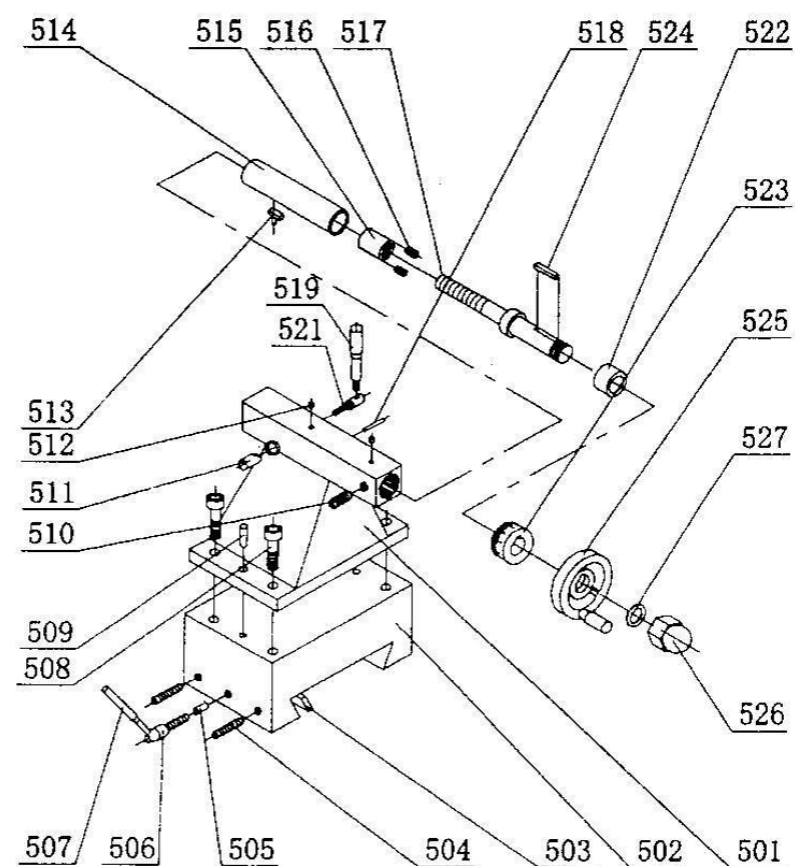
Part 3. Drilling-milling Box



Part T. Tool Post



Part 4 Work Bench



Part 5 Tailstock



Milling and Drilling Machine OWNER'S MANUAL

Parts List

Item	Part No.	Name & Spec	Qty.
BED			
101	L-H007.1-01	Bed	1
102	GB70-85	socket cap screw M6*16	2
103	GB117-86	taper bolt 3*12	2
104	GB923-88	dome nut M10	1
105	GB97-85	flat washer 10	3
106	GB4141.22-84	hand wheel B12*125	1
107	B-40*12*15	graduated disk	1
108	GB1155-74	oil cup 6	1
109	L-H007.1-08	lead screw support	1
110	GB1096-79	flat key 4*30	1
111	L-H007.1-03	lead screw	1
112	L-H007.1-05	lead screw nut	1
113	L-H007.1-04	lead screw nut holder	1
114	GB71-85	conical pointed tightening screw M6*8	1
115	GB6170-85	hexagon nut M10	1
117	L-H007.1-12	holding device	1
118	L-H007.1-13	pin bolt	1
119	GB91-86	splint pin 2.5*16	2
120	L-H007.1-10	dog bolt	1
121	L-H007.1-09	revolving axis	1
123	L-H007.1-14	motor frame	1
125	GB899-88	double- end bolt M8*22	4
127	L-H007.1-11	pin bolt	1
128	GB93-87	spring washer8	4
129	GB6170-86	hexagon nut M8	4
130		motor	1
131	GB1096-79	flat key 5*30	1
HEADSTOCK			
201	L-H007.2-12	round head handle	1
202	GB68-85	countersink screw M5*8	1
203	JB24-79	slotted round nut M33*1.5	1
204	L-H007.2-07	washer	1
205	GB1171-76	V-belt A-1000	1
206	L-H007.2-08	spindle pulley	1
207	L-H007.2-06	bearing retainer ring	1
208	GB297-84	bearing E207	1
209	L-H007.2-05	lock bolt	1
210	GB4141.15-84	handle lever BM8*63	1
211	GB4141.14-84	long handle cannula BM8*40	1
213		reducer D97-4-16	1
214	L-H007.2-04	headstock housing	1



Milling and Drilling Machine OWNER'S MANUAL

Item	Part No.	Name & Spec	Qty.
215	GB297-84	bearing E7208	1
216	GB1096-79	flat key 10*25	1
217	L-H007.2-05	spindle	1
218	L-H007.2-14	end cover	1
219	GB70-85	socket cap screw M6*16	3
220	L-H007.2-16	switch cover	1
221	GB68-85	countersink screw M5*12	4
222	GB68-85	countersink screw M4*8	2
223	L-H007.2-13	switch nut	2
224	HZ10-10P/4	combined switch	1
226	GB118-86	internal screw conical pin8*40	2
227	GB93-87	spring washer12	4
228	GB5782-85	hexagon bolt M12*45	4
231	L-H007.2-10	internal cover	3
232	GB6170-86	hexagon nut M6	1
233	GB93-87	spring washer8	1
234	GB97-85	flat washer 8	1
235	GB67-85	slotted panhead screw M5*8	4
236	L-H007.1-02	motor pulley	1
237	L-H007.2-09	cover	1
238	L-H007.2-11	double screw bolt	1
239	L-H007.2-20	bore cover	1
DRILLING-MILLING BOX			
301	GB97-85	flat washer 10	4
302	L-H007.3-08	adjuster	1
303	GB5783-86	hexagon bolt M8*25	3
304	L-H007.3-04	adjusting plate for supporting motor	1
305	GB5783-86	hexagon bolt M10*35	3
306	GB75-85	long cylindrical head tightening screw M6*16	1
307	L-H007.3-05	lower cover	1
308	L-H007.3-06	upper cover	1
309		cross linking 40	2
310	GB1171-74	V-belt O-710	1
311	ZQ4124-57	handle	1
312	GB818-88	cross recess panhead screw M6*15	1
313	GB812-88	round nut M30*1.5	1
314	GB67-85	slotted panhead screw M5*8	10
315	L-H007.3-09	big pulley	1
316	L-H007.3-10	spline housing	1
317	GB893-87	circlip 62	2
318	GB276-84	bearing 206	2
319	L-H06-117	bearing spacer ring	1



Milling and Drilling Machine OWNER'S MANUAL

Item	Part No.	Name & Spec	Qty.
320	GB68-85	countersink screw M4*8	1
321	GB24-79	slotted round nut M24*1.5	1
322	Gb276-84	bearing 205	1
323	L-H06-24	spindle sliding bush	1
324	L-H007.3-12	spindle	1
325	GB1096-79	flat key 8*25	2
326	L-H06-50	cylindrical gear	1
327	GB894-87	circlip for shaft 25	1
328	L-H06-52	spring base	1
329	GB67-85	panhead screw M5*8	1
330	ZQ4124-59	spring- box cover	1
331	L-H06-53	pan-shaped spring	1
332	GB71-85	conical pointed tightening screw M10*30	1
333	GB6170-85	hexagon nut M10	3
334	ZQ4124-38	clamping rod	1
335	ZQ4124-39	clamping lever	1
337	GB72-85	conical pointed dog screw M10*40	1
338	GB117-85	taper bolt 3*20	2
339	L-H06-37	fitting lever	1
340	GB4141.20-84	hand wheel 8*63	1
341	L-H007.3-21	shaft sleeve	2
342	L-H06-32	worm	1
343	GB297-84	single-row taper roller bearing E7207	1
344	L-H06-26	dust ring	1
345	L-H06-25	rubber washer	1
346	L-H06-27	shaft for drilling & milling	1
347	GB71-85	conical pointed tightening screw M6*10	1
348	L-H007.3-17	worm-gear case	1
349	GB1155-74	oil cup 6	1
350	GB70-85	socket cap screw M6*16	3
351	GB73-85	slotted flat-end tightening screw M4*6	1
352	L-H06-47	washer	1
353	L-H007.3-14	gear	1
354	L-H06-42	scale ring	1
355	L-H06-43	plate spring	1
356	L-H007.3-19	handle body	1
357	L-H007.3-20	handle lever	3
358	GB4141.14-84	long handle cannula BM10*50	3
359	GB894-87	circlip for shaft 32	1
360	L-H007.3-15	banking pin	1
362	GB308-74	steel ball 6	1
363	L-H06-31	spring	1



Milling and Drilling Machine OWNER'S MANUAL

Item	Part No.	Name & Spec	Qty.
364	GB1358-73	clutch handle BM10*40	1
365	L-H007.3-16	banking shalf	1
366	L-H007.3-01	connecting swivel plate	1
367	GB117-85	taper bolt 6*40	1
368	GB70-85	socket cap screw M6*20	6
369	L-H007.3-02	cover sheet	1
370	KA0-5	push button	1
371	GB818-85	cross recess panhead screw M4*10	2
372	L-H007.3-03	drilling & milling box	1
373	TZD-370	motor	1
374	L-H007.3-07	motor pulley	1
375	Z7020.2-14	eccentric shaft	1
376	GB71-85	conical pointed tightening screw M6*10	1
TOOL POST			
T01	GB4141.15-84	handle lever BM8*75	1
T02	GB4141.14-84	handle sleeve BM8*40	1
T03		handle locking holder	1
T04		washer	1
T05a		T shaped wrench(pressing cutter wrench)	1
T05	GB83-88	square pressing screw M8*22	8
T06		tool apron	1
T07		positioning cap	1
T08		spring	1
T09		locking shaft	1
T10		tool apron backer	1
T11		positioning block	3
T12	GB819-85	cross recess head countersink screw M4*10	3
T13	GB70-85	socket cap screw M5*10	4
T14		clamping block	2
T15		movable clamp	1
T16		sloping block	1
T17	GB71-85	conical pointed tightening screw M5*15	2
T18	GB6170-86	nut M5	2
T19	GB70-85	socket cap screw M5*10	1
T20		spacer block	1
T21		fixed clamp	1
T22		nut	1
T23	GB6172	nut M8	2
T24	GB97	flat washer 8	2
T25	GB37	T-shaper screw bolt M8*26	2
T26	GB6170	nut M10	2
T27	GB97	flat washer 10	2



Milling and Drilling Machine OWNER'S MANUAL

Item	Part No.	Name & Spec	Qty.
T28	GB37	T-shaper screw bolt M10*26	2
T29		basement	1
T30		graduated staff guage	1
T31	GB876-86	hollow rivet	2
T32	GB1096-79	flat key 4*20	1
T33		lead screw	1
T34	GB1155-74	oil cup 6	2
T35		lead screw base	1
T36	GB70-85	socket cap screw M6*16	2
T37		scale ring	1
T38		locking lever	1
T39		hand wheel	1
T40	GB812-88	round nut	2
WORK BENCH			
401	GB923-84	capped nut M10	1
402	GB97-85	flat washer 10	1
403	GB4141.22-84	hand wheel B12*125	1
404	B-50*12*50	graduated disk	1
405	L-H007.4-16	lead screw post	1
406	GB1155-74	oil cup 6	4
407	GB1096-79	flat key 4*30	1
408	L-H007.4-21	lead screw	1
409	L-H007.4-20	nut	1
410	L-H007.4-02	table	1
411	GB72-85	conical pointed tightening screw M8*20	4
412	ZQ4124-48	locking handle	2
413	L-H007.4-18	sloping block	2
414	L-H007.4-19	spacer block	1
415	L-H007.4-22	spacer block	1
416	L-H007.4-01	lower slide plate	1
417	ZQ4124-48	locking handle lever	2
418	GB70-85	socket cap screw M16*16	2
419	GB6172-86	hexagon thin nut M10	1
TAIL STOCK			
501	L-H007.5-06	tailstock	1
502	L-H007.5-01	tailstock seating	1
503	L-H007.5-02	spacer block	1
504	GB71-85	conical pointed tightening screw M8*30	2
505	L-H007.5-15	sloping block	1
506	L-H007.5-14	clamp shaft	1
507	L-H007.5-16	handle	1
508	GB70-85	socket cap screw M6*16	4



Milling and Drilling Machine OWNER'S MANUAL

Item	Part No.	Name & Spec	Qty.
509	GB117-85	taper bolt 4*25	2
510	GB71-85	conical pointed tightening screw M6*10	1
511	L-H007.5-04	clamp block	1
512	GB1155-74	oil cup	2
513	L-H007.5-08	T-shaped embody flat key	1
514	L-H007.5-06	tailstock core shaft	1
515	L-H007.5-09	nut	1
516	GB73-85	flat end tightening screw M4*8	3
517	L-H007.5-12	tailstock lead screw	1
518	GB119-85	cylinder pin 5*20	1
519	GB4141.15-84	handle lever BM8*65	1 set (including long handle cannula)
521	L-H007.5-03	check lock shaft	1
522	L-H007.5-13	supporting sleeve	1
523	L-H007.5-10	graduated disk	1
524	GB1096-79	flat key 4*20	1
525	GB4141.22-84	tailstock hand wheel B12*100	1
526	GB923-88	capped nut M10	1
527	GB97-86	flat washer 10	1

Replacement Parts

- For replacement parts and technical questions, please call Customer Service at 1-800-222-5381.
- Not all product components are available for replacement. The illustrations provided are a convenient reference to the location and position of parts in the assembly sequence.
- When ordering parts, the following will be required: Model Number, Serial Number/Lot Date Code, and Description.
- The distributor reserves the rights to make design changes and or improvements to product lines and manuals without notice.

Limited Warranty

Northern Tool and Equipment Company, Inc. ("We" or "Us") warrants to the original purchaser only ("You" or "Your") that the Ironton Air Tool product purchased will be free from material defects in both materials and workmanship, normal wear and tear excepted, for a period of one year from date of purchase. The foregoing warranty is valid only if the installation and use of the product is strictly in accordance with product instructions. There are no other warranties, express or implied, including the warranty of merchantability or fitness for a particular purpose. If the product does not comply with this limited warranty, Your sole and exclusive remedy is that We will, at our sole option and within a commercially reasonable time, either replace the product without charge to You or refund the purchase price (less shipping). This limited warranty is not transferable.



Milling and Drilling Machine OWNER'S MANUAL

Limitations on the Warranty

This limited warranty does not cover: (a) normal wear and tear; (b) accessories both consumable and durable; (c) damage through abuse, neglect, misuse, or as a result of any accident or in any other manner; (d) damage from misapplication, overloading, or improper installation; (e) improper maintenance and repair; and (f) product alteration in any manner by anyone other than Us, with the sole exception of alterations made pursuant to product instructions and in a workmanlike manner.

Obligations of Purchaser

You must retain Your product purchase receipt to verify date of purchase and that You are the original purchaser. To make a warranty claim, contact Us at 1-800-222-5381, identify the product by make and model number, and follow the claim instructions that will be provided. The product and the purchase receipt must be provided to Us in order to process Your warranty claim. Any returned product that is replaced or refunded by Us becomes our property. You will be responsible for return shipping costs or costs related to Your return visit to a retail store.

Remedy Limits

Product replacement or a refund of the purchase price is Your sole remedy under this limited warranty or any other warranty related to the product. We shall not be liable for: service or labor charges or damage to Your property incurred in removing or replacing the product; any damages, including, without limitation, damages to tangible personal property or personal injury, related to Your improper use, installation, or maintenance of the product; or any indirect, incidental or consequential damages of any kind for any reason.

Assumption of Risk

You acknowledge and agree that any use of the product for any purpose other than the specified use(s) stated in the product instructions is at Your own risk.

Governing Law

This limited warranty gives You specific legal rights, and You also may have other rights which vary from state to state. Some states do not allow limitations or exclusions on implied warranties or incidental or consequential damages, so the above limitations may not apply to You. This limited warranty is governed by the laws of the State of Minnesota, without regard to rules pertaining to conflicts of law. The state courts located in Dakota County, Minnesota shall have exclusive jurisdiction for any disputes relating to this warranty.



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