

# MODEL 708E/EL

Laboratory Centrifuge

## OPERATION MANUAL



**THE DRUCKER CO.**

*Reliability in Laboratory Centrifuges Since 1932*

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## ***Introduction:***

Centrifuges are an essential instrument in the laboratory preparation process and **The Drucker Company** has been *manufacturing centrifuges since 1932*.

The company was formed in St. Louis, Missouri, when Ken Drucker purchased the Phillips Company, an instrument repair company established in 1908. Within a few years, Mr. Drucker has turned the firm's business into that of a manufacturer of centrifuges. A man of foresight, Drucker began experimenting with instruments far in advance of his day, and in time became a respected figure in his industry. His concepts and ideas were so advanced that they are being used today in centrifuge design and operation.

We at **The Drucker Company** are proud of this long history of centrifuge manufacture. Today, as then, centrifuges continue to be the mainstay of the Company's business.

Sincerely,

Ken Moscone  
President, The Drucker Co.



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## **REVISION STATUS**

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Issue: Number 5	Date: 04-09-02	Initial Issue: 09-96
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Amended Pages: RCF tables, DC board

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Major Update: yes

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## **1.0 DESCRIPTION**

### **1.1 Intended Use**

The Drucker models 708E and 708EL are high-performance, medium capacity, laboratory centrifuges capable of separating suspended media in a variety of fluid samples contained in standard laboratory test tubes from 3ml to 50ml in volume.

### **1.2 Features**

#### ***Model 708E and 708EL:***

- Unique, positive acting Lid Safety Switch. Centrifuge cannot be operated with the lid open; if lid is opened during operation power is cut to the motor.
- Variable speed from 500 to up to 4,000 RPM (depending on rotor combination selected).
- Large sample capacity. Will spin from 3ml to 50ml tubes; up to 360ml total volume, depending on rotor combination selected)
- Extremely quiet operation. Rubber mounting and motor isolation provides for dynamic noise reduction and reduced vibration.
- Dynamic electric braking.
- Timed operation from 1 to 30 minutes.
- Heavy gauge welded steel construction for safety and durability.
- 0.37 inch thick, transparent Polycarbonate lid for safe observation of samples and optical calibration of speed.
- Thermally protected Permanent Magnet DC motor with 1,000 hour brush life.
- Cool-Flow air design assures minimal temperature rise during operation.

#### ***Model 708EL: In addition to the above:***

- Lid safety interlock system that prevents the centrifuge from operating while the lid is open. During operation the lid cannot be opened until the rotor has reached "0" RPM.

### 1.3 Construction: (see Figures 1, 2 and 3)

**General:** The centrifuges are constructed out of formed and welded steel panels for maximum strength and durability. Steel thickness is 0.075 inches. The line cord and a fuse holder containing a 4-amp slow blow fuse are located at the rear of the centrifuge.

**Motor:** The 1/5 HP, permanent magnet DC motor is attached to the centrifuge at the top of the motor by a molded rubber collar and is supported at its base by a suspended steel bracket. This unique mounting allows the centrifuge motor to swing during operation thereby reducing noise and vibration. The motor bearings are the shielded, anti-friction type that never need lubrication.

**Lid:** The centrifuge lid is machined out of a high strength polycarbonate plastic and is attached by two friction type nylon hinges. The hinges will hold the lid in any open position. The lid is mechanically secured to the cabinet by a molded polycarbonate latch that grips the underside of the top opening. The lid has a series of air inlet holes to provide for cooling of the centrifuge samples. This air is then exhausted out through louvers in the interior of the centrifuge, past the motor and then out through the centrifuge base. An optional, black Delrin, plastic cap and filter is available which covers the air inlet holes and filters the incoming air.

**Base:** The bottom of the centrifuge is covered by a galvanized steel base plate. The centrifuge rests on (4) rubber feet attached to the base.

**Control Panel:** A formed steel control panel is attached to the lower front of the centrifuge. Mounted directly to the rear of the control panel are the mechanical timer, speed control potentiometer, electric brake switch and the LED speed display PC board. Also attached to the back of the control panel, but at a right angle to the control panel face, is the speed control PC board and support tray. The control panel assembly is mounted to the centrifuge by (4) machine screws; (2) on the side and (2) on the bottom, making removal of the control panel for servicing or repair extremely quick and easy.

**Electric Brake:** Both the 708E and 708EL have an Electric Brake system that slowly stops the rotating samples. The circuit is inactive during operation and so it is safe to leave the brake switch in the "AUTO" position at all times if braking is desired.

**Lid Safety Switch:** Both the 708E and 708EL have a lid safety switch that prevents the centrifuge from operating if the lid is open. Power is cut to the motor if the lid is opened during operation.

**Model 708EL:** In addition to a Lid Safety Switch, the model 708EL has a unique Lid Safety Interlock system. The lid cannot be opened until the centrifuge has reached "0" RPM. This locking assembly is located under the front edge of the centrifuge top opening. Wires from the locking assembly are routed outside the rotation chamber to the control panel. These wires are protected by a molded plastic cover. A red indicator lamp located at the top front edge of the centrifuge illuminates when the lid is locked

**NOTE:** *The electrical line cord provided with the 708E and 708EL must be properly plugged into a power supply receptacle that is approved and is well grounded. The Model 708E and 708EL operate on 120 volts AC at 60/50 Hz line frequency. In addition, a 220 volt, 50/60 Hz option is available for both the 708E and 708EL.*

\*Lexan is a trademark of the General Electric Company.

## 2.0 SPECIFICATIONS:

### General specifications for the Model 708E and 708EL Centrifuge

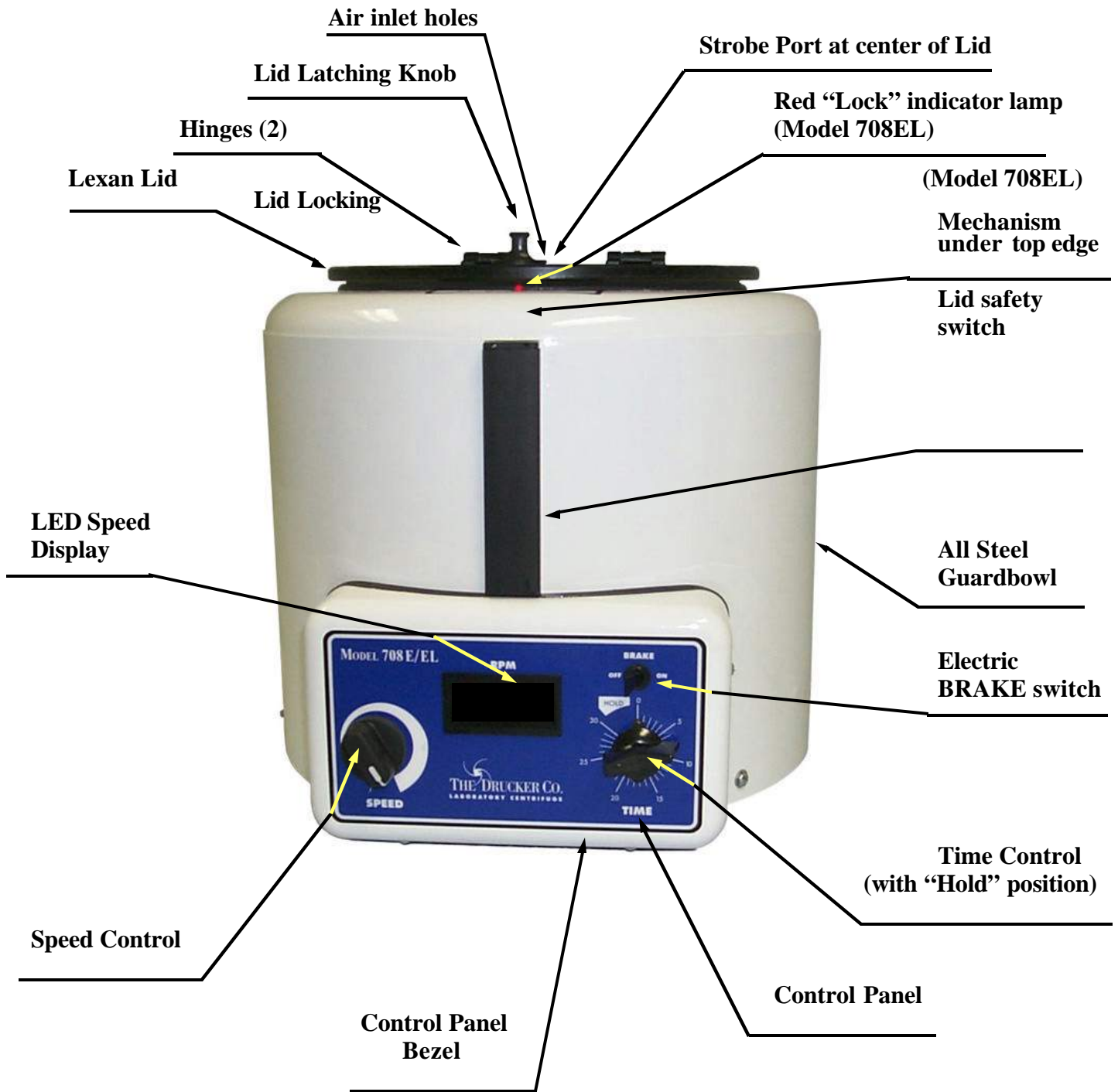
<b>Maximum Speed</b>	1920 20-Place Rotor, 1906 50mL 6-Place	4,000 (+/- 100) RPM
	1924 24-Place Rotor and Swing Out Rotors	3,200 (+/- 100) RPM
<b>Maximum Force (RCF)</b>	20-Place Rotor, 1920	2,150 x g @ 4,000 RPM
	6-Place Rotor, 1906	1,900 x g @ 3,200 RPM
	Swing Outs	2,000 x g @ 3,200 RPM
	24-Place Rotor, 1924	1,800 x g @ 3,200 RPM
<b>Maximum capacity</b>		360 ml. (24 x 15ml)
<b>Overall Dimensions</b>		
	Height with Lid Closed	13.0 in.
	Height with Cover Open	23.0 in.
	Outside Diameter	14.0 in.
<b>Centrifuge Motor</b>		1/5 HP Permanent Magnet DC
<b>Protection Fuses</b>		6 Amp. slow blow
<b>Timer</b>		Mechanical; 1 to 30 minutes
<b>Power Requirements</b>		120 VAC 60/50Hz
<b>Weight (without accessories)</b>		32 lbs.

## 3.0 SUPPLIED EQUIPMENT:

The following items are supplied with each model 708E and 708EL centrifuge:

1. Selected **Rotor and accessory** combination.
2. One (1) **Operator's Manual**.
3. One (1) **Test Card** identifying the Quality Control test results of the unit.

# Model 708E and EL Centrifuge



***Figure 1.***



## 4.0 INSTALLATION

### 4.1 Setup Procedure; Model 708E and 708EL:

- 1 Unpack the centrifuge and inspect for obvious damage; Place the centrifuge on a hard, stable surface. A bench top clearance height of 23 inches (min.) is required to open the centrifuge lid.
- 2 **Caution:** *Failure to provide adequate space for ventilation can cause damage to the samples plus overheating and premature failure of the centrifuge.*
- 3 Unlatch and open the lid; remove any rotor accessories that may have been packaged with the centrifuge; remove any protective shipping material from inside the centrifuge.
- 4 Slowly rotate the rotor by hand; check for free and level rotation. **Caution:** *If the rotor wobbles or shows signs of uneven rotation, do not proceed. Contact your authorized dealer or The Drucker Company.*

### 4.2 Model 708E Power On Safety Check:

- 1 Install the Rotor in the centrifuge but **do not insert any Test Tubes or Samples.**
- 2 Close and latch the lid. Set the Timer to "0" and rotate the Speed Control knob counter clockwise to its stop position. Plug the line cord into an approved electrical outlet. A beeping sound be heard and a "0" should appear in the speed display.
- 3 Set the Brake Switch to "Auto", the Timer to (15) minutes and slowly rotate the Speed Control knob clockwise; the speed display should momentarily read "**run**" and the rotor should start spinning smoothly without any excessive noise. The actual rotor speed (RPM) should be displayed. Adjust the speed to "2,000" RPM.
- 4 Listen to the sound of the centrifuge; a smooth whirring sound should be heard. If there are any loud and unusual sounds, stop the centrifuge immediately **Do not proceed!** Call your Authorized Dealer or the Drucker Company.
- 5 While the centrifuge is running, slowly rotate the Lid Knob counter-clockwise. After a slight rotational movement you should hear the motor start to slow down. Return the Lid Knob clockwise to its full stop position; the centrifuge motor should speed back up. If the centrifuge motor does not start to slow down when an attempt is made to open the lid, **Do not proceed !** Call your Authorized Dealer or the Drucker Company.

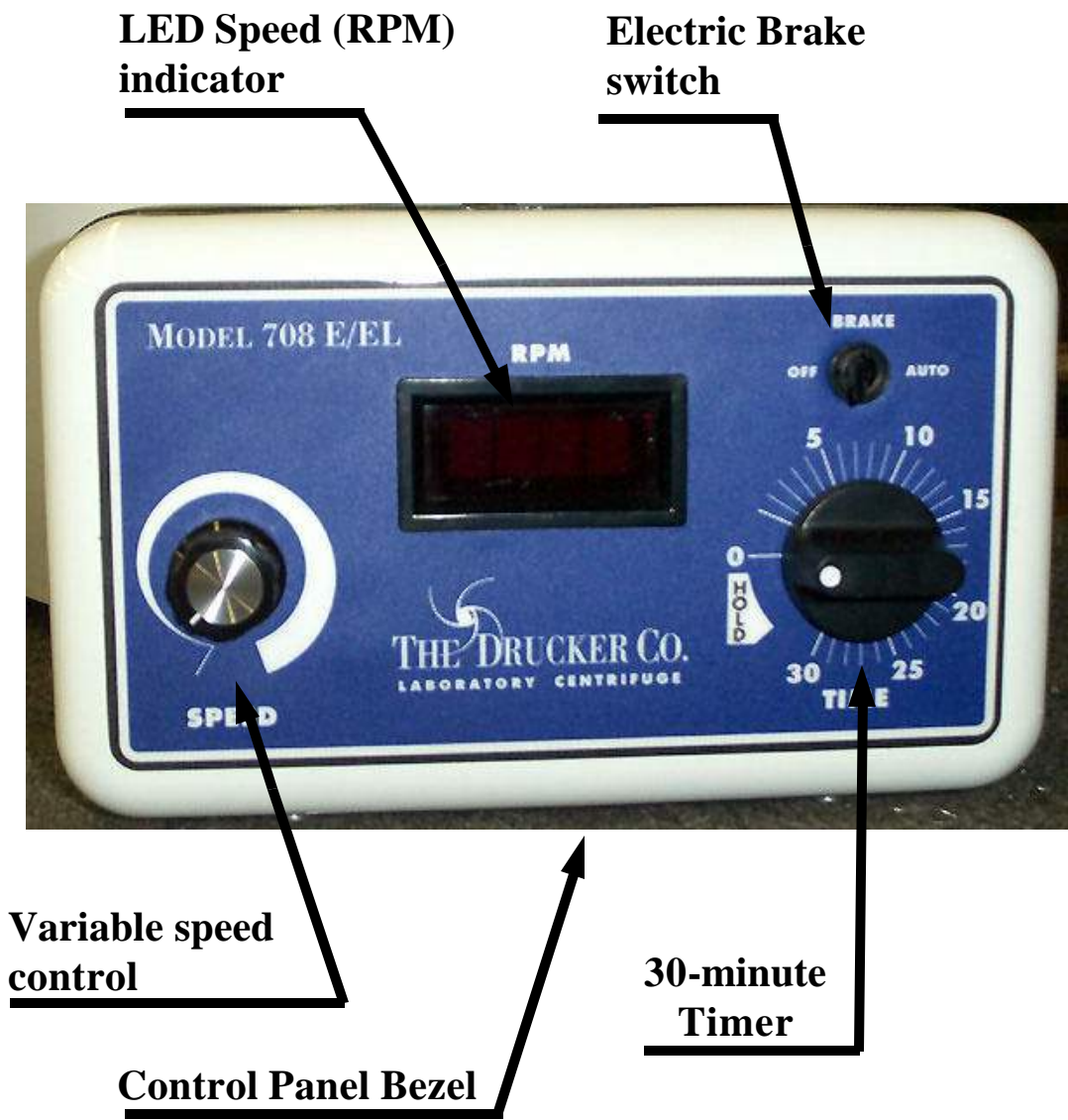
## 4.2 Model 708E Power On Safety Check: (Cont'd)

- 6 Let the time expire. When the displayed speed reaches "0" a beep should be heard and the speed display should momentarily read **'OPEn'**. If the timing cycle is correct and the centrifuge operates properly, insert the supplied rotor accessories in the rotor then repeat steps 4.2.1 to 4.2.3. If the centrifuge successfully passes steps 4.3.1 to 4.3.4 it is ready for operation.
- 7 If severe vibration is experienced, ***do not operate the centrifuge under any circumstances until the cause of the unbalance can be determined and rectified. If the cause of the unbalance cannot be identified, call The Drucker Company immediately.***

## 4.3 Model 708EL Power On Safety Check:

- 1 Close and latch the lid. Set the Timer to "0" and rotate the Speed Control counter clockwise to its stop. Plug the line cord into an approved electrical outlet. A beeping sound be heard and a "0" should appear in the speed display. The small red lamp protruding from the top front of the centrifuge should momentarily illuminate then go out.
- 2 Set the Brake Switch to "On", the Timer to (5) minutes and slowly rotate the Speed Control clockwise. The small red lamp protruding from the top front of the centrifuge should illuminate and the lid latching knob should be locked into position. The speed display should momentarily read **'run'** and then the actual rotor speed (RPM) should be displayed. The rotor should start spinning smoothly without any excessive noise.
- 3 Listen to the sound of the centrifuge; a smooth whirring sound should be heard. If there are any loud and unusual sounds, stop the centrifuge immediately ***Do not proceed !*** Call your Authorized Dealer or the Drucker Company.
- 4 While the rotor is spinning try to open the lid by turning the lid knob counter clock wise. You may, or may not, experience power loss to the centrifuge, ***but the lid should not open.*** If the lid does open, ***call The Drucker Company immediately.***
- 5 Let the time expire. When the displayed speed reaches "0" a beep should be heard and the speed display should momentarily read **'OPEn'**. At the same time, the red lamp on the top of the centrifuge should go out.
- 6 If the timing cycle is correct and the centrifuge operates properly, insert the supplied rotor accessories in the rotor then repeat steps 4.3.1 to 4.3.5. If the centrifuge successfully passes steps 4.3.1 to 4.3.5 it is ready for operation.
- 7 If severe vibration is experienced, ***do not operate the centrifuge under any circumstances until the cause of the unbalance can be determined and rectified. If the cause of the unbalance cannot be identified, call The Drucker Company immediately.***

**Model 708E and EL  
Control Panel  
*Front View***



**Figure 2**

# Model 708E and EL Control Panel Inside View

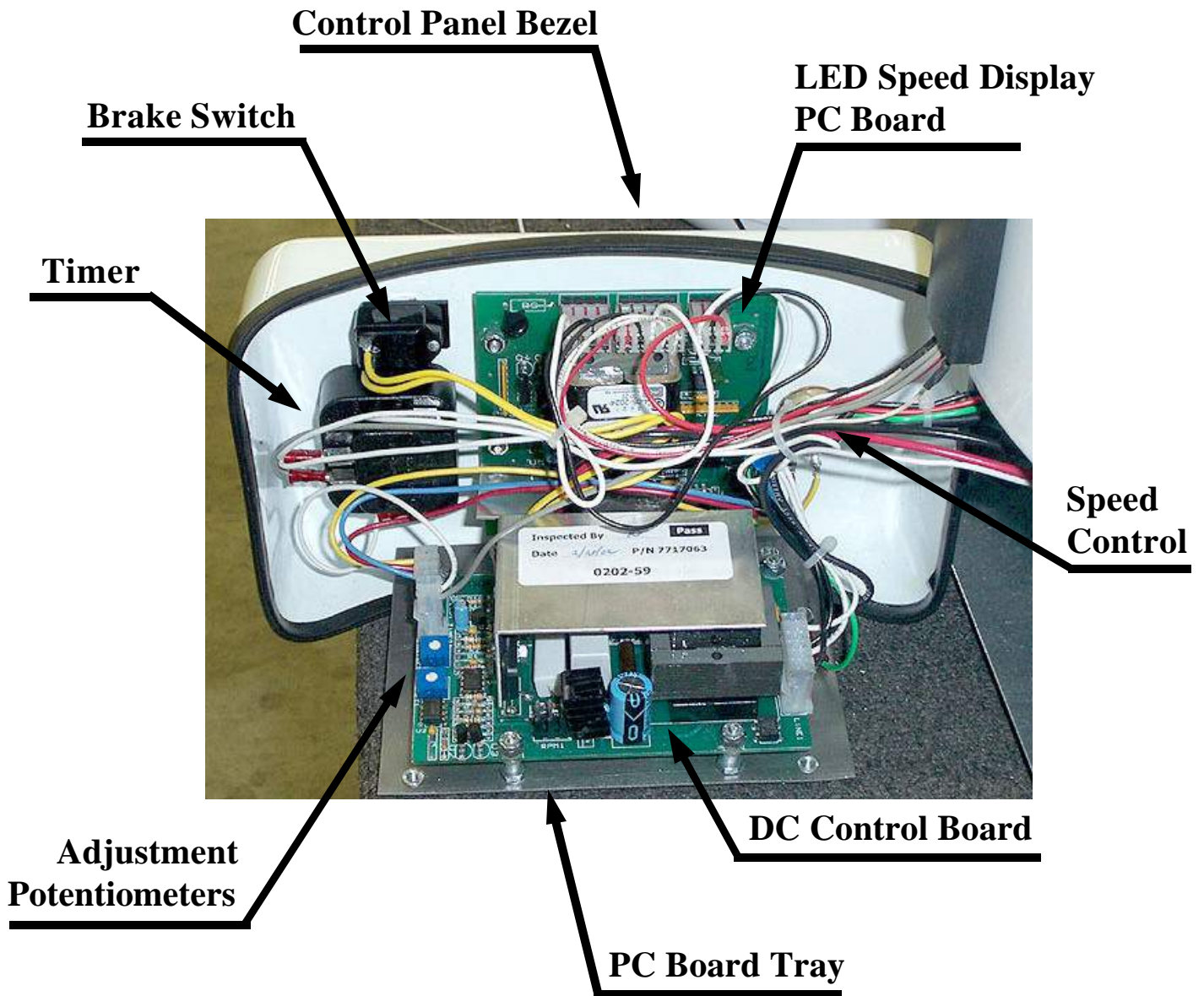


Figure 3

## 5.0 Proper Balancing:

**Note:** All centrifuges have critical speeds at which vibration occurs. As the speed increase beyond the critical speed, vibration will diminish. This inherent condition also occurs during deceleration. An unbalanced load intensifies the effect of these critical speeds.

If excessive vibration is noticed in normal laboratory use, the cause is most likely due to an unbalanced load. To attain a balanced load, use the following procedures:

- 1 The test tubes that are opposite each other in the rotor must be equal in mass and have the same center of gravity. Therefore, test tubes must be alike in shape, thickness and distribution of glass or plastic. The larger the test tubes, the more critical this selection is.
- 2 Use a laboratory balance with a sensitivity of at least one-tenth of a gram. Weigh all test tubes to be spun. Place equal weight test tubes across from each other in the rotor.
- 3 If necessary, fill a test tube with water to the same level or weight as the test tube with sample in it. Place the water filled test tube opposite the test tube with sample in the rotor.
- 4 Verify that all test tubes rotate freely in their test tube shields (holders). Start the centrifuge and spin the load at approximately 2,000 RPM and observe any vibration. If there is no excessive vibration the centrifuge is ready for use.
- 5 **NOTE: If excessive vibration is evident, DO NOT OPERATE THE CENTRIFUGE; recheck the balance weight of each test tube and repeat the above procedure.**
- 6 If excessive vibration still persists after step 5.0.5, **DO NOT OPERATE THE CENTRIFUGE;** Remove all test tubes *and Test Tube Shields* from the centrifuge.
- 7 Run the centrifuge again at 2,000 RPM. If the centrifuge runs smoothly after this step the vibration is due to either uneven weight of the samples or the test tube shields themselves. If the vibration still exists, it could be due to incorrect motor alignment or an out-of-balance rotor. **Do not proceed; call The Drucker Company immediately.**
- 8 If there is no excessive vibration evident after step 5.0.7 the centrifuge motor and rotor are OK. Make certain that all the test tube shields are clean and empty and reinsert them in the centrifuge rotor. **Do not insert any test tubes.** Restart the centrifuge per section 5.0.5.
- 9 If the centrifuge runs smoothly the test tube shields are OK and the vibration problem was due to extra tube cushions, dirt or excess material in one or more of the test tube shields. Repeat steps 5.0.1 through 5.0.4 and assure that there is a balanced load
- 10 If the vibration is still present after step 5.0.8, weigh each test tube shield. They should be equal in weight to within 0.1 grams. If they are not, call The Drucker Company for a replacement set of balanced test tube shields.

## 6.0 SERVICE

This section contains instructions for Operator servicing of the Drucker Model 708E and 708EL centrifuge. It is not intended to be a comprehensive description of servicing instructions or procedures but rather a guide to help a qualified service technician resolve minor operational problems. Servicing of the centrifuge must be carried out by a qualified service technician. Attempted service by anyone other than a qualified service technician will void any Drucker warranty.

### 6.1 **Drucker Service Philosophy**

All Drucker centrifuges are designed for maximum serviceability. Although designed for long, trouble free service, a model 708E or 708EL may be completely repaired (i.e.: replacement of all the main serviceable components or assemblies) in approximately one hour.

### 6.2 **Troubleshooting**

Before attempting operator service on the Model 708E or 708EL, refer to Table 6.1 (on the following pages) for the most probable cause of a malfunction.

### 6.3 **Motor Brush Replacement** (refer to Appendix B.)

The electrical motor in the model 708E and 708EL centrifuge is a permanent magnet DC motor designed to our particular specifications. Under normal use the motor brushes should last (1000) hours. When the brushes do need replacement follow the following procedure:

- 1 Unplug the centrifuge from its electrical outlet.
- 2 Turn the centrifuge over and carefully lay it on its top.
- 3 Remove the bottom cover plate by removing the four (4) machine screws attached to the bottom of the centrifuge. Also remove the two (2) machine screws on the base just behind the front control panel.
- 4 Locate the DC motor at the center of the centrifuge.
- 5 Using a short, flat blade screwdriver, remove the black plastic motor brush caps located on each side of the motor.
- 6 Remove the old motor brush noting the orientation of the rounded edge on the brush. The new brushes must be oriented in the same fashion.
- 7 Replace with Drucker part number 7735047 motor brush.
- 8 Replace the motor brush cap.
- 9 Rotate the centrifuge and repeat steps 6.3.1 through 6.3.5 for the second motor brush.
- 10 Inspect the old motor brushes. If the carbon has worn down to the bare metal, the motor armature may have been damaged. If this has happened, ***Do not operate the centrifuge;*** have a technician remove the motor and have the armature repaired.
- 11 Replace the bottom cover plate and return the centrifuge to an upright position.
- 12 Plug the centrifuge into a proper electrical socket.
- 13 Set the speed control to 2,000 RPM and turn the time to (5) minutes; if the centrifuge starts up and operates normally it is ready for continued operation. If unusual sounds are heard or there is excessive vibration, ***Turn the centrifuge off immediately, do not proceed.*** Call a qualified repair technician or The Drucker Company for help in locating the problem cause.

## **6.0 SERVICE (cont'd):**

### **6.4 Control Panel Bezel**

The control panel bezel of the models 708E and 708EL can be accessed by removing four (4) machine screws. There are two (2) screws located one on each side of the bezel that attach to brackets and two (2) screws underneath the centrifuge that hold the PC board tray in place. To remove the bezel, remove these four (4) machine screws and carefully pull the bezel assembly forward. Care should be taken when removing and reattaching the bezel so that wiring is not damaged. (*Ref. figure 2*)

### **6.5 Centrifuge Lid Assembly**

The Lid assembly of the 708E and 708EL has a rotating latch inserted at the front end. The latch consists of an interconnected knob on the upper surface of the lid and a pawl on the lower surface. The knob and pawl snap together with a spring washer in-between. The pawl, when rotated to the closed position, grips the underside of the centrifuge top and secures the lid from opening. The pawl also actuates a micro switch which permits the centrifuge to operate. There are two friction hinges mounted to the rear top surface. The two hinges are secured to the top rear of the centrifuge by (4) machine screws. The (4) machine screws bolt through the lid into plastic inserts on the underside of the centrifuge top. These inserts have molded recesses that engage and hold the nuts on the backside preventing the nuts from rotating off during operation.

*To remove the lid assembly open the lid and place a hand under each insert to catch the nuts before removing the machine screws.*

### **6.6 Centrifuge Lid Adjustment and Emergency 708EL Lid removal**

By *loosening* either the screws that attach the hinges to the centrifuge or the screws that attach the hinges to the lid you can gain 0.25” of travel to properly adjust the lid assembly if necessary. The lid locking feature of the model 708EL utilizes high quality components and low voltage to operate and should not fail over the life of the centrifuge. However, if the lid cannot be opened remove the (4) sheet metal screws that attach the hinges to the lid. Pull the lid back and clear of the locking mechanism and remove any samples. Have the locking mechanism repaired or replaced and reinstall the lid assembly.

### **6.6 Safety Lock Assembly removal**

The Lid Safety Interlock system of the model 708EL and the Lid Safety Switch system of the model 708E is mounted as an assembly under the front edge of the centrifuge top. To remove the assembly first remove any rotor and accessories. Peel off the black and white “Locked” label on the top of the centrifuge. Place a small socket on the locking nuts on the underside of the black tray and remove the two screws on the top. Access to the wires behind the vertical, black wire cover on the front of the centrifuge can be gained by sliding the wire cover up and off the mounting clip underneath.

**TABLE 6.1**  
**TROUBLESHOOTING**

<b>Symptom</b>	<b>Possible Cause</b>	<b>Suggested Solution</b>
1. Centrifuge does not operate when power (Timer) is turned on.	<i>Centrifuge not plugged in.</i>	Check that the line cord is properly plugged into a working electrical outlet.
	<i>Blown fuse.</i>	Replace fuse. If fuse blows again, call a service technician.
	<i>Defective Timer</i>	<b>To be accomplished by a qualified technician:</b> Remove the Control Panel; remove the (2) wires to the Timer and jumper them together. Plug the centrifuge in and rotate the speed control. If the centrifuge starts, replace the Timer.
	<i>Disconnected wire(s)</i>	<b>To be accomplished by a qualified technician:</b> Remove the control panel and check all wires and connections especially at the PC boards.
	<i>Defective PC Board</i>	<b>To be accomplished by a qualified technician:</b> Remove the Control Panel; remove and replace the PC Board. Take care as the board may contain some charge. Use protective gloves.
	<i>Worn Motor Brushes</i>	Remove and check the motor brushes per section 6.3. If the motor brushes are allowed to wear down to their metal holders the motor will short out and <b>must be replaced by a qualified technician.</b>
2. Speed display does not illuminate.	<i>Defective Motor</i>	Have a technician test and replace the Motor if necessary.
	<i>Disconnected wire(s)</i>	<b>To be accomplished by a qualified technician:</b> Remove the control panel and check all wires and connections especially at the Speed Display PC board.
	<i>Loose Tachometer Chopper Wheel</i>	Remove the tachometer housing cap located at the base of the motor. Using an Allan wrench tighten the chopper wheel assy. to the motor shaft; verify that the chopper wheel is centered in the optical pickup. Replace tachometer housing cap.

If none of the above corrects the problem, the problem cause is most probably in the Speed Display PC board. **Have a qualified technician replace this PC board.**



**TABLE 6.1 (Continued)**

<b>Symptom</b>	<b>Possible Cause</b>	<b>Suggested Solution</b>
3. Speed display shows "0" during operation, or has erratic display.	<i>Loose tachometer wheel</i>	<b>To be accomplished by a qualified technician:</b> Remove base plate. Remove tachometer cover at the base of the motor. Tighten the tachometer wheel. Adjust to the center of the tach sensor.
	<i>Defective Tach Sensor</i>	Remove and replace the tach sensor assembly at the base of the motor.
	<i>Defective display board</i>	Remove and replace the speed display board.
4. Fuse blows when line cord is plugged in.	<i>Short circuit in wiring</i>	<b>To be accomplished by a qualified technician:</b> Have a technician troubleshoot the electrical circuit; replace any defective components.
5. Fuse blows when motor is accelerating to set speed.	<i>Fuse with Improper rating</i>	Insert properly rated fuse. If the properly rated fuse still blows there is a short in the electrical to circuit. Call for a qualified technician.
	<i>Defective PC Board</i>	Remove and replace the Motor Control PC Board.
	<i>Worn Motor Brushes</i>	Remove and check the motor brushes per section 6.3. If the motor brushes are worn down they may not be making proper contact inside the motor. Replace the motor brushes and retest the centrifuge.
	<i>Defective Motor</i>	Have a technician test and replace the Motor if necessary.
6. Electric Brake does not work.	<i>Brake switch not on</i>	Turn on brake switch.
	<i>Defective Brake switch</i>	Remove the Control Panel and replace the brake switch.
	<i>Loose connection</i>	Check the brake switch connection to the PC Board.
7. Rotor begins rotating at "0" RPM	<i>Speed Control PC board adjustment</i>	Have a technician adjust the potentiometer on the Speed Control PC board.
8. Motor rotates Intermittently	<i>Loose wire(s)</i>	Check the electrical connections to the Motor Control PC Board.
	<i>Defective PC board</i>	Remove and replace the Motor Control PC Board.
	<i>Defective Motor</i>	Remove and replace the Motor.

**TABLE 6.1** (Continued)

Symptom	Possible Cause	Suggested Solution
8. Test tubes break during a run.	<i>Speed setting is too high for the test tubes.</i>	This is the major reason for breaking glass test tubes. Refer to Appendix C for the appropriate speed based on the RCF (relative centrifugal force) the rotor you have will exert on your samples.
	<i>Weak, or poor quality test tubes due to manufacturing or design/variations.</i>	Contact the test tube manufacturer for possible lot control problems. Change lots if possible or reduce to an acceptable level based on Appendix C.
	<i>Test tubes are inserted too far into the test tube shields.</i>	Use the right test tube cushion. Insert the test tubes in the tube shields such that the test tube stoppers are fully exposed and the test tube rests flat against the tube shield wall.
	<i>Dirty test tube shields.</i>	Remove and clean all test tube shields, especially after a test tube breakage.
	<i>Foreign material embedded in test tube cushion.</i>	Replace the test tube cushions.
9. Excessive vibration during operation.	Excessive test tube vibration	Refer to section 5.0 on Proper Balancing.
	Too many tube cushions in one or more tube shields.	Verify that only one tube cushion is in each tube shield and all tube cushions are the same size.
	Out-of-balance samples	Refer to Section 5.0 on Proper Balancing.
10. Rotor does not spin freely.	Out-of-balance Rotor	Remove all test tubes and tube shields from the rotor. Spin centrifuge at 2,000 RPM. If the vibration persists, Check the rotor for foreign deposits. If none are found replace the rotor or return it to The Drucker Company for balancing or replacement.
	Defective motor bearings	Remove the Motor and return it to The Drucker Company for repair or replacement.
11. Centrifuge body or motor overheating	The motor is set too low and the rotor is dragging.	Have a technician raise and realign motor
	Blocked air inlets or blocked air exhaust	Verify that the holes in the center of the lid are not blocked for proper air intake and that the centrifuge cabinet has ample clearance for proper cooling.
	Defective motor	Have a technician replace the motor

## **7.0 MAINTENANCE**

The following Preventative Maintenance procedures are intended to ensure consistent operation of the centrifuge and should be performed only by qualified personnel with a solid understanding of Electro-mechanical devices and laboratory instrumentation.

### **7.1 Centrifuge Cleaning**

No daily cleaning of the centrifuge is required, however, in the event of tube breakage or spillage in the rotor chamber the centrifuge should be thoroughly cleaned immediately.

***Caution: Always wear proper protective equipment and apparel when cleaning or disinfecting a centrifuge, especially after a test tube breakage.***

1. If sample material has spilled into the centrifuge or on the accessories, exercise care and proper laboratory protocol for the handling of spilled samples.
2. Remove the rotor and any accessories (wash these per section 7.2).
3. Wash the inside of the centrifuge with a strong bleach solution or recommended laboratory disinfecting solution. Scrub with a stiff brush if necessary.

***Caution: Wash with a wet cloth or sponge only, do not flush guard bowl with liquids***

4. Thoroughly dry the inside of the centrifuge.

### **7.2 Accessory Cleaning**

1. Remove the rotor and test tube shields using proper protective measures for the handling of spilled samples as outlined in your laboratory protocol.
2. Properly dispose of any broken or damaged test tubes and spilled samples.
3. Remove any test tube cushions from the test tube shields.
4. Wash the accessories with a strong bleach solution or recommended laboratory disinfecting solution. Scrub with a stiff brush if necessary.
5. Oven dry the accessories .
6. Install new tube cushions in the test tube shields.
7. Reinstall the test tube shields in the centrifuge rotor.

## **8.0 VERIFICATION/CALIBRATION**

### **8.1 Speed Verification:**

There should be no speed adjustment required for the model 708E and 708EL centrifuges. These models receive photo optical pulses from a pickup located on the motor shaft at the rate of (30) per single revolution. The pulses are interpreted directly to speed by the Speed Display PC board and should be accurate to within +/- 50 RPM. If the reported speed of the centrifuge is found to be incorrect make certain that the optical chopper wheel attached to the lower end of the motor drive shaft is tight and is centered in the middle of the photo pickup. Repeat the verification test. If the speed is still incorrect the Optical Pickup or Speed Display PC board, or both, must be replaced.

*Note: In order to perform a speed verification you will need a Mechanical or Optical Tachometer along with suitable targets.*

- 1 Clean the top surface of the centrifuge rotor and affix a suitable reflective target.
- 2 Set the Timer to 15 minutes.
- 3 Turn on the centrifuge and adjust the speed to approximately 3,000 RPM.
- 4 Once the speed seems uniform place a calibrated tachometer over the center hole in the centrifuge lid.
- 5 Measure the rotational speed of the rotor assembly with the tachometer.
- 6 If the measured speed matches the speed displayed to within +/- 50 RPM the centrifuge is within specification.
- 7 If the measured speed varies by more than 50 RPM from the speed displayed on the control panel first replace the Optical Pickup assy. If this does not work, replace the Speed Display PC board.

### **8.2 Time Verification/Calibration**

- 1 In order to perform a Time calibration you will need a calibrated stop watch.
- 2 Set the speed control to 2,000 RPM.
- 3 Set the Time for 15 minutes and immediately start the stop watch.
- 4 As soon as you hear the the mechanical timer time out to "0" stop the stop watch.
- 5 There are no adjustments on the Timer module; If the measured time varies by more than 5% from the time shown on the control panel, replace the timer.

## 9.0 Relative Centrifugal Force (RCF)

The motor driven rotation of the centrifuge results in a force being applied to the samples it contains. The further the samples are from the center of rotation and the faster the rotation speed, the higher the centrifugal force. A relative centrifugal force can be calculated according to the following formula:

$$\mathbf{RCF = 0.0000284 (R) (RPM)^2}$$

Where **R = Radius (in inches)**

or

$$\mathbf{RCF = 0.00001118 (r) (RPM)^2}$$

Where **r = radius (in centimeters)**

The radius, **R or r**, is measured from the center of the rotor to the outermost tip of the sample in the test tube.

The total force exerted on the sample is the **RCF x Rotation Time** (in minutes).

This relative centrifugal force, or **RCF**, may be critical in some laboratory applications. Total **RCF** is an approximate value that is subject to variations due to acceleration and braking times. During acceleration and braking periods, the speed of the centrifuge is less than the speed value set by the operator. The true cumulative **RCF** value is affected most by short run times and by heavier rotor loads since these loads take longer to accelerate and decelerate.

**See Appendix C for RCF Graphs**

## **10.0 WARRANTY INFORMATION:**

The Drucker Company warrants that it will repair or replace, at its option, free of charge, any centrifuge that fails after delivery to the original customer because of defects in materials or workmanship (provided it has not failed under the exceptions and conditions specified below), but within the following time periods:

- a. One (1) year warranty on the centrifuge and its accessories from the time of purchase.
- b. Six (6) months on the centrifuge motor and motor brushes.
- c. Sixty (60) day warranty on all replacement parts supplied after the warranty period.

***Note: All failed or serviced parts must be returned to the factory before a full warranty allowance or credit will be given.***

## **10.1 Warranty Exceptions and Conditions:**

Such exceptions and conditions include, but are not limited to, failure of parts due to improper use, accident, neglect, acts of God or operation in a manner not prescribed in this **Operation Manual**. The foregoing expresses The Drucker Company's sole warranty with respect to the centrifuge. This warranty is made in lieu of any and all other warranties and all implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed and excluded. The Drucker Company and its authorized dealers will not be liable for consequential damages, losses, or expenses arising from the improper use of the centrifuge. The Drucker Company will not honor any other warranty given by the authorized dealer that is different from the warranty given by The Drucker Company. This warranty is not assignable and is operative only in favor of the original customer to whom this warranty is delivered.

## **10.2 Dealer Obligation Under Warranty:**

Customers requesting service for an instrument during the period covered by the warranty should receive a response within a 48-hour period from the authorized dealer who sold the instrument. If this obligation is not met, and the customer so advises The Drucker Company, such authorized dealer will be notified of, and will be held responsible for, the action taken and expenses incurred by The Drucker Company in satisfying the customer.

## **10.3 Disclaimers and Exclusions:**

This **Operations Manual** includes a troubleshooting section, however, the customer is under no obligation to locate or remedy any service problem. By accepting and operating this instrument the customer hereby releases and forever discharges The Drucker Company, its successors, assigns, subsidiaries, affiliates, officers, agents, and employees from any and all claims, demands and liabilities in law or in equity, of any nature, based upon, arising out of, or resulting from locating, remedying, or attempting to locate or remedy any service problem. If service is required, the customer should contact the dealer from whom the instrument was purchased to obtain service by factory-trained personnel, or return the instrument to The Drucker Company for factory repair.

### 10.3 Disclaimers and Exclusions (Continued)

The information included in this **Operation Manual** is believed adequate for the operation and intended use of this centrifuge. If the centrifuge is to be used for any purpose exceeding or deviating from the capabilities specified herein, then written confirmation of acceptability for such purpose should be obtained from The Drucker Company. Failure to do so may affect the warranty. The Drucker Company will not guarantee any results nor assume any obligation or liability arising from such action.

To obtain service and/or replacement parts under warranty, the customer should contact The Drucker Company dealer from whom the instrument was purchased, or:

**THE DRUCKER COMPANY, Inc.**  
**200 Shady Lane**  
**Philipsburg, Pennsylvania 16866**  
**TEL: (814) 342-6205 FAX: (814) 342-6211**

### 10.4 Centrifuge Return Procedure

a) Contact The Drucker Company and provide the model and serial number of the instrument, the date of its delivery and the name of the dealer from whom the instrument was purchased. An RGA (***Returned Goods Authorization***) number must be obtained from Customer Service and a copy must accompany the prepaid return shipment. The Drucker Company can not accept goods returned without proper authorization.

b). Decontaminate the instrument or any part that has been exposed or used to process blood, potential pathogenic or radioactive material.

c). If the instrument or any part thereof is received in a condition The Drucker Company considers to be a potential hazard to its personnel, the instrument will be returned to customer not repaired along with a report of the Company's findings. The centrifuge will be returned to the customer at the customer's expense.

d) Properly package the instrument and return it to the above address.

# Appendix A

## Model 708 centrifuge Speed Control Adjustment *Procedure*

### A. Introduction:

The electronic Speed Control on the model 708 may be adjusted within a limited range. Two adjustments are possible, the low end or start-up speed and the maximum speed. The adjustments are made on two (2) potentiometers on the motor control PC board located inside the front control panel bezel.

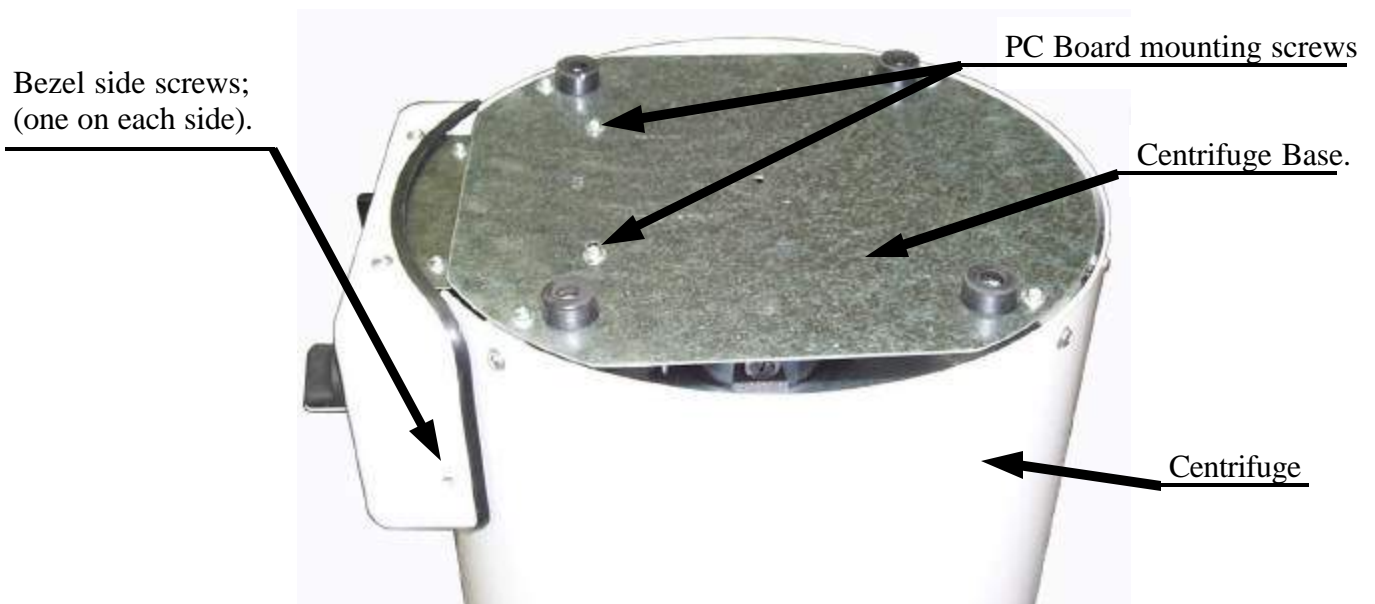
*Note: High voltages and current are involved; there is a danger of an electrical shock. This procedure should only be accomplished by a certified technician.*

### B. Removal of the Control Panel:

- 1 Lay the centrifuge on its side or top.
- 2 Remove the two PC board mounting screws.
- 3 Return the centrifuge to an upright position.
- 4 Remove the two Bezel side screws.
- 5 Pull the Control Panel straight out from the centrifuge. Do not remove or over tighten any of the connected wires.

**Figure 4A**

Control Panel Attachment Screws





### C. Low Speed Adjustment:

*Note: Use a small flat blade Nylon screwdriver for the following steps to prevent a short circuit to the PC Board and injury to the technician.*

- 1 Make certain that the centrifuge timer is in the off position.
- 2 Rotate the Low Speed pot completely counter-clockwise to its stop position (Ref. Fig 4B).
- 3 Rotate the speed control knob on the front of the control panel to its off position, (fully counter-clockwise).
- 4 Rotate the Low Speed pot clockwise until the centrifuge rotor just starts turning.
- 5 Rotate the Low Speed pot counter-clockwise until rotation stops.
- 6 The Low Speed adjustment is complete.

If a high speed adjustment is made after this low speed adjustment, recheck the low speed setting using the steps just described to ensure the low setting is accurate.

### Figure 4B

Top view of Motor Control PC Board

**Top Speed  
Adjustment**

**Slow Speed  
Adjustment  
(Zero Point)**



## **D. High Speed Adjustment:**

- 1 Make certain that the centrifuge timer is turned off.
- 2 *Note: Use a small flat blade Nylon screwdriver for the following steps to prevent a short circuit to the PC Board and injury to the technician.*
- 3 Turn the centrifuge timer on and turn the speed control knob on the front of the bezel control panel to its maximum setting, (fully clockwise).
- 4 Turn the high speed adjustment pot slowly until the desired maximum speed is attained. Turn the pot clockwise to increase speed and counter-clockwise to decrease speed.

Please note, the maximum attainable speed in the 708E centrifuge with a loaded (24) place rotor is 3,200 RPM and with a loaded (20) place it is 4,000 RPM. **The maximum speed for other rotor options may be much less!** Please take these limits into account when adjusting the high speed.

Refer to section 9.0, “Relative Centrifugal Force” and Appendix C to determine the appropriate maximum speed for your lab’s particular separation requirements.

# Appendix B

## Model 708 centrifuge Motor Brush Replacement *Procedure*

### A. Introduction:

The electric motor in the model 708E and 708EL centrifuge is a brush type, permanent magnet DC motor designed to Drucker's particular specifications. This motor is used in all 700 series centrifuges; model 708B, model 708E and 708EL (ref. Figure 5A).

Under normal use the motor brushes should last (500) hours. The brushes should be checked after 500 hours of use for wear. If there is substantial material remaining, the brushes should then be rechecked frequently thereafter. The brushes need to be replaced if only 1/4 inch of carbon remains (ref. Figure 5B). If less than 1/4 inch is present, the brush should be replaced.

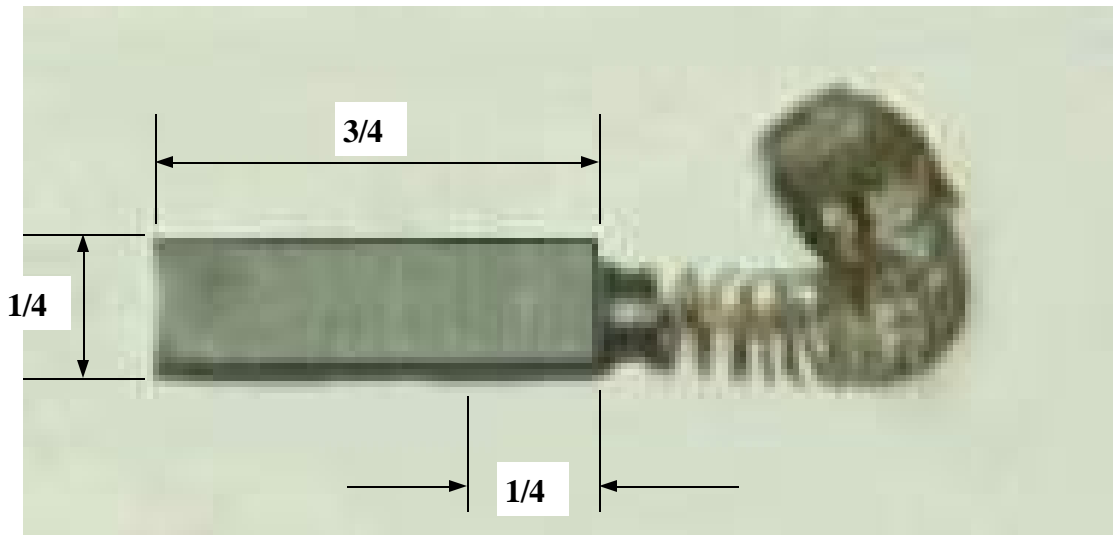


**Figure 1B**

**Model 708 Motor**

## Figure 5B

### Model 708 Motor Brush



#### B. Need For Brush Replacement: (ref. figure 5B)

The series 700 motor brushes, when new, measure 3/4" long by 1/4" high by 1/4" wide. When the remaining carbon material, on any one motor brush, reaches approximately 1/4", ***both*** motor brushes need to be replaced.

#### C. Motor Brush Removal (refer to figures 5C, 5D and 5E)

When the motor brushes need replacement follow the following procedure:

- 1 Unplug the centrifuge from its electrical outlet and remove all test tubes and test tube holders from the rotor.
- 2 Close and latch the lid, lay the centrifuge upside down on the lid.
- 3 Remove the metal base of the centrifuge by removing the (4) machine screws attached to the mounting brackets and the two (2) machine screws attached to the base of the control panel (refer to figure 3 and 4) .
- 4 Using a short, flat blade screwdriver, remove the black plastic motor brush cap located on each side of the motor (refer to figure 5).
- 5 Remove the old motor brush.
- 6 Inspect the old motor brushes. If the carbon has worn down to the bare metal, the motor armature may have been damaged. If this has happened, ***Do not operate the centrifuge***; have a technician remove the motor and have the armature repaired or order a replacement motor from the Drucker Company.

## D. Motor Brush Replacement

- 1 If the old motor brushes have carbon material remaining replace them with Drucker part number 7735047 motor brush.
- 2 Replace both motor brush caps.
- 3 Replace the centrifuge base.
- 4 Return the centrifuge to an upright position.
- 5 Add the test tube holders to the centrifuge rotor; ***do not add any test tubes at this time.***
- 6 Plug the centrifuge into a proper electrical socket.
- 7 Set the speed control to 2,000 RPM and turn the time to (15) minutes; if the centrifuge starts up and operates normally continue to step 15.
- 8 If unusual sounds are heard or there is excessive vibration, ***Turn the centrifuge off immediately, do not proceed.*** Call a qualified repair technician or The Drucker Company for help in locating the problem cause.
- 9 Let the centrifuge run continuously for one (1) hour minimum. This will give the new brushes a time to break in and contour to the curvature of motor armature.

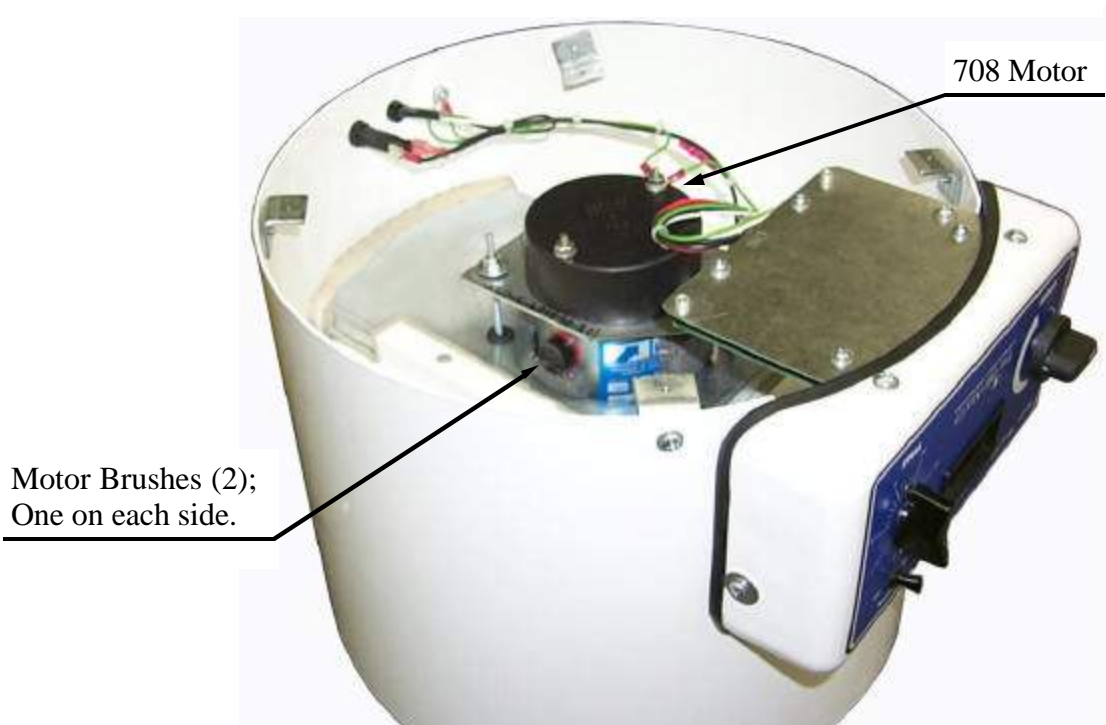
**Figure 5C**

**Model 708 Base Removal**



**Figure 5D**

**Model 708 Base Removed**



# Figure 5E

## Model 708 Motor Brush Removal

