



## 30DC Speed Lathe Manual

The Crozier Model 30DC Speed Lathe is our most popular model. It has many standard features not found on any other machine in its class or price range.

### *Standard Features*

- 3/4 HP Belt Drive
- Air-Collet Closure
- 0-3600 RPM, Variable Speed
- Dynamic Brake
- Cast Housing
- 5C Collets
- 1 Phase / 120 Volts



### **DESCRIPTION:**

**Air-Collet Closure:** The air-collet closure is designed and built as an integral element of the speed lathe. Therefore, low speed restriction or cylinder wobble is NOT inherent in Crozier speed lathes. The foot switch operated air-collet also mitigates operator fatigue in achieving collet closure. A foot valve operates the collet closure leaving both hands free. The air-collet closure facilitates rapid loading and unloading of the part. For thin wall parts, an air regulator on the inlet air will reduce the pressure to prevent damaging delicate parts. For Inside Dimension (ID) collets, the collet closure provides more than enough movement to properly operate the collet.

**Variable Drive motor:** The DC variable speed motor provides spindle speeds from 0 to 3600 RPM. This wide range allows the operator to find the optimum speed for each operation. There is no need to move the belt to change the speed. The motor is rated at 3/4 horsepower, sufficient for demanding jobs. The motor transfer is through a multi-groove belt, similar to the belt under the hood of your car. Dynamic spindle braking is provided through the control. There is nothing mechanical in the braking mechanism to wear, replace or adjust.

**Spindle:** The oversized spindle rides on ball bearings. The machine can operate continuously at 3600 RPM. The front bearing, on the collet end, is a double row assembly with an extremely high load capability. The bearings are permanently lubricated. The spindle has a through hole up to the capacity of a standard 5C collet. The collet insert can be replaced without replacing the entire spindle.

**Power:** The Speed Lathe requires 120 Volts, single-phase power. The input power is AC that is converted to DC. By design, the DC motor only draws power as required for the operation. Air requirements are 90 PSI dry air.

## SPECIFICATIONS:

### Collet

Collet Type	5C
Collet Capacity	1.062 in.
Collet Closure Operation	Air

### Spindle

Housing Construction	Cast
Bearing Type	Ball
Front Bearing	Double Row
Rear Bearing	Single Row
Rear Lubrication	Sealed
Standard Spindle Speed	0–3600 RPM
Maximum Spindle Speed	3600 RPM
Spindle through Hole	1.125 inches
Spindle Brake	Dynamic

### Drive System

Motion	Multi-groove V Belt
Motor Speed	2500 RPM
Motor Horsepower	.75 HP
Motor Phase	Single

### General Notes

Electrical	Single Phase/120V/10A
Base Width	20 inches
Base Depth	17 inches
Machine Height	16 inches
Machine Weight	110 lbs.
Shipping Weight	145 lbs.

### **UNPACKING**

The Crozier Model 30DC Speed Lathe is attached to a wooden pallet. The Speed Lathe is attached to the bottom of the container with four carriage bolts. Remove the bolts from the mounting holes. The Speed Lathe is ready for installation. Check the box for all parts. If any damage is noted call the freight company immediately. The freight company is responsible for the safe delivery of the machine and if immediate notification of damage is not reported, you might not be able to file a claim for damages.

### **INSTALLATION**

The Crozier Model 30DC Speed Lathe must be secured to a suitable stand at all times.

### **LUBRICATION**

The Crozier Model 30DC Speed Lathe is designed to operate with sealed bearings. No provision has been made for introducing grease into the bearings. Should it become necessary to change bearings only sealed bearings of electric motor quality C/3 fit with seals or shields on both sides should be used. No bearing spacers are required.

### **POWER CONNECTION**

The Crozier Model 30DC Speed Lathe input requirement is 120 Volts, single-phase power. Motor rotation is counter-clockwise, looking directly at the shaft. The machine comes ready from the factory to plug in the wall. The cord supplied is a standard 120 volt plug. No additional electrical work is required. There is no reason for the control box to be opened unless something was damaged in transit.

### **AIR REQUIREMENTS**

The Crozier Model 30DC Speed Lathe requires 90 PSI dry air for proper operation. The air operates the collet closure. Never operate the Speed Lathe without the air connection hooked up. Under no circumstance should the machine be run with a part in the collet and the air off.

### **AIR-COLLET CLOSURE**

Wait for the Speed Lathe to come to a complete stop before attempting to open the collet closure. DO NOT open the collet closure with the Speed Lathe running. Make sure the part is secured in the collet and the collet is closed under air pressure before turning the machine on. DO NOT place long parts that can whip or extremely heavy parts in the collet that are not in balance or straight.

The foot pedal activates the air closure, in the text, the valve is referred to as a foot valve. The foot pedal is normally hooked up when the machine is received. If not, it is important to make the right connection. The collet is drawn into the spindle with the foot pedal untouched. When you push down on the foot pedal, the collet is pushed off the taper and the collet opens. If the operation is backwards reverse the two (2) air lines going into the back of the machine. To load the collet, find the collet key in the spindle nose. Check the collet threads and drive slot on the collet. Make sure the collet threads and drive slot are clean. Insert the collet in the spindle nose lining up the key. Press the collet firmly against the draw tube. Turn the draw tube hand wheel clockwise drawing the collet into the nose. When the collet is nearly in the spindle place the part in the collet. Continue turning the hand wheel until the part is tight in the collet. When the part is tight in the collet push down on the pedal at the same time turn the hand wheel two (2) detents clockwise. Release the pedal. The part should now be tight. If the part is not tight, push down again and repeat the procedure turning one (1) detent each time.

## **COLLETS**

If the collet sticks or is hard to open, polish the collet surface that slides into the precision hole. Only high quality collets should be used. For best results, we recommend, Hardinge®: 5C collets. [Hardinge® Collets](#) are available from factory outlets in major cities or from reputable tool houses. If the machine is used in an abrasive environment the spindle hole should be cleaned when you change collets.

The threads on the draw tube can wear from extended use or using worn or undersized collets. If this occurs the collet will not lock into the spindle and the work piece will not be held. The draw tube must be replaced if this happens. Always check the collet threads for damage or foreign material. In an abrasive environment clean the collet threads at regular intervals. If the collet keeps working itself loose check the rotation. If the rotation is correct make sure the drive key has not sheared off. If this happens replacement of the key is necessary.

There should be a minimum of .075 inches in the opening and closing movement of the collet. The standard 5C collet can accept a work piece variance of .005 inches. Any larger variance will cause the collet to distort and not hold the part properly. Do not under any circumstance force the collet to hold an undersized part. Serious damage can result from such actions.

## **DC SPEED CONTROL**

The 30DC Speed Lathe is equipped with a variable speed drive system. The DC Speed Control consists of a DC motor and a DC speed control package. To vary the speed, turn the speed control knob on the control box. The speed control knob is labeled from 0 - 100 percent. 0 percent is off, while 100

percent is full speed. Choose a speed that is right for your operation. When you vary the speed from a higher speed to a lower speed, it is necessary to wait till the motor stabilizes at the new speed setting before beginning polishing or cutting. The start/stop buttons are located on the top of the control box. One common problem when starting the machine is the start button is energized and the spindle does not turn. Check the position of the speed control knob to make sure it is not set at 0 percent.

## **BRAKE**

The Speed Lathe is equipped with dynamic braking. It is automatically activated when the motor is shut off. After the motor stops, the spindle will turn freely. There is no adjustment required on the brake. The motor can be cycled on and off continually without damage to the unit.

## **GENERAL NOTES**

As with all equipment proper care should be taken. Safety glasses must be worn at all times while operating the Speed Lathe. It is the responsibility of the end user to determine the suitability of the Speed Lathe in their application.

This machine is a precision machine tool. The components used in its manufacture are of the highest quality and the machined parts are held to very exact tolerances. If you expect the machine tool to last, you must take proper care of it.

The Crozier Model 30DC Speed Lathe can be cycled on and off as fast as you can do the work.

## **MAINTENANCE MANUAL:**

Speed Lathes requires very little maintenance under normal use. Should maintenance become necessary please consult the parts drawing and assembly procedure before starting work. For best results when replacing old parts use only original Crozier replacement parts.

The machine is divided into two major components (the drive motor and the work spindle). They are connected by a common base and drive belt. Before starting any work, determine the nature of the problem. If you cannot repair the machine yourself and the work spindle must be returned to the manufacturer, disconnect the unit from the base and ship the work spindle **ONLY**. This can save time and money. Freight charges are the responsibility of the user. Before working on an electrical component, make sure the power has been disconnected and not just turned off at the switch.

Tools required to disassemble and assemble the 30DC Speed Lathe are:

- Arbor Press
- Snap Ring Pliers
- Pry Bar
- Allen Wrench Set
- Open End Wrench Set
- Flat Blade Screw Driver
- Drill
- Rubber Mallet
- Spanner Wrench
- Tape Measure

### **Motor Drive**

The drive motor is a standard DC motor available from a variety of different sources. If a replacement motor is required, you can buy a replacement from most motor shops or supply houses. The major motor problems are the bearings and brushes. If a motor problem occurs it is best to have a professional assess the problem. Before sending the motor in for repair remove the pulley and key. These parts are easily overlooked when the motor is returned. In some cases it is cheaper and faster to replace a bad motor and have it repaired later. If you have multiple units, have the old motor repaired and keep it as a spare.

### **Control Box Wiring**

The control box wiring shown below is for machines from 1999 to the present.

<u>Terminal Block</u>	<u>Connection Description</u>
#1	Incoming Power
#2	Incoming Power
#3	Not Connected
#4	Ground
#5	Start Button
#6	Start Button
#7	Stop Button
#8	Motor Lead #1
#9	Motor Lead #2
#10	Not Connected
#11	Air Valve Collet Closure
#12	Air Valve Collet Closure
#13	Foot Switch
#14	Foot Switch Non Interlock
#15	Foot Switch Interlocked
#16	Speed Potentiometer
#17	Speed Potentiometer
#18	Speed Potentiometer

### **Spindle**

The spindle is a precision piece of equipment and should be treated gently. Never apply unnecessary force on any part. Although the spindle housing and associated parts are made from quality castings any part can break from excessive force. The spindle has three sections (the collet end, the operating end and the main spindle housing).

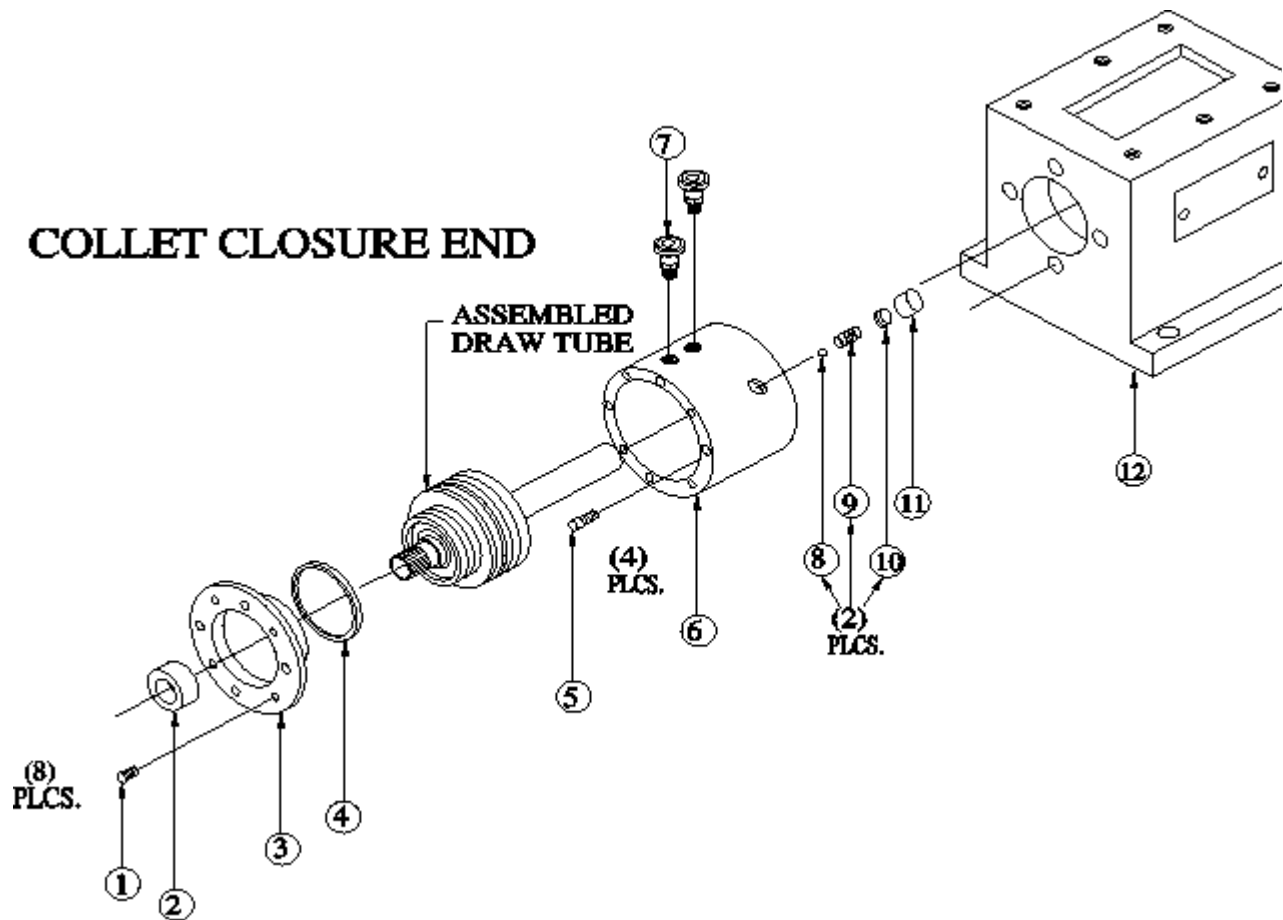
## Front End

To disassemble the front end:

1. Remove the four (4) Allen Cap bolts (F-209) holding the Front Bearing Cap (PL4-54).
2. Remove the Front Nut (N-100) from the Spindle (PL4-26).
3. Remove the Front Bearing Cap (PL4-54).
4. If you are removing the spindle, loosen the drive motor and remove the belt from the drive motor spindle.

## Collet Closure End

The collet closure is an air operated double acting cylinder which operates the collet action. Normal operating pressure is 90 PSI.



1. F-301 - Allen Flat 8/32 x 3/4
2. PL4-32 - Hand Wheel
3. PL4-06 - Outer Cam
4. A-406 - "O" Ring
5. F-204 - Allen Cap 5/16-18 x 1/2
6. PL4-07 - Operating Housing

1. A-300 - Air Fitting
2. PL4-11 - Steel Ball
3. PL4-10 - Spring
4. PL4-09 - Set Screw
5. PL4-66 - Plastic Plug
6. PL4-12 - Spindle Housing

To disassemble the collet closure end, refer to the drawing above and follow these instructions.

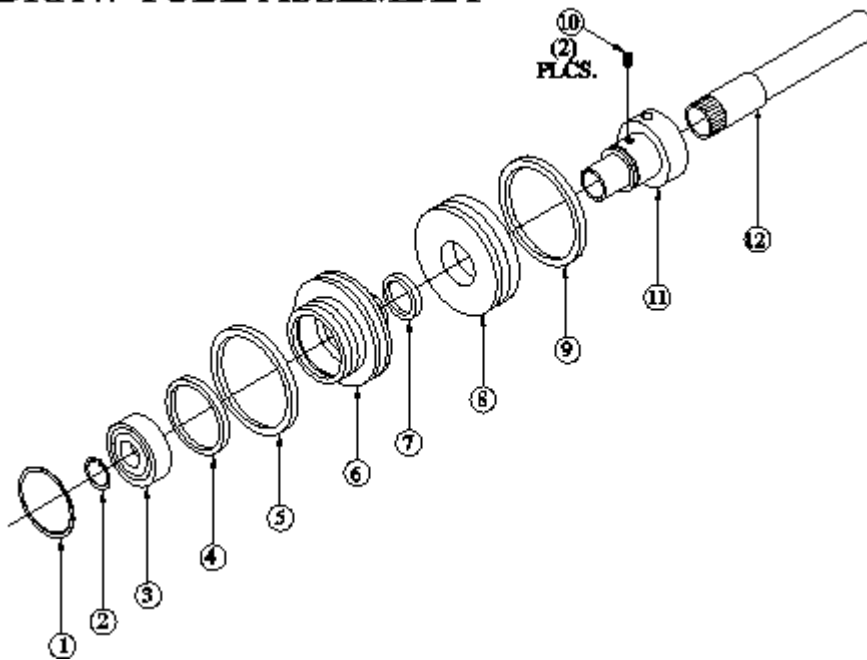
Mark the location of Outer Cam (PL4-06) in relation to Operating Housing (PL4-07). This setting needs to be maintained on assembly.

1. Remove eight (8) Allen screws (F-301) on the Outer Cam (PL4-06).
2. Remove the Outer Cam (PL4-06) and the "O" Ring (A-406) on the Outer Cam (PL4-06).
3. Remove two (2) set screws in Inner Cam (PL4-08) located on Operating Housing (PL4-07).
4. Grasp the Hand Wheel (PL4-02) and pull entire draw tube assembly out.
5. Remove the two Steel Balls (PL4-11) and two Springs (PL4-10) that have fallen from the Adjusting Plate (PL4-03).
6. Remove four (4) Allen Cap bolts (F-204) from the Operating Housing (PL4-07).
7. Remove Operating Housing (PL4-07).

### Draw Tube Assembly

Before starting work on the draw tube, measure the distance from the end of the draw tube to the underside of the Adjusting Plate (PL4-03). This setting needs to be maintained on assembly.

## DRAW TUBE ASSEMBLY



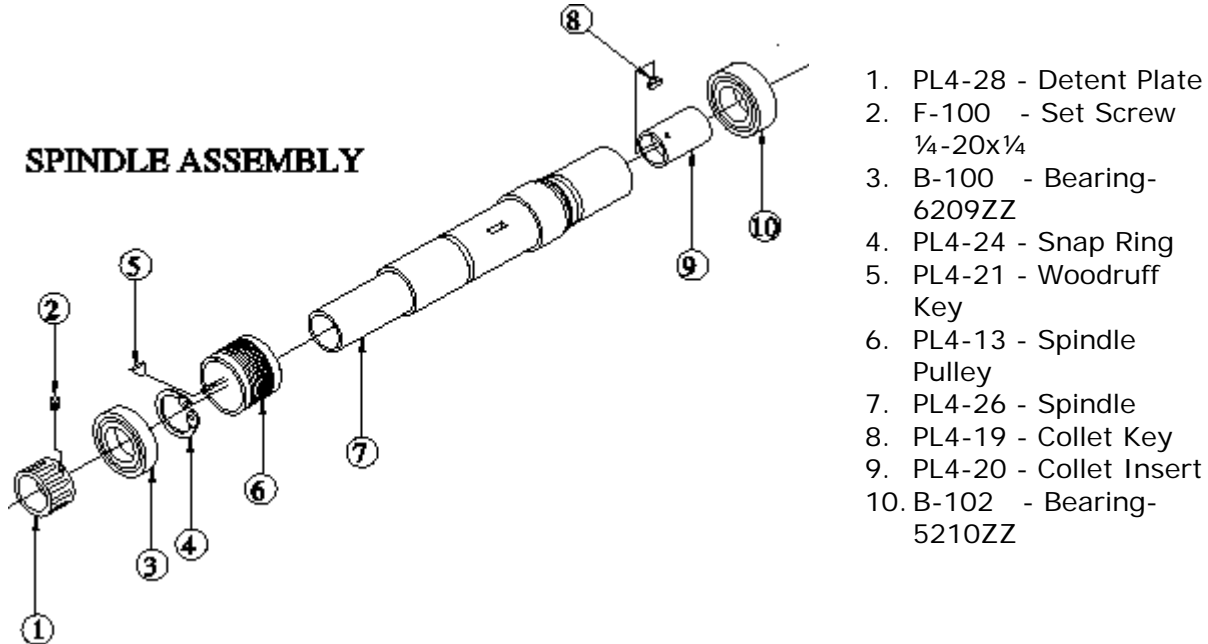
1. PL4-34 - Spiral Lock Ring
2. PL4-24 - Snap Ring
3. B-100 - Bearing-6209ZZ
4. A-402 - "O" Ring
5. A-404 - "O" Ring
6. PL4-05 - Center Cam
7. A-400 - "O" Ring
8. PL4-08 - Inter Cam
9. A-404 - "O" Ring
10. F-100 - Set Screw ¼-20x¼
11. PL4-03 - Adjusting Plate
12. PL4-01 - Draw Tube

1. Remove the Hand Wheel (PL4-02).
2. Remove small Snap Ring (PL4-32) on the Adjusting Plate (PL4-03). It is on the hand wheel end of the draw tube assembly.
3. Remove the Center Cam (PL4-05) with the Bearing (B-100) still inside. These parts comes off the hand wheel end.
4. The Inner Cam (PL4-08) comes off after the Center Cam (PL4-05). When putting the assembly back together put the Inner Cam (PL4-08) on before putting on the Center Cam (PL4-05).
5. Remove the Spiral Lock Ring (PL4-34). Remove the Bearing (B-100).
6. Remove the Adjusting Plate (PL4-03). The Adjusting Plate (PL4-03) is a press fit on the draw tube. It is also held on by two (2) Set Screws (F-100).
7. Remove the two (2) Set Screws (F-100) from the large diameter of the Adjusting Plate (PL4-05). Place them with the two Steel Balls (PL4-11) and Springs (PL4-10). See the procedure under General Notes.

## Spindle Housing

The unit is now down to the housing and the spindle. On the back of the spindle is the Detent Plate (PL4-28), held in place with a Set Screw (F-100).

Push the spindle out the collet end of the housing. Be careful not to pinch the drive belt. Remove the drive belt when the spindle is half way out of the housing. Take care not to drop the spindle.



1. Remove the Spindle Nut (N-100) from the Spindle (PL4-26) in front of double row Bearing (B-102).
2. Remove the front Bearing (B-102).
3. Remove the Detent Plate (PL4-28) from rear of the Spindle (PL4-26).
4. Remove the rear Bearing (B-100).

## General Notes

- When replacing bearings never use open bearings.
  - Always push on the inner race of bearings, never the outer race.
  - Never use a steel hammer to hit ANY parts.
  - Always grease the "O" rings when reassembling the units.
1. After reassembling the machine, replace the Steel Ball (PL4-11) and Spring (PL4-10) that came from the Adjusting Plate (PL4-03) back in the machine.
  2. On the Operating Housing (PL4-07) there is a large diameter hole with a Plastic Plug (PL4-66) in it. Remove the Plastic Plug (PL4-66).
  3. Using a flashlight to shine in the hole, turn the draw tube hand wheel until you see the hole.
  4. Place the Steel Ball (PL4-11) in, then the Spring (PL4-10).
  5. Replace the Set Screw (PL4-09).
  6. Make sure the Set Screw (PL4-09) is below the level of the Adjusting Plate (PL4-03) or the Set Screw (PL4-09) will catch.

7. Rotate the hand wheel 180 degrees and repeat the procedure for the second hole.
8. After this is done grasp the spindle by the pulley inside the housing and turn the hand wheel. You will hear a ratchet action.
9. Replace the Plastic Plug (PL4-66).

### **Assemble Spindle**

1. Place the Woodruff Key (PL4-21) in the slotted notch in the Spindle (PL4-26).
2. Slide the Spindle Pulley (PL4-13) over the long end of the Spindle (PL4-26) over the previously installed Woodruff Key (PL4-21). Make sure the Woodruff Key (PL4-21) lines up with the slot in the Spindle Pulley (PL4-13). Push the Spindle Pulley (PL4-13) all the way up to the spindle's shoulder.
3. Install the Snap Ring (PL4-24) on at rear of Spindle Pulley (PL4-13). Make sure the Snap Ring (PL4-24) is fully seated.
4. Install the front Bearing (B-100) on the Spindle (PL4-26). Push on the inner bearing race only. Seat the Bearing (B-100) against the spindle shoulder.
5. Install the rear Bearing (B-102) on the Spindle (PL4-26). Push on the inner bearing race only. Seat the Bearing (B-102) tightly against the spindle shoulder.
6. Install the Detent Plate (PL4-28) on the Spindle (PL4-26). Make sure the Detent Plate (PL4-28) is snug against the Bearing (B-100).
7. Take a drill and carefully dimple the Spindle (PL4-26), through the hole on the Detent Plate (PL4-28). Make the dimple about .050 to .075 of an inch deep.
8. Install the Set Screw (F-100) and tightening snugly.

The spindle assembly is ready to be placed in the housing. The spindle assembly goes through the front of the housing. After the Bearing (B-102) has cleared the front bearing area, place the Drive Belt (PL4-45A) under the spindle and near the Spindle Pulley (PL4-13). Continue to push the spindle assembly into the housing until the front Bearing (B-100) is tight in the housing. The front Bearing (B-100) will just be below the surface of the housing.

### **Assemble Front End**

1. Take the Front Bearing Cap (PL4-54) and place it over the spindle assembly.
2. Rotate the Front Bearing Cap (PL4-54) until the four bolt holes line up.
3. Install the four (4) Allen Cap bolts (F-209). Making certain that they are tight.
4. Install the Front Seal (PL4-53).
5. Install the Front Nut (N-100) by turning in on the spindle threads.
6. Tighten the Front Nut (N-100) by grasping the spindle assemble through the hole in the side of the housing. Use a spanner wrench and tighten as tight as you can by hand.

**PARTS LIST:**

Part #	Description	Qty.	Price
PL4-01	Draw Tube	1	\$ 98.00
PL4-02	Hand Wheel	1	\$ 15.00
PL4-03	Adjusting Plate	1	\$ 135.00
PL4-05	Center Cam	1	\$ 145.00
PL4-06	Outer Cam	1	\$ 95.00
PL4-07	Operating Housing	1	\$ 275.00
PL4-08	Inner Cam	1	\$ 95.00
PL4-09	Set Screw	2	\$ 1.75
PL4-10	Spring	2	\$ 1.75
PL4-11	Steel Ball	2	\$ 1.75
PL4-12	Spindle Housing	1	\$ 800.00
PL4-13	Spindle Pulley	1	\$ 75.00
PL4-19	Collet Key	1	\$ 8.50
PL4-20	Collet Insert	1	\$ 105.00
PL4-21	Woodruff Key	1	\$ 1.75
PL4-24	Snap Ring (196)	1	\$ 6.50
PL4-26	Spindle	1	\$ 375.00
PL4-28	Detent Plate	1	\$ 75.00
PL4-32	Snap Ring (177)	1	\$ 6.50
PL4-34	Spiral Lock Ring	1	\$ 5.00
PL4-40	Base	1	\$ 175.00
PL4-45A	Drive Belt	1	\$ 25.00
PL4-46	Motor Pulley	1	\$ 75.00
PL4-53	Front Seal	1	\$ 25.00
PL4-54	Front Bearing Cap	1	\$ 125.00
PL4-66	Plastic Plug	1	\$ 1.00
PL4-69	Motor Mount	1	\$ 75.00
PL4-70	Belt Guard	1	\$ 75.00

Part #	Description	Qty.	Price
A-202	Solenoid	1	\$ 65.00
A-300	Air Fitting	5	\$ 2.00
A-400	"O" Ring	1	\$ 4.00
A-402	"O" Ring	1	\$ 4.00
A-404	"O" Ring	2	\$ 4.00
A-406	"O" Ring	1	\$ 4.00
B-100	Bearing-6209ZZ	2	\$ 34.00
B-102	Bearing-5210ZZ	1	\$ 65.00
E-100	Control Box	1	\$ 100.00
E-210	Foot Switch	1	\$ 100.00
E-300	Motor Contactor	2	\$ 75.00
E-509	Knob Kit	1	\$ 15.00
E-510	Speed Pot	1	\$ 15.00
E-530	Brake Resistor	1	\$ 5.00
E-577	Power Cord	1	\$ 10.00
E-600	Start Button	1	\$ 25.00
E-601	Stop Button	1	\$ 35.00
E-606	Contact Block N/O	1	\$ 15.00
E-607	Contact Block N/C	1	\$ 15.00
E-610	Label-Start	1	\$ 4.00
E-611	Label-Stop	1	\$ 4.00
E-701	DC Control	1	\$ 125.00
F-100	Set Screw 1/4-20 x 1/4	3	\$ 1.75
F-107	Set Screw 5/16-18 x3/8	2	\$ 1.75
F-204	Allen Cap 5/16-18 x 1/2	8	\$ 1.75
F-209	Allen Cap 3/8-16 x 1/2	4	\$ 1.75
F-301	Allen Flat 8/32 x 3/4	8	\$ 1.75
F-400	Allen Hex 1/4-20 x 1/2	8	\$ 1.75
N-100	Front Nut	1	\$ 15.00
M-300	Motor	1	\$ 425.00

**CONTACT INFORMATION:**

***New Sales - Parts - Service***

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