

6640-01-120-2648

# INSTRUCTION MANUAL

## SORVALL® GLC-2B GENERAL LABORATORY CENTRIFUGE

Du Pont Company  
Biomedical Products Division  
Wilmington, Delaware 19898  
U.S.A.

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**Sorvall® Centrifuges**

Biomedical Products Division



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II-I-1



This manual is a guide to the use of

### GLC-2B General Laboratory Centrifuge

Data herein has been verified and validated and is believed adequate for the intended use of the instrument. If the instrument or procedures are used for purposes over and above the capabilities specified herein, confirmation of their validity and suitability should be obtained, otherwise Du Pont does not guarantee results and assumes no obligation or liability. This publication is not a license to operate under, or a recommendation to infringe upon, any process patents.

*Notes, cautions, and warnings* within the text of this manual are used to emphasize important and critical instructions.

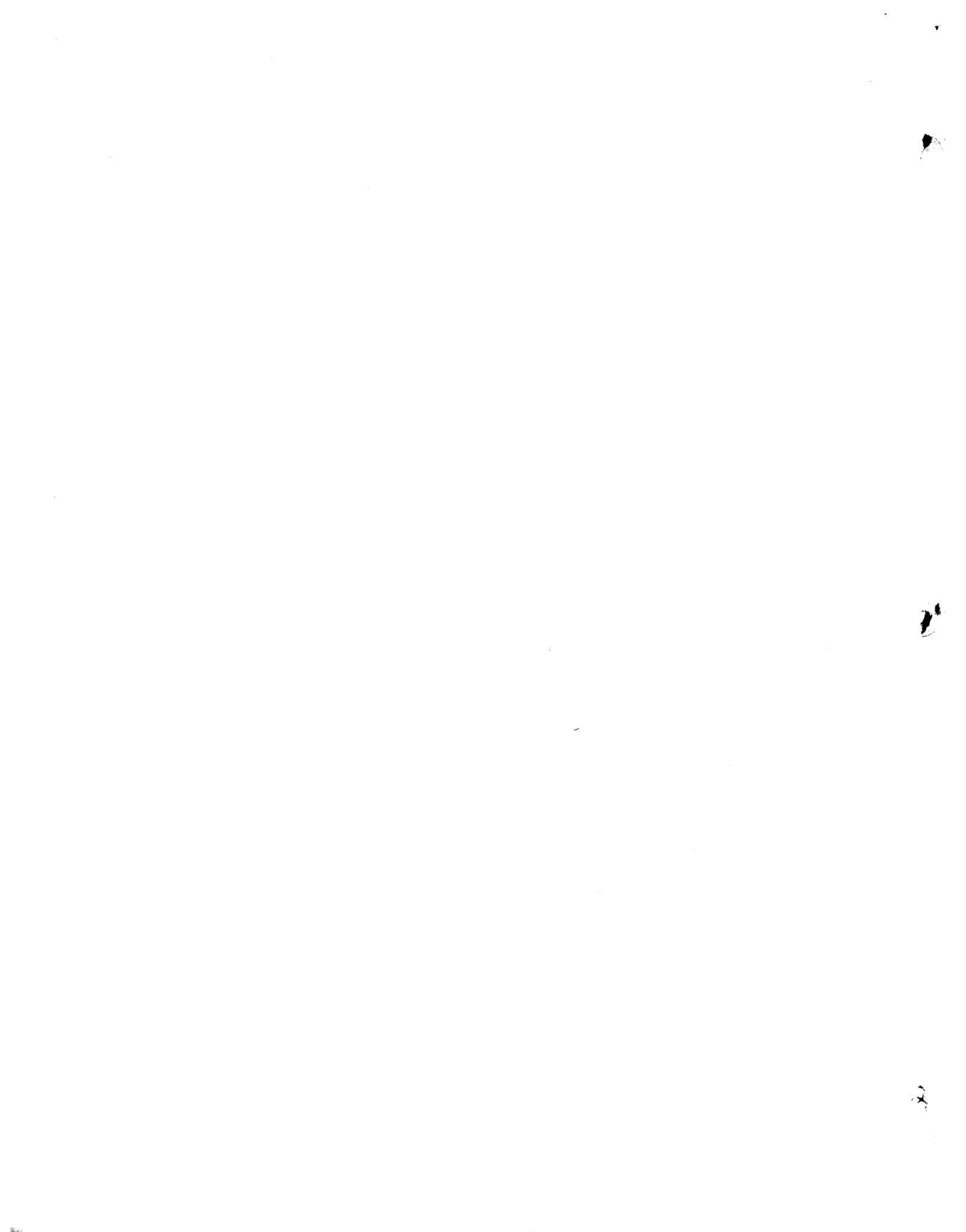
**WARNING:** An operating procedure, practice, etc, which, if not correctly followed, could result in personal injury.

**CAUTION:** An operating procedure, practice, etc, which, if not strictly observed, could result in damage of equipment.

**NOTE:** An operating procedure, condition, etc, which it is essential to highlight. *Health hazards precaution data.* If and when hazardous chemicals or adverse health factors affect the environment or use of the equipment, appropriate precautions are provided.

#### **WARNING**

Because of the inherent hazard involved with electrical circuits, untrained personnel must not attempt to test or repair any electrical circuits in the centrifuge.



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**WARRANTY**

Every Sorvall instrument is warranted to be free from defects in material and workmanship for a period of one year from the date of delivery. Du Pont will repair or replace and return free of charge any part which is returned to its factory within said period, transportation prepaid by user, and which is found upon inspection to have been defective in materials or workmanship. This warranty does not include normal wear from use, it does not apply to any instrument or part which has been altered by anyone other than an employee of Du Pont, nor to any instrument which has been damaged through accident, negligence, failure to follow operating instructions, the use of electric currents or circuits other than those specified on the plate affixed to the instrument, misuse or abuse.

DuPont reserves the right to change, alter, modify or improve any of its instruments without any obligation whatever to make corresponding changes to any instrument previously sold or shipped.

*The foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties, of merchantability or otherwise, expressed or implied in fact or by law, and state our entire and exclusive liability and buyer's exclusive remedy for any claim or damages in connection with the sale or furnishing of goods or parts, their design, suitability for use, installation or operation. Du Pont will in no event be liable for any special or consequential damages whatsoever, and our liability under no circumstances will exceed the contract price for the goods for which liability is claimed.*



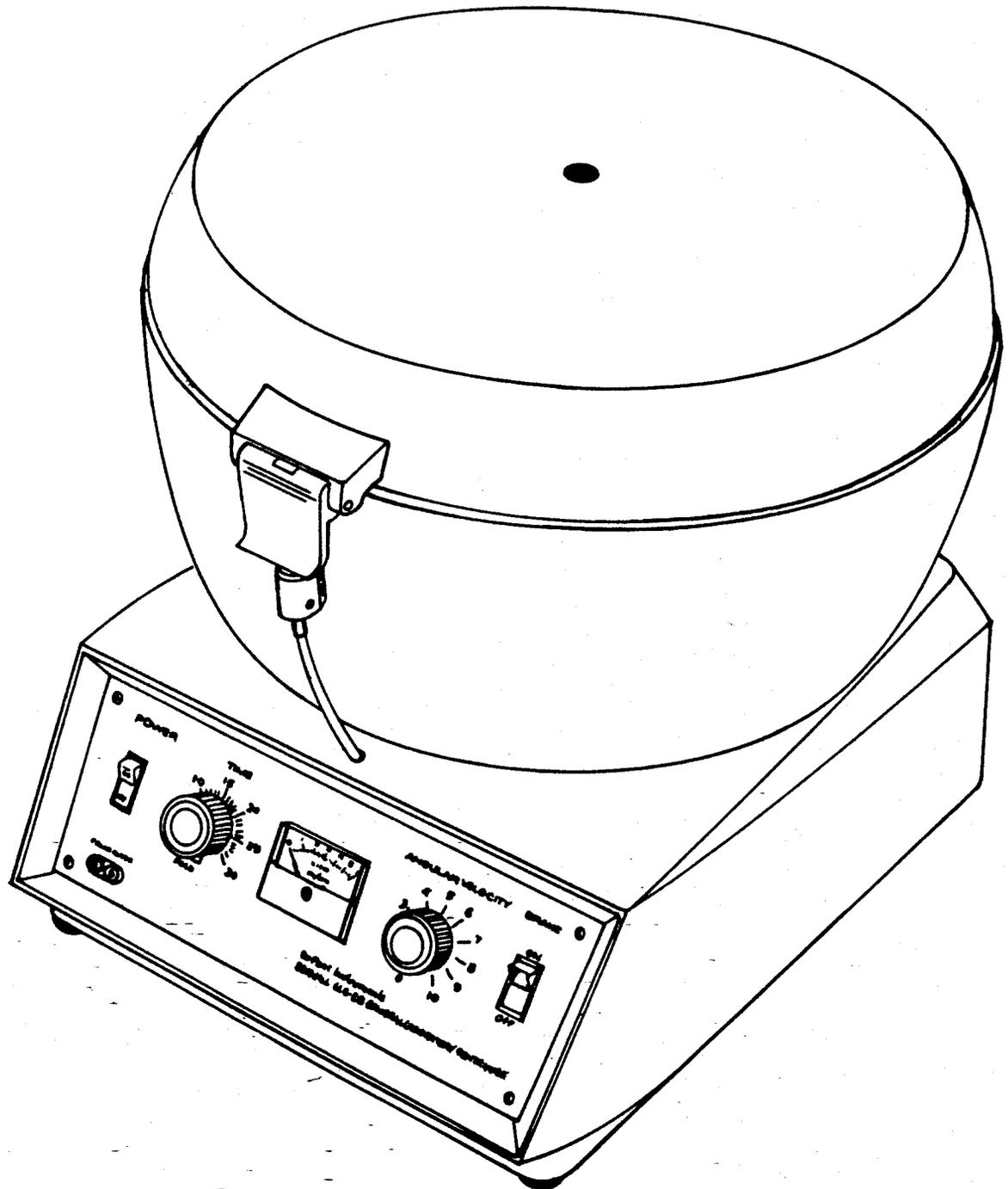


Figure 1-1. GLC-2B. General Laboratory Centrifuge



## SECTION 1 DESCRIPTION

### 1-1. SCOPE.

This manual contains the information necessary to install, operate, and maintain the Sorvall GLC-2B General Laboratory Centrifuge, hereafter referred to as the centrifuge. In addition, a replaceable parts list is provided.

### 1-2. PURPOSE.

The purpose of the centrifuge is to separate substances of different densities, to remove moisture, or to increase gravitational effects by centrifugal force.

### 1-3. DESCRIPTION.

The centrifuge, figure 1-1, uses a motor to drive either angle or swinging bucket rotors. The rotor

drive is a gyro-action, self-centering drive with a keyway to prevent slippage. See equipment required for ordering specific rotors and accessories.

The housing is cast aluminum-alloy base with steel rotor guard chamber. The full-access rotor chamber lid is counterbalanced to prevent slamming. The lid latch is locked in place by a motor operated lid-latch plunger. This safety feature prevents centrifuge operation until the lid is mechanically and electrically locked. It also prevents opening the lid when the rotor is spinning.

The control panel is integrated into the unit as part of the base and contains the operating controls and indicators. All controlling and operating circuits are contained in the base.

The unit is finished with stain-resistant, baked-on epoxy enamel.

*Table 1-1. Specifications*

Rotor	Maximum Operating Angular Velocity in Revolutions per minute	Maximum Relative Centrifugal Force (RCF)
M Rotor	6000	4950
SP/X Rotor	6000	4950
HL-4 with omni-carrier	2600	1240
HL-4 with 50-ml bucket	3200	2070
HL-4 with 100-ml bucket	2600	1545
HL-4 with sealed bucket assy	3000	1749
<b>Dimensions:</b>		
Width	45 cm (17.5 in)	
Depth	43 cm (17.0 in)	
Height	46 cm (18.0 in)	
Mass (weight)	18 kg (40 lb)	
Operating Temperature Range	0 °C to 25 °C	
<b>Electrical Requirements:</b>		
Electrical Potential	115 Vac single-phase 220 Vac single-phase	
Current	8 A 4 A	
Frequency	60 Hz 50 Hz	



## **Du Pont Instruments**

GLC-2B

### **1-4. SPECIFICATIONS.**

Refer to table 1-1 for centrifuge specifications.

### **1-5. EQUIPMENT REQUIRED.**

In addition to the centrifuge, rotors and rotor accessories are required for laboratory use.

The following list gives the interchangeable rotors and accessories. Refer to the Du Pont Instruments Product Guide for specific details.

#### **a. Interchangeable Rotors.**

- (1) PN 33029 M Centrifuge Rotor
- (2) PN 35115 SP/X Centrifuge Rotor
- (3) PN 11004 HL-4 Horizontal Rotor

#### **b. Optional Accessories for HL-4 Rotor.**

Refer to the Du Pont/Sorvall Product Guide.



## SECTION 2 INSTALLATION

### 2-1. GENERAL

This section provides the information to unpack, inspect, and install the centrifuge prior to operation.

### 2-2. UNPACKING.

The centrifuge is shipped in a specially-designed heavy-duty cardboard carton to prevent damage in shipping.

Unpack carefully. In the event that parts are missing or broken, notify both the carrier and Sorvall Instruments immediately.

### 2-3. INSTALLATION.

The centrifuge has been ordered with specific power requirements and should be used only on appropriate service lines. These are:

105 - 125 V, 60 Hz, single phase, 8 A  
 or  
 210 - 230 V, 50 Hz, single phase, 4 A

The 3-wire cord with a 3-prong plug will fit Hubbell receptacle number 5261 (115 V parallel blades), number 5561 (220 V tandem blades), or equivalent.

The centrifuge may be placed on any sturdy table or bench. Once positioned, it is ready for inspection

and operation since it has been tested and adjusted prior to shipment.

#### CAUTION

Cooling air is drawn into the cabinet from all four sides of the base. Be sure the entrances are not obstructed.

Connect the power cord to the 3-wire grounded receptacle and refer to operating instructions.

### 2-4. CONTAMINATION

Because of the nature of samples likely to be processed in the rotor, the chance of contamination, either biological or radioactive, is very possible. Always be aware of this possibility and take normal precautions. Use standard decontamination procedures should exposure occur.

Should a centrifuge or rotor that has been used with radioactive or pathogenic material require servicing by Du Pont personnel either at the customer's laboratory or at Du Pont facilities, comply with the following procedure to ensure safety of our personnel.

a. Clean the centrifuge and/or rotor to be serviced of all encrusted material and decontaminate it prior to servicing by our representative. There must be no radioactivity detectable by survey equipment.

b. Complete and attach Decontamination Information Certificate (Du Pont Instruments Form No. IPDP-59) to the centrifuge or rotor.



GLC-2B

## DuPont Instruments

If centrifuge or rotor to be serviced does not have a Decontamination Information Certificate attached and, in our opinion, presents a potential radioactive or biological hazard, our representative will not service the equipment until proper decontamination and certification is complete. If we receive a centrifuge or rotor at our Service facilities which, in our opinion, is a radioactive or biological hazard, the sender will be contacted for instructions as to disposition of the equipment. Disposition costs will be borne by the sender.

Decontamination Information Certificates are included with these instructions. Additional certifi-

cates are available from your local technical or customer service representative. In the event these certificates are not available, a written statement certifying that the unit has been properly decontaminated and outlining the procedures used will be acceptable.

### NOTE

Service representative will annotate a Customer Service Repair Report if decontamination was required, and if so, what the contaminate was and what procedure was used. If no decontamination was required, it will be so stated.



## SECTION 3 OPERATING PROCEDURES

### 3-1. GENERAL.

This section locates and describes the function of each operating control and indicator and provides the data needed to start up, operate, and shut down the centrifuge.

Since rotor balance is an operational consideration, it and the selection and use of centrifuge tubes is discussed.

### 3-2. ROTOR CONSIDERATIONS.

Since the rotor is an essential part of the centrifugation, there are two very important considerations of rotor operation: temperature and balance.

#### a. Rotor Temperature.

Rotor temperature rise accompanies any type of centrifugation. The design of the GLC-2B with its large rotor chamber minimizes the temperature increase. The increase in temperature is due to a number of variables such as ambient temperature within the chamber, rotor speed, length of run, and tube holder and specimen temperature.

When running temperature-sensitive material, experimentation must be done first.

#### b. Rotor Balance.

For best performance, the rotor mass including trunnion rings, holders, tubes, and specimen must be properly balanced. If the rotor is improperly balanced, an unbalance switch will trip the POWER circuit breaker, removing input electrical potential and allowing the rotor to coast to a stop.

If less than a full complement of specimen tubes is being run, they must be placed in opposite rotor compartments. Tubes filled with water may be used to balance the rotor as required.

To assist in balancing, the trunnion rings are stamped with their gram mass. If an additional trunnion ring is ordered, its gram mass must be specified or they must be ordered in matched pairs.

Balance a rotor as follows:

(1) Always load the rotor with an equal opposing mass. This includes trunnion ring, holder, tube, and specimen quantity.

(2) If it is not possible to load rotor with an opposing specimen mass, use a trunnion ring, holder, and tube filled with water to equal the specimen.

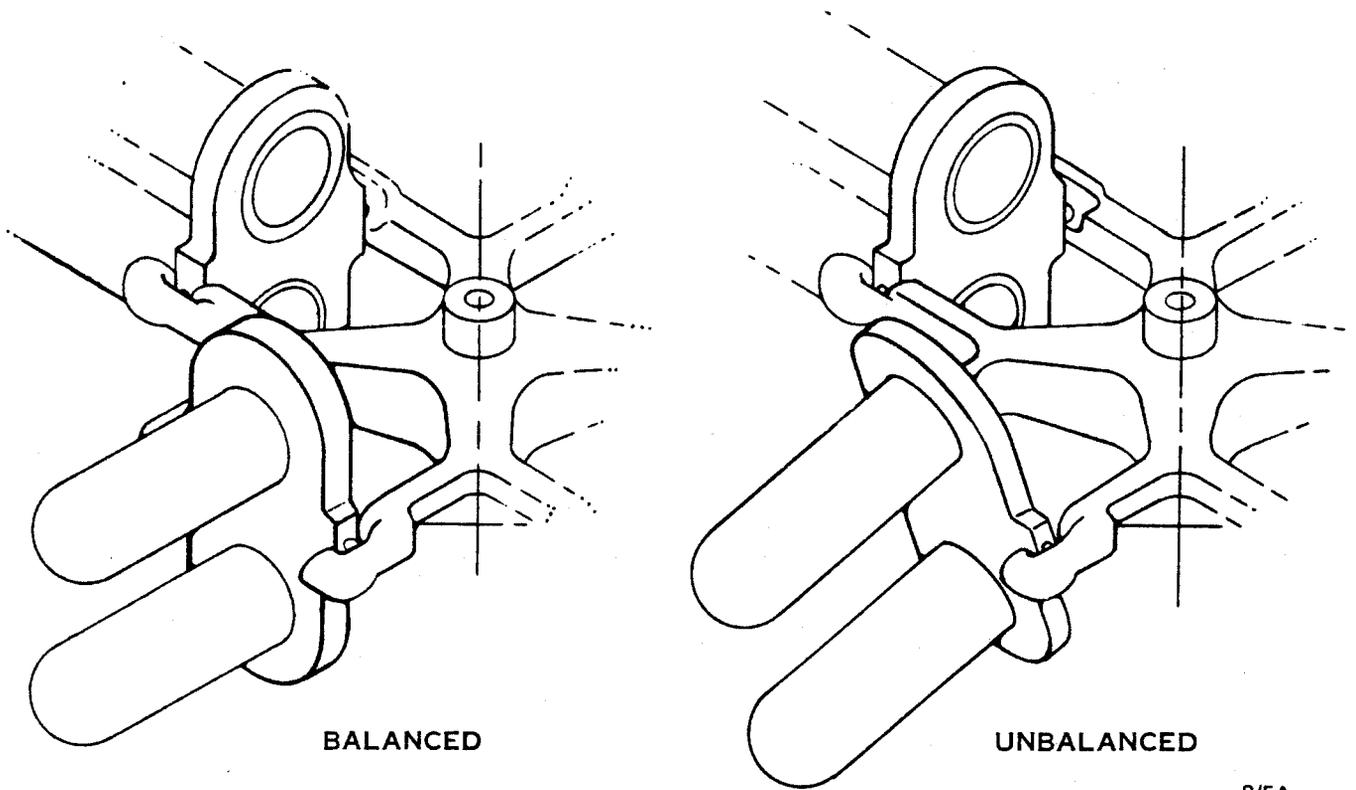
(3) Balance each opposing pair of holders individually.

(4) If the HL-4 rotor is used, suitable bucket and trunnion combinations must be carried in all four locations. With 50-ml buckets or the omni-carrier with inserts, both buckets and inserts must be balanced. This prevents the bucket or carrier from attempting to find its center of mass during centrifugation which may affect its horizontal operation (figure 3-1). Use a balance tube or tubes to prevent this possibility:

#### **WARNING**

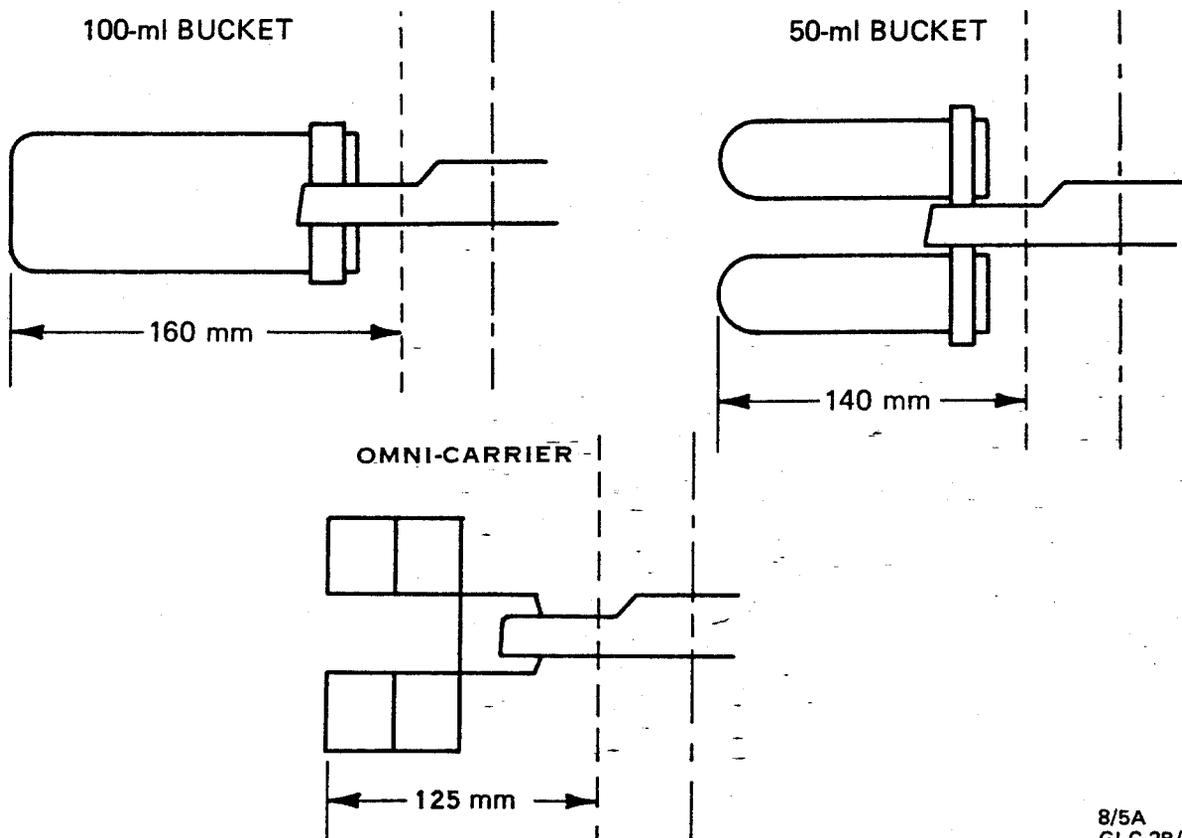
- When 50-ml buckets or the omni-carriers with inserts are to be run, be certain both buckets or inserts are balanced.
- When sealed bucket assemblies are to be run, be certain that all trunnion rings swing freely on the support pins before starting the rotor.





8/5A  
GLC-2B/3

Figure 3-1. Improperly Balanced Bucket



8/5A  
GLC-2B/4

Figure 3-2. Tube Length Limits



### 3.3. SELECTION AND USE OF CENTRIFUGE TUBES.

A wide variety of tubes may be used with the HL-4 rotor but particular attention should be paid to the length of tube. Because of the configuration of the rotor and the arc through which the tubes will swing, there is a limit of tube length with each bucket and insert (figure 3-2).

Rubber pads must be used with the 100-ml and 50-ml buckets when running glass centrifuge tubes to prevent tube breakage.

### 3.4. LOADING PRECAUTIONS.

When using the omni-carriers, make certain that the inserts are fully seated in the holder, otherwise damage may result.

Because oversized tubes occasionally will be found from any manufacturer, it is recommended that tubes be test-fitted to the rotor compartment (or insert) to ensure their fit prior to filling with specimen.

### 3.5. CONTROLS AND INDICATORS.

Figure 3-3 shows the operating controls and indicators. Table 3-1 lists them by item number and describes their function.

### 3.6. OPERATION.

With the centrifuge installed as described in Section 2, operate it as follows:

#### CAUTION

Never operate the centrifuge at its critical angular velocity (with revolutions of approximately 1000/min) for any length of time to avoid shortening the motor drive assembly life.

- a. Set the POWER switch ON and turn the TIMER to OFF. This unlocks the lid. (There is a ten second delay while the safety interlock energizes.)
- b. Unlock the lid latch and raise the lid.

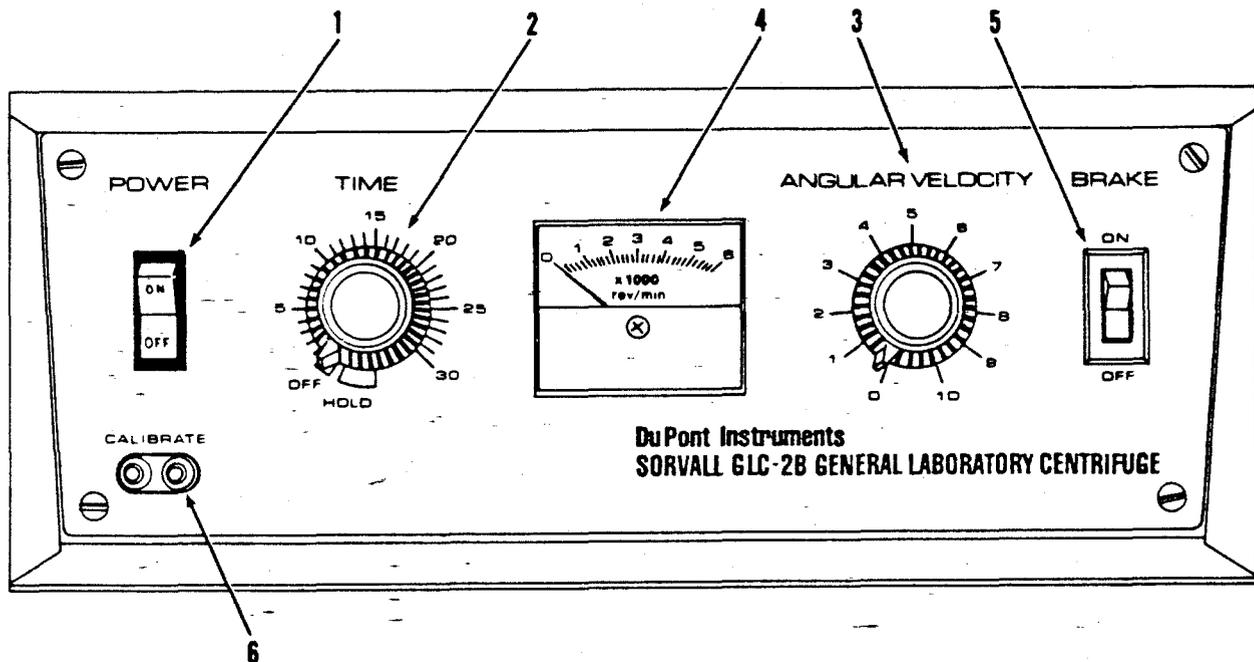


Figure 3-3. Controls and Indicators



c. Inspect the interior of the guard assembly and remove any foreign objects.

d. Select the rotor to be used and place it on the motor drive shaft within the guard assembly.

**CAUTION**

Make sure that the keyway in the rotor is properly engaged in the keyway on the drive shaft.

e. Load the rotor with the specimen tubes. Refer to paragraph 3-3.

**CAUTION**

The centrifuge must not be operated without the rotor installed and properly balanced. An unbalance interlock switch will short out the input electrical potential and trip the POWER circuit breaker if unbalance settings are exceeded.

f. Close the counterbalanced lid and lock the lid latch. Be certain the timer is off and the latch pin is in the retracted position.

*Table 3-1. Function of Controls and Indicators*

Item No.	Name	Position	Function
1.	POWER switch	ON and OFF	Applies power to circuits, shuts power off. Switch is illuminated when power is on.
2.	TIME control	a. HOLD	At HOLD, the timing circuit is bypassed and the drive motor runs until the TIME control is set to 0. At 0, the lid will unlock after the rotor stops.
		b. 0 to 30	The TIME control may be set to any time between 0 and 30 minutes. The drive motor will run for the period of time selected and the timer contacts will open (times out) to stop timer and drive motors. At 0, the lid will unlock after the rotor stops.
3.	ANGULAR VELOCITY Control	0 to 10	Selects ranges of drive motor "speed" from 0 to 10. These are arbitrary number units for reference only. Observe "speed" on tachometer indicator.
4.	Tachometer		Indicates the drive motor "speed". The smallest division represents revolutions of 100/min.
5.	BRAKE Control	ON and OFF	Selects brake or coast when timer goes to 0.
6.	CALIBRATE		Provides connection facility for use of the Sorvall Portable Digital Tachometer (Portac) to calibrate the Centrifuge.



- g. Preset the ANGULAR VELOCITY control to 0.

**NOTE**

Presetting the ANGULAR VELOCITY control to 0 will prolong the life of the control relay.

- h. Turn the TIME switch to the desired time. If another timer is used, turn the TIME switch to HOLD. The latch pin will extend and the drive motor will start if the lid is down and properly latched. If the ANGULAR VELOCITY control is not preset to 0, a slight momentary rotation of the rotor may occur at this point. This is a normal condition.

**NOTE**

In the HOLD mode, the TIME switch must be turned to 0 at the end of the desired time to end the time cycle.

- i. Set the BRAKE switch to ON or OFF.
- j. Adjust the ANGULAR VELOCITY control for the desired "speed" as read on the tachometer.

**NOTE**

Should the timer be manually set to 0 and then reset, the centrifuge will not restart until the rotor revolutions equal 0/min.

**CAUTION**

Maximum rotor "speeds" are:

Rotor	Angular Velocity (Revolutions per Minute)
M, SP/X	6000
HL-4, 50-ml bucket	3200
HL-4, 100-ml bucket	2600
HL-4 omni carriers	2600

The relative centrifugal force (RCF) is given in table 3-2 and the maximum compartment loads are given in table 3-3.

- k. After the pre-set time has elapsed, secure the centrifuge as follows:

1. Leave the POWER switch ON.
2. Unlock the lid-latch and remove the rotor.
3. Close the lid and lock the latch.
4. Set the POWER switch OFF.

**3-7 RUNNING HAZARDOUS MATERIALS**

The GLC-2B Centrifuge is a non-refrigerated instrument which utilizes a ventilation system employing open air circulation to cool the centrifuge, the rotor and its contents. During operation, fresh air is drawn into the centrifuge, displacing the heated air already inside, which is consequently expelled into the laboratory. If the centrifuge chamber contains vapor or aerosols which were released from uncapped, leaking or broken tubes, those vapors will also be swept out by the ventilation system into the laboratory area. Thus, the GLC-2B Centrifuge is not designed to handle materials which are pathogenic, toxic or otherwise hazardous in nature.

If such materials are to be run in the GLC-2B Centrifuge the instrument should be located in a bio-hazard safety enclosure and operated with all appropriate safety precautions.

**WARNING**

Do not attempt to run pathogenic, toxic, or otherwise hazardous materials in the GLC-2B Centrifuge unless it is located in a bio-hazard safety enclosure and operated with all appropriate safety precautions.

Use standard decontamination procedures on the



centrifuge should exposure to any hazardous materials occur. See paragraph 2-4 for procedures to follow if a centrifuge or rotor which has been used with hazardous materials must be returned to our service facilities for repair.

**WARNING**

The use of sealed rotors, buckets and/or sample containers will offer increased protection during routine operation. However, these items will not provide positive contamination protection from accidents resulting in damage to the rotor or buckets.

Table 3-2. Relative Centrifugal Force

<b>ROTOR</b>	<b>MAXIMUM RADIUS</b>	<b>ROTOR</b>	<b>MAXIMUM RADIUS</b>	<b>ROTOR</b>	<b>MAXIMUM RADIUS</b>
M & SP/X	12.32 cm	HL-4 Rotor with: 50-ml Bucket 100-ml Bucket Omni-Carrier	18.11 cm 20.47 cm 16.41 cm	HL-4 Rotor with: Sealed 50-ml Bucket	18.11 cm

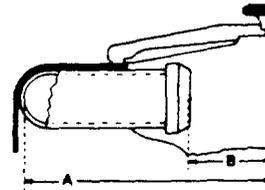
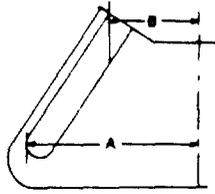
ANGULAR VELOCITY (revolutions per minute)	RADIUS (CENTIMETERS)				
	2.54	12.32	16.41	18.11	20.47
500	7	34	46	51	57
1000	28	138	183	202	229
1500	64	310	413	455	515
2000	114	551	733	809	915
2500	177	860	1146	1265	1430
3000	255	1239	1650	1821	2059
3500	348	1686	2246	2479	2802
4000	454	2202	2933	3238	3660
4500	575	2787	3713	4098	4632
5000	710	3441	4583	5059	5719
5500	858	4164	5546	6121	6919
6000	1022	4955	6600	7285	8235

FORMULA USED

$$RCF = \alpha r \left( \frac{\omega}{1000} \right)^2, \text{ where } \alpha = 11.17 \text{ min}^2/\text{cm}, r = \text{radius in centimeters and } \omega = \text{angular velocity in revolutions per minute}$$



Table 3-3. Maximum Compartment Mass



ANGLE ROTORS	RADIUS (CENTIMETERS)		MAXIMUM COMPARTMENT MASS (GRAMS)	HORIZONTAL ROTORS	RADIUS (CENTIMETERS)		MAXIMUM COMPARTMENT MASS (GRAMS)	
	A	B			A	B		
M	inner row	9.14	5.04	HL-4	50 ml	18.11	8.25	650
	outer row	12.32	7.59		100 ml	20.47	7.75	550
SP/X	inner row	8.23	4.65	Omni-Carrier	16.41	9.84	815	
	outer row	12.32	7.59	Sealed 50 ml bucket	18.11	8.59	450	

To determine RCF for points not given on the charts, multiply the desired radius by the 2.54 cm radius value at the given "speed".



## SECTION 4 MAINTENANCE

### 4-1. GENERAL.

This section provides data needed to maintain and troubleshoot the centrifuge. Procedures include testing, cleaning, and troubleshooting. Most parts can be replaced without special procedures. Should maintenance beyond the scope of this manual be necessary, contact the nearest office of Sorvall Instruments, Biomedical Division.

#### **WARNING**

Because of the inherent hazard involved with electrical circuits, untrained personnel must not attempt to test or repair any electrical circuits in the centrifuge.

Schematic (figure 4-1) and wiring diagrams (figure 4-2) are included as diagnostic aids in troubleshooting.

An exploded view (figure 5-1) provides parts identification.

### 4-2. TEST EQUIPMENT REQUIRED.

No special test equipment is required. A general purpose multimeter and common handtools are sufficient.

### 4-3. INSPECTION AND CLEANING.

Inspect the centrifuge weekly for any signs of wear, corrosion, or accumulation of dirt. Wipe its exterior clean with a cloth dampened with warm water and a mild soap or detergent. Remove the rotor. Wipe the interior of the guard bowl clean.

Wash the rotor with warm water and a mild soap or detergent. It is important to wash the rotor after any spills. Remove any caustic or acid materials with a detergent such as Ninon or Alconox and stiff bristle brush and rinse rotor well. After rinsing, dry thoroughly with a soft absorbent cloth or towel. Store the rotor upside down.

### 4-4. TROUBLESHOOTING.

A troubleshooting chart is provided in the rear of this section to isolate a faulty component. If any problems arise in replacing and/or adjusting a component, contact the nearest service representative.

Refer to Section 5 for the part number of the replacement part.

### 4-5. UNBALANCE SWITCH ADJUSTMENT (figure 4-3).

- a. Install a HL-4 rotor with 100-ml buckets in the rotor guard.
- b. Place a 10-gram mass in one of the buckets.
- c. Remove the front panel.
- d. Adjust the revolutions to 1000/min.



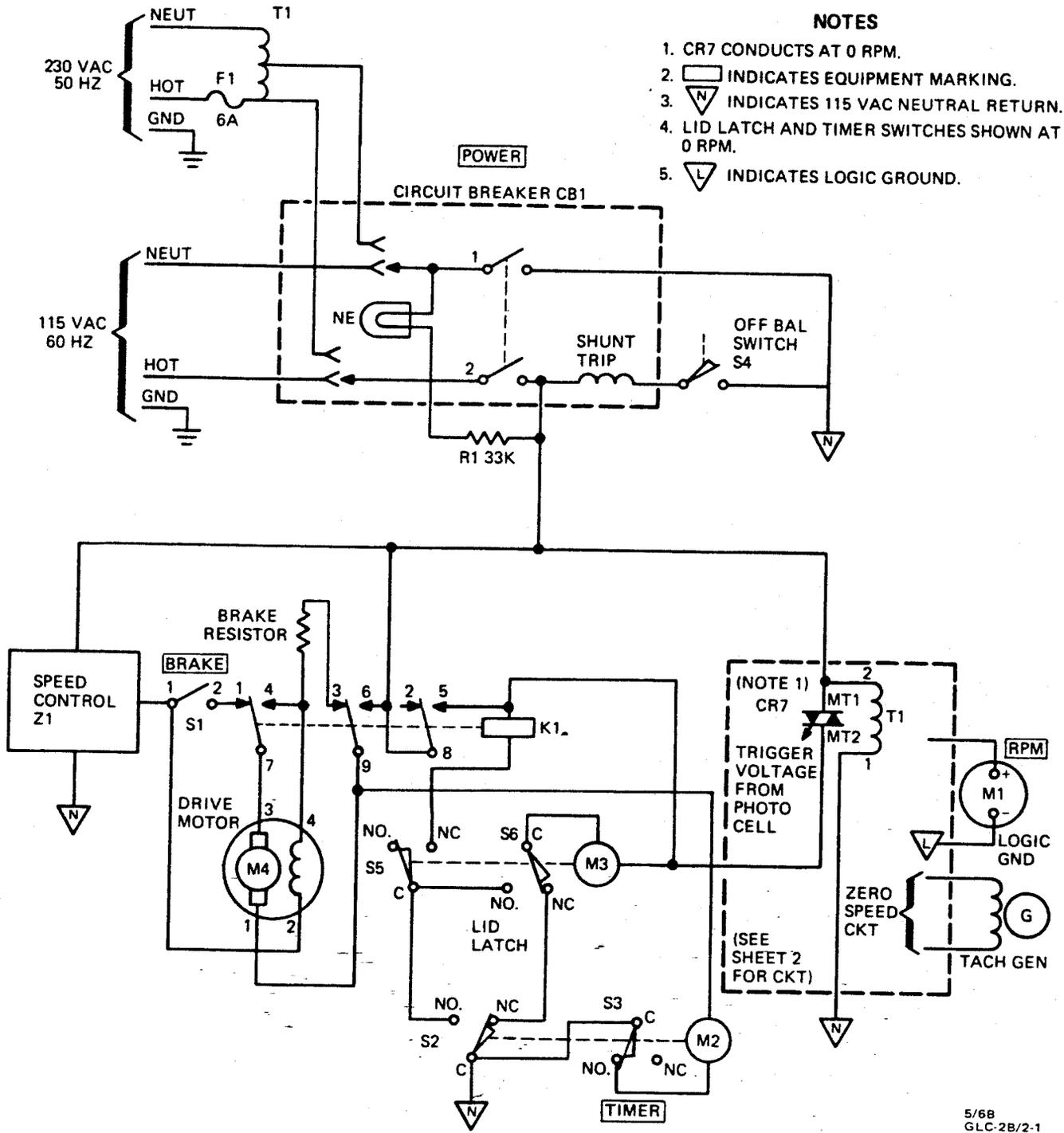


Figure 4-1. Schematic Diagram (Sheet 1 of 2)

5/68  
GLC-2B/2-1



NOTES

1. RESISTANCE ARE IN OHMS AND ARE 1/4W, 5%; CAPACITANCES ARE IN MICROFARADS.
2. UNLESS OTHERWISE NOTED, DIODES ARE TYPE IN914; AMPLIFIERS ARE TYPE LM311N.

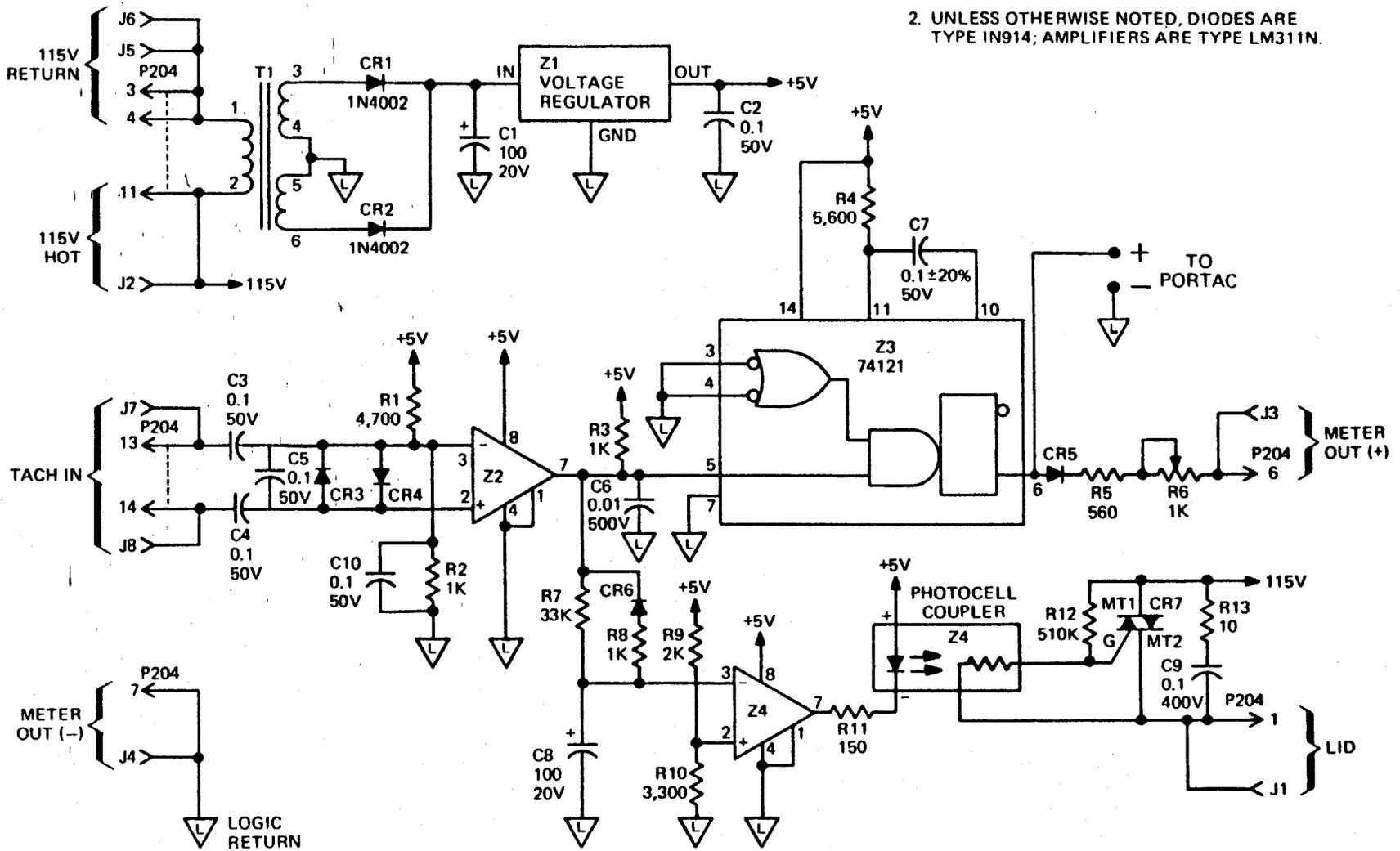
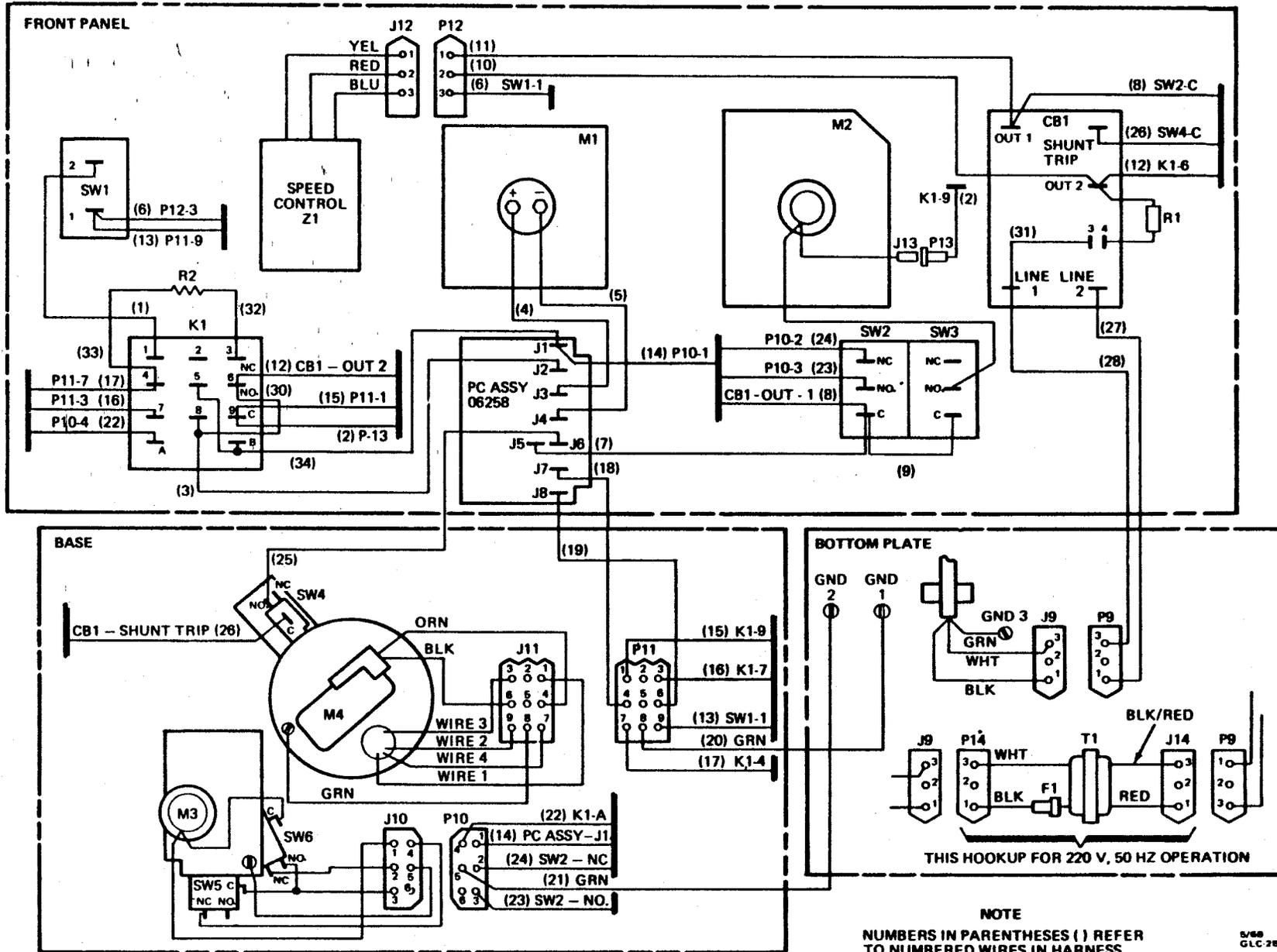


Figure 4-1. Schematic Diagram (Sheet 2 of 2)





NOTE  
 NUMBERS IN PARENTHESES ( ) REFER  
 TO NUMBERED WIRES IN HARNESS

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 GLC 28/6

Figure 4-2. Interconnecting Diagram



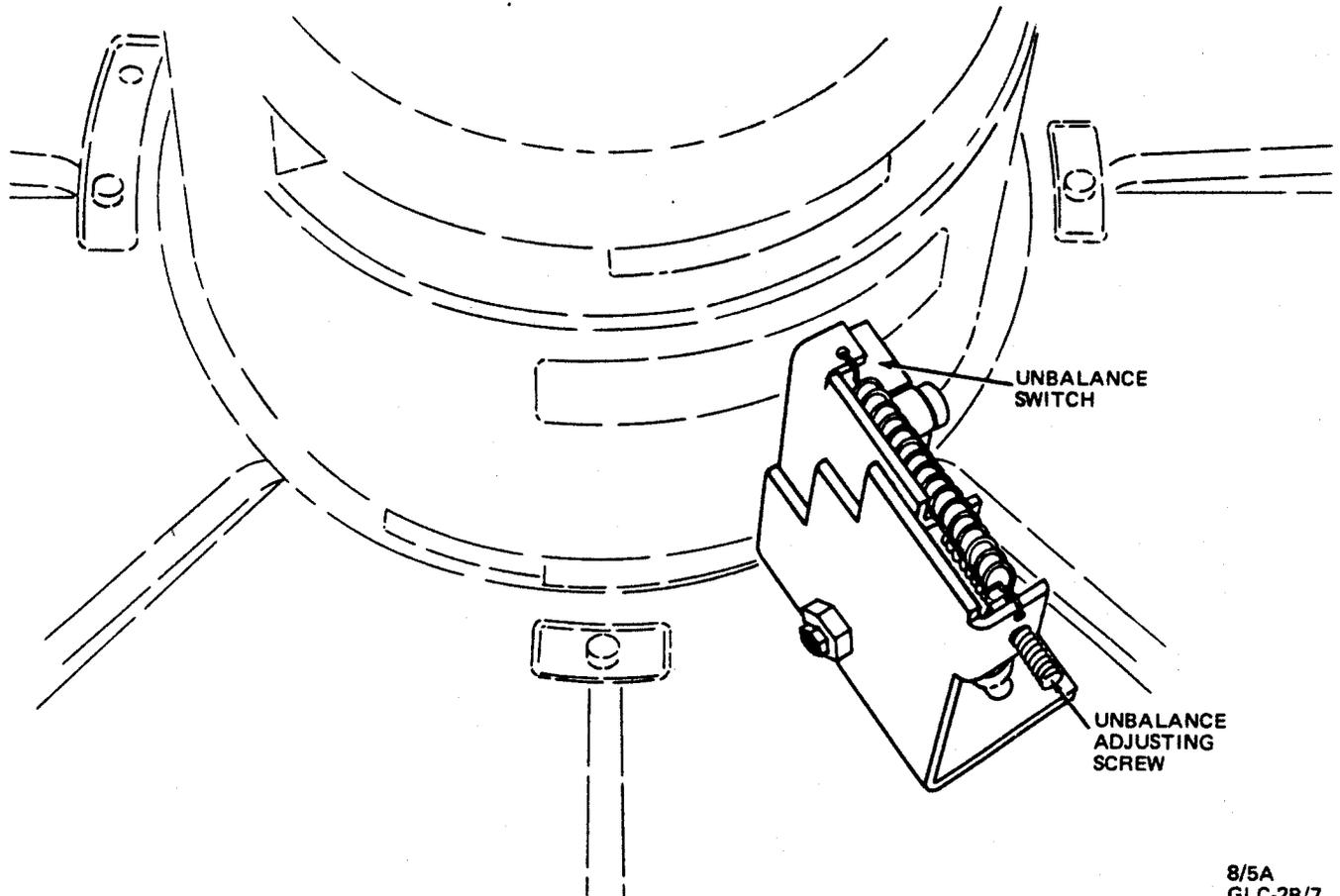
8/5A  
GLC-2B/7

Figure 4-3. Unbalance Switch Adjustment.

e. While the motor speed is increasing, adjust the unbalance adjusting screw until the unbalance switch opens at revolutions of  $1000/\text{min} \pm 500/\text{min}$ .

f. Stop the rotor.

g. Replace the 10-gram mass with an 8-gram mass.

h. Adjust the revolutions to 1000/min. The unbalance switch should not open with the 8-gram mass. If it does, repeat steps d thru h until the 8-gram mass does not open the switch.

#### 4.6. PULSE GENERATOR ADJUSTMENT. (figure 4-4).

a. Tilt the centrifuge over and remove the four screws and rubber feet.

b. Remove the other three baseplate screws and washers. Remove the base.

c. Insert a 0.051-cm (0.020-in) feeler gauge between the pickup and the high points of the tachometer gear.

d. If necessary, loosen the two screws holding the pickup, reposition it as required, and tighten the screws.

e. Install the baseplate with the seven screws and washers and the four rubber feet.



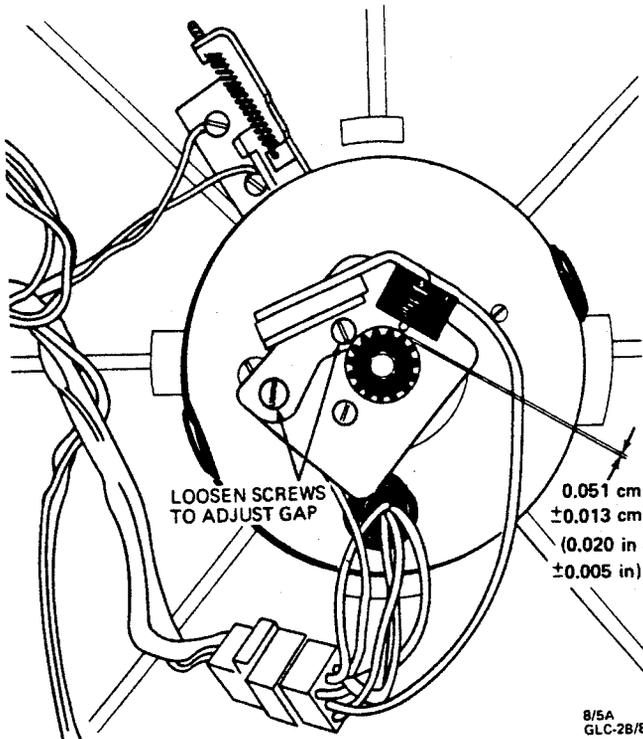


Figure 4-4. Pulse Generator Adjustment.

4-7. TACHOMETER ZERO ADJUSTMENT.  
(figure 4-5).

With the POWER switch OFF, adjust screw until the pointer reads 0.

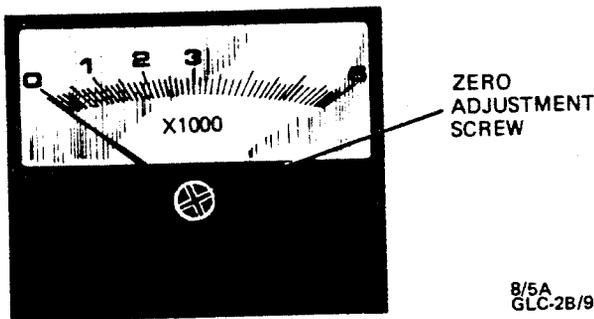


Figure 4-5. Zero Adjustment.

4-8. SPEED CONTROL POTENTIOMETER ADJUSTMENT (figure 4-6).

**WARNING**

Use only an insulated tool to make this adjustment.

- a. Connect the centrifuge to a power source through a variable transformer.
- b. Adjust the variable transformer for the specified input power (115 V or 220 V).
- c. Place a rotor on the gyro-drive assembly and close the cover.
- d. Remove the front panel.
- e. Turn the SPEED control to 0.
- f. Observe the motor under the guard bowl.
- g. If the motor is not turning, turn the thumbwheel (R1) clockwise using an insulated tool until the motor just starts to turn. Then turn the thumbwheel counterclockwise until the motor stops.
- h. If the motor is turning, turn the thumbwheel (R1) counterclockwise until the motor stops.

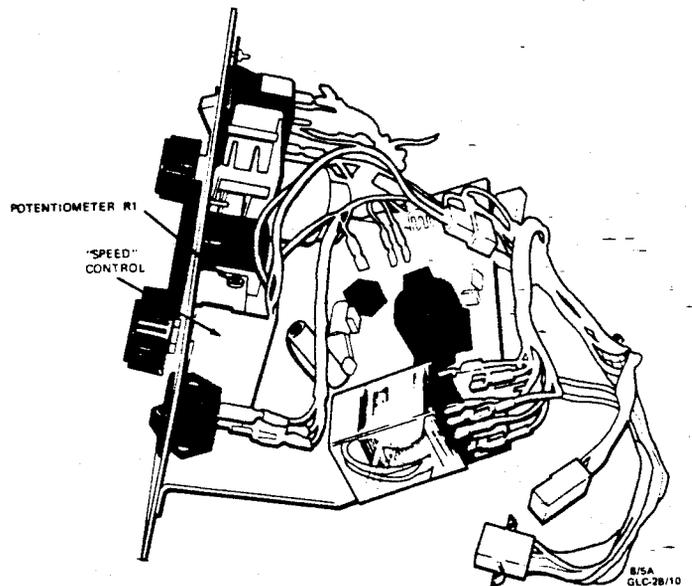


Figure 4-6. Speed Control Adjustment



#### 4-9. MOTOR BRUSH INSPECTION AND REPLACEMENT (figure 5-1).

- a. Unplug the power cord.
- b. Tilt the centrifuge over on its back.
- c. Remove the four screws and the rubber feet.
- d. Remove the other three baseplate screws and washers. Remove the base.
- e. Remove the plastic brush caps with a stubby screwdriver. Pull the brushes from their holders noting orientation.

#### NOTE

Before inserting replacement brushes, carbon accumulation should be removed from the area of the brush holder in which the brush rides. Brush should then move freely in the brush holder.

- (1) If brush length is greater than 9 mm (3/8 in), replace brushes in their original brush tubes with the same orientation.



Length  
Measurement

- (2) If this is the first set of brushes and brush length is less than 6 mm (1/4 in), replace brushes.

- (3) If this is not the original set of brushes

and the length is less than 6 mm (1/4 in), the motor armature should be reconditioned. For information and/or instructions on armature reconditioning, contact the Du Pont Service Department in Newtown, Connecticut.

- f. Install the plastic brush caps. Make sure the brush spring retainer 'ears' are seated in the brush holder slots.

- g. Install the baseplate and the four rubber feet using the appropriate screws and washers.

- h. Set the centrifuge on its feet and plug in the power cord.

- i. If new brushes have been installed, run the centrifuge at revolutions of 2000/min with no rotor for a period of 30 minutes to seat the brushes. Failure to do this will result in immediate brush burn and commutator pitting and will severely limit the life of the new parts.

#### CAUTION

Do not stone or burnish commutator as this will increase brush wear and may result in smear metal on the surface of the commutator.

Do not allow motor to become inoperative by allowing brushes to wear to the point where the brushes do not make contact with the commutator. This causes severe arcing resulting in excessive brush and commutator wear.



Table 4-1. Troubleshooting.

NOTE

During troubleshooting, loose or faulty connections must not be overlooked.

PROBLEM	PROBABLE CAUSE	REMEDY
POWER switch is ON but not illuminated and centrifuge will not operate.	1. Faulty power supply.	1. Reset power switch. On 50 Hz instruments check transformer inline fuse.
	2. Centrifuge circuit overloaded	2. Reset power switch. On 50 Hz instruments check transformer inline fuse.
	3. Faulty POWER switch.	3. Replace switch.
	4. Faulty power transformer (if 220 Vac supply).	4. Replace transformer.
Motor operates but rotor remains stationary.	Sheared drive coupling.	Check upper and lower couplings on gyro drive and replace as necessary.
POWER switch is ON, ANGULAR VELOCITY and TIME controls are set, and latch locks but motor will not start.	1. Faulty TIME control.	1. Check control and set to HOLD or to timed run. Replace if necessary.
	2. Closed unbalance switch.	2. Rock gyro drive shaft back and forth and readjust switch. Replace switch if necessary.
	3. Misadjustment or faulty lid lock latch mechanism.	3. Adjust or replace latch mechanism.
Poor braking.	1. Worn or binding brushes.	1. Replace brushes.
	2. Dirty commutator.	2. Clean or repair motor.
	3. Faulty connection.	3. Locate and repair.



Table 4-1. Troubleshooting. (continued)

PROBLEM	PROBABLE CAUSE	REMEDY
Centrifuge motor will not stop when timer turns to 0.	Faulty timer.	Replace timer.
Motor stops but latch will not unlock.	<ol style="list-style-type: none"> <li>1. Faulty lid latch mechanism.</li> <li>2. Loose or broken cable.</li> <li>3. Faulty zero "speed" circuit on printed circuit card.</li> <li>4. Faulty control relay.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace latch mechanism.</li> <li>2. Inspect cable and tighten or replace as necessary.</li> <li>3. Replace card.</li> <li>4. Replace relay.</li> </ol>
POWER switch is ON, TIME control is set, and cover is latched but motor will not start.	<ol style="list-style-type: none"> <li>1. Faulty control relay.</li> <li>2. Faulty "speed" control</li> <li>3. Faulty motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace relay.</li> <li>2. Replace "speed" control.</li> <li>3. Check brushes and commutator and replace or repair as necessary.</li> </ol>
Motor will not brake	Faulty BRAKE switch.	Inspect switch and replace if necessary.
Centrifuge makes rasping noises.	<ol style="list-style-type: none"> <li>1. Faulty motor brushes.</li> <li>2. Faulty motor and/or gyro bearings.</li> <li>3. Faulty drive coupling.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and replace brushes.</li> <li>2. Check motor and gyro drive by spinning. Replace bearings as necessary.</li> <li>3. Repair or replace drive.</li> </ol>



Table 4-1. Troubleshooting. (continued)

NOTE

During troubleshooting, loose or faulty connections must not be overlooked.

PROBLEM	PROBABLE CAUSE	REMEDY
Abnormal wear of brushes	<ol style="list-style-type: none"> <li>1. Worn Commutator</li> <li>2. Defective Armature</li> <li>3. Improper Maintenance</li> </ol>	<ol style="list-style-type: none"> <li>1,2,3. Repair motor armature or replace motor.</li> <li>3. Provide preventive maintenance on motor.</li> </ol>
Motor spins to maximum "speed" regardless of ANGULAR VELOCITY control setting.	<ol style="list-style-type: none"> <li>1. Faulty ANGULAR VELOCITY control.</li> <li>2. Shorted motor field coil.</li> <li>3. "Speed" control out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace control.</li> <li>2. Repair or replace motor.</li> <li>3. Adjust "speed" control</li> </ol>
Motor runs but tachometer does not operate.	<ol style="list-style-type: none"> <li>1. Faulty tachometer.</li> <li>2. Faulty tachometer circuit.</li> <li>3. Faulty tachometer sensor.</li> <li>4. Tachometer air-gap out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check full scale deflections (1mA). Replace if necessary.</li> <li>2. Replace printed circuit card.</li> <li>3. Replace tachometer sensor.</li> <li>4. Adjust air-gap and secure.</li> </ol>



## SECTION 5 PARTS LIST

### 5-1. GENERAL.

This section lists the parts which Du Pont/Sorvall considers practical to stock and supply for replacement. Table 5-1 lists the parts by major assembly and subassembly. Included are item numbers referencing to figure 5-1, part numbers, and descriptions.

### 5-2 INDENTATION.

Parts in these lists are indented to indicate item relationships. The following is an example of the indentation system used in the description column.

Assembly and/or component A

- Detail Part or Subassembly B of Assembly and/or Component A

- Attaching Hardware (if applicable) for Detail Part or Subassembly B

- • Parts C of Detail Part or Subassembly B

- • Attaching Hardware (if applicable) for Parts C

Attaching Hardware (if applicable) for Assembly or Component A

Normally, only special attaching hardware is listed. Except for any special item, all hardware is stainless steel in standard sizes that can be obtained locally.

*Table 5-1. Parts List for GLC-2B General Laboratory Centrifuge*

Item No.	Part No.	Description
<b>CONTROL COMPONENTS:</b>		
1	06267	Instrument Panel Assembly, 60 Hz
1	06274	Instrument Panel Assembly, 50 HZ
2	12145	• Timer Assembly, 60 Hz
2	12146	• Timer Assembly, 50 Hz
	62127	• Knob, Timer
3	66161	• Tachometer Indicator
4	12245	• ANGULAR VELOCITY Control Assembly
5	66159	• Circuit Breaker, Lighted
6	66158	• Switch, Brake
<b>COVER AND GUARD COMPONENTS:</b>		
7	06188	• Lid Assembly
8	06204	• Guard Subassembly
9	06313	• Lid Lock Actuating Assembly
10	06143	• Lock Boot
11	06142	• Helical Torsion Spring
12	06186	• Pin Hinge
13	06190	• Latch Assembly



Table 5-1. Parts List for General Laboratory Centrifuge GLC-2B (continued).

Item No.	Part No.	Description
		<b>ELECTRICAL CIRCUIT COMPONENTS:</b>
14	12246	● Printed Circuit Board Assembly
15	06268	● Transformer Assembly (220 Vac Models Only)
		<b>MOTOR AND RELATED COMPONENTS:</b>
16	06369	● Motor Assembly with Pulse Generator
17	06115	● Support, Motor
18	25015	● Retaining Plate
19	25238	● Lower Coupling Assembly
20	66744	● Cap, Brush Holder
21	12279	● Carbon Brush Assembly
	66301	● Motor, Replacement
		<b>GYRO AND RELATED COMPONENTS:</b>
22	06003	● Gyro Action Drive Assembly
	61861	● ● Bearing (Two Required)
23	06004	● Coupling Subassembly
24	06199	● Seal, Gyro Action Drive
25	06107	● Microswitch Subassembly, Unbalance
26	06008	● Screw
27	66665	FILTER CHOKE

**5-3. PARTS ORDERING INFORMATION.**

To obtain replacement parts, contact any of the offices listed on the back cover and include the part

number and description. To ensure that you receive the correct part for your instrument, be sure you include the instrument type or number and its serial and/or model number.



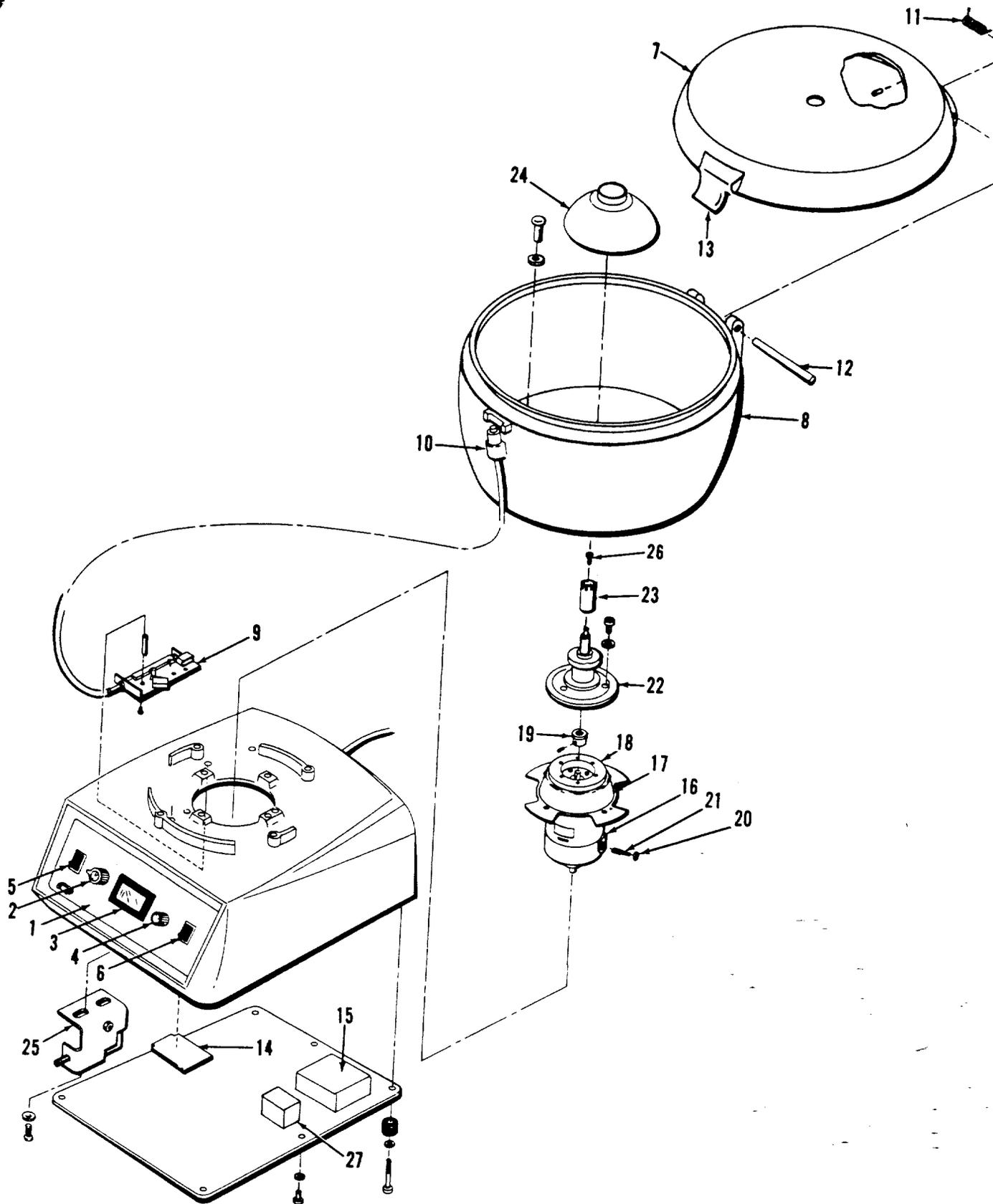


Figure 5-1. Exploded View.



**DU PONT COMPANY • BIOMEDICAL PRODUCTS DIVISION  
WILMINGTON, DE, 19898 U.S.A.**

In the  
**UNITED STATES**  
for Technical  
Information, Instrument  
Service, or  
a Quotation,  
Contact:

**NORTHEAST DISTRICT**  
(CT, DE, ME, MA, NH, NJ, NY, PA, RI,  
VT, WV)  
Quillen Building, Concord Plaza  
Wilmington, DE 19898  
(302) 772-5655

**CENTRAL DISTRICT**  
(IL, IA, KS, MI, MN, MO, NB,  
ND, OK, SD, TX, WI)  
2200 E. Devon Ave.  
Des Plaines, IL 60018  
(312) 635-1130

**SOUTHEAST DISTRICT**  
(AL, AR, DC, FL, GA, IN, KY, LA, MD,  
MS, NC, OH, SC, TN, VA)  
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Wilmington, DE 19898  
(301) 770-2500

**WESTERN DISTRICT**  
(AK, AZ, CA, CO, HI, ID, MT,  
NV, NM, OR, UT, WA, WY)  
675 West Foothill Blvd.  
Claremont, CA 91711  
(714) 624-9007

To Order **SORVALL®** Products  
or Replacement Parts, Contact:

Du Pont Company  
Biomedical Products Division  
Concord Plaza  
Wilmington, DE 19898  
Telephone (302) 772-6250  
TELEX 835420

In the **FEDERAL REPUBLIC OF  
GERMANY**, and **U.K.**,  
Contact:

Du Pont de Nemours (Deutschland) GmbH  
Biomedical Products Division  
Dieselstrasse 18  
P.O. Box 1509  
D-6350 Bad Nauheim 1  
**FEDERAL REPUBLIC OF GERMANY**  
(06032) 3961

Du Pont (U.K.) Limited  
Wedgwood Way  
Stevenage, Herts SG1 4QN  
**UNITED KINGDOM**  
Telephone: 0438-727181  
Telex: 825591

In Other  
Countries,  
Contact:

Your local  
**SORVALL**  
representative



# CONDENSED OPERATING INSTRUCTIONS

## SORVALL® RT6000 AND T6000 TABLETOP CENTRIFUGES

1. Turn TIME control off (between 0 and HOLD). Set power switch to ON.
2. When OPEN light comes on, turn door release knob clockwise and open door.
3. Install rotor and close door. Turn door release knob counterclockwise to engage latches.
4. Set TEMP dial to desired run temperature (RT6000 ONLY).
5. Set BRAKE switch to ON if braking is desired.
6. Set TIME control to desired run time.
7. Adjust SPEED dial until desired speed is obtained.
8. At the end of the run, when the OPEN light comes on and the door latches release:
  - a. Leave the power switch on.
  - b. Turn door release knob clockwise and open door.
  - c. Remove samples and/or rotor, close door and turn power switch off.

### NOTE

- Make sure the specimen and rotor are properly balanced and seated on the drive shaft.
- The fan will turn on and continue to operate whenever the power switch is on.
- Always check to see that the rotor has stopped spinning completely before opening the chamber door. Do not open the door while the rotor is still in motion.
- The FAULT light will illuminate if the power is switched on with the door closed. The light will go out when the door is opened.

PN 07633-3

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# Sorvall® Centrifuges

Diagnostic and Bioresearch Systems Division



