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Benchmark 2000

L-K Industries, Inc. 6952 Lawndale ¤ Houston TX 77023 ¤ 713 926•2623, fax 713 926•7736 ¤ www.lk-ind.com

Technical Services Manual

Lab Centrifuge

Model #'s LAB-A115C, LAB-A220C, LAB-B115C, LAB-B220C, LAB-C115C, LAB-C220C, LAB-D115C, LAB-D220C

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUP D OR NON-HAZARDOUS LOCATIONS ONLY

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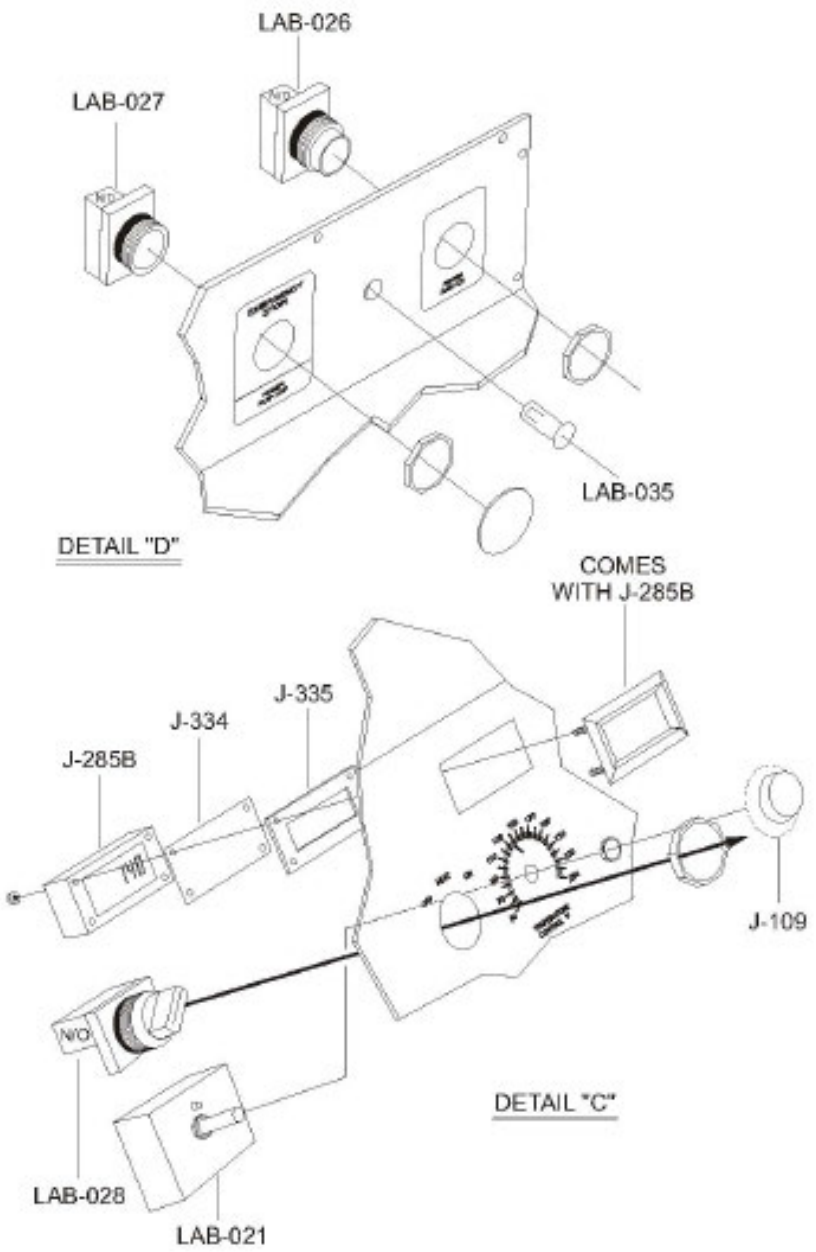

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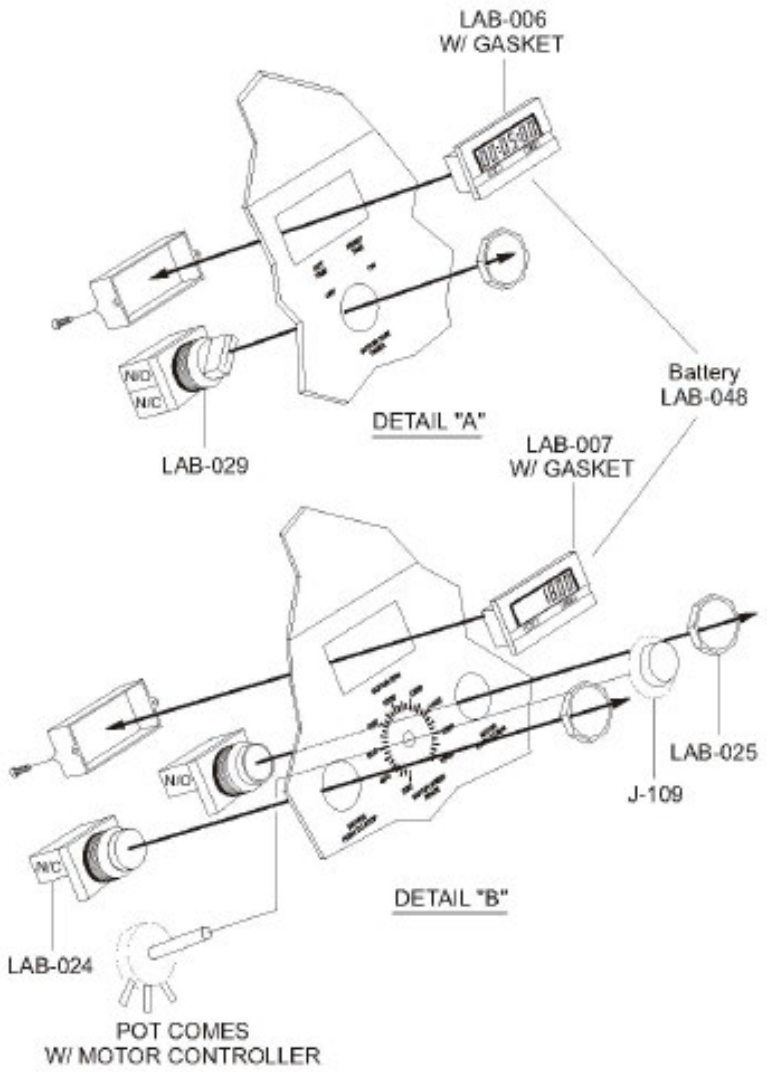
LAB-006
W/ GASKET
Battery
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N/O
N/C
DETAIL "A"
LAB-029
LAB-007
W/ GASKET
LAB-025
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N/O
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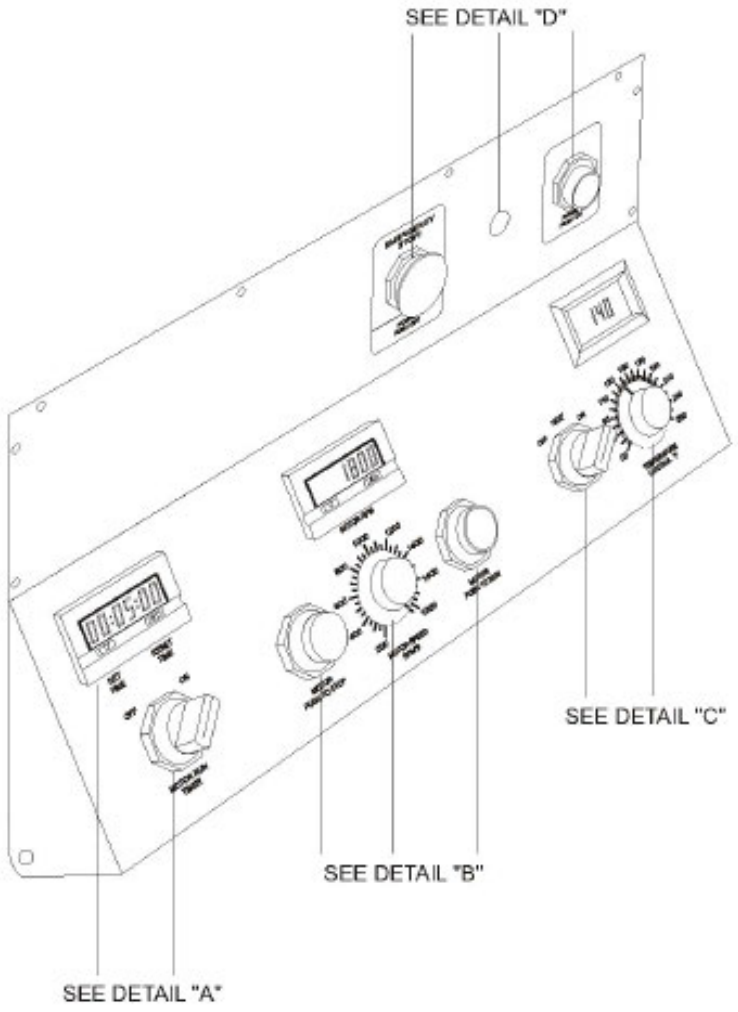
POT COMES
W/ MOTOR CONTROLLER



1 Read this first

This manual is intended for qualified electronic technicians.

Knowledge of electronic and sound industry practices is necessary to use this manual. **Warning! Service to any Benchmark Centrifuge while under warranty without factory authorization will void any and all warranties.** This manual is not a substitution for sound industry practices. Any component damaged during service by any technician other than factory is the responsibility of the customer for repair or replacement. This manual is designed only to assist the technician in troubleshooting the Benchmark Centrifuge and should be used only as a guide. ⚠ **Danger** ⚠ **Risk of electrical shock! When the front panel is open, there is exposure to full voltage when the power is not off at the breaker box even when the power is not turned on at the centrifuge!**

Warning! The motor controller board has a floating ground plane.

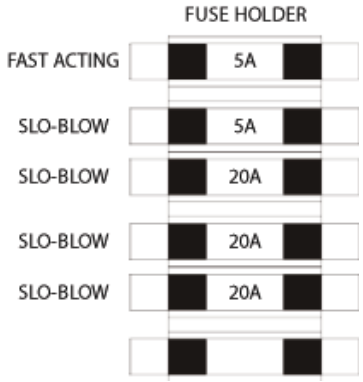
Any short circuit from the board or wiring coming from the board to ground will short out the board. Be very careful when making adjustments when the board is energized or this could result in a very expensive replacement of the board and other components.

If the centrifuge does not work and you are not sure of the cause:

1. Check to be sure power is on.
2. Make sure lid is completely closed.
3. If using timer, make sure there is time remaining. (reset timer to previous setting or set the time by following the procedure in “TIMED OPERATIONS”.
4. If the timer is not being used, turn the “MOTOR RUN TIMER” to “OFF” position.
5. Check fuses. ⚠ **Danger** ⚠ **Risk of electrical shock!** Remove power to the centrifuge by turning circuit breakers off before opening the front panel.

Fuses

There are 5 fuses located behind the front panel of your centrifuge. These are used for over current protection due to voltage spikes or accident. If replacement becomes necessary, disconnect power to the centrifuge. Remove the 8 screws on the upper front panel. Panel swings down. Replace fuses with 250V "SLO-BLOW" or "FAST ACTING" ceramic type that is CSA or UL certified as indicated at right:



2 Troubleshooting

If the previous action does not remedy the problem, continue with the following procedures. If the problem you have is not listed below call (713) 926-2623 for assistance.

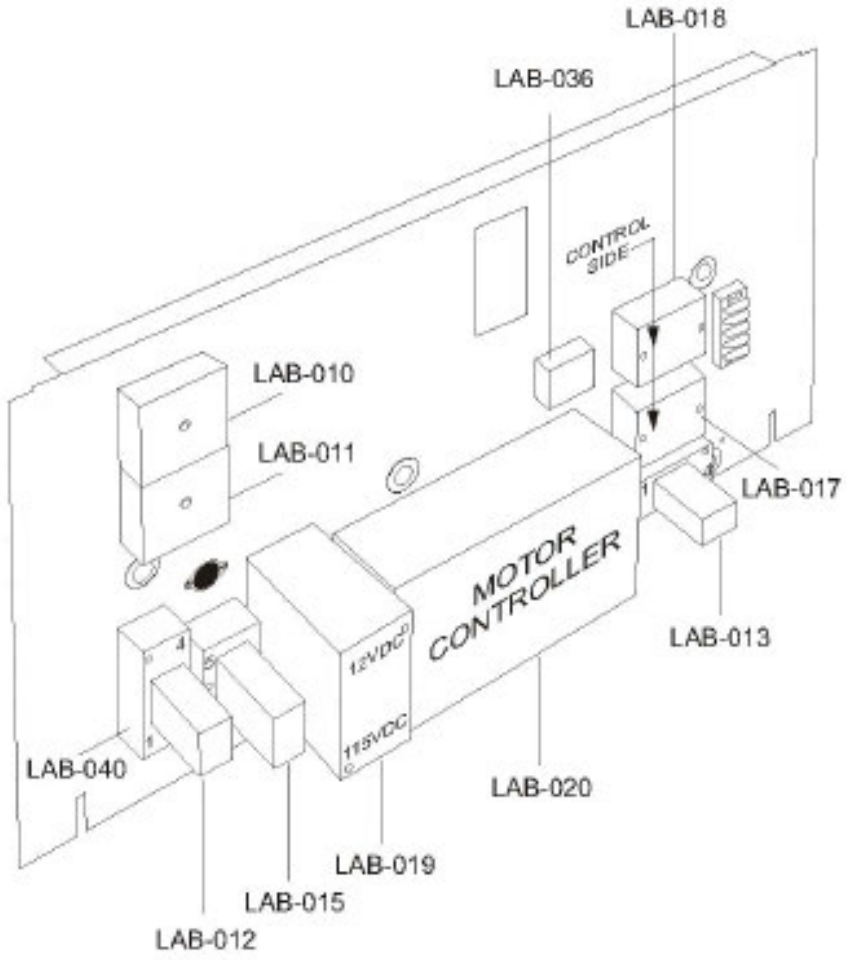
Motor will not run

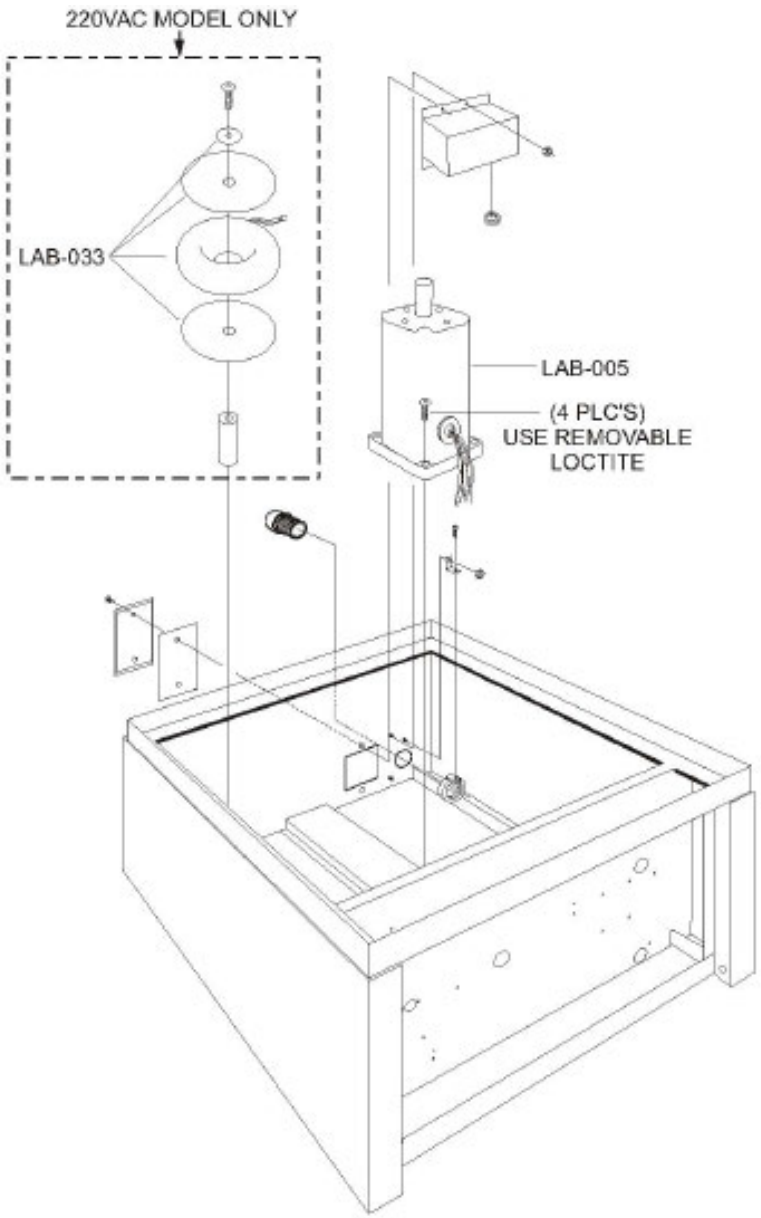
⚠ **Danger** ⚠ **Risk of electrical shock!** There are many conditions that can cause the motor not to run. Some of these conditions are very simple while others are more complex. We will start with the simple solutions.

Proximity Switch

Most of the problems we have encountered thus far has been with the proximity switch in the lid. This switch senses the lid being closed and closes a circuit allowing the motor controller to feed power to the motor.

The switch can be temporarily closed by placing a magnet in front of it with the top door open. See drawings on the following pages for location. If the motor works with the temporary magnet in place, an alignment of the proximity switch will be neces-





sary. When aligning, be sure the lid closes far enough so that the safety lock can engage when the motor starts to run.

The magnetic fields change slightly when the steel top is replaced. Be sure to check the alignment again when the top is in place. Further adjustment may be necessary.

The proximity switch itself could be faulty or have a bad connection. Follow the wires to the connection points behind the control panel and run a jumper between them to act as a temporary closed switch. If the motor works after this jumper is in place, the proximity switch may have to be replaced or wiring fixed.

Motor Controller

When the motor controller is working properly and powered up, you will find a green power and a red fault led lit up on the daughter board. When the motor is running the red fault light will turn off. If the green power light does not come on when power is properly supplied to the board, it is likely the rectifier on the board has been blown and the board will have to be repaired or replaced. Generally, when this occurs, the fuse that protects the board will blow when powering up the centrifuge.

If you are getting a green and red light, you can easily check to see if other circuitry is the problem by bypassing all of the controls to the motor controller board. Set the speed control pot to approx. 500 rpm's. Run a jumper (counting from right to left) from pin 1 (black wire) to pin 3 (gray wire). The motor should start spinning. If the motor does not work, check the 12VDC relays and power supply to the left of the motor controller board. Make sure they are working properly and all wiring is in place.

If you are getting a green and red light and the motor wants to stall or does not come up the speed properly or the fault light does not go off when the motor is running, check all 3 of the 20 amp slow blow fuses.

When replacement of the motor controller becomes necessary, you will need to set the trim pots on the board. Warning! Be very careful not to short any terminals on the board.

With power off

1. **Set TQ pot:** Turn all the way clockwise
2. **Set Regulation pot:** Turn all the way clockwise
3. **Set Accel. pot:** Turn all the way counterclockwise.

4. **Set Decel. pot:** Turn all the way counterclockwise.
5. **Set Min. Spd. pot:** Turn all the way counterclockwise.
6. **Set Max. Spd. pot:** Turn all the way counterclockwise.

   Turn Speed Control Knob to 1850 rpm's. Power on motor. Turn max. spd. pot clockwise until the motor reaches max. 1850 rpm's.
7. **Reset TQ pot:** Turn all the way counterclockwise.

   Turn Speed Control Knob to 1850 rpm's. Power on motor. Turn max. spd. pot clockwise until the motor reaches max. 1850 rpm's.

Tachometer

With the centrifuge turned off, there should be a "0" showing in the LCD window. If this is not the case, replace batteries and follow the procedure for programming the tachometer.

If the tachometer is giving false readings on rpm's, follow the procedures for reprogramming.

Timer

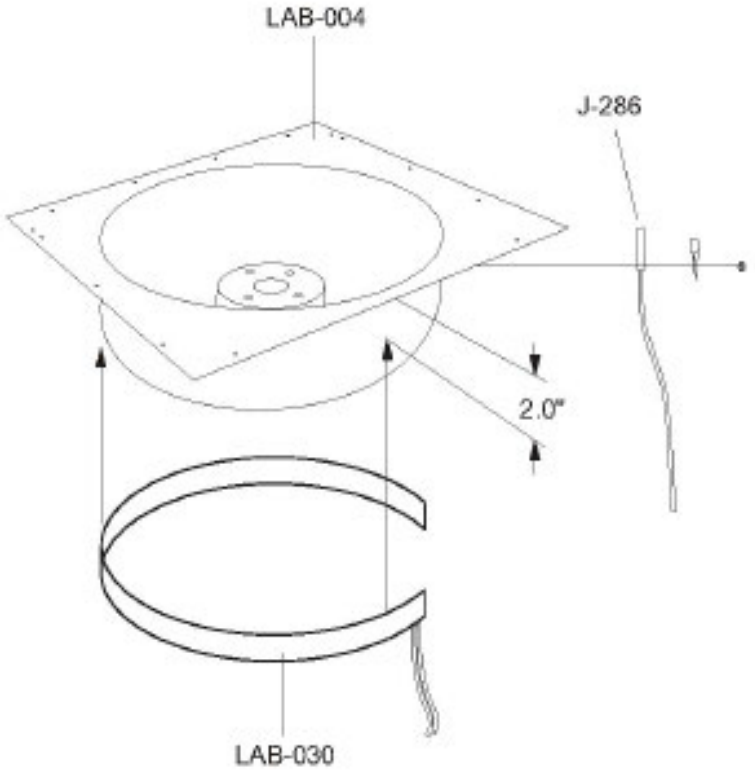
With the centrifuge turned off, there should be numbers showing in the LCD window. If this is not the case, replace batteries and follow the procedure for programming the timer.

If the timer is giving false readings or showing 8's in the LCD window, follow the procedures for reprogramming.

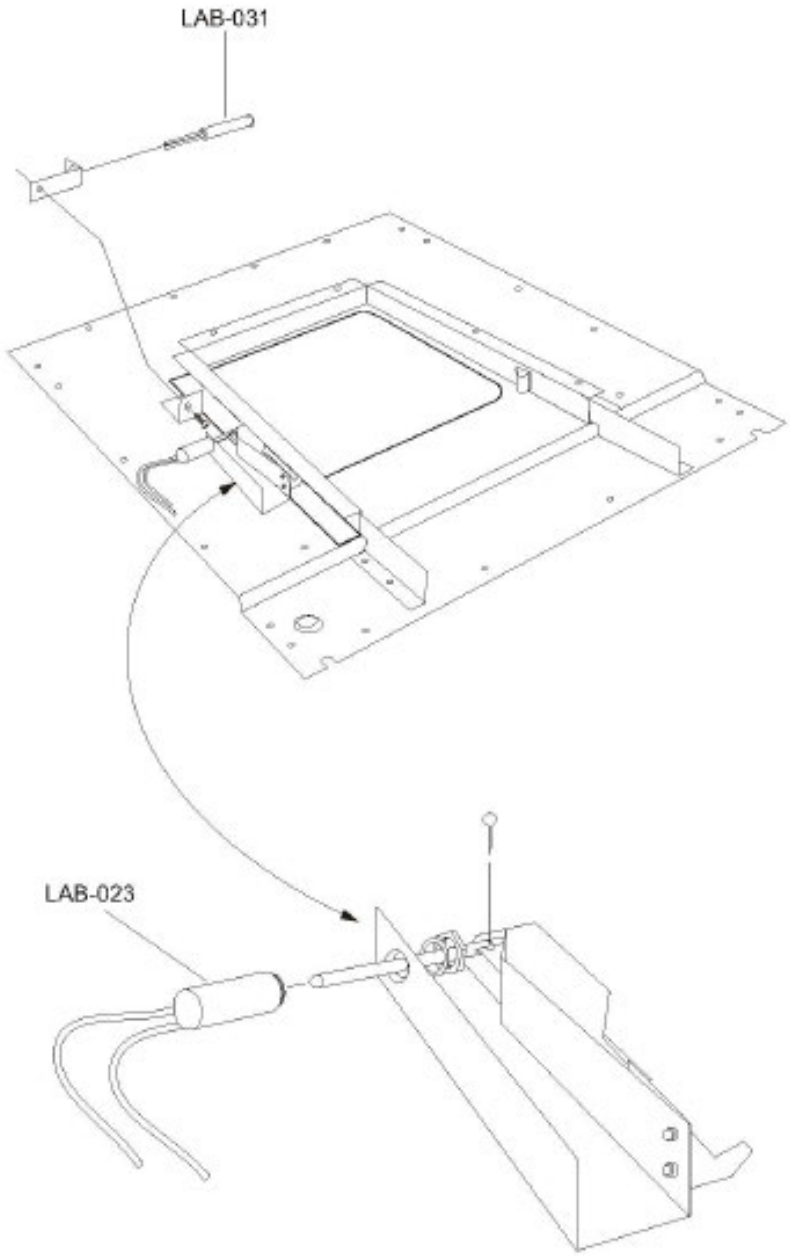
3 Checking Accuracy

RPM's

In order to check the accuracy of the rate meter, the lid safety lock mechanism will have to be defeated. The only time this mechanism should ever be defeated is for the purposes of this procedure. Do Not leave the interlock mechanism in a defeated state during normal operations or any time this evaluation is not being conducted. Defeating this mechanism is fairly simple, however, caution



USE HIGH TEMP SILICON TO GLUE ITEM 2 TO ITEM 1
AS SHOWN ABOVE.
MAKE SURE THERE ARE NO VOIDS.



should be taken that nothing is placed or falls into the bowl while the lid lock is defeated. In this condition, startup can occur while a foreign object is in the rotation area. Once the mechanism is defeated, do not place your hands or any object into the bowl area. Make sure nothing can accidentally fall into the bowl.

Procedure

With the unit off, remove any sample tubes from the rotor. Mark the tube holders so when you remove them, they can be placed back into the same rings they came from. Remove the tube holders with the cushions. Place the holders somewhere outside the bowl. Check to make sure there are no foreign objects in the bowl. Use a non-contact tachometer to measure rpm's. Follow the instructions of the tachometer's manufacturer. Apply reflective tape to the rotor as required by manufacturer. Once you are ready to take the reading, the lid safety lock mechanism may be defeated. Place a magnet in the far left corner of the door opening into the bowl of the centrifuge. This magnet should be placed about 1 inch from the back toward the front of the unit inside the left track of the door way. Be sure to secure the magnet with some means so the magnet cannot fall into the centrifuge bowl even with vibration. The magnet will not adhere to the stainless steel wall on its own. With the magnet securely in place, the centrifuge motor will now run with the door open. Check rpm's of the hand held tachometer against the rate meter on the front panel. Turn power off and remove magnet. Replace the tube holders. The centrifuge will now return to normal operation. Please note as a general rule the rate meter either works or it doesn't. If the meter is programmed properly, the rpm reading should be accurate due to the way the meter is sensing the pulse off the hall effect of the motor. If the rate meter is not working properly, replacement will be necessary.

Temperature

Due to the relative nature of sensing heat, temperature accuracy can only be tested through process. The temperature sensor is always going to read higher than the sample due to the location of the sensor on the outside of the bowl and the pressure build up against the outside of the bowl. Set the temperature indicator to whatever it takes to maintain sample temperature. In most cases, set the heat 20 degrees higher than the desired sample temperature.Please note as a general rule the temperature controller, indicator or

sensor either works or it doesn't. If the controller, indicator or sensor is not working properly, replacement will be necessary.

The following procedures are only necessary when original programming is lost, replacing batteries or replacing with a new unit.

RPM Indicator

Rate Display

Indicates the present rate value, which is equal to the pulse frequency multiplied by the input calibration value.

Down Key

When the program input is active this key is used to scroll through the menu items. After a menu item has been chosen for editing, the down key is used to set the value for the currently selected (flashing) digit.

Next/Reset

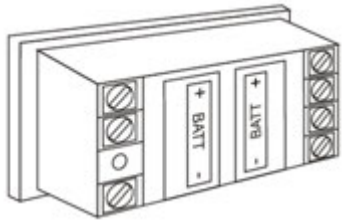
When the program input is active this key is used to select a menu item for editing (left most digit will begin to flash) and then move to the desired digit to be changed.

Battery Replacement

Make sure power to your centrifuge is disconnected at the main breaker box. Open the front panel of the centrifuge by removing the 8 screws at the top. Swing the panel down to expose the back of the RPM indicator.

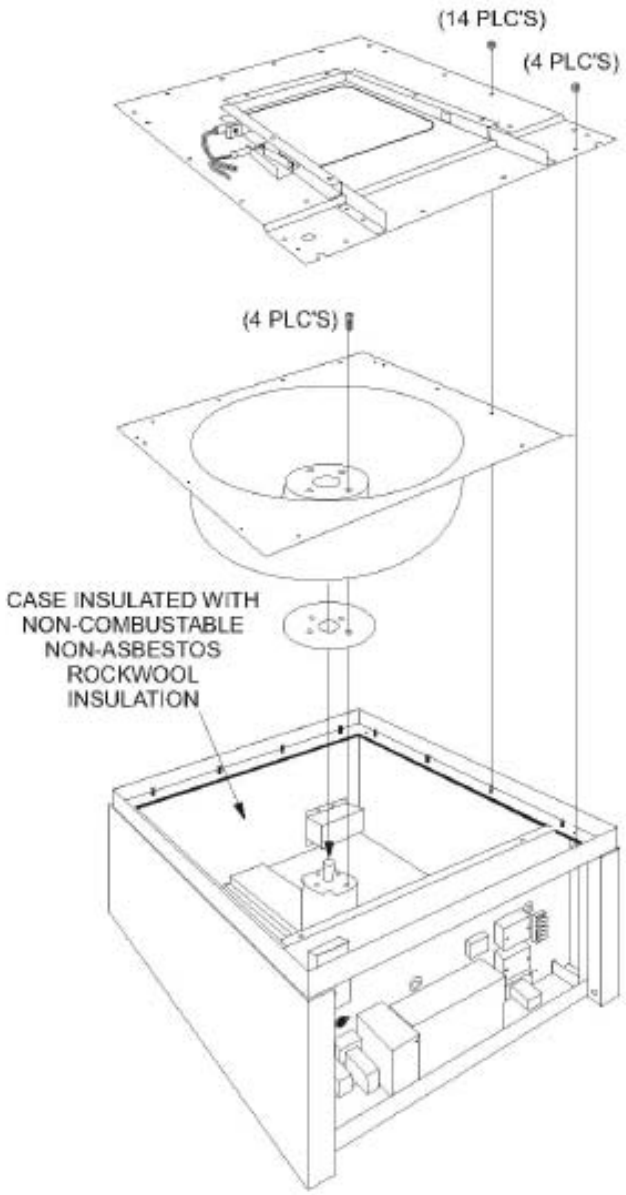
Battery Installation

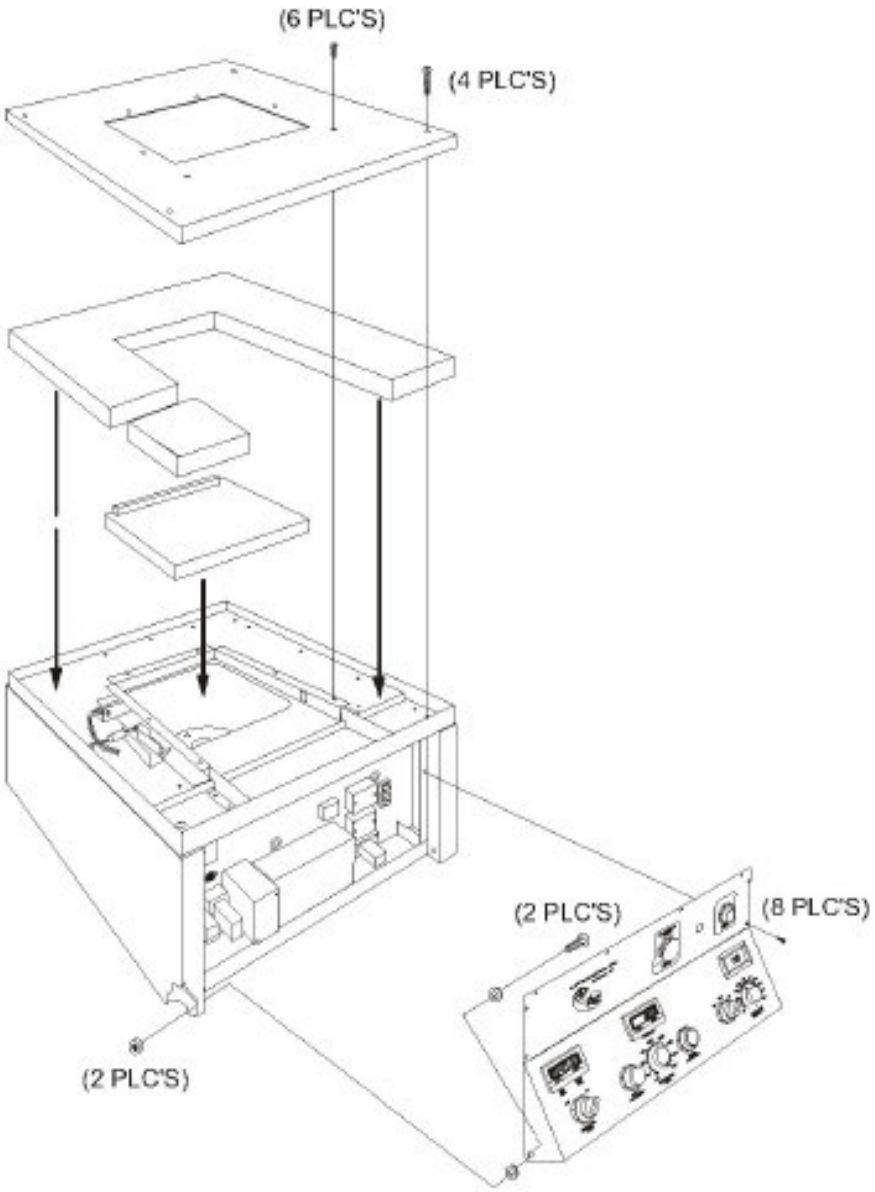
Remove the battery cover by pushing inward and down. Remove old batteries. Install new



batteries in both of the two slots. Once the batteries are in place, the unit will go into a self test mode, and all the segments on the LCD display will be illuminated. The self test mode is exited by depressing the Next key, which will then display the model number (4). Depress the Next key again to ready the unit for operation.

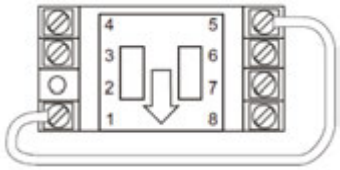
Each time the batteries are removed and then replaced, the





RPM indicator will have to be reprogrammed. Run a jumper wire from terminal 5 to terminal 1 as shown below:

Programming parameters can now be accessed by pressing the Down key on the front of the RPM indicator. To edit a parameter, use the Down key scroll until the desired parameter appears on the screen. Pressing the Next key will cause the left most digit of that value to begin to flash.



Use the Next and Down keys in combination to choose individual digits and change their value.

Rate Calibrator Dec. Pt.

Sets the decimal position to be used with the Rate Input Calibrator in a range from X.XXX to XXXX. Disregard the value of the number and set the decimal posi-

tion to XX.XX as shown below.

Rate Input Calibrator

Multiplies the input frequency by this value and displays the results as the rate value. In combination with the Rate Decimal Point parameter the calibrator value can be set in a range from 0.001 to 9999. Set this value to 15 as shown below.

Rate Display Decimal

Point

Sets the decimal position to be used for the rate display in a range from Off to 0.000. Set this parameter to off as shown below.

Timer (Eagle Signal Only)

Time Display

Indicates amount of remaining time.

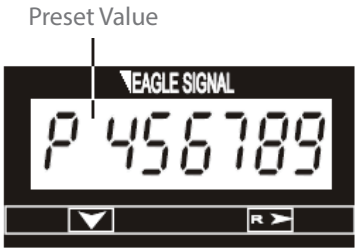
Down Key

Toggles the unit between the time and preset displays when in Operation Mode. After a menu item has been chosen for editing, the down key is used to set the value for the currently selected (flashing) digit.

Next/Reset Key

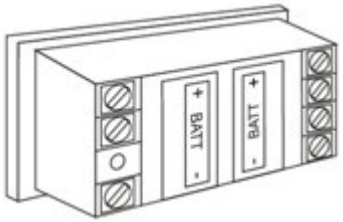
When in Operation Mode, depressing the key will reset the time value to the operator preset value. When the preset input is active this key is used to select a menu item for editing (left most digit will begin to flash) and will move to the right each time the key is depressed.

Preset Value. Indicates replaced, the timer will have the reset value.



Battery Replacement

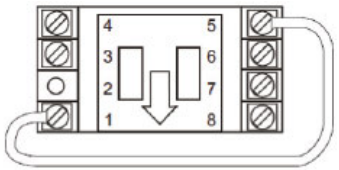
Make sure power to your centrifuge is disconnected at the main breaker box. Open the front panel of the centrifuge by removing the 8 screws at the top. Swing the panel down to expose the back of the timer. Set this parameter to interval (“int”) as shown below.

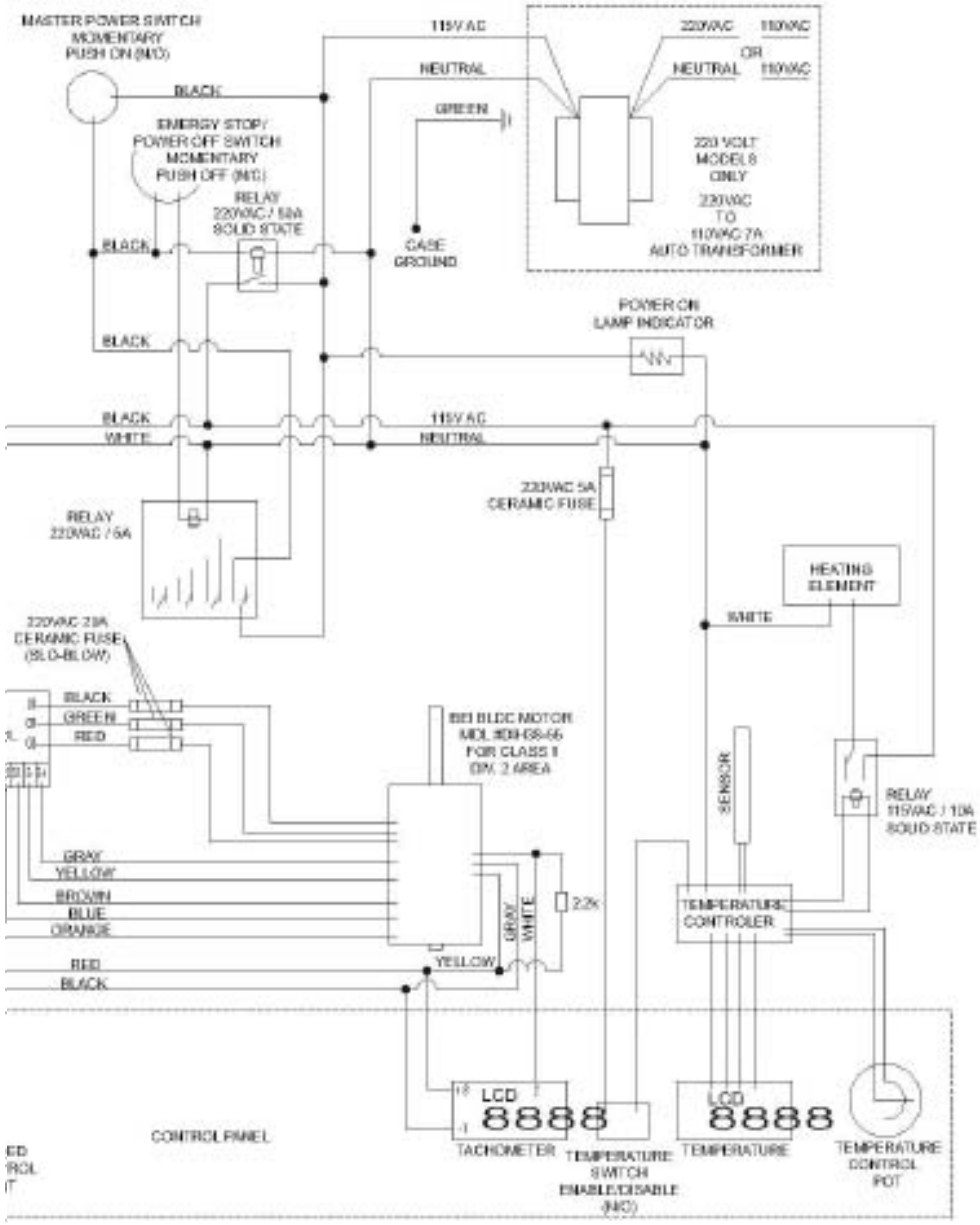


Battery Installation

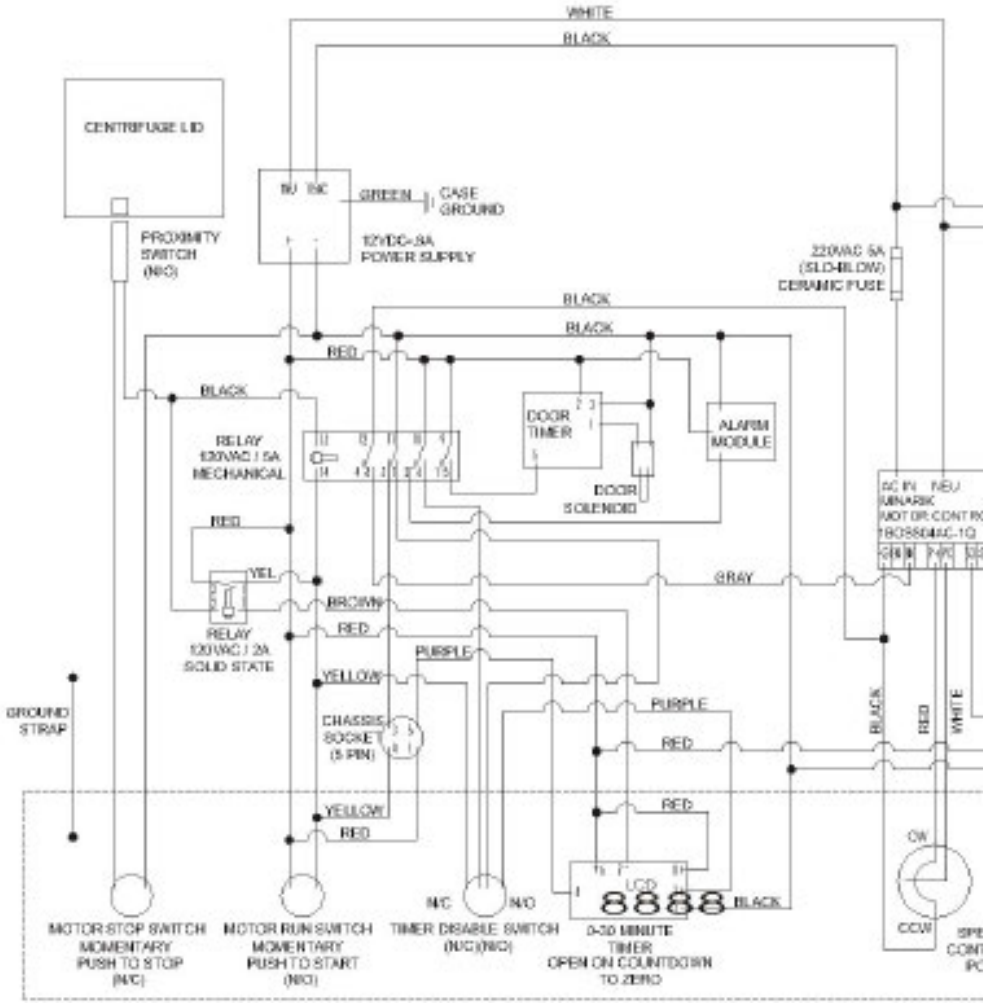
Remove the battery cover by pushing inward and down. Remove old batteries. Install new batteries in both of the two slots. Once the batteries are in place, the unit will go into a self test mode, and all the segments on the LCD display will be illuminated. The self test mode is exited by depressing the Next key, which will then display the model number (8). Depress the Next key again to ready the unit for operation.

Each time the batteries are removed and then replaced, the timer will have to be reprogrammed. Run a jumper wire from terminal 5 to terminal 1 as shown below.





Schematic



Programming parameters can now be accessed by pressing the Down key on the front of the RPM indicator. To edit a parameter, use the Down key to scroll until the parameter appears. Pressing the Next key will cause the left most digit of that value to begin to flash. Use the Next and Down keys in combination to choose individual digits and change their value.

Timing Direction

Determines if the time will count up or down. Set this parameter to "dn" as shown below:

Preset Lock

When enabled the preset value can not be changed through the front panel. Set this desiredparameter to "off" as shown on the screen.

Output Mode

Determines whether the output will be an on-delay or interval timer Set this parameter to interval ("int") as shown below.

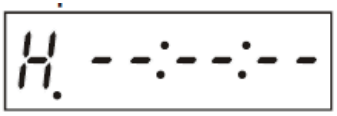
Front Panel Reset Enable

When active (ON) the time value, when being displayed, can be reset by pressing the Next/Reset key If set to OFF, the time value can only be reset through the remote input Set this parameter to "on" as shown below.

Time Format

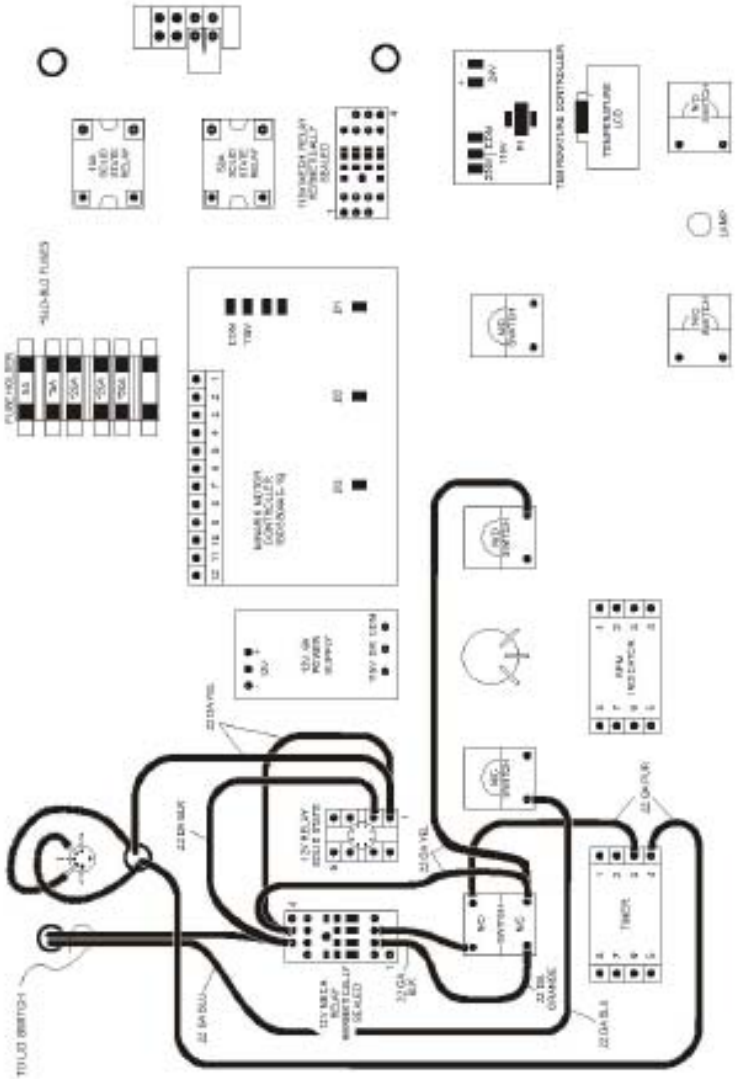
Sets the units in which the elapsed time will be accumulated. Use the next key to scroll through the available choices: Seconds, Minutes (_ _ _ _ _ . _)
Hours (_ _ _ _ _ . _)
Hours: Minutes: Seconds.

Set the parameter to Hours: Minutes: Seconds: as shown below.

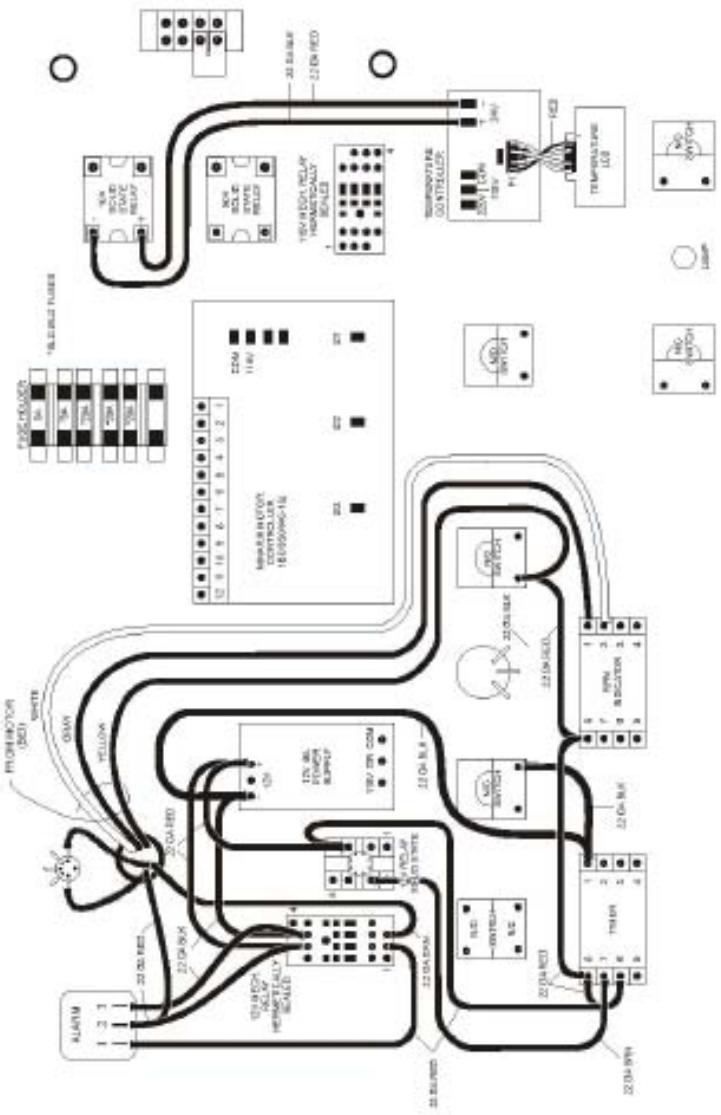


Note: On initial start-up, as well as after any programming changes, it will be necessary to reset the unit before beginning operation.

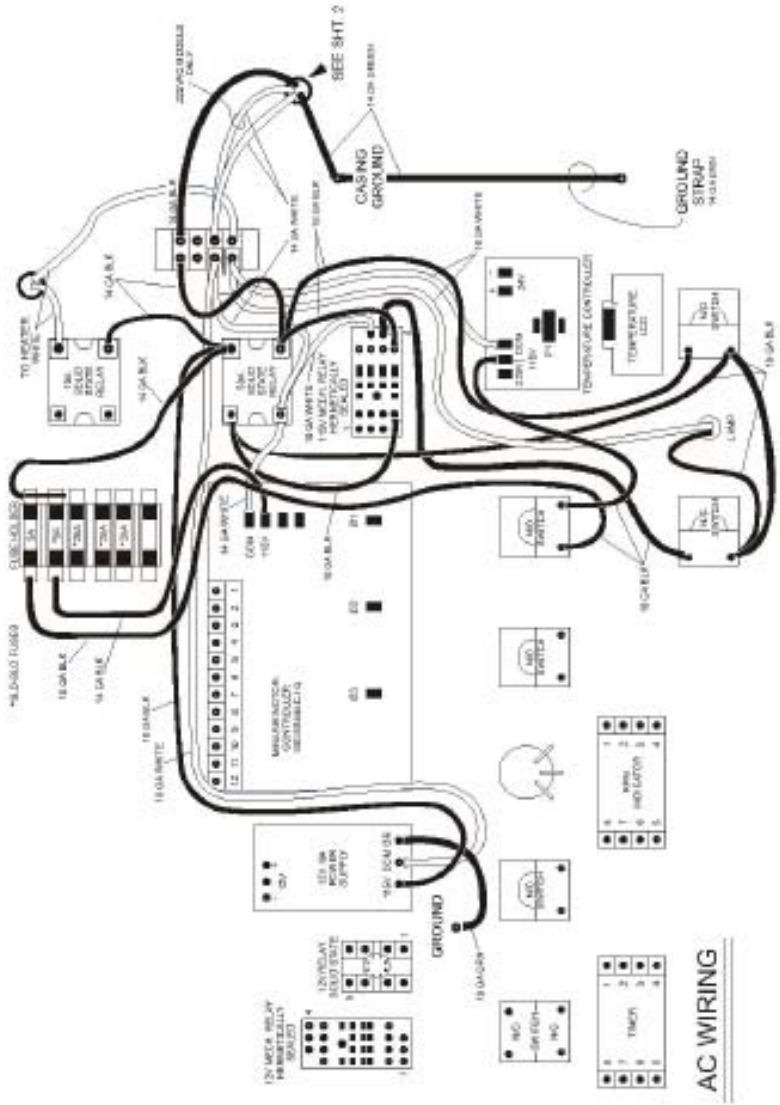
The following pages show wiring diagrams and breakdowns for repair and assembly, including component part numbers. When ordering replacement parts, please have the model and serial number of your machine available.



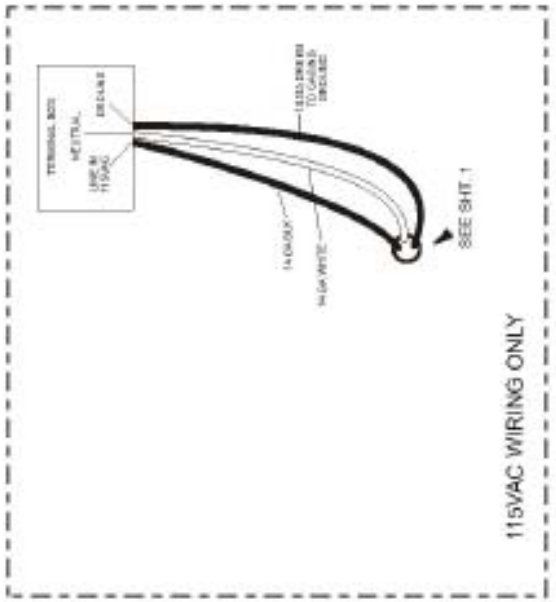
MOTOR CONTROL WIRING

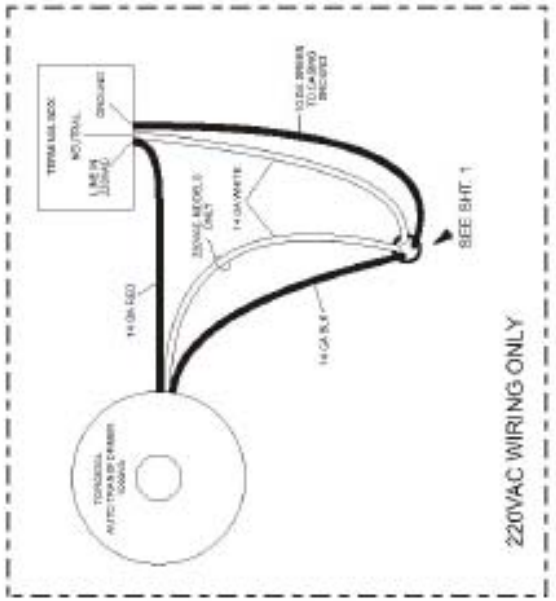


MOTOR CONTROL WIRING

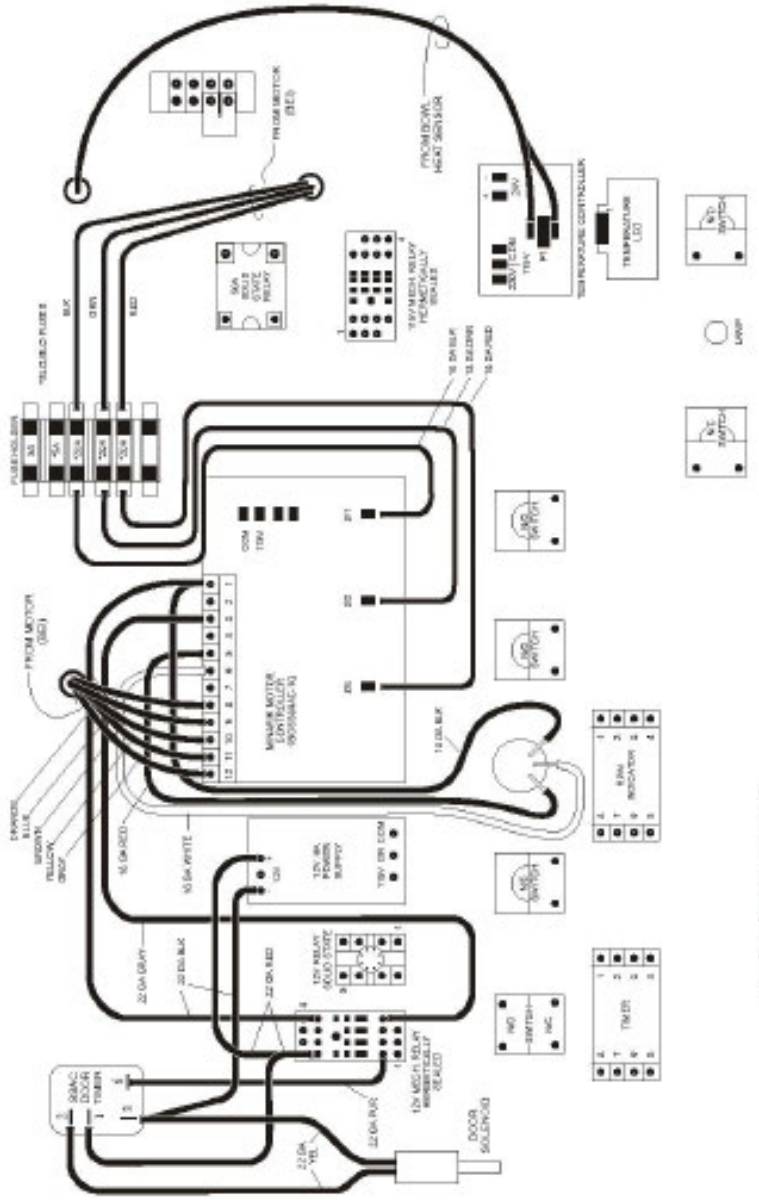


AC WIRING





AC WIRING



MOTOR WIRING