C960, C962, C964 Treadmill

Warning: This service manual is for use by Precor trained service providers only.
If you are not a Precor Trained Servicer, you must not attempt to service any Precor Product;
Call your dealer for service.

This document contains information required to perform the majority of troubleshooting, and replacement procedures required to repair and maintain this product.

This document contains general product information, software diagnostic procedures (when available), preventative maintenance procedures, inspection and adjustment procedures, troubleshooting procedures, replacement procedures and electrical block and wiring diagrams.

To move directly to a procedure, click the appropriate procedure in the bookmark section to the left of this page. You may “drag” the separator bar between this page and the bookmark section to change the size of the page being viewed.

Section One - Things you Should Know

About This Appendix

Section One, Things You Should Know. This section includes technical specifications and a procedure matrix. Read this section, as well as the owner's manuals shipped with the C960, C962 and C964 Treadmills, before you perform the procedures in this manual.

Section Two, Software Features. Precors C960 Series Treadmills are programmed with several diagnostic and setup features. This section contains the procedures you need to access the diagnostic features on this treadmill.

Section Three, Checking Treadmill Operation. This section provides you with a quick way of checking treadmill operation. Check treadmill operation at the end of a maintenance procedure and when it is necessary to ensure that the treadmill is operating properly.

Section Four, Inspection and Adjustment Procedures. Perform inspection procedures when a trouble symptom points to a problem and after replacing major components. Many maintenance problems can be fixed by adjusting various treadmill components. This section also provides the step-by-step procedures required to make these adjustments.

Section Five, Troubleshooting Procedures. Diagnostic and troubleshooting procedures are performed when it is necessary to isolate a problem to a particular component.

Section Six, Replacement Procedures. When a component must be replaced, follow the step-by-step procedures included in this section.

Section Seven, Technical Diagrams and Parts Lists. This section includes wiring diagrams and block diagrams for the C960, C962 and C964 Treadmills.

General Information

For the latest exploded view, part number and part pricing information, visit the Precor dealer website at “www.precor.com/Dealer.

Technical Specifications

Length:	80.5 inches (205 cm.)
Width:	Handrails 32 inches (81 cm.)
Height:	45 inches (114 cm.)
Running surface:	61 inches by 20 inches (155 cm. by 51 cm.)
Speed:	240 Volts: 0.5 to 15 m.p.h. (0.8 to 24 k.p.h.)
	120 Volts: 0.5 to 10 m.p.h. (0.8 to 16 k.p.h.)
(SCR)	
	120 Volts: 0.5 to 15 m.p.h. (0.8 to 24 k.p.h.),
(PWM)	
Incline:	-3% to +15% grade (C962 and C964 only)
	0% Fixed grade (C960)
Power:	50/60 Hz 120 Vac or 240 Vac
Shipping Weight:	502 lbs (226 kg.)

Serial Number Sequencing

Table 1 identifies the serial number sequences for C960 Series SCR and PWM treadmills.

Table 1. C960 Series Treadmill Serial Number Sequences

SCR Units

If the Model is...	And the Voltage Rating is...	The Serial Number Starts With...
C960	120	83
C960	240	84
C962	120	80
C962	240	82
C964	120	81
C964	240	85

PWM Units

If the Model is...	And the Voltage Rating is...	The Serial Number Starts With...
C960	240	1N
C962	120	1Y
C962	240	1P
C964	120	1Q
C964	240	1R

i Units

If the Model is...	And the Voltage Rating is...	The Serial Number Starts With...
C962i	120	3A
C962i	240	3B
C964i	120	3E
C964i	240	3F

SCR and PWM Upper PCAs

Note:
Upper PCA part number 33663-10X is used on C960s & C962s. Upper PCA part number 33662-10X is used on C964s. There are currently three versions of the upper PCA that may be encountered in the field. Versions -101 through 105 were only used on SCR treadmills and have a fixed 11 MHZ clock frequency. Treadmills manufactured starting October 10, 1995 used the version -106. Theses boards could be used on either SCR or PWM treadmills and could be set for either 11 MHZ (SCR) or 16 MHZ (PWM) operation (see diagram 1.1). On August 6, 1997 on version -108 the jumper selection was changed to indicate SCR or PWM (see diagram 1.2).

Diagram 1.1 - UPCA jumpers versions -106 & -107

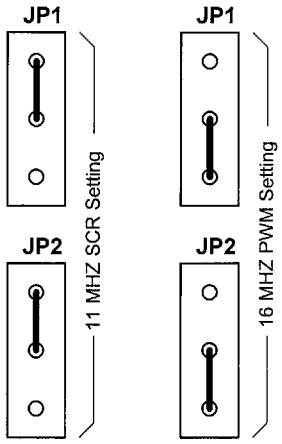
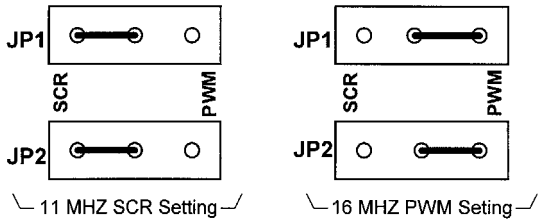


Diagram 1.2 - UPCA jumpers versions -108 and higher



Procedure 2.1 - Running the Diagnostic Program (SCR & PWM Units)

Placing the C962 or C964 Treadmill in diagnostic mode causes the software to perform the following operations:

a Test the LEDs mounted on the upper PCA;

b Provide the option of adjusting the lift system;

c Provide the option of adjusting the limit switches;

d Display the odometer setting in either miles or kilometers;

e Display the software version number;

f Display the drive motor power bits;

g For SCR units (PROM Version 2.08 and earlier), display a prompt allowing you to select between 110- and 220-volts; and

h Provide a method of checking the operation of the keys on the electronic console.

Procedure

1. Plug the power cord into the wall outlet, then position the safety switch at the green dot. Turn on the treadmill by using the circuit breaker.

2. At the **PRESS ENTER FOR PROGRAMS** prompt, press and hold the **SPEED ▼**, **SPEED ▲**, and **INCLINE ▲** keys simultaneously or keys **RESET,5,1,7,6,5,7,6,1** sequentially on units with standard access codes. The LED display test is initiated on the electronic console. (The C964 electronic console is shown in Diagram 2.1. Diagram 2.2 is the C962 electronic console. The C960 electronic console is shown in Diagram 2.3).

3. Watch the electronic console as the display test progresses. This test is programmed to display the following LED illumination sequence:

    a A horizontal series of dashes appear on the left and right display windows; and

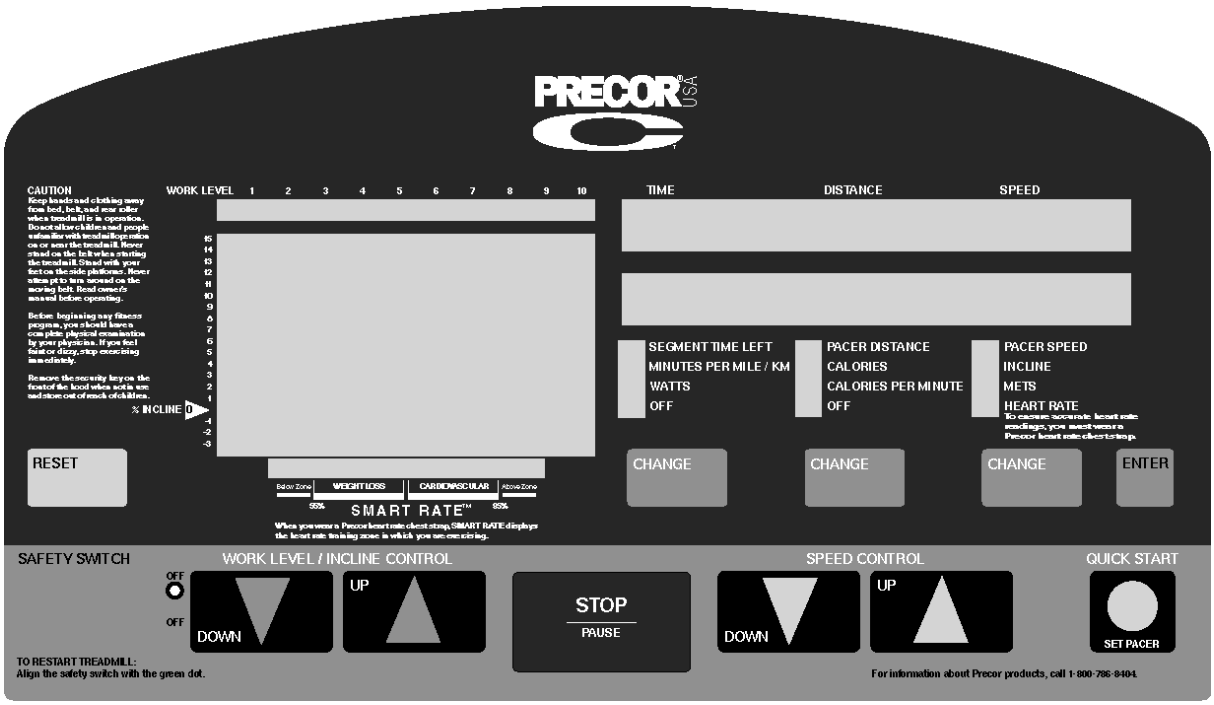
    b The LEDs to the left of the first column of functions illuminate, followed by the LEDs to the second and third column.

4. The **ADJUST LIFT [YES/DN NO/UP]** prompt is displayed. If you wish to adjust the lift**...**

THEN...
Press any ▼ key, then continue with the next step.

OTHERWISE...
Press any ▲ key, then skip to Step 6.

Diagram 2.1 - C964 Electronic Display



5. With the message **PRESS ENTER WHEN FINISHED** displayed on the electronic console, press the INCLINE ▲ and INCLINE ▼ keys to adjust the slant of the running bed. Press **ENTER** when you are finished.

6. The LIMIT SWITCH [YES/DN NO/UP] prompt is displayed. If you wish to check the limit switches**...**

THEN...
Press any ▼ key, then continue with the next step.

OTHERWISE...
Press any ▲ key, then skip to Step 9.

7. Watch the electronic console. If the three limit switches are adjusted correctly, the following series of messages is displayed on the electronic console:

GOING TO FIFTEEN PERCENT
AT FIFTEEN PERCENT
GOING TO UPPER LIMIT
GOING TO NEG THREE PERCENT
AT NEGATIVE THREE PERCENT
GOING TO LOWER LIMIT
GOING TO ZERO

Diagram 2.2 - C962 Electronic Display

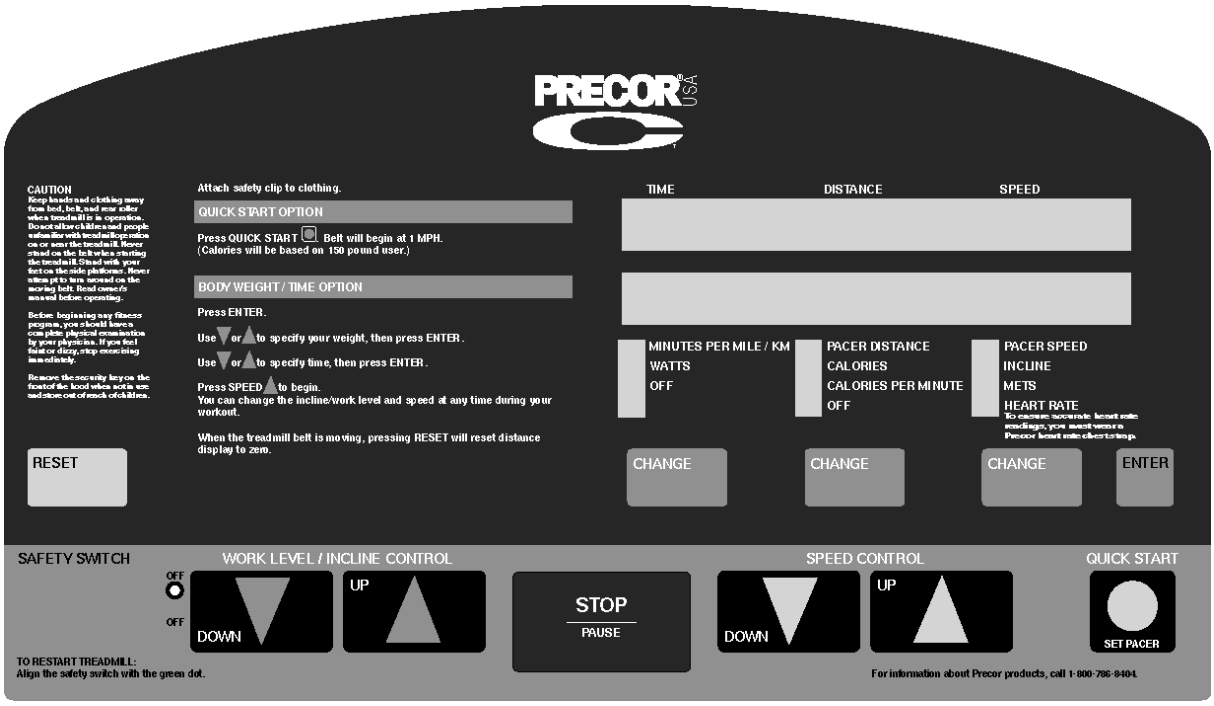
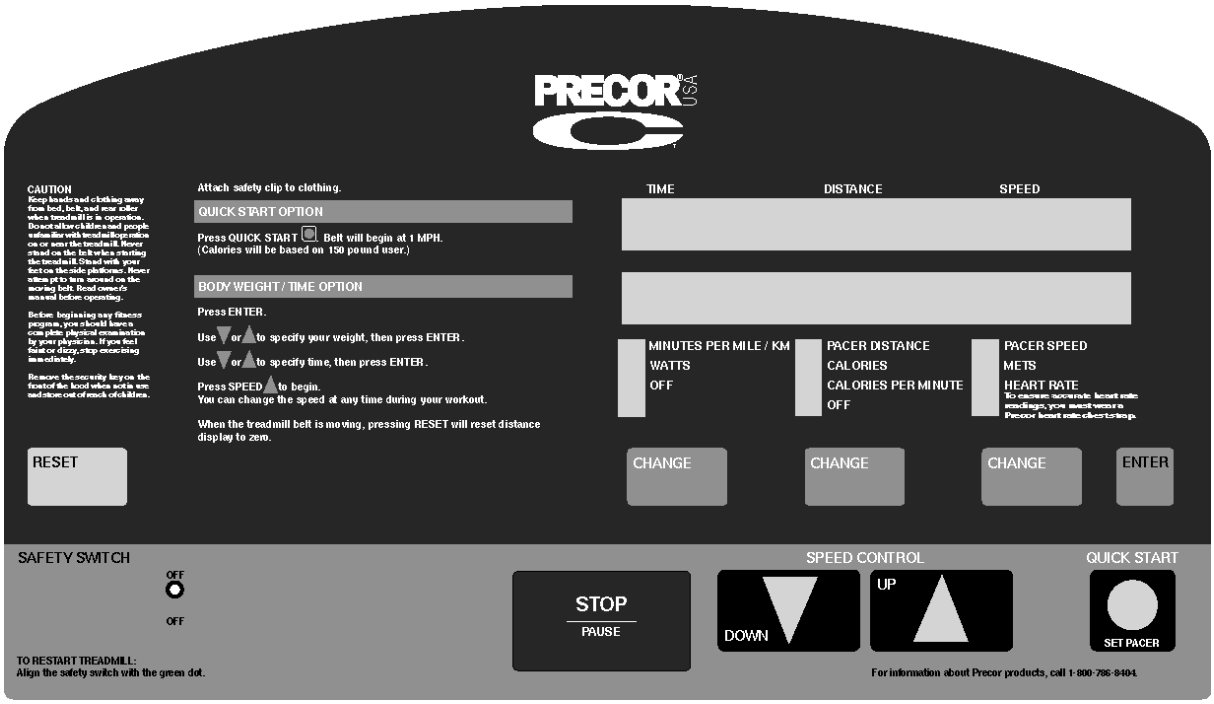


Diagram 2.3 - C960 Electronic Display



8. If all of the messages listed in Step 7 are displayed on the electronic console**...**

THEN...	**OTHERWISE...**
The treadmill lift switches are calibrated correctly, press **ENTER** to continue.	Press **RESET** to return to the **PRESS ENTER FOR PROGRAMS** prompt, then calibrate the lift systems described in Procedure 4.1.

Note:
Some newer versions of software display the odometer as a separate function. Refer to procedure 2.4 for these units.

9. The electronic console displays the odometer reading. With the **MILE NNNNN** or **KILOMETER NNNNN** message displayed, press **ENTER**.

Note:
NNNNN represents the number of miles (or kilometers) travelled on the running belt. The mileage is recorded on the upper PCA. If a new upper PCA is installed in the treadmill, the odometer reading will be zero.

10. The electronic console displays the version number of the PROM. With the **VERSION N.N** message displayed, press **ENTER**.

Note:
N.N represents the version number of the PROM currently installed on the upper PCA.

11. The electronic console displays the drive motor power bits. With the **POWER BITS NNN** message displayed, press **ENTER**.

IMPORTANT
Step 12 applies only to SCR units (PROM Version 2.08 and earlier).

12. Press **ENTER** to display the **CHOOSE MOTOR [220/DN 110/UP]** prompt. If you are servicing a 110-volt treadmill, press any ▲ key, then continue with the next step. If you are servicing a 240-volt unit, press any ▼ key.

13. The electronic console displays the **NO KEYS** message. Press each of the keys listed in the left column of Table 2.1. Verify that the message across from each function key name is displayed on the electronic console as the key is pressed.

Note:
The messages displayed in the right column are displayed as the keys are pressed. The message **NO KEYS** is displayed after each key is pressed.

14. When the **NO KEYS** message is displayed after you test the **QUICK START/SET PACER** key, press **RESET** to return to the **PRESS ENTER FOR PROGRAMS** prompt.

15. Turn off the treadmill with the circuit breaker, then unplug the power cord from the wall

outlet.

Table 2.1 - Electronic Console Key Test

KEY TO BE PRESSED	MESSAGE TO BE VERIFIED
Left CHANGE Key	**CHANGE 1**
Middle CHANGE Key	**CHANGE 2**
Right CHANGE Key	**CHANGE 3**
ENTER	**ENTER**
INCLINE t	**INCLINE DOWN**
INCLINEs	**INCLINE UP**
STOP/PAUSE	**STOP**
SPEED t	**SPEED DOWN**
SPEED s	**SPEED UP**
QUICK START/SET PACER	**SET PACER**

Procedure 2.2 - Running the Diagnostic Program (i Units)

Placing the C962i or C964i Treadmill in diagnostic mode causes the software to perform the following operations:

a Test the LEDs mounted on the upper PCA;

b Provide the option of calibrating the lift system;

c Display the drive motor power bits;

d Display and test the heart rate function;

e Display the error code log;

f Provide a method of checking the operation of the keys on the electronic console;

g Test the circuit breaker trip function.

Procedure

1. Plug the power cord into the wall outlet, then position the safety switch at the green dot. Turn on the treadmill by using the circuit breaker.

2. At the **PRESS ENTER FOR PROGRAMS** prompt, press keys **RESET,5,1,7,6,5,7,6,1** sequentially. The LED display test is initiated prompt on the electronic console. (The C964i electronic console is shown in Diagram 2.4. The C962i electronic console is shown in Diagram 2.5).

3. Watch the electronic console as the display test progresses. This test is programmed to illuminate every LED on the display. It is necessary to watch the test as it proceeds to determine if an LED does not illuminate. Press the **ENTER** key to proceed to the next test.

4. The lift calibration setup will be available if required. If you need to calibrate the lift proceed with step 5, otherwise, press the **ENTER** key, go to step 6 and choose **RECALIBRATE NO**.

5. Using the **INCLINE ▲** and **INCLINE ▼** keys set the treadmill so that the distance from the bottom front corner of the treadmill frame is 4.3 inches ± .05 inch. When the position is set press the **ENTER** key. In step 6 of this procedure, choose **RECALIBRATE YES.**

6. You will be offered the to choice to either recalibrate the lift or to proceed without recalibrating the lift. Press one of the ▲ keys to recalibrate the lift or one of the ▼ keys to proceed without recalibrating the lift.

Diagram 2.4 - C964i Electronic Display

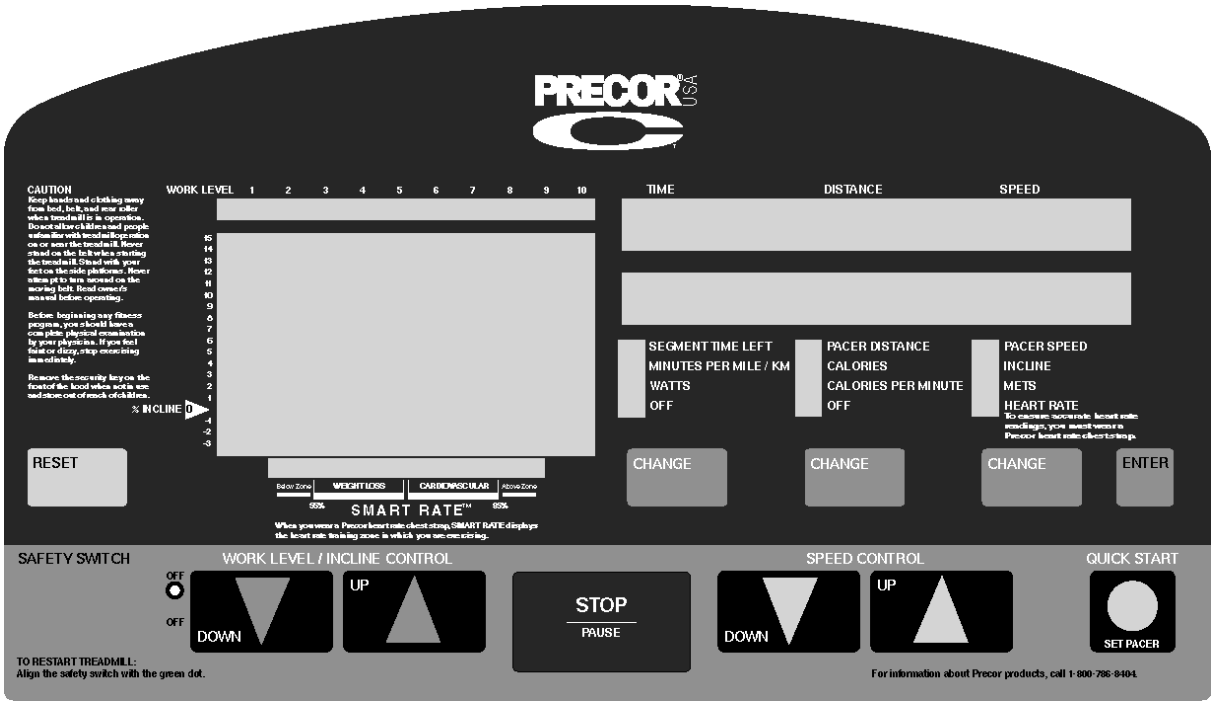
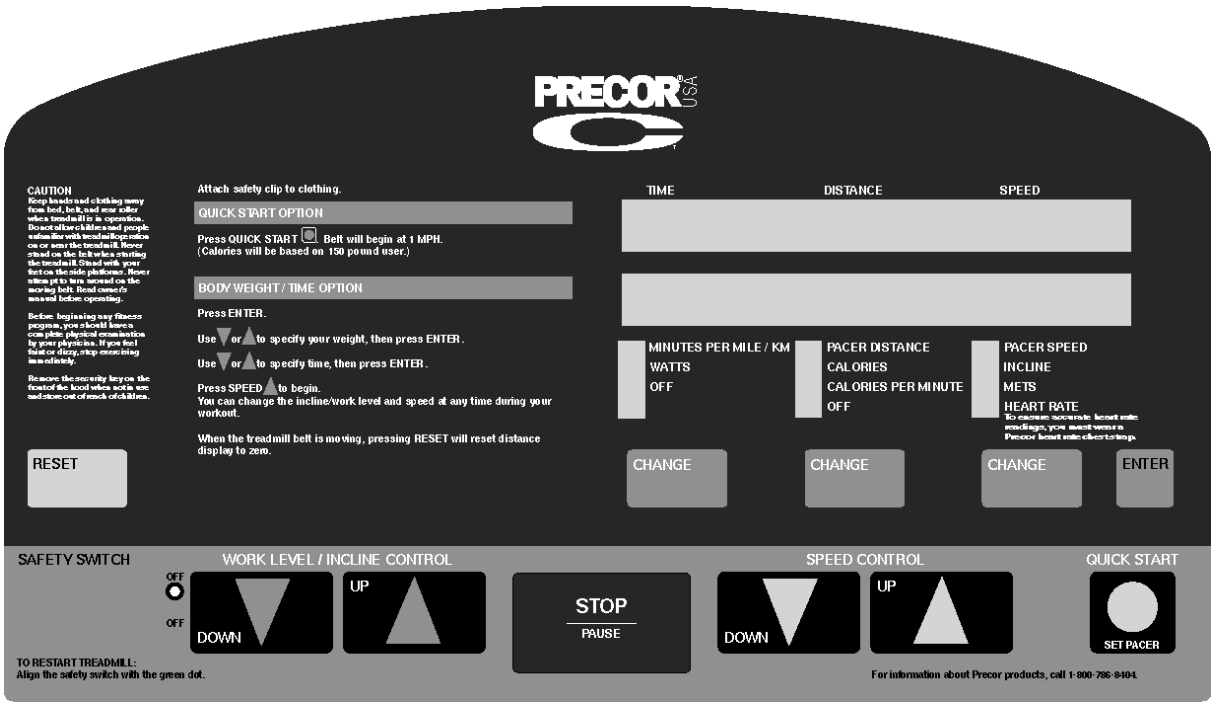


Diagram 2.5 - C962i Electronic Display



7. The power bits will be displayed. The power bits indicate how much power is being applied to the drive motor. The power bit reading is a combination of the speed selected and the load applied to the treadmill. The power bit reading can be used to help determine bed and belt wear. To display power bits, press the **SPEED ▲** key. Observe that the power bit reading will increase when the speed is increased and/or the load is increased. Press the **ENTER** to continue to the next test.

8. Heart rate will be displayed. Either a heart rate test transmitter or chest strap transmitter may be used. The heart rate will be displayed. Press the **ENTER** key to proceed to the next test.

9. The error code log will be displayed. Use the st keys to scroll through the log. Position 1 will contain the most recent error logged and error 5 will contain the oldest error logged. If more than five errors have been logged, the most recent error will be entered into position 1, and all of the existing errors will be pushed down one position. The error that was in position 5 will be lost. If you wish to clear the error code log, press the **QUICK START** key. Press the **ENTER** key to proceed to the next test.

10. The keypad test will be displayed. Press each of the keys on the display panel, the display will indicate which key was pressed. This test will also check safety switch operation.

11. The next test is the circuit breaker trip test. While the keypad test is still displayed, press and hold the **STOP** key. After a few seconds the circuit breaker will trip.

12. The diagnostics program is now complete.

Procedure 2.3 - Selecting Club Settings

Selecting United States standard units causes information to be displayed in feet and pounds. Information is displayed in meters and kilograms if metric units are selected.

Procedure

1. Plug the power cord into the wall outlet, then position the safety switch at the green dot. Turn on the treadmill by using the circuit breaker.

2. At the **PRESS ENTER FOR PROGRAMS** prompt, press and hold all three **CHANGE** keys simultaneously or keys **RESET,5,6,5,1,5,6,5** sequentially on units with standard access codes until the **CHOOSE UNITS [YES/DN NO/UP]** prompt is displayed.

3. Use any ▲ or ▼ key to select either the U. S. Standard or Metric measurement system.

4. With the **MAX SPEED** prompt displayed, use the ▲ or ▼ keys to designate a workout speed limit. Press **ENTER** when the desired speed appears.

Note:
For 110-volt treadmills, the maximum workout speed limit is between either 1 and 10 MPH or 1 and 16 KPH. Maximum workout speed limits for 220-volt treadmills range between 1 and 12 MPH or 1 and 20 KPH.

5. With the **MAX WORKOUT** prompt displayed, use the ▲ or ▼ keys to designate a workout time limit between 10 and 240 minutes. Press **ENTER** when the desired time appears.

IMPORTANT
On PWM C960 Series Treadmills, you may choose either English, Spanish, German or French language options.

6. The **MODIFY CUSTOM** prompt is displayed. If you plan to customize the program**...**

THEN...	**OTHERWISE...**
Press any ▼ key, then press ENTER to return to the PRESS ENTER FOR PROGRAMS prompt.	Press any ▲ key, then press ENTER tto return to the PRESS ENTER FOR PROGRAMS prompt.

Note:
Instructions for designing custom courses are provided in the C964 Owner's Manual.

Procedure 2.4 - Displaying the Odometer

Note:
Some older versions of software display the odometer as part of the diagnostics program. Refer to procedure 2.1 for these units.

1. To access the odometer press the **RESET** key to return to the start up point, if necessary. Press keys **Speed ▲** and **Incline ▲**, simultaneously or keys **RESET,6,5** sequentially. The odometer will displayed in either miles or kilometers depending on club setting selection. Refer to procedure 2.3.

2. Press the **Enter** key. The hours in use will be displayed.

3. Press the **Enter** key. The software version will be displayed.

4. Press the **Enter** key to exit.

Procedure 2.5 - Determining Software Version Numbers

Software version numbers are invaluable for tracking and identifying problems and staying aware of changes to the operation and features of the product. Software version numbers will usually appear as two digits separated by a decimal.

Procedure

1. Plug the power cord into the wall outlet, then position the safety switch at the green dot. Turn on the treadmill by using the circuit breaker.

2. On older software versions access the diagnostics as in procedure 2.1. On newer software versions enter the odometer program as in procedure 2.4

Procedure 2.6 - Documenting Software Problems

When a problem is found with either the software or upper or lower PCAs, record the information listed below. If you isolated the problem to either the PROM, upper PCA, or lower PCA, include the information you recorded with the malfunctioning PROM or PCA when you ship it to Precor.

When a problem occurs, record the following information:

- Model and serial number
- Software version number

Determine the version number of the PROM mounted on the upper PCA as described in Procedure 2.5 or by looking at the label on the PROM. See Diagram 2.6

- Program number running when the problem occurred
- A description of:
    - a What happened or failed to happen.
    - b The action taken by the user just before the problem occurred.
    - c Problem-related information (such as how far into the program the problem occurred, the work level being used when the problem occurred, etc.).
- The frequency of occurrence.

Diagram 2.6 - Prom

Section Three - Checking Treadmill Operation

This section provides you with a quick method of checking treadmill operation. Check treadmill operation at the end of a maintenance procedure and when it is necessary to ensure that the treadmill is operating properly.

Procedure

1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.

2. Place the treadmill in Manual Mode. Adjust the speed of the running belt to 2–3 m.p.h. Operate the treadmill for at least 5 minutes.

    a Concentrate on the feel of the running belt and the sound of the drive motor and rollers. Be on the alert for unusual noises, smells, or vibrations.

    b. On SCR units, measure and log the AC input current under loaded and unloaded conditions. On PWM units, log the power bits under loaded and unloaded conditions.

    c Observe the Leds on the electronic console. Make sure that each LED lights as the information corresponding to that LED is displayed on the electronic console.

3. Press the **STOP** key. When the treadmill comes to a stop, view the electronic console as the treadmill scans time, speed, distance and percent.

Note:
If you are servicing a C960 Treadmill, skip Steps 4 and 5.

4. Press the **INCLINE ▲** key while viewing the electronic console. Confirm that the treadmill inclines and the incline display increments to twelve percent as the **INCLINE ▲** key is pressed.

5. Press the **INCLINE ▼** key while viewing the electronic console. Confirm that the running bed returns to a level position and the incline display decrements to minus three percent as the **INCLINE ▼** key is pressed.

6. Return the treadmill to 0% incline and turn off the treadmill with the circuit breaker, then unplug the treadmill from the wall outlet.

Procedure 4.1 - Calibrating the Lift Assembly on C962 & C964 SCR & PWM Units

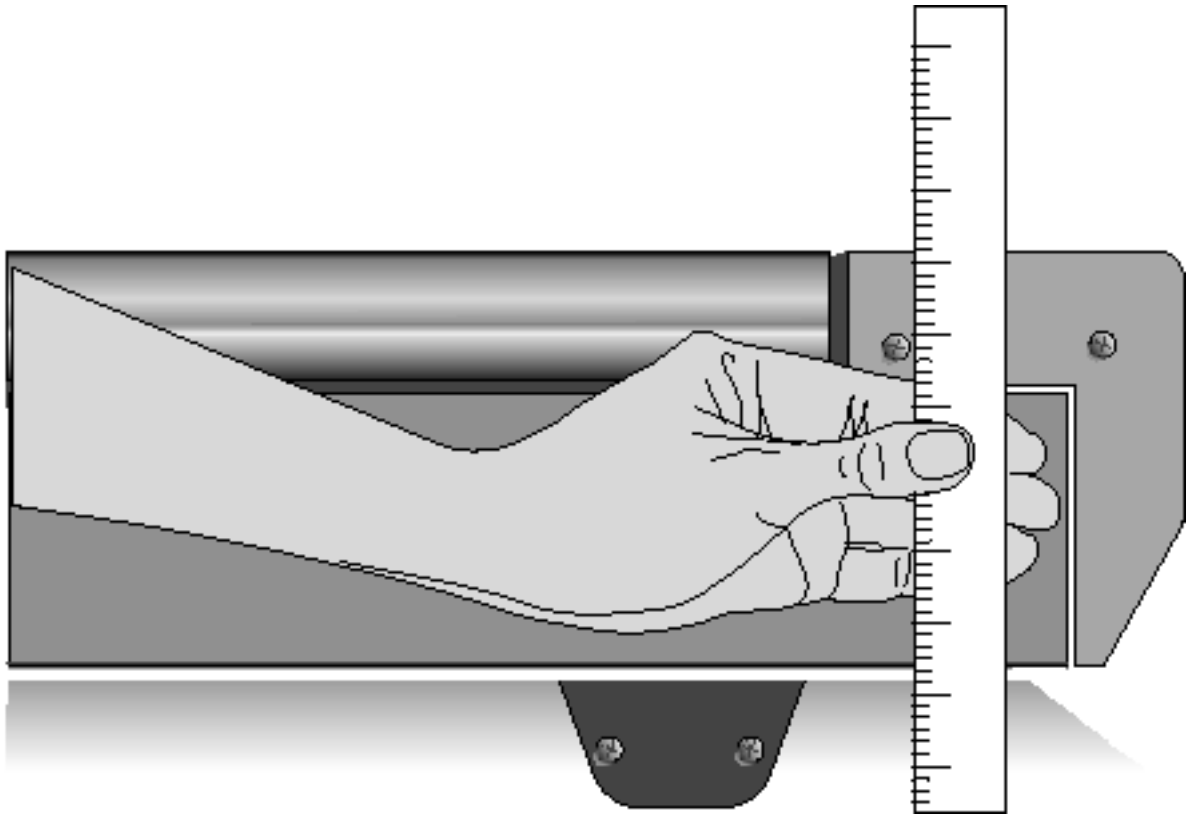
WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

1. If the treadmill is not already at zero percent incline, press any key when the **CALIBRATE LIFT PRESS ANY KEY** prompt is displayed.

2. Using the ruler, measure the distance between the floor and the top of the front and back ends of the side rail (see Diagram 4.1).

Note:
The distance between the floor and the top of the front end of the side rail should be 11 inches.

Diagram 4.1 - Measuring the Ends of the Side Rail



3. If the distances recorded in the previous step are equal to within 1/4 inch...

THEN...	**OTHERWISE...**
Skip to Step 17.	Continue with the next step.

4. At the **PRESS ENTER FOR PROGRAMS** prompt, press and hold the **ENTER** key.

5. Press ENTER when the display test starts.

6. With the **ADJUST LIFT [YES/DN NO/UP]** prompt displayed, press any ▼ key. The message **PRESS ENTER WHEN FINISHED** is displayed on the electronic console.

7. If the distance measured at the front of the side rail is larger than the distance measured at the back of the side rail...

THEN...	**OTHERWISE...**
Press the INCLINE ▼ key until the front and back treadmill measurements are equal; then press RESET.	Press the INCLINE ▲ key until the front and back treadmill measurements are equal; then press RESET.

8. Turn off the treadmill with the circuit breaker, then unplug the power cord from the wall outlet.

WARNING
Before continuing with this procedure, review the Warning and Caution statements listed in Section One of the Commercial Treadmill Service Manual.

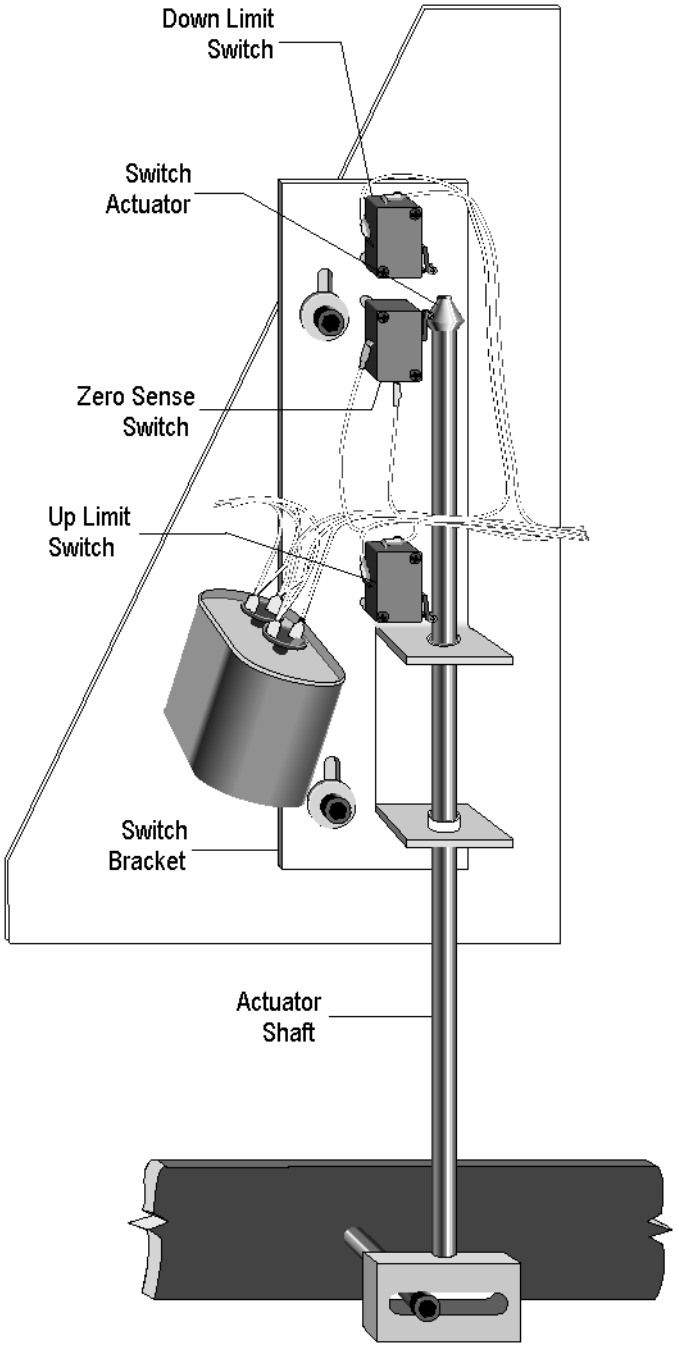
9. Remove the hood.

10. Check the position of the zero sense switch in relation to the switch actuator (see Diagram 4.2).

11. If the widest point of the switch actuator is lined up with the center of the wheel on the zero sense switch...

THEN...	**OTHERWISE...**
The zero sense switch is calibrated correctly; skip to Step 16.	The switch bracket must be adjusted; continue with the next step.

Diagram 4.2 - Limit Switch Bracket Assembly



WARNING
When power is applied to the treadmill, the wires connected to the upper and lower limit switches carry 110 volts (or 220 volts if you are servicing a 220-volt treadmill). Turn off the treadmill and unplug the power cord from the wall outlet before you perform the following steps.

12. Loosen the socket head bolts and washers that secure the switch bracket to the lift platform (see Diagram 4.2).

Note:
The zero sense switch can be actuated if the center of the wheel is slightly above or slightly below the widest point of the switch actuator. However, for best results, adjust the position of the zero sense switch as described in the following step.

13. If the center of the wheel on the zero sense switch is above the widest point of the switch actuator...

THEN...	**OTHERWISE...**
Move the switch bracket down until the widest part of the actuator is centered on the wheel on the zero sense switch; then continue with the next step.	Move the switch bracket up until the widest part of the actuator is centered on the wheel on the zero sense switch; then continue with the next step.

14. Tighten the socket head bolts and washers that secure the switch bracket to the lift platform.

15. Replace the hood

16. Check the operation of the treadmill as described in Section 3 of this appendix.

IMPORTANT
If the electronic console displays the diagnostic message **LIFT ERROR PRESS STOP** when you incline or decline the running bed to its maximum limits, repeat this procedure.

Procedure 4.2 - Calibrating the Lift Assembly on C962i & C964i Treadmills

Note:
On April 20, 2000 the C962i and C964i treadmills were equipped with a lift utilizing an internal lift potentiometer. Use the calibration procedure in steps 1-4 for units manufactured prior to April 20, 2000. For units manufactured after March 26, 2000, skip to step 5.

1. Enter the diagnostics program by pressing keys **RESET,5,1,7,6,5,7,6,1,** sequentially. Proceed to the lift calibration portion of the diagnostics routine.

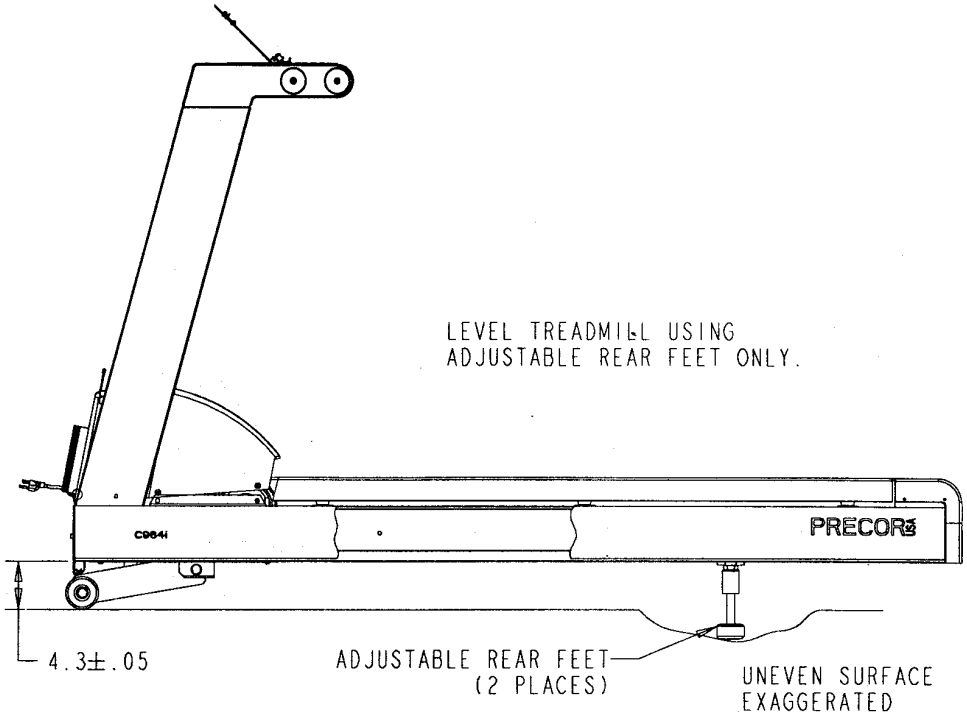
2. Use the **INCLINE ▲** and **INCLINE ▼** keys to set the distance between the front, bottom corner of the frame to the floor at 4.3 inches ± 0.05 inch. See diagram 4.3. After the 4.3 inch distance has been set, press the **ENTER** key. At the message **PRESS UP TO RECALIBRATE / PRESS DOWN FOR NO RECALIBRATION,** press one of the ▲ keys.

3. Exit the diagnostics program.

4. Check the rear bottom corners of the frame. If the rear corners of the frame do not measure 4.3 inches to the floor, adjust the rear feet accordingly. If the rear feet need to be adjusted more than 1 inch, the treadmill should be relocated to a more level location.

Note:
It is important that the lift is calibrated first (steps 1 & 2) before the rear height is adjusted.

Diagram 4.3 - Lift Calibration Dimensions



5. Set the on/off switch in the off position. Lay the treadmill on its left side.

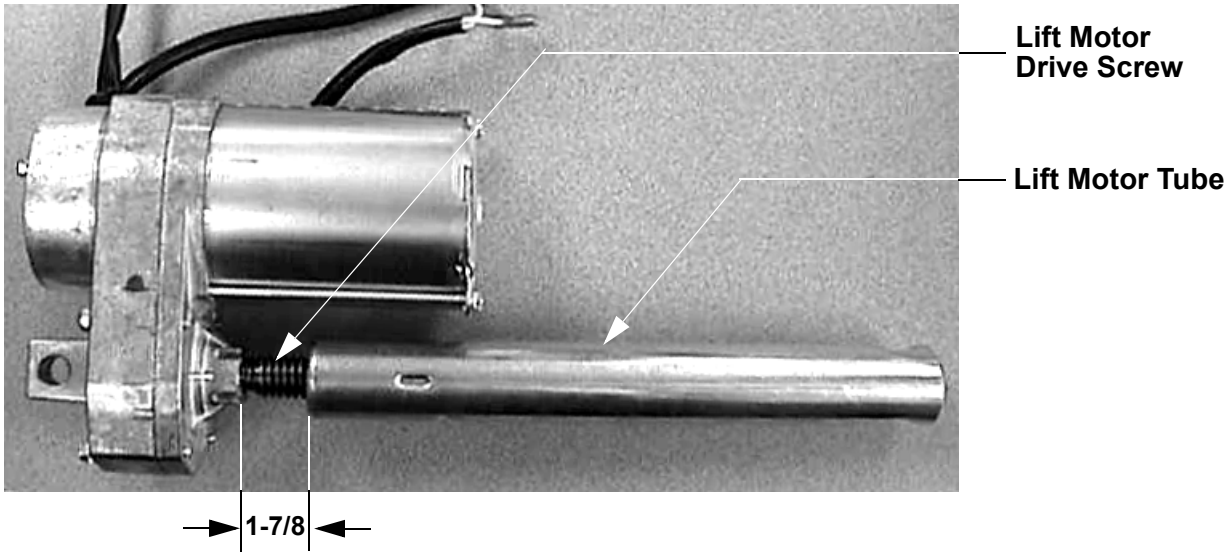
6. Remove the bolt that fastens the lower end of the lift motor to the lift platform.

7. Set the on/off switch in the on position. Enter the diagnostics program by pressing keys **RESET,5,1,7,6,5,7,6,1,** sequentially. Proceed to the lift calibration portion of the diagnostics routine.

8. Using the **INCLINE ▲** and **INCLINE ▼** keys, set the lift calibration number to 78.

9. Exit the diagnostics program and set the on/off switch in the off position. Taking care not to rotate the lift motor drive screw, rotate the lift motor tube until the measurement between the lift motor frame and the top of the lift tube is 1-7/8 inches. See Diagram 4.4.

Diagram 4.4 - Lift Motor Calibration



10. Fasten the lift motor tube to the lift platform with the bolt removed in step 6. Do not rotate the lift tube any more than is necessary to align the lift tube mounting hole with the lift platform mounting hole.

11. Set the treadmill in an upright position. The distance from the front of the treadmill to the floor should be 4.3 inches. See Diagram 4.3.

12. Check the rear bottom corners of the frame. If the rear corners of the frame do not measure 4.3 inches to the floor, adjust the rear feet accordingly. If the rear feet need to be adjusted more than 1 inch, the treadmill should be relocated to a more level location.

Procedure 4.3 - Inspecting and Adjusting Safety Switch Alignment

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Inspecting the Alignment of the Safety Switch

1. Turn off the treadmill with the circuit breaker, then unplug the power cord from the wall outlet.

2. Attach the safety clip to your clothing at waist level, then watch the safety switch as you step backwards.

Note:
Do not attach the safety clip too securely.

3. If the safety switch tripped before the safety clip came off your clothing...

THEN...	OTHERWISE...
The safety switch is adjusted correctly; skip to Step 15	Continue with the next step.

Adjusting the Alignment of the Safety Switch

4. Remove the screws that secure the display housing to the display housing mounting plate.

5. Place your right hand on the two right upper display housing mounting tabs. Place your left hand on the left tabs.

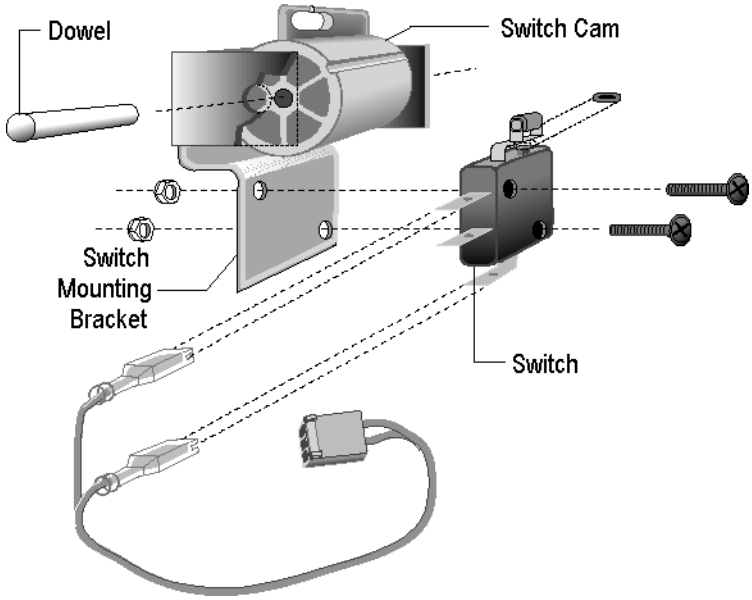
6. Push the right tabs towards the right targa upright and the left tabs towards the left targa upright, while lifting the display housing from the mounting plate. Support the display housing on the front handrails.

7. Loosen the screws and nuts that secure the safety limit switch to the switch mounting bracket (see Diagram 4.5).

8. Slide the safety switch away from the cam.

9. Tighten the screws and nuts that secure the safety limit switch to the switch mounting bracket.

Diagram 4.5 - Safety Switch Assembly



10. Line up the tabs on the display housing with the holes on the display housing mounting plate.

11. Gently press the display housing onto the mounting plate until the tabs are pushed into the holes.

12. Attach the safety clip to your clothing at waist level, then watch the safety switch as you step backwards.

13. If the safety switch tripped before the safety clip came off your clothing**...**

THEN...	**OTHERWISE...**
The safety switch is adjusted correctly; continue with the next step.	Return to Step 5.

14. Replace the three screws that secure the upper display housing to the display housing mounting plate.

Procedure 5.1 - Troubleshooting the Keypad and Upper PCA

If the function keys on the electronic console are unresponsive, the problem may be either the upper PCA or keypad. This troubleshooting procedure gives you the information you need to determine which of these components is malfunctioning.

Procedure

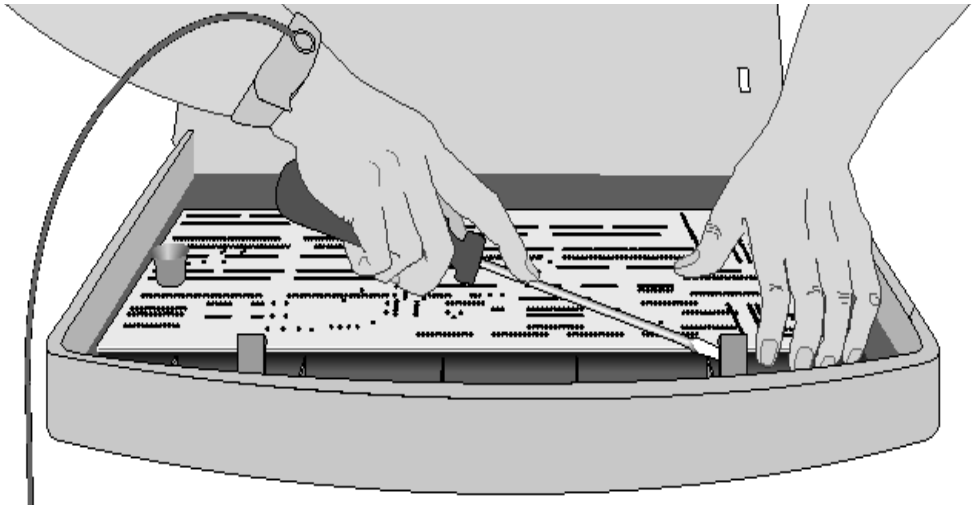
1. Set the circuit breaker in the “off” position.

WARNING
Before continuing with this procedure, review the Warning and Caution statements listed in Section One of the Residential Treadmill Service Manual.

2. Remove the screws that secure the upper display assembly to the upper handrail. Carefully, pull some excess interconnect cable out from the targa upright. Rotate the display housing, so that the rear of the upper PCA is facing upward, and set the display housing on the upper handrail.

3. Attach the wrist strap to your arm, then connect the ground lead of the wrist strap to the treadmill frame.

Diagram 5.1 - Removing the Upper PCA



4. Set the voltmeter to a range that will conveniently read +6 Vdc.

5. Set the circuit breaker in the “on” position.

6. Use a DVM, set for DC volts, and read between pin 5 of J4 and the each of the pins in Table 5.1 (no keys pressed) and Table 5.2 (with the appropriate key pressed)...

Diagram 5.2 - Upper PCA Component Layout

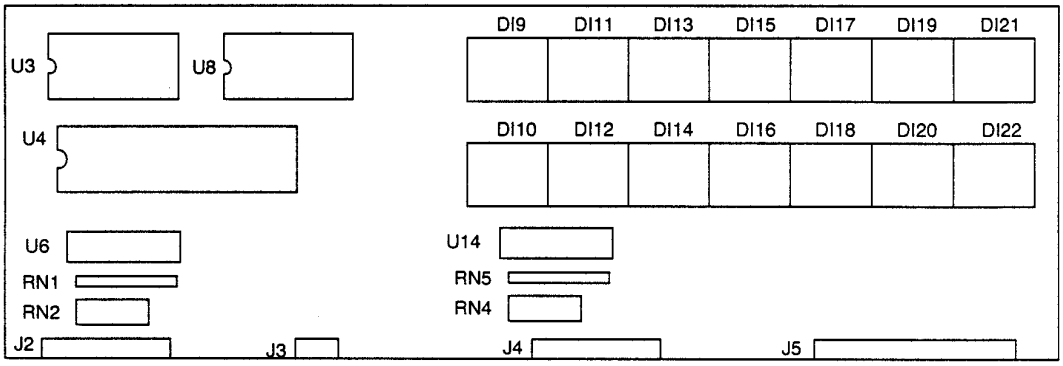


Table 5.1 - Voltage Test Points (Function Keys Not Pressed)

PLACE THE POSITIVE LEAD OF THE VOLTMETER ON...	THE VOLTMETER SHOULD READ...
Pin 1 of J4	5 Vdc ± 500 mVdc
Pin 2 of J4	5 Vdc ± 500 mVdc
Pin 3 of J4	5 Vdc ± 500 mVdc
Pin 4 of J4	5 Vdc ± 500 mVdc
Pin 6 of J4	5 Vdc ± 500 mVdc
Pin 7 of J4	5 Vdc ± 500 mVdc
Pin 8 of J4	5 Vdc ± 500 mVdc
Pin 9 of J4	5 Vdc ± 500 mVdc
Pin 4 of J2	5 Vdc ± 500 mVdc
Pin 5 of J2	5 Vdc ± 500 mVdc
Pin 6 of J2	5 Vdc ± 500 mVdc

Table 5.2 - Voltage Test Points (Function Keys Pressed)

Place the positive lead of the voltmeter on...	At the electronic console, press...	The voltmeter should read between...
Pin 1 of J4	Left **CHANGE** key	0 Vdc and 350 mVdc
Pin 2 of J4	**STOP** key	0 Vdc and 350 mVdc
Pin 3 of J4	**SPEED ▼** key	0 Vdc and 350 mVdc
Pin 4 of J4	**SPEED ▲** key	0 Vdc and 350 mVdc
Pin 6 of J4	**QUICK START** key	0 Vdc and 350 mVdc
Pin 7 of J4	**ENTER** key	0 Vdc and 350 mVdc
Pin 8 of J4	Right **CHANGE** key	0 Vdc and 350 mVdc
Pin 9 of J4	Center **CHANGE** key	0 Vdc and 350 mVdc
Pin 4 of J2	**RESET** key	0 Vdc and 350 mVdc
Pin 6 of J2	**INCLINE ▼** key	0 Vdc and 350 mVdc
Pin 7 of J2	**INCLINE ▲ ▼**key	0 Vdc and 350 mVdc

7. If the voltage readings match those listed in Tables 5.1 and 5.2 and one or more keys do not function, replace the upper PCA.

8. If the voltage readings in Table 5.1 are incorrect, disconnect the keypad cable from the key pad connector and repeat the voltage measurements in 5.1. If the voltage readings are now correct, replace the display housing (keypad). If the voltage readings are still incorrect, replace the upper PCA.

9. If the voltage readings in Table 5.1 are correct and one or more voltage readings in Table 5.2 are incorrect, replace the display housing (keypad).

10. Set the circuit breaker in the “off” position.

11. If necessary, carefully re-connect the keypad cable to the keypad connector.

12. Remove the ground lead of the wrist strap from the treadmill frame, then remove the wrist strap from your arm.

13. Position the display enclosure on the display plate. Install the screws that secure the display enclosure to the display plate.

14. Check the operation of the treadmill as described in Section Three of this appendix.

Procedure 5.2 - Troubleshooting the Lift System (SCR & PWM Units)

Lift System Description:
The lift system on these units consists of an AC line voltage driven lift motor (120 Vac or 240 Vac), a hall effect rotation sensor and three position location switches. The lift system orients itself by locating the zero sense switch when the treadmill is powered up. When the zero sense switch is activated the system recognizes that physical position as 0% incline. If the zero sense switch is activated when the treadmill is powered up, the system proceeds directly into the normal program mode. If the zero sense switch is not activated when the treadmill is powered up, the system performs a self calibration procedure. The purpose of the self calibration procedure is to locate the zero sense switch (0% incline). The user will be prompted to press any key to commence the lift calibration. The treadmill will go up 4%, because the lowest the treadmill could have been at power up is -3%. If the treadmill does not locate the zero sense switch by going up 4%, it will stop and then go down until it activates the zero sense switch. The system will then proceed to the normal program mode. Once the 0% lift position has been located, the system tracks any subsequent lift operations by counting motor revolutions. A hall effect sensor is mounted on a bracket that is next to a hub that is attached to the lift motor shaft. As the lift motors operates, a magnet mounted in the hub, passes the hall effect sensor once per motor revolution. The hall effect sensor send one pulse to the lift control system per revolution. The system knows how far the lift travels per revolution and by counting revolutions (hall effect sensor pulses), knows the current lift position. The other two position switches (upper and lower limit) do not come into play during normal operation. If either switch is activated it means that the lift has moved beyond its normal range of motion. When either limit switch is activated, power is removed from the lift motor. Removing power from the lift motor, protects the lift system from physical damage.

Note:
All resistance measurements must be performed with power removed from the treadmill. Performing resistance measurements with voltage applied may damage your ohmmeter.

Procedure

1. If the lift motor operates but creates a lift error (error 40, 41 or 43) go to step 8. If the lift motor will not move continue with step 2.

2. Put the treadmill in a condition in which the lift motor is ready to be operated (for example, quick start into the manual program). Using an AC voltmeter, monitor the voltage across the lift capacitor and press one of the incline keys. Approximately 1.4 times the AC input voltage should appear on the lift capacitor when an incline key is pressed. Approximately 170 Vac on a 120 Vac unit or approximately 340 Vac on a 240 Vac unit. The actual lift capacitor voltage will vary with the AC input voltage. If AC line voltage or 1.4 times line voltage is on the lift capacitor go to step 6. If no AC voltage is on the lift capacitor, continue with step 3.

3. Set the treadmill circuit breaker in the “off” position. Remove the 2 amp lift fuse (F2) from the lower PCA. Using an ohmmeter, measure the fuse resistance. The fuse should measure approximately 1W or less. If the fuse is open or significantly higher than 1W, replace the fuse. If the fuse was bad, perform the test in step 4 before applying power to the lift. If the fuse was good continue with step 5.

4. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The Lower PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 34W (120 Vac units) or 122W (240 Vac units). Therefore, if the measurement is significantly lower than 34W or 122W, disconnect both red leads from the lift capacitor. Measure the resistance between the black leads on the lift capacitor and red lead to the lower PCA. If it measures significantly low, replace the lower PCA. Measure the resistance between the black leads on the lift capacitor and red lead to the lift motor. If it measures significantly low, replace the lift motor. Measure the resistance between the black leads on the lift capacitor and other terminal of the lift capacitor. If it measures significantly low, replace the lift capacitor.

5. At this point the lift fuse is good, but there is no AC voltage on the lift capacitor when the lift is actuated. There are three potential causes for this condition. They are lower PCA, ribbon cable or upper PCA. There are no good means of troubleshooting these components other than substituting known good components. Replace only one component at a time. If the component that you replaced does not correct the problem, replace the original component. Try substituting the lower PCA first, the ribbon cable second and the upper PCA third. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

6. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The lower PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 34W or 122W. If it measures significantly high or open (•), replace the lift motor.

7. If the resistance measurement in step 6 was approximately 34W (120 VAC units) or 122W (240 VAC units), replace the lift capacitor. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

8. Typically, when the lift is able to physically move but causes a lift error, the problem is in the lift position identification system (rotation sensor and zero sense switch).

9. Connect a DC voltmeter between the white wire (term. 2 of J3) and the red wire (term. 4 of J3) on the lower PCA. Set the treadmill circuit breaker in the “on” position and slowly rotate the hub at the bottom of the lift motor by hand. The DC voltmeter should read approximately 0 Vdc when the magnet in the hub is not near the hall effect sensor and approximately 5 VDC when the magnet is near the hall effect sensor. If the voltage switches between 0 and 5 Vdc as the magnet passes the hall effect sensor continue with step 11.

10. Measure the voltage between the red wire (term. 4 of J3) and the black wire (term 1 of J3). The voltage should read a constant 5 Vdc. If the voltage is 0 or significantly lower than 5 Vdc, disconnect the rotation sensor connector from the lower PCA. Measure the voltage between the red wire (term. 4 of J3) and the black wire (term 1 of J3) on the lower PCA. If the voltage is still 0 Vdc or significantly low, replace the lower PCA. If the voltage is now correct, replace the hall effect sensor.

Note:
If possible set the lift in a position that does not operate the zero sense switch. The zero sense switch may be operated by hand to perform the tests in step 11.

11. At this point the hall effect sensor is functioning normally, but lift errors occur. With a DC voltmeter measure the voltage across the zero sense (center) switch. It should measure approximately 0 Vdc when the switch is not operated and approximately 5 Vdc when the switch is operated. If the operated voltage is 0 Vdc or significantly low, remove both blue wires from the zero sense switch. Measure the voltage between the two blue wires. If the voltage is now correct replace the zero sense switch. If the voltage is still O Vdc or significantly low, replace the lower PCA.

12. At this point the hall effect sensor and the zero sense switch are functioning normally, but lift errors occur. There are three potential causes for this condition. They are lower PCA, ribbon cable or upper PCA. There are no good means of troubleshooting these components other than substituting known good components. Replace only one component at a time. If the component that you replaced does not correct the problem, replace the original component. Try substituting the lower PCA first, the ribbon cable second and the upper PCA third. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

Procedure 5.3 - Troubleshooting the Lift System (i Units)

Lift System Description:
The C962i and C964i treadmills were manufactured with two types of lift systems. Units built prior to April 20, 2000 consisted of an AC line voltage driven lift motor (120 Vac or 240 Vac) and an external 10 KW potentiometer. The 10KW potentiometer rotates as the lift operates and indicates the current lift position. The lift system is factory calibrated, but will require re-calibration whenever the upper PCA is replaced (refer to procedure 4.2). Units built after April 19, 2000, utilized a lift motor with an internal 1 KW potentiometer. Use the procedure in steps 1-14 for trpubleshooting units manufactured prior to April 20, 2000. Start with step 15 for units manufactured after April 19, 2000.

Note:
All resistance measurements must be performed with power removed from the treadmill. Performing resistances measurements with voltage applied may damage your ohmmeter. Whenever the upper PCA is replaced on a C962i or C964i manufactured prior April 20, 2000, the lift system must be re-calibrated.

1. If the lift motor operates but creates a lift error (error 40, 41 or 42) go to step 8. If the lift motor will not move continue with step 2.

2. Put the treadmill in a condition in which the lift motor is ready to be operated (for example, quick start into the manual program). Using an AC voltmeter, monitor the voltage across the lift capacitor and press one of the incline keys. Approximately 1.4 times the AC input voltage should appear on the lift capacitor when a incline key is pressed. Approximately 170 Vac on a 120 Vac unit or approximately 340 Vac on a 240 Vac unit. The actual lift capacitor voltage will vary with the AC input voltage. If AC line voltage or 1.4 times line voltage is on the lift capacitor go to step 6. If no AC voltage is on the lift capacitor, continue with step 3.

3. Set the treadmill circuit breaker in the “off” position. Remove the 2 amp lift fuse (F2) from the lower PCA. Using an ohmmeter, measure the fuse resistance. The fuse should measure approximately 1W or less. If the fuse is open (•) or significantly higher than 1W, replace the fuse. If the fuse was bad, perform the test in step 4 before applying power to the lift. If the fuse was good continue with step 5.

4. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The lower PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 34W (120 Vac units) or 122W (240 Vac units). Therefore, if the measurement is significantly lower than 34W or 122W, disconnect both red leads from the lift capacitor. Measure the resistance between the black leads on the lift capacitor and red lead to the lower PCA. If it measures significantly low, replace the lower logic/lift PCA. Measure the resistance between the black leads on the lift capacitor and red lead to the lift motor. If it measures significantly low, replace the lift motor. Measure the resistance between the black leads on the lift capacitor and other terminal of the lift capacitor. If it measures significantly low, replace the lift capacitor.

5. At this point the lift fuse is good, but there is no AC voltage on the lift capacitor when the lift is actuated. There are three potential causes for this condition. They are lower logic/lift PCA, ribbon cable or upper PCA. There are no good means of troubleshooting these components other than substituting known good components. Replace only one component at a time. If the component that you replaced does not correct the problem, replace the original component. Try substituting the lower PCA first, the ribbon cable second and the upper PCA third.

6. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

7. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The lower logic/lift PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 34W or 122W. If it measures significantly high or open (•), replace the lift motor.

8. If the resistance measurement in step 6 was approximately 34W (120 VAC units) or 122W (240 VAC units), replace the lift capacitor. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

9. Typically, when the lift is able to physically move but causes a lift error, the problem is in the lift position identification system (lift potentiometer or lift calibration).

10. Measure the voltage between the red wire (term. 1 of J1) and the black wire (term 3 of J1) on the lower PCA. The voltage should measure approximately 5 Vdc. If the voltage is 0 Vdc or significantly low, continue with step 11. If the voltage is correct go to step 12.

11. Disconnect the J1 connector from the lower logic/lift PCA. Measure the voltage between term.1 of J1 and term 3 of J1on the lower PCA. If the voltage is still 0 Vdc or significantly low replace the lower logic/lift PCA. If the voltage is correct with the J1 connector disconnected, replace the potentiometer assembly.

12. Disconnect the J1 connector from the lower logic/lift PCA. With an ohmmeter, measure the resistance between the red wire (term. 1 of J1) and the black wire (term 3 of J1). The measurement should be approximately 10KW. With an ohmmeter, measure the resistance between the red wire (term. 1 of J1) and the white wire (term 2 of J1)and measure the resistance between the white wire (term. 2 of J1) and the black wire (term 3 of J1). The sum of the last two measurements should total approximately 10 KW.

13. If either of the two 10 KW measurements are open (•) or significantly low or high, replace the potentiometer assembly.

14. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

15. If the lift motor operates but creates a lift error (error 40, 41 or 42) go to step 22. If the lift motor will not move continue with step 2.

16. Put the treadmill in a condition in which the lift motor is ready to be operated (for example, quick start into the manual program). Using an AC voltmeter, monitor the voltage across the lift capacitor and press one of the incline keys. Approximately 1.4 times the AC input voltage should appear on the lift capacitor when a incline key is pressed. Approximately 170 Vac on a 120 Vac unit or approximately 340 Vac on a 240 Vac unit. The actual lift capacitor voltage will vary with the AC input voltage. If AC line voltage or 1.4 times line voltage is on the lift capacitor go to step 20. If no AC voltage is on the lift capacitor, continue with step 17.

17. Set the treadmill circuit breaker in the “off” position. Remove the 2 amp lift fuse (F2) from the lower PCA. Using an ohmmeter, measure the fuse resistance. The fuse should measure approximately 1W or less. If the fuse is open (•) or significantly higher than 1W, replace the fuse. If the fuse was bad, perform the test in step 18 before applying power to the lift. If the fuse was good continue with step 19.

18. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The lower PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 32W (120 Vac units) or 115W (240 Vac units). Therefore, if the measurement is significantly lower than 32W or 115W, disconnect both red leads from the lift capacitor. Measure the resistance between the black leads on the lift capacitor and red lead to the lower PCA. If it measures significantly low, replace the lower logic/lift PCA. Measure the resistance between the black leads on the lift capacitor and red lead to the lift motor. If it measures significantly low, replace the lift motor. Measure the resistance between the black leads on the lift capacitor and other terminal of the lift capacitor. If it measures significantly low, replace the lift capacitor.

19. At this point the lift fuse is good, but there is no AC voltage on the lift capacitor when the lift is actuated. There are three potential causes for this condition. They are lower logic/lift PCA, ribbon cable or upper PCA. There are no good means of troubleshooting these components other than substituting known good components. Replace only one component at a time. If the component that you replaced does not correct the problem, replace the original component. Try substituting the lower PCA first, the ribbon cable second and the upper PCA third.

20. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

21. Using an ohmmeter, measure the resistance across the lift capacitor terminals. The lower logic/lift PCA resistance should be extremely high (megohms), the capacitor resistance should be extremely high (megohms) and the lift motor winding should read approximately 32W or 115W. If it measures significantly high or open (•), replace the lift motor.

22. If the resistance measurement in step 6 was approximately 32W (120 VAC units) or 115W (240 VAC units), replace the lift capacitor. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

23. Typically, when the lift is able to physically move but causes a lift error, the problem is in the lift position identification system (lift potentiometer or lift calibration).

24. Measure the voltage between the red wire (term. 1 of J1) and the black wire (term 3 of J1) on the lower PCA. The voltage should measure approximately 5 Vdc. If the voltage is 0 Vdc or significantly low, continue with step 11. If the voltage is correct go to step 12.

25. Disconnect the J1 connector from the lower logic/lift PCA. Measure the voltage between term.1 of J1 and term 3 of J1on the lower PCA. If the voltage is still 0 Vdc or significantly low replace the lower logic/lift PCA. If the voltage is correct with the J1 connector disconnected, replace the potentiometer assembly.

26. Disconnect the J1 connector from the lower logic/lift PCA. With an ohmmeter, measure the resistance between the red wire (term. 1 of J1) and the black wire (term 3 of J1). The measurement should be approximately 1KW. With an ohmmeter, measure the resistance between the red wire (term. 1 of J1) and the white wire (term 2 of J1)and measure the resistance between the white wire (term. 2 of J1) and the black wire (term 3 of J1). The sum of the last two measurements should total approximately 1 KW.

27. If either of the two 1 KW measurements are open (•) or significantly low or high, replace the lift motor assembly.

28. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

Procedure 5.4 - Troubleshooting the Speed Sensor

Note:
The speed sensor is a hall effect sensor that emits a pulse when a flywheel lobe passes it. The speed control circuit processes the pulse train emitted by the speed sensor. The speed sensor signal is a real time representation of the operating speed of the treadmill. The speed control circuit compares the real time speed (speed sensor output) with the speed that it expects the treadmill to be operating at and acts accordingly to control treadmill speed or initiate an error code sequence, if necessary. Typically, if a problem exists with the speed sensor the drive motor will operate (perhaps only briefly) before a speed related error occurs (errors 20-26).

Note:
Some speed sensor have red, black and white wires and some have red, black and green wires. The following procedures will assume red, black and white wires. If the speed sensor on the unit under test has red black and green wires, perform your test procedures using the green wire instead of the white wire. The white and green wires serve the same function.

1. Set the treadmill circuit breaker in the “on” position. Using a DC voltmeter, measure the voltage between terminal 1 of J5 (red wire) and terminal 3 of J5 (white wire) on the lower PCA. Slowly, rotate the drive motor flywheel. The voltage should read approximately 5 Vdc as a flywheel lobe passes the speed sensor and approximately 0 Vdc when a flywheel lobe is not in front of the speed sensor.

2. If the voltage in step 1 is correct, go to step 5. If the voltage in step 1 is 0 Vdc or significantly low when a flywheel lobe passes the speed sensor, continue with step 3.

3. Measure the voltage between terminal 1 of J5 (red wire) and terminal 4 of J5 (black wire) on the lower PCA. The voltage should read approximately 5 Vdc.

4. If the voltage is missing or significantly low, disconnect the speed sensor plug from the lower PCA. Measure the voltage between pins 1 & 4 of the J5 plug on the lower PCA. If the voltage is approximately 5 Vdc, replace the speed sensor. If the voltage is missing or significantly low, replace the lower PCA.

5. At this point the speed sensor output is good, but speed error occur. There are three potential causes for this condition. They are ribbon cable, upper PCA or lower PCA. There are no good means of troubleshooting these components other than substituting known good components. Replace only one component at a time. If the component that you replaced does not correct the problem, replace the original component. Try substituting the ribbon cable first, the upper PCA second and the lower PCA third.

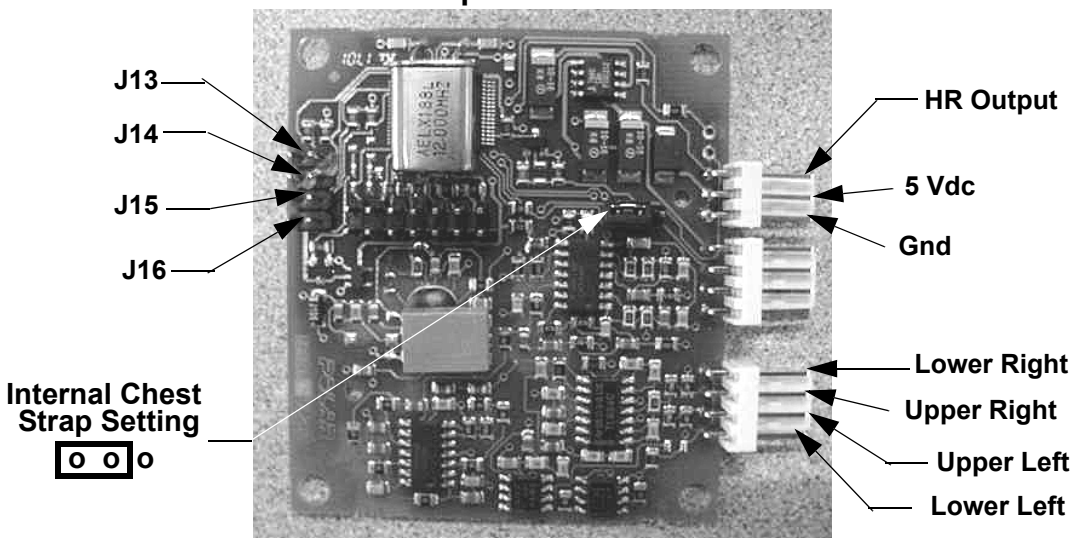
6. If you have performed all of the above procedures and have been unable to correct the problem, call Precor Customer Support.

Procedure 5.5 - Troubleshooting Hand Held Heart Rate

Circuit Description
The hand held heart rate system is actually a dual system, that is, it can accept a heart rate signal from either the hand held heart rate contacts on the units handlebar or from a Polar heart rate chest strap transmitter. Refer to Diagram 5.3 and verify that no jumpers are equipped on J13, J14, J15 or J16. Also, verify that there is a jumper equipped on the internal chest strap setting. The internal chest strap setting is the two left hand pins on the three pin connector as shown below in Diagram 5.3. These settings allow the heart rate system to operate on the internal chest strap receiver with the chest strap heart rate priority. That is, if both a chest strap and hand heart rate signal is being received, the system will accept the chest strap signal and ignore the hand held signal. If a chest strap signal is not being received, the system will accept the hand held signal.

Note:
There are four typical failure modes for the hand held/chest strap heart rate system. They are: 1 - hand held is normal - no chest strap reading; 2 - no hand held reading - chest strap normal; 3 - no hand held or chest strap reading; 4 - constant or intermittent readings when neither hand held or chest strap are in use.

Diagram 5.3 - Hand held/chest strap heart rate PCA



Normal hand held reading - No chest strap reading

1. Set the on/off switch in the “on” position and access the diagnostic program (Procedure 2.1 or 2.2). Advance to the heart rate display portion of the diagnostic program. Verify that a chest strap signal is not being accepted with either a Polar heart rate test transmitter or a known good chest strap transmitter. If this reading is good, skip to step 3.

2. Using a Polar heart rate test receiver, verify the operation of the chest strap transmitter furnished with the unit. If the Polar heart rate test receiver does not receive a signal, replace the chest strap transmitter.

3. Set the on/off switch in the “off” position and remove the display housing.

4. Verify the internal chest strap setting is set as shown in Diagram 5.3. Verify that a ferrite bead is installed on the heart rate PCA to upper PCA cable.

5. If the above procedures did not correct the problem, replace the heart rate PCA.

No hand held reading - Normal chest strap reading

6. Set the on/off switch in the “on” position and access the diagnostic program (Procedure 2.1 or 2.2). Advance to the heart rate display portion of the diagnostic program. Verify that a hand held signal is not being accepted by firmly grasping both the right and left hand held contacts on the handlebars. Cover as much of the contact surface area with your hands as possible (without moving your hands), you should receive a heart rate reading within ten seconds.

7. If a hand held signal is not being accepted, set the on/off switch in the off position.

8. Temporarily, install a spare jumper on J14 of the heart rate PCA (hand held priority). Set the on/off switch in the “on” position and repeat the procedure in step 6.

9. If the hand held signal is now being accept, something in the near vicinity is radiating RF (radio frequency) energy that is being received by the chest strap portion of the heart rate PCA. Disabling the chest strap signal proves that it is radiated energy that is causing the problem.

10. If a hand held signal still not being accepted, skip to step 13.

11. The source of the radiated energy must be determined and relocated so that it no longer affects the heart rate PCA. Televisions, cell phones, Cardio-theatre receivers, etc. are possible sources of radiated energy.

12. Set the on/off switch in the “off” position, and remove the temporary jumper from J14 of the heart rate PCA. Re-locate all potential sources of radiation. Set the on/off switch in the “on” position and repeat the procedure in step 6.

13. Set the on/off switch in the “on” position and access the diagnostic program (Procedure 2.1 or 2.2). Advance to the heart rate display portion of the diagnostic program. Verify that a hand held signal is not being accepted by firmly grasping both the right and left hand held contacts with the opposite hands, right hand on the left handlebar contacts and left hand on the right handlebar contacts. Cover as much of the contact surface area with your hands as possible, you should receive a heart rate reading within ten seconds. If a hand held signal is still not being accepted, skip to step 15.

14. If a hand held signal was accepted in step 13, the hand held contact wiring is reversed. The end of the wire harness that connects to the hand held contacts in the handlebar is segregated into two groups. One group has blue shrink wrap around it and the other group has black shrink wrap around it. The “blue” group must go to the right hand contacts and the “black” group must go to the left hand contacts. In both groups the black wire must go to the lower contact and the red wire must go to the upper contact. If necessary, rewire the hand held contacts as described above and test as described in step 6.

15. Set the on/off switch in the “off” position. Refer to Diagram 5.3 for the following measurements. With an ohmmeter measure between the “lower right contact” pin on the J1 connector and the lower right hand held heart rate contact on the handlebar. The reading should be 1 W or less. Measure between the “upper right contact” pin on the J1 connector and the upper right hand held heart rate contact on the handlebar. The reading should be 1 W or less. Measure between the “upper left contact” pin on the J1 connector and the upper left hand held heart rate contact on the handlebar. The reading should be 1 W or less. Measure between the “lower left contact” pin on the J1 connector and the lower left hand held heart rate contact on the handlebar. The reading should be 1 W or less. If any of the above readings are greater than 1 W, replace the heart rate PCA to handlebar wire harness.

No hand held reading - No chest strap reading

16. Set the on/off switch in the “on” position and access the diagnostic program (Procedure 2.1 or 2.2). Advance to the heart rate display portion of the diagnostic program. Verify that neither a chest strap signal or a hand held signal is being accepted with either a heart rate test transmitter or a chest strap transmitter.

17. Check the plug/connector connections on both the heart rate PCA (J4), and upper PCA (J1).

18. If neither a chest strap signal or a hand held signal is being accepted, measure between the “ground” and “5 Vdc” pins on J4 for 5 Vdc. If 5 Vdc is present, replace the heart rate PCA.

19. If 5 Vdc is not present, remove the connector from J4 of the heart rate PCA. Measure between the “ground” and “5 Vdc” pins of the connector (just removed from the heart rate PCA) for 5 Vdc. If 5 Vdc is present, replace the heart rate PCA. If the 5 Vdc is not present, measure between the corresponding pins of J1 on the upper PCA (red and black wires). If 5 Vdc is not present replace the upper PCA. If 5 Vdc is present, replace the upper PCA to heart rate PCA cable.

Constant or intermittent readings when neither the hand held or chest strap is in use

20. Verify that a ferrite core is clamped around the heart rate PCA to upper PCA cable.

21. Constant or intermittent heart rate readings when neither heart rate system is in use is caused by something in the near vicinity radiating RF energy that is being received by the chest strap portion of the heart rate PCA.

22. Temporarily, install a spare jumper on J14 of the heart rate PCA (hand held priority). Set the on/off switch in the “on” position and repeat the procedure in step 6.

23. If the hand held signal is now being accept, something in the near vicinity is radiating RF energy that is being received by the chest strap portion of the heart rate PCA. Disabling the chest strap signal proves that it is radiated energy that is causing the problem.

24. The source of the radiated energy must be determined and relocated so that it no longer affects the heart rate PCA. Televisions, cell phones, Cardio-theatre receivers, etc. are possible sources of radiated energy.

25. Set the on/off switch in the “off” position, and remove the spare jumper from J14 of the heart rate PCA. Re-locate all potential sources of radiation. Set the on/off switch in the “on” position and repeat the procedure in step 6.

Procedure 5.6 - Troubleshooting the External A.C. Power Source

It is extremely important that any Precor treadmill be connected to and operated on a dedicated 20 amp A.C. circuit. A 20 amp dedicated circuit is defined as: a circuit fed by a 20 amp circuit breaker that feeds a single load. A treadmill operating from a non-dedicated circuit or a circuit breaker of less than 20 amps capacity will not have the necessary power available to operate normally under higher load conditions. The lack of available power can cause any number of symptoms ranging from numerous intermittent (seemingly inexplicable) error conditions, poor speed control, or tripping the house circuit breaker.
If any of the above symptoms exist the external A.C. circuit must be checked and confirmed to be a 20 amp dedicated circuit **before** troubleshooting the treadmill.
In addition the A.C. voltage must be checked. Nominal A.C. operating voltage on 120 Vac circuits is 105 Vac to 120 Vac. Nominal A.C. operating voltage on 240 Vac circuits is 208 Vac to 240 Vac.
For operator safety considerations and to minimize electrostatic discharge conditions the A.C. frame ground continuity must also be verified to be a low resistance connection to the A.C. distribution ground bar.

Important
If the A.C. circuit feeding a treadmill is found to be a non-dedicated circuit or a circuit equipped with a circuit breaker with a capacity of less than 20 amps, the A.C. circuit must be corrected to be a 20 amp dedicated circuit **before** any reliable troubleshooting can be performed on the treadmill. More importantly, a non-dedicated circuit may constitute a safety hazard to the treadmill operator.

120 Vac Systems

120 Vac distribution systems utilize a single pole circuit breaker (hot lead) and a neutral lead connected to a common neutral (ground) bar. The A.C. safety ground (green wire) is connected to a separate ground bar in the distribution system.

The most common problems found are (1) the circuit is fed by a circuit breaker of less than 20 amp capacity, (2) the circuit breaker correctly feeds a single A.C. outlet but the neutral is common between several A.C. outlets and (3) both the hot and neutral leads feed several A.C. outlets. The appropriate correction action or actions (see below) must be followed if any of the above conditions exist. **Corrective actions should only be undertaken by a licensed electrician.**

1. **The circuit breaker feeding the treadmill is not a 20 amp circuit breaker.**
   If the circuit breaker is greater than 20 amps, the circuit breaker should be replaced with a 20 amp circuit breaker. If the circuit breaker is less than 20 amps the circuit breaker must be replaced with a 20 amp circuit breaker and the wiring from the A.C. distribution must be capable of safely handing 20 amps. If the A.C. wiring is under sized, it must be replaced with wire capable of safely handling 20 amps. Please, refer to local electrical codes when determining the appropriate wire size for a 20 amp circuit.

2. **The circuit breaker correctly feeds a single A.C. outlet but the neutral is common between several A.C. outlets.**
   The common neutral lead must be removed from treadmills A.C. outlet and a new neutral lead from the treadmills A.C. outlet to the A.C. neutral distribution bar must be added.

3. **Both the hot and neutral leads feed several A.C. outlets.**
   Both the common neutral and hot leads must be removed from treadmills A.C. outlet and a new neutral lead and hot lead from the treadmills A.C. outlet to the A.C. neutral distribution bar and circuit breaker must be added.

240 Vac Systems

240 Vac distribution systems utilize a double pole circuit breaker (two hot leads) The A.C. safety ground (green wire) is connected to a ground bar in the distribution system.
The most common problems found are (1) the circuit is fed by a circuit breaker of less than 20 amp capacity and (2) both the hot leads feed several A.C. outlets. The appropriate correction action or actions (see below) must be followed if any of the above conditions exist. **Corrective actions should only be undertaken by a licensed electrician.**

1. **The circuit breaker feeding the treadmill is not a 20 amp circuit breaker.**
   If the circuit breaker is greater than 20 amps, the circuit breaker should be replaced with a 20 amp circuit breaker. If the circuit breaker is less than 20 amps the circuit breaker must be replaced with a 20 amp circuit breaker and the wiring from the A.C. distribution must be capable of safely handing 20 amps. If the A.C. wiring is under sized, it must be replaced with wire capable of safely handling 20 amps. Please, refer to local electrical codes when determining the appropriate wire size for a 20 amp circuit.

2. **Both the hot leads feed several A.C. outlets.**
   Both hot leads must be removed from treadmills A.C. outlet and two new hot leads from the treadmills A.C. outlet to the circuit breaker must be added.

A licensed electrician may use the followings hints to determine if an A.C. service is dedicated.

1. If, on a 120 Vac system, the A.C. distribution panel contains more circuit breakers than neutral leads, the system has shared neutral leads and is not dedicated.

2. If an A.C. outlet (120 or 240 Vac) has multiple hot and/or neutral leads, it is not a dedicated.

3. If either of the above conditions exist, the system is not dedicated. However, absence of the above conditions does not necessarily mean that the system is dedicated. If any doubt exists about A.C. systems dedication, point to point tracing of the A.C. wiring may be the only way to prove system dedication.

Procedure 6.1 - Replacing the Lift Motor, Rotation Sensor or Magnet Hub

Note:
If you need to replace a lift motor that utilizes a hall effect rotation sensor, remove the magnet hub and rotation sensor bracket from the defective lift motor and mount them on the new lift motor. Unless the magnet and rotation sensor are defective, do not remove them from their mounting positions on the magnet hub and sensor bracket. Replacement lift motors are not furnished with the hall effect rotation sensor.

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Removing the Lift Motor

1. Remove the hood.

2. Remove the red lift motor lead from the lift motor capacitor, but leave the remaining red wire connected to the capacitor terminal.

3. Remove the black lift motor lead from the lift motor capacitor, but leave the remaining black wire connected to the capacitor terminal.

4. Disconnect the connector on the white lift motor lead.

5. If the treadmill does not have a rotation sensor (C962i or C964i), go to step 8.

6. Remove the revolution sensor plug from the J2 connector jack on the lower PCA.

Note:
When the revolution sensor wire assembly is disconnected from the lower PCA, the zero sense switch must be disconnected as well.

7. Disconnect the two blue wires on the rotation sensor wire assembly from the zero sense switch terminals.

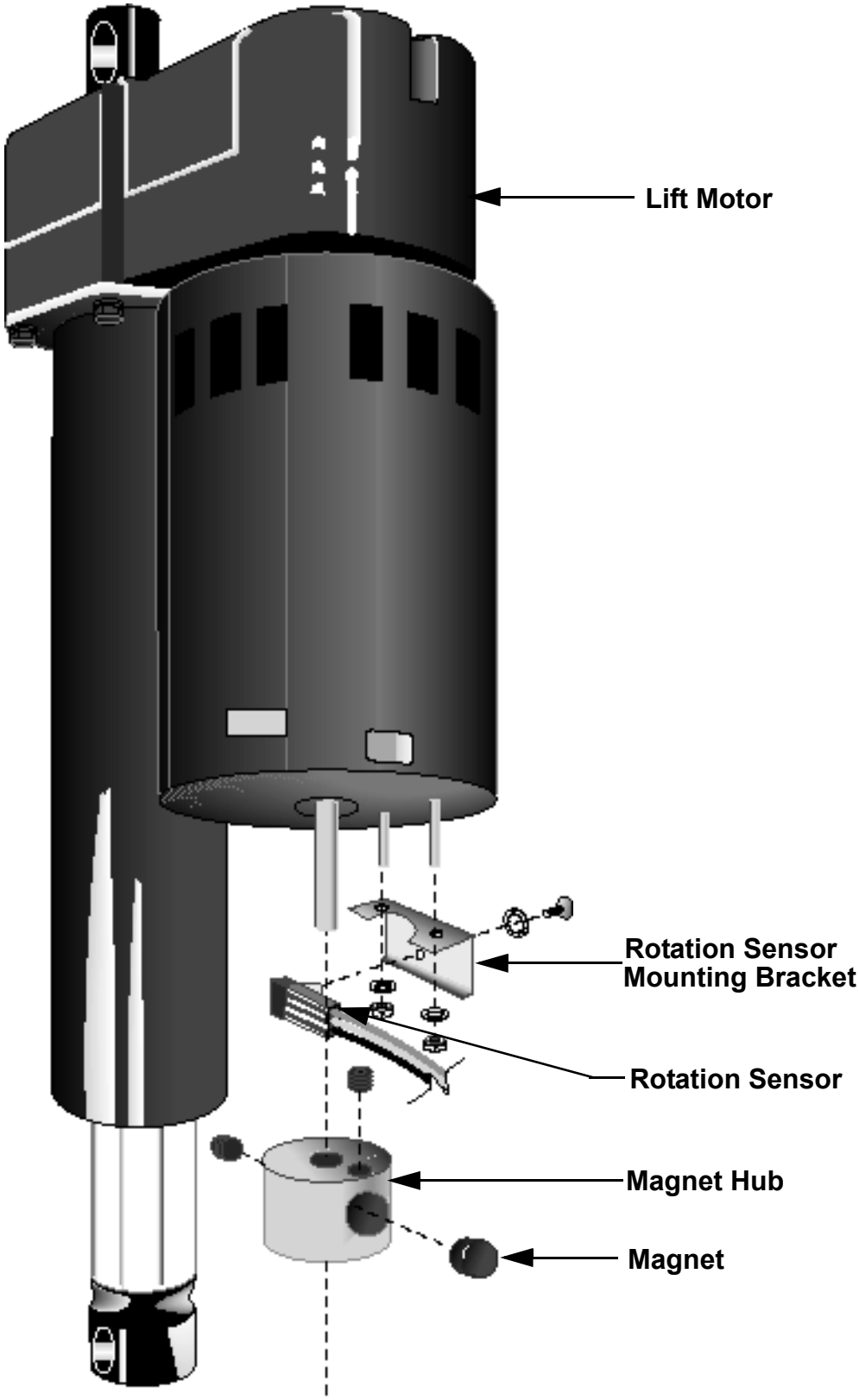
8. Place the treadmill on its left side.

9. Remove the two shoulder screws and nuts that secure the lift motor to the treadmill frame and lift platform (see Diagram 6.1). Remove the lift motor and set it aside.

10. If the treadmill does not have a rotation sensor (C962i or C964i), go to step 25.

11. Remove the set screw that secures the magnet hub to the lift motor. Set aside the magnet hub.

Diagram 6.1 - Exploded view of the Lift Motor (with Rotation Sensor)



Replacing the Magnet

12. Remove the set screw that secures the magnet to the magnet hub. Discard the magnet.

Note:
When you position the magnet in the magnet hub, place the north pole towards the center of the magnet hub. The north pole of the magnet should be marked with a spot of white paint. If the magnet on the treadmill you are servicing is not marked, use either a compass or another magnet to determine the north pole.

13. Position a new magnet in the magnet hub.

14. Tighten the set screw that secures the magnet to the magnet hub.

15. If you are replacing the revolution sensor**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 19.

16. Remove the screw and washer that secure the rotation sensor to the sensor bracket (see Diagram 6.1).

17. Position the revolution sensor at its mounting location.

18. Position the screw and washer that secure the rotation sensor to the sensor bracket. Torque the screw to 8 in-lbs.

19. If you are replacing the lift motor you removed earlier in this procedure**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 25.

Removing and Replacing the Rotation Sensor Bracket

20. Remove the two nuts that secure the sensor bracket to the lift motor.

21. Position the sensor bracket removed in the previous step on the lift motor.

22. Replace the two nuts that secure the sensor bracket to the lift motor.

23. Position the magnet hub on the lift motor so that it is flush with the speed sensor bracket.

24. Replace the set screw that secures the magnet hub to the lift motor.

Replacing the Lift Motor

25. Extend the lift motor actuator 1/2”.

Note:
To extend the lift motor actuator faster, place a screwdriver shaft in the lower mounting hole of the lift motor and rotate the lift motor tube.

26. Position the lift motor at its mounting location.

Note:
When you perform Step 27, replace the lower screw and nut first.

27. Replace the two shoulder screws and nuts that secure the lift motor to the treadmill frame.

Note:
The original nuts used to mount the lift motor are Kep nuts, which do not require a separate washer. If you do not use Kep nuts to mount the lift motor, use washers when you mount the lift motor to the treadmill frame.

28. Return the treadmill to an upright position.

29. Connect the black lift motor lead to the terminal of the lift motor capacitor that already has a black wire.

30. Connect the red lift motor lead to the terminal of the lift motor capacitor that already has a red wire.

31. Connect the connector on the white lift motor lead that connects the lift motor to pin 4 of lower PCA connector J3.

32. Connect the molex connector on the revolution sensor wire assembly to connector J2 on the lower PCA.

33. If the treadmill does not have a rotation sensor (C962i or C964i), go to step 36.

34. Connect the two blue wires on the revolution sensor wire assembly to the terminals on the zero sense switch terminals.

35. Calibrate the treadmill lift assembly as described in Procedure 4.1 of this appendix.

36. Check the operation of the treadmill as described in Section Three of this appendix, then replace the hood as described in Procedure 5.1 of the Commercial Treadmill Service Manual.

Procedure 6.2 - Replacing the Limit Switches, Actuator Shaft or Switch Bracket

Note:
The limit switches and the actuator shaft are mounted on the switch bracket (see Diagram 5.1).

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Procedure

1. Remove the hood.

2. If you are removing the actuator shaft or switch**...**

THEN...	**OTHERWISE...**
Skip to Step 12 (to remove the upper limit bracket switch), Step 6 (to remove the down limit switch) or Step 9 (to remove the zero sense switch.	Continue with the next step.

Removing the Upper Limit Switch

WARNING
When power is applied to the treadmill, the wires connected to the upper and lower limit switches carry high voltage. Turn off the treadmill and unplug the power cord from the wall outlet before you perform the following steps.

3. Carefully remove the red wires from the upper limit switch.

Note:
See Diagram 6.2 for limit switch wiring.

4. Remove the screws and washers that secure the limit switch to the switch bracket.

5. If you are removing more than one limit switch**...**

THEN...	**OTHERWISE...**
Continue with the next step to remove the down limit switch or Step 9 to remove the zero sense switch	Skip to Step 11.

Removing the Down Limit Switch

6. Carefully remove the black wires from the down limit switch.

7. Remove the screws and washers that secure the limit switch to the switch bracket (see Diagram 5.1).

8. If you are removing the zero sense switch**...**

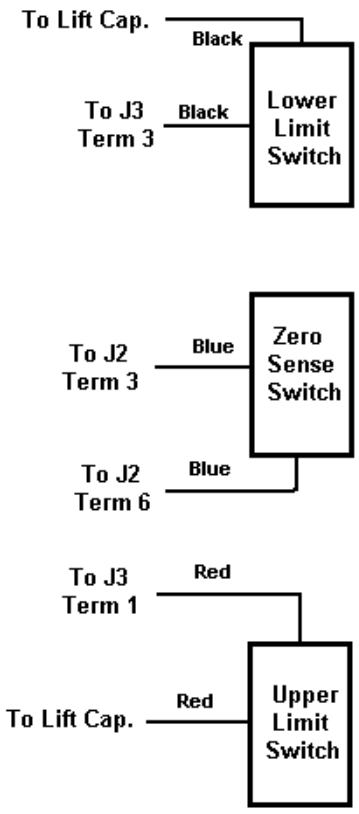
THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 11.

Removing the Zero Sense Switch

9. Carefully remove the blue wires from the zero sense switch.

10. Remove the two screws and washers that secure the limit switch to the switch bracket (see Diagram 5.1).

Diagram 6.2 - Limit Switch Wiring Diagram



11. If you are removing the actuator shaft or switch bracket**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 26.

Removing the Actuator Shaft and Switch Actuator

12. Remove the screw that secures the switch actuator to the actuator shaft. Set aside the screw and switch actuator.

13. Remove the shoulder screw that connects the actuator shaft and actuator block to the lift platform.

Note:
If necessary, hold the actuator shaft with the pliers and support the actuator block firmly with your hand when you perform Step 14.

14. Unscrew the actuator shaft from the actuator block. Set aside the actuator block.

15. Slide the actuator shaft from the switch bracket.

16. If you are removing the switch bracket**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 20.

Removing and Replacing the Switch Bracket

17. Remove the socket head screws and washers that secure the switch bracket to the lift motor platform. Set aside the switch bracket.

18. Position the switch bracket at its mounting location.

19. Replace the socket head screws and washers that secure the switch bracket to the lift motor platform.

Replacing the Actuator Shaft and Switch Actuator

20. Slide the actuator shaft through the switch bracket until it is positioned at its mounting location.

21. Thread the actuator block onto the lower end of the actuator shaft.

Note:
If necessary, use the pliers to secure the actuator block to the actuator shaft.

22. Position the shoulder screw removed in Step 13 through the actuator block and into the base of the lift platform.

23. Tighten the shoulder screw that connects the actuator shaft and actuator block to the lift platform.

24. Position the switch actuator on the top of the actuator shaft.

25. Replace the screw that secures the switch actuator to the actuator shaft.

26. If you must replace one or more of the limit switches**...**

THEN...	**OTHERWISE...**
Continue with the next step to replace the upper limit switch, skip to step 31 to replace the down limit switch or skip to Step 35 to replace the zero sense switch.	Skip to Step 38.

Replacing the Upper Lift Limit Switch

27. Position the limit switch at its mounting location.

28. Replace the screws and washers that secure the limit switch to the switch bracket.

29. Connect the red wires disconnected in Step 3 to the limit switch terminals.

30. If you are replacing more than one limit switch**...**

THEN...	**OTHERWISE...**
Continue with the next step (to to replace the down limit switch) or skip to Step 35 (to replace the zero sense switch.	Skip to Step 38.

Replacing the Down Lift Limit Switch

31. Position the limit switch at its mounting location.

32. Replace the screws and washers that secure the limit switch to the switch bracket.

33. Connect the black wires disconnected in Step 6 to the limit switch terminals.

34. If you are replacing the zero sense switch**...**

THEN...	OTHERWISE...
Continue with the next step.	Skip to Step 38.

Replacing the Zero Sense Switch

35. Position the limit switch at its mounting location.
36. Replace the screws and washers that secure the limit switch to the switch bracket.
37. Connect the blue wires disconnected in Step 9 to the switch terminals.
38. Calibrate the lift assembly as described in Procedure 4.1 of this appendix.
39. Check the operation of the treadmill as described in Section Three of this appendix.

Procedure 6.3 - Replacing the Lift Motor Capacitor

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Removing the Lift Motor Capacitor

1. Remove the hood

2. Remove the black and red wires from the lift motor capacitor terminals.

3. Loosen the screw and nut on the capacitor mounting bracket.

Note:
If you are servicing a 240-volt 960 series treadmill, use a phillips screwdriver to loosen and tighten the screw on the capacitor mounting bracket.

4. Remove the capacitor from the mounting bracket.

Replacing the Lift Motor Capacitor

5. Position the lift motor capacitor in the capacitor mounting bracket.

Note:
Wire length and wire assembly configuration may limit the mounting orientations of the lift motor capacitor. Make sure that the wires you removed from the capacitor will reach the capacitor terminals before you perform the next step.

6. Tighten the screw and nut on the capacitor mounting bracket.

7. Connect the wires removed in Step 2 to the capacitor terminals.

Note:
Because the lift motor capacitor is not polarized, you can connect wires to either terminal. However, you cannot mix wire colors on any one terminal.

8. Check the operation of the treadmill as described in Section Three of this appendix.

Procedure 6.4 - Replacing the Lift Platform

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Removing the Lift Platform

1. Turn off the treadmill with the circuit breaker, then unplug the power cord from the wall outlet.

2. Place the treadmill on its right side.

Note:
To avoid scratching or marring the treadmill, put a drop cloth underneath the treadmill when you perform Step 2.

3. Remove the lower bolt and nut that secures the lift motor to the lift platform. It is not necessary to remove the lift motor when you remove the lift platform.

4. Skip this step on C962i and C964i treadmills. Remove the bolt that connects the actuator block to the lift platform. (See Diagram 6.3B)

5. Perform this step on C962i and C964i treadmills, only. Remove the nut that retains the lift potentiometer and remove the lift potentiometer. Remove the coupler that connects the lift potentiometer to lift platform shaft. Note the orientation of the flat side of the lift platform shaft. When it is replaced, later in this procedure, it must be remounted in the same orientation. If the lift shaft is incorrectly oriented the lift system calibration will be incorrect. Remove the retaining ring from the lift shaft. Use a thin drift punch or similar tool to carefully drive the pin out of the lift shaft on the left hand (lift potentiometer) side of the lift platform. Remove the lift shaft. (See Diagram 6.3A)

6. Remove the bolt(s) and nut(s) that secure the lift platform to the treadmill frame. Remove the lift platform.

Diagram 6.3A - Lift Shaft Orientation

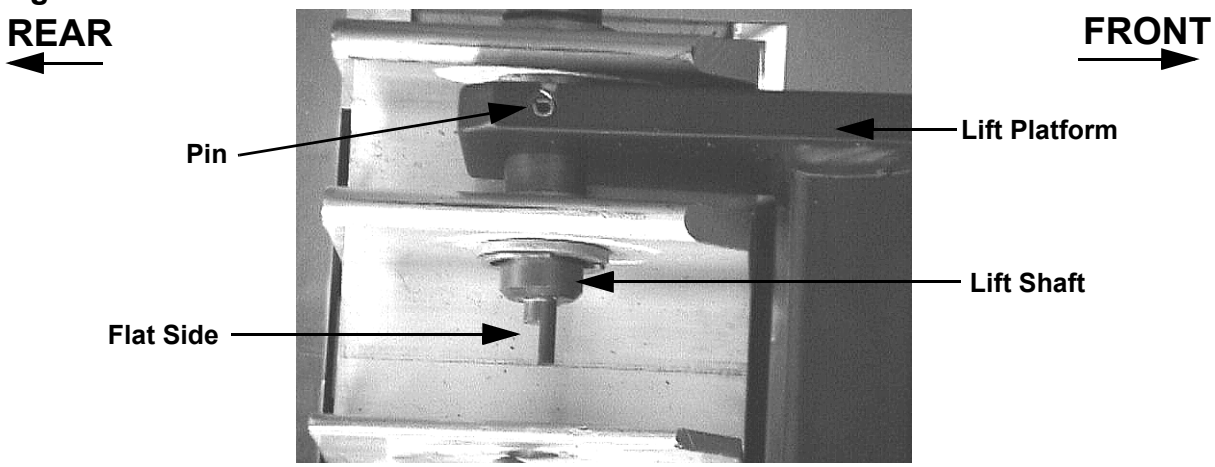
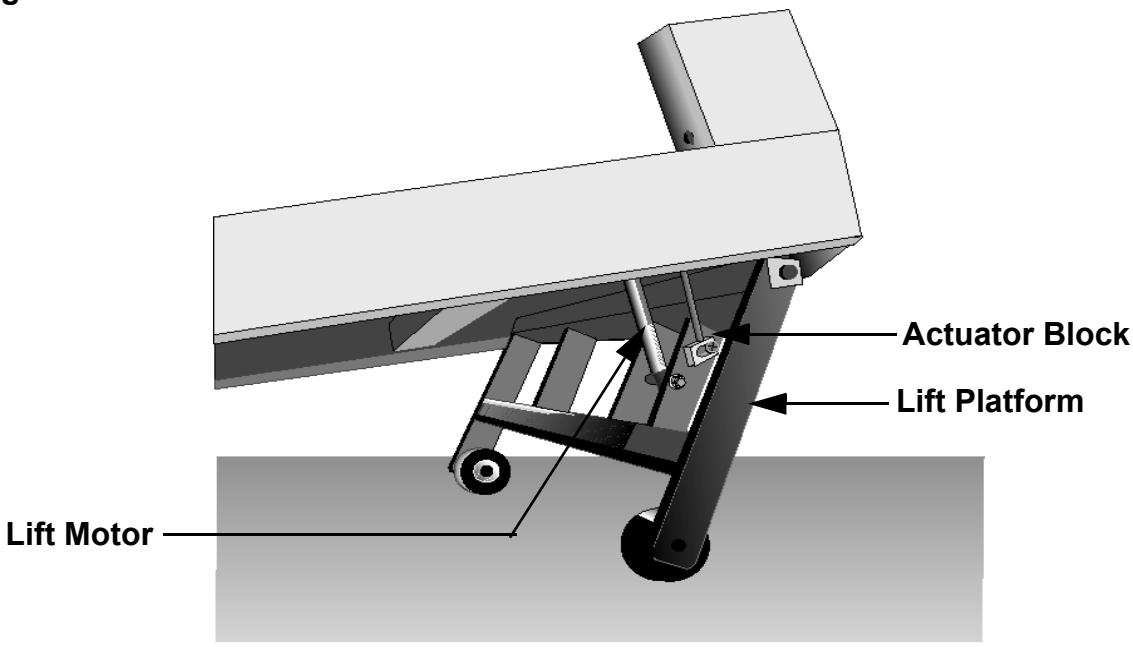


Diagram 6.3B - Lift Platform



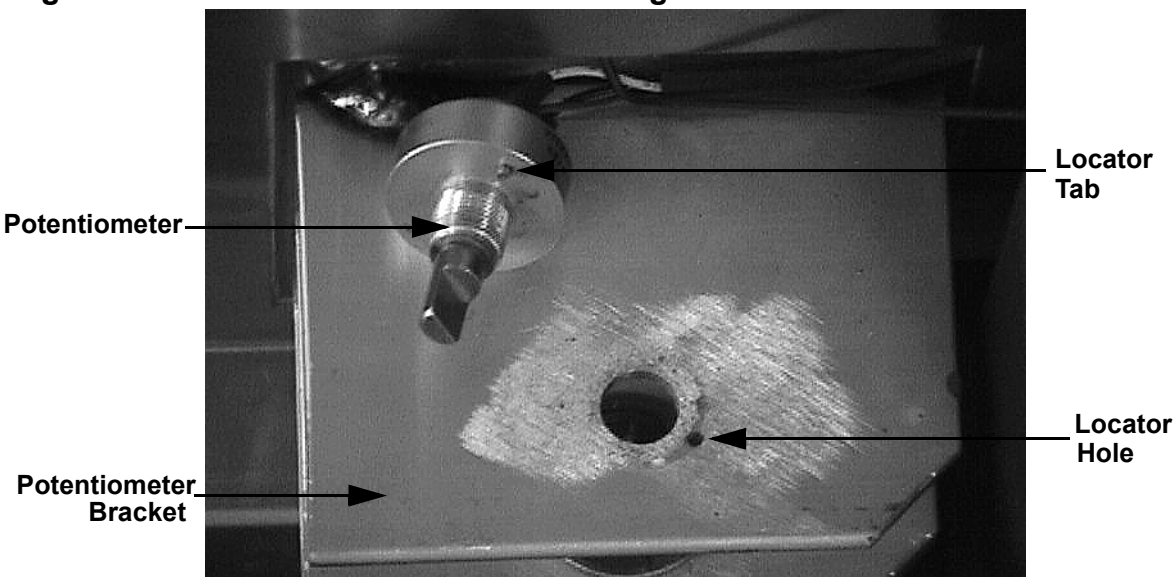
Replacing the Lift Platform

7. With the treadmill still on its right side, position the lift platform at its mounting position.

8. Replace the bolt(s) and nut(s) that secure the lift platform to the treadmill frame.

9. Perform this step on C962i and C964i treadmills, only. Replace the lift shaft. Replace the retaining ring. Orient the lift shaft into the position it was in when removed in step 5. With the lift platform rotated to the front of the treadmill, the flat side of the lift shaft will face to the rear of the treadmill when correctly oriented. See Diagram 6.3A. Align the hole in the lift platform with the hole in the lift shaft and replace the pin. Carefully tap the pin into place with a mallet or hammer. Slide the coupler onto the the lift shaft and replace the lift potentiometer. Align the flat side of the lift potentiometer shaft with the flat side of the lift shaft and and position the lift potentiometer so that the locator tab on the lift potentiometer fits into the locator hole in the lift potentiometer bracket. See Diagram 6.3C. Carefully tighten the lift potentiometer nut. Do not overtighten the lift potentiometer nut. If the coupler has set screws, align the coupler over the junction of the lift potentiometer shaft and the lift shaft and tighten the coupler set screws.

Diagram 6.3C - Lift Potentiometer Mounting



10. Skip this step on C962i and C964i treadmills. Replace the bolt that connects the actuator block to the lift platform.

11. Replace the lower bolt and nut that secures the lift motor to the lift platform.

12. Check the operation of the treadmill as described in Section Three of this appendix.

Procedure 6.5 - Replacing the Drive Belt

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Removing the Drive Belt

1. Remove the hood.

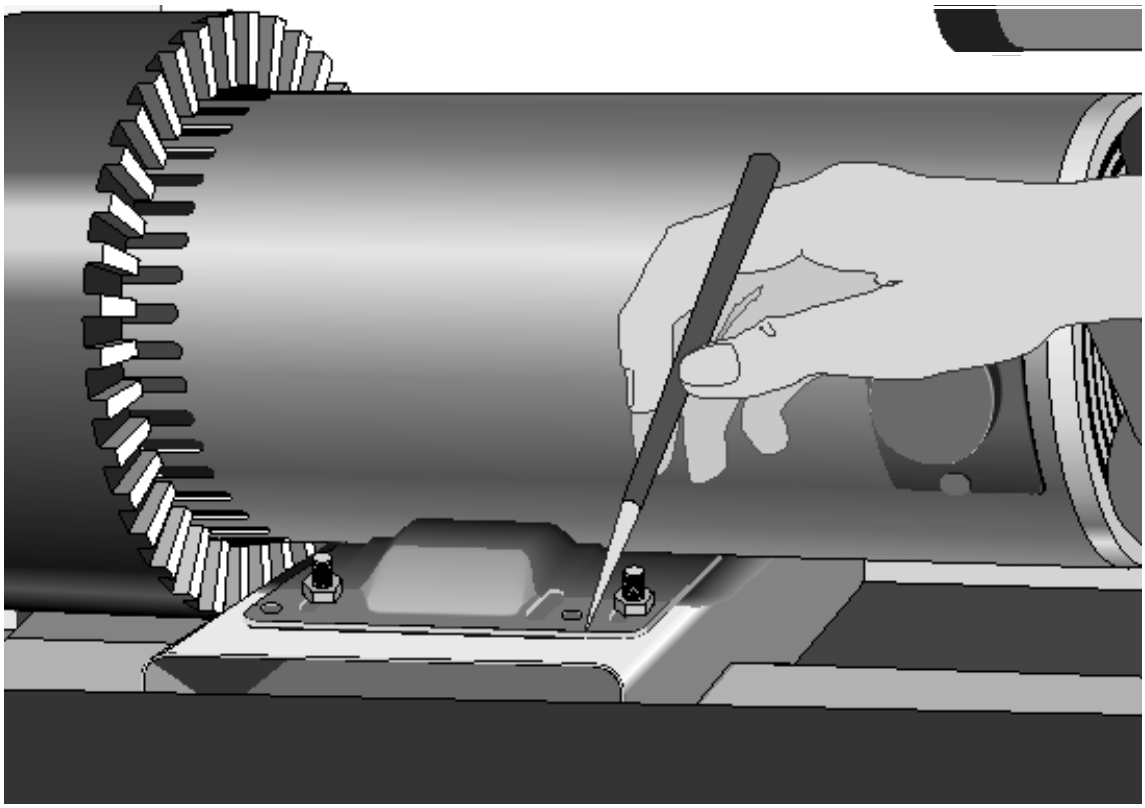
2. Score a line on the drive motor mounting plate that runs the length of the motor pedestal (see Diagram 6.4).

Note:
The line scored on the mounting plate allows you to correctly position the drive motor.

3. If the treadmill is an SCR treadmill, remove the inductor.

4. Loosen the four lock nuts that secure the drive motor pedestal to the drive motor mounting plate.

Diagram 6.4 - Scoring the Drive Motor Pedestal



5. Carefully push the drive motor toward the drive roller.

6. Loosen the bolts threaded through both ends of the drive roller shaft.

7. Remove the socket head screws that secure the top drive roller mounts (see Diagram 6.5).

8. Remove the top roller mounts, then remove the drive belt from the drive roller pulley.

9. Lift the drive roller from the lower roller mounts and slide it from the running belt.

10. Slip the drive belt off the drive motor pulley.

Replacing the Drive Belt

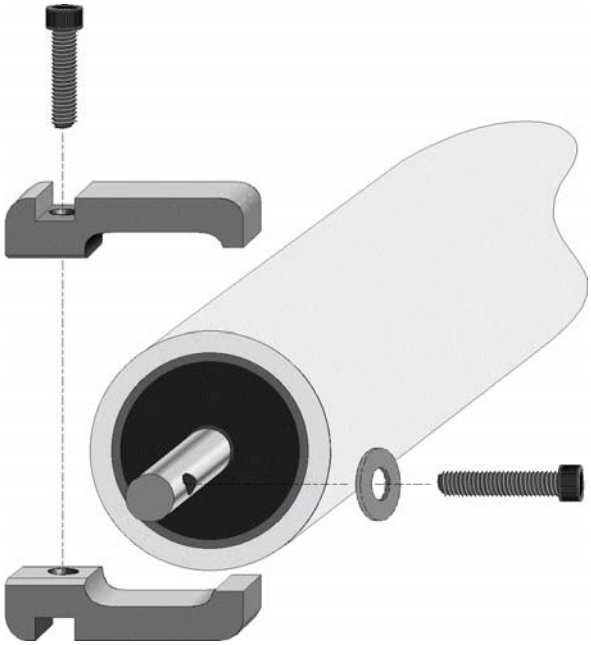
11. Push the drive roller through the running belt. Place the drive belt on the drive roller pulley and place the drive roller on the lower drive roller mounts.

12. Place the top roller mounts on the lower roller mounts.

Note:
When you place the top roller mounts over the ends of the roller shaft, the bolt heads and washers must be outside of the clamp formed by the upper and lower roller mounts.

13. Thread the socket head screws through the top roller mounts and into the lower roller mounts.

Diagram 6.5 - Roller Mount Assembly



14. Tighten the socket head screws.

15. Push and hold the left side of the drive roller toward the drive motor.

Note:
Right, left, front, and *back* are from the perspective of a user standing on the treadmill and facing the electronic console.

CAUTION
Do not crush the washer on the bolt when you perform the next step.

16. Turn the bolt in the left end of the drive roller shaft all the way clockwise and tighten securely.

17. Adjust the right hand bolt until the drive roller is square to the frame.

18. Position the new drive belt on the drive motor pulley.

19. Position the drive motor pedestal parallel to the line scored on the drive motor mounting plate.

20. Tighten the bolts that mount the pedestal to the drive motor mounting plate.

21. Replace the inductor.

22. Inspect and adjust the tension of the drive belt as described in the Commercial Treadmill Service Manual.

Note:
The drive belt will track along either the right or left edge of the pulley grooves. It will not center itself between the pulley flanges.

23. Check the operation of the treadmill, then replace the hood.

Procedure 6.6 - Replacing the Drive Roller or Drive Roller Bearings

WARNING
Always turn off the circuit breaker and unplug the treadmill before you remove the treadmill hood.

Note:
If the drive roller bearings require replacement, you may replace either the bearings or the entire drive roller. Replacing the bearings uses parts that are less expensive but requires more time to perform the replacement.

Removing the Drive Roller

1. Remove the hood.

2. Remove the running belt tension by turning the drive roller adjustment bolts counterclockwise.

3. Remove the drive motor as described in Procedure 6.5.

4. Remove the socket head screws that secure the top drive roller mounts.

5. Remove the top roller mounts, then remove the drive belt from the drive pulley.

6. Lift the drive roller from the lower roller mounts and slide it out of the running belt.

7. Slip the drive belt off the drive motor pulley, then set aside the drive belt until you are ready to install the drive roller.

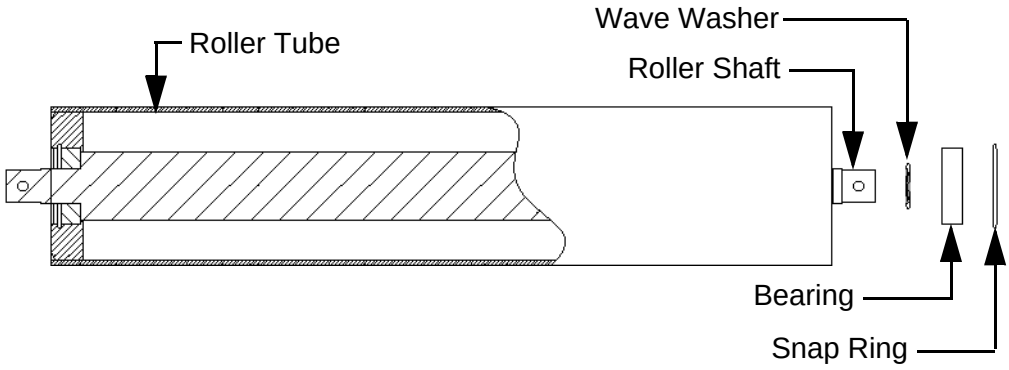
8. If you are replacing the bearings or the bearings and shaft in drive roller**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Remove the bolts threaded through the drive roller shaft; then skip to Step 21.

Removing the Roller Bearings and Shaft

Always remove and replace the bearings and washers as a set. It is not necessary to replace the shaft if you are replacing the bearings. However, if you are replacing the shaft, you must also replace the bearings and washers.

Diagram 6.6 - Exploded View of a Roller



9. Remove the snap ring from both ends of the roller (see Diagram 6.6).

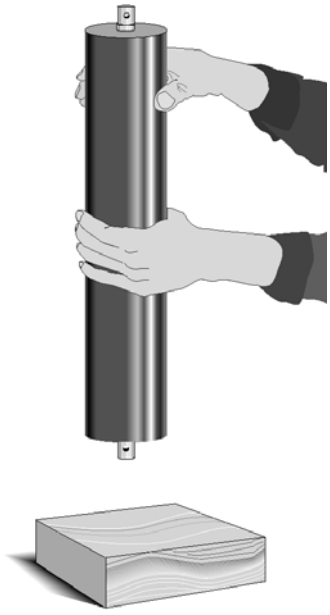
10. Hold the roller in a vertical position 3–4 inches above a block of wood. The block of wood must be on a hard solid surface such as a floor. (see Diagram 6.7

11. Hold the roller with the end of the roller upward, and drop the roller onto the block of wood. The roller may need to be dropped several times to drive the bearing out of the roller.

12. Remove the bearing from the opposite end of the roller in the same manner. Care must be taken to keep the roller shaft in the bearing because the shaft is no longer being retained on the lower end of the roller as it is dropped onto the block of wood.

13. Remove the shaft from the roller.

Diagram 6.7 - Removing a Bearing



Replacing the Roller Bearings and Shaft

You will need an assistant to perform the following steps.

14. Have an assistant support the roller against a work surface. One end of the roller must be flush with the work surface.

15. Place a bearing on the roller, then position the bearing replacement tube against the outer race of the bearing

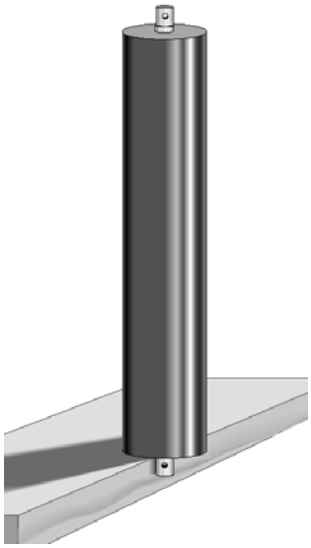
Note:
A ten inch length of 2 inch O.D. pipe with a cap threaded onto one end, will serve as a bearing replacement tool. The open end will be placed against the bearing and the end with the capped end will be struck with the hammer.
.
CAUTION
The bearing must go squarely into the roller tube. If the bearing is not square in the roller tube, you will be unable to insert the bearing.

16. Set the roller tube on a solid work surface. Place a new bearing in the bearing pocket on one end of the roller tube. Using the bearing replacement tool and a hammer or mallet, gently tap the bearing into the tube. The bearing will be below flush and the snap ring groove will be exposed when the bearing is properly set into the roller tube.

17. Using the snap ring pliers, install the snap ring.

18. Place a wave washer onto roller shaft. Slide the roller tube down over the shaft until the end of the shaft protrudes through the bearing. Invert the roller tube while holding the shaft in place. Set the roller tube on a block of wood as shown in Diagram 6.8.

Diagram 6.8 - Replacing the Roller Bearing



19. While an assistant supports the roller tube, place a wave washer on to the shaft. Slide the new bearing onto the upper end of the shaft. Using the bearing replacement tool and a hammer or mallet, gently tap the bearing into the tube. The bearing will be below flush and the snap ring groove will be exposed when the bearing is properly set in the roller tube.

20. Using the snap ring pliers, install a retaining ring next to the bearing just mounted in the roller.

Replacing the Drive Roller

21. Thread the drive roller adjustment bolts into the drive roller shaft.

22. Visually inspect the drive belt for wear, cracks, or other damage. Replace the drive belt if required.

23. Slide the drive roller through the running belt. Place the drive belt on the drive roller pulley and place the drive roller on the lower drive roller mounts.

24. Place the top roller mounts on the lower roller mounts.

Note:
When you place the top roller mounts over the ends of the roller shaft, the bolt heads and washers must be outside of the clamp formed by the upper and lower roller mounts.

25. Thread the socket head screws through the top roller mounts and into the lower roller mounts and tighten.

26. Push and hold the left side of the drive roller toward the drive motor.

Note:
Right, left, front, and *back* are from the perspective of a user standing on the treadmill and facing the electronic console.

27. Securely tighten the left hand drive roller adjustment bolt. It is important that the bolt pulls drive roller shaft all the way forward in the roller mount.

28. While applying rearward pressure to the drive roller, adjust the right hand drive roller adjustment bolt until the drive roller is square relative to the treadmill frame.

29. Position the drive belt on the drive motor pulley.

30. Position the drive motor parallel to the line scored on the motor mounting pedestal.

31. Tighten the four bolts that mount the pedestal to the drive motor mounting plate.

32. Inspect and adjust the tension of the drive belt as described in Procedure 3.2 of the Commercial Treadmill Service Manual.

33. Inspect and adjust the tension, tracking, and alignment of the running belt as described in Procedure 3.1 of the Commercial Treadmill Service Manual.

34. Check the operation of the treadmill as described in Section Three of this appendix, then replace the hood.

Procedure 6.7 - Replacing the Take-Up Roller or Take-Up Roller Bearings

Removing the Take-Up Roller

1. Remove the screws that secure the right and left end caps to the treadmill frame. Set the end caps and end cap mounting hardware aside.

2. Place a running belt gauge on each side of the running belt and set the gauges a mid range.

3. Remove the running belt tension by turning the take up roller tension adjustment bolts counterclockwise.

4. Turn the running belt tracking bolt counterclockwise 2–3 turns.

5. Remove the socket head bolts that secure the top take-up roller mounts.

6. Remove the top roller mounts, then lift the take-up roller from the lower roller mounts.

7. If you are replacing the bearings or the bearings and shaft in the take-up roller**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Remove the tension limiting bolt and running belt tracking bolt from the take-up roller shaft. Skip to Step 19.
you perform the following steps.	

Removing the Roller Bearings and Shaft

Always remove and replace the bearings and washers as a set. It is not necessary to replace the shaft if you are replacing the bearings. However, if you are replacing the shaft, you must also replace the bearings and washers.

8. Remove the snap ring from one end of the roller (see Diagram 6.6).

9. Hold the roller in a vertical position 3–4 inches above a block of wood. The block of wood must be on a hard solid surface such as a floor. (see Diagram 6.7).

10. Hold the roller with the end of the roller that has had the snap ring removed upward, and drop the roller onto the block of wood. The roller may need to be dropped several times to drive the bearing out of the roller.

11. Remove the bearing from the opposite end of the roller in right same manner. Care must be taken to keep the roller shaft in the bearing because the shaft is no longer being retained on the lower end of the roller as it is dropped onto the block of wood.

12. Remove the shaft from the roller.

Replacing the Roller Bearings and Shaft

You will need an assistant to perform the following steps.

13. Have an assistant support the roller against a work surface. One end of the roller must be flush with the work surface.

14. Place a bearing on the roller, then position the bearing replacement tube against the outer race of the bearing

Note:
A ten inch length of 2 inch O.D. pipe with a cap threaded onto one end, will serve as a bearing replacement tool. The open end will be placed against the bearing and the end with the capped end will struck with the hammer.
.CAUTION
The bearing must go squarely into the roller tube. If the bearing is not square in the roller tube, you will be unable to insert the bearing.

15. Set the roller tube on a solid work surface. Place a new bearing in the bearing pocket on one end of the roller tube. Using the bearing replacement tool and a hammer or mallet, gently tap the bearing into the tube. The bearing will be below flush and the snap ring groove will be exposed when the bearing is properly set into the roller tube.

16. Using the snap ring pliers, install the snap ring.

17. Place a wave washer onto roller shaft. Slide the roller tube down over the shaft until the end of the shaft protrudes through the bearing. Invert the roller tube while holding the shaft in place. Set the roller tube on a block of wood as shown in Diagram 6.8.

18. While an assistant supports the roller tube, place a wave washer on to the shaft. Slide the new bearing onto the upper end of the shaft. Using the bearing replacement tool and a hammer or mallet, gently tap the bearing into the tube. The bearing will be below flush and the snap ring groove will be exposed when the bearing is properly set in the roller tube.

19. Using the snap ring pliers, install a retaining ring next to the bearing just mounted in the roller.

Replacing the Take-Up Roller

20. Slide the take-up roller through the running belt, then place the take-up roller on the lower roller mounts.

21. If the treadmill uses a tension limiting bolt assembly, thread it into the right end of the take-up roller shaft.

22. Thread the running belt tracking bolt through the left end of the take-up roller shaft.

Note:
When you replace the bolts in the take-up roller, the tension limiting bolt must be on the right side of the treadmill when the take-up roller is installed on the treadmill. The belt tracking bolt must be on the left side of the treadmill.

23. Place the top roller mounts on the lower roller mounts.

Note:
When you place the top roller mounts over the ends of the roller shaft, the bolt heads and washers must be outside of the clamp formed by the upper and lower roller mounts.

24. Thread the socket head bolts through the top roller mount and into the lower roller mount.

25. Tighten the socket head bolts that secure the top and lower roller mounts.

26. Replace the screws that secure the right and left end caps to the treadmill frame.

27. Tension the running belt until both gauges are again at mid range.

28. Inspect and adjust the tension, tracking, and alignment of the running belt as described in Procedure 3.1 of the Commercial Treadmill Service Manual.

29. Check the operation of the treadmill as described in Section Three of this appendix.

Procedure 6.8 - Replacing the Safety Switch Assembly

The exploded view of the safety switch assembly is shown in Diagram 6.9.

Removing the Safety Switch Cam

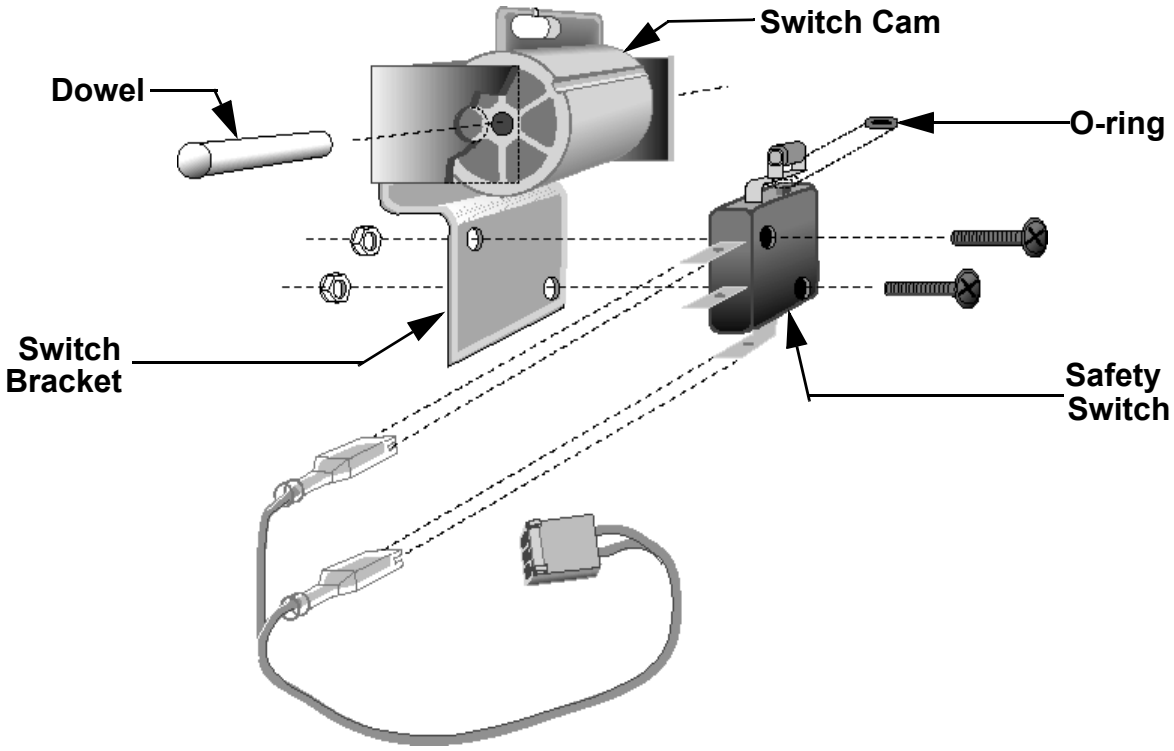
1. Remove the three screws that secure the upper display housing to the display housing mounting plate.

2. Place your right hand on the two right upper display housing mounting tabs. Place your left hand on the left tabs. Push the right tabs towards the right targa upright and the left tabs towards the left targa upright as you lift the display housing from the mounting plate. Support the display housing on the front handrails.

3. If you are removing the safety switch cam as well as the safety limit switch**...**

THEN...	**OTHERWISE...**
Continue with the next step.	Skip to Step 6.

Diagram 6.9 - Safety Switch Assembly



4. Disconnect the safety cord from the switch cam (see Diagram 6.10).

5. Remove the dowel that secures the switch cam to the switch mounting bracket (see Diagram 6.10). Set aside the safety switch cam.

Removing the Safety Limit Switch

6. Disconnect the safety switch wiring.

7. Remove the screws and nuts that secure the safety switch to the switch mounting bracket.

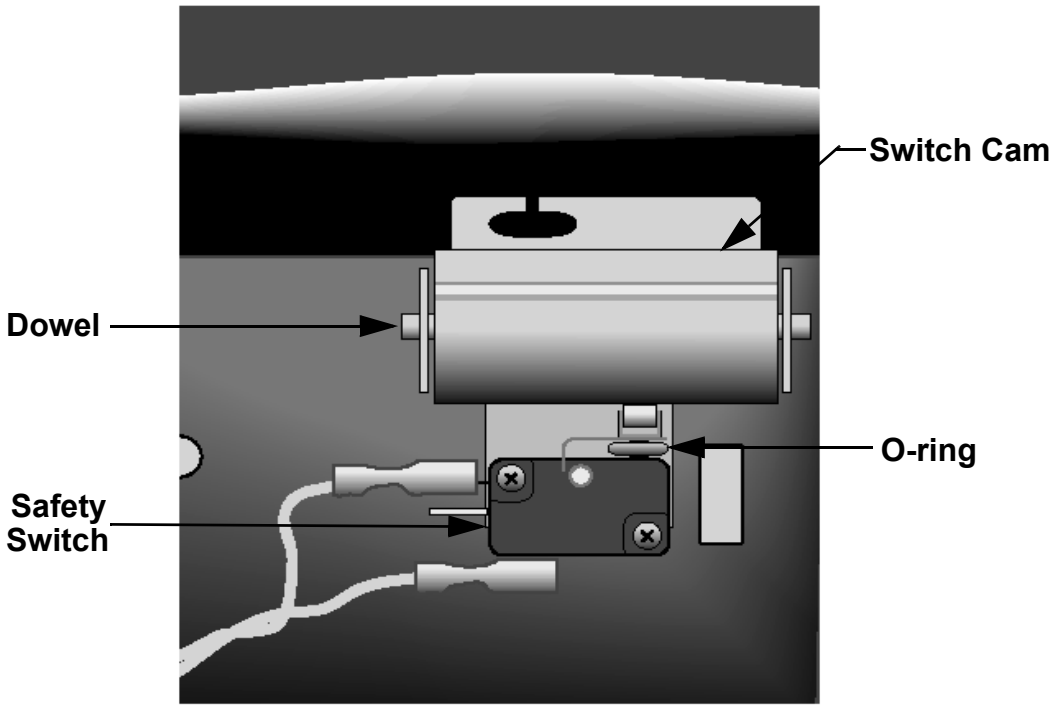
8. Remove the small rubber ring positioned between the safety switch actuator and the switch cam.

Replacing the Safety Switch

9. Position the small rubber ring removed in the previous step between the safety switch actuator and the switch cam.

10. Position the safety limit switch at its mounting location.

Diagram 6.10 - Safety Switch Cam and Safety Cord Bracket



11. Replace the screws and nuts that secure the safety limit switch to the switch mounting bracket.

12. Connect the safety switch wire assembly to the upper PCA.

Replacing the Safety Switch Cam

13. If the safety switch cam operates too freely, the switch may operate unintentionally. If desired a friction pad (Precor part # 38628-101) may be inserted between the safety switch cam and switch mounting bracket.

14. Position the safety switch cam at its mounting location.

15. Replace the dowel that secures the switch cam to the switch mounting bracket.

Note:
One end of the dowel will go into the switch cam easier than the other end.

16. Line up the tabs on the display housing with the holes on the display housing mounting plate.

17. Gently press the display housing onto the mounting plate until the tabs are pushed into the holes.

18. Connect the safety cord on the switch cam.

19. Replace the screws that secure the upper display housing to the display housing mounting plate.

20. Check the operation of the treadmill as described in Section Three of this appendix.

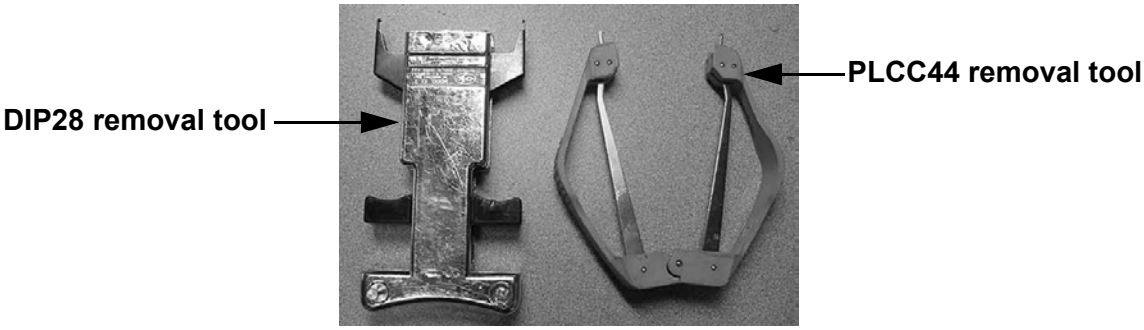
Procedure 6.9 - Replacing the PROM

Anti-static kits (part number 20024-101) can be ordered from Precor.

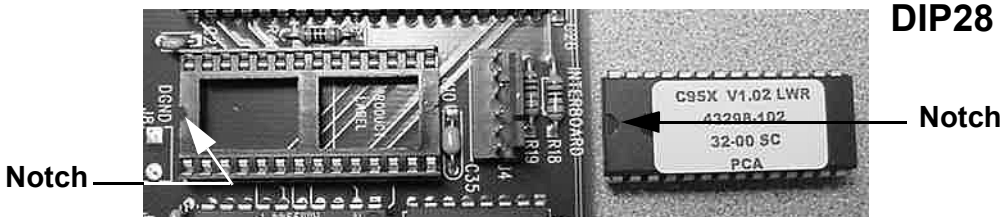
1. The PROM and the associated printed circuit assembly (PCA) are static sensitive. Anti-static devices must be used and all anti-static precautions must be followed during this procedure.

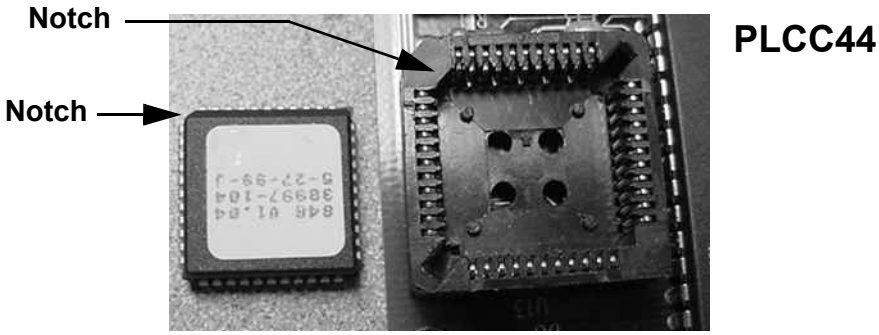
2. Remove the printed circuit assembly per its associated procedure.

3. Currently we are using two styles of IC software packages. they are a 28 pin dual in line package (DIP28) and a forty-four pin square package (PLCC44). Each of these packages should be removed with a proper IC removal tool (see the illustrations below)

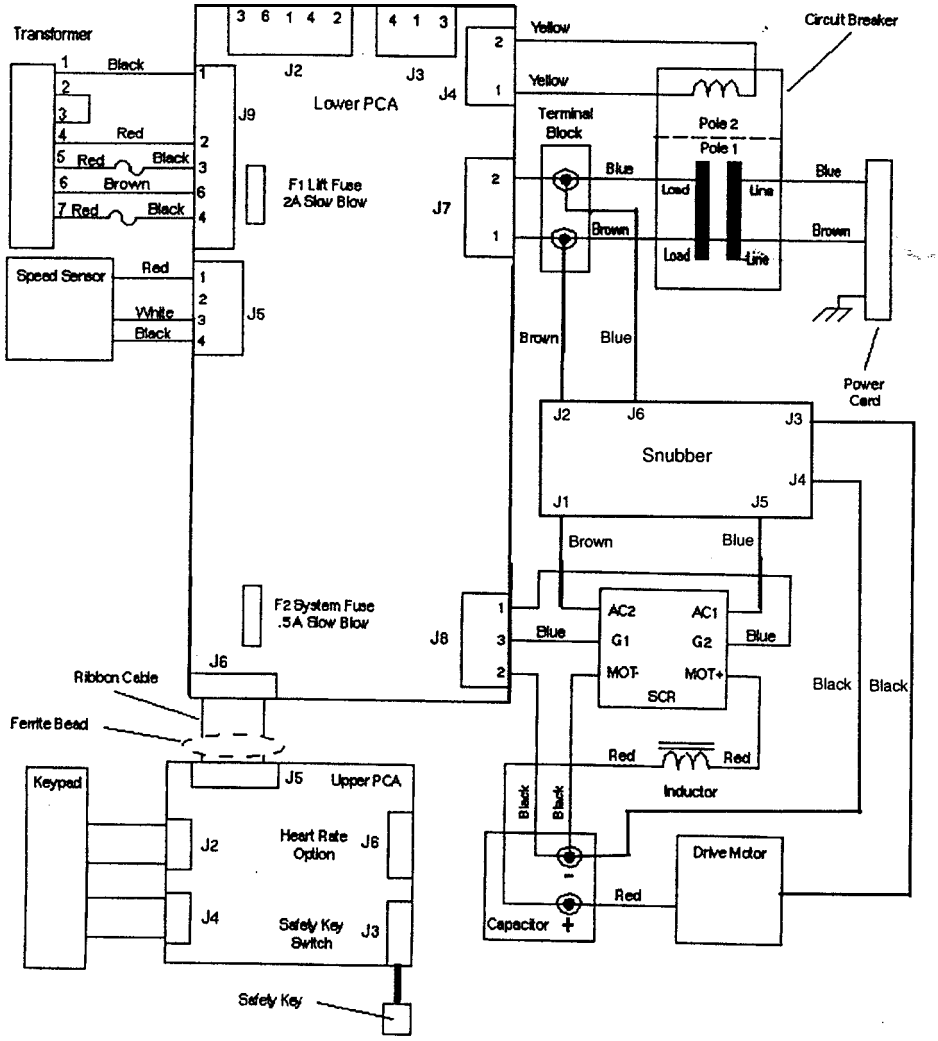


4. The ICs may inserted into their socket by hand by carefully aligning the notch on the IC with the notch on the IC socket and carefully pressing the IC into its socket. See the illustrations below for the alignment notches. Care must be taken that the IC legs on a DIP28 are all aligned in the socket to prevent the legs from bending when inserted. The PLCC44 IC must be carefully aligned squarely in its socket or it will not insert. Do not force the IC into its, socket. If it does not insert easily, remove the it and re-align it in its socket.

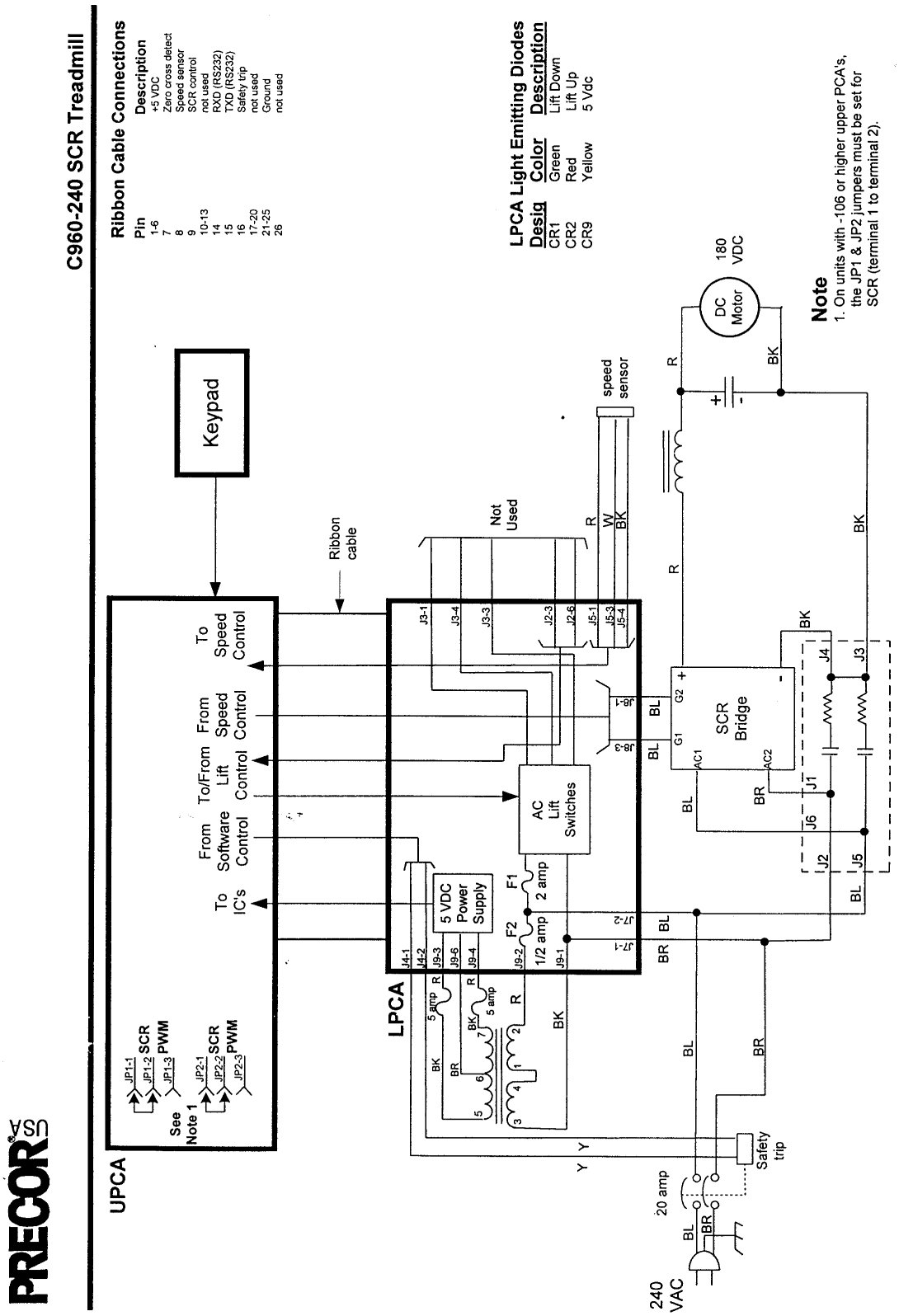




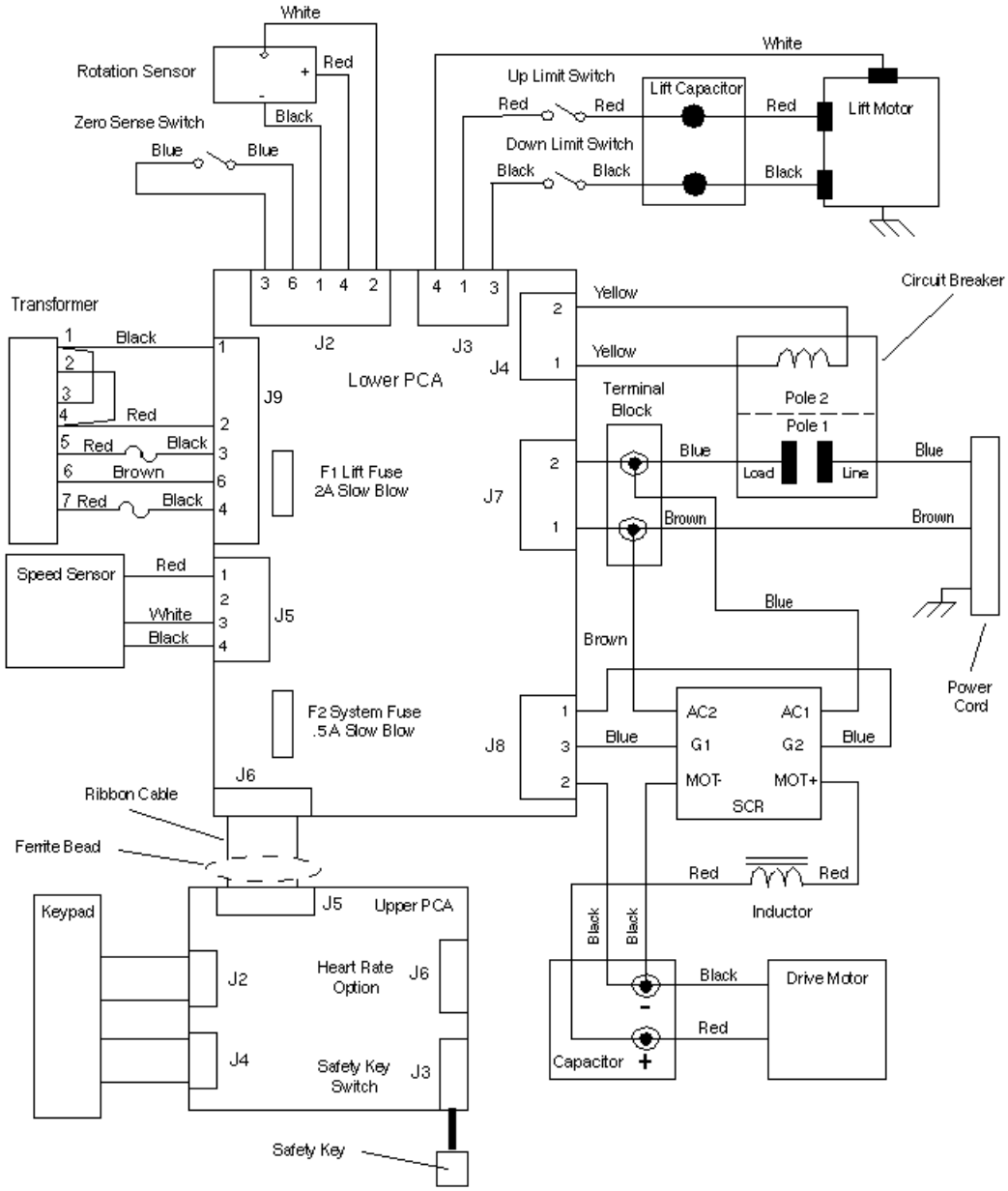
Wiring Diagram 7.1 - C960 SCR 240 Vac



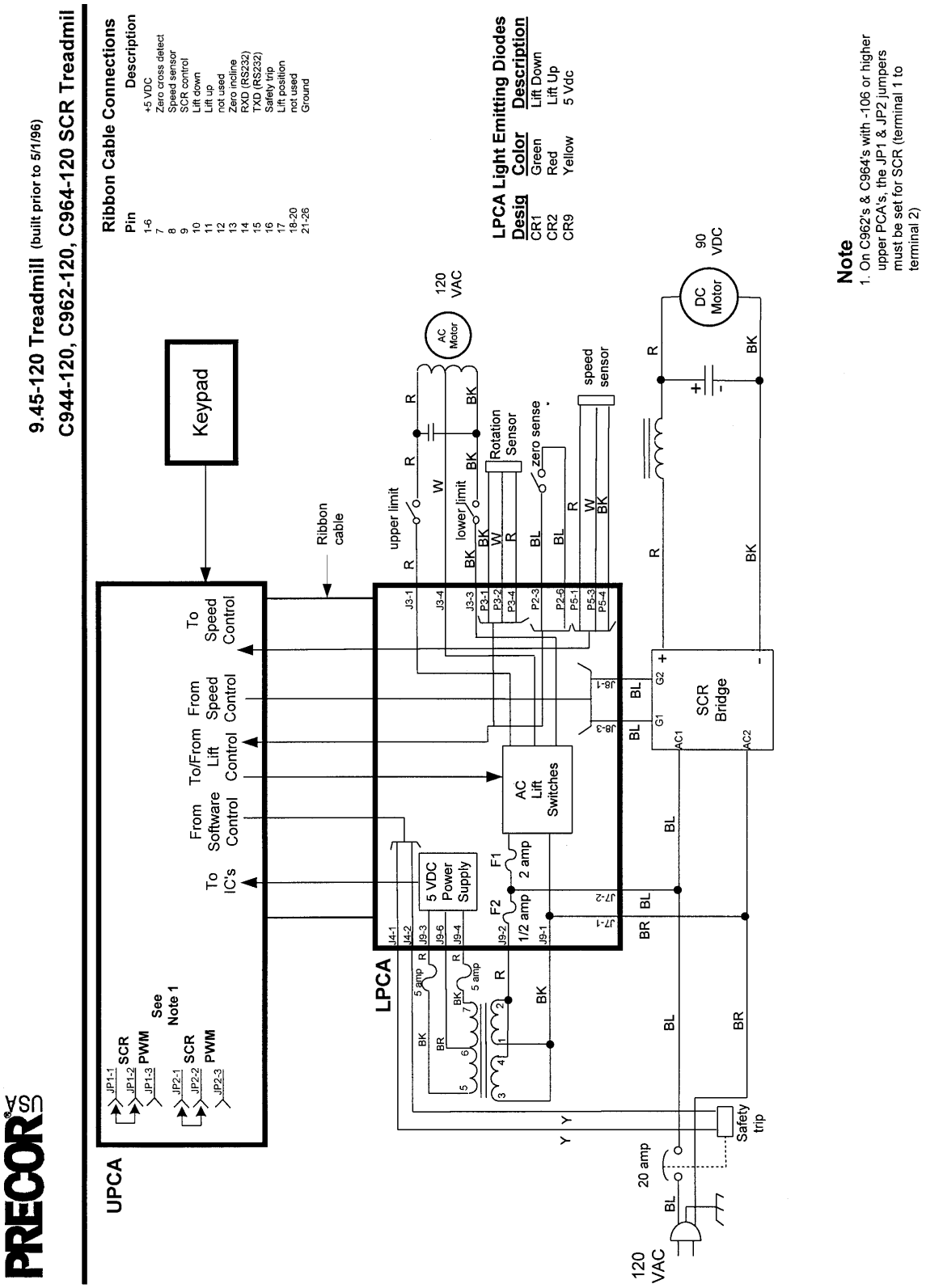
Block Diagram 7.2 - C960 SCR 240 Vac



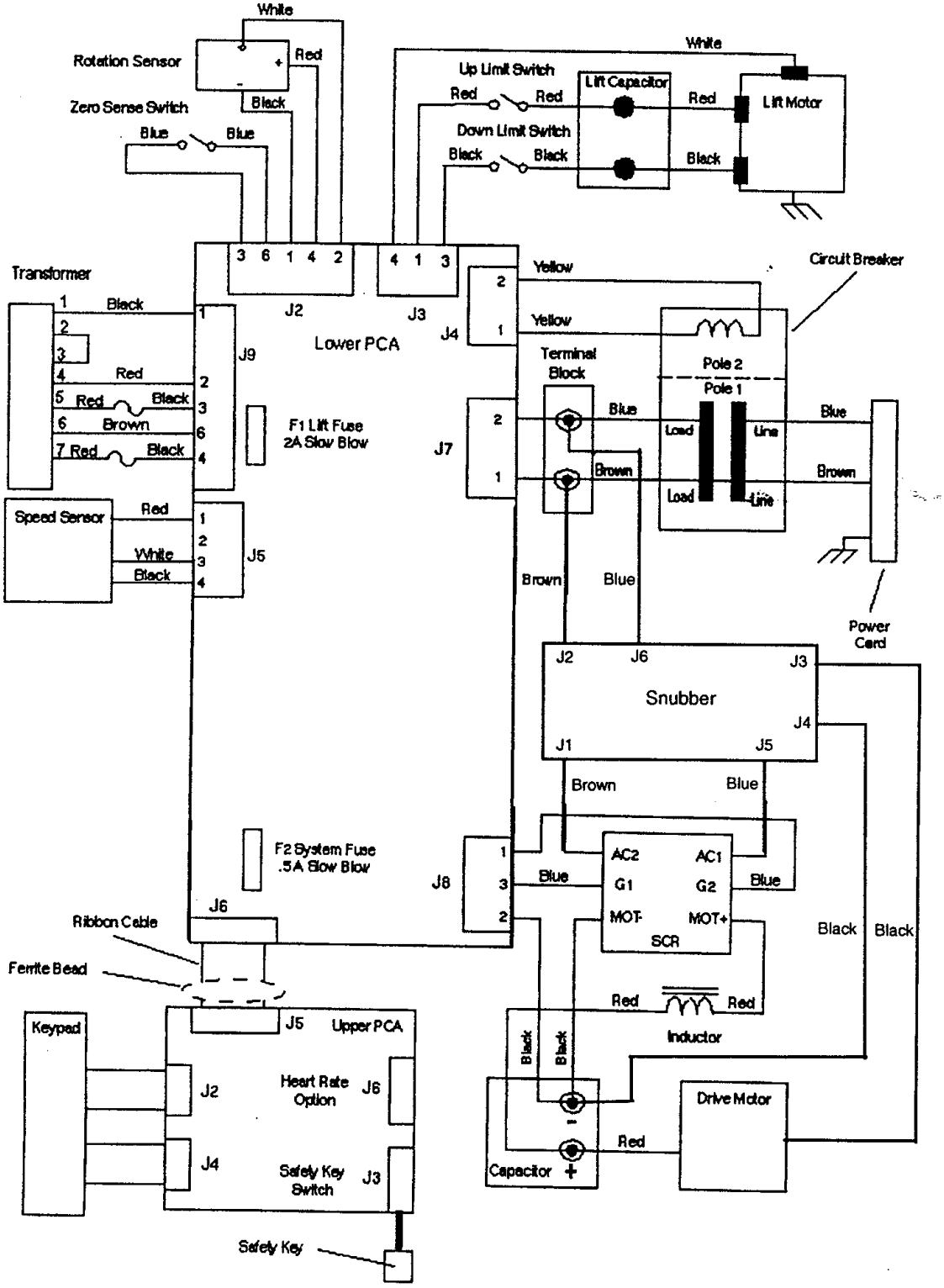
Wiring Diagram 7.3 - C962, C964 SCR 120 Vac



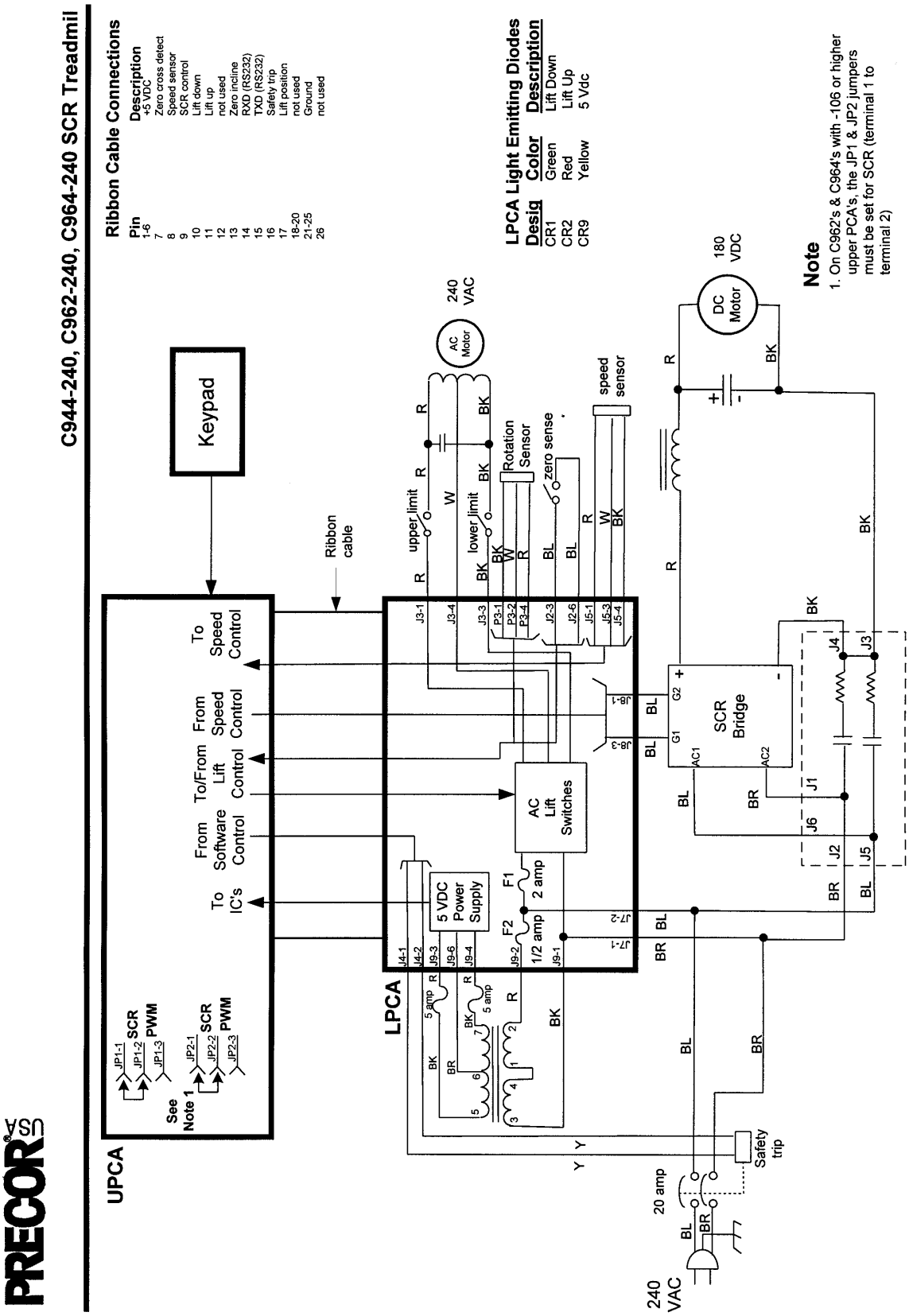
Block Diagram 7.4 - C962, C964 SCR 120 Vac



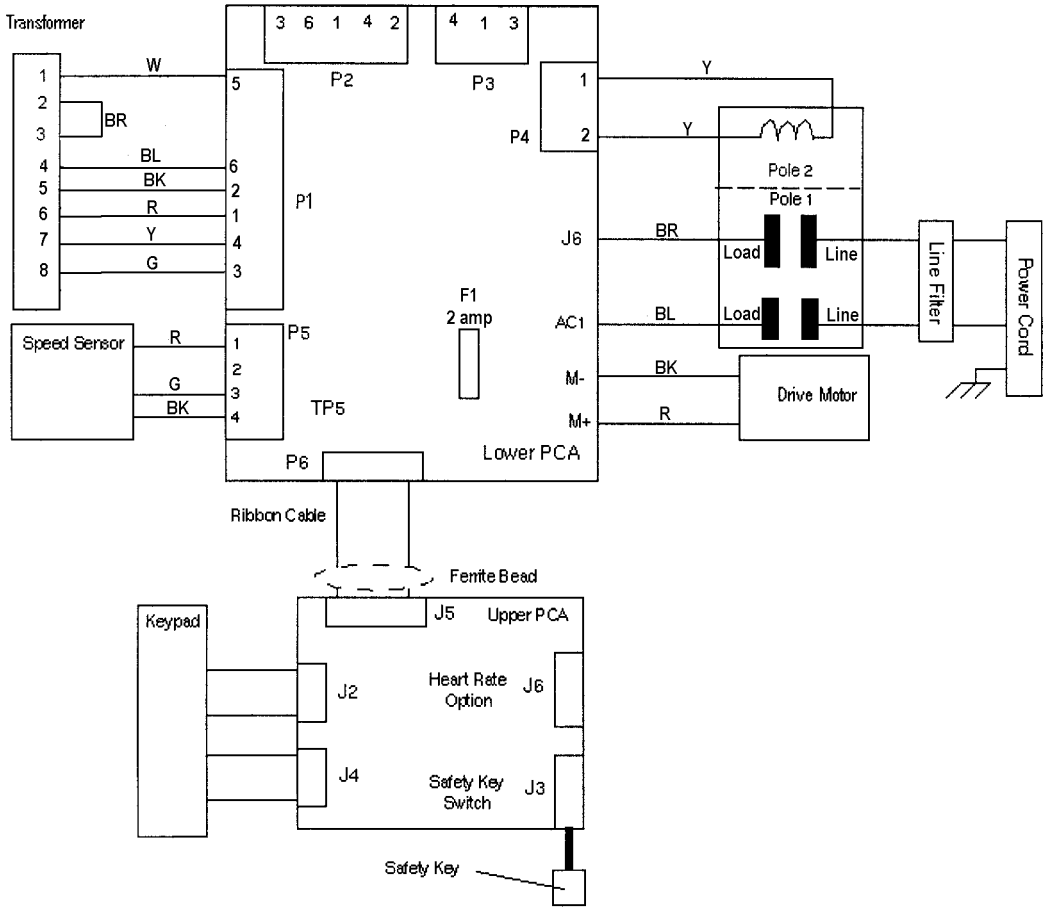
Wiring Diagram 7.5 - C962, C964 SCR 240 Vac



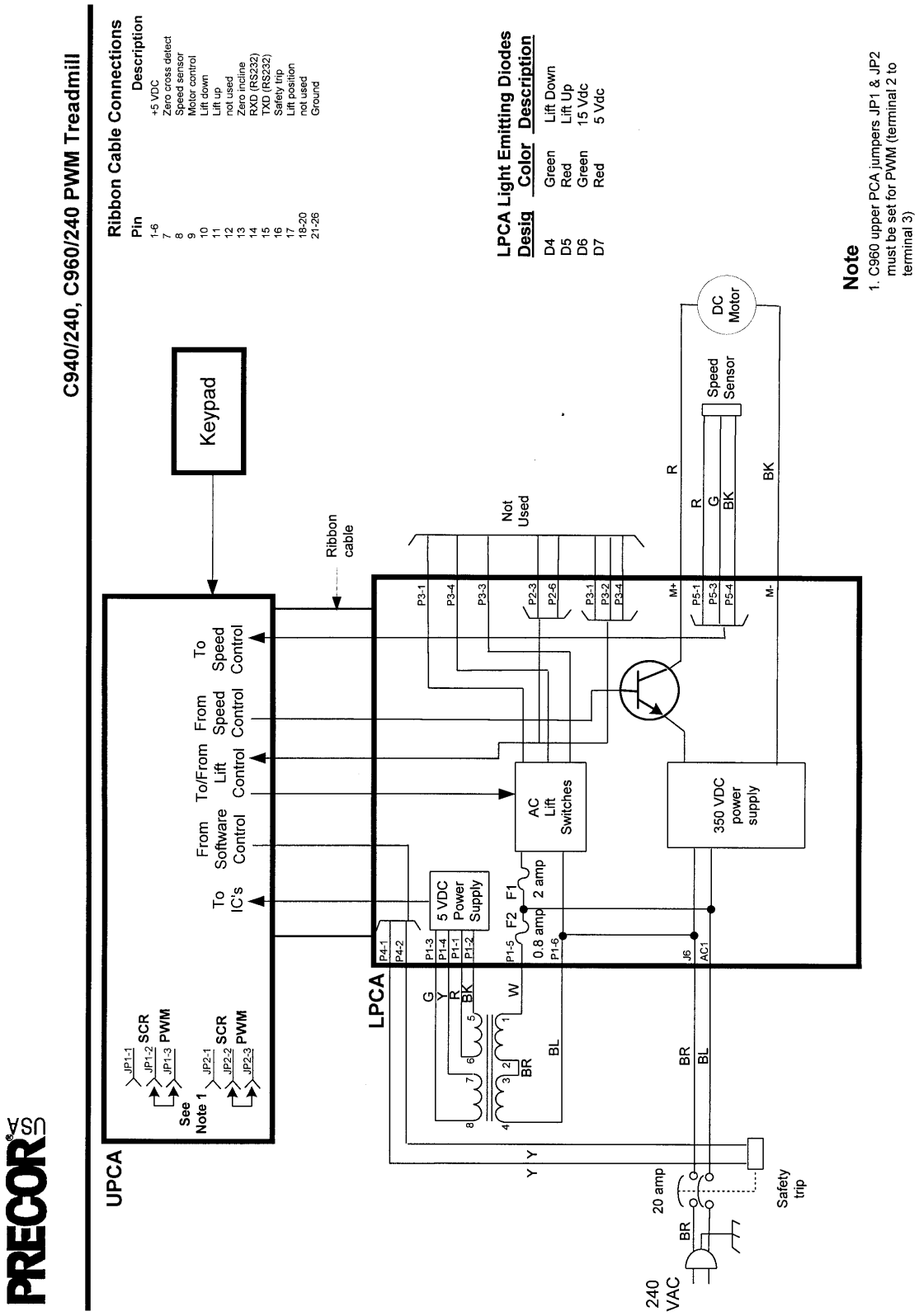
Block Diagram 7.6 - C962, C964 SCR 240 Vac



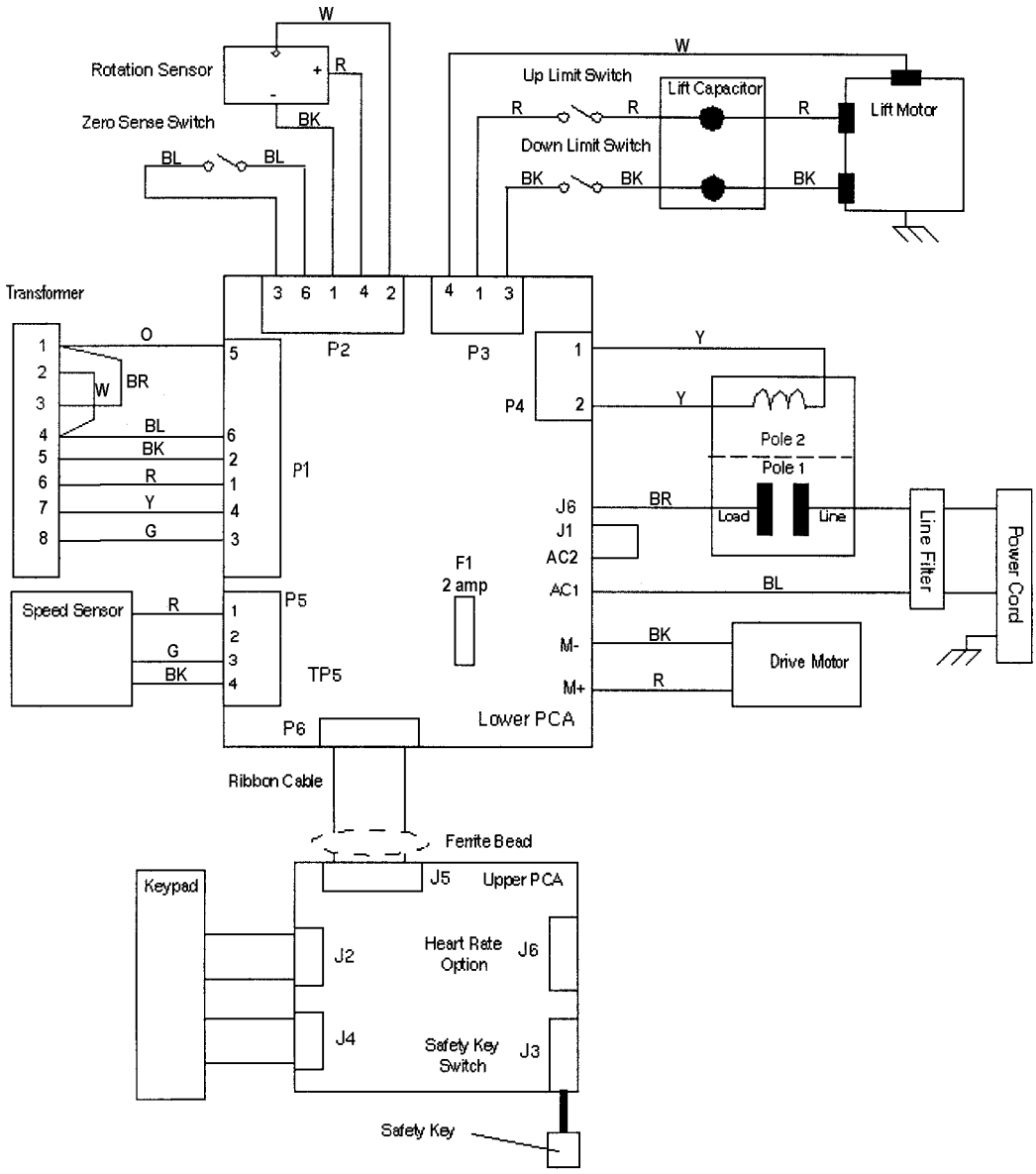
Wiring Diagram 7.7 - C960 PWM 240 Vac



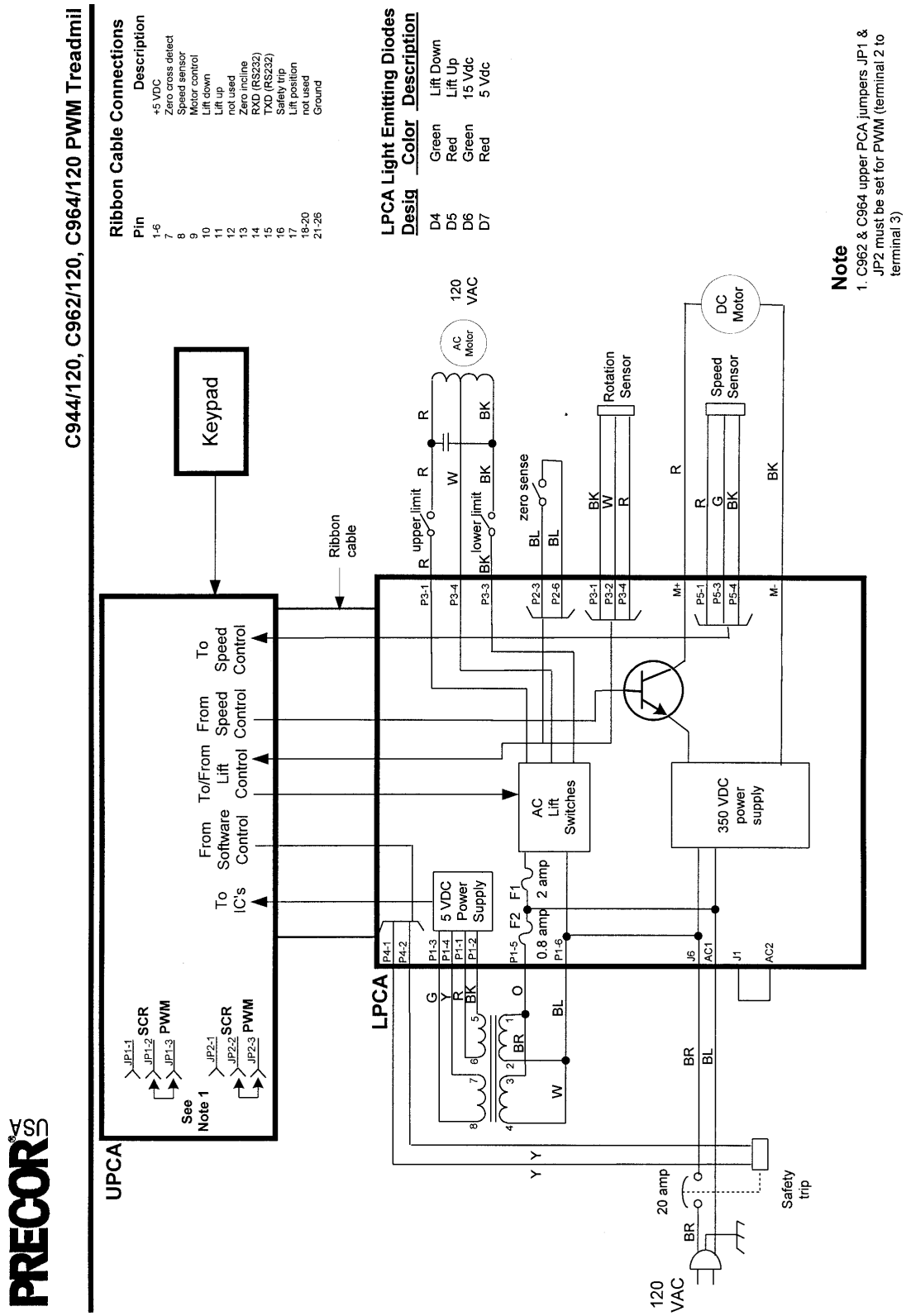
Block Diagram 7.8 - C960 PWM 240 Vac



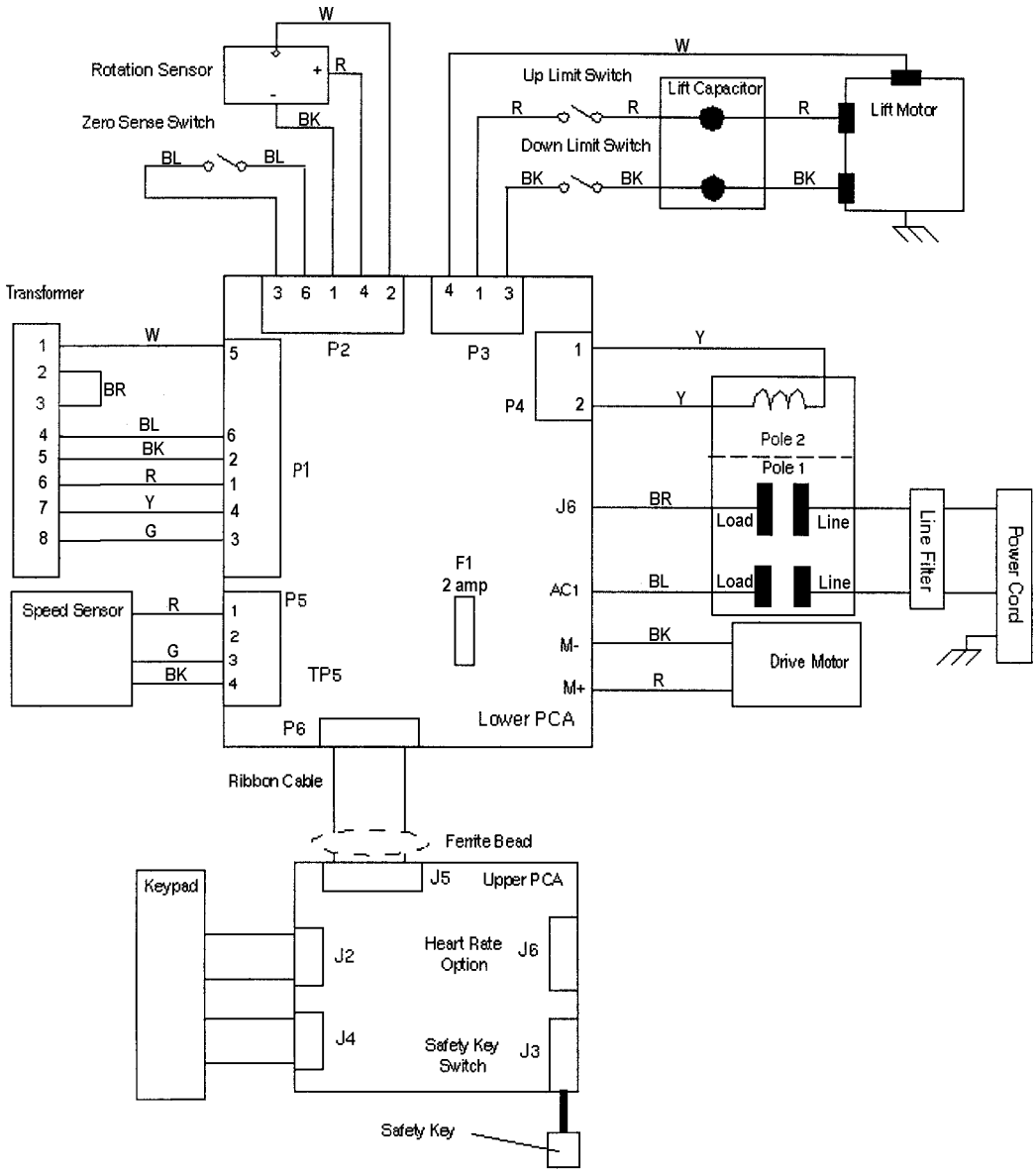
Wiring Diagram 7.9 - C962, C964 PWM 120 Vac



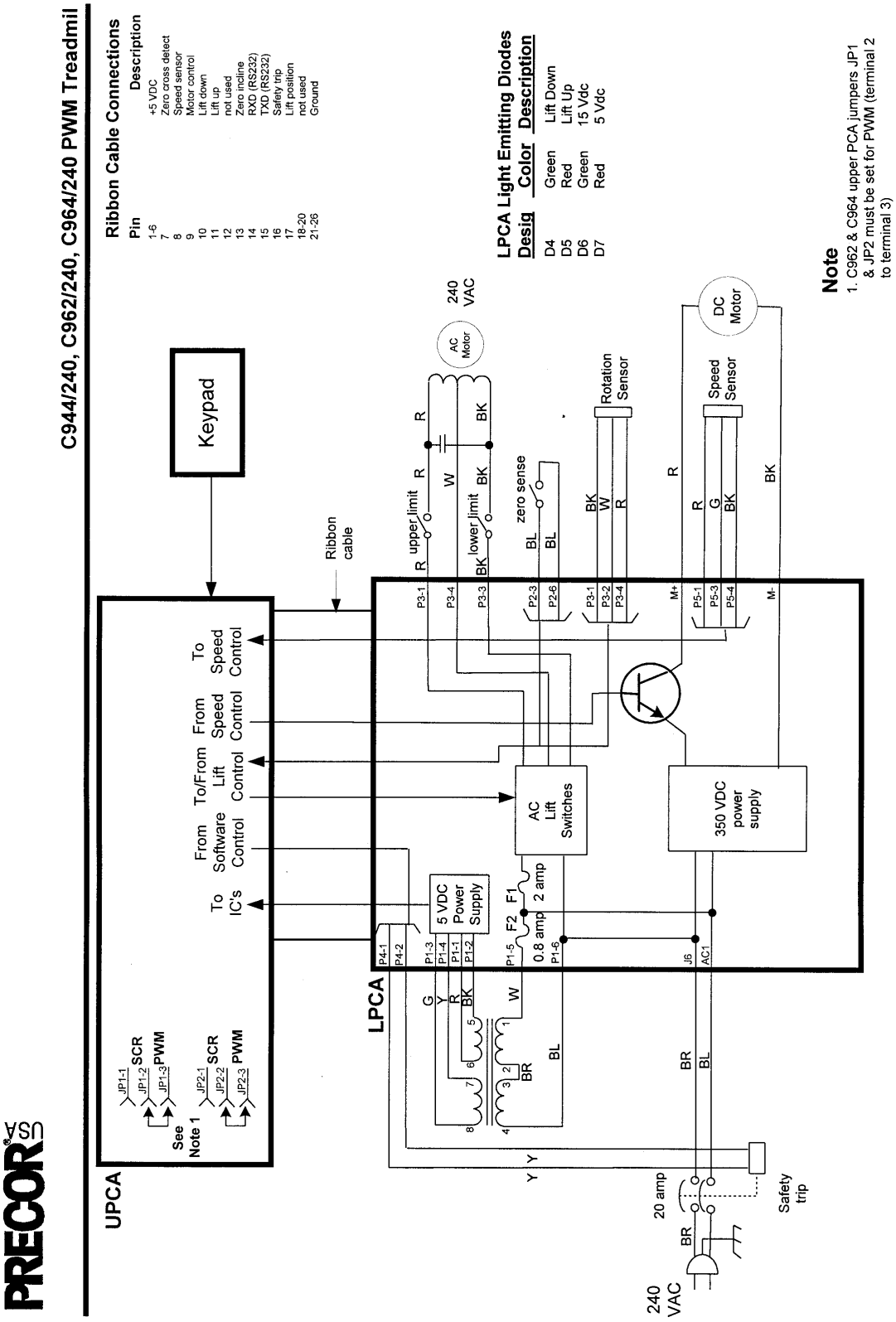
Block Diagram 7.10 - C962, C964 PWM 120 Vac



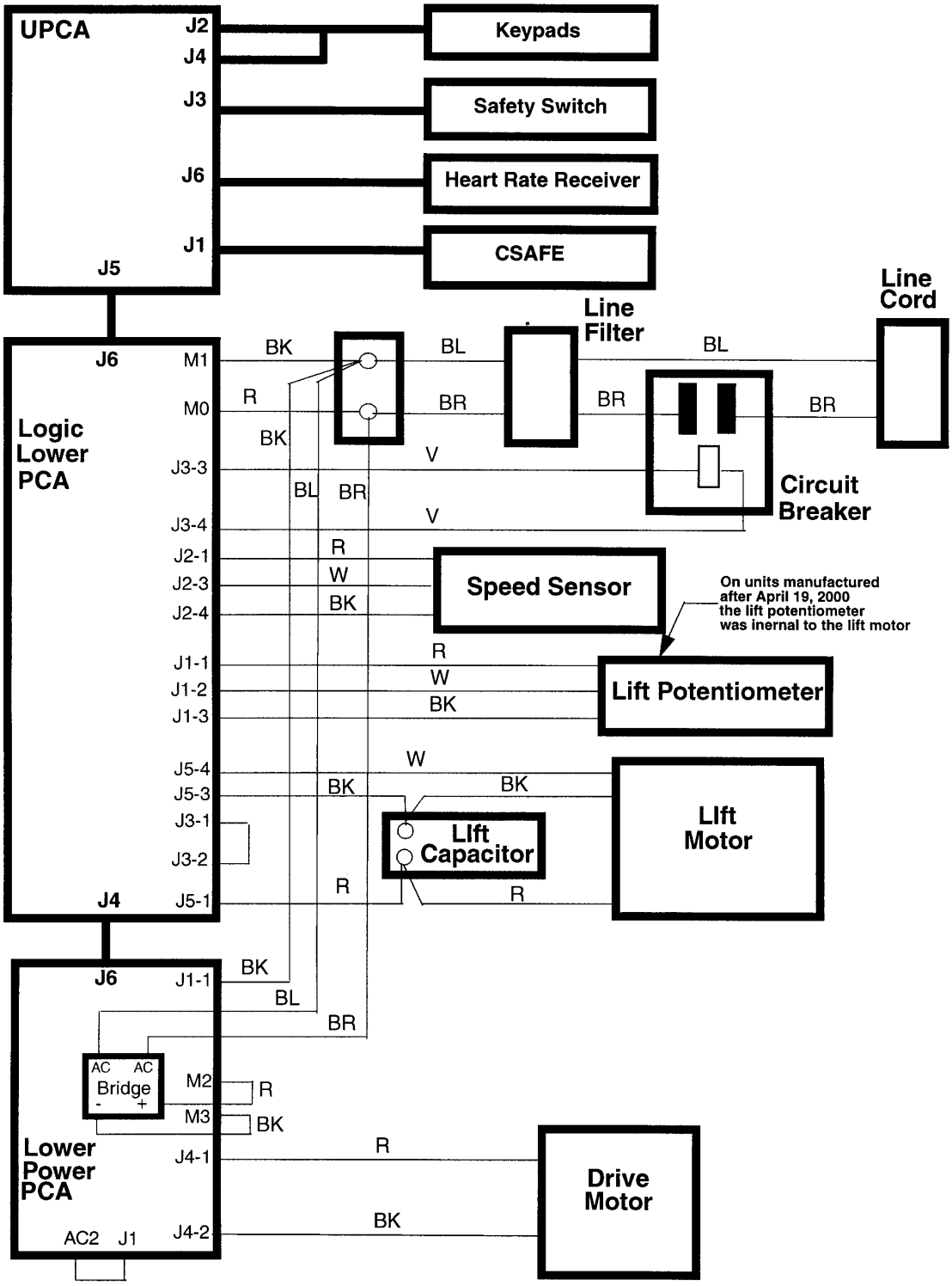
Wiring Diagram 7.11 - C962, C964 PWM 240 Vac



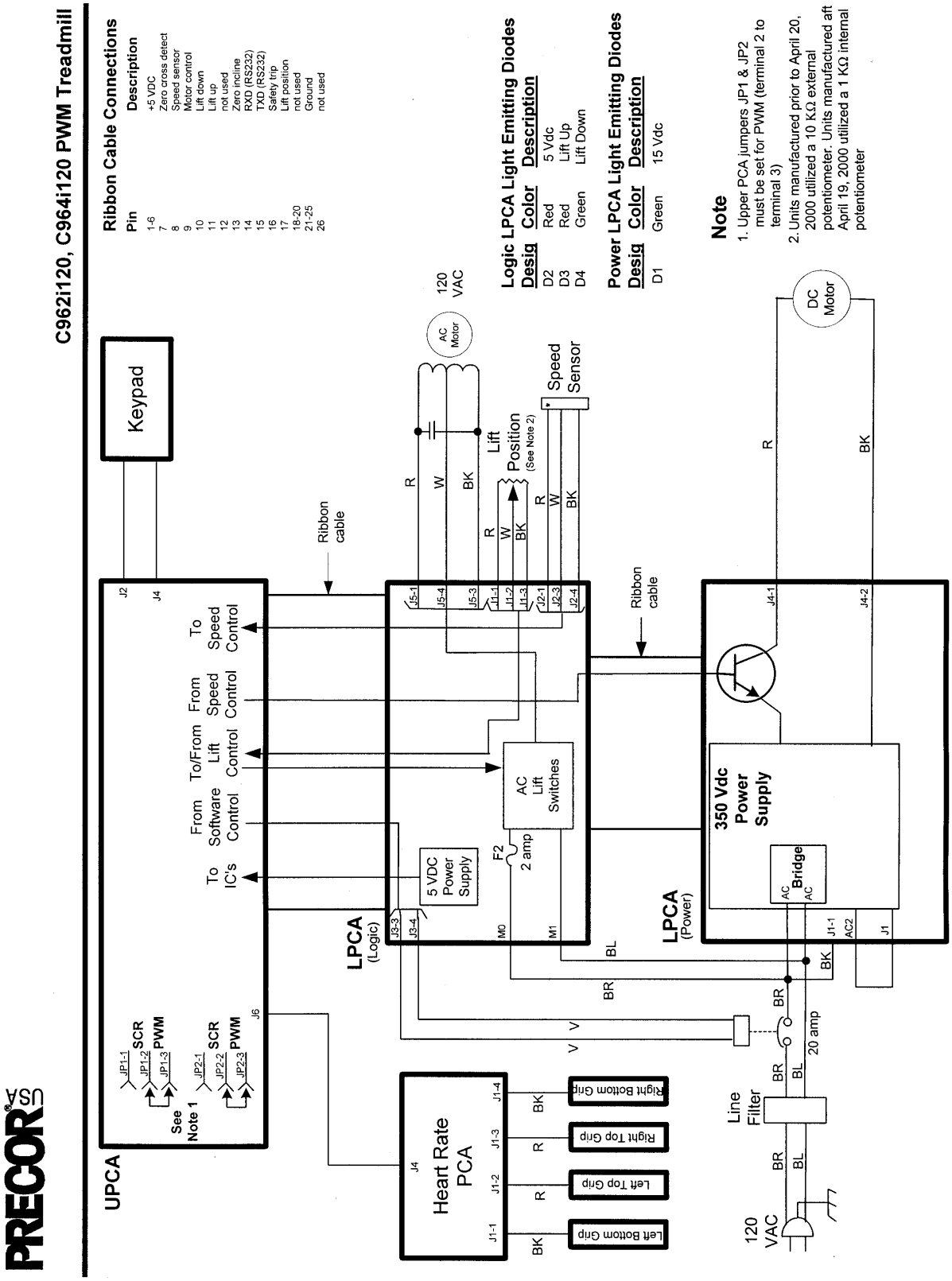
Block Diagram 7.12 - C962, C964 PWM 240 Vac



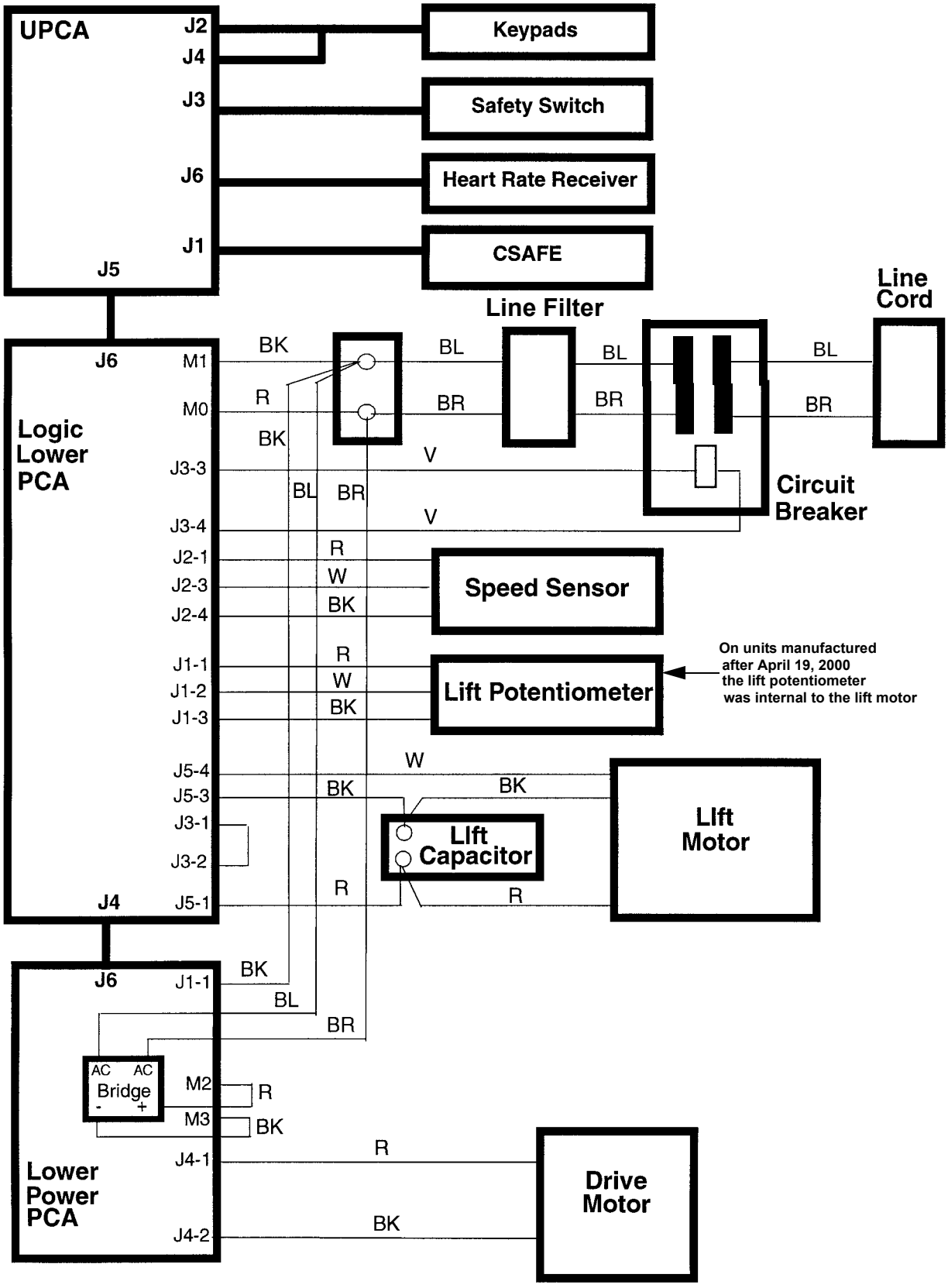
Wiring Diagram 7.13 - C962i, C964i 120 Vac



Block Diagram 7.14 - C962i, C964i 120 Vac



Wiring Diagram 7.15 - C962i, C964i 240 Vac



Block Diagram 7.16 - C962i, C964i 240 Vac