

POWERMATIC[®]

WMH | TOOL GROUP

Operating Instructions and Parts Manual **Construction Line Boring Machine** Model CBM21



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Revision B 8/04
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This manual has been prepared for the owner and operators of a Powermatic CBM21 Line Boring Machine. Its purpose, aside from machine operation, is to promote safety using accepted operating and maintenance procedures. To obtain maximum life and efficiency from your Line Boring Machine and to aid in using it safely, please read this manual thoroughly and follow the instructions carefully.

Warranty and Service

WMH Tool Group warrants every product it sells. If one of our tools needs service or repair, one of our Authorized Repair Stations located throughout the United States can provide quick service or information.

In most cases, a WMH Tool Group Repair Station can assist in authorizing repair work, obtaining parts, or perform routine or major maintenance repair on your Powermatic product.

For the name of an Authorized Repair Station in your area, please call 1-800-274-6848, or visit our web site at www.wmhtoolgroup.com

More Information

Remember, WMH Tool Group is consistently adding new products to the line. For complete, up-to-date product information, check with your local WMH Tool Group distributor, or visit our web site at www.wmhtoolgroup.com

WMH Tool Group Warranty

WMH Tool Group makes every effort to assure that its products meet high quality and durability standards and warrants to the original retail consumer/purchaser of our products that each product be free from defects in materials and workmanship as follows: 1 YEAR LIMITED WARRANTY ON ALL PRODUCTS UNLESS SPECIFIED OTHERWISE. This Warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, normal wear-and-tear, repair or alterations outside our facilities, or to a lack of maintenance.

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To take advantage of this warranty, the product or part must be returned for examination, postage prepaid, to an Authorized Repair Station designated by our office. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection discloses a defect, we will either repair or replace the product at our discretion, or refund the purchase price if we cannot readily and quickly provide a repair or replacement. We will return the repaired product or replacement at WMH Tool Group's expense, but if it is determined there is no defect, or that the defect resulted from causes not within the scope of WMH Tool Group's warranty, then the user must bear the cost of storing and returning the product. This warranty gives you specific legal rights; you may also have other rights, which vary from state to state.

WMH Tool Group sells through distributors only. Members of the WMH Tool Group reserve the right to effect at any time, without prior notice, alterations to parts, fittings and accessory equipment, which they may deem necessary for any reason whatsoever.

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Warnings

1. Read and understand the entire owners manual before attempting assembly or operation.
2. Read and understand the warnings posted on the machine and in this manual. Failure to comply with all of these warnings may cause serious injury.
3. Replace the warning labels if they become obscured or removed.
4. This line boring machine is designed and intended for use by properly trained and experienced personnel only. If you are not familiar with the proper and safe operation of a line boring machine, do not use until proper training and knowledge have been obtained.
5. Do not use this line boring machine for other than its intended use. If used for other purposes, WMH Tool Group disclaims any real or implied warranty and holds itself harmless from any injury that may result from that use.
6. Always wear approved safety glasses/face shields while using this line boring machine. Everyday eyeglasses only have impact resistant lenses; they are not safety glasses.
7. Before operating this line boring machine, remove tie, rings, watches and other jewelry, and roll sleeves up past the elbows. Remove all loose clothing and confine long hair. Non-slip footwear or anti-skid floor strips are recommended. Do **not** wear gloves.
8. Wear ear protectors (plugs or muffs) during extended periods of operation.
9. Some dust created by power sanding, sawing, grinding, drilling and other construction activities contain chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
 - Lead from lead based paint.
 - Crystalline silica from bricks, cement and other masonry products.
 - Arsenic and chromium from chemically treated lumber.Your risk of exposure 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 face or dust masks that are specifically designed to filter out microscopic particles.
10. Do not operate this machine while tired or under the influence of drugs, alcohol or any medication.
11. Make certain the switch is in the **OFF** position before connecting the machine to the power supply.
12. Make certain the machine is properly grounded.
13. Make all machine adjustments or maintenance with the machine unplugged from the power source.
14. Remove adjusting keys and wrenches. Form a habit of checking to see that keys and adjusting wrenches are removed from the machine before turning it on.
15. Keep safety guards in place at all times when the machine is in use. If removed for maintenance purposes, use extreme caution and replace the guards immediately.
16. Check damaged parts. Before further use of the machine, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.
17. Provide for adequate space surrounding work area and non-glare, overhead lighting.
18. Keep the floor around the machine clean and free of scrap material, oil and grease.
19. Keep visitors a safe distance from the work area. **Keep children away.**



Warnings

20. Make your workshop child proof with padlocks, master switches or by removing starter keys.
21. Give your work undivided attention. Looking around, carrying on a conversation and “horse-play” are careless acts that can result in serious injury.
22. Maintain a balanced stance at all times so that you do not fall or lean against the drill bits or other moving parts. Do not overreach or use excessive force to perform any machine operation.
23. Use the right tool at the correct speed and feed rate. Do not force a tool or attachment to do a job for which it was not designed. The right tool will do the job better and safer.
24. Use recommended accessories; improper accessories may be hazardous.
25. Maintain tools with care. Keep bits sharp and clean for the best and safest performance. Follow instructions for lubricating and changing accessories.
26. Make sure the work piece is securely attached or clamped to the table. Never use your hand to hold the work piece.
27. Turn off the machine before cleaning. Use a brush or compressed air to remove chips or debris — do not use your hands.
28. Do not stand on the machine. Serious injury could occur if the machine tips over.
29. Never leave the machine running unattended. Turn the power off and do not leave the machine until it comes to a complete stop.
30. Remove loose items and unnecessary work pieces from the area before starting the machine.
31. Check your stock for loose knots, nails or other aspects that may create a safety hazard or affect the machine's performance.

Familiarize yourself with the following safety notices used in this manual:



This means that if precautions are not heeded, it may result in minor injury and/or possible machine damage.



This means that if precautions are not heeded, it may result in serious injury or possibly even death.

- - SAVE THESE INSTRUCTIONS - -

Introduction

This manual is provided by Powermatic covering the safe operation and maintenance procedures for a Model CBM21 Construction Line Boring Machine. This manual contains instructions on installation, safety precautions, general operating procedures, maintenance instructions and parts breakdown. This machine has been designed and constructed to provide years of trouble free operation if used in accordance to instructions set forth in this manual. If there are any questions or comments, please contact either your local supplier or WMH Tool Group. WMH Tool Group can also be reached at our web site: www.wmhtoolgroup.com.

Description

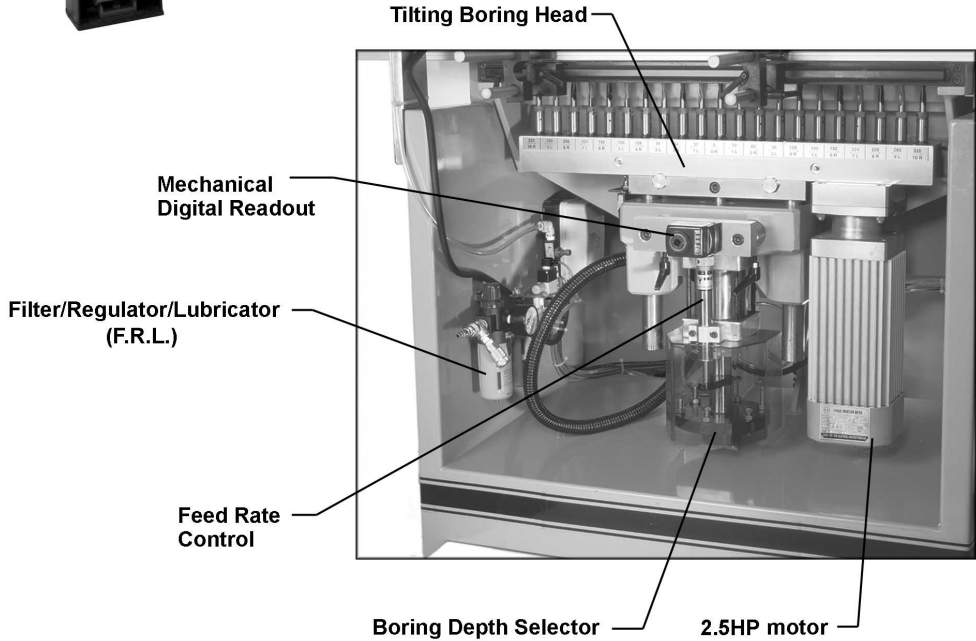
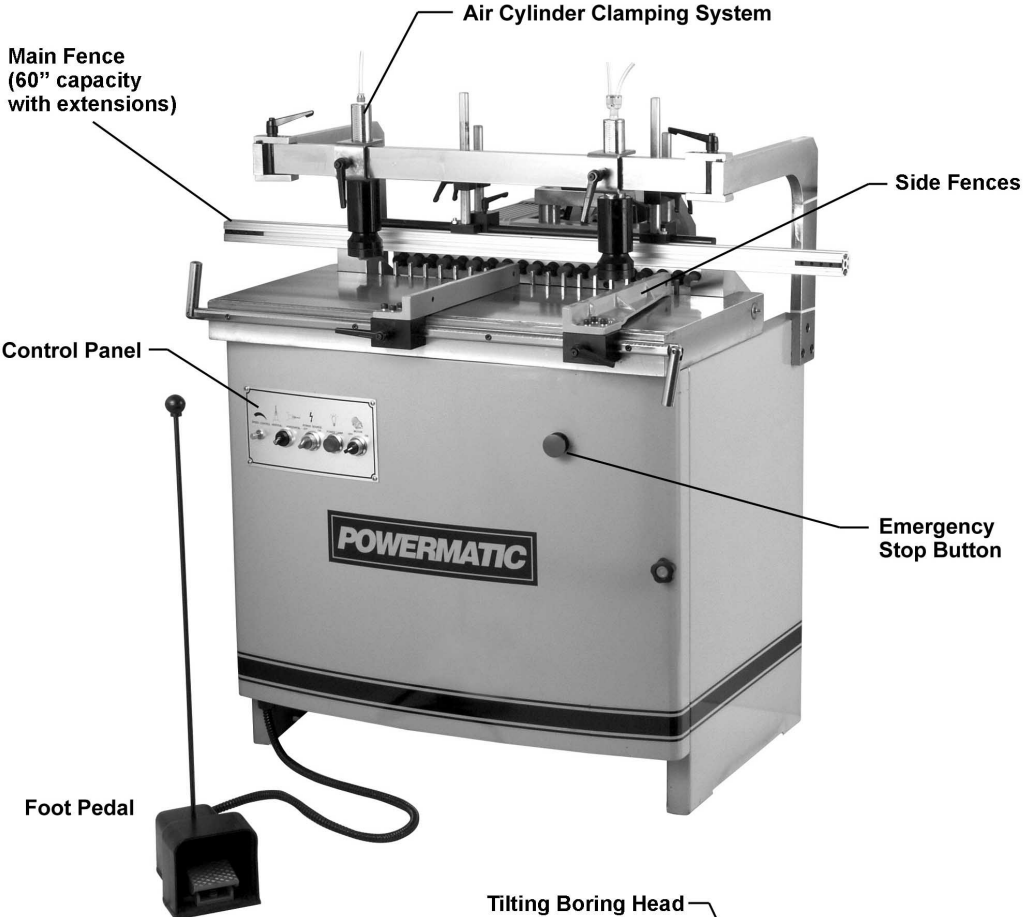
The Model CBM21 is an automatic 21-spindle single row construction drill. It is designed for fast, safe and reliable 32 millimeter (1-1/4") centerline boring in wood products, in both the horizontal and vertical positions. Depth of boring is controlled by a six-position turret depth stop, and a foot pedal controller will quickly and conveniently accomplish the entire boring cycle. The motor starts only when the pneumatic feed cycle is activated by the foot pedal; this extends service life and conserves electrical power.

Specifications

Model Number.....	CBM21
Stock Number.....	1791302
Distance between centers (mm).....	32
Spindle speed (RPM).....	3450
Number of spindles.....	21 (11 right, 10 left)
Depth of stroke (in).....	0 to 3-1/8
Table surface (W x L/in).....	17-1/4 x 35
Boring head adjustment (degrees).....	0 to 90
Quick change collet size (mm).....	10
Table height from floor (in).....	34
Number of depth stops.....	6
Length of fence with extensions (in.).....	60 right and left
Air pressure required (psi).....	90
Motor.....	TEFC, 2.5HP, 1Ph, 230V
Overall dimensions (L x W x H/in).....	49 x 31 x 48
Shipping weight (lbs).....	841
Net weight (lbs).....	682

The above specifications were current at the time this manual was published, but because of our policy of continuous improvement, WMH Tool Group reserves the right to change specifications at any time and without prior notice, without incurring obligations.

Features of the CBM21 Line Boring Machine



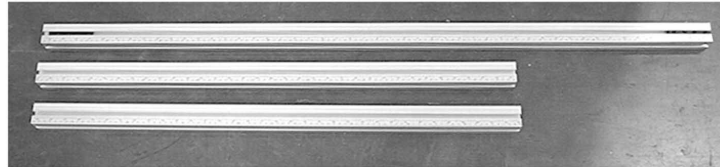
Unpacking

Open shipping container and check for shipping damage. Report any damage immediately to your distributor and shipping agent.

Remove the tool box and any other accessories from beneath the machine. Compare the contents of your container with the following parts list to make sure all parts are intact. Missing parts, if any, should be reported to your distributor. Read the instruction manual thoroughly for assembly, maintenance and safety instructions.

Contents of the Shipping Container

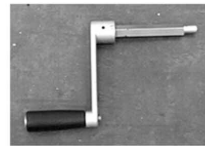
- 1 Line Boring Machine
- 1 Foot Pedal
- 1 Main Fence
- 2 Fence Extensions (L and R)
- 1 Tool Box containing:
 - 1 Crank Handle
 - 4 Fence Stops
 - 21 Quick Chucks
 - 4 Carriage Bolts with Hex Nuts
 - 1 Set Hex Wrenches (1.5 to 10mm)
 - 1 Combination Wrench (22-24mm)
 - 1 Flat Head Screwdriver
- 1 Owner's Manual
- 1 Warranty Card



Main Fence and Extensions



Foot Pedal



Crank Handle



Fence Stops



Quick Chucks



Carriage Bolts w/Hex Nuts



Wrenches/Screwdriver

⚠️WARNING

Read and understand the entire contents of this manual before attempting set-up or operation! Failure to comply may cause serious injury.

Assembly

Tools required for assembly

14mm (or 9/16") wrench
2.5mm hex wrench (provided)
Flat head screwdriver (provided)
Bubble level
Forklift or hoist with straps

Remove all shipping container pieces from around the machine, and remove protective plastic. Remove the toolbox and other accessory items from below the machine.

Remove the screws and washers that are holding the machine to the pallet (A, Figure 1) with a 14mm (or 9/16") wrench. Use a forklift to lift the machine off the pallet. Place the forks under the bottom of the machine.

The Line Boring Machine should be placed on a sturdy, level floor with good ventilation and sufficient lighting. Leave enough space around the machine for mounting the fence extensions, loading and off-loading stock and general maintenance work. Leave the forklift beneath the machine temporarily.

Exposed metal surfaces have been given a protective coating at the factory. This should be removed with a soft cloth moistened with kerosene or mineral spirits. Do not use acetone, gasoline, or lacquer thinner for this purpose. Do not use solvents on plastic parts, and do not use an abrasive pad because it may scratch the surfaces.

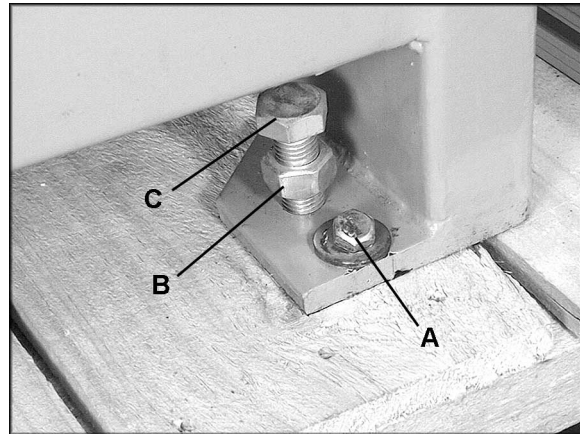


Figure 1

Leveling the Machine

With the machine resting on the floor, place a bubble level on the table top. If the machine is not level, use one or more of the leveling screws, shown in Figure 1, to make this adjustment.

1. Raise the machine slightly off the ground.
2. Loosen the hex nut (B, Figure 1) with the provided 24mm wrench.
3. Rotate the screw (C, Figure 1) to raise or lower it as needed.
4. Tighten the hex nut (B, Figure 1) down against the machine's foot pad, to hold the setting of the screw.
5. Lower the machine to the floor and check the level again. Repeat this process as necessary until the machine is level.
6. Remove the forklift or hoist.

Crank Handle

At the rear of the machine, mount the crank handle by pushing it into the square hole next to the digital readout (Figure 2).



Figure 2

Installing/Replacing Boring Bits

Boring bits (not included) are to be installed in the chucks, which are in turn mounted to the spindles of the machine. The chucks accept boring bits with 10mm shanks. These boring bits will have a screw inside the shank (see Figure 7). This style of boring bit is available from the dealers listed on page 28. It can also be found at many woodworking supply stores.

This machine requires a total of 21 boring bits, which are standard color coded. There should be 11 right-hand bits (black in color) and 10 left-hand bits (orange in color).

Always wipe clean the shank of the boring bit before inserting into the chuck.

CAUTION Use care when installing or removing sharp boring bits.

To install boring bits:

1. Make sure the two set screws (Figure 3) on the chuck are backed out far enough for the bit to be inserted. Push the shank of the boring bit into the knurled end of the chuck. Make sure the flat of the boring bit shank is toward the set screws, as shown in Figure 3.
2. Tighten both set screws on the chuck with a 2.5 mm hex wrench, shown in Figure 3.
3. Swing open the plexiglass guard to gain access to the spindles (Figure 4).
4. Pull protective plastic caps off the spindles. NOTE: Retain plastic caps for future use.
5. Push the chuck all the way down onto the spindle. See Figure 5. Rotate the chuck right and left while pushing it down, to make sure it properly engages the spindle, and is fully seated, as shown in Figure 5. (The roll pin inside the chuck should slide into the notch in the spindle.)
6. Repeat for other spindles as needed.

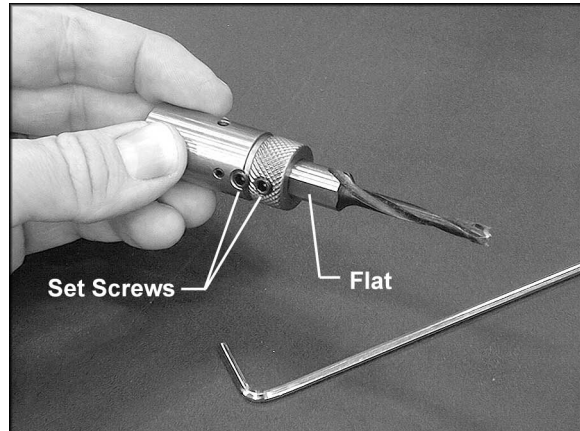


Figure 3



Figure 4



Figure 5

7. After all boring bits are installed, check to make sure they are aligned, that is, that they all protrude an equal distance from the chuck. (This assumes, of course, that all boring bits are of equal length.) This can be done by laying a straight edge across the tips of the boring bits, as shown in Figure 6.
8. If a boring bit does not align with the others, remove that boring bit/chuck from the spindle. Loosen the two set screws on the chuck and remove the bit from the chuck.
9. Use a flat head screwdriver to turn the screw at the end of the bit shank (Figure 7) in or out until the bit will protrude the correct distance from the chuck.
10. Re-insert the bit into the chuck and tighten the two set screws.
11. Re-install the chuck on the spindle, and confirm the accuracy of the adjustment with your straight edge.

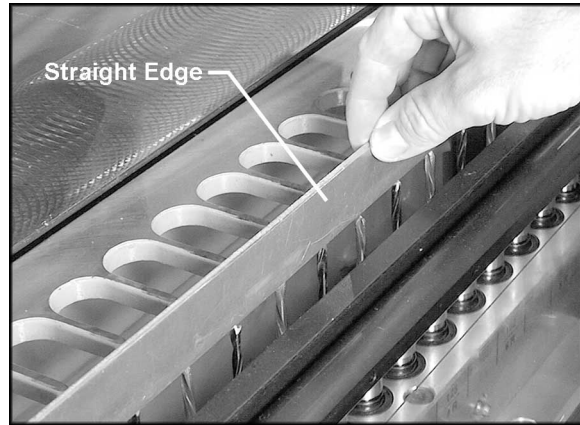


Figure 6

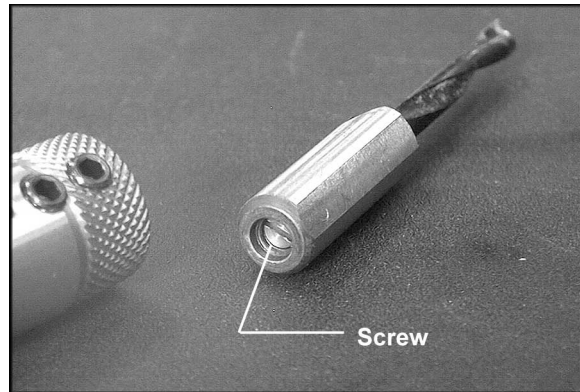


Figure 7

Mounting the Main Fence

To mount the main fence to the machine, proceed as follows. (The main fence is the longest of the three extruded pieces.)

1. Orient the fence so that the measuring scale is facing up. See Figure 8.
2. Remove the hex nut from two of the four carriage bolts that were provided with the machine.
3. Slide the heads of two carriage bolts into the channel on the fence (Figure 8). Note the orientation of the fence; the carriage bolts should be placed into the correct channel as shown in Figure 8.
4. Place the fence, scale upward, at the back of the table and slide the carriage bolt shafts through the holes in the stopper blocks, as shown in Figure 9.
5. Attach a hex nut to each carriage bolt and make them snug only at this time.
6. The scale on the main fence must now be centered in relation to the spindles. See "Centering the Main Fence Scale".

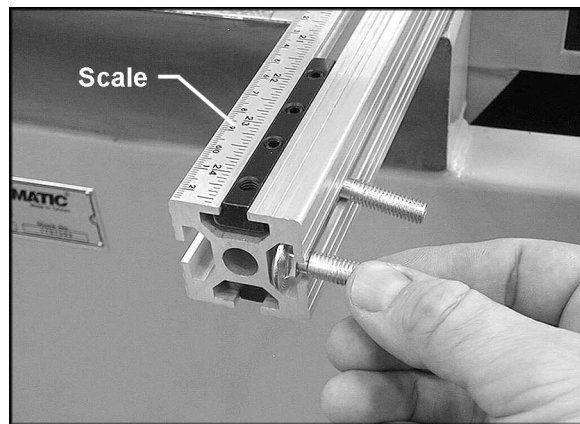


Figure 8

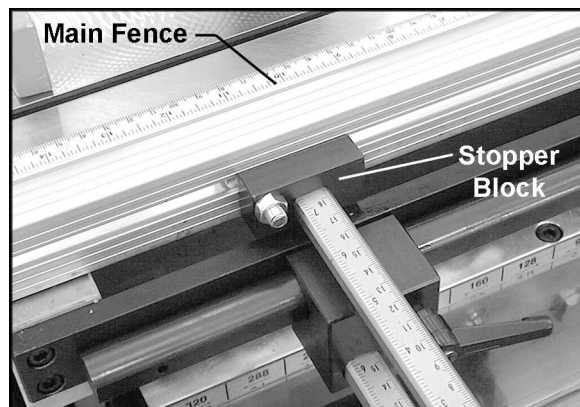


Figure 9

Centering the Main Fence Scale

For accurate measurements, the main fence must be centered with the center spindle on the boring head:

1. Slide one of the side fences (Figure 10) to “zero” position according to the scale at the front of the table.

[NOTE: For further information on adjusting the side fences, see “Side Fences” under the Adjustments section.]

2. Place one of the aluminum fence extensions against the side fence and flush up against the main fence, as shown.
3. Loosen the hex nuts on the stopper blocks that secure the main fence (Figure 9), and shift the main fence as necessary until the “zero” on the main fence lines up with the edge of the extension, as shown in Figure 10.
4. Tighten the hex nuts on the stopper blocks (Figure 9) with a 1/2” wrench.

The main fence scale is now centered in relation to the center spindle as well as the side fences. Further fence adjustments will be dealt with in the “Adjustments” section.

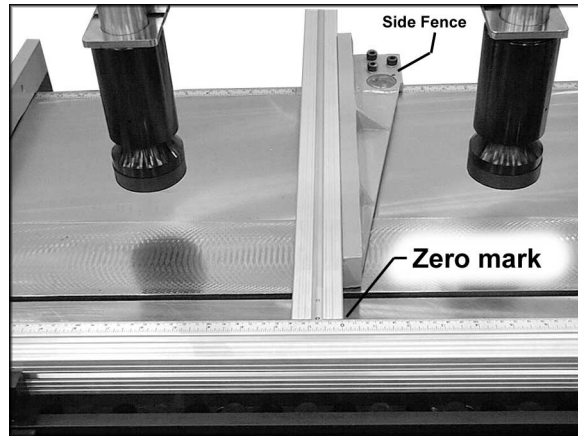


Figure 10

Fence Extensions

Left and Right Fence Extensions are provided to support long workpieces. Check the sequence on the measuring scales to distinguish left and right hand pieces.

1. On the main fence, loosen the four set screws in the front connecting block (Figure 11) and the rear connecting block (not shown) with a 2.5 mm hex wrench.
2. The connecting blocks should be located in the side channels of the main fence. If they are not, slide them out and re-insert them into the side channels, as they are shown in Figure 11.
3. Slide the fence extension onto both connecting blocks, and flush against the main fence, as shown in Figure 11.
4. Firmly tighten all four set screws in each connecting block.
5. Repeat for the other fence extension at the opposite end of the main fence.

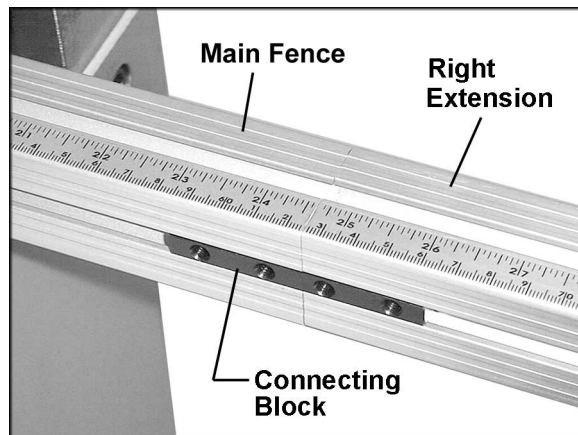


Figure 11

Fence Stops

Mount a fence stop from the end of the fence by sliding the bolt head at the bottom of the stop into the top channel of the fence, as shown in Figure 12.

The fence stop can be moved to any point along the fence, and secured by tightening the locking handle. When not in use, the stop plate can be flipped upward and out of the way.

NOTE: All locking handles, such as that shown in Figure 12, can be pivoted out of the way. Simply pull up on the handle, rotate it to a more convenient position, then release it making sure it seats itself on the screw.

Attaching Air Hoses

1. Insert the loose end of the long air hose into the Y-fitting as shown in Figure 13.
2. Insert one end of the short air hose into the Y-fitting, and the other end into the I-fitting. See Figure 13.

Air Supply Connection

⚠WARNING Make sure the locking handle (see Figure 21) on the side of the machine is tightened before connecting the air, to prevent the boring head from rising suddenly.

Connect your air hose to the nozzle on the machine's F.R.L unit, as shown in Figure 14. Make sure your hose fitting is pushed completely onto the nozzle.

Check the reading on the pressure gauge - it should read approximately 90 psi (or 6.3 kg/cm²). If the air pressure is incorrect, adjust it with the regulator knob (Figure 15) as follows:

1. Pull up on the air pressure regulator knob, then rotate it clockwise to increase the air pressure; or counterclockwise to decrease the air pressure. Make this adjustment in small increments and allow the pressure gauge time to react.
2. When satisfied, push the regulator knob back down.

(For further adjustments of the air system, see under "Adjustments".)

⚠CAUTION Do not operate this machine until the pressure gauge shows the correct pressure of approximately 90 psi (6.3 kg/cm²). Other pressure settings can cause potential damage to the machine.

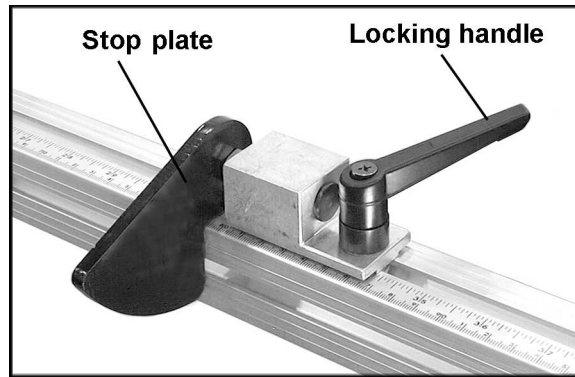


Figure 12

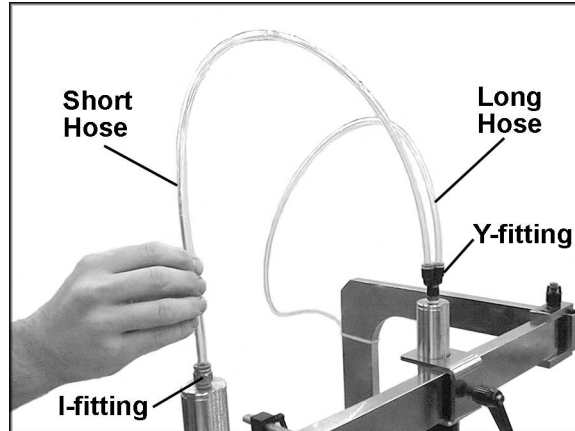


Figure 13

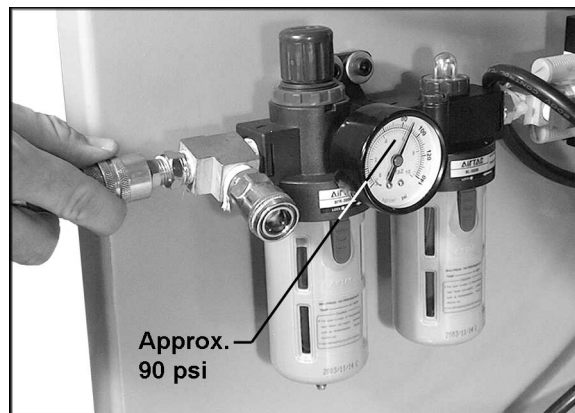


Figure 14

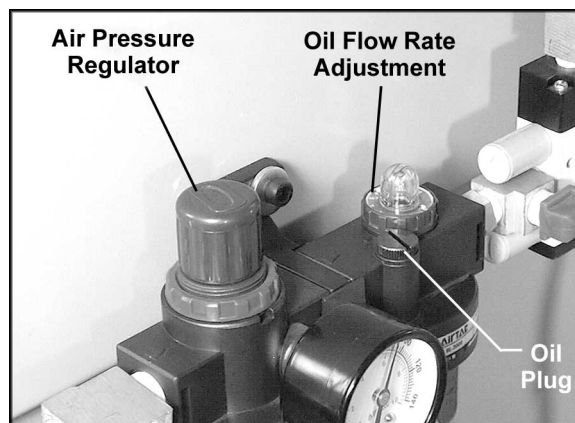


Figure 15

Grounding Instructions

⚠WARNING Electrical connections must be made by a qualified electrician in compliance with all relevant codes. This machine must be properly grounded to help prevent electrical shock and possible fatal injury.

A power plug is not provided with the Model CBM21. You may either connect a 230 volt plug or “hardwire” the machine directly to your electrical panel provided there is a disconnect near the machine. Consult electrical drawing on page 44 for further clarification of wiring setup.

This machine must be grounded. Grounding provides a path of least resistance to help divert current away from the operator in case of electrical malfunction.

Make sure the voltage of your power supply matches the specifications on the motor plate of the machine.

Extension Cords

If an extension cord is necessary, make sure the cord rating is suitable for the amperage listed on the machine's motor plate. An undersize cord will cause a drop in line voltage resulting in loss of power and overheating.

The chart in Figure 16 shows the correct size cord to use based on cord length and motor plate amp rating. If in doubt, use the next heavier gauge. The smaller the gauge number the heavier the cord.

Recommended Gauges (AWG) of Extension Cords

Amps	Extension Cord Length *					
	25 feet	50 feet	75 feet	100 feet	150 feet	200 feet
< 5	16	16	16	14	12	12
5 to 8	16	16	14	12	10	NR
8 to 12	14	14	12	10	NR	NR
12 to 15	12	12	10	10	NR	NR
15 to 20	10	10	10	NR	NR	NR
21 to 30	10	NR	NR	NR	NR	NR

*based on limiting the line voltage drop to 5V at 150% of the rated amperes.
NR: Not Recommended.

Adjustments

Setting Boring Depth

The depth of the bored holes (up to 3-1/8") is controlled by the turret depth selector (Figure 17) which has depth stops numbered 1 through 6. The smaller the number, the deeper the bored holes.

Rotate the selector to the desired number, as shown in Figure 17. Make sure it clicks into place.

The depth stops can be set by the operator. Use a 17mm wrench to loosen the hex nut at the base of the cap screw (Figure 17), and turn the cap screw as needed. Tighten the hex nut to lock in the setting.

Figure 16

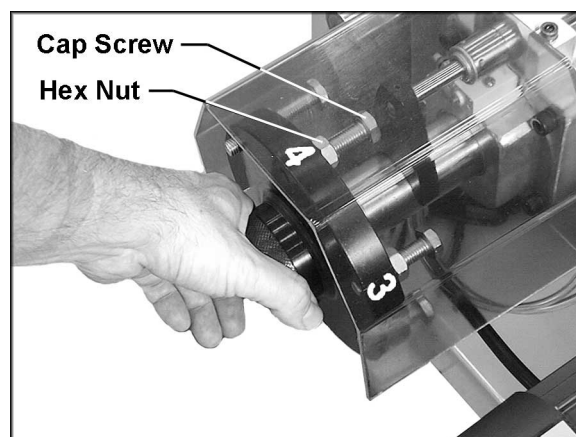


Figure 17 shows setting at depth stop number 4

Centerline Adjustment

The boring head is capable of fine adjustment to locate the centerline of your holes.

1. Loosen the two locking handles (Figure 18).
2. Rotate the crank handle to move the boring head. This adjustment will change the centerline of the holes.
3. The mechanical digital readout displays the measurement in inches.
4. Securely tighten both locking handles.

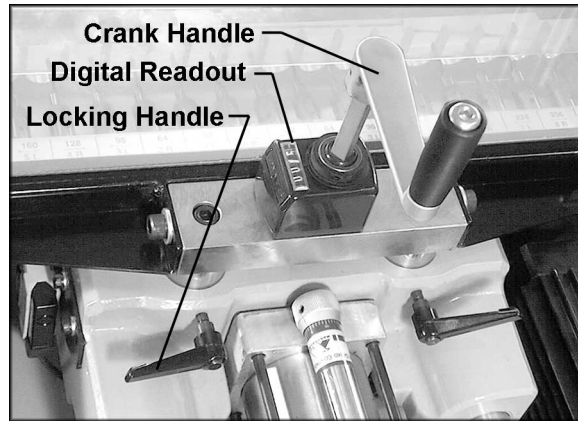


Figure 18

Setting Boring Bit Feed Rate (Fine Adjustment)

The rate at which the boring head moves and the boring bits feed into the workpiece is generally controlled by the switch on the front control panel (see "Operating Controls"). However, this setting can also be made at the rear of the machine by the knurled speed control knob (Figure 19) located next to the turret cylinder. This speed control knob, which has an accompanying measurement scale, lends itself to more fine tuning of the boring bit feed rate.

Turn the knurled speed control knob, shown in Figure 19, in relation to the adjacent scale. The smaller the number on the scale, the slower the feed rate.

Feed rate is determined by the type of wood being used and is best learned through trial and error. A general rule of thumb is that hard woods require slower feed rates, while soft woods require faster feed rates.

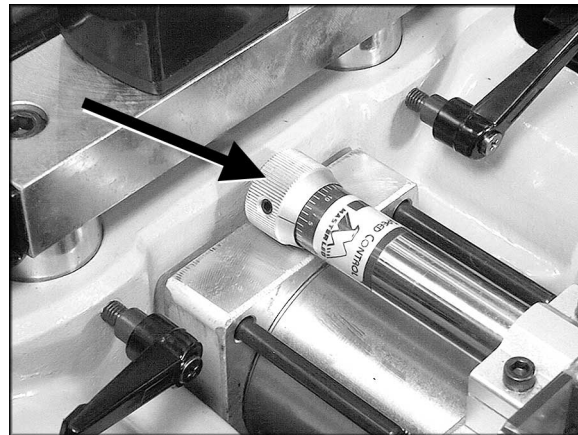


Figure 19

Dwell Adjustment

The boring head limit switch, shown in Figure 20, has an adjustable air relief valve for controlling the "dwell" (i.e., the length of time the boring bits remain in the workpiece before the boring head retracts).

This setting has been established at the factory, and should not need adjusting for normal operations. In the future, however, should this setting require attention, proceed as follows:

1. Loosen the knurled nut on the adjustable air relief valve (Figure 20).
2. Rotate the knob clockwise to increase the dwell, counterclockwise to decrease the dwell.
3. When finished, re-tighten the knurled nut.



Figure 20
shown with guard removed

Boring Head: 90 Degree Pivot

To pivot the boring head from vertical position to horizontal position, proceed as follows:

1. Make sure the main fence has been moved back, so that it cannot bind against the table when the boring head pivots upward. (See page 21 for fence movement.)
2. Loosen the locking handle (rotate counterclockwise) on the left side of the machine frame. See Figure 21.
3. Pull out on the angle pin. (NOTE: You may have to loosen the socket head cap screw on the angle pin to allow it to move freely.)
4. On the front control panel, turn the "Vertical-Horizontal" switch to Horizontal position (see "Operating Controls").

⚠WARNING The boring head may swing up rapidly. Keep hands clear and do not allow anyone to stand near the boring head area when raising or lowering it.

5. When the boring head reaches horizontal position, tighten the locking handle.

⚠WARNING The locking handle should always be tightened, except when tilting the boring head.

90-Degree Stop

The 90-degree stop for the boring head has been factory set and should require no adjustment. As the machine receives extensive use, however, you may wish to check this setting and if necessary adjust as follows:

1. Open the front or rear door.
2. Loosen the hex nut (A, Figure 22).
3. Rotate the stop screw (B, Figure 22) as needed, until the boring head will attain 90-degrees when the boring head contacts the stop screw.
4. Tighten the hex nut (A, Figure 22).

Horizontal Stop

The horizontal stop for the boring head is controlled by the nut located on the cylinder (C, Figure 22). The nut regulates how far the cylinder rod can protrude, and thus controls where the boring head comes to a stop when pivoted to horizontal position.

Rotate the nut as needed until the boring head is level (0 degrees) at horizontal position.

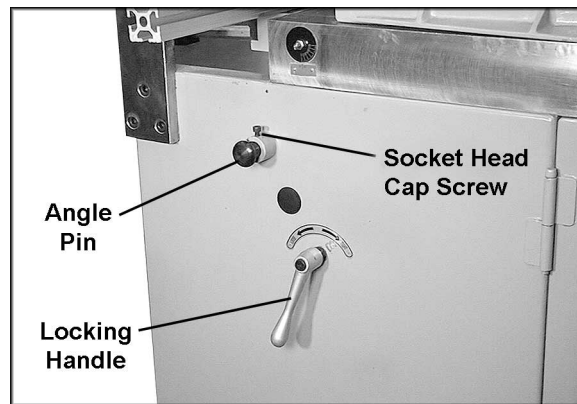


Figure 21

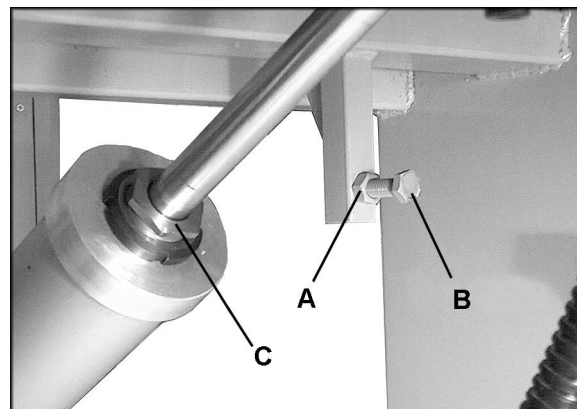


Figure 22

45-Degree Stop

The 45-degree stop for the boring head has been factory set and should require no adjustment. As the machine receives extensive use, however, you may wish to check this setting and if necessary adjust as follows:

1. The angle pin (Figure 23) should be pushed in completely. (You may have to slightly loosen the socket head cap screw on the angle pin to allow the angle pin to move.)
2. Loosen the hex nut on the 45-degree stop screw (Figure 23).
3. Turn the stop screw until the 45-degree angle is obtained. Check this setting by pivoting the head down until the stop screw contacts the angle pin. The angle can be read on the angle gauge (Figure 23).
4. Make further turns of the stop screw if needed, then tighten the hex nut on the stop screw.
5. When using the 45-degree stop, always tighten the locking handle (Figure 21).

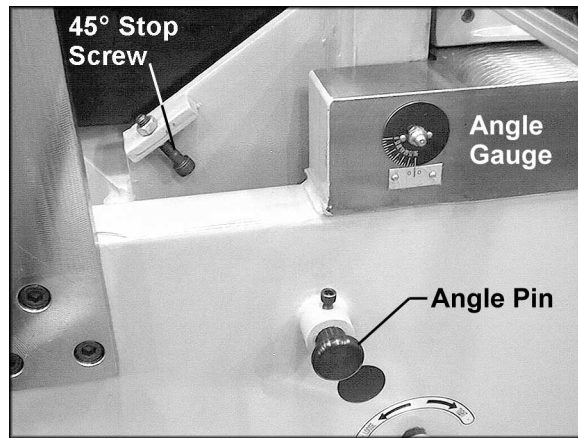


Figure 23

Boring Head Air Supply

Should you decide to close off air to the boring head cylinder only, you can do this by opening the front door of the machine, and turning the valve lever at the bottom of the cylinder (Figure 24) counterclockwise.

Re-open the valve by turning the valve lever parallel to the valve, as shown in Figure 24.

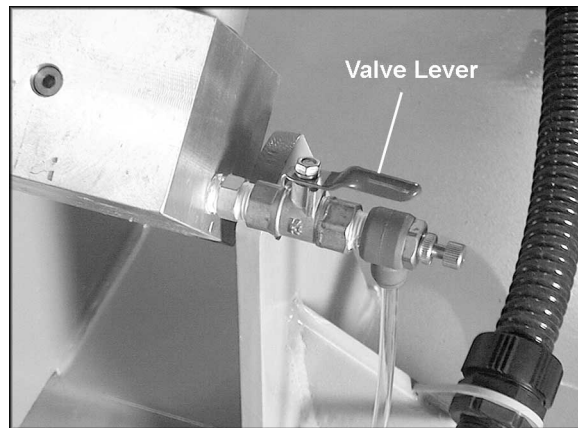


Figure 24

Clamp Position and Pressure

The workpiece is held to the table surface during operations by an air cylinder clamping system. This system has multiple adjustments:

Horizontal Adjustment: Loosen the locking handles (A, Figure 25) and slide the clamps to any point along the beam (C, Figure 25). Once the clamps are properly positioned, securely tighten the locking handles (A, Figure 25).

Vertical Adjustment: The clamps can be adjusted vertically to suit the thickness of your workpiece. Loosen the locking handle (A, Figure 25) and slide the clamp up or down as desired. Re-tighten locking handle.

Parallel Adjustment: The beam (C, Figure 25) can be shifted to keep the clamping system in line with the workpiece; for example, when using narrow workpieces. Loosen both locking handles (B, Figure 25) and slide the beam backward or forward as needed. When finished, always re-tighten the locking handles (B, Figure 25).

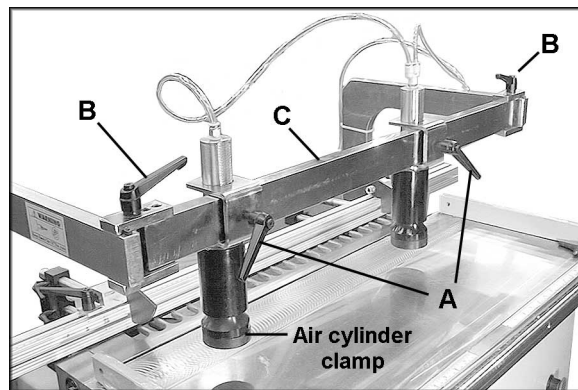


Figure 25

Parallelism of Boring Head to Table Surface

To ensure accurate hole centerlines in your workpiece, the line of spindles must be parallel to the table top. Check this setting and adjust if necessary:

1. Remove fence and clamp assemblies. Remove boring bits and chucks from the spindles.
2. Pivot the boring head to horizontal position, and lock it in position.
3. Rotate the crank handle to bring the spindles up as far as they will go.
4. Insert two 10mm rods approximately 4.5" long into two quick release chucks. Mount one rod and chuck to the center spindle, and the other rod and chuck to the far left spindle. See Figure 26. NOTE: The 10mm rods must be used to ensure accuracy in the measurements.
5. Place a gauge block on the table and below the rod of the center spindle, as shown in Figure 27. (The gauge block can be any size as long as it fits between table and rod.)
6. Rest a .005" feeler gauge on top the gauge block, and lower the spindles by turning the crank handle until the rod contacts the feeler gauge, as shown in Figure 27. The feeler gauge should just rub against both the gauge block and the rod.
7. Lock the boring head in this position, by tightening the two lock handles next to the crank handle (see Figure 18) .
8. Remove the chuck, with its rod, from the center spindle and install it on the far right spindle.
9. Use the gauge block and feeler gauge to check the height of the end spindles, in the same manner as you did the center spindle. Both end spindles should match the height of the center spindle. If they do not, loosen the four mounting screws as shown in Figure 28. Turn the large adjustment screws (Figure 28) slightly until the spindle heights match.
10. When the spindle heights match, re-tighten the four mounting screws.
11. Leave the 10mm rods on the spindles for further adjustment procedures.

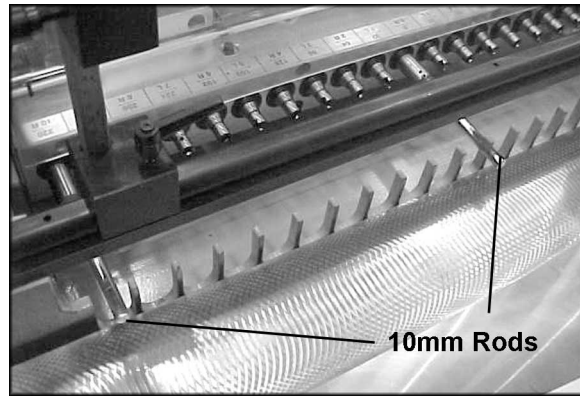


Figure 26

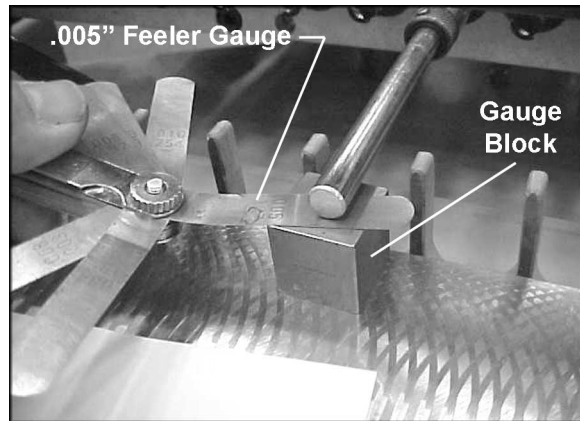


Figure 27

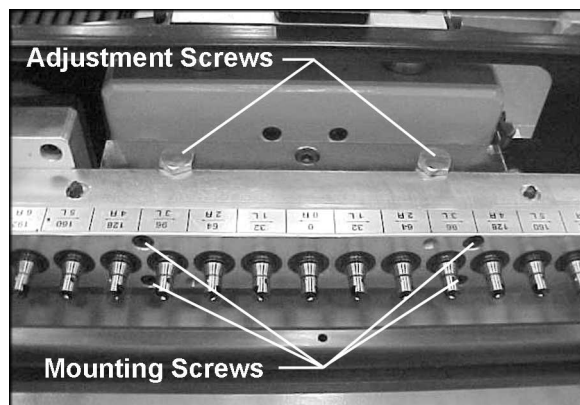


Figure 28

“Zero” the Digital Readout

This procedure will set the digital readout so that it reads zero when the centerline of the spindles is aligned with the table surface.

NOTE: It is important to use 10mm rods in the chucks and a .006” feeler gauge when doing this adjustment, as these measurements are critical for accurate set up.

1. With the boring head still in horizontal position, and the the 10mm rods still in place on the spindles, lower the spindles with the crank handle until a .006” feeler gauge just rubs between the rod and the table surface, as shown in Figure 29.
2. At this point, 0.20” is the distance from the center of the spindle (or rod) to the table surface. Therefore, the mechanical digital readout should read 0.20” as shown in Figure 30.
3. If the readout does not indicate 0.20”, lock the boring head by tightening the two lock handles (see Figure 18).
4. Loosen the set screw (Figure 30) with a 2.5mm hex wrench. Rotate the collar until the display reads 0.20” .
5. Re-tighten the set screw.
6. The digital readout has now been “zeroed” correctly in relation to the table surface.

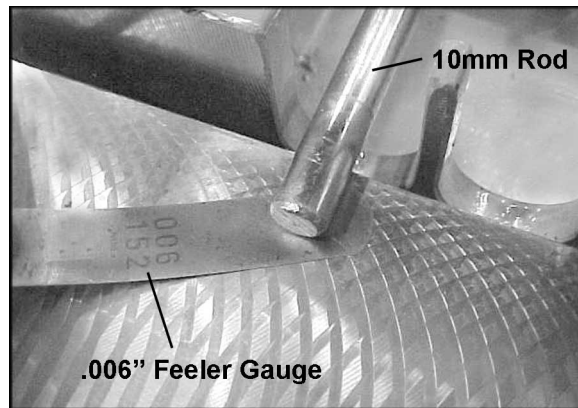


Figure 29

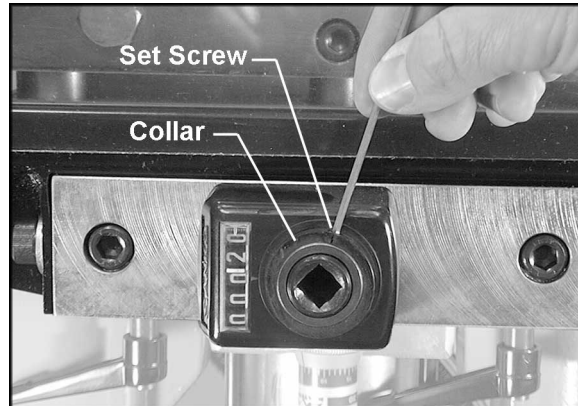


Figure 30

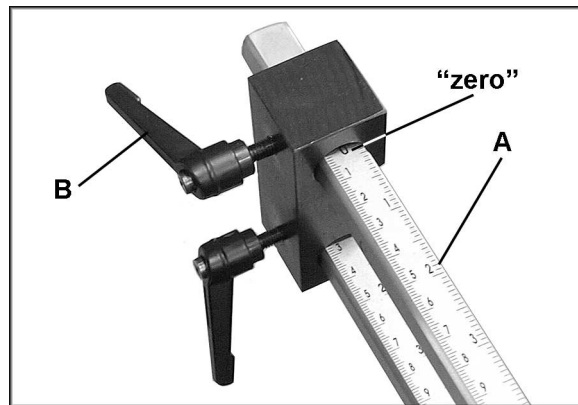


Figure 31

“Zero” the Main Fence

The main fence is used when the boring head is in vertical position. The following procedure will set the main fence so that it is in harmony with the centerline of the spindles. This setting will ensure that the holes in two mating workpieces (one bored in horizontal mode, the other in vertical mode) will align properly when the edges of the two workpieces are matched.

1. Pivot boring head to vertical position and lock in place.
2. Set upper bar scale (A, Figure 31) to zero and tighten the locking handle (B, Figure 31). Do this at both ends of the main fence.
3. Bring bar supporter flush to the end of lower bar, as shown in Figure 32, and tighten locking handle (C, Figure 32). Do this at both ends of the fence.
4. Pivot boring head to horizontal position and lock in place.

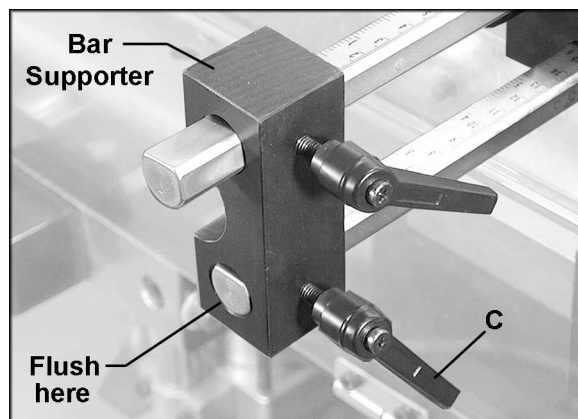


Figure 32

5. Loosen locking handle on the lower bar at both ends of the fence, as shown in Figure 33.
6. Lower fence all the way to the table and tighten lower bar handles.

The fence is now “zeroed” to the boring bit centerline. For boring operations, the upper bar scales (A, Figure 31) will be set to the thickness of your workpiece.

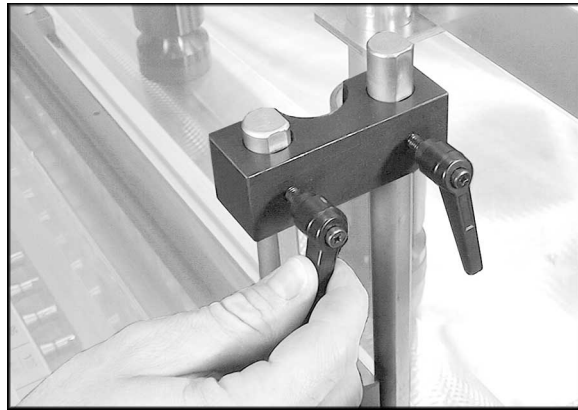


Figure 33

Main Fence Movement

The main fence can be adjusted forward or backward to suit the size of the workpiece.

1. Loosen locking handle (A, Figure 34) at both ends of the main fence.
2. Move the fence forward or backward, making sure that the measurement on the bar scale (B, Figure 34) is the same on both ends of the fence.
3. Tighten locking handle (A, Figure 34) at both ends of the main fence.

IMPORTANT: Make sure the main fence is not in the path of the boring bits. Always push the main fence back away from the table before pivoting the boring head to horizontal position.

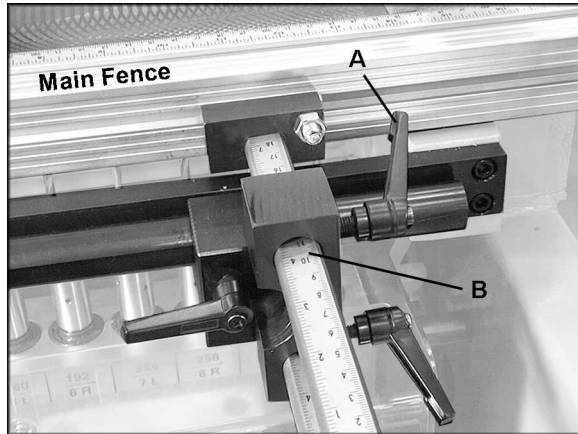


Figure 34

Side Fences

The two side fences (Figure 35) can be moved the length of the rail.

When a side fence is set to “zero” on the adjacent scale, it will line up with the centerline of the center spindle.

1. Loosen locking handle (Figure 35), and slide the side fence into position.
2. The measurement on the scale is read through the magnification lens.
3. Re-tighten locking handle.

To remove a side fence from the table, lift up on the turning handle (Figure 35) until it is parallel with the rail. Slide the fence all the way to the end of the turning handle. The side fence will then hang down at the side of the machine, out of the way but convenient for quick reinstallation on the rail.

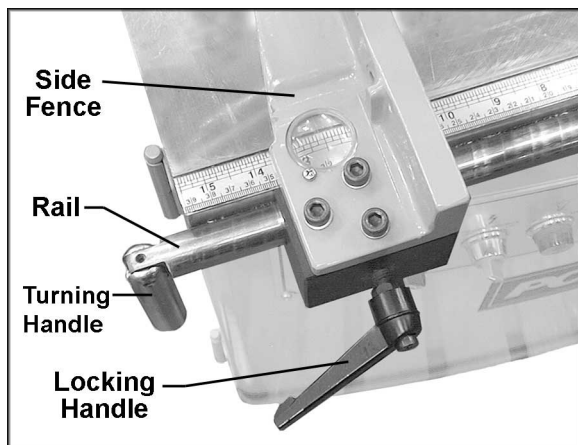


Figure 35

Oil Flow Rate

To adjust the rate of the oil flow, rotate the oil flow rate adjustment collar (Figure 36) until the desired number on the collar lines up with the small triangular indicator on the housing adjacent to the collar. The larger the number, the greater the rate of oil flow.

Operating Controls

The controls at the front of the machine are shown in Figure 37, and are described from left to right.

Speed Control – Adjusts the feed rate of the boring bits into the stock. Turn clockwise to reduce speed, counterclockwise to increase speed. NOTE: This adjustment can be fine tuned at the rear of the machine – see page 16.

Vertical/Horizontal – Moves the boring head unit to either vertical or horizontal boring position.

Power Source – Main on/off switch.

Power Lamp – Lights up when the machine is on.

Motor – Starts and stops boring bit rotation.

Emergency Stop – This red mushroom-shaped button (Figure 38) is used for instant shut-down of the machine in case of emergencies. After pushing it in, to restart the machine rotate the knurled ring clockwise and allow the stop button to pop back out.

A foot pedal is provided with this machine. Pressing the foot pedal activates the hydraulic clamps and brings the boring bits down into the workpiece. Releasing the foot pedal releases the clamps and retracts the boring head after the boring cycle is completed.

Limit Switch

A limit switch is mounted just below the boring head (Figure 39). As the boring head retracts after a boring operation, it will contact the limit switch, which will shut off the machine, in preparation for the next cycle.

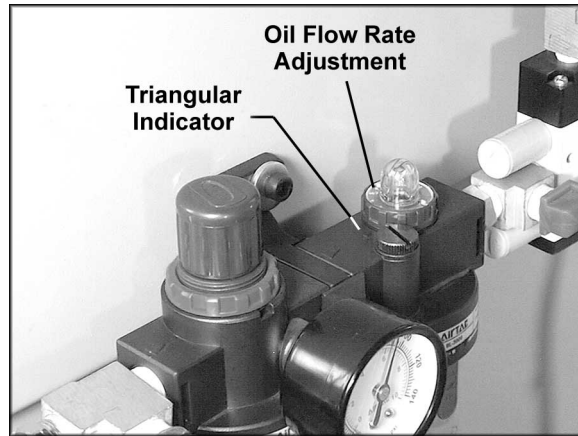


Figure 36

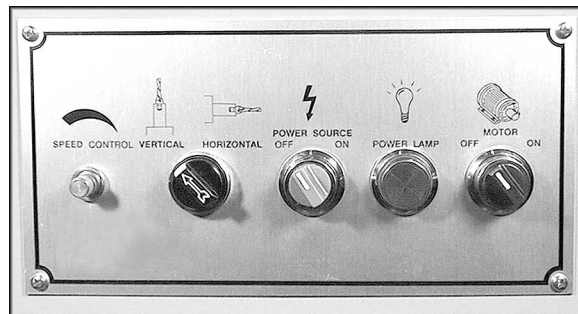


Figure 37

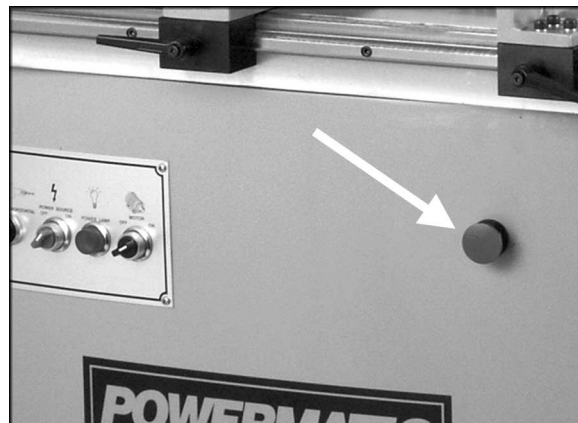


Figure 38



Figure 39

Operation

⚠WARNING This line boring machine is for use with wood or plastic products only – Do NOT use it for drilling in metal.

The boring bits rotate in opposite directions to prevent excessive torque against the workpiece. The rotation of the boring bits should match the arrow indicators on the label affixed to the boring head. This label is shown in Figure 5.

The following is the basic procedure for operating the CBM21 Line Boring Machine.

1. Make sure all boring bits and chucks are seated on the spindles, and that boring bits are aligned properly.
2. Turn on the power and the air supply.
3. Loosen the boring head locking handle, and position the boring head in either horizontal or vertical position. Re-tighten the locking handle.
4. Rotate the turret depth selector to the desired boring depth.
5. Adjust main fence and/or side fences. Set fence stops as necessary.
6. Adjust clamping system for the size of your workpiece.
7. Rotate the crank handle to establish the centerline of your holes.
8. Adjust the feed speed control knob on the control panel as desired.
9. Place the workpiece in position against the fence and stops. Press the foot pedal to advance the boring head and perform the boring procedure. NOTE: The bits will remain rotating in the workpiece as long as the foot pedal is held down.
10. Release the foot pedal, and allow the boring head to clear the workpiece. The machine will shut off automatically.
11. Remove workpiece from the table.

Maintenance

⚠WARNING Before performing any maintenance on this machine, disconnect it from the electrical supply by pulling out the plug or switching off the breaker. Failure to comply may cause serious injury.

Always keep oil in the lubricator cup (Figure 40) to at least 80 percent of full cup capacity.

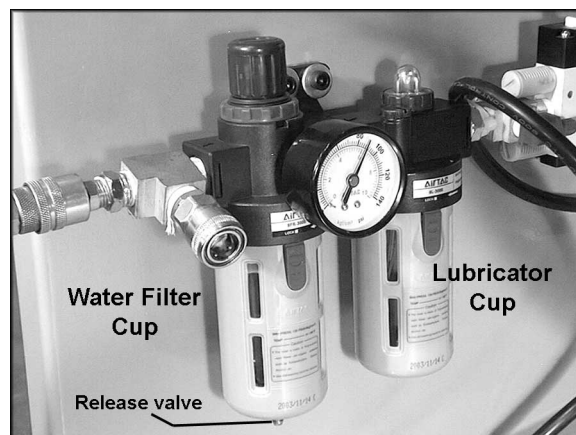


Figure 40

Unscrew and remove the oil plug (Figure 41) with a flat head screwdriver, and add oil through the inlet port. This is available from your local distributor or can be found in most hardware and tool stores. Always re-install the oil plug after adding oil.

The water filter cup (Figure 40) collects moisture from the air line. Periodically remove any water that collects in the water filter cup by pushing up the release valve at the bottom of the cup.

If the power cord is worn, cut, or damaged in any way, have it replaced immediately.

The table surface must be kept clean and free of rust for best results. Some users apply a thin coat of paste wax. Another option is talcum powder applied with a blackboard eraser rubbed in vigorously once a week; this will fill casting pores and form a moisture barrier. This method provides a table top that is slick and allows rust rings to be easily wiped from the surface. Important also is the fact that talcum powder will not stain wood or mar finishes as wax pick up does.

Lubrication

Occasionally wipe clean guide rods and cylinders. If there is an appreciable build-up of dust, dirt or wood shavings, use an oil cloth, but never pour oil directly on these areas. Over-oiling defeats the purpose of lubrication as it hastens the collection of dust, shavings, etc.

Grease the boring head tilting trunnion through the two grease fittings at opposite sides of the frame (Figure 42). Use a good quality general-purpose grease.

Grease the gears within the boring head, using the two grease fittings at the back of the boring head (Figure 43).

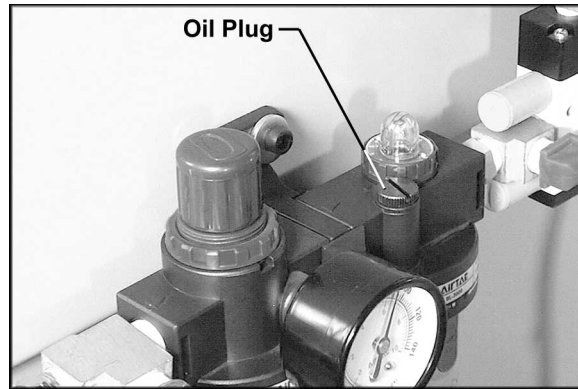


Figure 41

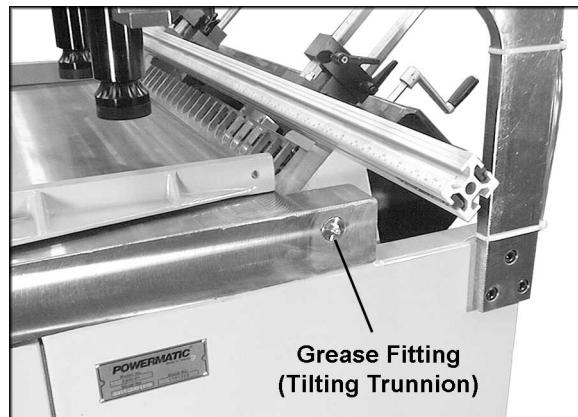


Figure 42



Figure 43

Troubleshooting – Mechanical and Electrical Problems

Trouble	Probable Cause	Remedy
Machine will not start/restart or repeatedly trips circuit breaker or blows fuses.	No incoming power.	Verify unit is connected to power, and the switch is on.
	Cord damaged.	Replace cord.
	Overload automatic reset has not reset.	When the Line Boring Machine overloads on the circuit breaker built into the motor starter, it takes time for the machine to cool down before restart. Allow unit to adequately cool before attempting restart. If problem persists, check amp setting on the motor starter inside the electrical enclosure.
	Machine frequently trips.	One cause of overloading trips which is not electrical in nature is too fast a cut. The solution is to slow the speed at which the bits enter the workpiece. If too fast a cut is not the problem, then check the amp setting on the overload relay. Match the full load amps on the motor as noted on the motor plate. If amp setting is correct then there is probably a loose electrical lead. Check amp setting on motor starter.
	Building circuit breaker trips or fuse blows.	Verify that machine is on a circuit of correct size. If circuit size is correct, there is probably a loose electrical lead. Check amp setting on motor starter.
	Motor starter failure.	If you have access to a voltmeter, you can separate a starter failure from a motor failure by first, verifying incoming voltage at 220+/-20 and second, checking the voltage between starter and motor at 220+/-20. If incoming voltage is incorrect, you have a power supply problem. If voltage between starter and motor is incorrect, you have a starter problem. If voltage between starter and motor is correct, you have a motor problem.
Motor overheated.	Clean motor vents of dust and debris to allow proper air circulation. Allow motor to cool down before restarting.	

Trouble	Probable Cause	Remedy
<p>Machine will not start/restart or repeatedly trips circuit breaker or blows fuses.</p> <p>(continued)</p>	<p>Motor failure.</p>	<p>If electric motor is suspect, you have two options: Have a qualified electrician test the motor for function or remove the motor and take it to a qualified electric motor repair shop and have it tested.</p>
	<p>Miswiring of the unit.</p>	<p>Double check to confirm all electrical connections are correct and properly tight. The electrical connections other than the motor are pre-assembled and tested at the factory. Therefore, the motor connections should be double checked as the highest probability for error. If problems persist, double check the factory wiring.</p>
	<p>On/off switch failure.</p>	<p>If the on/off switch is suspect, you have two options: Have a qualified electrician test the switch for function, or purchase a new on/off switch and establish if that was the problem on changeout.</p>

Troubleshooting – Operational Problems

Trouble	Probable Cause	Remedy
Machine will not start.	Not connected to power source.	Check plug connection.
	Fuse blown, or circuit breaker tripped.	Replace fuse, or reset circuit breaker.
	Cord damaged.	Replace cord.
Drill speed is not sufficient; machine has low power.	Feed rate not adjusted properly.	Adjust feed rate control. [page 16]
	Extension cord too light or too long.	Replace with adequate size and length cord. [page 15]
	Low current.	Contact a qualified electrician.
After drilling, boring head will not retract.	Adjustable air relief valve damaged. [page 16]	Replace air relief valve.
After drilling, the air cylinder clamp(s) will not rise.	Adjustable air relief valve damaged. [page 16]	Replace air relief valve.
	Spring in the air cylinder clamp is broken.	Replace clamp.
Boring head will not advance.	Air hose is cracked/broken.	Replace air hose.
	Speed regulator valve too tight.	Loosen speed regulator valve.
	Air leaking from air cylinder.	Repair or replace air cylinder.
	Limit switch damaged.	Replace limit switch.
	Foot pedal not operating.	Replace foot pedal switch.
Smoke occurs while holes are being drilled.	Wood is wet.	Use dry stock.
	Boring bits are dull.	Sharpen or replace boring bits.
	Air pressure insufficient.	Properly set air pressure to approximately 90 psi (6.3 kg/cm ²). [page 14]

Replacement Parts

Replacement parts are listed on the following pages. To order parts or reach our service department, call 1-800-274-6848 between 7:00 a.m. and 6:00 p.m. (CST), Monday through Friday. Having the Model Number and Serial Number of your machine available when you call will allow us to serve you quickly and accurately.

Boring Bit Purchase/Replacement

These companies supply the Right-Hand and Left-Hand boring bits required for this machine:

Amana Tools phone: 1-800-445-0077

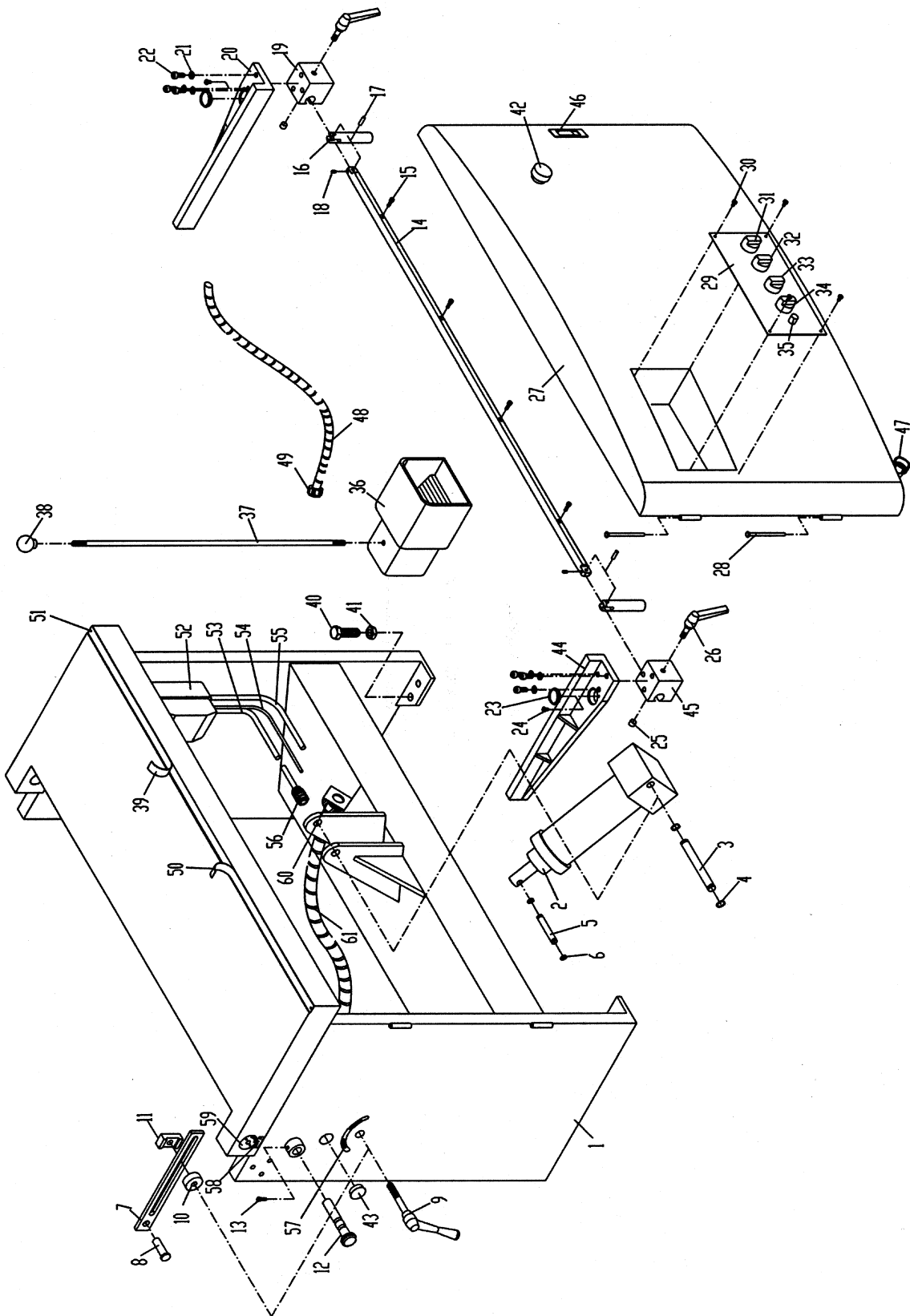
CMT phone: 1-888-CMT-BITS

Parts List: Frame Assembly

Index No.	Part No.	Description	Size	Qty
1	CBM21-101	Machine Frame		1
2	CBM21-102	Tilting Cylinder		1
3	CBM21-103	Pin	Ø16 x 135	1
4	CBM21-104	C Ring	S16	2
5	CBM21-105	Pin	Ø12 x 75	1
6	CBM21-106	C Ring	S12	2
7	CBM21-107	Support Bracket		1
8	CBM21-108	Shaft		1
9	CBM21-109	Locking Handle	M12 x 85	1
10	CBM21-110	Collar		1
11	CBM21-111	Lock Block		1
12	CBM21-112	Angle Pin		1
13	TS-1503031	Socket Head Cap Screw	M6 x 12	1
14	CBM21-114	Scale Bar		1
15	TS-1503051	Socket Head Cap Screw	M6 x 20	4
16	CBM21-116	Turning Handle		2
17	CBM21-117	Pin	Ø6 x 20	2
18	TS-1522011	Socket Set Screw	M5 x 6	2
19	CBM21-119	Block, Right		1
20	CBM21-120	Side Fence Body, Right		1
21	TS-2361081	Lock Washer	M8	6
22	TS-1504051	Socket Head Cap Screw	M8 x 25	6
23	CBM21-123	Magnifier		2
24	TS-1532032	Machine Screw	M4 x 10	2
25	CBM21-125	Brass Bushing		2
26	CBM21-126	Locking Handle	M10 x 30	2
27	CBM21-127	Door		1
28	CBM21-128	Pin		2
29	CBM21-129	Panel		1
30	TS-1533032	Machine Screw	M5 x 10	4
31	CBM21-131	Motor Switch		1
32	CBM21-132	Power Indicator		1
33	CBM21-133	Power Switch		1
34	CBM21-134	Position Switch		1
35	CBM21-135	Speed Control		1
36	CBM21-136	Foot Switch Box		1
37	CBM21-137	Rod		1
38	CBM21-138	Knob		1
39	CBM21-139	Scale, Right		1
40	CBM21-140	Hex Cap Screw (Full Thread)	M16 x 50	4
41	TS-154010	Hex Nut	M16	4
42	CBM21-142	Emergency Stop Button		1
43	CBM21-143	Plug		1
44	CBM21-144	Side Fence Body, Left		1
45	CBM21-145	Block, Left		1
46	CBM21-146	Door Latch		1
47	CBM21-147	Strain Relief (L Type)		1
48	CBM21-148	Protective Hose		1
49	CBM21-149	Strain Relief		1
50	CBM21-150	Scale, Left		1
51	CBM21-151	Rivet		8
52	CBM21-152	Magnetic Switch		1
53	CBM21-153	Motor Cord (switch to motor)		1
54	CBM21-154	Limit Switch Cord (switch to limit switch)		1
55	CBM21-155	Power Cord		1
56	CBM21-156	Strain Relief		1

Index No.	Part No.	Description	Size	Qty
57	CBM21-157	Scale		1
58	CBM21-158	Indicator		1
59	CBM21-159	Scale		1
60	CBM21-160	Strain Relief		2
61	CBM21-161	Protective Hose		1
62	3312341	Powermatic Logo (not shown)		1
63	COS18-242	Warning Label (not shown)		1

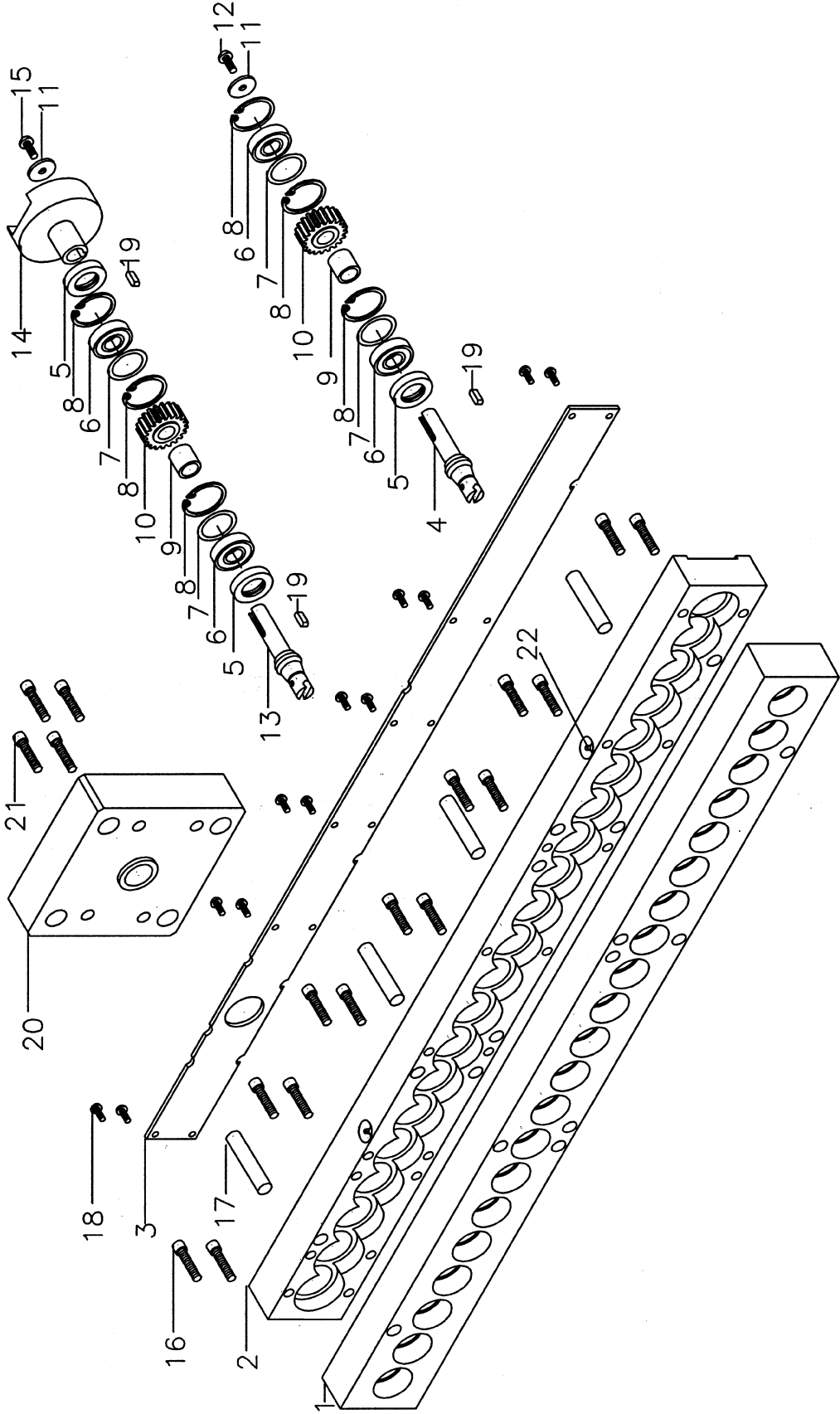
Frame Assembly



Parts List: Boring Head Assembly

Index No.	Part No.	Description	Size	Qty
1	CBM21-201	Bottom Gear Box		1
2	CBM21-202	Top Gear Box		1
3	CBM21-203	Gear Box Cover		1
4	CBM21-204	Spindle		20
5	CBM21-205	Oil Seal		22
6	BB-6001ZZ	Ball Bearing	6001ZZ	42
7	CBM21-207	Special Caulking Ring		42
8	CBM21-208	C Ring	R28	63
9	CBM21-209	Bushing		21
10	CBM21-210	Gear		21
11	CBM21-211	Special Caulking Ring		21
12	TS-1513021	Socket Head Flat Screw	M5 x 12	20
13	CBM21-213	Main Spindle		1
14	CBM21-214	Transmission Shaft		1
15	TS-1513031	Socket Head Flat Screw	M5 x 16	1
16	TS-1503071	Socket Head Cap Screw	M6 x 30	14
17	CBM21-217	Pin	Ø10 x 50	4
18	TS-1512021	Socket Head Flat Screw	M4 x 12	12
19	CBM21-219	Key	4 x 12	22
20	CBM21-220	Motor Base		1
21	TS-1504071	Socket Head Cap Screw	M8 x 35	4
22	CBM21-222	Grease Fitting		2

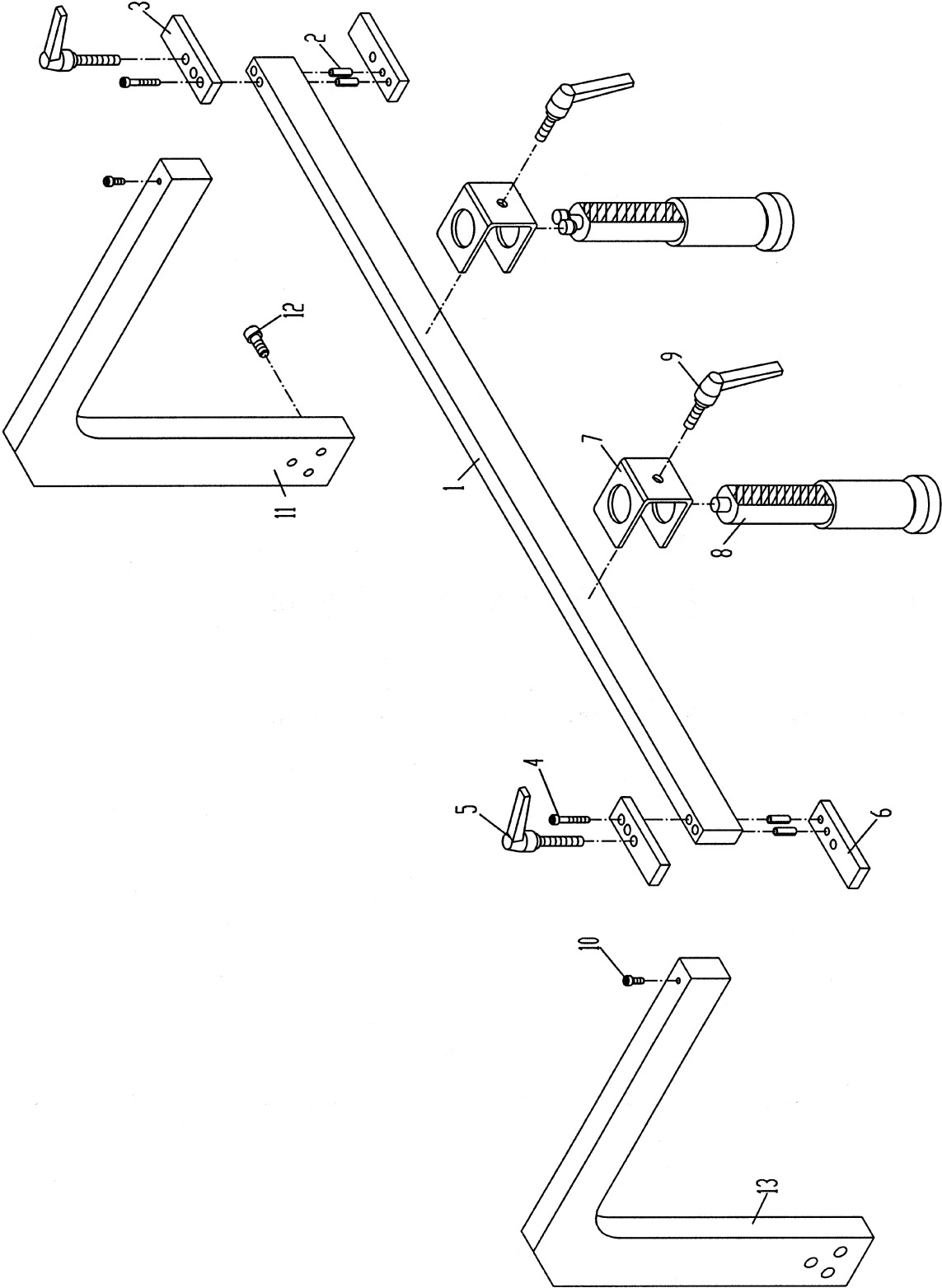
Boring Head Assembly



Parts List: Clamp System Assembly

Index No.	Part No.	Description	Size	Qty
1	CBM21-301	Beam		1
2	CBM21-302	Pin	Ø8 x 25	4
3	CBM21-303	Upper Block		2
4	TS-1503041	Socket Head Cap Screw	M6 x 16	4
5	CBM21-305	Locking Handle	M10 x 80	2
6	CBM21-306	Lower Block		2
7	CBM21-307	Clamp Base		2
8	CBM21-308	Clamp		2
9	CBM21-309	Locking Handle	M10 x 20	2
10	TS-1502011	Socket Head Cap Screw	M5 x 8	2
11	CBM21-311	Support Bracket, Right		1
12	TS-1505041	Socket Head Cap Screw	M10 x 30	6
13	CBM21-313	Support Bracket, Left		1

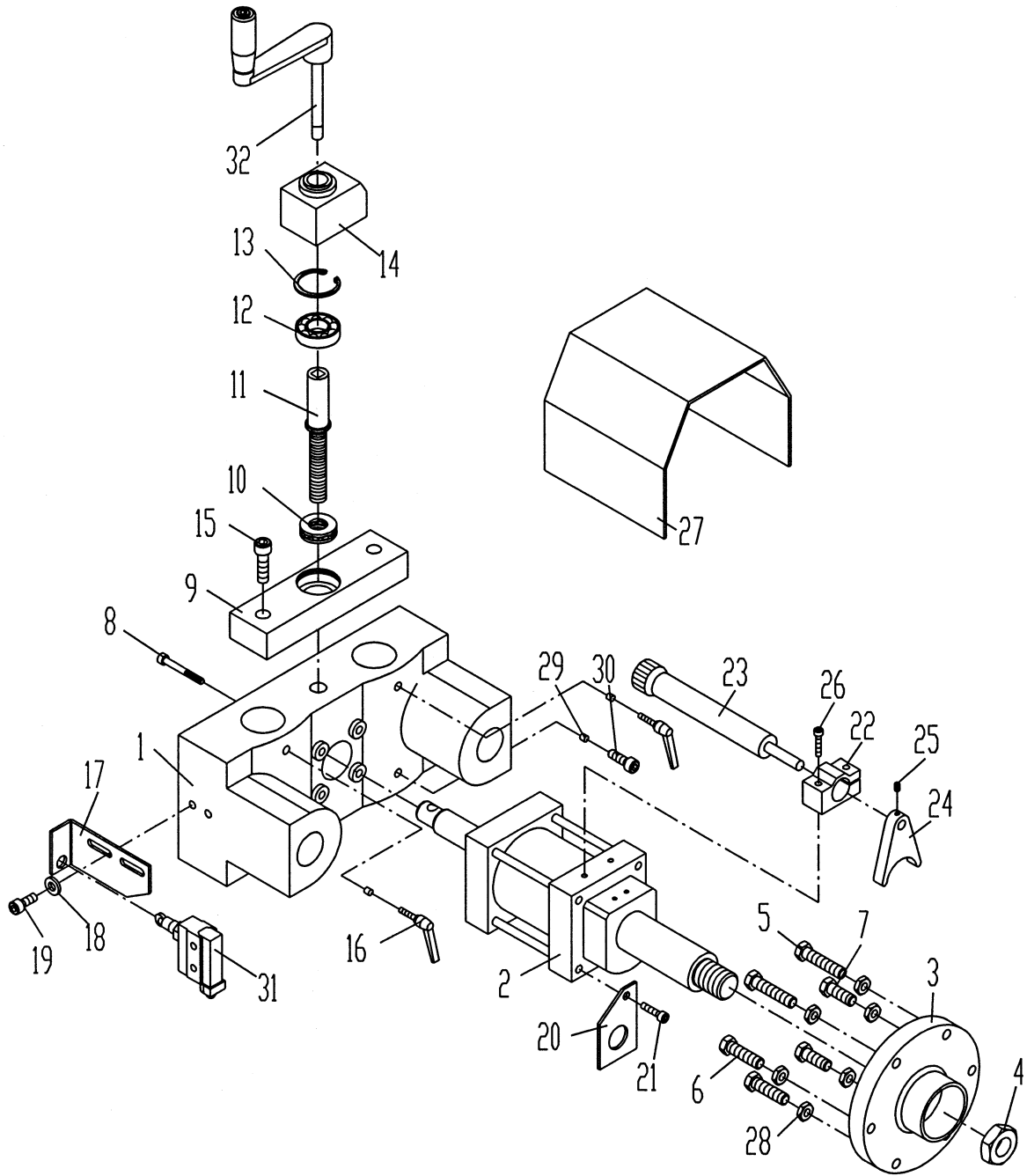
Clamp System Assembly



Parts List: Drive Unit Assembly

Index No.	Part No.	Description	Size	Qty
1	CBM21-401	Cylinder Base		1
2	CBM21-402	Cylinder		1
3	CBM21-403	Depth Adjustable Plate		1
4	CBM21-404	Special Hex Nut		1
5	CBM21-405	Hex Cap Screw (Full Thread)	M10 x 60	2
6	CBM21-406	Hex Cap Screw (Full Thread)	M10 x 45	2
7	CBM21-407	Hex Cap Screw (Full Thread)	M10 x 40	2
8	TS-1504131	Socket Head Cap Screw	M8 x 70	4
9	CBM21-409	Gear Box Housing		1
10	CBM21-410	Bearing	51103	1
11	CBM21-411	Shaft		1
12	CBM21-412	Bearing	16004	1
13	CBM21-413	C Ring	R42	1
14	CBM21-414	Readout		1
15	TS-1505041	Socket Head Cap Screw	M10 x 30	2
16	CBM21-416	Locking Handle	M8 x 16	2
17	CBM21-417	Limit Switch Bracket		1
18	TS-0680021	Flat Washer	1/4"	2
19	TS-1503041	Socket Head Cap Screw	M6 x 16	2
20	CBM21-420	Bracket		1
21	TS-1504021	Socket Head Cap Screw	M8 x 12	4
22	CBM21-422	Base		1
23	CBM21-423	Hydraulic Speed Controller		1
24	CBM21-424	Stopper		1
25	TS-1522031	Socket Set Screw	M5 x 10	1
26	TS-1503081	Socket Head Cap Screw	M6 x 35	2
27	CBM21-427	Guard		1
28	TS-1540071	Hex Nut	M10	6
29	CBM21-429	Brass Bushing		4
30	TS-1504031	Socket Head Cap Screw	M8 x 16	2
31	CBM21-431	Limit Switch		1
32	CBM21-432	Crank Handle		1

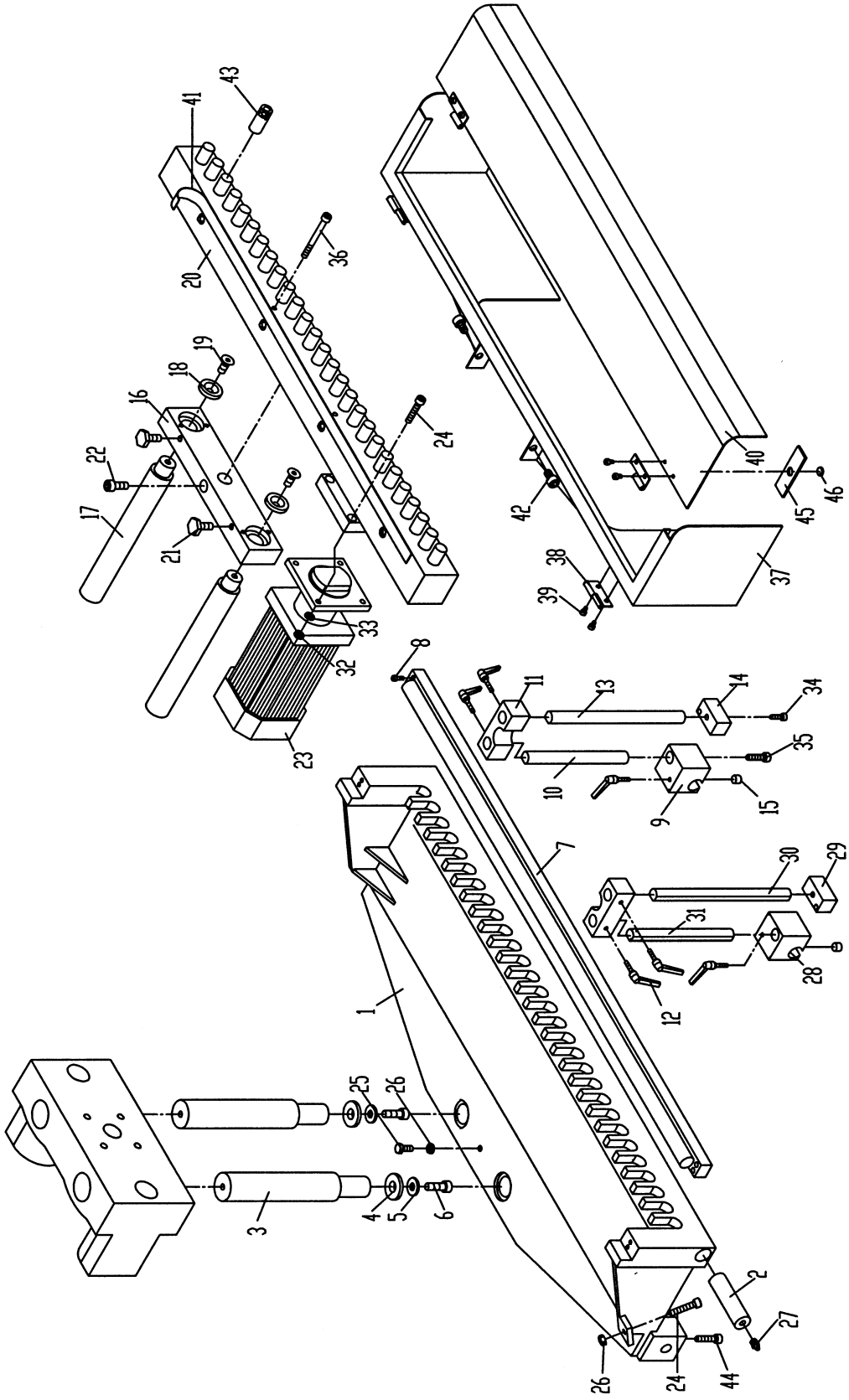
Drive Unit Assembly



Parts List: Motor and Frame Assembly

Index No.	Part No.	Description	Size	Qty
1	CBM21-501	Rack Plate Frame		1
2	CBM21-502	Turning Shaft		2
3	CBM21-503	Guide Bar		2
4	CBM21-504	Special Washer		2
5	TS-0680041	Flat Washer	3/8"	2
6	TS-1505041	Socket Head Cap Screw	M10 x 30	2
7	CBM21-507	Guide Bar		1
8	TS-1503031	Socket Head Cap Screw	M6 x 12	4
9	CBM21-509	Block, Right		1
10	CBM21-510	Short Scale Bar, Right		1
11	CBM21-511	Bar Supporter		2
12	CBM21-512	Locking Handle	M6 x 15	6
13	CBM21-513	Long Scale Bar, Right		1
14	CBM21-514	Stopper, Right		1
15	CBM21-515	Brass Bushing		2
16	CBM21-516	Guide Block		1
17	CBM21-517	Guide Bar		2
18	CBM21-518	Spacer		2
19	TS-1516021	Socket Head Flat Screw	M10 x 25	2
20	CBM21-520	Boring Head		1
21	CBM21-521	Special Screw		4
22	TS-1505071	Socket Head Cap Screw	M10 x 45	1
23	CBM21-523	Motor		1
24	TS-1504081	Socket Head Cap Screw	M8 x 40	5
25	TS-1490031	Hex Cap Screw	M8 x 20	1
26	TS-1540061	Hex Nut	M8	2
27	CBM21-527	Grease Fitting		2
28	CBM21-528	Block, Left		1
29	CBM21-529	Stopper, Left		1
30	CBM21-530	Long Scale Bar, Left		1
31	CBM21-531	Short Scale Bar, Left		1
32	TS-2331081	Cap Nut	M8	4
33	TS-2361081	Lock Washer	M8	4
34	TS-1503051	Socket Head Cap Screw	M6 x 20	2
35	TS-1504061	Socket Head Cap Screw	M8 x 30	2
36	TS-2238751	Socket Head Cap Screw	M8 x 75	4
37	CBM21-537	Safety Guard		1
38	CBM21-538	Hinge		2
39	CBM21-539	Socket Head Cap Screw	M5 X 5	8
40	CBM21-540	PC Cover		1
41	CBM21-541	Label, Bit Rotation		1
42	CBM21-542	Socket Head Cap Screw	M10 X 12	2
43	CBM21-543	Quick Chuck		21
44	TS-1504071	Socket Head Cap Screw	M8 x 35	1
45	CBM21-545	Magnet (Square)		2
46	CBM21-546	Magnet (Round)		2

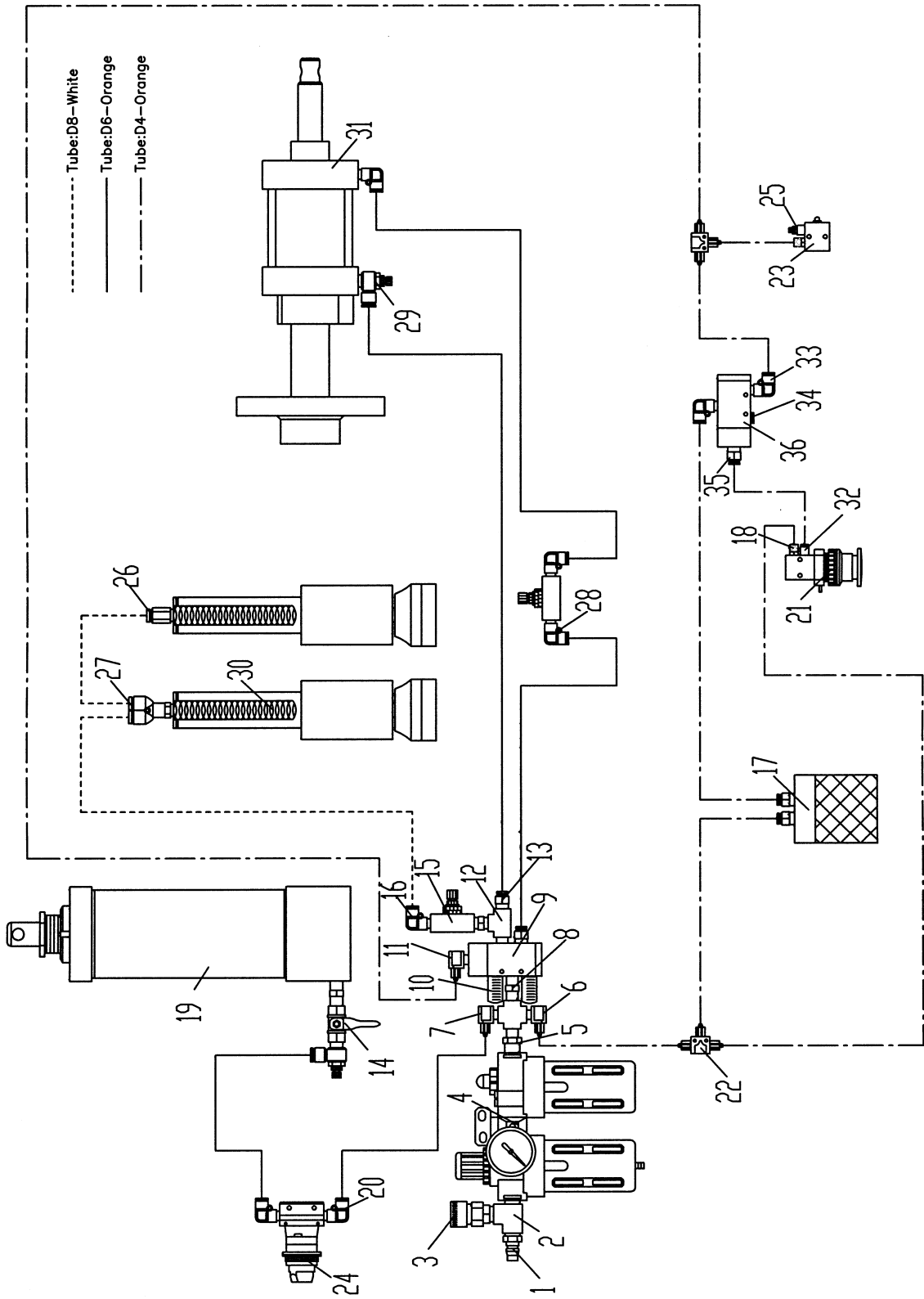
Motor and Frame Assembly



Parts List: Pneumatic Diagram

Index No.	Part No.	Description	Size	Qty
1	CBM21-601	Quick Fitting		1
2	CBM21-602	Connection Block		1
3	CBM21-603	Quick Fitting		1
4	CBM21-604	F.R.L. Unit		1
5	CBM21-605	Jointer	3/8" x 1/4"	1
6	CBM21-606	Tube Fitting (L type)	1/4" x Ø 4	1
7	CBM21-607	Tube Fitting (L type)	1/4" x Ø 6	1
8	CBM21-608	Jointer	1/4" x 1/4"	3
9	CBM21-609	Connector		1
10	CBM21-610	Silencer	1/8"	2
11	CBM21-611	Tube Fitting (L type)	1/8" x Ø 4	1
12	CBM21-612	Connection Block	1/4"	1
13	CBM21-613	Quick Tube Fitting (I type)	1/4" x Ø 6	2
14	CBM21-614	Ball Valve	1/4"	1
15	CBM21-615	Air Regulator	1/4"	2
16	CBM21-616	Quick Tube Fitting (L type)	1/4" x Ø 8	1
17	CBM21-617	Pedal Switch		1
18	CBM21-618	Golden Tube Fitting (I type)	Ø 5 x Ø 4	2
19	CBM21-102	Tilting Cylinder		
20	CBM21-620	Quick Tube Fitting (L type)	1/8" x Ø 6	2
21	CBM21-142	Emergency Stop Button		
22	CBM21-622	Tube Fitting (T type)	Ø 4 x Ø 4 x Ø 4	2
23	CBM21-623	Limit Switch		1
24	CBM21-134	Position Switch	1/8"	
25	CBM21-625	Air Regulator	Ø 5	1
26	CBM21-626	Quick Tube Fitting (I type)	1/4" x Ø 8	1
27	CBM21-627	Quick Tube Fitting (Y type)	1/4" x Ø 8	1
28	CBM21-628	Quick Tube Fitting (L type)	1/4" x Ø 6	3
29	CBM21-629	Air Regulator	1/4" x Ø 6	2
30	CBM21-308	Clamp		
31	CBM21-402	Cylinder		
32	CBM21-632	Quick Tube Fitting (I type)	Ø 5 x Ø 4	1
33	CBM21-633	Quick Tube Fitting (L type)	1/8" x Ø 4	2
34	CBM21-634	Special Screw	1/8"	1
35	CBM21-635	Quick Tube Fitting (I type)	1/8" x Ø 4	3
36	CBM21-636	Connector	1/8"	1

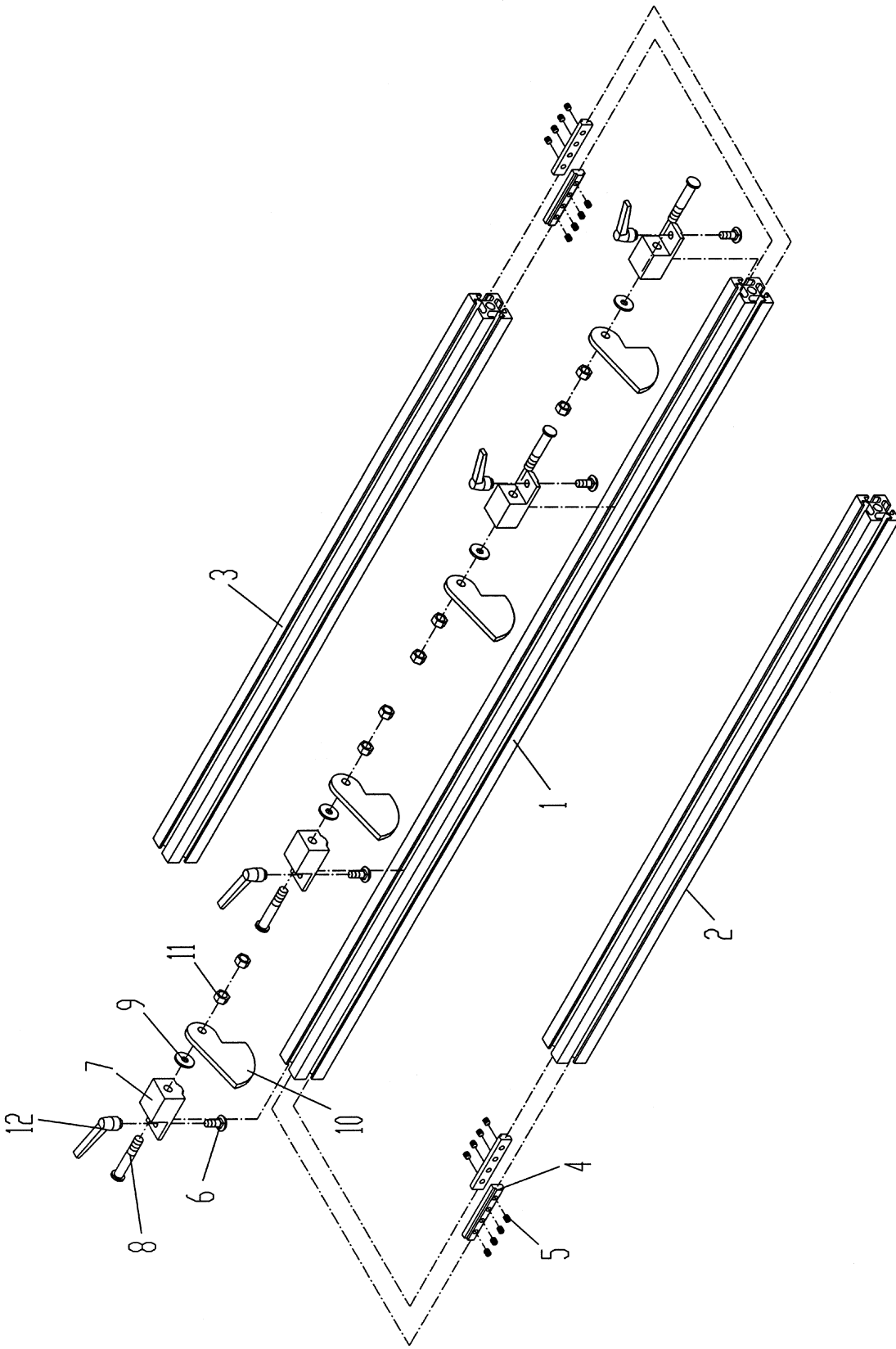
Pneumatic Diagram



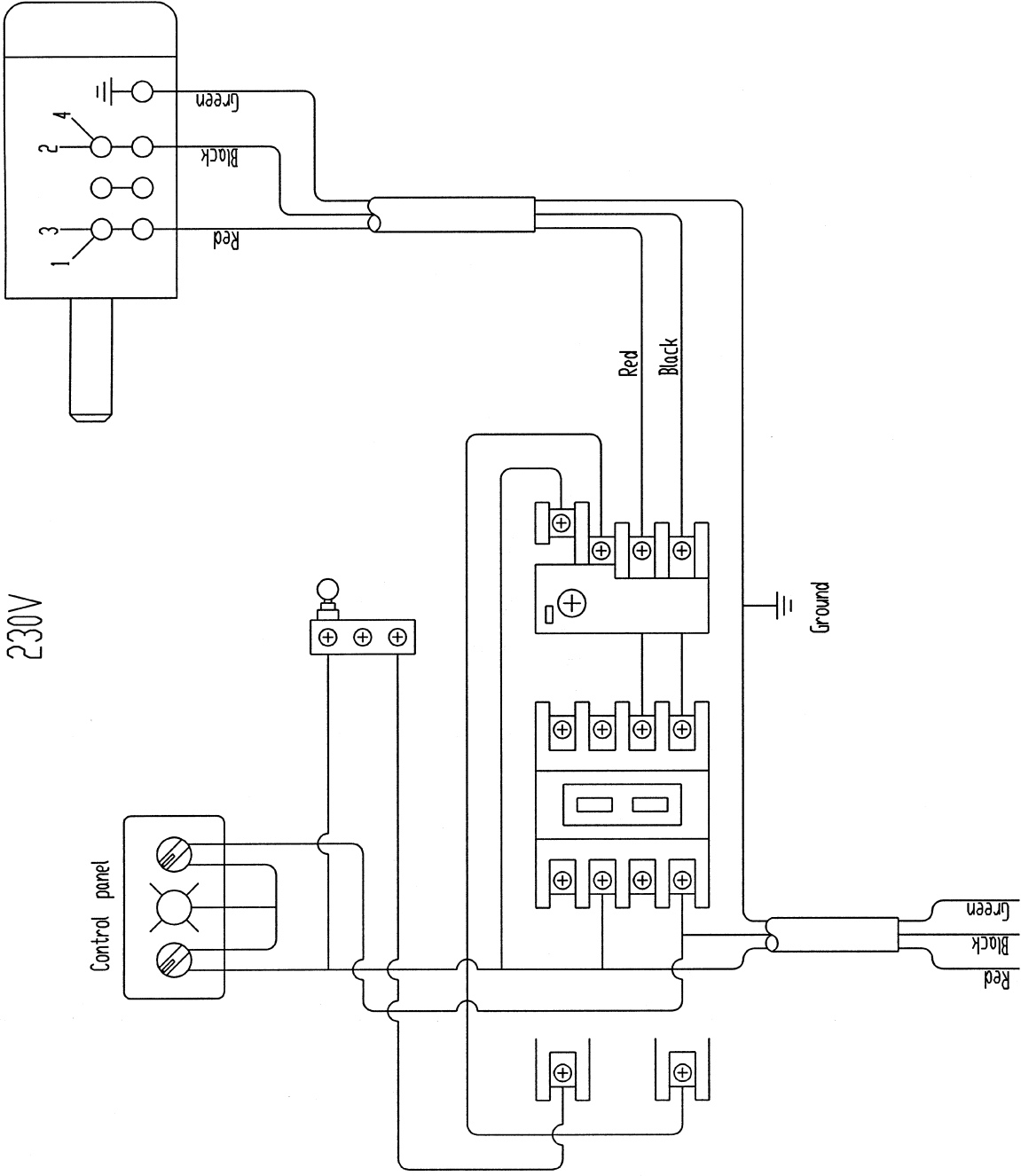
Parts List: Fence and Stops

Index No.	Part No.	Description	Size	Qty
1	LBM21-120	Fence		1
2	LBM21-143	Extended Fence, Left		1
3	LBM21-146	Extended Fence, Right		1
4	LBM21-144	Connecting Block		4
5	TS-2276081	Socket Set Screw	M6 x 8	16
6	LBM21-111	Carriage Bolt	M8 x 20	4
7	LBM21-126	Stop Block Body		4
8	LBM21-127	Special Bolt		4
9	TS-0680031	Flat Washer	5/16"	4
10	LBM21-129	Stop Plate		4
11	TS-1540061	Hex Nut	M8	8
12	LBM21-116	Locking Handle	M8	4

Fence and Stops



Electrical Connections



NOTES

NOTES

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