

9.21, 9.21i, 9.21s, 9.21si 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 9.21, 9.21i, 9.21S, 9.21Si Treadmill Owner's Manual, before you perform the maintenance procedures in this manual.

Section Two, Software Features. Precor's 9.21, 9.21i, 9.21S, 9.21Si Treadmill is 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 particular problem and after removing and replacing major components. Many maintenance problems can be fixed by adjusting various treadmill components. This section also provides you with the step-by-step procedures required to make these adjustments.

Section Five, Troubleshooting Procedures. The diagnostic and troubleshooting procedures contained in this section should be performed when it is necessary to isolate a problem to a particular component.

Section Six, Replacement Procedures. When a treadmill component must be replaced, go to this section and follow the step-by-step procedures required to remove and replace the component.

Section Seven, Wiring and Block Diagrams. This section includes wiring and block diagrams for 9.21, 9.21i, 9.21S, 9.21Si Treadmill.

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

PHYSICAL SPECIFICATIONS

Length:	67 inches (170 cm)
Width:	Handrails 28.5 inches (71 cm) Base 25 inches (63.5)
Height:	44 inches (117 cm)
Running surface:	51 inches by 17 inches (129.5 cm by 43 cm)
Motor:	1.7 hp continuous duty (9.21 & 9.21S) 2.0 hp continuous duty (9.21i & 9.21Si)
Speed:	0.5 to 10 mph (0.8 to 16 kph) 10 mph is equivalent to a 6 minute mile
Incline:	0 to 15% grade
Power:	50/60Hz 120v AC 20 Amps
Weight:	193 lbs (87 kg)
Shipping weight:	233 lbs (105 kg)

ELECTRONIC SPECIFICATIONS

9.21 & 9.21i Programs:

Manual
Interval (1 minute rest: 1 minute work)
Weight Loss

9.21S & 9.21Si Programs:

Heart Rate Interactive Course
Manual
Interval (1 minute rest: 1 minute work)
Weight Loss
6 Preprogrammed courses (3 Walk, 3 Run)
2 Custom courses

9.21, 9.21i, 9.21S & 9.21Si Display Readouts:

Distance (miles or kilometers)
Time
Speed (mph or kph)
Calories
Incline
Heart rate
Scan

Procedure 2.1 - Accessing the Diagnostic Program (prior to July 21, 1997)

The 9.21, 9.21S diagnostic program cycles through the following modes:

Software Version Mode. Displays the PROM version number.

LED Mode. Illuminates each of the LED's mounted on the upper PCA.

Lift Mode. Allows you to verify that the lift calibration number increments and decrements as the **INCLINE** keys are pressed.

Power Bits Mode. Allows you to verify that the power bits number increments and decrements as the **SPEED** keys are pressed.

Note:

When the treadmill is in power bits mode and the **SPEED ▲** key is selected, the treadmill speed will increase twice as fast as it does when the treadmill is in a normal operating mode.

Procedure

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

Note:

Diagram 2.1 illustrates the 9.21 Treadmill display. The 9.21S Treadmill display is shown in Diagram 2.2.

2. Press and hold the **STOP**, **SPEED ▼**, **SPEED ▲** and **QUICK START** keys simultaneously.
3. The electronic console displays the version number of the PROM mounted on the upper PCA. Record the PROM version number.
4. Following the version number, a horizontal line sweeps from top to bottom and then a vertical line sweeps from right to left.

Note:

The lines check the LED's mounted on the upper PCA. If the lines are broken when they sweep across the electronic console, replace the upper PCA as described in Procedure 5.2 of the Residential Treadmill Service Manual.

5. After the LED test, the electronic console displays the potentiometer increment number.
6. Press the **INCLINE** keys. Verify that the running bed inclines and declines as the **INCLINE** keys are pressed.
7. Watch the electronic console. When the potentiometer increment number is displayed on the electronic console, enter power bit mode by starting the running belt.

Note:

When the running belt is started, the number of power bits will be displayed. Power bits are directly related to the drive motor input signal.

8. Press the **SPEED ▲** and **▼** keys. Verify that the power bits number increments and decrements as the **SPEED** keys are pressed.
9. Press **STOP** to return to the **Enter Your Weight** banner.
10. Turn off the treadmill with the circuit breaker, then unplug the treadmill from the wall outlet.

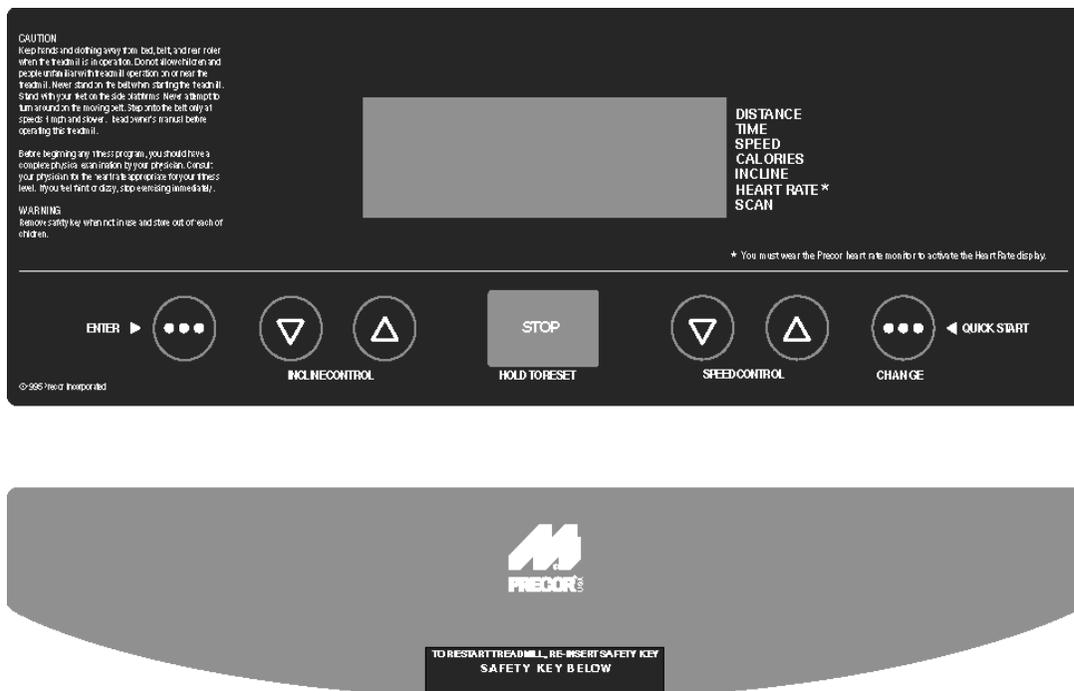
Diagram 2.1 - 9.21 Display

Diagram 2.2 - 9.21S Display



Procedure 2.2 - Accessing the Diagnostic Program (after July 20, 1997)

Units built after July 20, 1997 used the standard access codes. The keys on the display are hypothetically numbered for 1 to 7 from left to right. Therefore, **ENTER** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.1 or 2.2) or on a 9.21i or 9.21Si **INCLINE ▲** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.3).

Placing the unit in the diagnostic mode causes the software to perform the following operations:

- a. Test the LED's 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.
1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.
 2. Press keys **RESET,5,1,7,6,5,7,6,1**, sequentially.
 3. Following the version number, a horizontal line sweeps from top to bottom and then a vertical line sweeps from right to left.

Note:

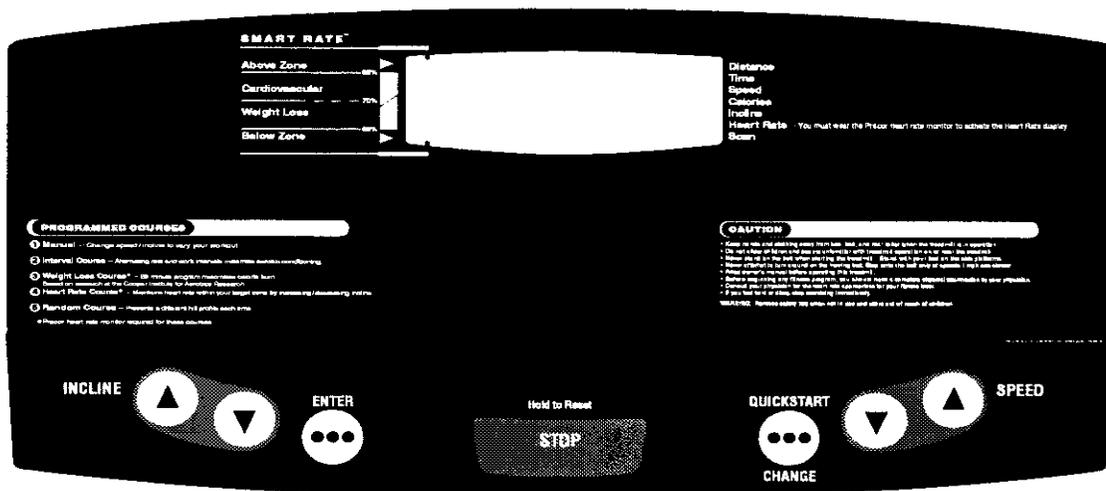
The lines check the LEDs mounted on the upper PCA. If the lines are broken when they sweep across the electronic console, replace the upper PCA.

4. After the LED test, the electronic console displays the potentiometer increment number.
5. Press the **INCLINE** keys. Verify that the running bed inclines and declines as the **INCLINE** and **DECLINE** keys are pressed.
6. Watch the electronic console. When the potentiometer increment number is displayed on the electronic console, enter power bit mode by starting the running belt.

Note:

When the running belt is started, the number of power bits will be displayed. Power bits represent the amount of power applied to the drive motor. Power bits are the product of selected speed and applied load.

7. Press the **SPEED ▲** and **▼** keys. Verify that the power bits number increments and decrements as the **SPEED** keys are pressed.
8. Press the **STOP** key to exit the power bits mode and enter the heart rate mode.
9. If the heart rate option has been installed, you may test the heart rate function using a chest strap transmitter or test transmitter.
10. Press the **ENTER** key to enter the error code log. The error code log will display the last 10 errors that occurred. Error 1 will be the most recent error and error 10 will be the oldest error. If more than 10 errors occur, the most recent error will be inserted in position 1 and all other errors will be pushed down one position. The error that was in the 10th position will be lost. If you wish to clear the error code log, press the **QUICK START** and **STOP** keys, simultaneously.
11. Press the **ENTER** key to exit the error code log and enter the key pad test.
12. Press each key one at a time the display will confirm the key that was pressed. Press the **INCLINE▼** and **SPEED ▲** keys, simultaneously to exit the keypad test.
13. The next test is the circuit breaker test. Follow the instructions on the display to cause either a test trip of the treadmill circuit breaker or exit the diagnostics program.

Diagram 2.3 - 9.21i and 9.21Si Display

Procedure 2.3 - Displaying the Odometer (prior to July 21, 1997)

This procedure allows you to display the number of miles or kilometers logged on the treadmill.

Procedure

1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.
2. With the Enter Your Weight banner scrolling, press the **STOP** key, the **SPEED ▼** key, and then the **SPEED ▲** key sequentially

Note:

After you perform Step 2, the electronic console displays the number of miles or kilometers logged on the treadmill.

3. Turn off the treadmill with the circuit breaker, then unplug the treadmill from the wall outlet.

Procedure 2.4 - Displaying the Odometer (after July 20, 1997)

The diagnostic program used prior to July 21, 1997 and the diagnostic program used after July 20, 1997 are essentially the same except that the key strokes used to access the programs are different. Units built after July 20, 1997 used the standard access codes. The keys on the display are hypothetically numbered for 1 to 7 from left to right. Therefore, **ENTER** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.1) or on a 9.41Si **INCLINE ▲** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.2).

This procedure allows you to display the number of miles or kilometers logged on the treadmill.

Procedure

1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker
2. Press keys **RESET,6,5**, sequentially.
3. The software version will be displayed. Press the **ENTER** key to continue.
4. The console displays the number of miles logged or kilometers on the treadmill.
5. Turn off the treadmill with the circuit breaker, then unplug the treadmill from the wall outlet.

Procedure 2.5 - Selecting U.S. Standard or Metric Units (prior to July 21, 1997)

Selecting United States standard units causes information to be displayed in feet, miles and pounds. Information is displayed in meters, kilometers and kilograms if metric units are selected. After you have selected a measurement standard, the software compiles and records workout information in the units of the measurement standard selected. Changing to the alternate measurement standard after your workout has started will cause invalid data to be displayed. For this reason, change the measurement standard only after turning ON the treadmill.

Procedure

1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.
2. With the Enter Your Weight banner scrolling, press and hold the **SPEED ▲** and **QUICK START** keys simultaneously until the **Press ▲ for MPH or ▼ for KPH** message scrolls across the screen.
3. Use the **SPEED ▲** or **SPEED ▼** key to select the measurement standard.

Procedure 2.6 - Selecting United States Standard or Metric Units (after July 20, 1997)

The diagnostic program used prior to July 21, 1997 and the diagnostic program used after July 20, 1997 are essentially the same except that the key strokes used to access the programs are different. Units built after July 20, 1997 used the standard access codes. The keys on the display are hypothetically numbered for 1 to 7 from left to right. Therefore, **ENTER** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.1) or on a 9.41Si **INCLINE ▲** would be key 1, **INCLINE ▼** would be key 2, etc. (see Diagram 2.2).

Selecting United States standard units causes information to be displayed in feet, miles and pounds. Information is displayed in meters, kilometers and kilograms if metric units are selected. After you have selected a measurement standard, the software compiles and records workout information in the units of the measurement standard selected. Changing to the alternate measurement standard after your workout has started will cause invalid data to be displayed. For this reason, change the measurement standard only after turning ON the treadmill.

Procedure

1. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.
2. With the Enter Your Weight banner scrolling, press keys **RESET,5,6,7,1**, sequentially. The message **Press ▲ for MPH or ▼ for KPH** will scroll across the screen.
3. Use the **SPEED** or **INCLINE** keys to select the measurement standard. The banner scrolling across the electronic console acknowledges the measurement standard selected.
4. The message **Press ▲ for Distance or ▼ for Time or Reset to Ask** scrolls across the console.

IF...

Distance is selected

THEN...

When Treadmill custom courses are selected, the User will be prompted to enter workout distance.

Time is selected

When Treadmill custom courses are selected, the User will be prompted to enter workout time.

Ask is selected

When Treadmill custom courses are selected, the User will be prompted to enter either workout distance or time.

Note:

When the treadmill is turned off it will remember the last measurement standard selected.

Procedure 2.7 - Documenting Software Problems

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

When a problem occurs, record the following information:

- Model and serial number.
- Software version number .
- User and 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.

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. Adjust the speed of the running belt to 2–3 mph.
3. 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. Measure and log the AC input current under loaded and unloaded conditions.
 - c. Press the **CHANGE** key while observing 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.
4. Press the **STOP** key. When the treadmill comes to a stop, press the **CHANGE** key and view the electronic console as the treadmill scans time, speed, distance, and percent.
5. Press the **INCLINE ▲** key while viewing the electronic console. Confirm that the running bed inclines and the incline display increments to 15 percent as the **INCLINE ▲** key is pressed.
6. 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 zero percent as the **INCLINE ▼** key is pressed.

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

Procedure 4.1 - Calibrating the Lift

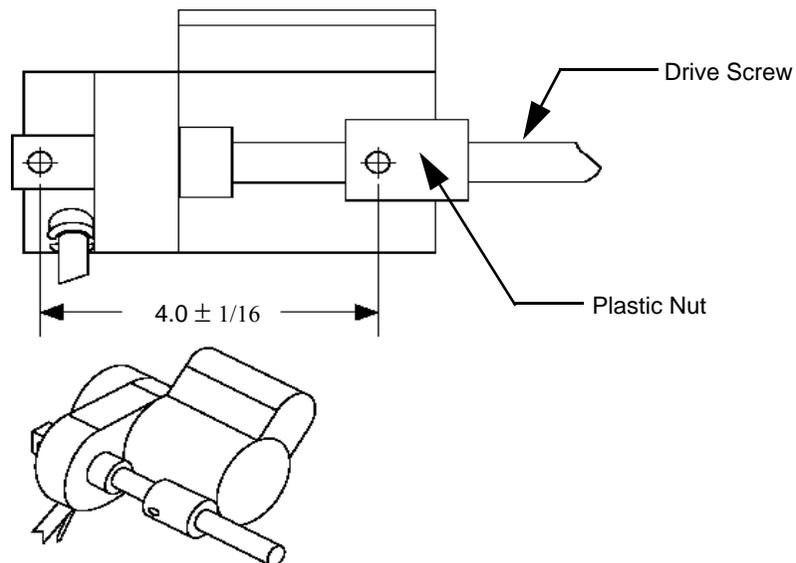
WARNING

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

Procedure

1. Remove the hood.
2. Remove the lift motor from the treadmill as described in Procedure 6.4 of this appendix.
3. Place the treadmill upright. Lay the motor in front of the treadmill.
4. Plug the lift motor connector into the lower PCA. Connect the lift motor ground to the treadmill frame.
5. Plug the power cord into the wall outlet, then turn on the treadmill with the circuit breaker.
6. Enter the diagnostics program per procedure 2.1 or 2.2, as appropriate.
7. If you are servicing a treadmill built before April 1, 1996, use the **INCLINE** keys to set the Calibration Number to 20. Set the Calibration Number to 22 if you are servicing a treadmill built after April 1, 1996.
8. Place 3/8" bolts into the mounting hole on the plastic nut and the top mounting hole of the lift motor. Place a ruler next to both left or both right edges of the bolts. Turn the plastic nut without turning the drive screw until the distance between the bolts is 4.00 inches +/- 1/16" (see Diagram 4.1).

Diagram 4.1 - Lift Motor Calibration



Note:

1/16" is 1/2 of a revolution of the plastic nut. The white plastic nut must not rotate while you are pressing the either of the **INCLINE** keys.

9. Exit the diagnostics program.
10. Turn off the treadmill with the circuit breaker, then unplug the treadmill from the wall outlet.

Note:

When you perform the next step, keep the white plastic nut in the same relative position to the drive screw. If necessary though, you may turn the drive screw 1/2 of a revolution.

11. Mount the lift motor on the treadmill as described in Procedure 6.4 of this appendix.
12. Check the operation of the treadmill as described in Section Three of this appendix.

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.
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 6 of J4 and the each of the pins in Table 5.1 (no keys pressed) and Table 5.2 (with the appropriate key pressed)...

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

Place the positive lead of the voltmeter on...	The voltmeter should read...
Pin 3 of J4	5 Vdc \pm 500 mVdc
Pin 4 of J4	5 Vdc \pm 500 mVdc
Pin 5 of J4	5 Vdc \pm 500 mVdc
Pin 7 of J4	5 Vdc \pm 500 mVdc
Pin 8 of J4	5 Vdc \pm 500 mVdc
Pin 9 of J4	5 Vdc \pm 500 mVdc
Pin 10 of J4	5 Vdc \pm 500 mVdc

Table 5.2. Voltage Test Points (Function Keys Pressed)

Place the positive voltmeter lead on...	At the electronic console, press...	The voltmeter should read between...
Pin 3 of J4	ENTER	0 Vdc and 500 mVdc
Pin 4 of J4	INCLINE DOWN	0 Vdc and 500 mVdc
Pin 5 of J4	INCLINE UP	0 Vdc and 500 mVdc
Pin 7 of J4	STOP	0 Vdc and 500 mVdc
Pin 8 of J4	SPEED DOWN	0 Vdc and 500 mVdc
Pin 9 of J4	SPEED UP	0 Vdc and 500 mVdc
Pin 10 of J4	QUICK START/CHANGE	0 Vdc and 500 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 keypad 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 Optional Heart Rate System

Note:

The 9.41S and 9.41Si treadmills are not equipped with heart rate as standard equipment. Heart rate will be present only if the optional heart rate system has been installed.

If the **HEART RATE** indicator does not blink with your heart beat when you perform Procedure 2.1, the problem may be either the heart rate receiver assembly or the chest strap assembly. This troubleshooting procedure gives you the information you need to determine which of these components is malfunctioning.

Procedure

1. If you are referring to this procedure because the **HEART RATE** indicator did not blink properly when you performed Procedure 2.1...

THEN...

Skip to Step 6.

OTHERWISE...

Continue with the next step.

2. Plug the power cord into the wall outlet, then turn on the treadmill with the ON/OFF switch.
3. If necessary use conductive spray (Precor part number 37364-101) to ensure good contact between the chest strap transmitter and the user, put on the heart rate chest strap transmitter. Enter the diagnostics program per Procedure 2.1 or 2.2. Proceed to the heart rate test portion of the diagnostics program. **HArt** will be displayed in the right display window when the heart rate routine is accessed.
4. If the **HEART RATE** indicator blinks with your heart beat and the heart rate information displayed is correct...

THEN...

The Heart Rate system is operating correctly. There is no need to continue with this procedure.

OTHERWISE...

Continue with the next step.

5. Re-adjust the fit of the chest strap. If the **HEART RATE** indicator still does not blink as described in Step 4. If the chest strap transmitter has a replaceable battery, replace the battery. If the **HEART RATE** indicator still does not blink as described in Step 4...

THEN...

OTHERWISE...

Continue with the next step.

The Heart Rate system is operating correctly. There is no need to continue with this procedure.

6. Hold the Heart Rate Test Transmitter (Precor part number 20045-101) near the display housing. If the **HEART RATE** indicator on the electronic console blinks with the LED on the Smart Rate Test Generator...

THEN...

The chest strap assembly is bad. Wear a new chest strap assembly when you use the Heart Rate System.

OTHERWISE...

The heart rate receiver assembly is bad. Replace the heart rate receiver as described in Procedure 5.4 of the Residential Treadmill Service Manual.

7. Press **ENTER** to return to the User ID.

Procedure 5.3 - Troubleshooting the Lift System

System Description

The lift system is powered by a 120 Vac lift motor that uses two independent motor windings, one operates the motor in an upward direction and one operates the motor in a downward direction. The motor contains a 10 K Ω or 1 K Ω potentiometer (depending on manufacturer), driven by the motor, that indicates lift position. AC power to operate the lift motor is provided by a pair of triacs. One triac provides power to the “up” winding of the lift motor and the other triac provides power to the “down” winding of the lift motor. The triacs are controlled either manually or by software control from the upper PCA.

1. If the lift motor will not move skip to step 7. If the lift motor moves and an error occurs continue with step 2.
2. Access the diagnostics program per Procedure 3.2 and proceed to the lift calibration portion of the diagnostics program. If the lift calibration number is 0 or 255 skip to step 3. Operate the lift, if the lift calibration number does not increment as the lift moves, skip to step 3. If the calibration number increments as the lift moves, recalibrate the lift per Procedure 5.3. If recalibration does not correct the problem, continue with step 3.
3. Set the treadmill circuit breaker in the “off” position. Using an ohmmeter, measure between terminal 4 (white wire) and terminal 6 (orange wire) of the P2 connector on the lower PCA. The measurement should be approximately 10 K Ω (or 1 K Ω). If the measurement is open (∞) or significantly high or low, replace the lift motor.
4. Using an ohmmeter, measure between terminals 4 and 5 of P2 and measure between 5 and 6 of P2 on the lower PCA. The two measurements should total approximately 10 K Ω (or 1 K Ω). If the measurement is open (∞) or significantly high or low, replace the lift motor.
5. If you have performed all of the above tests and an error still occurs when the lift motor operates, there are three parts that could cause the problem. There are not any good tests to check these parts other than substituting a known good part. They are lower PCA, ribbon cable and upper PCA. Replace only one part at a time. If the new part does not correct the problem replace the original part.
6. If you have performed all of the above tests and the lift system is still not functioning, call Precor Technical Support.
7. Set the treadmill circuit breaker in the “off” position. Remove the F2 (2 amp slow blow) fuse from the lower PCA. Measure the fuse with an ohmmeter. The measurement should be 1 Ω or less. If the fuse is good, re-insert the fuse and skip to step 9. If the fuse is open (∞) or significantly high, replace the fuse. Before operating the lift motor it is necessary to perform a continuity test on the lift motor.

8. Remove the P2 connector from the lower board. Using an ohmmeter, measure between terminals 1 and 3 of P2, between terminals 1 and 2 of P2 and between terminals 2 and 3 of P2. The measurements should be approximately 14.5Ω , 14.5Ω and 29Ω , respectively. If any of the measurements are significantly low or high, replace the lift motor.
9. Re-insert the P2 connector in the lower PCA. Set the treadmill circuit breaker in the “on” position. Using an AC voltmeter, monitor the voltage between terminals 1 and 2 (red and white wires) of the P2 connector. Enter the manual program and press the **INCLINE ▲** key. The measurement should be approximately 120 Vac (line voltage). If the voltage is present and the lift motor moves normally, skip to step 10. The voltage will only be present until such time as an error occurs. If line voltage is not present skip to step 11. If line voltage is measured but the motor does not move, replace the lift motor.
10. Monitor terminals 1 and 3 (white and black wires) of P2. Enter the manual program and press the **INCLINE ▼** key. The measurement should be approximately 120 Vac (line voltage). If the voltage is present and the lift motor moves normally skip to step 12. The voltage will only be present until such time as an error occurs. If line voltage is measured but the motor does not move, replace the lift motor.
11. If line voltage is not present in both steps 9 and 10, there are three parts that could cause the problem. There are not any good tests to check these parts other than substituting a known good part. They are lower PCA, ribbon cable and upper PCA. Replace only one part at a time. If the new part does not correct the problem replace the original part.
12. If you have performed all of the above tests and the lift system is still not functioning, call Precor Technical Support.

Procedure 5.4 - 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 handling 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 treadmill's A.C. outlet and a new neutral lead from the treadmill's 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 treadmill's A.C. outlet and a new neutral lead and hot lead from the treadmill's 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 handling 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 treadmill's A.C. outlet and two new hot leads from the treadmill's 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.

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 Target Disk and Fan

WARNING

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

Removing the Target Disk

1. Remove the hood.
2. Remove the fan from the motor shaft.
3. Push the new fan onto the motor shaft. If you are installing a new motor on the treadmill, push the fan onto the shaft of the new motor.
4. Replace the hood.

Procedure 6.2 - Replacing the Speed Sensor

WARNING

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

Removing the Speed Sensor

1. Remove the hood.
2. Disconnect the speed sensor cable from the lower PCA.
3. Remove the nut that secures the speed sensor to the speed sensor bracket. Set aside the speed sensor.

Replacing the Speed Sensor

4. Position the speed sensor next to the speed sensor bracket. Install the nut that retains the sensor to the bracket.
5. Connect the speed sensor cable to the lower PCA.
6. Inspect and adjust the gap between the speed sensor and the target as described in Procedure 3.4 of the Residential Treadmill Service Manual.
7. Check the operation of the treadmill as described in Section Three of this appendix, then replace the hood.

Procedure 6.3 - 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. Remove the hood.

Note:

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

2. Place the treadmill on its left side.
3. Remove the e-rings and lift pins that secure the lift motor nut to the lift platform.

Note:

It is not necessary to remove the lift motor when you remove the lift platform.

4. Remove the e-rings from the ends of the lift platform shaft. Slide the shaft away from the lift platform and treadmill frame.
5. Remove the wheels from the lift platform. Mount the wheels on the new lift platform.

Replacing the Lift Platform

6. With the treadmill still on its left side, position the lift platform at its mounting position.
7. Slide the lift platform shaft into the lift platform and treadmill frame.
8. Replace the e-rings on the ends of the lift platform shaft.
9. Replace the e-rings and lift pins that secure the lift motor nut to the lift platform.
10. Return the treadmill to an upright position.
11. 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 Residential Treadmill Service Manual.

Procedure 6.4 - Replacing the Lift Motor

WARNING

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

Removing the Lift Motor

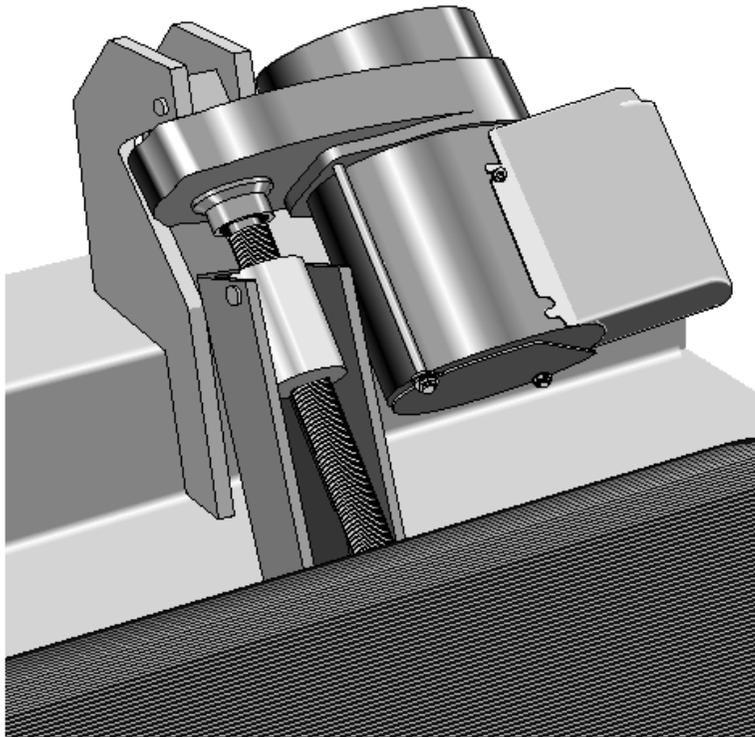
1. Remove the hood.
2. Disconnect the lift motor wiring assembly from the lower PCA.
3. Remove the ground wire from the lift motor ground stud on the treadmill frame.

Note:

Place a drop cloth under the treadmill to protect the flooring and to ensure that the treadmill handrails are not scratched or damaged.

4. Place the treadmill on its right side.
5. Remove the hitch pin from the clevis pin that holds the top of the lift motor to the treadmill frame. Remove the clevis pin from the top of the lift motor (see Diagram 5.1).

Diagram 5.1 - Lift Motor



6. Remove the e-rings and lift pins that secure the lift motor nut to the lift platform. Remove and set aside the lift motor.

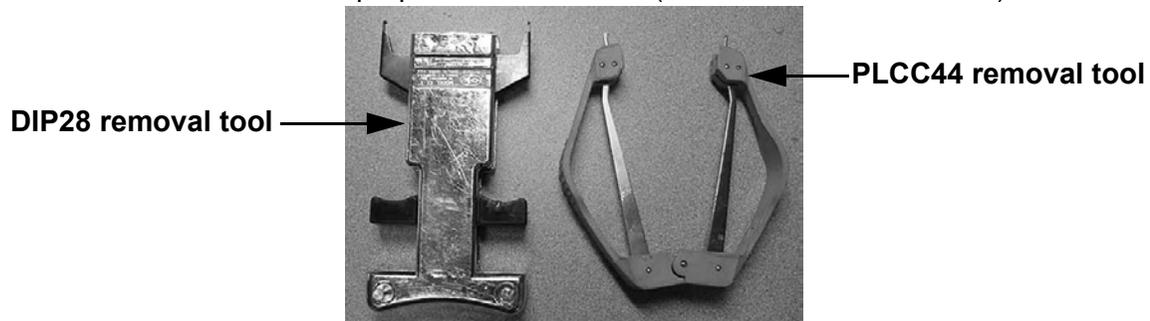
Replacing the Lift Motor

7. Calibrate the treadmill as described in procedure 4.1 of this appendix.
8. Line up the mounting holes at the top of the lift motor with the lift motor mounting holes on the treadmill frame.
9. While an assistant holds the lift motor in place, position the clevis pin through the top of the lift motor and the treadmill frame. push the hitch pin through the clevis pin.
10. Replace the e-rings and lift pins that secure the lift motor nut to the lift platform.
11. Secure the ground wire to the lift motor ground frame connection.
12. Connect the lift motor wiring assembly to the lower PCA.
13. 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 Residential Treadmill Service Manual.

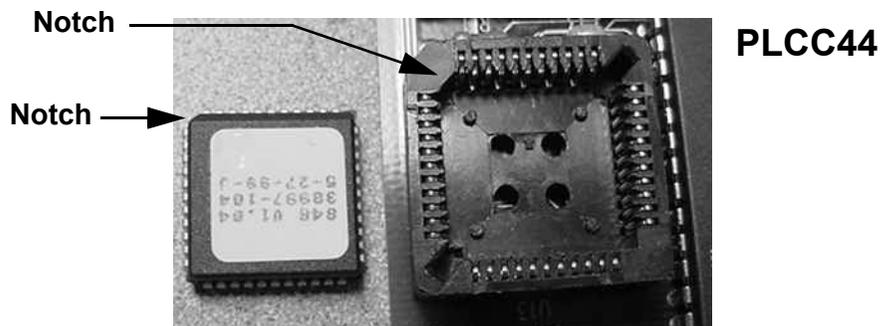
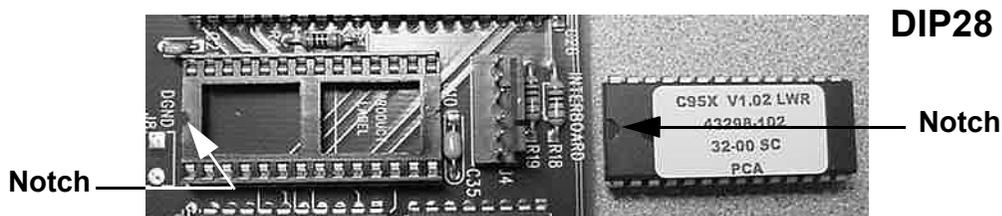
Procedure 6.5 - Replacing the PROM

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 IC's 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 - 9.21, 9.21i, 9.21S and 9.21Si

