

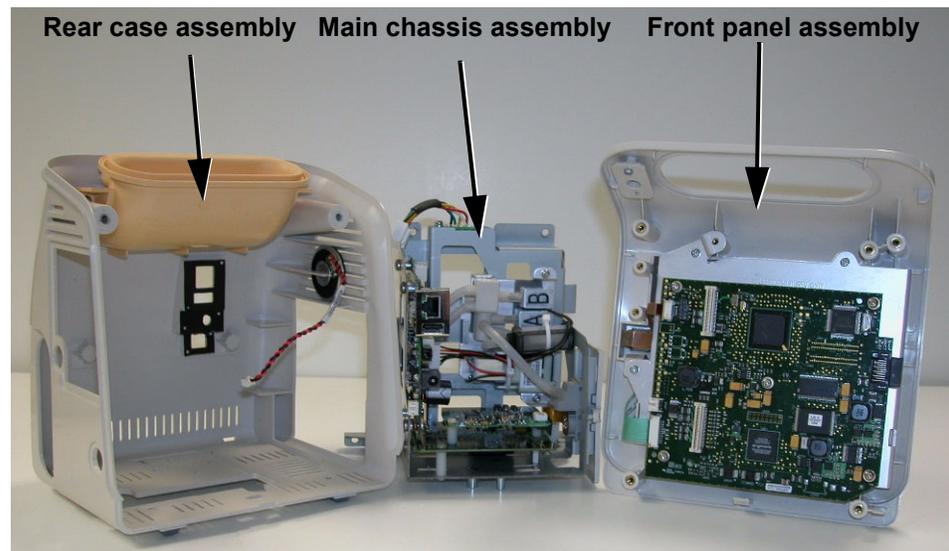
Repairing the Monitor

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 three main assemblies:

- Rear case assembly
- Main chassis assembly
- Front panel assembly



For more information on replaceable parts, see Chapter 8, “Replacement Parts and Assembly Drawings.”

Warning Before attempting to open or disassemble the monitor, disconnect the AC power from the monitor and remove the battery. High voltage is generated by the LCD backlight driver.

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

Warning 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 on performing safety and performance tests, see Chapter 5, “Performance Verification Testing.”

Note — If your monitor is equipped with a wireless assembly, remove all of the wireless components before performing any of the following procedures. For more information, see the *SureSigns VS2 Wireless Installation and Setup Guide*.

Tools Required for Service

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

- #1, #2 Phillips head screwdrivers
- Torx T10, T20 screwdrivers
- Medium slotted screwdriver
- Needle-nose pliers
- Plastic cable zip ties
- Wire cutters
- ESD mat and wrist strap

Replacing the Battery

Caution Before removing the battery, perform a monitor hard shutdown.

Performing a Hard Shutdown

Perform a hard shutdown whenever you need to power down for a battery change or reset the barcode scanner. This ensures that all patient and system data is saved in memory.

To perform a hard shutdown:

1. Press the **System Admin** key.
2. In the **System Menu**, rotate the wheel until the **System Admin** button is highlighted, and then press the wheel.
3. In the window that appears, enter the Administrator password, **2-1-5**, as shown:

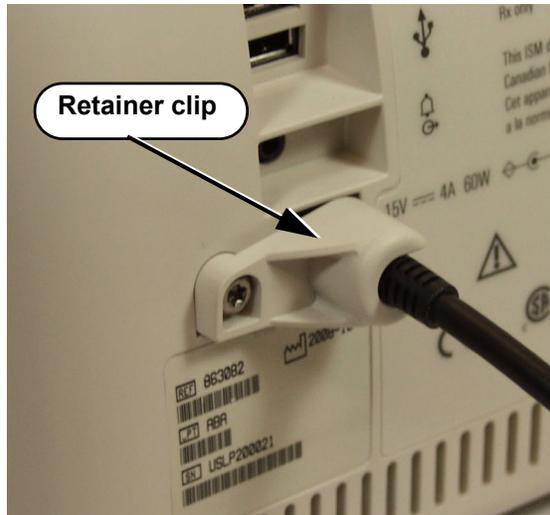


4. In the **System Admin Menu**, rotate the wheel until the **Service** button is highlighted, and then press the wheel.
5. In the **Service Menu**, rotate the wheel until the **Shutdown** button is highlighted and then press the wheel.
6. In the window that appears, rotate the wheel until **Yes** is highlighted and then press the wheel.
The system shuts down.

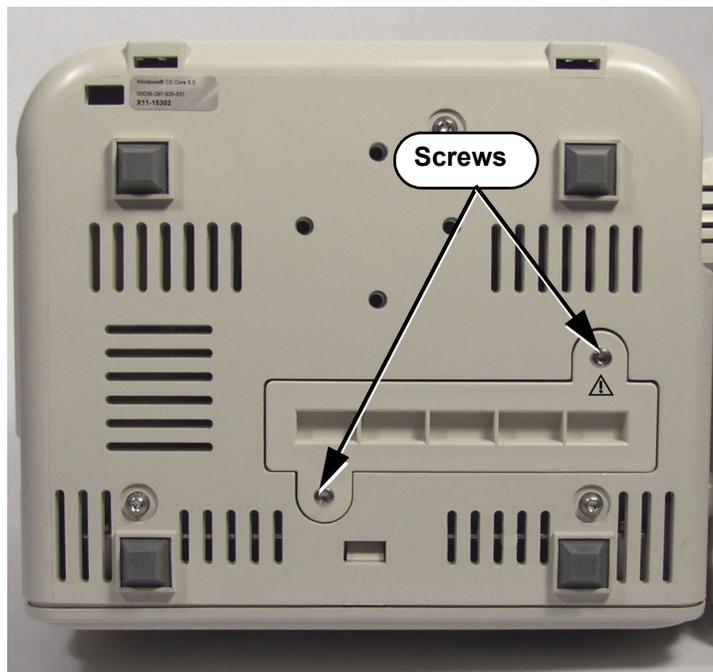
Removing the Battery

To remove the battery:

1. Remove the power cord retainer clip and then remove the power cord from the rear of the monitor.



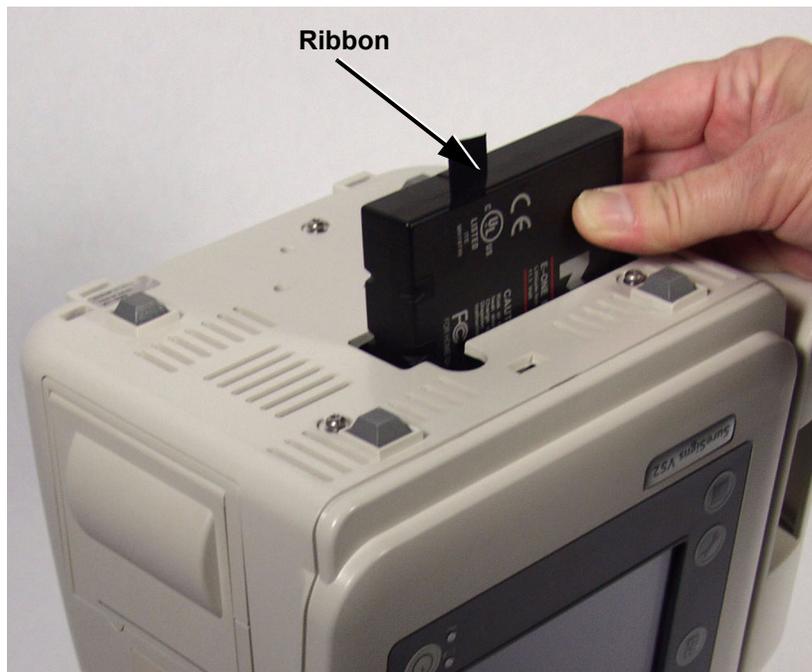
2. Remove the 2 screws from the battery cover on the bottom of the monitor.



Caution Place the monitor upside down when you remove the battery. The battery is not secured inside the monitor and may fall out when the cover is removed.

Replacing the Battery

3. Grasp the ribbon on the battery and pull the battery out of the monitor.



Installing the Battery

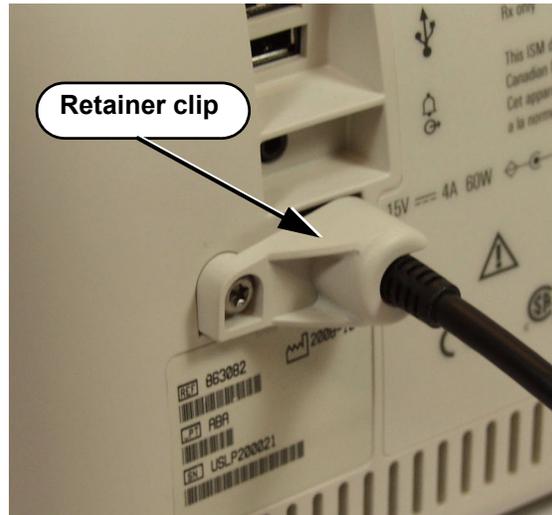
To install the battery:

1. Orient the battery so that the contacts are toward the rear case and the ribbon is towards the front panel.
2. Insert the battery into the empty battery compartment.
3. Replace the battery cover and the two screws.
4. Confirm that the battery is seated by observing that the battery LED is lit.

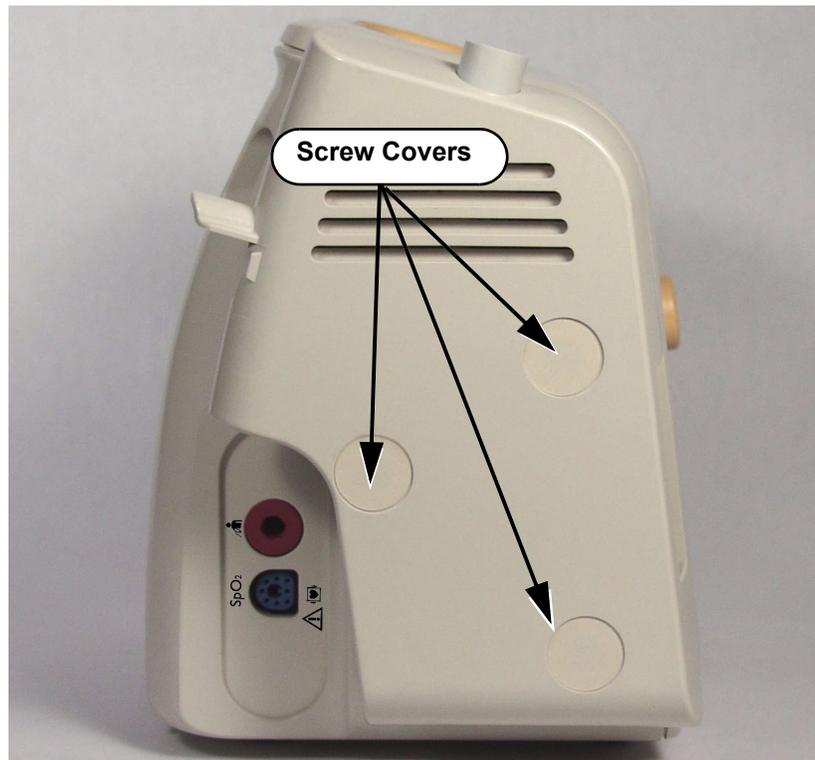
Removing the Temperature Module

To remove the temperature module:

1. If necessary, remove the power cord retainer clip and then remove the power cord from the rear of the monitor.

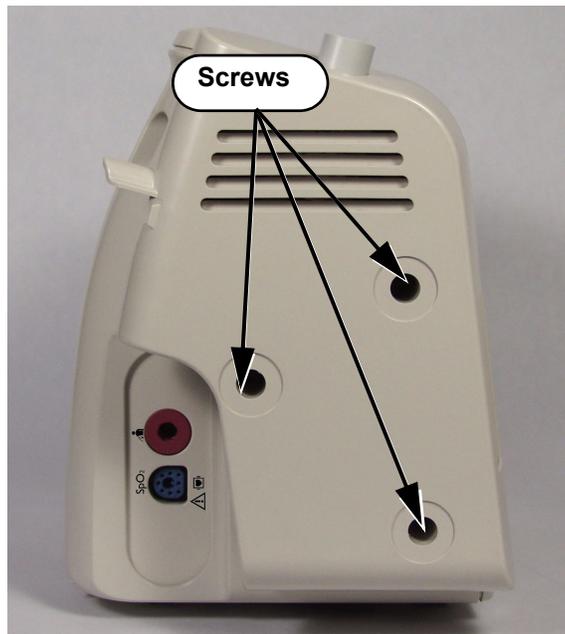


2. Remove the temperature probe and well.
3. Remove the battery from the monitor. See "Removing the Battery" on page 7-3.
4. Remove the adhesive covers from the screw holes by inserting a sharp, pointed tool under the edge of the covers.



Removing the Temperature Module

5. Remove the three Torx T20 screws from the temperature module.



6. Pull the module straight away from the monitor.

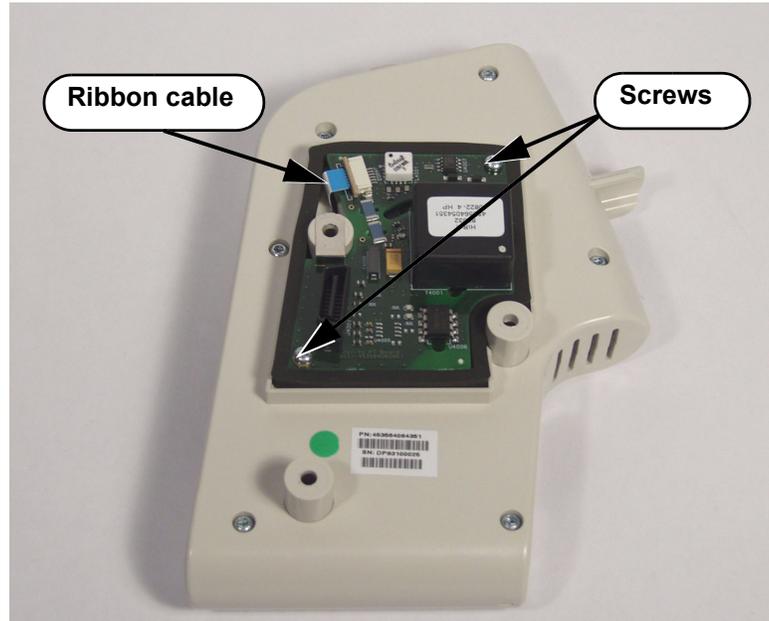


Caution After you replace the temperature module, perform the temperature accuracy test. For more information, see the “Temperature Test” on page 5-13.

Replacing the Temperature Adapter Board

To replace the Temperature Adapter board:

1. Remove the temperature module. See “Removing the Temperature Module” on page 7-5.
2. Remove the ribbon cable.



3. Remove the two Torx T10 screws from the board and remove the board from the module.



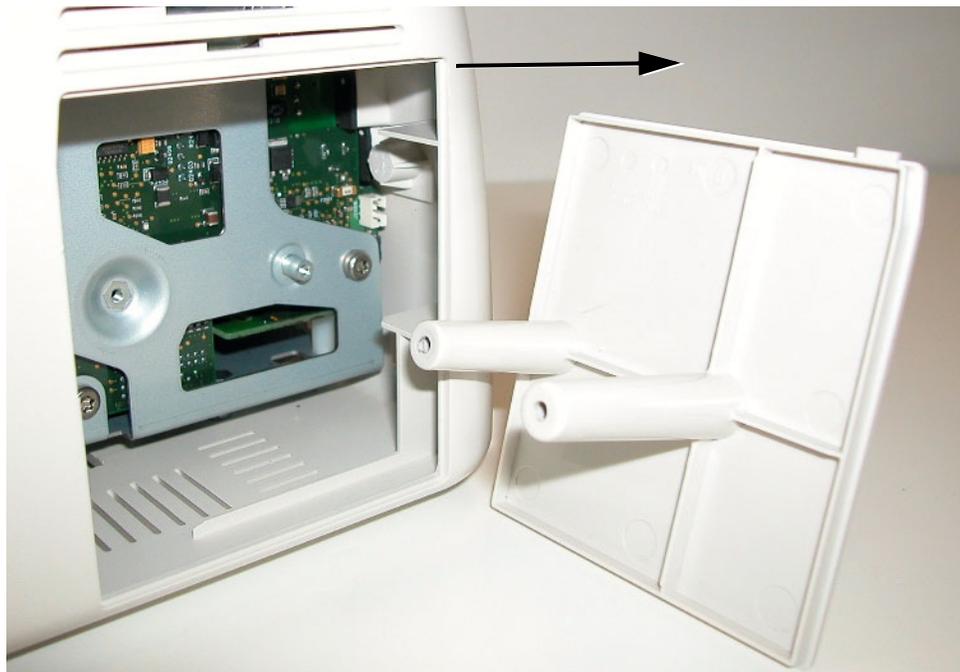
Removing the Recorder Faceplate

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

1. Remove the plastic strip covering the two Torx T10 screws holding the faceplate to the monitor case.



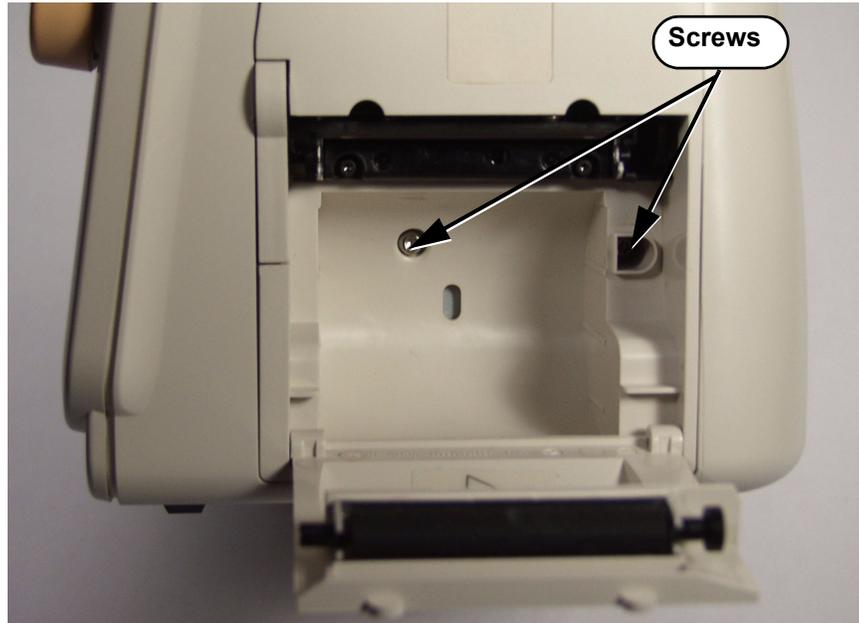
2. Remove the two screws and pull the faceplate straight away from the monitor.



Removing the Optional Recorder

To remove the optional recorder:

1. Open the recorder door on the rear case assembly and remove the paper roll.
2. Loosen (do not try to remove) the two Torx T10 screws holding the recorder to the monitor case.



3. Place your two thumbs on either side of the recorder case and pull it straight out of the assembly and away from the recorder connector on the main board.



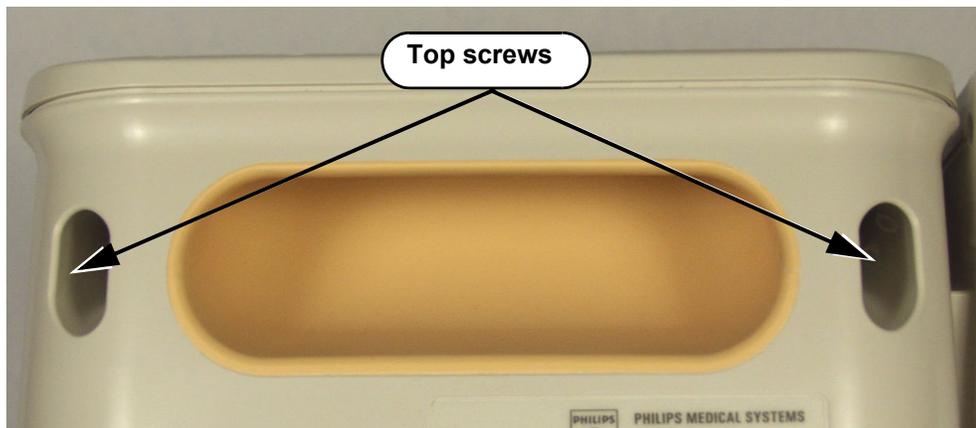
Caution When you reassemble the recorder or faceplate, do not overtighten the screws.

Removing the Rear Case

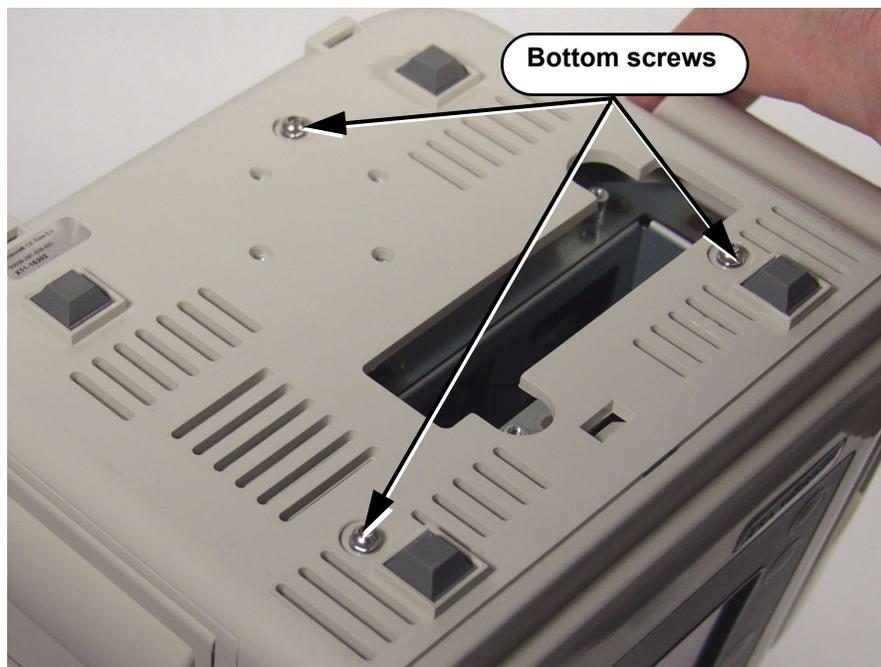
To open the monitor to install internal replacement parts, you must first separate the rear case from the front panel and main chassis assemblies.

To remove the rear case:

1. Remove any lines from the patient monitoring and communication connectors.
2. If the monitor has a power cord retainer clip, remove it, and then remove the power cord from the back of the monitor. See “Installing the Power Cord Retainer Clip” on page 4-22.
3. Remove the battery from the monitor. See “Removing the Battery” on page 7-3.
4. If the monitor has a recorder, remove it. See “Removing the Recorder Faceplate” on page 7-8.
5. If the monitor has a temperature module, remove it. See “Removing the Temperature Module” on page 7-5.
6. Remove the two Torx T20 screws from the top of the monitor.



7. Remove the three bottom screws.

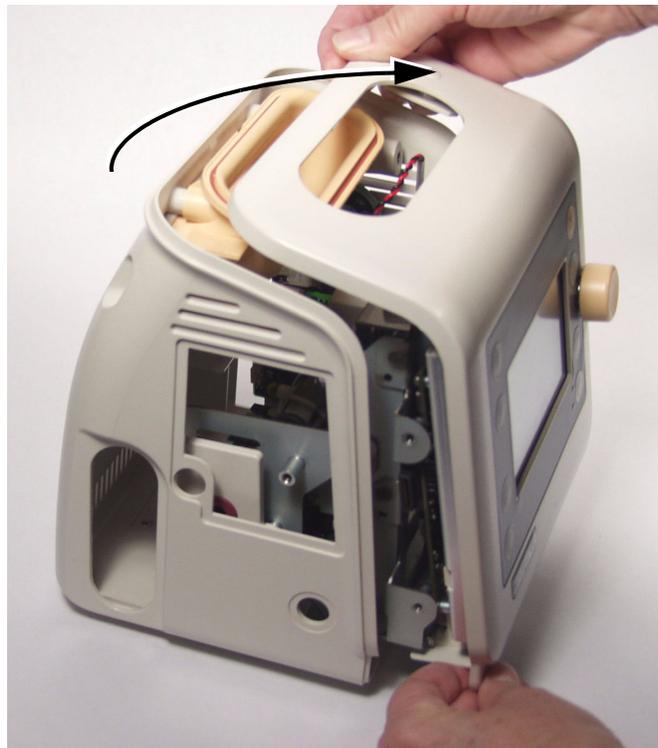


8. Insert a small slotted screwdriver into the slot on the bottom of the monitor and press the tab to release the front panel from the monitor.



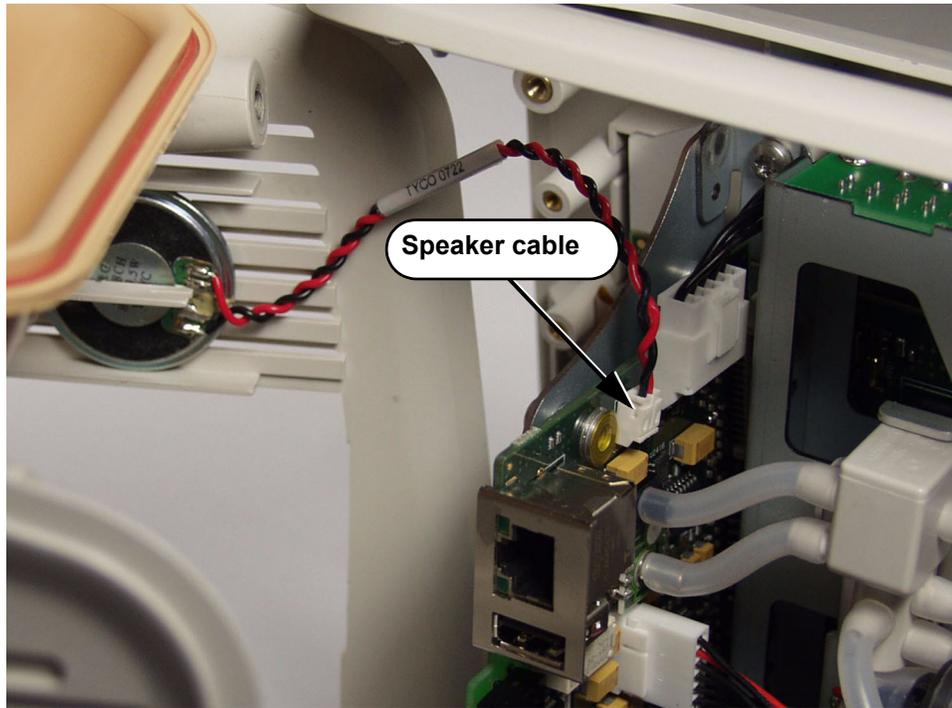
9. Lift the front panel assembly carefully and slowly over the handle and pull it away.

Caution Connectors run between the front and rear case assemblies.

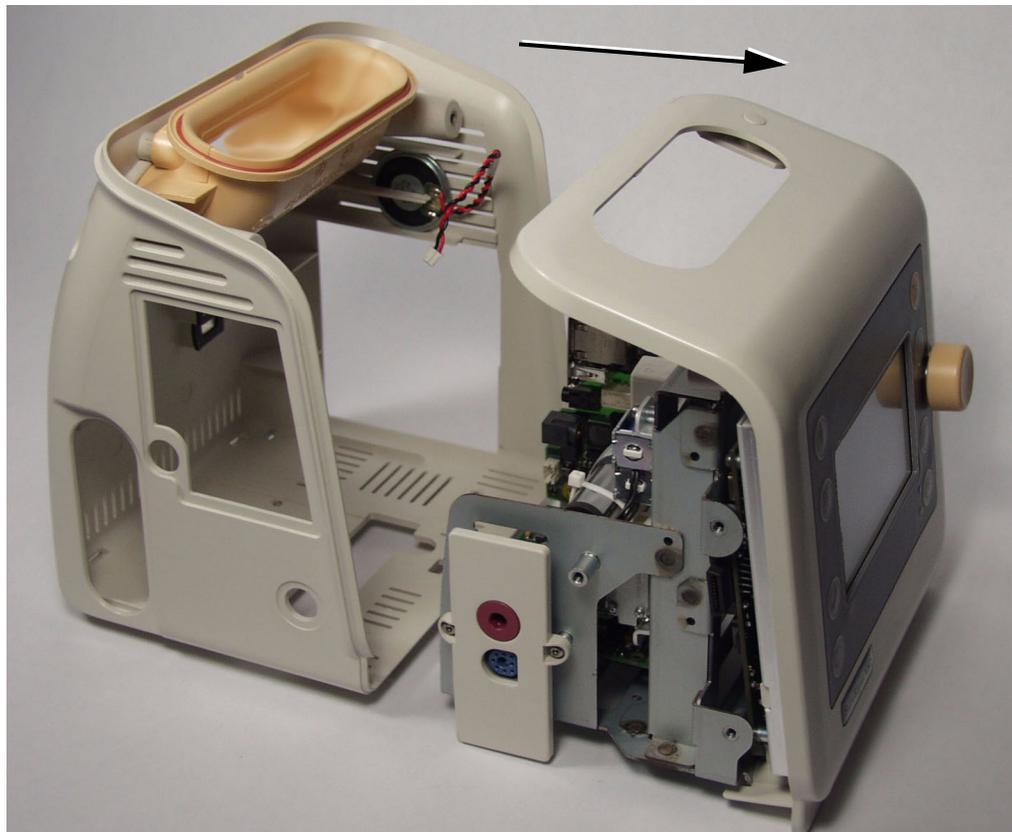


Removing the Rear Case

10. Disconnect the speaker cable from the assembly.



11. Separate the front and rear cases.



Reassembling the Monitor

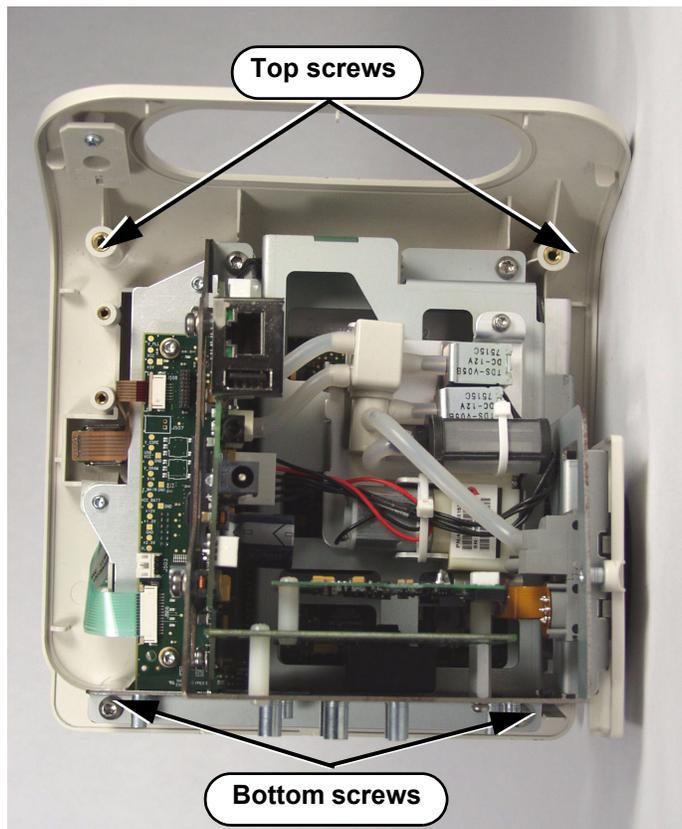
To reassemble the monitor:

1. Reconnect the cables.
2. Line up the tab on the front case with the slot on the bottom of the rear case and slip the front assembly case over the handle.
3. Snap the two assembly cases together and install the three screws.
4. Replace the power cord and the power cord retainer. See “Installing the Power Cord Retainer Clip” on page 4-22, and then power up the monitor.
5. If the monitor starts up properly, perform the required performance tests. See “Testing and Inspection Guidelines” on page 5-1.

Removing the Main Chassis Assembly

To remove the main chassis assembly from the front case:

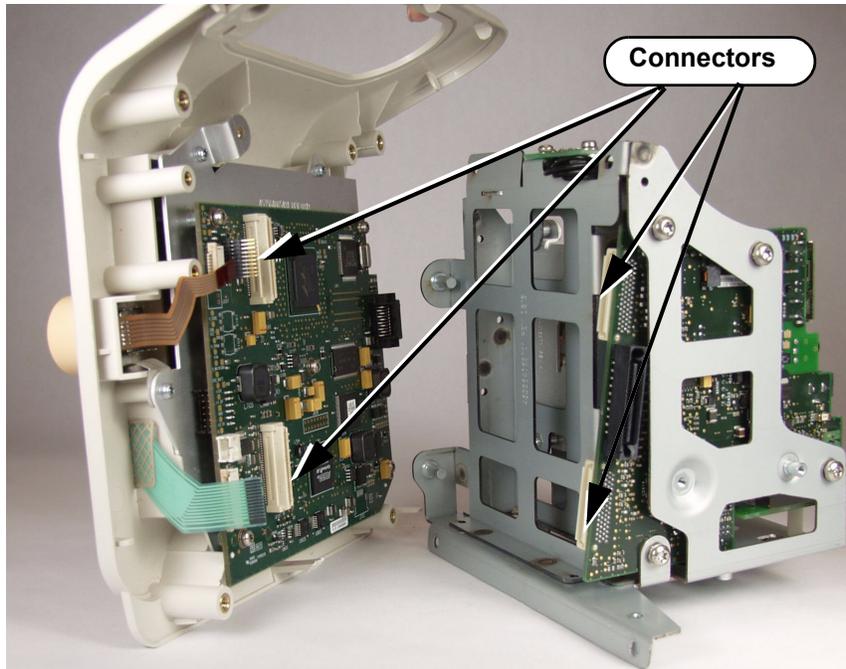
1. Separate the front and rear case assemblies. See “Removing the Rear Case” on page 7-10.
2. On the front case, remove the four Torx T20 screws from the main chassis assembly and pull it away from the front panel assembly.



Reassembling the Main Chassis Assembly

To reassemble the main chassis assembly:

1. Line up the connectors on the daughter board with those on the main board.

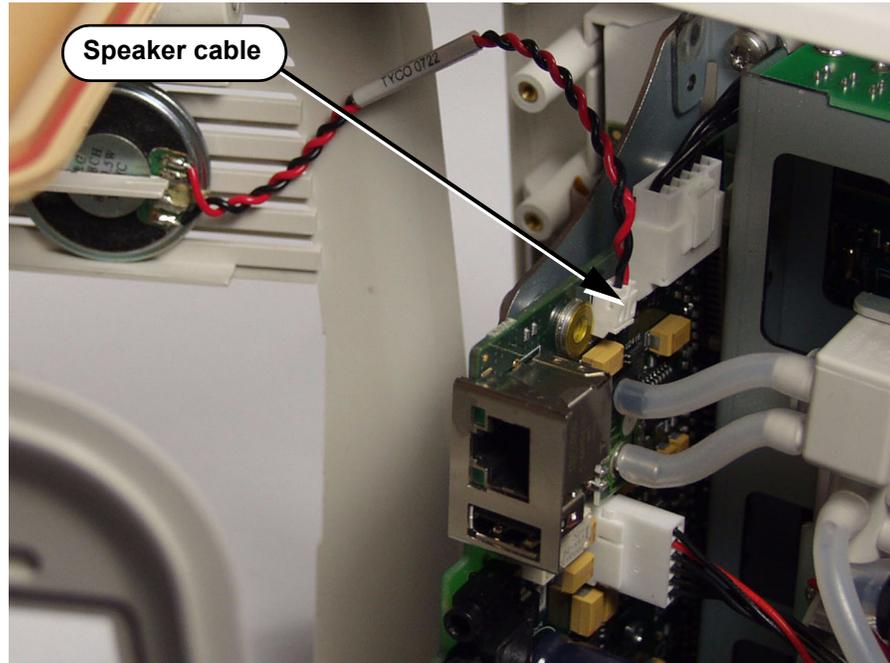


2. Push the parts together until they snap in place.
3. Replace the four Torx T20 screws.

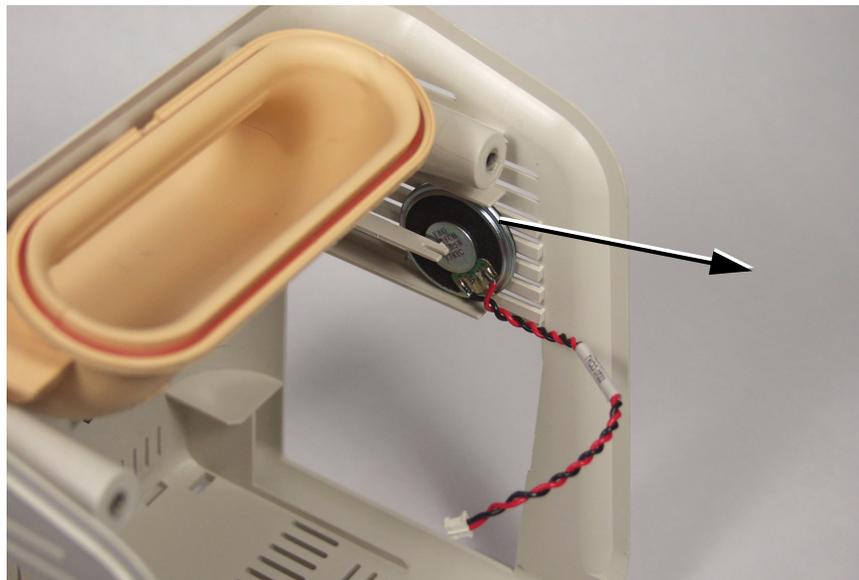
Removing the Speaker

To remove the speaker:

1. Separate the front and rear case assemblies. See “Removing the Rear Case” on page 7-10.
2. Disconnect the speaker cable from the daughter board.



3. Remove the speaker by sliding it out of the rear case.

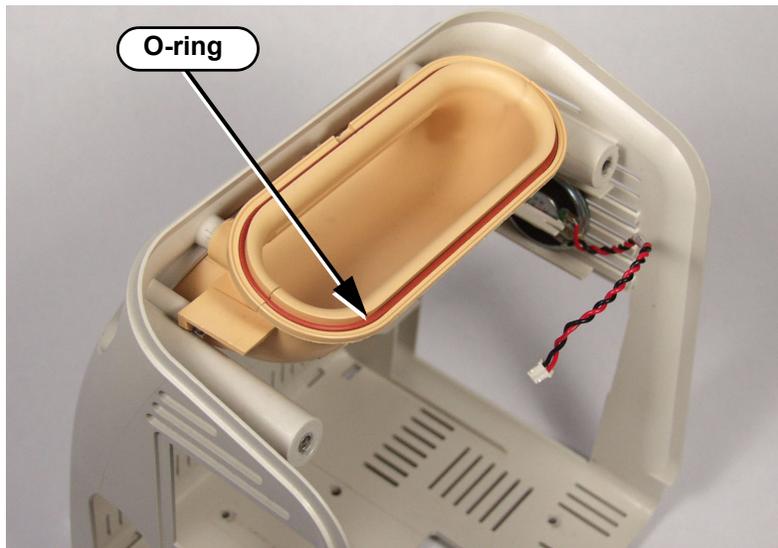


4. After reassembling the monitor, ensure the speaker works. Verify that a chime sounds when you power on the monitor and test the alarms. See “Alarms Test” on page 5-7.

Replacing the Handle O-Ring

To replace the handle O-ring:

1. Separate the front and rear case. See “Removing the Rear Case” on page 7-10.
2. Gently pull the O-ring from its position in the handle. If the O-ring has been damaged or torn, be sure to remove all of the pieces from the channel in the handle.



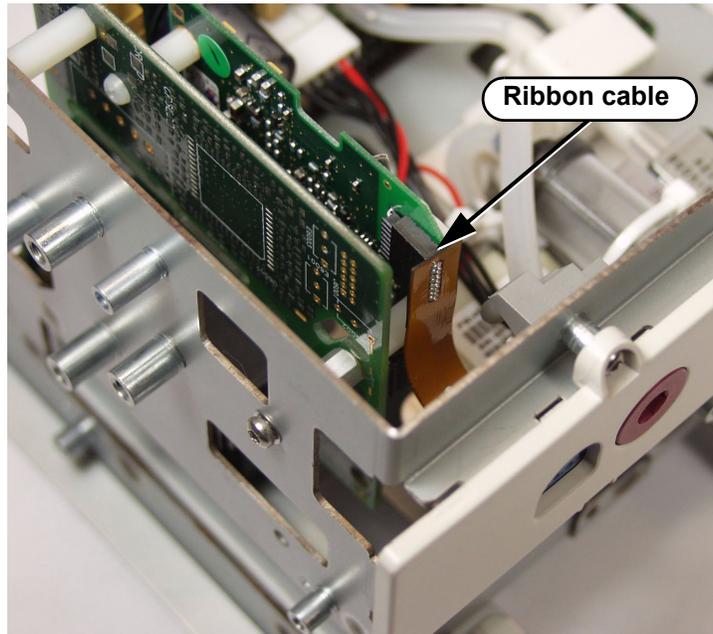
3. Place a new O-ring in the handle and tap it into place all along the channel.

Removing the Connector Panel Assembly

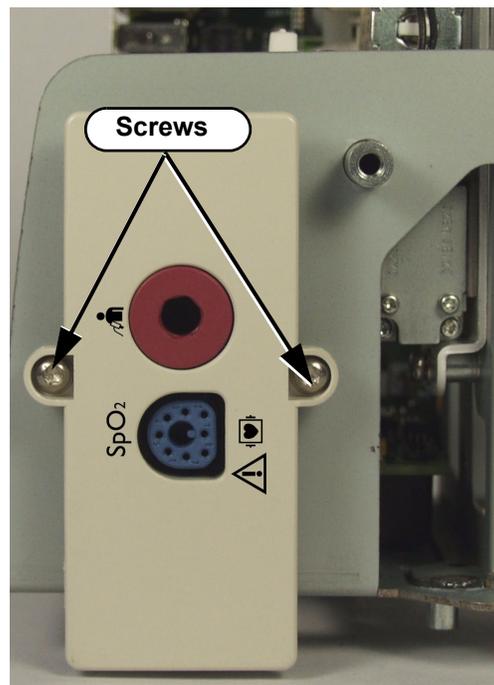
To remove the connector panel from the monitor:

1. Separate the front and rear monitor cases. See “Removing the Rear Case” on page 7-10.

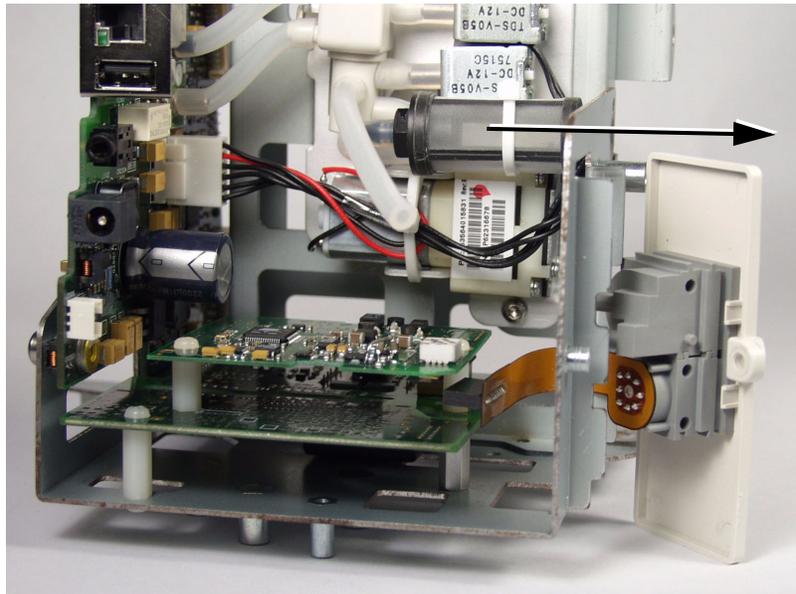
2. Use a knife to remove the glue between the connector and the board, and then disconnect the ribbon cable from the SpO₂ board.



3. On the main chassis, remove the two screws from the connector panel assembly.



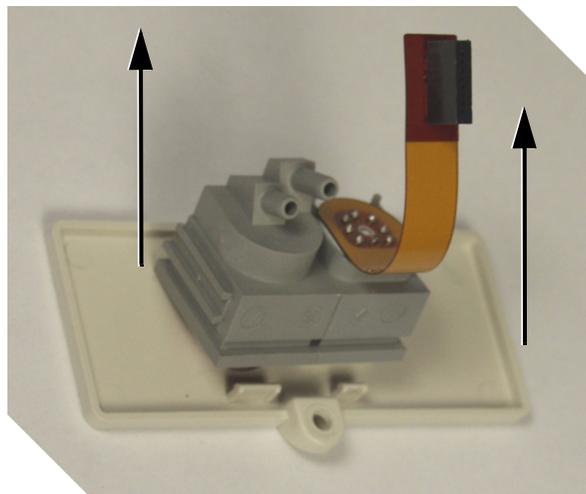
4. Remove the connector panel assembly from the chassis.



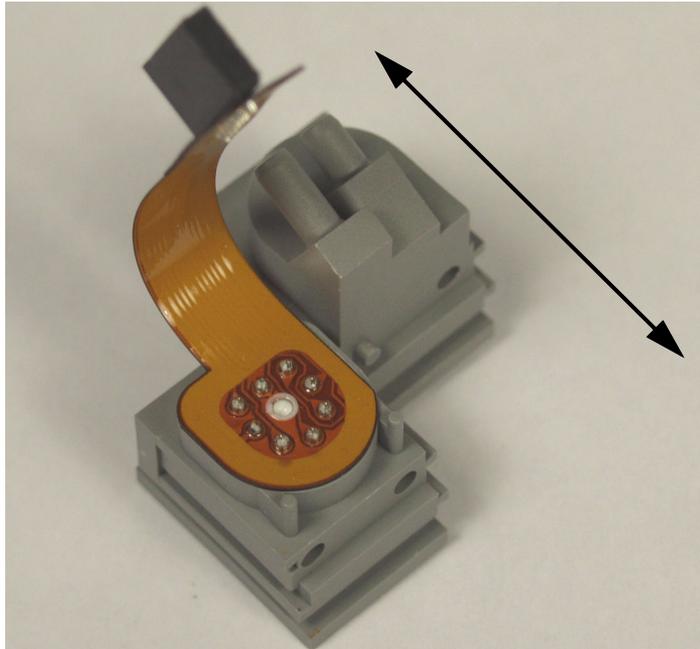
Removing the Connector Blocks

To remove the connector blocks from the connector panel assembly:

1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Remove the connector panel assembly. See “Removing the Connector Panel Assembly” on page 7-16.
3. Press the connector blocks in the direction shown until they are released and lift them out of the connector panel assembly.



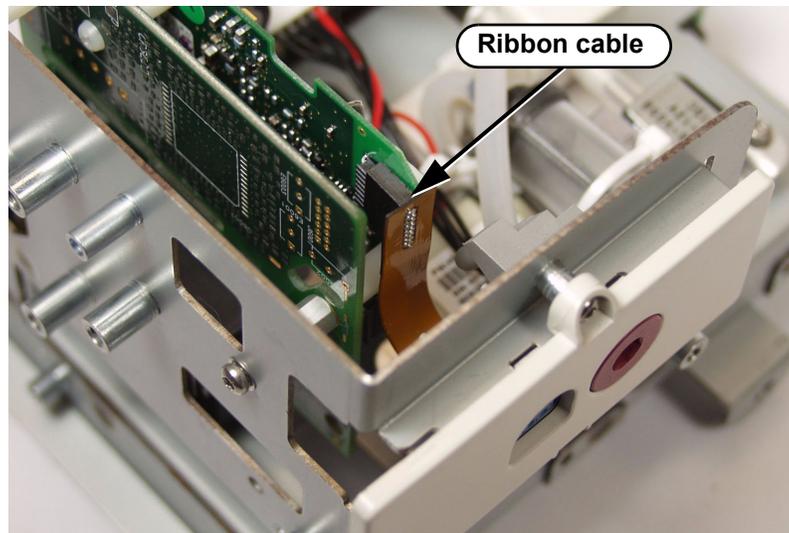
4. Slide the blocks in opposite directions to separate the NBP and SpO₂ connectors.



Removing the SpO₂ Board

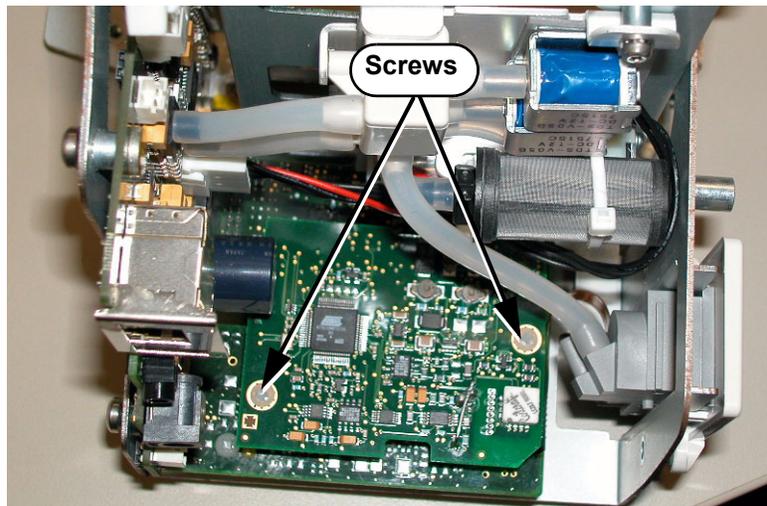
To remove the SpO₂ board:

1. Remove the rear case. See “Removing the Rear Case” on page 7-10.
2. Disconnect the SpO₂ ribbon cable.



Removing the SpO₂ Adapter Board

3. Remove the two white plastic #1 Phillips-head screws on the SpO₂ board.



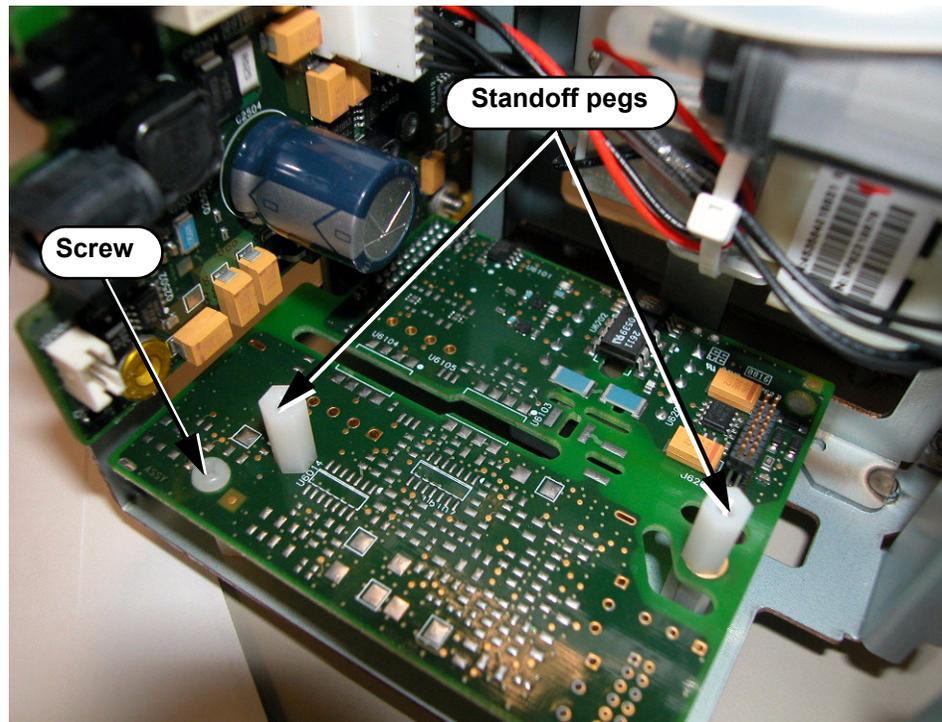
4. Remove the SpO₂ board from the standoff pegs on the SpO₂ adapter board.

Removing the SpO₂ Adapter Board

To remove the SpO₂ adapter board:

1. Remove the rear case. See “Removing the Rear Case” on page 7-10.
2. Remove the front panel from the chassis. See Chapter 7, “Repairing the Monitor.”
3. Remove the SpO₂ board. See “Removing the SpO₂ Board” on page 7-19.
4. Remove the standoff pegs.

5. Remove the white plastic #1 Phillips-head screw on the SpO₂ Adapter board.



6. Gently pull the board away to disconnect it from the daughter board.

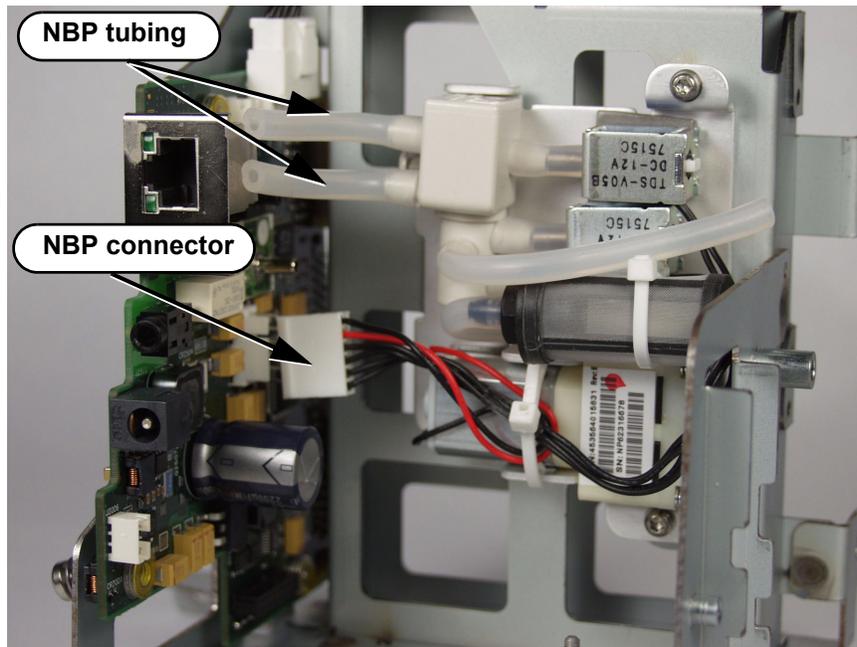
Removing the Daughter Board

To remove the Daughter board:

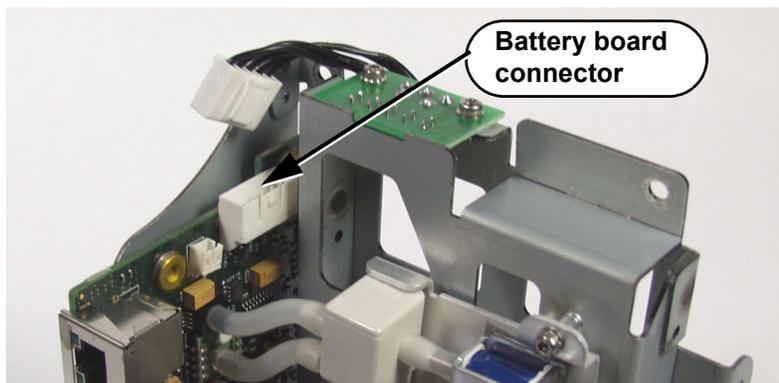
1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Remove the main chassis assembly. See “Removing the Main Chassis Assembly” on page 7-13.
3. Remove the SpO₂ board. See “Removing the SpO₂ Board” on page 7-19.
4. Remove the SpO₂ Adapter board. See “Removing the SpO₂ Adapter Board” on page 7-20.

Removing the Daughter Board

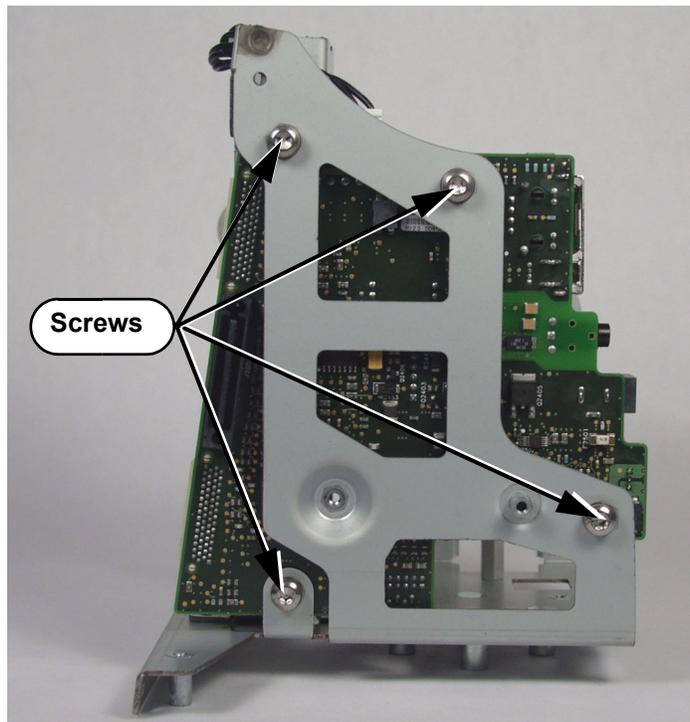
5. Remove the NBP tubing and connector.



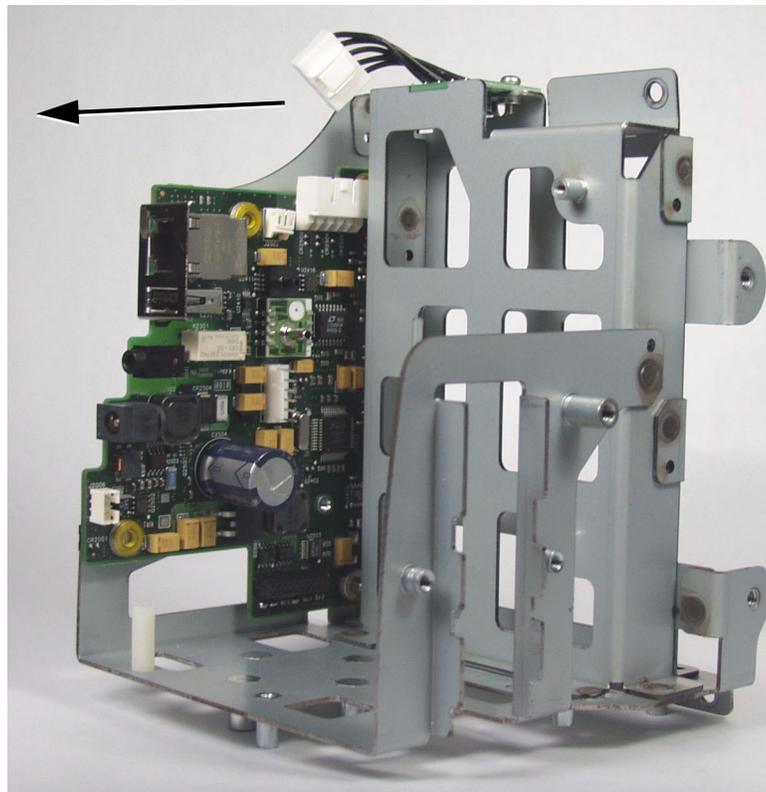
6. Disconnect the Battery board cable from the connector.



7. Remove the four Torx T20 screws on the Main Chassis.



8. Gently pull the board away from the chassis.

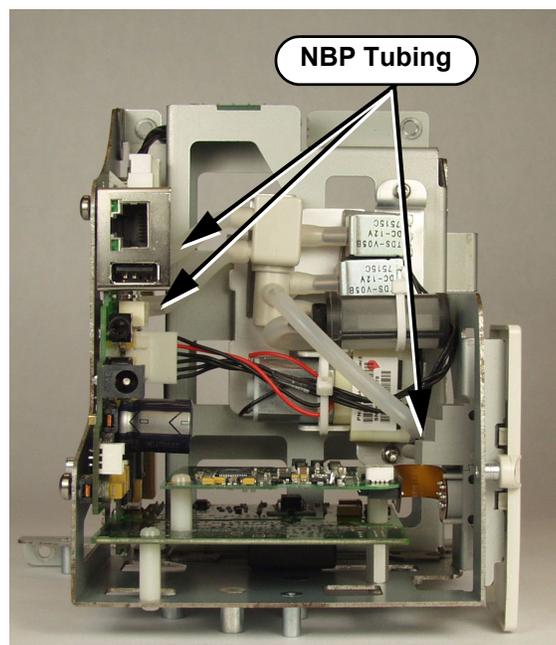


Removing the NBP Module

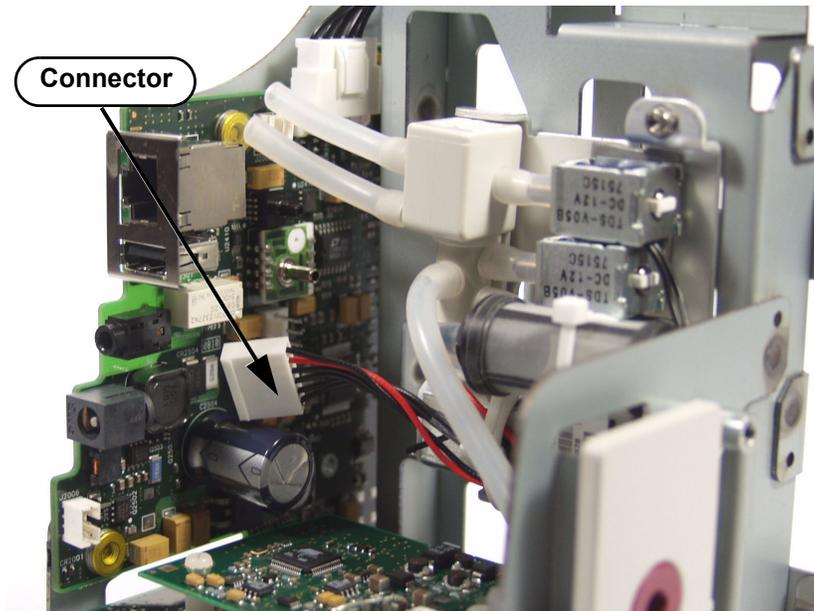
Caution After you replace the NBP module, you must reset the NBP cycle count and run the NBP test. For information on resetting the NBP cycle count, see “Viewing and Resetting Tracked Parameters” on page 6-32. For information on running the NBP test, see “NBP Test” on page 5-9.

To remove the NBP module:

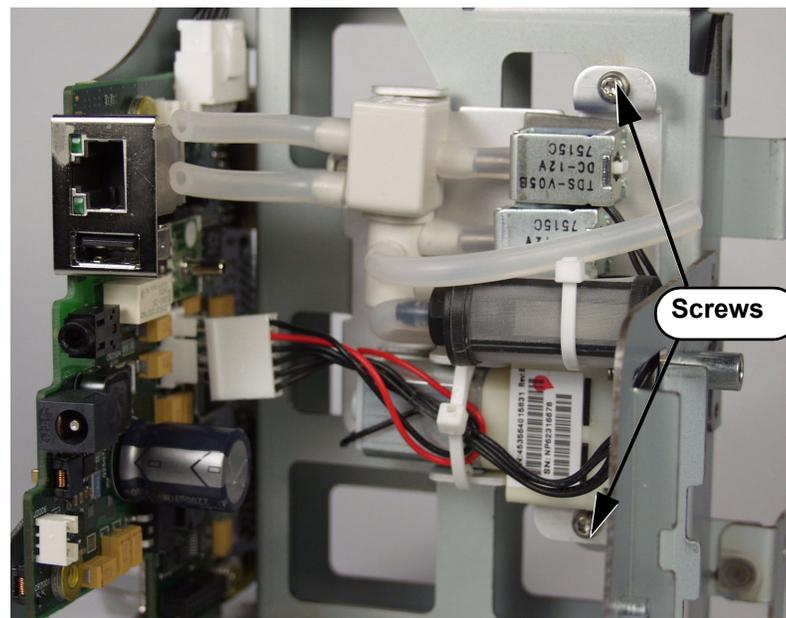
1. Separate the front panel assembly from the rear case. See “Removing the Rear Case” on page 7-10.
2. “Removing the Main Chassis Assembly” on page 7-13.
3. Disconnect the NBP tubing.



4. Disconnect the NBP connector from the Daughter board.



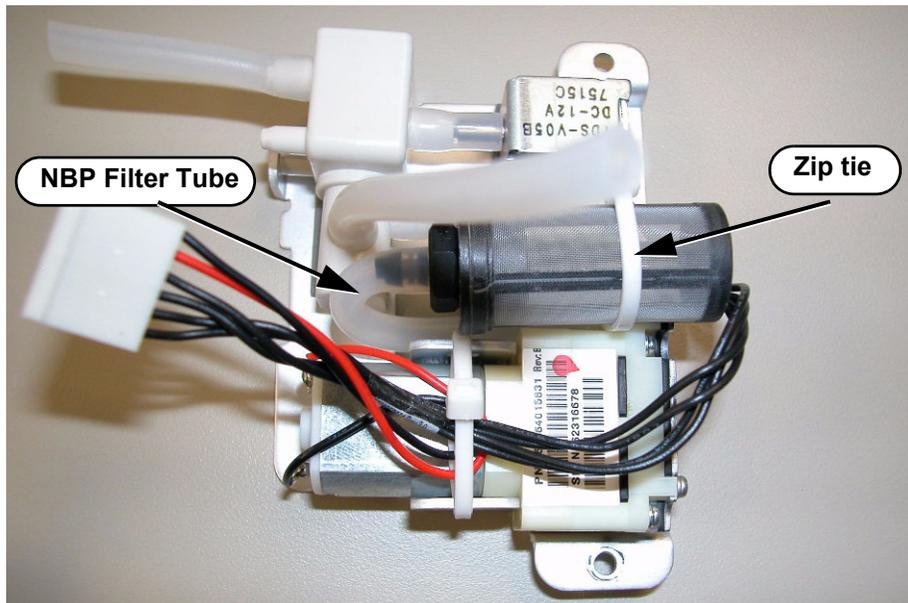
5. Remove two Torx T10 screws and washers from the metal bracket holding the NBP module assembly to the bottom of the main board.



Removing the NBP Filter

To remove the NBP filter:

1. Remove the NBP module. See “Removing the NBP Module” on page 7-24.
2. Use wire cutters to cut the plastic zip tie securing the filter to the module, and disconnect the filter from the NBP filter tube.



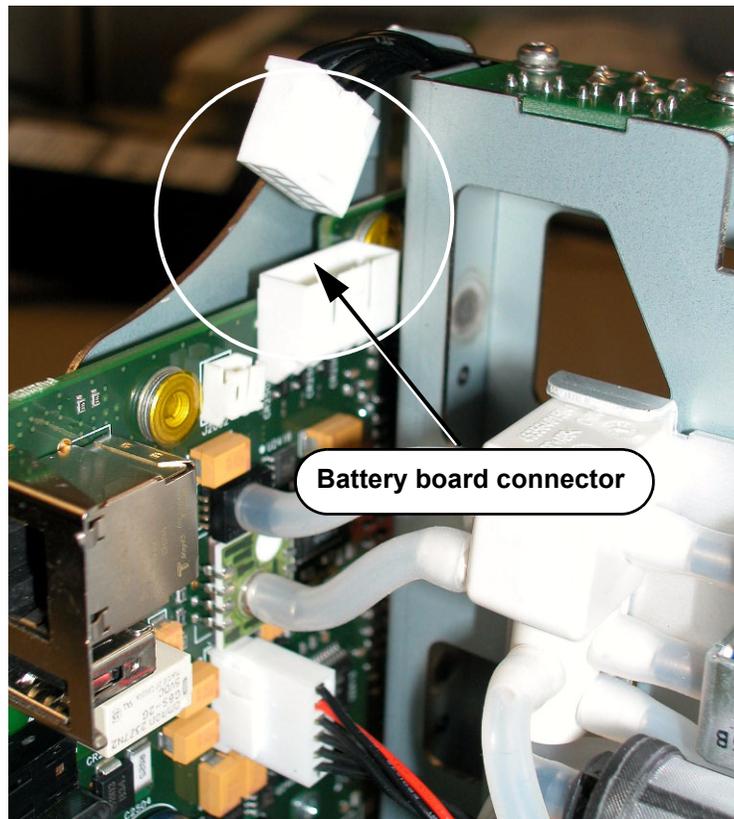
Caution When you replace the NBP filter, secure it to the NBP module with a new plastic zip tie.

Removing the Battery Connector Board

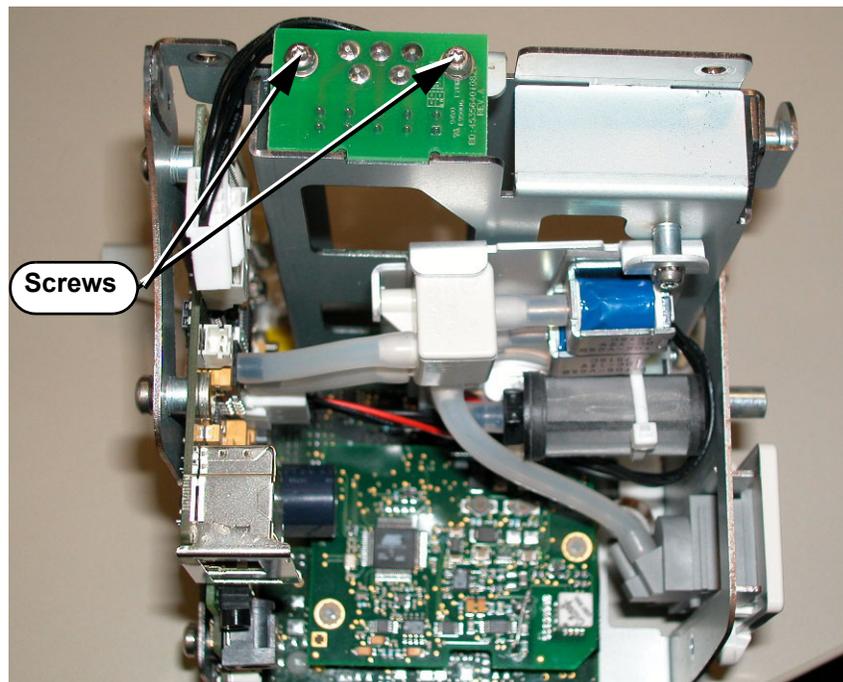
To remove the battery connector board:

1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Remove the main chassis assembly. See “Removing the Main Chassis Assembly” on page 7-13.

3. Disconnect the battery board connector from the Daughter board.



4. Remove the two Torx T10 screws and washers holding the battery connector board.



5. Lift the board away from the chassis and remove it.

Removing the Navigation Wheel Assembly

To remove the navigation wheel assembly board:

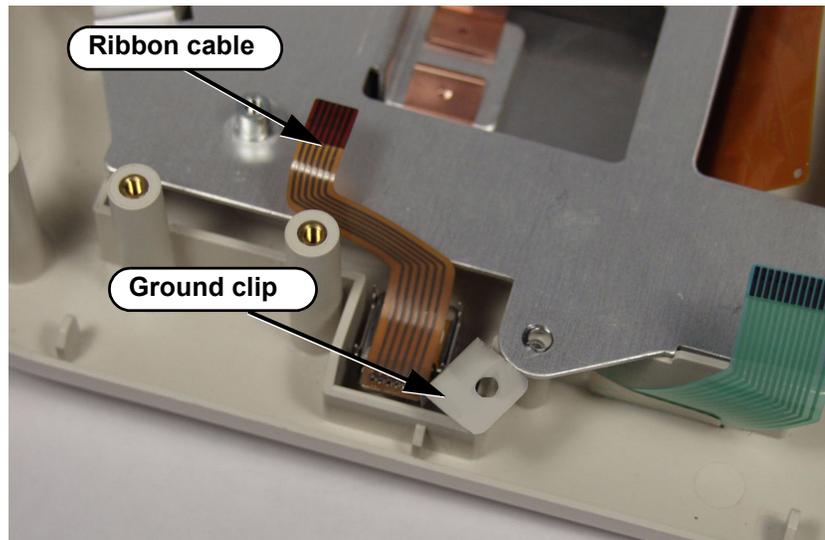
1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Pull the wheel off of the stem.



3. Remove the locking nut and washer.



4. Disconnect the ribbon cable and remove the screw from the ground clip.



5. Remove the Navigation wheel assembly from the front panel.

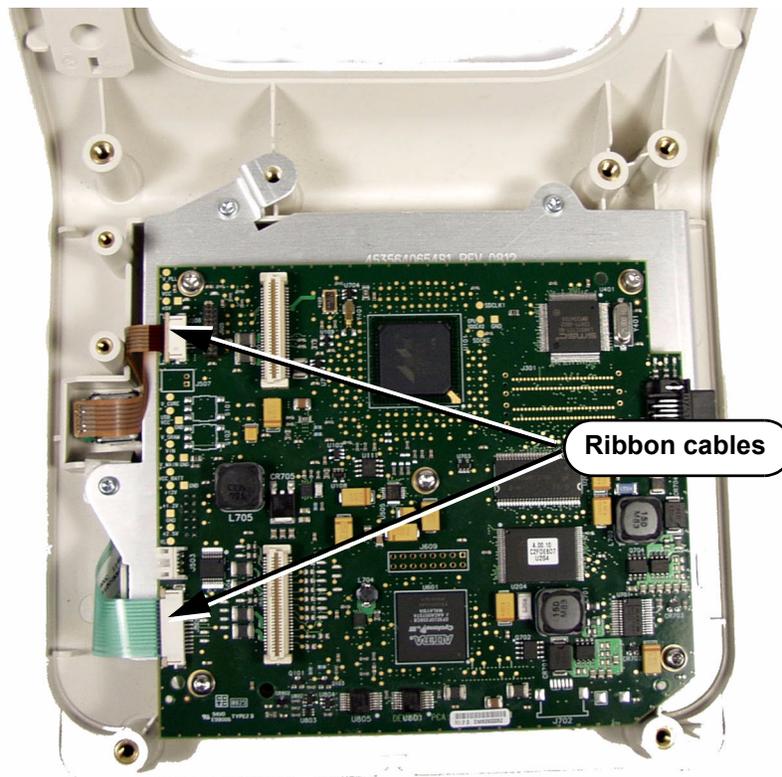


Removing the Main Board

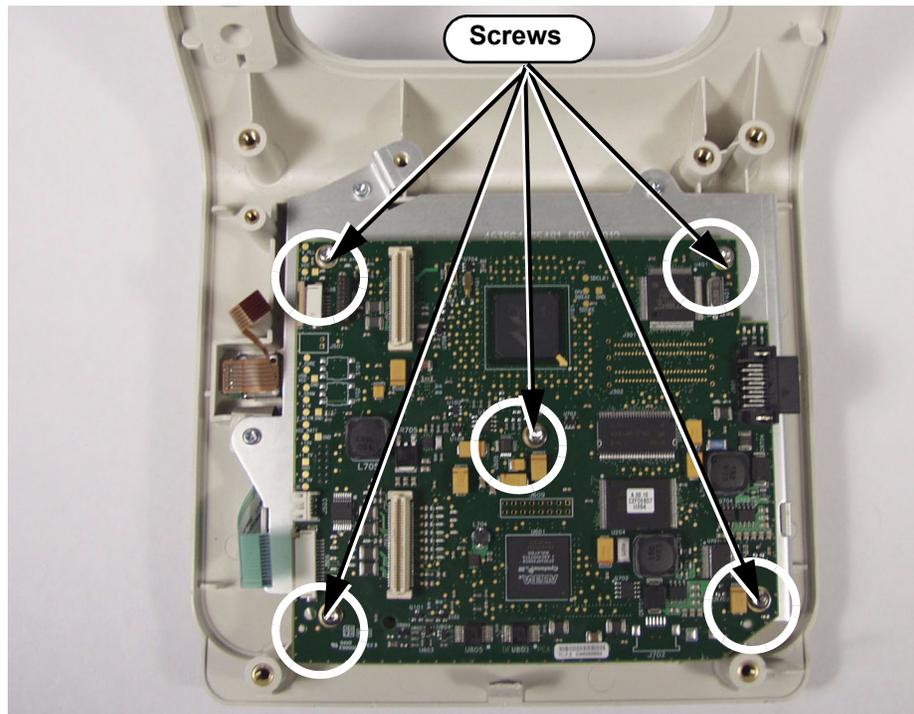
Caution To save your current configuration settings, export them before you replace the main board. For more information, see “Exporting Configuration Settings” on page 4-14. After you replace the main board, you must reset the monitor serial number and reconfigure the system. For information on resetting the serial number, see “Resetting the Serial Number” on page 7-32. For information about importing previous configuration settings, see “Importing Configuration Settings” on page 4-17.

To remove the main board:

1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Remove the main Chassis assembly. See “Removing the Main Chassis Assembly” on page 7-13.
3. Disconnect the ribbon cables from the Main board.

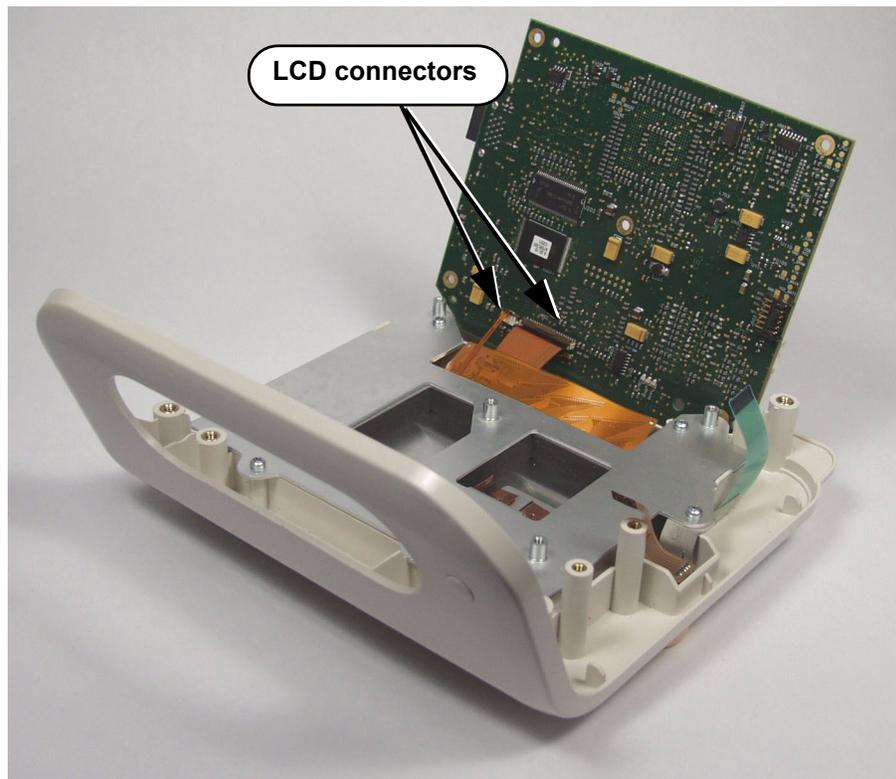


4. Remove the five Torx T10 screws from the main board.



5. Disconnect the LCD ribbon cables from the main board.

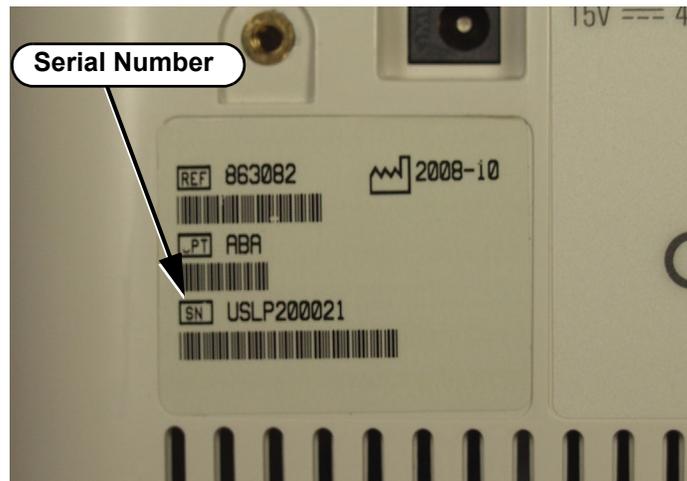
Caution The small ribbon cable is fragile. Use caution and remove it gently.



6. Remove the main board from the assembly.
7. After you replace the main board and reassemble the monitor, you must perform the following procedures before use:
 - “Resetting the Serial Number” on page 7-32.
 - “Setting the System Configuration” on page 7-34 or “Importing Configuration Settings” on page 4-17.

Resetting the Serial Number

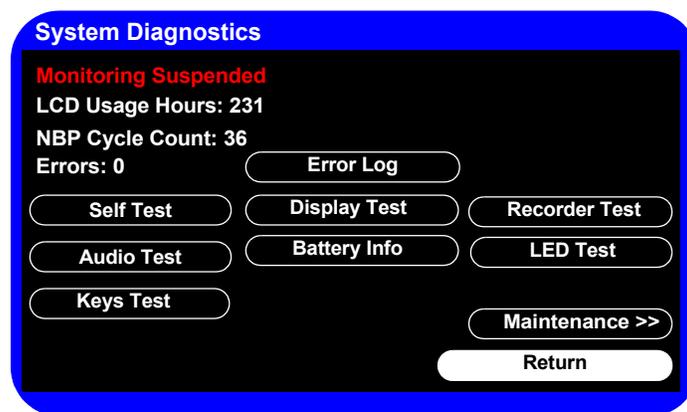
When you replace the main board, you must reset the unit’s serial number. The serial number appears in a label (marked **SN**) on the back of the monitor.



To reset a serial number:

1. Access the **System Diagnostics** menu using the **Diagnostics** button on the **Service Menu** in the **System Admin Menu**. For detailed information, see “Accessing the Service Menu” on page 4-12.
2. In the **Service Menu**, rotate the wheel until the **Diagnostics** button is highlighted and then press the wheel.

The **System Diagnostics** menu appears.

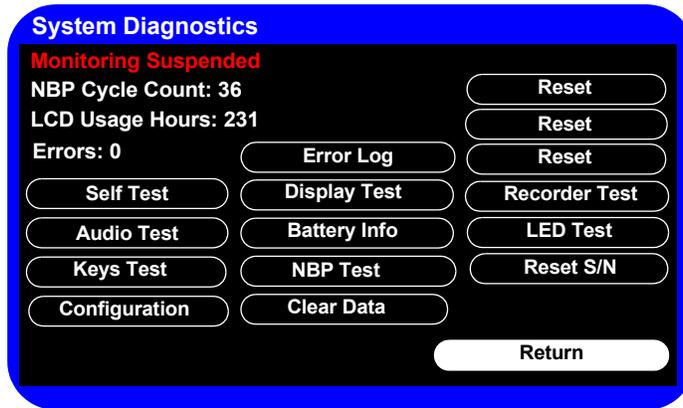


3. Rotate the wheel until the **Maintenance >>** button is highlighted and press the wheel.

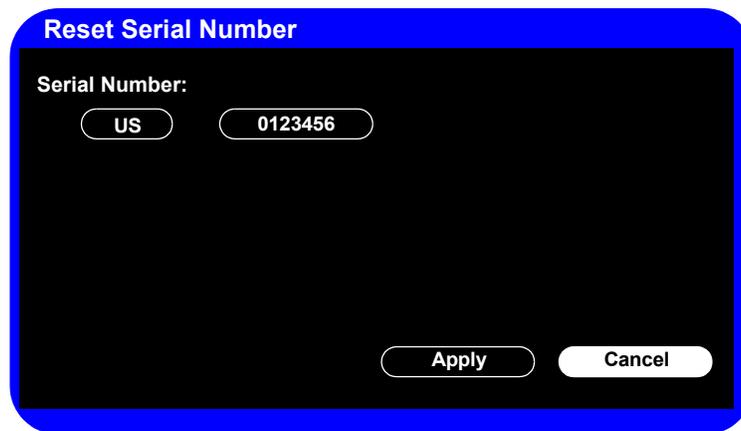
- In the window that appears, enter the password, **1-2-9**, as shown:



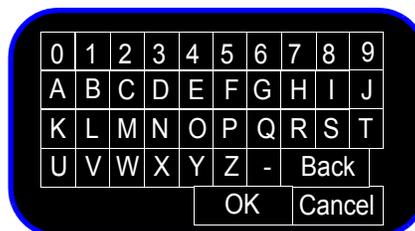
The complete **System Diagnostics** menu, including the **Maintenance** options, appears.



- Turn the wheel to highlight the **Reset S/N** button and press the wheel. The **Reset Serial Number** window appears.



- Rotate the wheel to the country button, push the wheel and select the letters that correspond to those shown on your monitor.
- Rotate the wheel to the serial number button, and then push the wheel. A keyboard appears.



- Use the wheel to enter the serial number.
- Press **Back** to backspace, **Cancel** to close the keyboard without saving, or **OK** to save the changes.

10. Rotate the wheel to select the **Apply** button, and then push the wheel to save the change.
11. In the window that appears, rotate the wheel to select **OK**.
The monitor restarts.

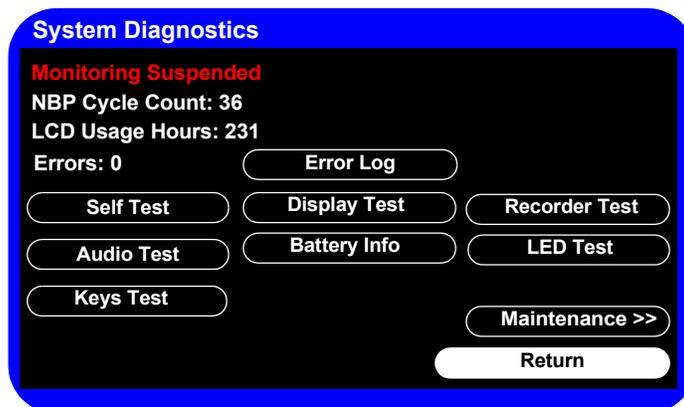
Setting the System Configuration

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

Caution The system configuration settings must match the hardware installed on the monitor. Incorrect settings can damage the monitor.

To reset the system configuration:

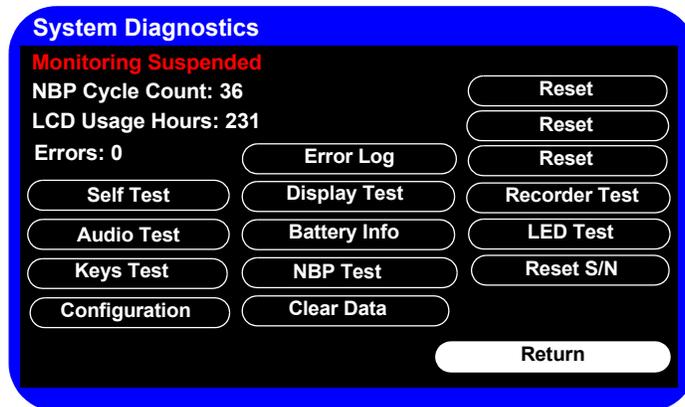
1. In the **Service Menu**, rotate the wheel until the **Diagnostics** button is highlighted and then press the wheel.
The **System Diagnostics** window appears.



2. Select the **Maintenance >>** button and press the wheel.
3. In the window that appears, enter the password, **1-2-9**, as shown:

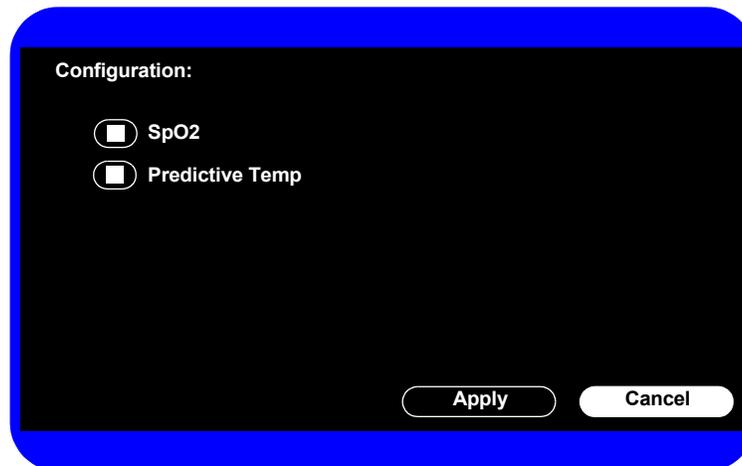


The complete **System Diagnostics** menu, including the **Maintenance** options, appears.



4. In the **System Diagnostics** window, rotate the wheel to highlight the **Configuration** button, and then press the wheel.

The **Configuration** menu appears:



5. Rotate the wheel and press it to place a check mark by each option to be used.
6. Rotate the wheel to highlight the **Apply** button, and then press the wheel.
7. In the window that appears, rotate the wheel to select **OK** and then press the wheel.
The monitor restarts.

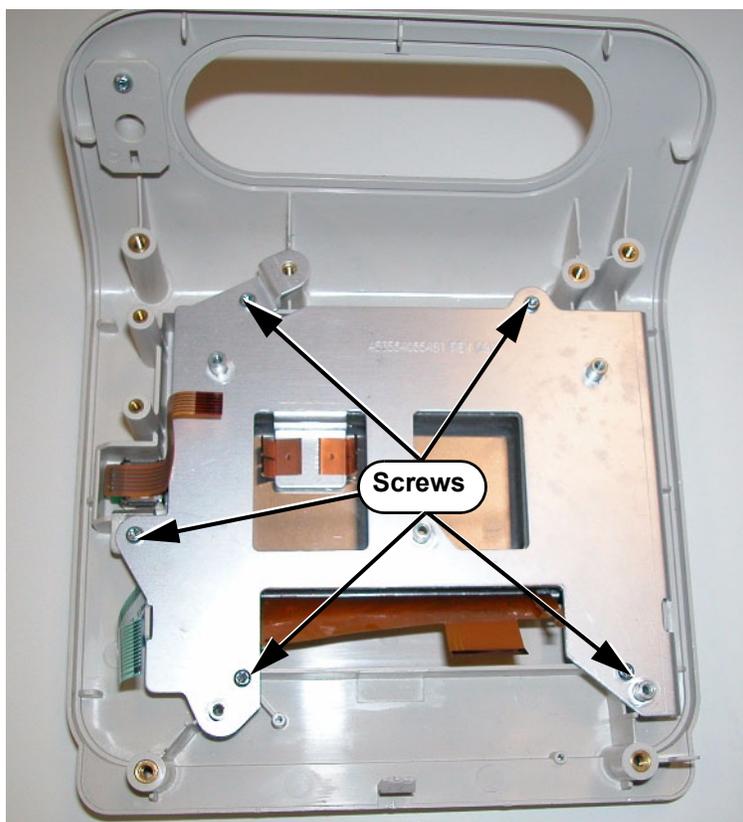
Removing the LCD

Caution After you replace the LCD, you must reset the LCD Usage Hours. For more information on resetting the LCD Usage Hours, see “Viewing and Resetting Tracked Parameters” on page 6-32.

Caution Perform this procedure in a dust-free environment to avoid damage to the LCD display.

To remove the LCD:

1. Separate the front and rear monitor case assemblies. See “Removing the Rear Case” on page 7-10.
2. Remove the Main Chassis. See “Removing the Main Chassis Assembly” on page 7-13.
3. Remove the Main board. See “Removing the Main Board” on page 7-30.
4. Remove the five Torx T10 screws that hold the LCD frame in place.



5. Lift off the LCD frame.

6. Remove the LCD from the front panel.

