

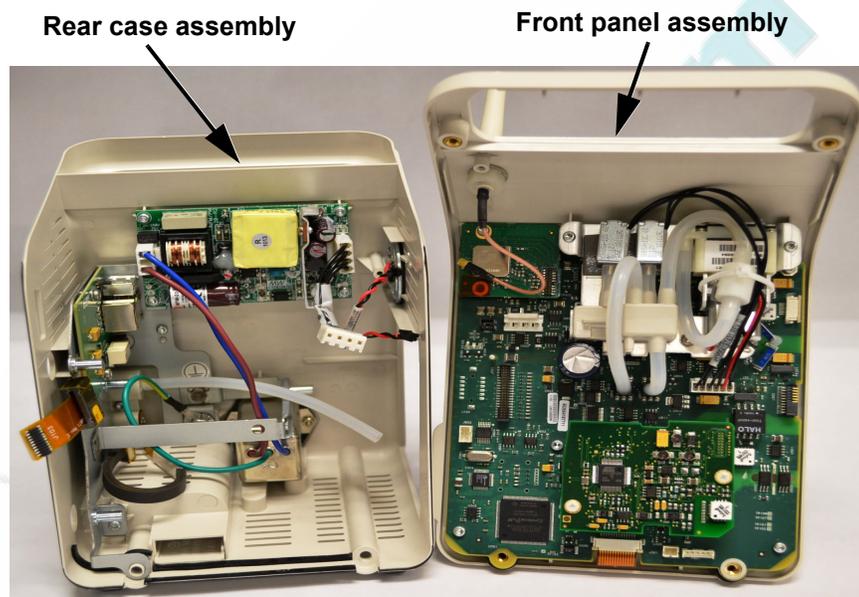
Repairing the Monitor

Disassembling the Monitor

This chapter contains the procedures for disassembling and assembling the monitor to replace or repair defective assemblies or components.

The monitor has two main assemblies:

- Rear case assembly
- Front panel assembly



For more information about replaceable parts, see Chapter 6, “Replacement Parts and Assembly Drawings.”

Warning

Before you attempt to open or disassemble the monitor, disconnect the AC power from the monitor and remove the battery. Remove any cables from the measurement modules, and the nurse call and network connections.

After any monitor repair, you must perform the recommended Performance and Safety tests before putting the monitor into operation. Failure to perform these tests might result in erroneous monitor readings. For more information about performing safety and performance tests, see Chapter 3, “Performance Verification Testing.”

Caution

Observe ESD (electrostatic discharge) precautions when working inside the monitor.

Tools Required for Service

The following tools and equipment are required to disassemble, repair, and re-assemble the monitor:

- Small Phillips screwdriver
- Torx T10, T20 screwdrivers
- Medium flathead screwdriver
- 10 mm wrench
- 6 mm wrench
- Needle-nose pliers
- ESD mat and wrist strap

Shutting Down the System

Perform a hard shutdown whenever you need to power down the monitor for repair. This ensures that all patient and system data is saved in memory.

To perform a hard shutdown:

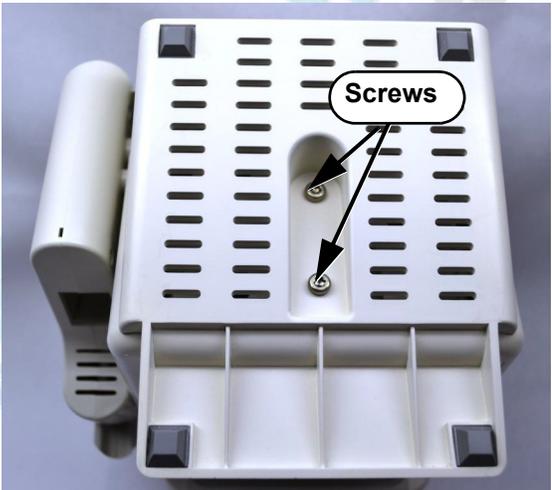
Step	
1	Select the System button. The System Menu appears.
2	Select the Shutdown button.
3	In the window that appears, select the Yes button. The monitor shuts down.

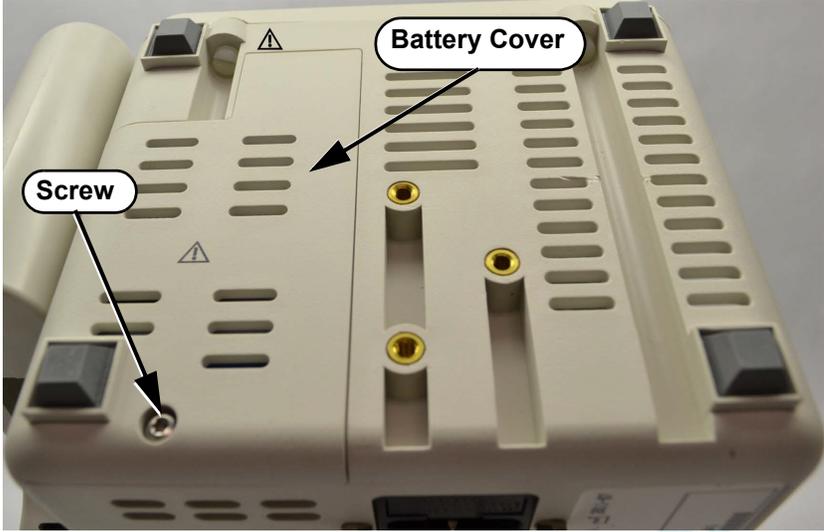
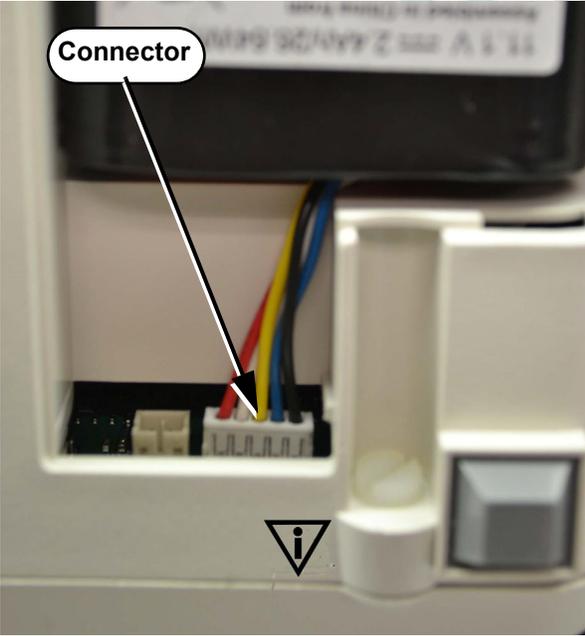
Removing the Battery

Warning Dispose of used batteries in an environmentally responsible manner. Do not dispose of the battery in normal waste containers. Consult your hospital administrator to find out about local arrangements.

Caution Before you remove the battery, perform a hard shutdown.

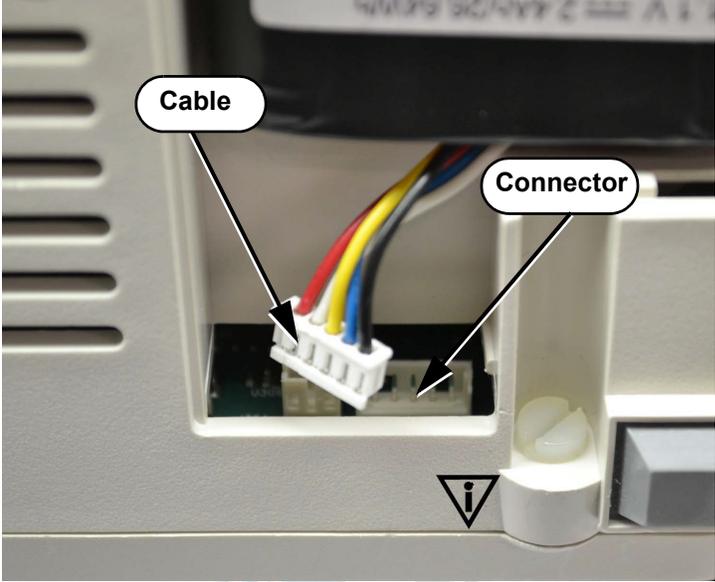
To remove the battery:

Step	
1	Perform a hard shutdown (see “Shutting Down the System” on page 5-2) and disconnect the power cord from the rear of the monitor.
2	<p>If your monitor has a tabletop base, remove it by removing the two Torx T20 screws from the bottom of the base.</p> 

<p>3</p>	<p>Remove the Torx T10 screw from the battery cover on the bottom of the monitor.</p> 
<p>4</p>	<p>Disconnect the battery cable from the connector and remove the battery from the monitor.</p> 

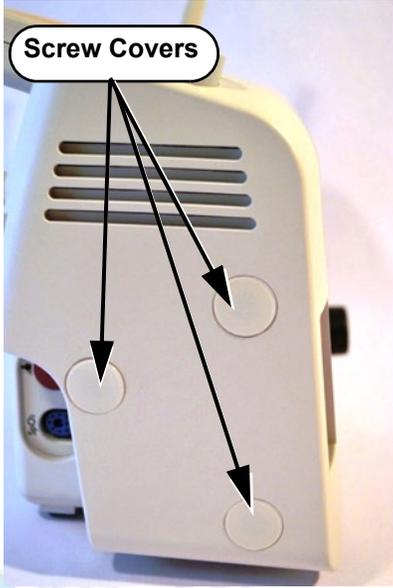
Installing the Battery

To install the battery:

Step	
1	<p>Connect the battery cable. Ensure that the cable is attached securely to the connector.</p> 
2	<p>Insert the battery into the compartment with the cable closest to the case.</p>
3	<p>Replace the battery cover and the Torx T10 screw.</p>
4	<p>Confirm that the battery is installed correctly by observing that the Charging LED is lit.</p>

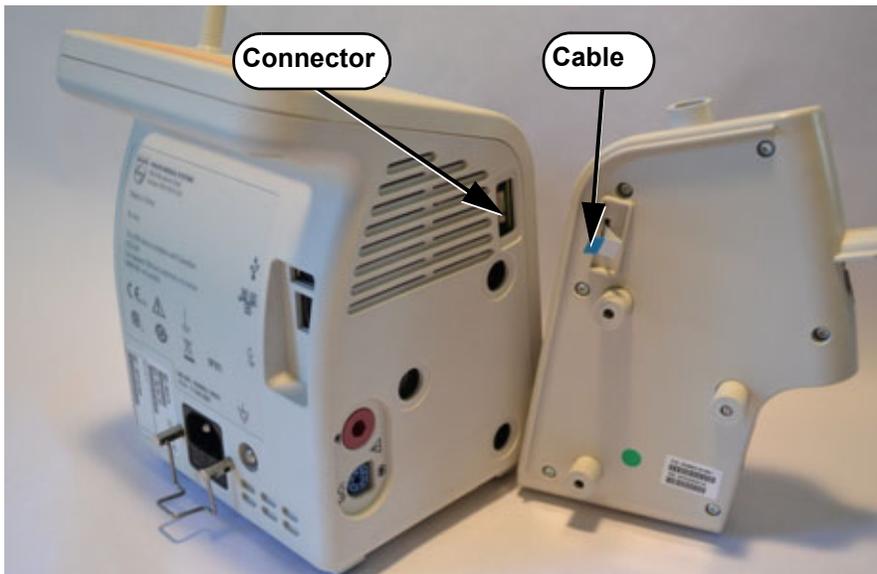
Removing the Temperature Module

To remove the temperature module:

Step	
1	Remove the temperature probe and well.
2	<p>Remove the adhesive covers from the screw holes by inserting a sharp, pointed tool under the edge of the covers.</p> 
3	Remove the three Torx T20 screws from the temperature module.

4

Slowly and gently pull the temperature module away from the monitor and disconnect the cable from the connector on the main board.



Caution

After you replace the temperature module, perform the temperature accuracy test. For more information, see “Temperature Test” on page 3-16.

Removing the Recorder Faceplate

For monitors without an optional recorder, remove the faceplate as follows:

Step	
1	Remove the battery. See “Removing the Battery” on page 5-3.

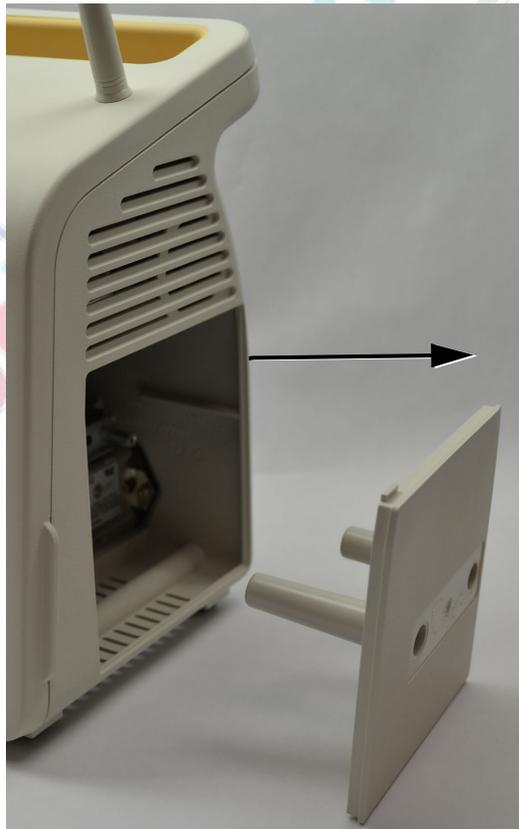
2

Remove the plastic adhesive screw cover by inserting a sharp tool under it and lifting it up.



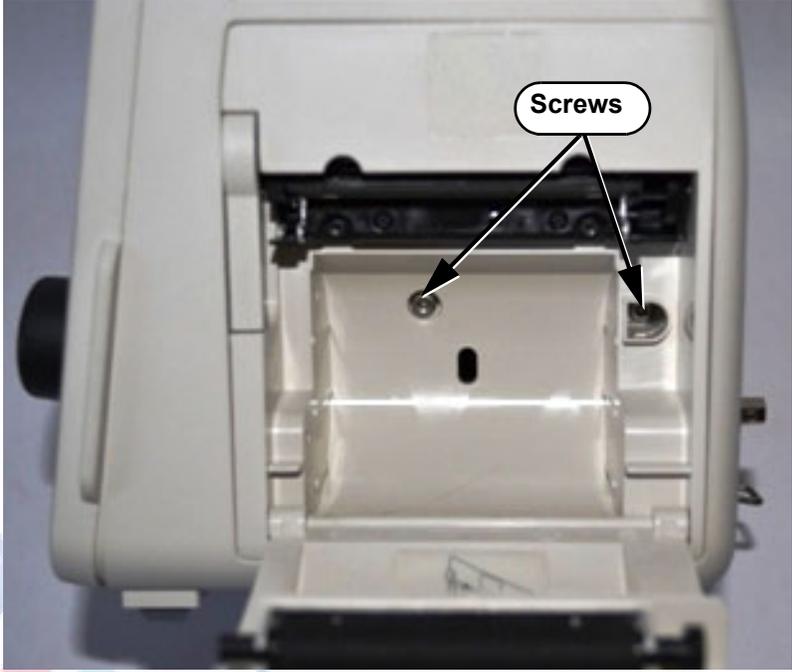
3

Remove the two Torx T10 screws and pull the faceplate straight away from the monitor.



Removing the Optional Recorder (VS2⁺ Only)

To remove the optional recorder:

Step	
1	Remove the battery. See “Removing the Battery” on page 5-3.
2	Open the recorder door and remove the paper roll.
3	Loosen (do not remove) the two Torx T10 screws holding the recorder to the monitor case. <div data-bbox="581 611 1373 1283" style="text-align: center;">  </div>

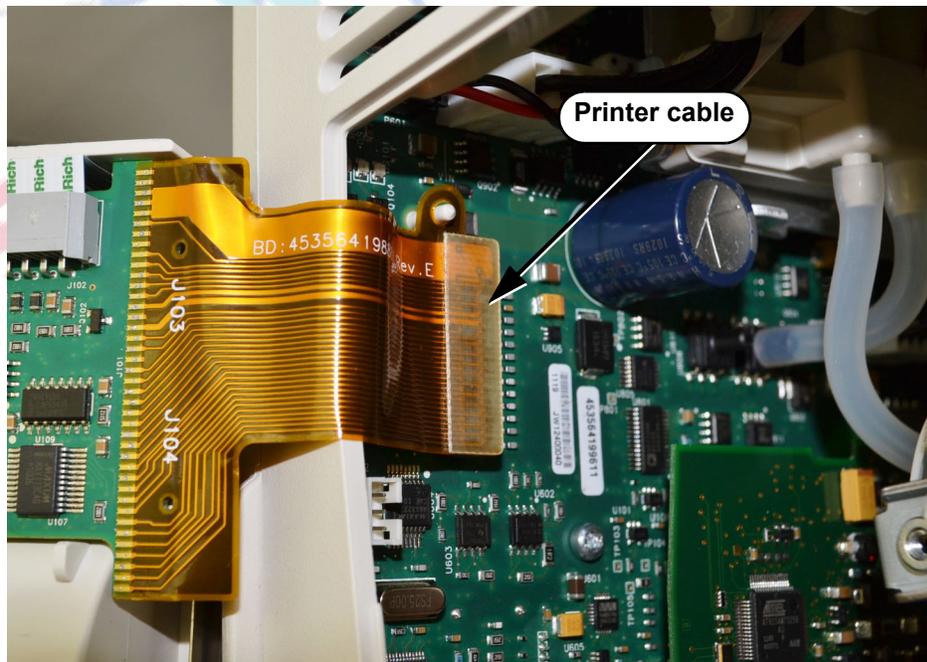
- 4 Place your thumbs on either side of the recorder case and being careful not to pull the ribbon cable from the connector, slowly pull the recorder straight out of the monitor.



Caution

When you reassemble the recorder or faceplate, do not overtighten the screws.

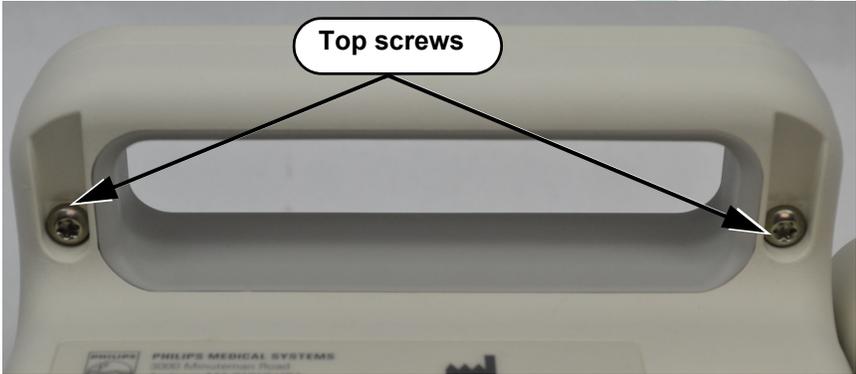
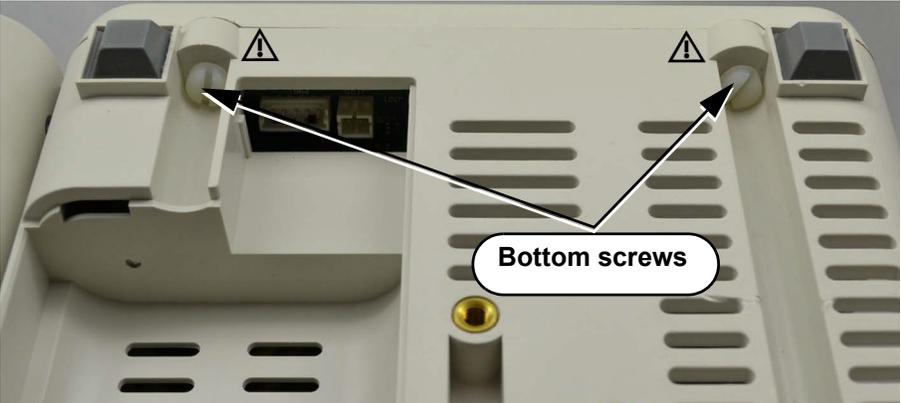
- 5 Rotate the recorder to the side to expose the printer cable connection and disconnect the printer cable from the main board.



Removing the Front Panel

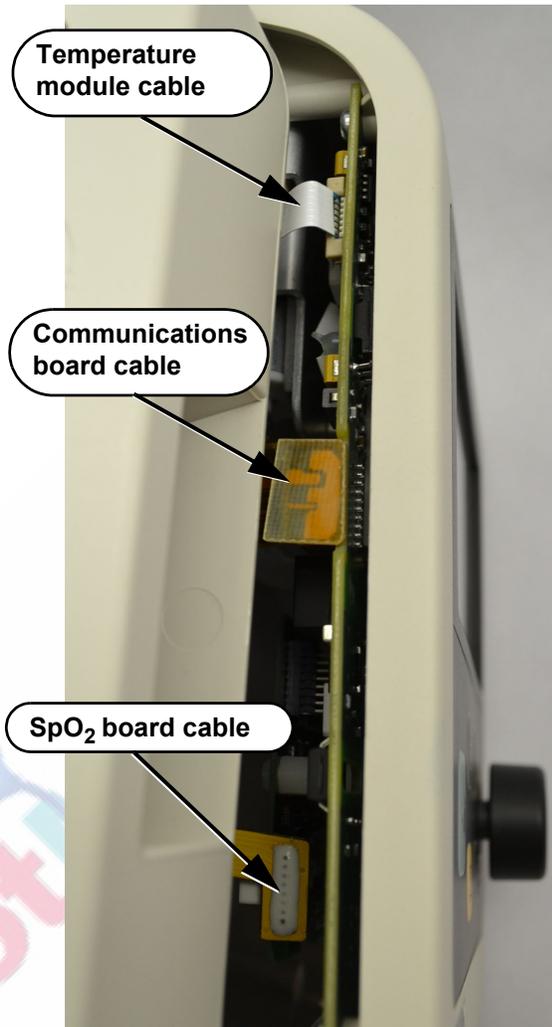
To open the monitor to install internal replacement parts, you must first separate the front panel assembly from the rear case assembly.

To remove the front panel:

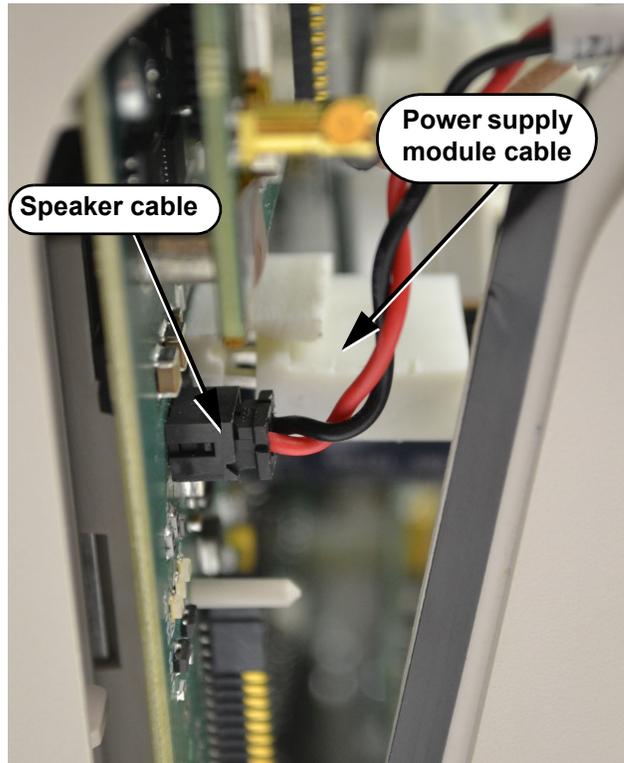
Step	
1	Remove the battery from the monitor. See “Removing the Battery” on page 5-3.
2	Remove the recorder faceplate or recorder. See “Removing the Recorder Faceplate” on page 5-7 or “Removing the Optional Recorder (VS2 ⁺ Only)” on page 5-9.
3	<p>Remove the two Torx T20 screws from the top of the monitor.</p> 
4	<p>Remove the two nylon flathead screws from the bottom of the monitor.</p> <hr/> <p>Warning</p> <p>When you reassemble the monitor be sure to install the nylon screws in the bottom of the monitor. Installing metal screws in the bottom of the monitor can cause an electrical hazard.</p> <p>As shown in the illustration below, the nylon screws are associated with the symbol:</p>  <hr/> 

5 Gently pull the front panel up and over the handle, and while holding the two parts close together, disconnect the cables in the following order:

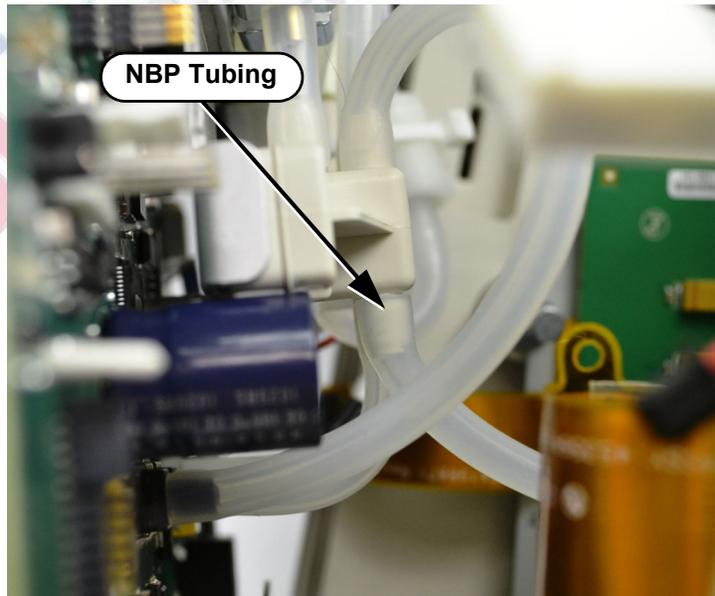
1. Temperature module cable
2. Communications board cable
3. SpO₂ board cable



- 6 On the opposite side of the monitor, disconnect the speaker cable and the power supply module cable.



- 7 Disconnect the NBP tubing from the bottom left connector on the NBP module.



- 8 Carefully and slowly pull the front panel away from the rear case.

Reassembling the Monitor

To reassemble the monitor:

Step	
1	<p>If you are replacing the front panel on a monitor with the wireless option, you must first remove the antenna hole cover from the replacement front panel by doing the following:</p> <ul style="list-style-type: none"> Remove the Torx T10 screw from the cover. <div data-bbox="738 520 1024 1136" data-label="Image"> </div> <ul style="list-style-type: none"> Remove the cover from the antenna hole and reinstall the antenna.
2	Reconnect the cables that run between the front panel and rear case.
3	Snap the front panel and rear case together and install the two Torx T20 screws in the handle.
4	<p>Install and hand-tighten the two nylon screws in the bottom of the case.</p> <hr/> <p>Warning</p> <p>Be sure to install the nylon screws in the bottom of the case. Installing metal screws in the bottom of the case can cause an electrical hazard.</p> <hr/> <p>Caution</p> <p>Only hand-tighten the nylon screws.</p> <hr/>
5	Replace the power cord and turn on the monitor.
6	If the monitor starts up properly, perform the required performance tests. See Chapter 3, “Performance Verification Testing.”

Replacing the Speaker

To replace the speaker:

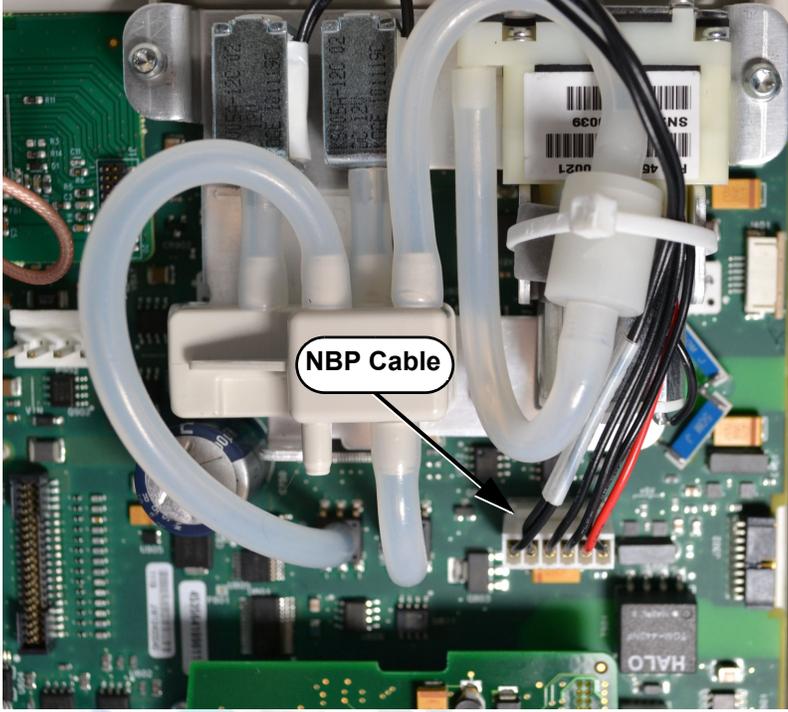
Step	
1	Separate the front panel from the rear case assembly to disconnect the speaker cable. See “Removing the Front Panel” on page 5-11.
2	Remove the speaker by gently lifting it over the ridge and sliding it out of the rear case. <div data-bbox="680 585 1269 978" data-label="Image"> </div>
3	Slide the speaker back into the rear case, connect the cable, and reassemble the monitor.
4	After you reassemble the monitor, ensure that the speaker works. Verify that a tone sounds when you power on the monitor and test the alarms. See the “Testing the Speaker” on page 4-31.

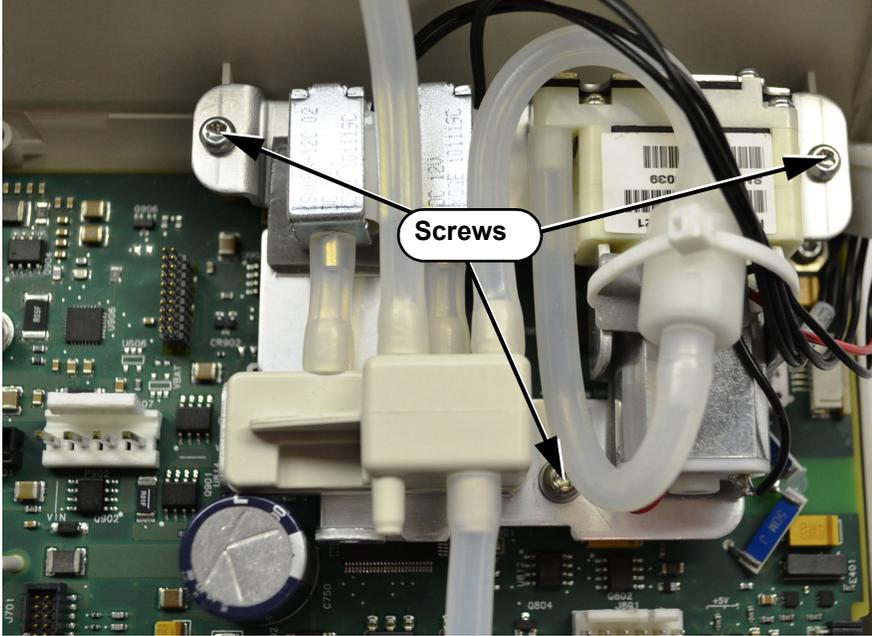
Removing the NBP Module

Caution After you replace the NBP module, you must reset the NBP cycle count and run the NBP test. For information about resetting the NBP cycle count, see “Viewing and Resetting Tracked Parameters” on page 4-35. For information about running the NBP test, see “NBP Tests” on page 3-13.

Removing the NBP Module

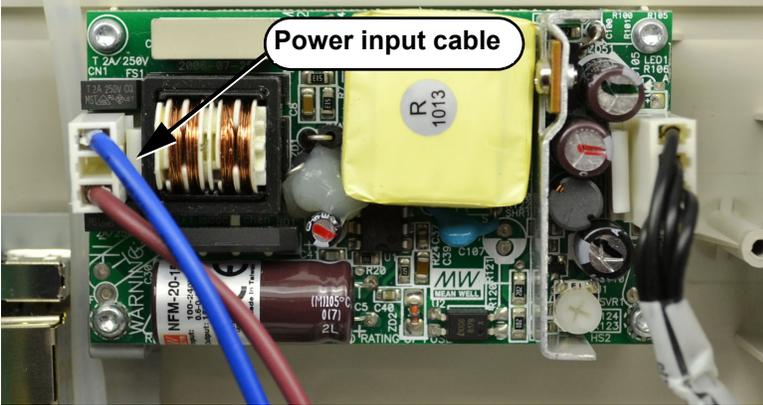
To remove the NBP module:

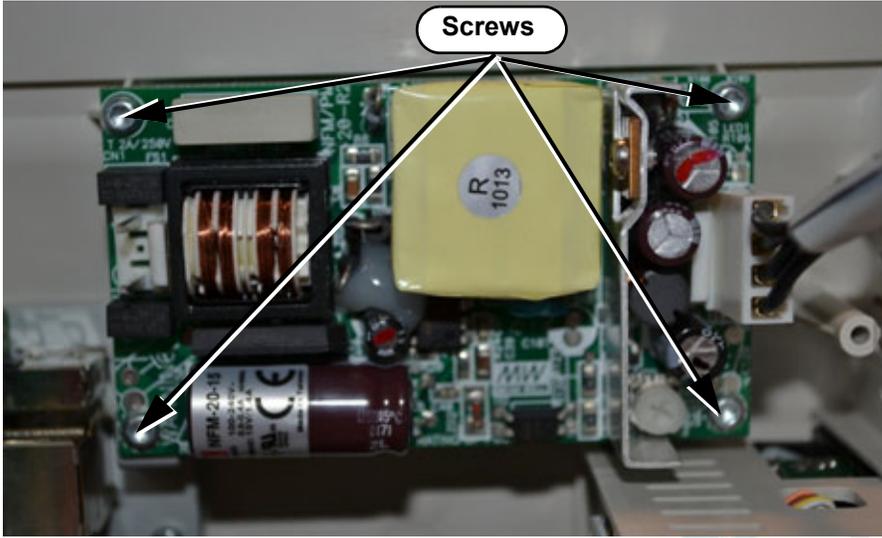
Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	<p data-bbox="386 411 902 443">Disconnect the NBP cable from the main board.</p> 
3	<p data-bbox="386 1224 914 1255">Disconnect the NBP tubing from the main board.</p> 

<p>4</p>	<p>Remove the three Torx T10 screws from the metal bracket attaching the NBP module assembly to the main board.</p> 
<p>5</p>	<p>Remove the assembly from the front case.</p>

Removing the Power Supply

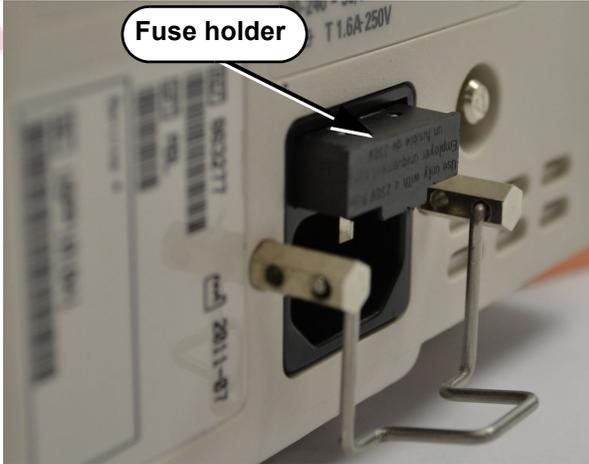
To remove the power supply:

Step	
<p>1</p>	<p>Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.</p>
<p>2</p>	<p>Disconnect the power input assembly cable.</p> 

3	<p>Remove the four Torx T10 screws and remove the power supply from the rear case.</p> 
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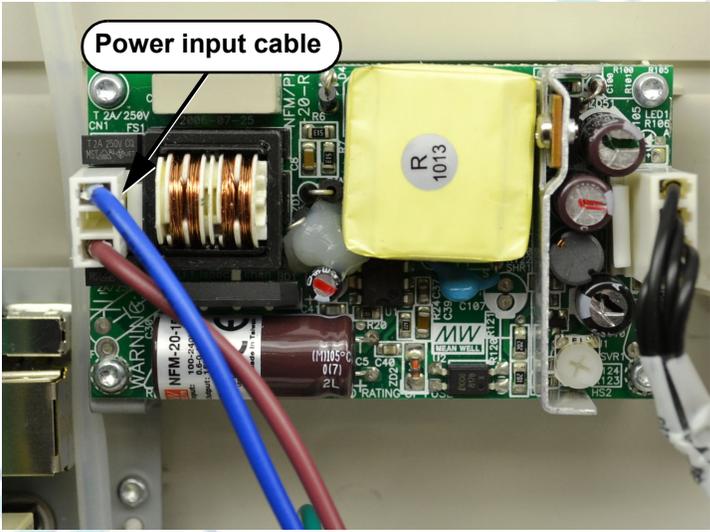
Replacing a Fuse

To replace a fuse in the AC power connector:

Step	
1	Remove the AC power cord from the rear of the monitor.
2	Remove the battery from the monitor. See “Removing the Battery” on page 5-3.
3	<p>Use a small flathead screwdriver to pry the fuse holder out of the AC power connector.</p> 
4	Replace the fuse(s), and then push the fuse holder back into the power connector until it snaps into place.

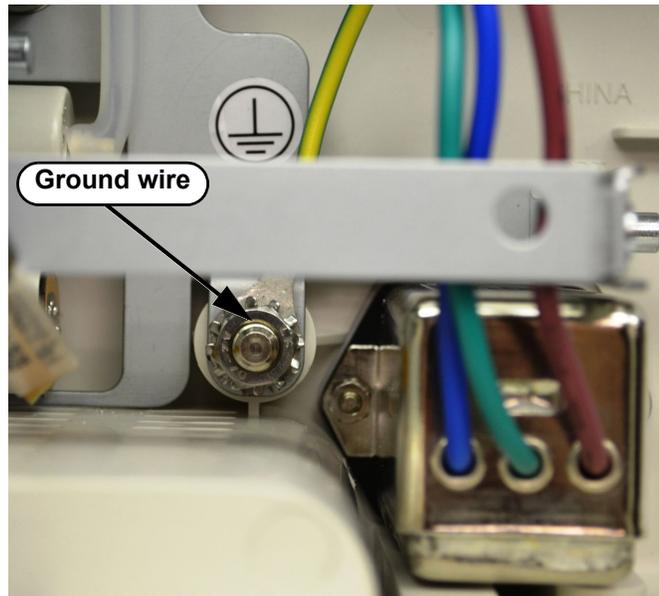
Removing the AC Power Connector

To remove the AC power connector:

Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	On the VS2 ⁺ with the recorder option, remove the recorder. See “Removing the Optional Recorder (VS2 ⁺ Only)” on page 5-9.
3	Remove the cable tie that secures the power input cables to the chassis.
4	<p>Disconnect the power input cable from the power supply assembly.</p> 

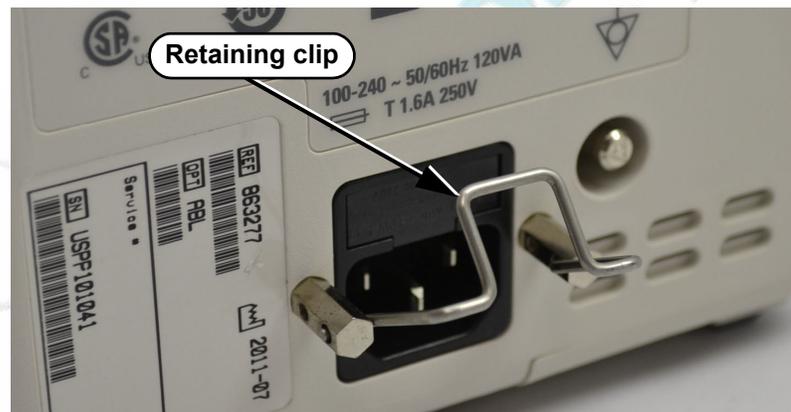
5

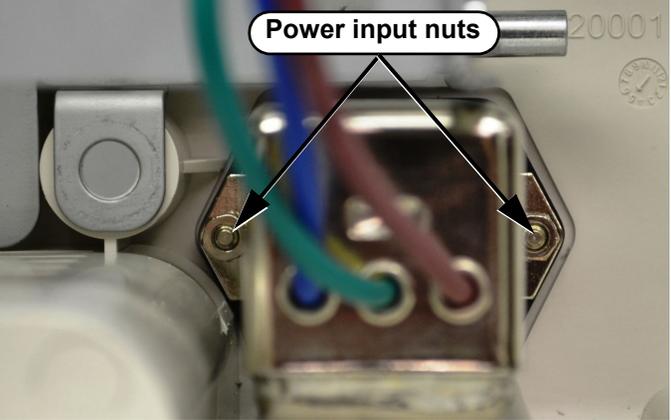
Disconnect the ground wire.



6

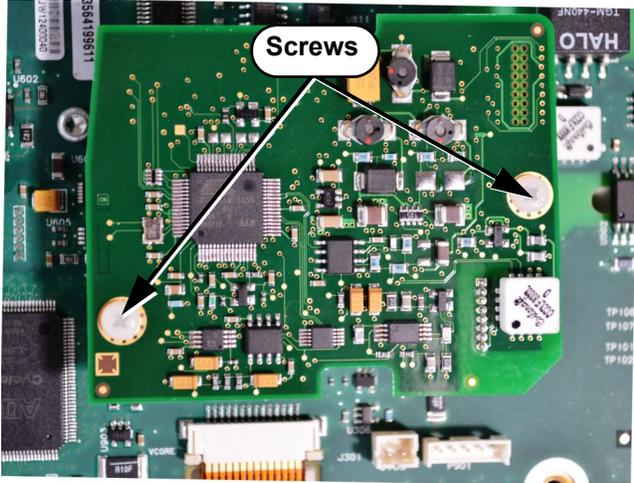
Squeeze the power cord retaining clip and remove it from the bolts.



<p>7</p>	<p>Remove the bolts by using a 6 mm wrench to hold the nut while unscrewing the bolt from the front.</p> 
<p>8</p>	<p>Remove the AC power input assembly from the inside of the rear case.</p> 

Removing the SpO₂ Board

To remove the SpO₂ board:

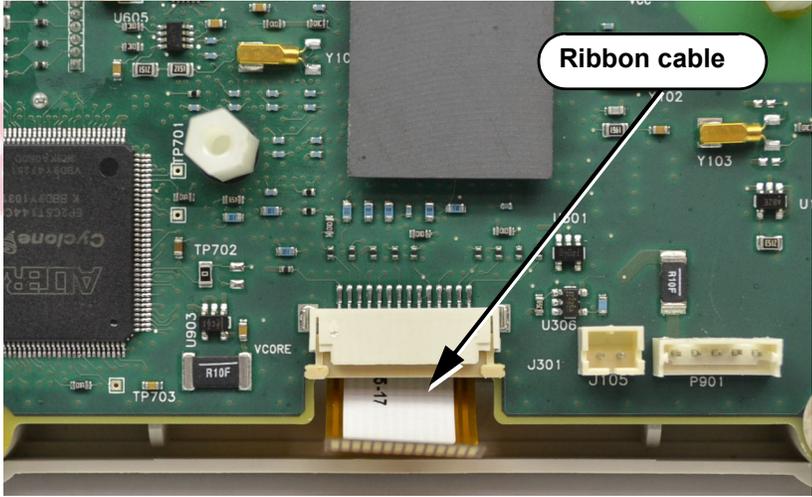
Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	Remove the two white plastic Phillips screws on the SpO ₂ board assembly. 
3	Lift the SpO ₂ board assembly straight up and off of the standoff pegs and away from the connectors on the main board.

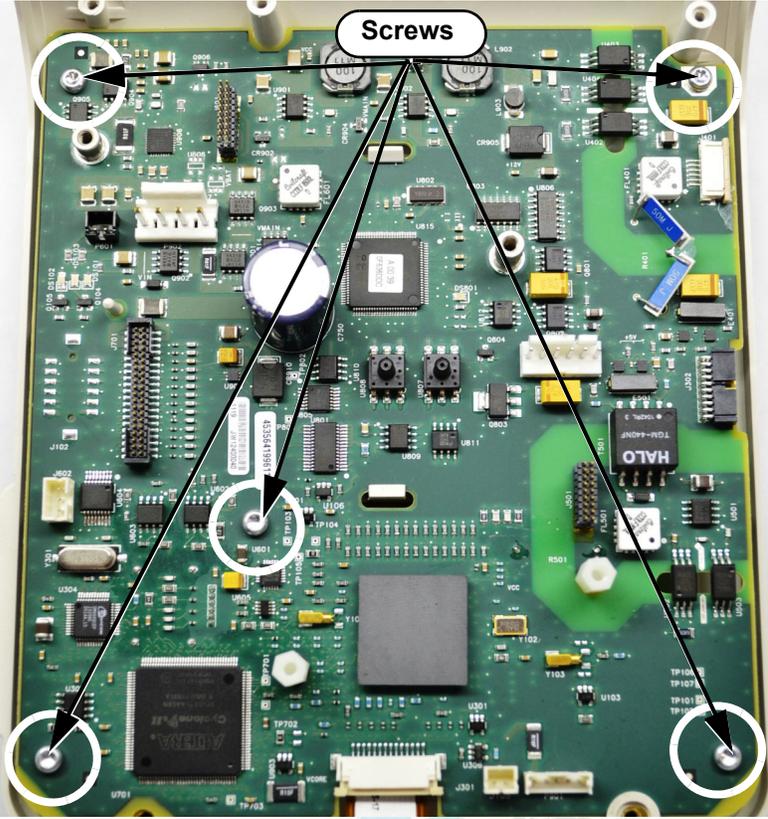
Replacing the Main Board

Caution To save your current configuration settings, export them before you replace the main board. For more information, see the *SureSigns VS2⁺ and VSi Installation and Configuration Guide*.

After you replace the main board, you must reset the monitor serial number and reconfigure the system. For information about resetting the serial number, see “Resetting the Serial Number” on page 5-25. For information about importing previous configuration settings, see the *SureSigns VS2⁺ and VSi Installation and Configuration Guide*.

To remove the main board:

Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	<p data-bbox="467 411 1398 474">On the SureSigns VS2⁺ monitor, remove the navigation wheel by pulling the wheel off of the stem.</p> 
3	Remove the NBP module. See “Removing the NBP Module” on page 5-15.
4	Remove the SpO ₂ board. See “Removing the SpO ₂ Board” on page 5-22.
5	On monitors with the wireless option installed, remove the wireless board. See “Removing the Wireless Board” on page 5-32.
6	<p data-bbox="467 1224 1000 1255">Disconnect the ribbon cable from the main board.</p> 

7	<p>Remove the five Torx T10 screws from the main board.</p> 
8	<p>Remove the main board from the front panel.</p>
9	<p>After you replace the main board and reassemble the monitor, you must perform the following procedures before use:</p> <ul style="list-style-type: none">• “Resetting the Serial Number” on page 5-25.• “Setting the System Configuration” on page 5-27.

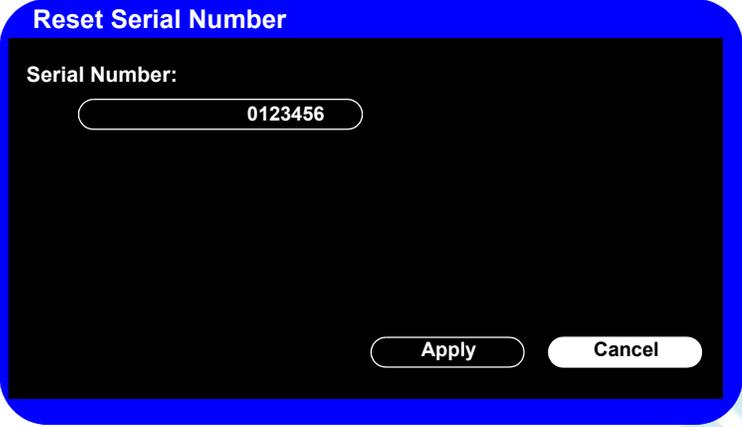
Resetting the Serial Number

When you replace the main board, you must reset the monitor's serial number. The serial number appears in a label (marked **SN**) on the back of the monitor as shown below.



To reset the serial number:

Step	
1	Access the System Diagnostics menu. For detailed information, see “Running System Diagnostics” on page 4-29.
2	Select the Maintenance >> button.
3	In the window that appears, enter the password, 1-2-9 , as shown: <div data-bbox="756 1262 1192 1402" style="border: 2px solid red; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; margin: 0;">Please enter the password:</p> <div style="display: flex; justify-content: center; gap: 10px;"> 1 2 9 </div> <div style="display: flex; justify-content: center; gap: 20px; margin-top: 5px;"> OK Cancel </div> </div>
4	The complete System Diagnostics menu, including the Maintenance options, appears. <div data-bbox="553 1520 1239 1923" style="border: 2px solid blue; border-radius: 15px; padding: 10px; margin: 10px auto; width: 80%;"> <p style="color: blue; margin: 0;">System Diagnostics</p> <p style="color: red; margin: 0;">Monitoring Suspended</p> <p>NBP Cycle Count: 36</p> <p>LCD Usage Hours: 231</p> <p>Errors: 0</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-between;"> <div style="width: 30%;"> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Self Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Audio Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Keys Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">NBP Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Clear Data</p> </div> <div style="width: 30%;"> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Error Log</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Display Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Battery Info</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Network Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Reset S/N</p> </div> <div style="width: 30%;"> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Reset</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Reset</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Reset</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Recorder Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">LED Test</p> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px;">Configuration</p> </div> </div> <p style="text-align: center; border: 1px solid gray; border-radius: 5px; padding: 2px; margin-top: 10px;">Return</p> </div> <div style="margin-left: 10px; margin-top: 10px;"> <p>VS2⁺ only</p> </div>

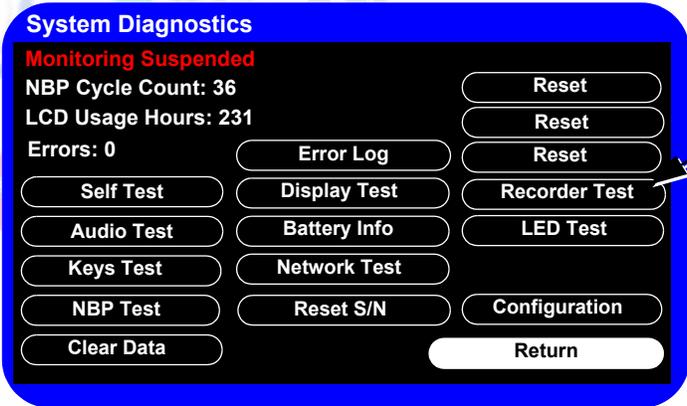
<p>5</p>	<p>Select the Reset S/N button. The Reset Serial Number menu appears.</p> 
<p>6</p>	<p>Select the Serial Number button. A keyboard appears.</p> 
<p>7</p>	<p>Enter the serial number (from the label on the back of the monitor), and then select the OK button to save the change.</p>
<p>8</p>	<p>Select the Apply button.</p>
<p>9</p>	<p>In the window that appears, select the OK button. The monitor restarts.</p>

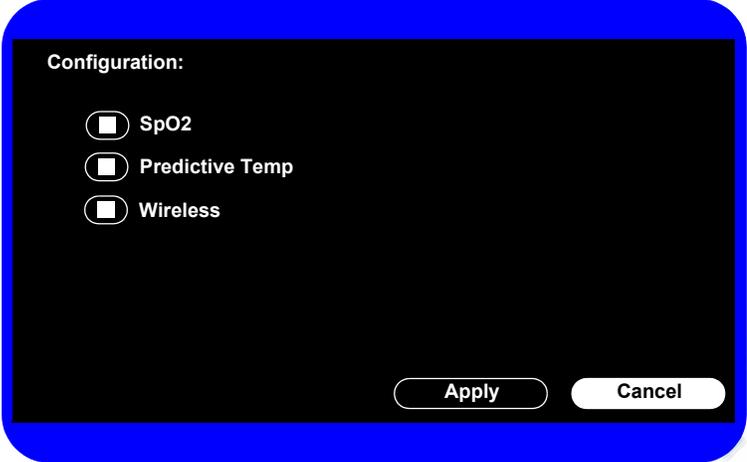
Setting the System Configuration

When the monitor performs a self test, it first checks its system configuration. If you replace the main board, you must reprogram the system configuration.

Caution The system configuration settings must match the hardware installed on the monitor. Incorrect settings may result in system malfunction alarm messages and the monitor not starting up. If this happens, correct the system configuration settings.

To reset the system configuration:

Step	
1	Access the System Diagnostics menu. For detailed information, see “Running System Diagnostics” on page 4-29.
2	Select the Maintenance >> button.
3	<p>In the window that appears, enter the password, 1-2-9, as shown:</p> 
4	<p>Select the OK button.</p> <p>The complete System Diagnostics menu, including the Maintenance options, appears.</p> 

5	<p>In the System Diagnostics menu, select the Configuration button. The Configuration menu appears:</p> 
6	<p>Select each option to be used. Note — For detailed information about the Wireless settings, see the <i>SureSigns VS2⁺ and VSi Network Configuration Guide</i>.</p>
7	<p>Select the Apply button.</p>
8	<p>In the window that appears, select the OK button. The monitor restarts.</p>

Removing the LCD

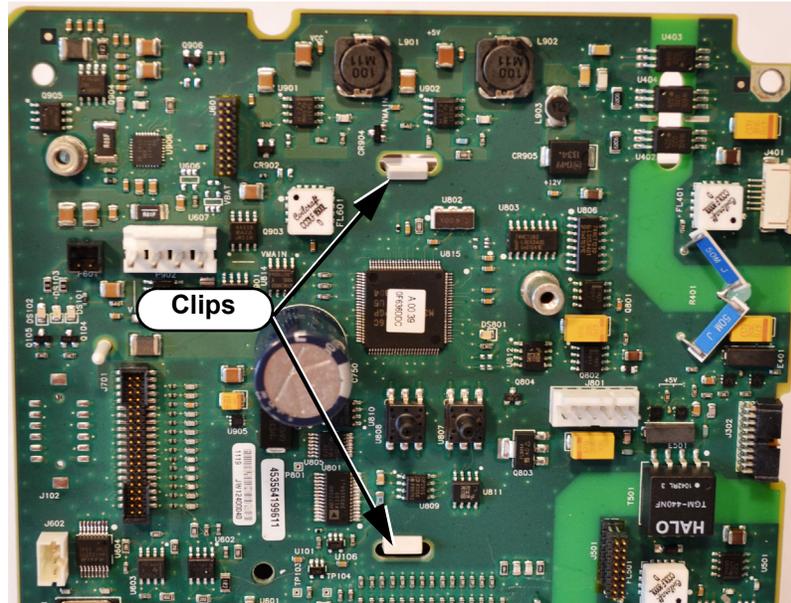
- Caution**
- Perform this procedure in a dust-free environment to avoid damage to the LCD display.
 - After you replace the LCD, you must reset the LCD Usage Hours. For more information about resetting the LCD Usage Hours, see “Viewing and Resetting Tracked Parameters” on page 4-35.

To remove the LCD:

Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	Remove the main board. See “Replacing the Main Board” on page 5-22.

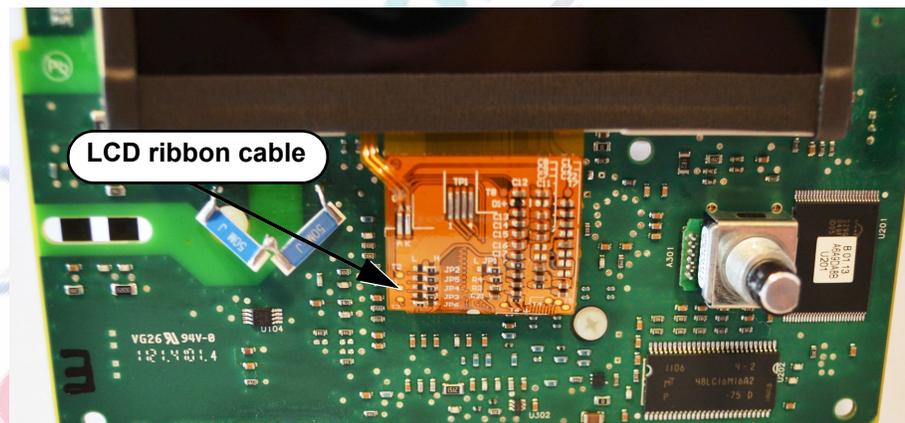
3

Disengage the two clips that attach the LCD module to the main board.



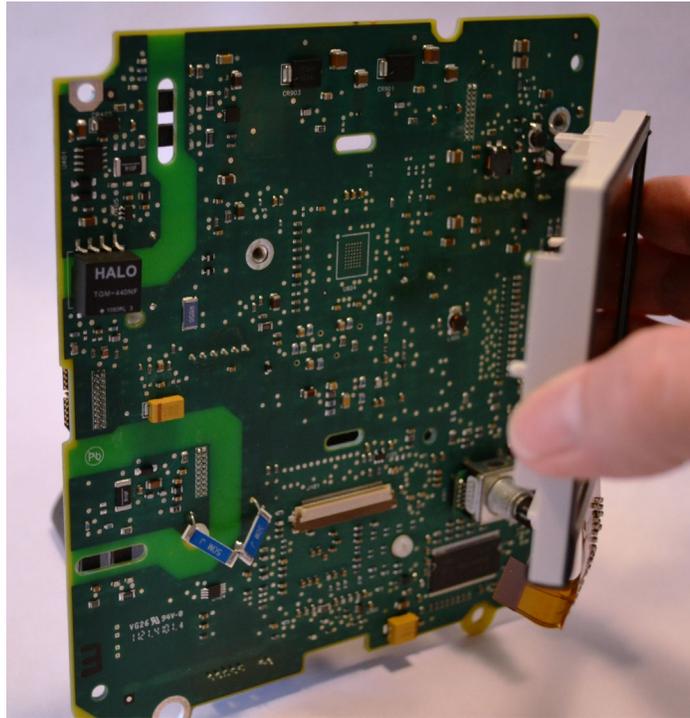
4

Disconnect the LCD ribbon cable from the main board.



5

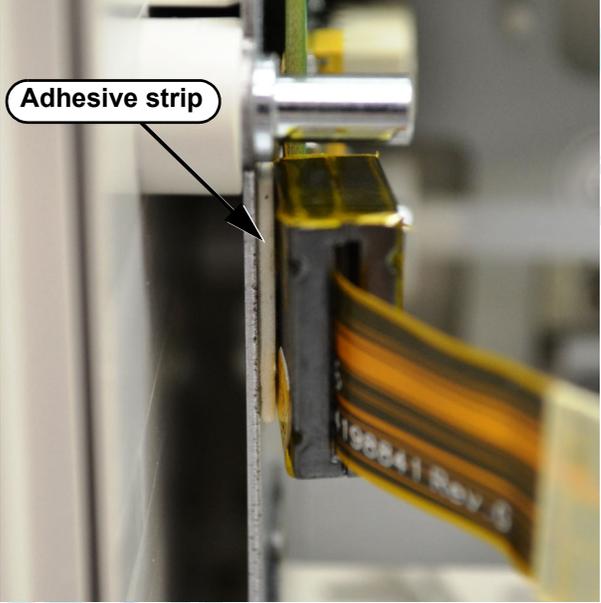
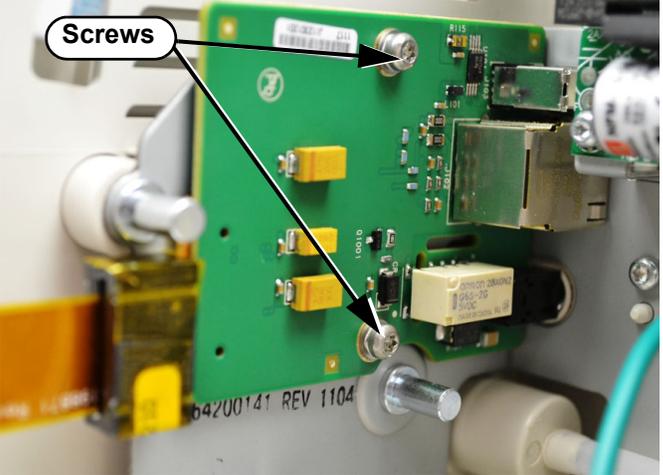
Remove the LCD from the front panel.



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Monitors
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Removing the Communications Board

To remove the communications board:

Step	
1	Separate the front and rear monitor case assemblies. See “Removing the Front Panel” on page 5-11.
2	<p>Remove the cable from the chassis by inserting a sharp tool under the adhesive strip and removing it.</p> 
3	<p>Remove the two Torx T10 screws and washers holding the communications board to the chassis assembly.</p> 
4	Lift the board out of the rear case.

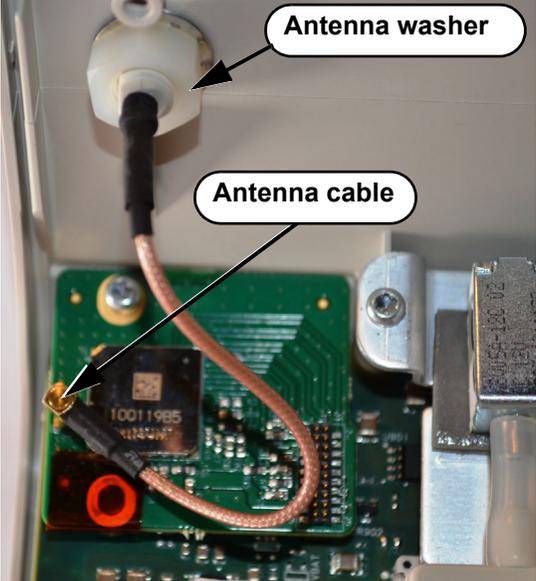
Removing the Wireless Board

To replace the wireless board:

Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	Pull the antenna cable upward to disconnect it from the wireless board. 
3	Loosen the antenna washer and then remove the antenna from the front case. 
4	Remove the Torx T10 screw from the wireless board and remove the board from the front panel.

Removing the Antenna

To remove the antenna:

Step	
1	Separate the front panel from the rear case assembly. See “Removing the Front Panel” on page 5-11.
2	Disconnect the antenna cable from the wireless board and remove the washer. 
3	Unscrew the antenna and remove it from the front panel.