

## Repair Notes

The following sections give details of how to successfully work with the internal assemblies of the HeartStart MRx.

**TIP:** If your HeartStart MRx still has a 64 MB data card, then it is recommended to perform the M4773A (internal and external 256-MB Data Card) upgrade next time you perform an internal repair.

## Safety Precautions

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**WARNING:** Remove all power sources (AC, battery, DC) before opening the HeartStart MRx. Failure to do so may allow the device to charge without warning and could result in serious injury or death.

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**CAUTION:** Take the necessary precautions against shock or injury before you conduct monitor/defibrillator tests or repairs.

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- Only properly trained technicians should service the device.
- The device can contain deadly voltages even if the device is turned off.
- Make sure the device is disarmed.  
To disarm the defibrillator, press **Disarm**. If the Shock button has not been pressed within the time period specified in the Time to Auto Disarm Configuration setting, the defibrillator disarms automatically. Additionally, when the HeartStart MRx is fully charged, you can disarm it any time by turning the Therapy Knob to the “Off” position.
- Make sure that you disconnect all power before opening the device.
- Make sure you discharge the device before working with it.
- Make sure you work in a static-safe environment. Use a static control wrist band, in conjunction with an antistatic pad which is grounded per the manufacturer’s instructions.
- Special cleaning technologies are used during the manufacturing of the PCAs. Be careful not to touch the surface areas of the PCAs with bare hands. Additionally, oil from hands can affect product performance.

## Flex Circuit Connections

In order for flex circuit connections to function properly, they must be disconnected and reconnected as follows:

- Always unlatch the PCA-mounted connector before removing the flex circuit, and hold the latch open while reinserting the flex circuit into the connector.
- When reconnecting, align the flex circuit carefully in its receptacle. Make sure it is both centered from side to side in the connector and oriented at 90 degrees to the connector.
- Be sure the flex circuit is fully seated in the connector and the connector is properly latched.

## Flex Circuit Handling

The flex circuits are delicate and can be damaged by improper handling:

- Do not bend sharply.
- Do not scrape the contact surface against other parts.
- Handle the flex with bent-tip needle-nose pliers whose jaws are covered with a soft material (such as plastic tubing or tape).

## Internal Connections

Whenever troubleshooting indicates a particular PCA may be at fault, it is always good practice to check all the connections to that PCA and retest before replacing the PCA.

## Cable and Assembly Placement

How the wires and cables are routed and dressed inside the chassis plays an important role in two areas: in preventing long term wear problems, and in reducing electromagnetic and radio frequency interference emitted by the monitor/defibrillator.

- When you disassemble any part of the device, pay special attention to how cables and wires are routed.
- When you reassemble the device, be sure to route and dress all cables and wires as they were originally.
- Return all components to their original position within the case.

## Device Reassembly

If you do not reassemble the device correctly, it may no longer be properly sealed. This could result in water damage to the device. Be sure to maintain the water-resistant seal by:

- Placing all gaskets in their proper locations.
- Correctly assembling all parts that mate with gaskets (making sure the gaskets are not wrinkled or pinched).
- Replacing all screws.
- Making sure that screws are not cross-threaded and that they are firmly tightened.
- Tightening M3 screws to 6-inch pounds and M4 screws to 10-inch pounds.

## Disposal

Prior to disposal, remove the batteries. Then dispose of the device in accordance with your country's regulations for equipment containing electronic parts.

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**WARNING:** To avoid contaminating or infecting personnel, the environment, or other equipment, make sure you disinfect and decontaminate the monitor/defibrillator appropriately prior to disposal. Properly dispose of or recycle depleted batteries according to local regulations. Do not puncture, disassemble, or incinerate batteries. Be careful not to short the battery terminals because this could result in a fire hazard. Disposal of the device with the battery inserted presents a potential shock hazard.

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## Disposing of Empty Calibration Gas Cylinders

- Ⓢ To dispose of empty calibration gas cylinders:
  - 1 Empty the cylinder completely by pushing the pin of the regulator valve or by pulling out the pin of the fill wave using a tire valve stem wrench or a pair of needle-nose pliers.
  - 2 When the cylinder is empty, either remove the valve stem from the fill (or regulator) hole, or drill a hole in the cylinder.
  - 3 Write "Empty" on the cylinder and dispose of it appropriately for scrap metal.

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**WARNING:** Ensure that the cylinder is completely empty before trying to remove the valve stem or drill the tank.

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# Repair Tools and Equipment

The following tools are needed to perform the procedures in this chapter:

- Torx T-10 and T-15 drivers (or Torx driver kit, part number 5181-1933). T-15 driver shaft should be at least 3.5-inches (90 mm) long and less than 0.4-inches (10 mm) in diameter to reach down to recessed case screws.
- Slip-joint pliers or adjustable open-end wrench.
- Straight-bladed screwdriver.
- Nut driver (5/16") or small adjustable wrench
- #2 Phillips screwdriver, shaft at least 5" long.
- Straight-tip needle-nose pliers or tweezers.
- Bent-tip needle-nose pliers whose jaws are covered with a soft material (e.g. plastic tubing or tape).
- Fine-nose wire cutters.
- Utility knife.
- Paper clip.
- Clip leads (at least 2, each approx. 10-18").
- Voltmeter
- Software Support tool (see [Table 48 "Software Support Tool"](#) on page 205 for part numbers).
- Defibrillator Discharge Tool (M2475-69573).

## Key Components

Replacement assemblies marked with an asterisk ( \* ) in the Replacement Parts tables contain one or more Key Components. Key Components require detailed tracking, by recording the key component part number and either the key component's date code or its serial number. This data must be recorded for both the failed assembly and the replacement assembly.






Philips service personnel must record this information on the Customer Service Order (CSO).





The Key Components that are part of the replacement assemblies are listed in [Table 60 "Key Components"](#) on page 220.

## External Assemblies

This section describes how to remove and replace assemblies that are external to the case. You *do not* need to open the case for any of these procedures.

This section is organized into the following topics:

Topic	Page
 Bedrail Hook Mount	86
 CPR Meter Rear Cover	87
 Handle and Cap Plate	88
 Labels	91
 Paddle Tray and Plates	93

Topic	Page
 Paddle Tray 50-ohm Load Resistor	95
 Printer Assembly	96
 Therapy Cable Stabilizing Collar	98
 Therapy Knob	100

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**NOTE:** See the *Instructions for Use* for information on attaching the carrying case and accessory pouches.

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## Bedrail Hook Mount

### ⊙ Preparation

- 1 Turn the device off.
- 2 Position the rear case  
Lay the rear case on the work surface with the display facing down and the printer in the lower left corner.

### ⊙ Removal

- 1 Loosen and remove the two T-15 screws.
- 2 Remove the bedrail hook mount.

### ⊙ Replacement

- ▶ Secure the bedrail hook mount to the back of the device using the two screws.

### ⊙ To Complete the Replacement:

- ▶ Visually inspect the device to ensure that you installed the bedrail hook mount correctly. It is not necessary to run any Performance Verification and Safety testing.

## CPR Meter Rear Cover

Replace the CPR meter rear cover if the vent membrane is damaged, atmospheric pressure balancing groove is blocked, or other damage to the cover occurs. See [Figure 34](#) on page 87.

### Ⓢ Removal and Replacement

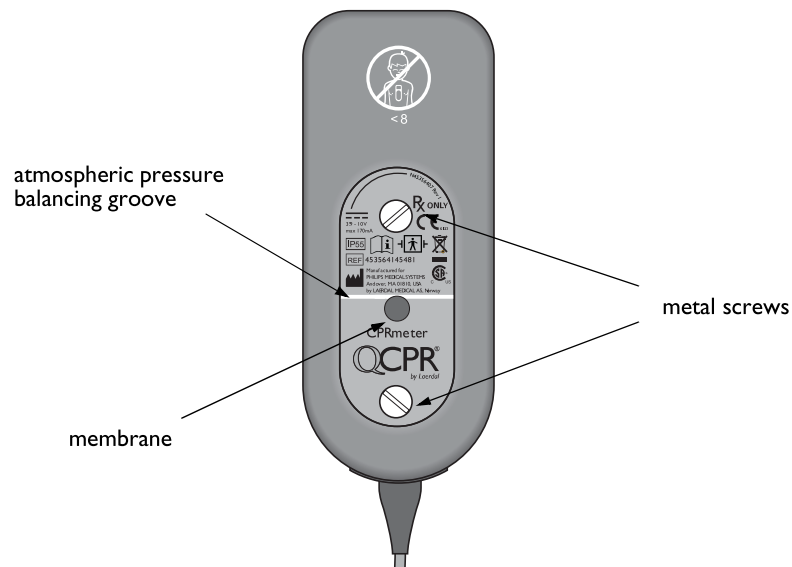
- 1 Remove the two metal screws.
- 2 Replace the cover.  
Carefully pry off the old cover and snap on the new cover.
- 3 Replace the screws.

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**CAUTION:** There is an empty battery compartment under the cover. Do not install batteries in the CPR meter; it does not need batteries when connected to HeartStart MRx. Putting a battery in the CPR meter may cause the CPR meter to fail and possibly cause damage.

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Figure 34 CPR Meter Rear Cover Assembly



### Ⓢ To Complete the Replacement:

- ▶ Run the CPR meter test as described in “[CPR Meter and Compression Sensor Tests](#)” on page 193. It is not necessary to run any other Performance Verification and Safety testing.

## Handle and Cap Plate

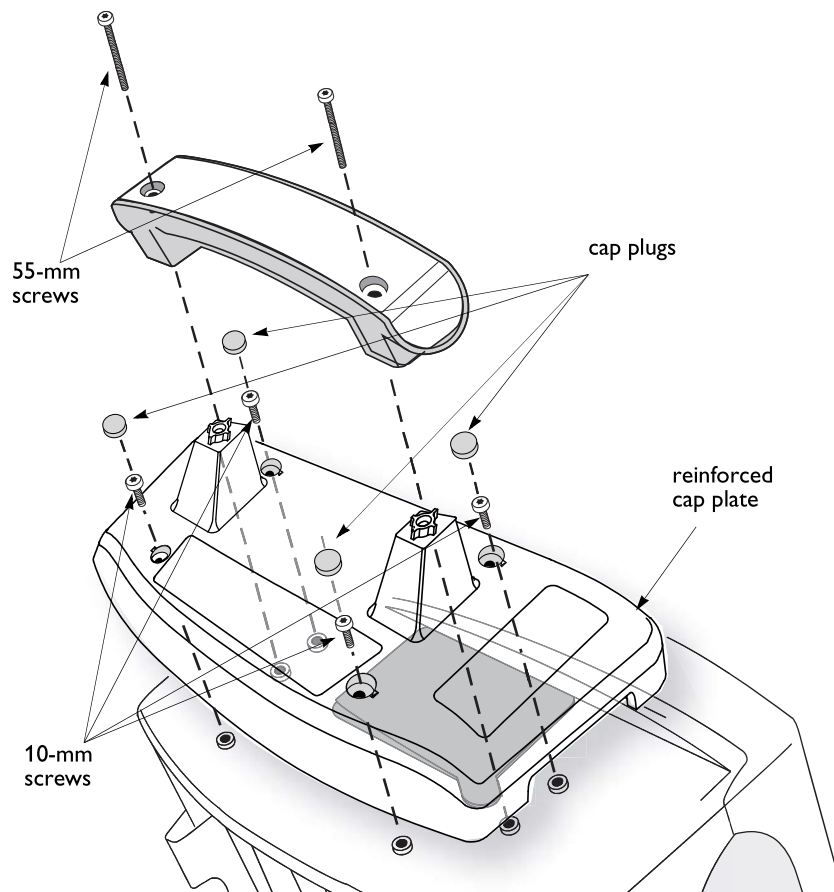
### ⊙ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.

### ⊙ Removal

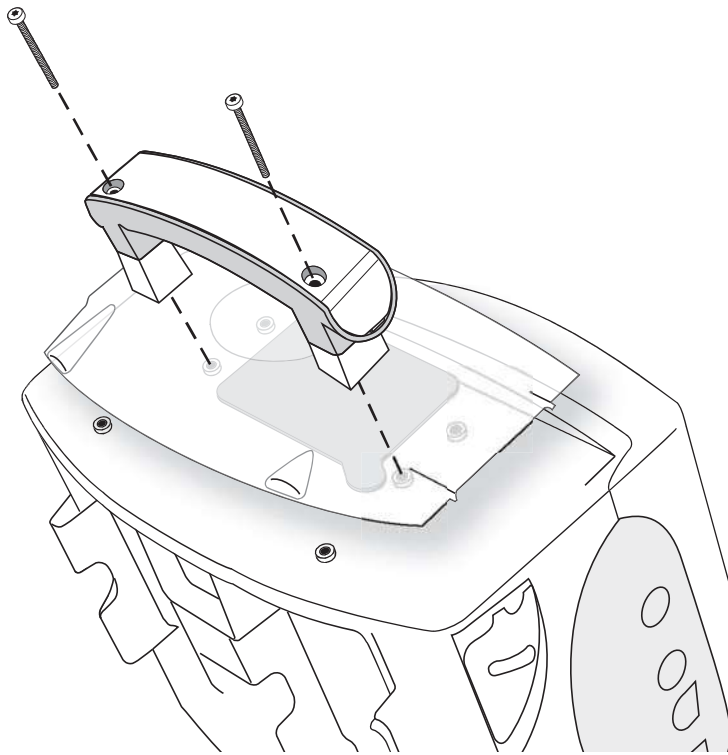
- 1 Remove the handle cover. Depending on the type of handle on the device, do one of the following:
  - a If there are four reinforcing screws covered by screw caps near the handle base (see [Figure 35](#)), then:
    - Use a tweezer to lift the caps.
    - Loosen the four T-15 screws.Set the screws and the caps aside.

Figure 35 Removing the Handle and Cap Plate (Reinforced)



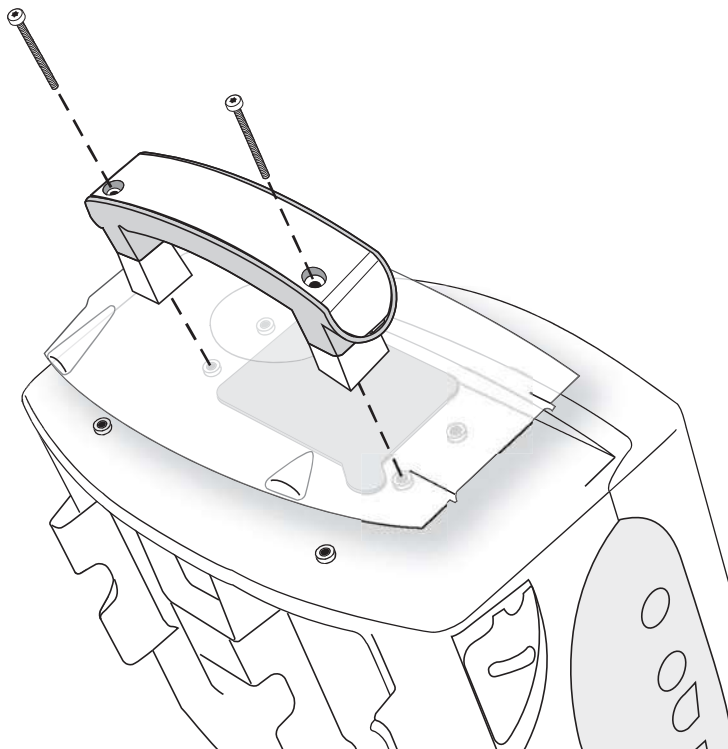
- b If there is a label covering the handle, lift up the edges on both sides of the label with your fingernail to uncover the screw heads (see [Figure 36](#)). Do not remove the label; leave its middle part attached to the handle.

Figure 36 **Removing the Handle and Cap Plate (label not shown)**



- c** If there is no label covering the handle, lift up the notch on the side of the handle (with your fingernail or a screwdriver) and push in on either side of the handle cover and lift up to uncover the screwheads (see [Figure 37](#)).

Figure 37 **Removing the Handle and Cap Plate (no label)**

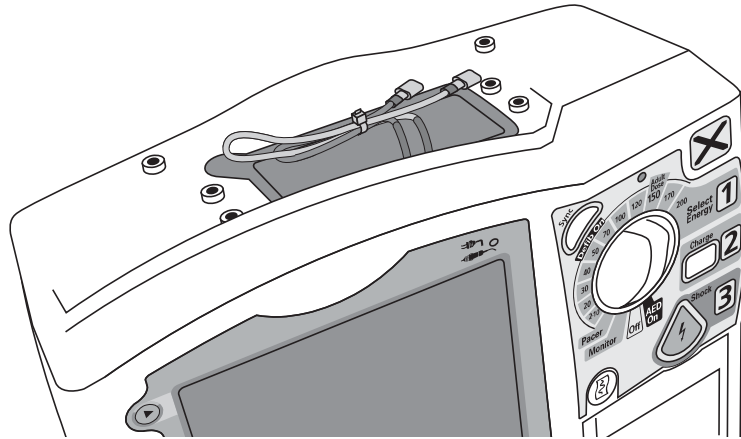


- 2 Loosen the two T-15 screws located on either side of the handle.
- 3 Remove the handle and cap plate.

⊙ Replacement

- 1 Secure the PCMCIA hole plug wires.  
Group the wires together and secure with the cable tie wrap. Cut off any excess tie wrap.

Figure 38 PCMCIA Hole Plug Cable Tie Wrap



- 2 Replace the cap plate.
  - a Lay the cables flat against the PCMCIA hole plug, being careful not to pinch the cables under the ridges on the cap plate.
  - b Line up the screw holes with the threaded inserts.
- 3 Replace the handle.  
Line up the handle with the shaped posts on the cap plate. The handle screws should be toward the back of the device.
- 4 Replace the screws.  
Replace the two T-15 screws and tighten.
- 5 Cover the screwheads.  
If there is a label covering the handle, smooth down the label edges to cover the screwheads.  
If there is a plastic top covering the handle, snap it in place by pushing down on either side of the cover.

⊙ To Complete the Replacement:

- 1 Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.
- 2 Order the Instructional and Hazardous Shock Warning label sets (see “Labels” on page 210) on every new cap plate.
- 3 Replace the labels (see “Labels” on page 91).



## Labels

There are six groups of labels for the HeartStart MRx:

- the Instruction label set
- the Hazardous Shock Warning label set
- the Branding label
- the Speaker label
- the Connector label set
- and the Hardware Version label

Each set of labels is one sheet containing all the labels in that set.

### Instruction Label Sets

There is one instruction label set for each language. (See “Labels” on page 210 for part numbers.) This set includes labels for:

- Therapy Knob (with and without Pacing)  
**NOTE:** Each Instruction label set includes a label for devices with pacing and a label for devices without pacing. You *must* ensure that you place the correct label on the device:
- Paddles instructions (left and right side)
- Paddles warning
- Cap plate instructions
- Cap plate warnings
- Battery ID
- Service warning

### Hazardous Shock Warning Label Set

The Hazardous Shock Warning label set is affixed to the Power PCA shield and under the Paddle tray or cap plate.

### Branding Label Set

The branding label is affixed to the front of the device, directly below the center of the display.

### Speaker Label Set

The speaker label is affixed to the speaker.

### Connector Label Set

This label set is shipped as part of the rear case field replacement kit. It includes the labels for the battery, AC power, DC in connector, network connectors, and patient connector (Therapy port).

### Hardware Version Label

This label (also known as a primary label) is shipped as part of the Processor PCA kit. It lists the Serial Number, Hardware version and the Options Key and is affixed to battery compartment B.

## Removing and Replacing Labels

### ⊙ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.

### ⊙ Removal

- 1 Start at one corner.  
Using a sharp tool such as a utility knife, pick up one corner of the label.
- 2 Peel up the label.  
Peel the label up by pulling slowly and evenly on the loosened corner.

### ⊙ Replacement

- 1 Clean the surface.
  - a Remove any adhesive residue by rubbing the dry surface with your finger and “rolling up” the adhesive residue. Solvents are ineffective, as is scraping with a tool.
  - b Clean the surface with isopropyl alcohol. Allow it to dry.
- 2 Peel off the backing.  
Peel the backing off the new label. Avoid touching the label adhesive as this can prevent the label from bonding properly.
- 3 Apply the label.
  - a Align one edge of the label with the recess on the case, then roll the label down slowly into position.
  - b Press firmly all over the label, especially the edges, to ensure it adheres to the case.

### ⊙ To Complete the Replacement:

- ▶ Visually inspect the device to ensure that you applied the labels correctly. It is not necessary to run any Performance Verification and Safety testing.

## Paddle Tray and Plates

There is a 50-ohm load resistor pre-assembled inside the tray, which is used to test the paddles.

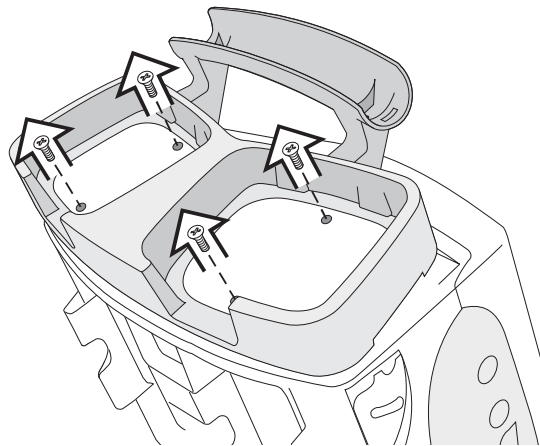
### ⊙ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.

### ⊙ Removal

- 1 Remove the paddles from the tray.  
Disconnect the paddles from the Therapy port. Snap both paddles out of the paddle tray and lay them aside.
- 2 Remove the screws from the tray plates.  
Loosen and remove the four T-15 screws. See [Figure 39](#).

Figure 39 **Removing the Paddle Plates**

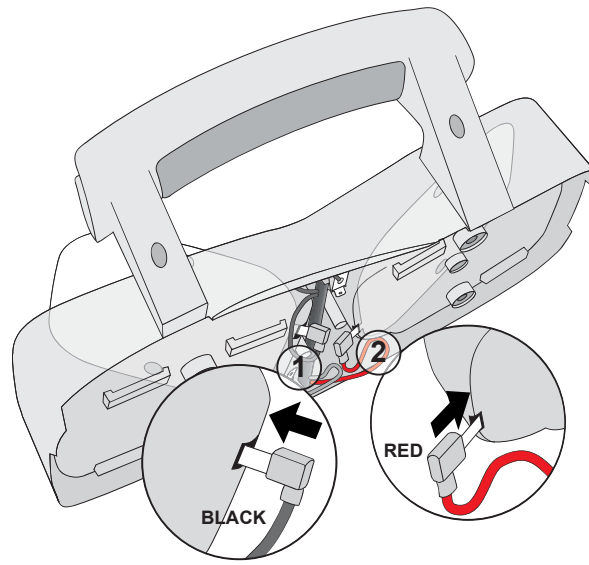


- 3 Gently lift the paddle tray to gain access to the wires underneath.
- 4 Pull the spade connectors straight off of the tabs.
- 5 If you are replacing the plates only, then remove the old plates from the paddle tray.

### ⊙ Replacement

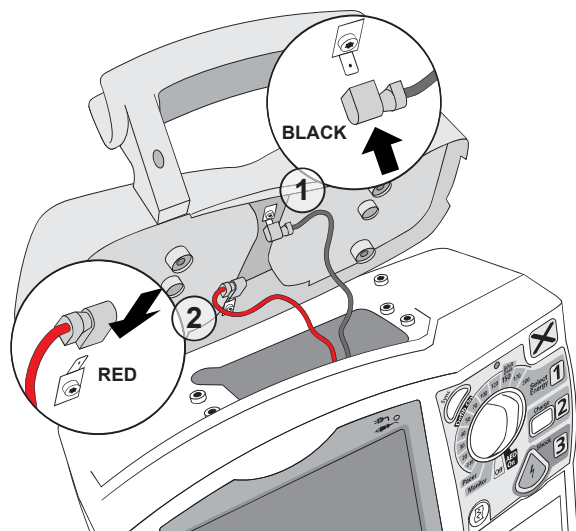
- 1 If you are replacing the plates only, then install the tray plates into the tray.
  - a Hold the paddle tray so that the connections are facing toward you and the handle is on top.
  - b Holding the tray plate at an angle, place the plates into the left and right trays, inserting the tabs through the holes.
- 2 Connect the plates to the tray resistor. See [Figure 40](#).
  - a While holding the *left* plate at an angle, connect the spade connector from the *black* wire to the tab ① being careful not to bend the tab.
  - b Holding the *right* plate at an angle, connect the spade connector from the *red* wire to the tab ②.

Figure 40 Installing the Tray Plates



- 3 Connect the paddle tray to the device. See [Figure 41](#).
  - a Connect the spade connector from the black wire to the tab with the black wire on the resistor (①).
  - b Connect the spade connector from the red wire to the tab with the red wire on the resistor (②).

Figure 41 Connecting the Paddle Tray



- 4 Place the paddle tray into position on the device.  
Line up the screw holes in the paddle tray and tray plates with the threaded inserts on the device. Be careful not to pinch the wires under the threaded inserts.
  - 5 Replace the screws.  
Replace the four T-15 screws and tighten.
- Ⓞ To Complete the Replacement:
- ▶ Run Performance Verification and Safety testing as described in the [“Performance Verification”](#) chapter.

## Paddle Tray 50-ohm Load Resistor

The 50-ohm load resistor comes pre-assembled in the paddle tray. However, if it fails, you can replace it using the following procedures.

### ⦿ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.
- 3 Remove the paddle tray.  
See “Paddle Tray and Plates” on page 93.

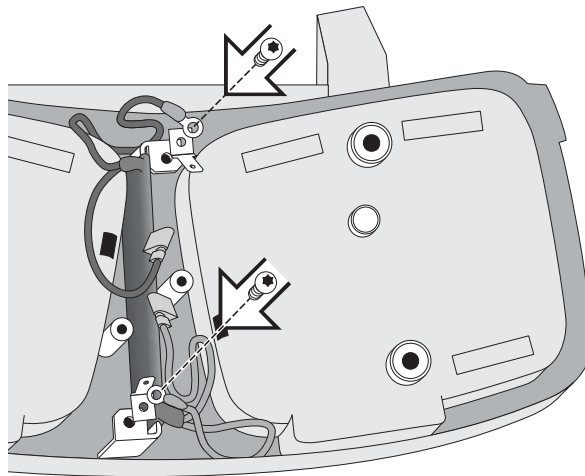
### ⦿ Removal

- 1 Disconnect the spade connectors from the paddle tray tabs.
- 2 Unscrew the two T-10 screws.
- 3 Lift the 50-ohm load resistor out of the paddle tray.

### ⦿ Replacement

- 1 Place the 50-ohm load resistor into the paddle tray.  
Make sure that the black wires are closest to the handle.
- 2 Place each screw through the ring terminal, through the spade connector, and through the metal bracket on the resistor. Fasten to the threaded insert in the paddle tray.
- 3 Make sure the wires and connectors are oriented as shown in [Figure 42](#).

Figure 42 Replacing the 50-ohm Load Resistor



- 4 Tuck the wires into the paddle tray.
- 5 Replace the paddle tray.  
See “Paddle Tray and Plates” on page 93.

### ⦿ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Printer Assembly

The HeartStart MRx can have either the 50-mm printer or the 75-mm printer. Follow the instructions for the printer installed in your device. Some of the illustrations show only the 50-mm printer, as some procedures for both printers are similar.

### ⊙ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.
- 3 Wait at least one full minute before proceeding. This allows time for the internal power supplies to discharge stored energy.

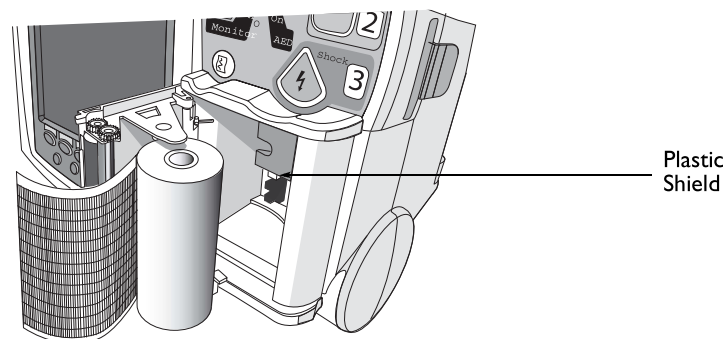
### ⊙ Removal

- 1 Open the printer and remove the paper.
  - a Push in the printer door latch and open the printer door.
  - b For the 75-mm printer, pull up on the white plastic cover holding the paper roll to remove it.
  - c Remove the paper.

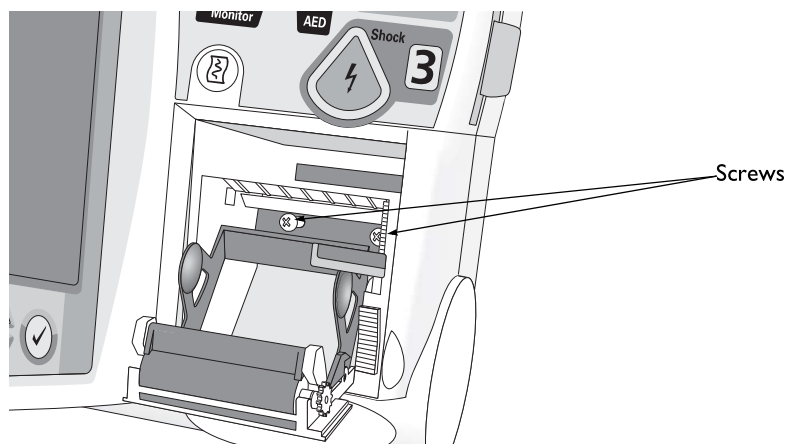
- 2 Loosen the screws.

Loosen the two captive Phillips screws at the back of the printer, being careful not to damage the wires. For the 75-mm printer, you may access the screws through the holes in the plastic shield (see [Figure 43](#)) or pull out the shield. Close the door slightly to improve access to the screws. [Figure 44](#) shows the screws on the 50-mm printer. The screws are in the same location for the 75-mm printer.

**Figure 43 75-mm Printer Assembly**

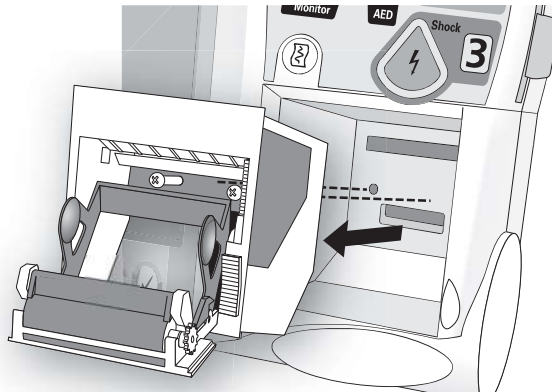


**Figure 44 50-mm Printer Assembly**



- 3 Remove the printer by grasping the inside and pulling it straight out of the printer well.

Figure 45 **Removing the Printer**



### ⊙ Replacement

- 1 Slide in the printer.
  - a Slide the printer straight into the printer well. For the 75-mm printer, turn the printer so that the printed circuit assembly is to the right as you face the device.
  - b Push in gently until it is fully seated.
- 2 Tighten the screws.

Open the printer door and tighten the two screws. For the 75-mm printer, access the screws through the screw holes in the white plastic cover.
- 3 If you have pulled out the shield, make sure to tuck it inside, so that the left edge of the shield presses against the back wall of the compartment.
- 4 Replace the paper and close the door.

See the label on the inside of the printer door or the *Instructions for Use* for additional instructions.

### ⊙ To Complete the Replacement:

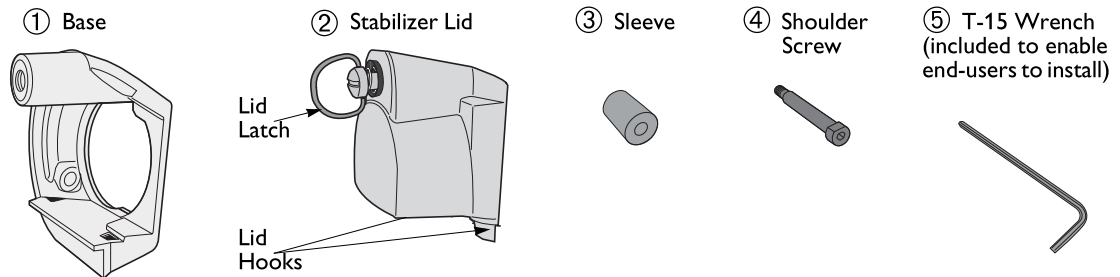
- ▶ Perform Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Therapy Cable Stabilizing Collar

### Kit Content

The Therapy Cable Stabilizing Collar kit parts are shown on [Figure 46](#):

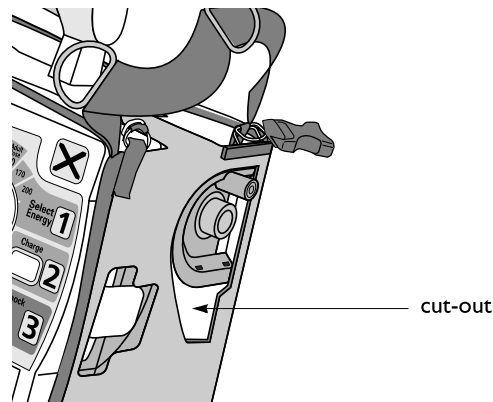
**Figure 46 Therapy Cable Stabilizing Collar Kit Parts**



### ⊙ Preparation

- 1 Make sure you have the carrying case with the cut-out under the Therapy Connector recess (see [Figure 47](#)). Do not use the previous-model carrying case with the Stabilizing Collar. Order a new case if necessary.

**Figure 47 Carrying Case with the Cut-out**



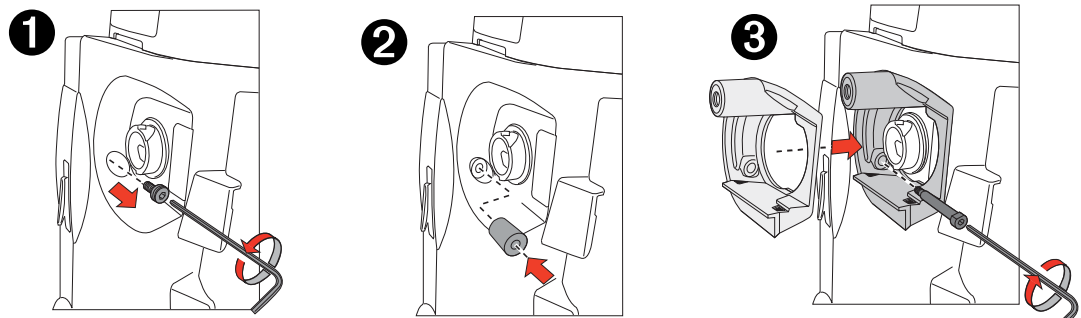
- 2 Remove all power sources (AC, battery, DC) from your HeartStart MRx.
- 3 Remove the carrying case (see the *HeartStart MRx Instructions for Use*).

### ⊙ Installation

- 1 Remove and discard the screw from the Therapy Connector recess (see [Figure 48](#), **1**).
- 2 Insert the plastic Sleeve **3** in the screw opening (**2**).
- 3 Align the Base **1** and attach it using the Shoulder screw **4** (**3**), tighten the screw. Line up the flat face on the head of the Shoulder screw upward so that it can slide past the Therapy Port.

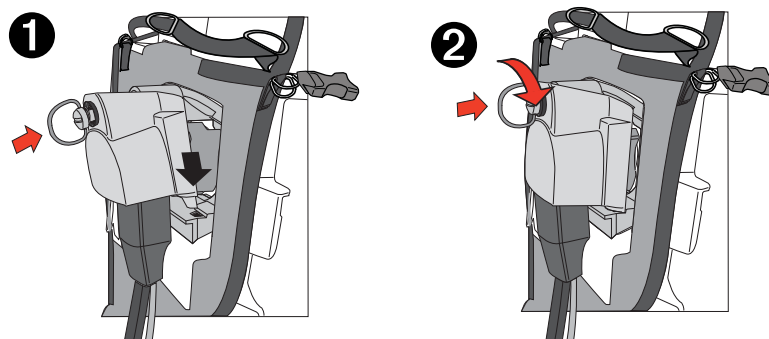


Figure 48 Installing the Stabilizing Collar



- 4 Make sure the PCMCIA hole plug wires are secured with the cable tie wrap. If the PCMCIA hole plug wires appear not secured, then follow the instructions in “Handle and Cap Plate” on page 88.
- 5 Replace the HeartStart MRx carrying case, cap plate, and handle.
- 6 Attach the Therapy Cable to the Therapy Cable Connector.
- 7 Stabilize the Therapy Cable with the Stabilizer Lid ②.
  - a Engage the Lid Hooks at the bottom of the Stabilizer Lid with the lower lip of the Base ① (see Figure 49, ①).
  - b Press in and turn the Lid Latch 90° clockwise (②).

Figure 49 Stabilizing the Therapy Cable



Ⓞ To Complete the Installation:

- ▶ Power up the HeartStart MRx and run an Operational Check as described in the “Performance Verification” chapter.

## Therapy Knob

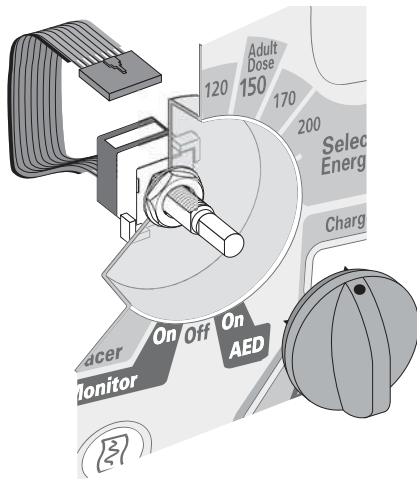
### ⊙ Preparation

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries.

### ⊙ Removal

- 1 Turn the knob to AED.
- 2 Pull the knob off its shaft.  
Grasp the knob and pull straight out from the front of the device. Use pliers, if necessary.

Figure 50 Therapy Knob Replacement



### ⊙ Replacement

- ▶ Push the knob onto the shaft.
  - a Align the flat side of the clip inside the knob with the flat surface on the shaft and press the knob into place. Be sure the knob is pressed fully into place.
  - b Make sure it rotates freely and that it points to the correct markings on the front panel.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

# Top Assemblies

This section describes how to remove and replace assemblies from the top of the device, through the PCMCIA hole plug. You do *not* need to open the case for any of these procedures but you are working inside the device.

This section discusses how to remove and replace the Bluetooth<sup>®</sup> wireless technology card.

## Bluetooth<sup>®</sup> Card

Replace the Bluetooth card through the PCMCIA hole plug — you do not need to open the case for this procedure, but you will be working inside the device.

### ⦿ Preparation

- 1 Remove either the paddle tray or handle and cap plate.  
See “Paddle Tray and Plates” on page 93 or “Handle and Cap Plate” on page 88.
- 2 Move the PCMCIA hole plug to one side.  
Grasp the PCMCIA hole plug by the corner tab and pull up. Use pliers, if necessary.
- 3 Position the device.  
Stand the device up with the display facing away from you.

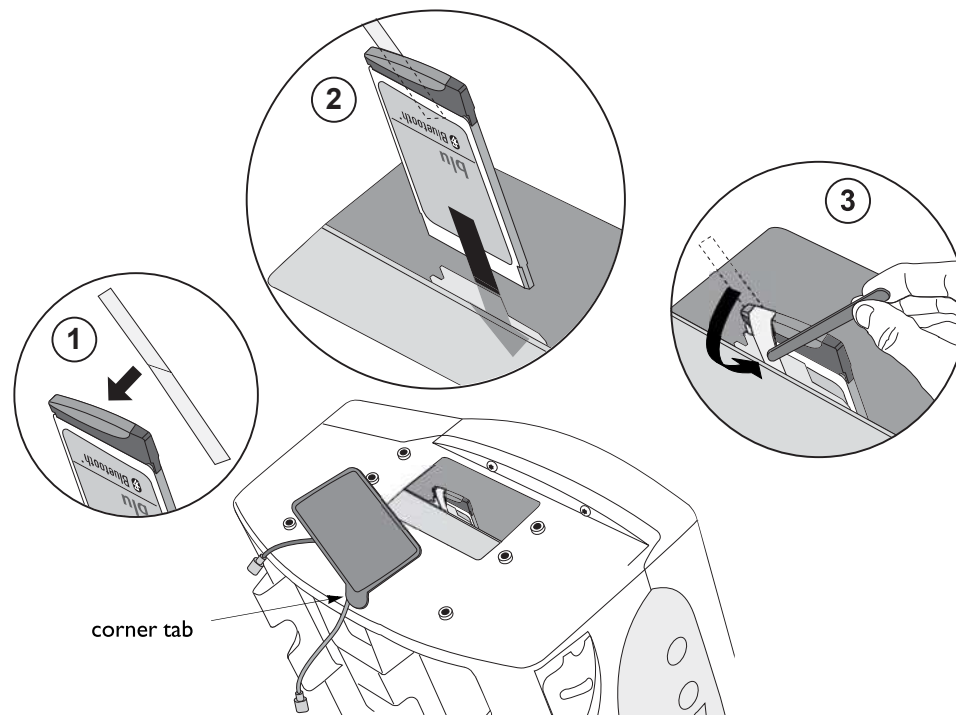
### ⦿ Removal

- 1 Using a utility knife, cut the tape securing the Bluetooth card, being careful not to cut any wires.
- 2 Remove the card.
  - a Push the eject button to the left of the card.
  - b Pull the card out. Use needle-nose pliers, if necessary.

**⊙ Replacement**

- 1** Place the tape on the Bluetooth card.
  - a** Peel the backing off of the tape.
  - b** Place the tape at an angle approximately 1/2 of the way down the side of the card with the CE label (See [Figure 51](#) ①).
- 2** Insert the Bluetooth card into the PCMCIA slot.
  - a** Align the card so that the tallest part of the card is over the shoulder screw.
  - b** Push the card into the slot as far as it can go (②).
- 3** Secure the Bluetooth card to the PCMCIA metal housing with the tape.

Press the tape onto the PCMCIA metal housing using a flat instrument, such as tongue depressor or something similar (③).

**Figure 51 Inserting the Bluetooth Card****⊙ To Complete the Replacement:**

- ▶ Run Performance Verification and Safety testing as described in the [“Performance Verification”](#) chapter.

# Internal Assemblies — Introduction

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**WARNING:** Remove all power sources (AC, battery, DC) before opening the device. Failure to do so may allow the device to charge without warning and could result in serious injury or death.

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## Opening the Case

**TIP:** If your HeartStart MRx still has a 64 MB data card, then it is recommended to perform the M4773A (internal and external 256 MB Data Card) upgrade next time you perform an internal repair.

Ⓢ To open the sealed case safely, perform the following steps, in the order listed.

Each step is described in more detail in following sections.

- 1 Discharge the power supply capacitors (see “Discharging the Power Supply Capacitors” below).
- 2 Separate the case (see “Separating the Case” on page 103).
- 3 Discharge the Therapy capacitor (see “Discharging the Therapy Capacitor” on page 106).
- 4 Disconnect the case halves (see “Disconnect the Case Halves” on page 107).

## Discharging the Power Supply Capacitors

---

**WARNING:** Always discharge the power supply capacitors before servicing the HeartStart MRx.

---

Ⓢ To discharge the power supply capacitors:

- ▶ Disconnect external power and remove all batteries.  
The power supply capacitors are now discharging. Wait at least 60 seconds before unplugging any internal connections.

## Separating the Case

Separate the front and back case from each other by performing the following steps.

---

**WARNING:** Dangerous voltages may be present on components and connections exposed during device disassembly. Use extreme caution while the device cover is removed.

---

**CAUTION:** Be sure to work in a static-free environment. Use an electrostatic wrist band. The work surface and area surrounding it must be static-free. Use an antistatic pad which is grounded per the manufacturer’s instructions.

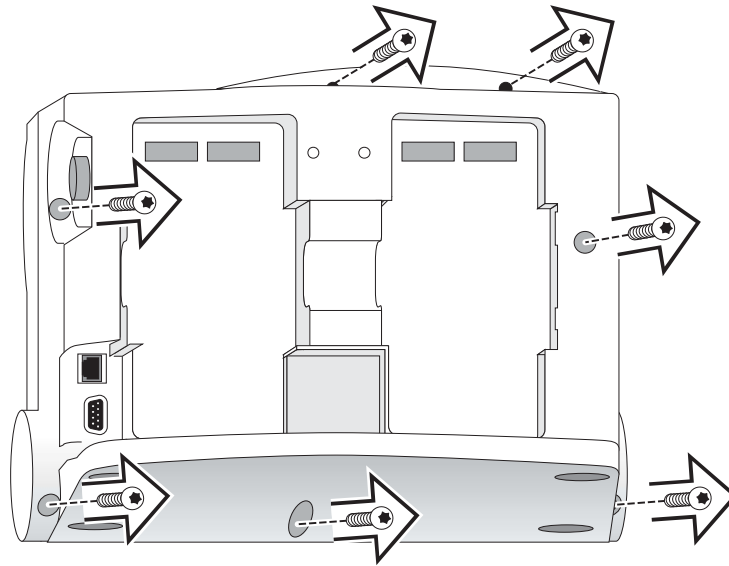
---

Ⓢ To separate the front and back case from each other:

- 1 Remove accessory pouches, if present.
- 2 Remove the bedrail hook mount, if present.  
See “Bedrail Hook Mount” on page 86.
- 3 Remove the paddle tray or handle and cap plate.  
See “Paddle Tray and Plates” on page 93 or “Handle and Cap Plate” on page 88.
- 4 Lay the device down.  
Lay the device on a padded work surface with the display facing down and the bottom of the device nearest to you.

- 5 Remove the case screws and the Stabilizing Collar (if equipped).
  - a Loosen the seven T-15 screws in the back of the case.

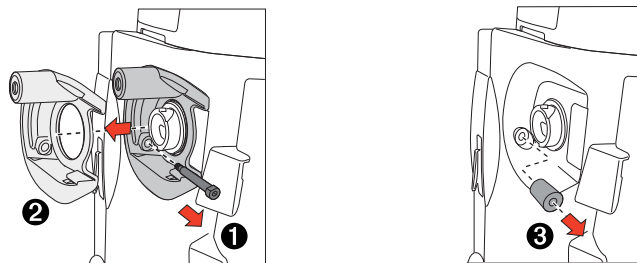
Figure 52 Case Screws



If your M3536A HeartStart MRx device is equipped with the Stabilizing Collar, then instead of the T-15 screw remove the Shoulder screw (1), the Base (2), and the Sleeve (3) from the Therapy Cable recess (see Figure 53).

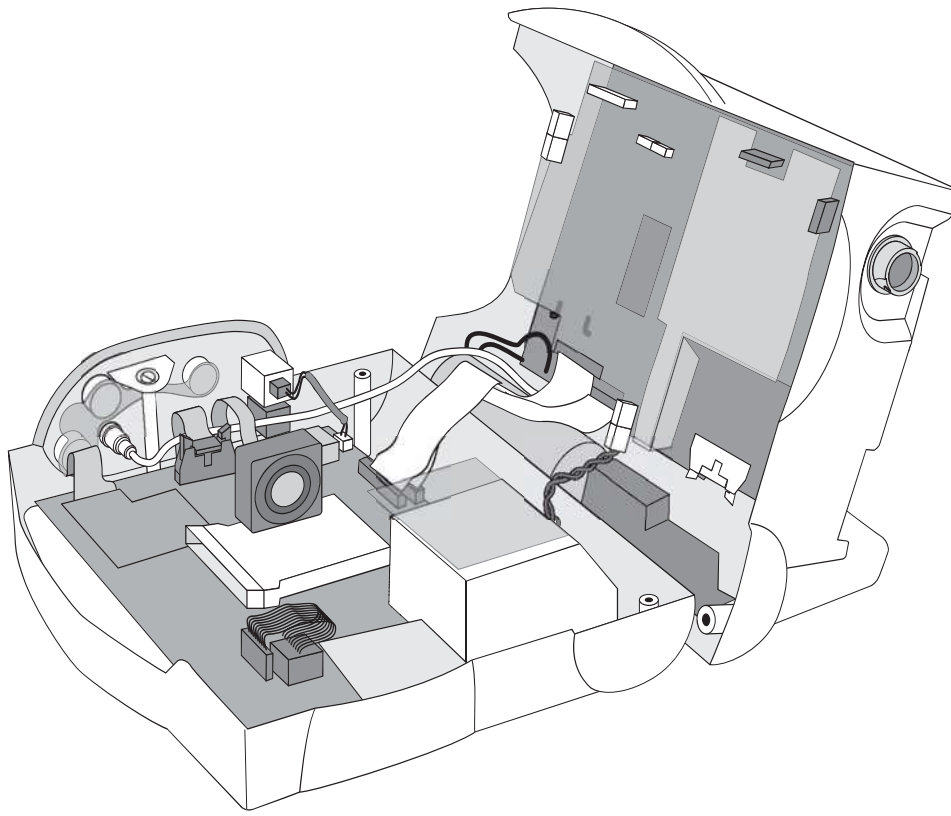
**TIP:** If the Sleeve is stuck inside the case recess, then remove it after opening the case. Do not leave the Sleeve inside the recess to avoid losing it.

Figure 53 Removing the Stabilizing Collar



- b Hold the case halves together with your hands, and turn the device over so the display is facing up. The case screws will fall out of their holes as you do this.
  - c Once the screws are all out and accounted for, stand the device on the work surface with the display facing you.
- 6 Open the case.
  - a Swing the front case away from the rear case separating the therapy port side first. Be careful not to pull on the cables that connect them. (You may need to use some force to separate the halves.)
  - b If you are having difficulty separating the halves, remove the data card tray. Place one hand with your fingers in the data card slot and grasp the therapy port with the other hand. Pull the case halves apart while applying steady pressure until the seal starts to break. (This can sometimes take up to one minute.)

Figure 54 Clamshell Open Case



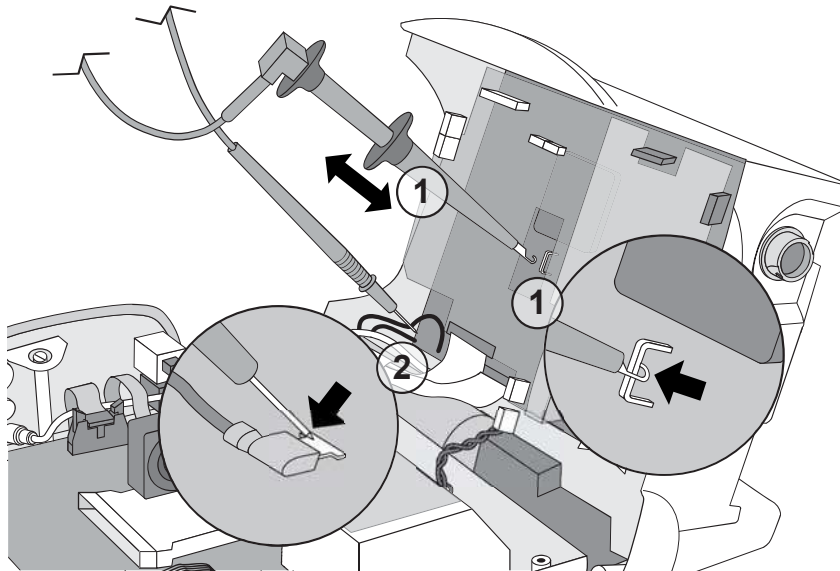
## Discharging the Therapy Capacitor

**WARNING:** Use extreme caution in the following steps. Dangerous voltages may be present on components and connections. Do not touch any components or connections until you are sure the capacitor is discharged.

Ⓢ To discharge the Therapy Capacitor:

- 1 Position the rear case.  
Stand the rear case up on its base with the large blue Therapy capacitor facing you. See [Figure 55](#).
- 2 Using the Defibrillator discharge tool, clip the hooked end onto the resistor that looks like a large staple on the Therapy PCA. (①).
- 3 Touch the other end of the discharge tool to the metal portion of the Therapy capacitor's red spade connector and hold in place for at least 5 seconds (②)
- 4 Once you make contact for at least 5 seconds, *the Therapy capacitor is now discharged.*

Figure 55 Using the Discharge Tool



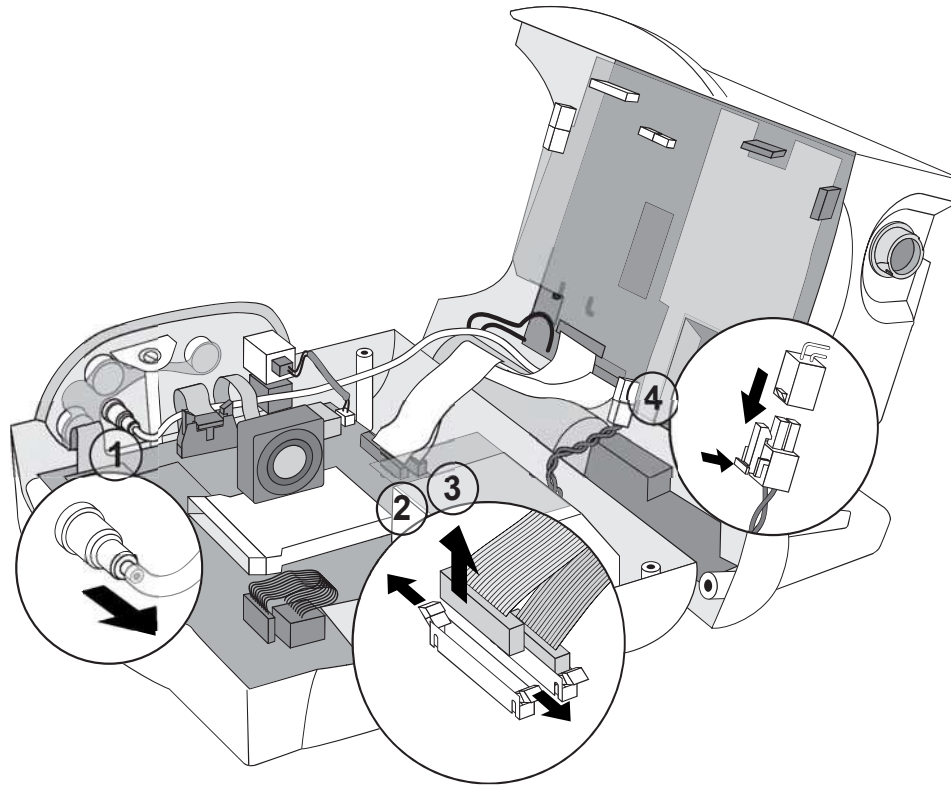
**NOTE:** The Therapy PCA prevents dangerous voltages from existing on the Therapy capacitor after the device is turned off. If there are sparks or any other evidence of significant electrical current when you apply the discharge tool, replace the Therapy PCA.



## Disconnect the Case Halves

- 1 Disconnect the case halves. See [Figure 56](#).

Figure 56 **Disconnecting the Case Halves**



- a Disconnect the NBP tubing from the measurement module panel (①).
  - b Disconnect the two ribbon cables from the Processor PCA by releasing their latches and pulling straight out (②③).
  - c Disconnect the two-wire printer power cable from the Power PCA by releasing the latch and pulling straight down toward the bottom of the case (④).
- 2 Pull the halves of the case apart.  
Separate the halves of the case and set them on the work surface.

## Internal Assemblies — Front Case

This section is organized into the following topics:

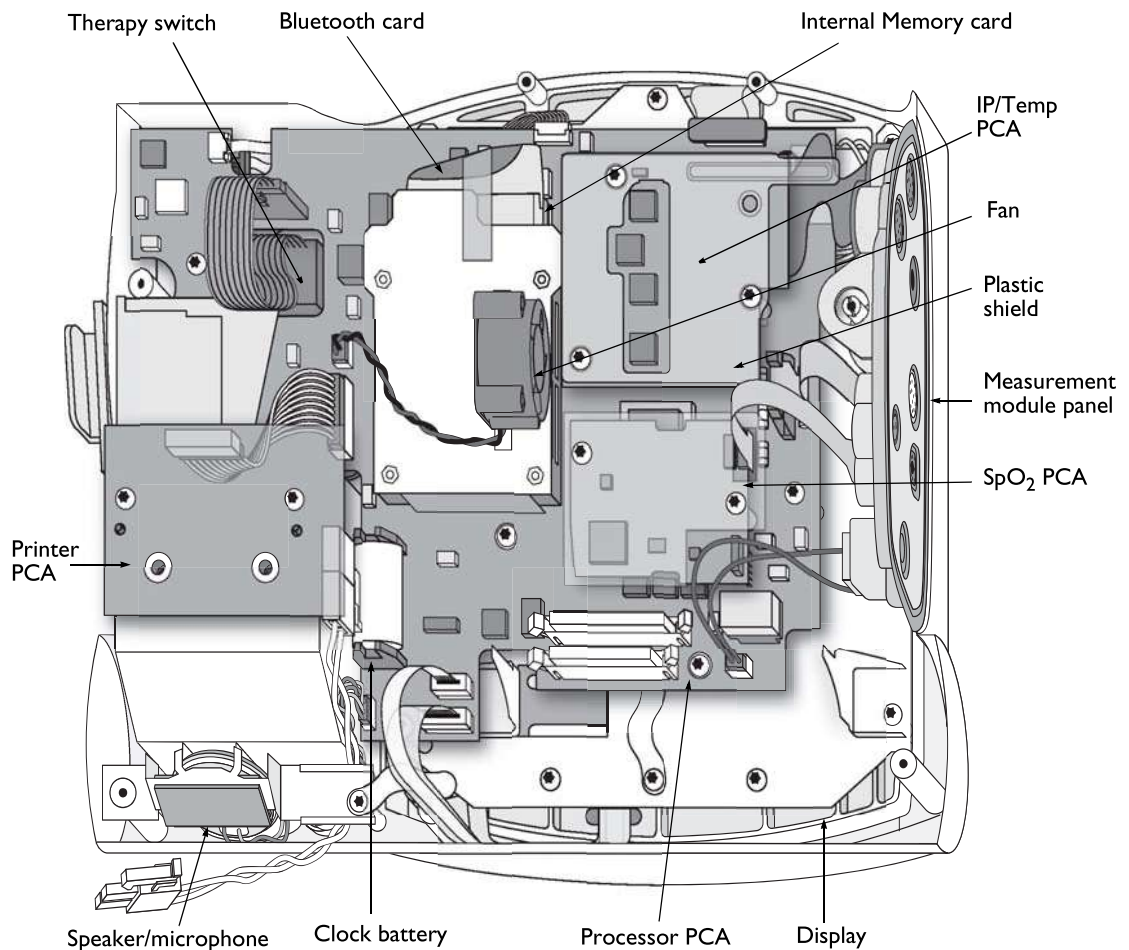
Topic	Page
✓ PCMCIA Hole Plug	109
✓ Speaker and Microphone	110
✓ Internal Memory Card	111
✓ SpO <sub>2</sub> PCA	112
✓ IP/Temp PCA	115
✓ Measurement Module Panel	117
✓ Therapy Switch	119
✓ Fan Assembly	120

Topic	Page
✓ Processor PCA	121
✓ Clock Battery	128
✓ Printer Connector PCA	129
✓ Display Assembly	130
✓ Ready For Use Indicator	132
✓ Front Panel Buttons	133
✓ Front Case Assembly	134

### Overview of Front Case

Refer to [Figure 57](#) to identify assemblies in the front case.

**Figure 57 Front Case Overview**



## PCMCIA Hole Plug

Even though the PCMCIA hole plug is located physically in the rear case, it blocks access to the Bluetooth card located in the front case, therefore it is discussed here.

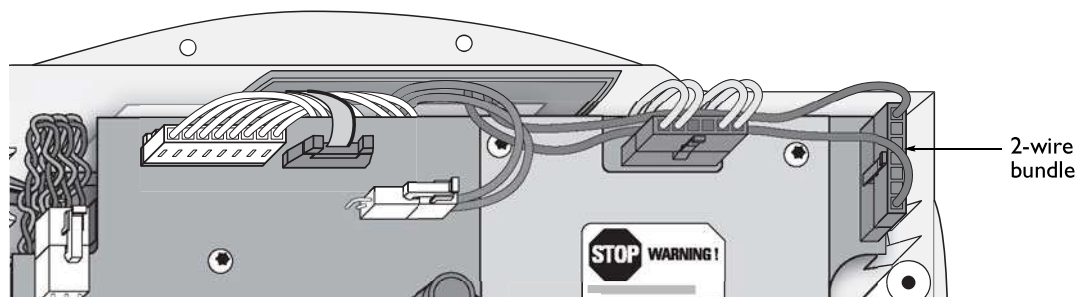
### ⦿ Preparation

- 1 Remove either the paddle tray or handle and cap plate.  
See “Paddle Tray and Plates” on page 93 or “Handle and Cap Plate” on page 88.
- 2 Open and separate the case.  
See “Opening the Case” on page 103.
- 3 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.

### ⦿ Removal

- 1 Disconnect the PCMCIA hole plug connector from the Power PCA.  
Unplug the 2-wire bundle from the Power PCA.

Figure 58 **Disconnecting the PCMCIA Hole Plug**



- 2 Remove the PCMCIA hole plug.  
Grasp the PCMCIA hole plug by the corner tab and pull up. Use pliers, if necessary.

### ⦿ Replacement

- 1 Guide the 2-wire bundle through the hole.  
Make sure the wire is routed as shown in [Figure 58](#).
- 2 Connect the 2-wire bundle to the Power PCA.
- 3 Replace the PCMCIA hole plug.
  - a Press in all of the corners.
  - b Work your way around the plug, pressing it into place.
- 4 Close the case.  
See “Closing the Case” on page 158.
- 5 Replace the paddle tray or handle and cap plate.  
See “Paddle Tray and Plates” on page 93 or “Handle and Cap Plate” on page 88.

### ⦿ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Speaker and Microphone Assembly

The speaker and microphone assembly can be removed without removing any other front case assemblies.

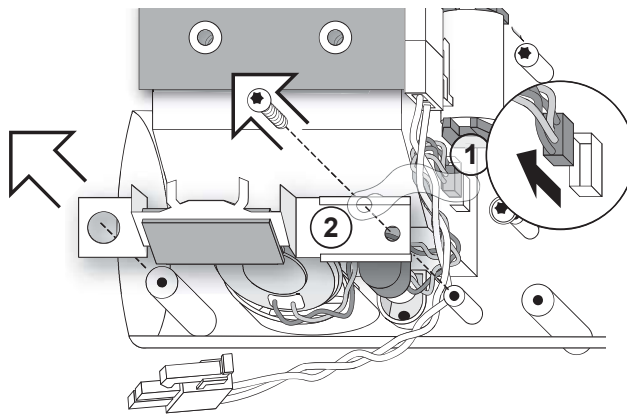
### ⊙ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

### ⊙ Removal

- 1 Disconnect the speaker and microphone from the Processor PCA. See Figure 59. Unplug the four-wire connector by pulling straight up (①).

Figure 59 Removing the Speaker and Microphone



- 2 Remove the screw. Loosen and remove the T-10 screw that fastens the plastic shield and bracket to the case.
- 3 Remove the shield and bracket. Lift the shield and bracket straight up (②).
- 4 Note the position of the speaker, microphone, and the cables for each. The speaker lays forward against the speaker support at an angle. The microphone fits into an appropriately shaped recess in the case.
- 5 Remove the speaker and microphone. Neither is attached to the case; simply pull both straight up.

### ⊙ Replacement

- 1 Place the speaker and microphone into position.
  - a Position the speaker connections at the bottom, as shown in Figure 59. There are two ribs at the bottom of the speaker support- the speaker sits on top of the ridges.
  - b Place the microphone into its recess. Align the microphone wires with the notch in the recess.
- 2 Place the shield and bracket in position. Make sure the red and black 4-wire bundle and the white 2-wire printer bundle pass under the bracket, as shown in Figure 59.
- 3 Replace the screw and tighten.
- 4 Connect the speaker/microphone assembly. Connect the four-wire connector to the Processor PCA.
- 5 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Internal Memory Card

The internal memory card resides in the PCMCIA slot on the Processor PCA. The internal memory card can be removed without removing any other front case assemblies.

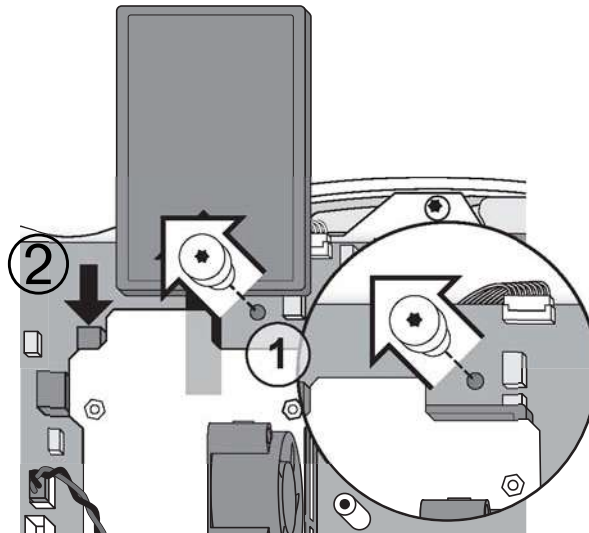
### ⊙ Preparation

- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the front case  
Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

### ⊙ Removal

- 1 Remove the shoulder screw (①).  
Loosen and remove the T-10 shoulder screw on the Processor PCA.
- 2 Stand the front case up with the display facing away from you.
- 3 Remove the internal memory card.
  - a Press the black eject button (②).
  - b Pull the card out.

Figure 60 Removing the Internal Memory Card



### ⊙ Replacement

- 1 Insert the internal memory card into the PCMCIA slot closest to the Processor PCA.
  - a Align the card so that the CE label is facing the Processor PCA.
  - b Push the card into the slot as far as it can go.
- 2 Replace the shoulder screw.
- 3 Close the device.  
See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## SpO<sub>2</sub> PCA

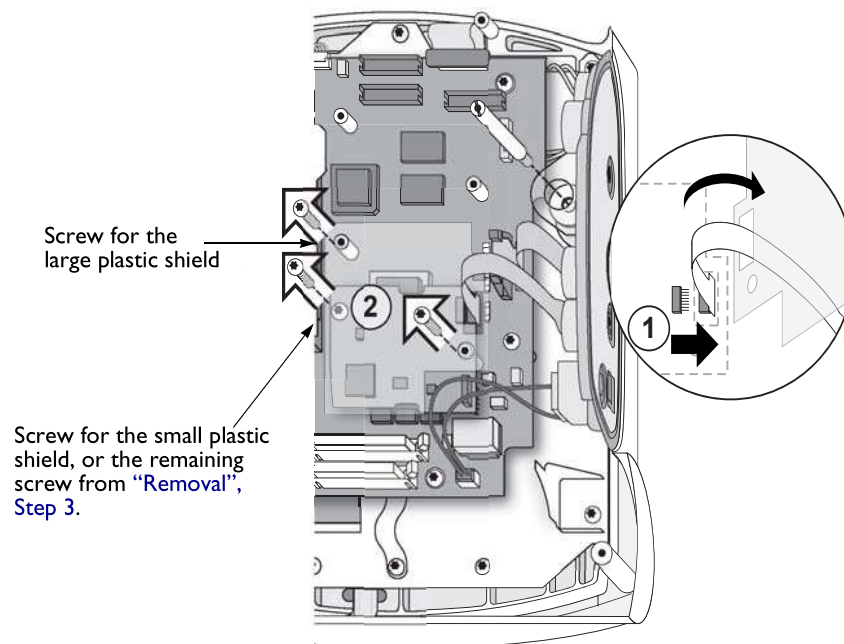
**NOTE:** SpO<sub>2</sub> PCA replacement requires the software version at or above B.06. Install the latest software if your software version is at B.05 or lower, and you replace the SpO<sub>2</sub> PCA.

The SpO<sub>2</sub> PCA can be removed without removing any other front case assemblies.

There are two variations of the SpO<sub>2</sub> PCA assembly (see [Figure 61](#) for the details):

- The assembly with the large plastic shield. This shield is secured by two T-10 screws and covers another T-10 screw. This variation is incompatible with the IP/Temp option.
- The assembly with the small plastic shield. This shield is secured by two T-10 screws and does not cover any screws. This variation is used with the IP/Temp option.

Figure 61 **Disconnecting the SpO<sub>2</sub> PCA**



### ⦿ Preparation

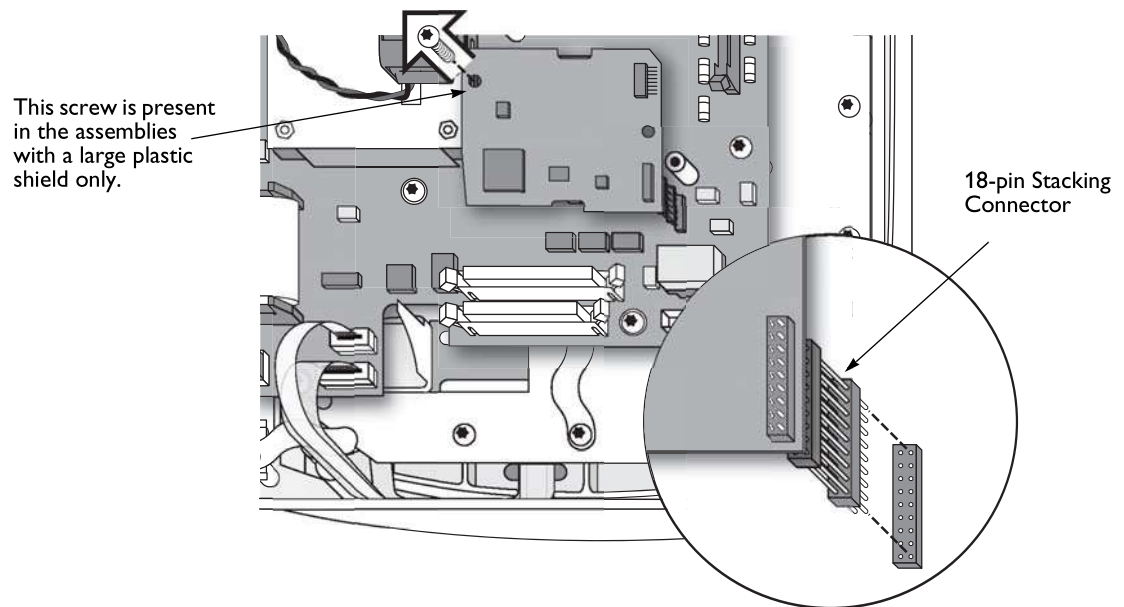
- 1 Open and separate the case.  
See [“Opening the Case”](#) on page 103.
- 2 Position the front case.  
Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

**Ⓞ Removal**

- 1** Remove the plastic shield.
  - a** Loosen and remove the two T-10 screws. (Depending on the type of the shield in the device, the screws are located in different places. Refer to [Figure 61](#).)
  - b** Lift up the plastic shield.
- 2** Disconnect the SpO<sub>2</sub> flex circuit from the SpO<sub>2</sub> PCA.  
Grasp the connector and pull sideways (①).
- 3** Remove the remaining screw (if present).

If your assembly is equipped with the large plastic shield that covers another T-10 screw, then loosen and remove the remaining screw (see [Figure 62](#)).

If your assembly is equipped with the small plastic shield that does not cover any screws, then proceed with [Step 4](#).
- 4** Lift the SpO<sub>2</sub> PCA.  
As you lift the SpO<sub>2</sub> PCA, it will disconnect from the Processor PCA. The 18-pin stacking connector may lift up with the SpO<sub>2</sub> PCA or it may stay secured to the Processor PCA. In either case, keep the connector as you will need it for the replacement procedure.

**Figure 62 Removing the SpO<sub>2</sub> PCA**

### ⊙ Replacement

- 1 Secure the 18-pin stacking connector to the Processor PCA.
  - a If the stacking connector is secured to the Processor PCA, leave it in place, but make sure it is firmly engaged in the socket.
  - b If the stacking connector is secured to the SpO<sub>2</sub> PCA, remove it and insert the short plug into the J23 socket on the Processor PCA. Make sure it is firmly engaged in the socket.
  - c If the stacking connector is disconnected, then insert the short plug into the socket on the Processor PCA. Make sure it is firmly engaged in the socket.
  - d If the stacking connector is damaged or lost, an extra one is provided in the repair kit.
- 2 Place the SpO<sub>2</sub> PCA in position.
  - a Line up the screw holes on the SpO<sub>2</sub> PCA with the standoffs on the Processor PCA.
  - b Line up the holes on the SpO<sub>2</sub> PCA with the 18-pin stacking connector on the Processor PCA. Push gently to ensure that the pins on the stacking connector are fully engaged.

---

**CAUTION:** Make sure that you do not lose or bend the 18-pin stacking connector. If it gets disconnected from the boards, make sure that the short plug engages the Processor PCA socket, and the long plug engages the SpO<sub>2</sub> PCA socket.

If you are removing the IP/Temp PCA (see “[Invasive Pressure/Temperature \(IP/Temp\) PCA](#)” on page 115) too, make sure to keep the 8-pin stacking connector with the IP/Temp PCA, and the 18-pin stacking connector with the SpO<sub>2</sub> PCA, and not interchange them.

---

- 3 Place the SpO<sub>2</sub> flex circuit through the plastic shield.
- 4 Connect the SpO<sub>2</sub> PCA.  
Connect the SpO<sub>2</sub> flex circuit to the SpO<sub>2</sub> PCA. Make sure it slides all of the way in.
- 5 For the assemblies with the large plastic shield only, replace the screw.  
If your PCA is equipped with the large plastic shield that covers a T-10 screw, then replace the screw (see [Figure 62](#)).  
If your PCA is equipped with the small plastic shield that does not cover any screws, then proceed with the next step.
- 6 Place the plastic shield over the SpO<sub>2</sub> PCA and secure.  
Replace and tighten the two T-10 screws.
- 7 Close the case.  
See “[Closing the Case](#)” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.



## Invasive Pressure/Temperature (IP/Temp) PCA

The Invasive Pressure / Temperature (IP/Temp) PCA is mounted on the Processor PCA. There are two plastic shields: one fits over the IP/Temp PCA and separates it from the rear case assemblies, and the other, with the rubber foam pad attached, sits under the PCA and separates it from the Processor PCA.

### ⦿ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the front case. Turn the front case around on the work surface so that the display is facing down, and the printer is in the far right corner.

### ⦿ Removal

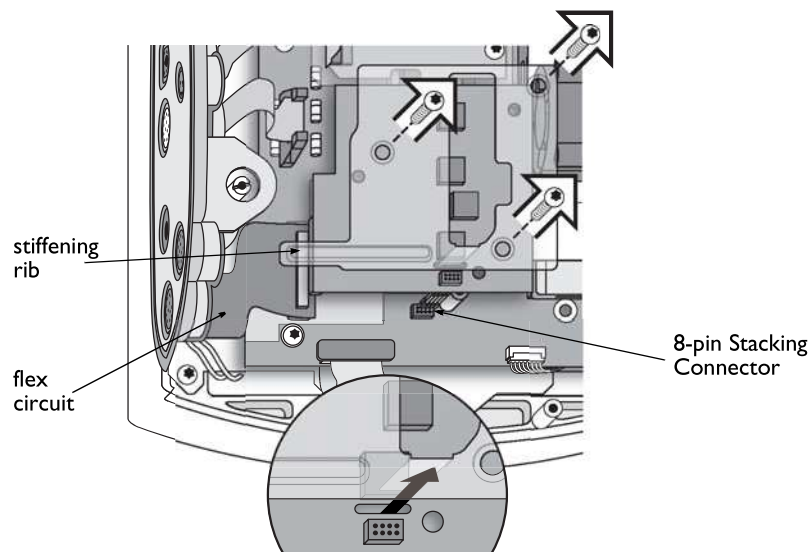
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**CAUTION:** Do not attempt to disconnect the IP/Temp flex circuit from the IP/Temp PCA before the IP/Temp PCA removal. The board or circuit damage may occur.

---

- 1 Remove the plastic shield from the IP/Temp PCA, as shown in [Figure 63](#).
  - a Loosen and remove the three T-10 screws.
  - b Remove the plastic shield and set it aside.

Figure 63 Removing the IP/Temp PCA



- 2 Lift the IP/Temp PCA from the Processor PCA.  
As you lift the IP/Temp PCA it will disconnect from the Processor PCA. The 8-pin stacking connector may lift up with the IP/Temp PCA, or it may stay connected to the Processor PCA. In either case, keep the connector as you will need it for the replacement procedure.
- 3 Disconnect the IP/Temp flex circuit from the IP/Temp PCA.  
Gently disconnect the flex circuit, as you lift up the IP/Temp PCA.

---

**CAUTION:** Make sure that you do not lose or bend the 8-pin stacking connector. If it gets disconnected from the boards, make sure that the short plug engages the Processor PCA socket, and the long plug engages the IP/Temp PCA socket.

If you are removing the SpO<sub>2</sub> PCA too, make sure to keep the 8-pin stacking connector with the IP/Temp PCA, and the 18-pin stacking connector with the SpO<sub>2</sub> PCA, and not interchange them.

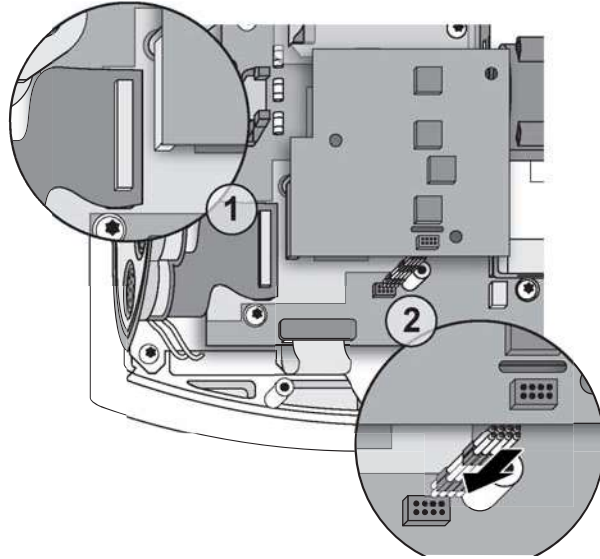
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- 4 Leave the plastic shield with the rubber foam pad in place.

⊙ Replacement

- 1 Make sure that the plastic shield with the rubber foam pad is in place.
- 2 Connect the IP/Temp flex circuit from the measurement module panel to the IP/Temp PCA (①), as shown in [Figure 64](#). The flex circuit connection is located underneath the IP/Temp PCA.

Figure 64 Replacing the IP/Temp PCA



- 3 Secure the stacking connector (②) to the Processor PCA.
  - If the stacking connector is attached to the Processor PCA, then leave it in place.
  - If the stacking connector is attached to the IP/Temp PCA, then remove it and insert the short plug into the socket on the Processor PCA.
  - If the stacking connector is disconnected, then insert the short plug into the socket on the Processor PCA.
  - If the stacking connector is damaged or lost, an extra one is provided in the repair kit.

Make sure the stacking connector is firmly engaged in the socket.
- 4 Attach the IP/Temp PCA to the Processor PCA.
  - a Align the long plug of the stacking connector with the socket on the IP/Temp PCA. Be careful not to bend the pins.
  - b Align the holes in the IP/Temp PCA with the screw holes in the stand-offs on the Processor PCA.
  - c Lightly but securely engage both stacking connector plugs with the sockets on both PCAs.
- 5 Place the plastic shield in position and secure it.
  - a Line up the shield so that the stiffening rib (shown in [Figure 63](#) on page 115) protrudes to your left, towards the measurement panel.
  - b Fit the shield's plastic tab into the slot in the IP/Temp PCA.
  - c Replace and tighten the three T-10 screws.
- 6 Close the case.  
See “[Closing the Case](#)” on page 158.

⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Measurement Module Panel

There are different measurement module panels depending on the options in the device. If the device has the IP/Temp option, you will need to remove the [Invasive Pressure/Temperature \(IP/Temp\) PCA](#) in order to replace the measurement module panel.

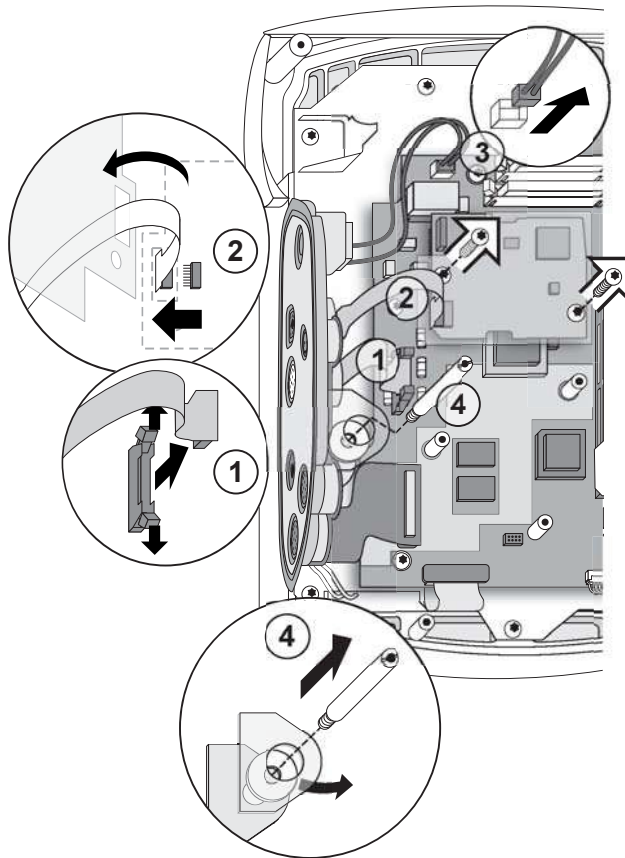
### ⦿ Preparation

- 1 Open and separate the case.  
See “[Opening the Case](#)” on page 103.
- 2 Position the front case.  
Turn the front case around on the work surface so that the display is facing down, and the printer is in the far right corner.

### ⦿ Removal

- 1 Lift the plastic shield from the SpO<sub>2</sub> PCA. See [Figure 65](#).
  - a Loosen and remove the two T-10 screws.
  - b Lift up the plastic shield.
- 2 Remove the IP/Temp PCA, if present.  
See “[Invasive Pressure/Temperature \(IP/Temp\) PCA](#)” on page 115.

Figure 65 **Removing the Measurement Module Panel**



- 3 Disconnect the measurement module panel.
  - a Disconnect the ECG connector cable from the Processor PCA by releasing the latches at the edges of the connectors (①).
  - b Disconnect the SpO<sub>2</sub> flex circuit from the SpO<sub>2</sub> PCA (②).
  - c Disconnect the ECG Out jack wire from the Processor PCA (③).
- 4 Remove the standoff and washer using a straight-blade screwdriver (④).
- 5 Remove the measurement module panel.

Lift the module straight up out of its groove in the front case.

### ⊙ Replacement

- 1 Place the measurement module panel into position.

Align its gasket with the groove in the case and lower the module into position. Be careful not to cut, pinch or crush the soft gasket.

---

**NOTE:** Make sure that you carefully seat the measurement module panel without skewing it or crushing the gasket.

---

- 2 Replace the washer and standoff.
- 3 Loop the SpO<sub>2</sub> flex circuit through the plastic shield.
- 4 Connect the measurement module panel.
  - a Connect the ECG Out jack wire to the Processor PCA.
  - b Place the SpO<sub>2</sub> flex circuit through the plastic shield.
  - c Connect the SpO<sub>2</sub> flex circuit to the SpO<sub>2</sub> PCA.
  - d Connect the ECG connector cable to the Processor PCA. Be sure that the connector is properly centered and both latches are locked.
- 5 Replace the plastic shield over the SpO<sub>2</sub> PCA.

Replace and tighten the two screws.
- 6 Replace the IP/Temp PCA, if present.

See “[Invasive Pressure/Temperature \(IP/Temp\) PCA](#)” on page 115.
- 7 Close the case.

See “[Closing the Case](#)” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Therapy Switch

### ⊙ Preparation

- 1 Remove the Therapy Knob. See “Therapy Knob” on page 100.
- 2 Remove the nut and washer. Loosen and remove the nut (9/16-inch) and washer.
- 3 Open and separate the case. See “Opening the Case” on page 103.
- 4 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

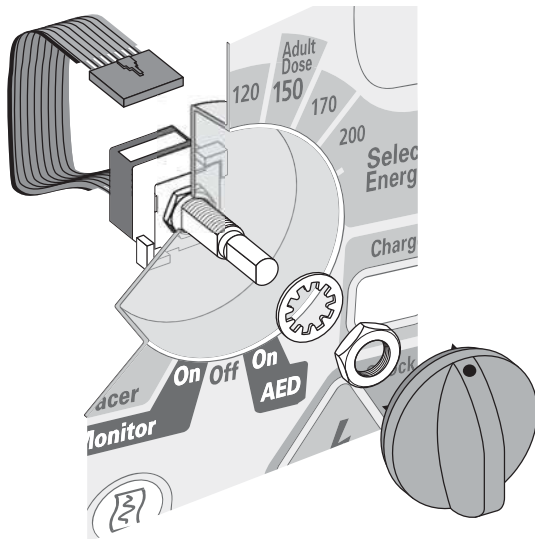
### ⊙ Removal

- 1 Unplug the ribbon cable from the Processor PCA.
- 2 Remove the Therapy switch.

### ⊙ Replacement

- 1 Position the switch, as shown in [Figure 66](#).  
Orient the switch so the black stripe on the ribbon cable is on the edge closest to the fan.

Figure 66 **Orientation of Therapy Switch**



- 2 Connect the ribbon cable to the Processor PCA without twisting or kinking the cable.
- 3 Replace the washer and nut.  
Tighten the nut. Do not overtighten.
- 4 Check the orientation.
  - a Slide the Therapy Knob onto the shaft, ensuring that the flat part of the knob recess aligns with the flat part of the shaft.
  - b Rotate the knob fully in both directions. Check that the knob aligns properly with the panel markings.
- 5 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Fan Assembly

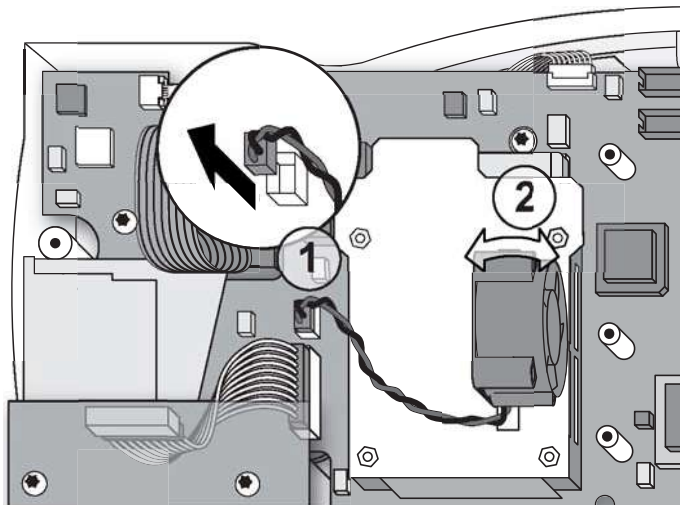
### ⊙ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

### ⊙ Removal

- 1 Unplug the braided fan cable from the Processor PCA (①).
- 2 Remove the fan.
  - a Slowly bend the fan back and forth to loosen it, being careful not to damage the sheet metal (②).
  - b When the fan is loose, lift it off of the adhesive.

Figure 67 Replacing the Fan



- 3 Peel the adhesive off of the sheet metal. Make sure that all of the adhesive is removed.

### ⊙ Replacement

- 1 Clean the fan and the PCMCIA aluminum plate.  
Wipe both the fan and the PCMCIA aluminum plate with 70% isopropyl alcohol and let them dry. Do not touch the surfaces once you have cleaned them.
- 2 Remove one side of the adhesive backing and secure it to the fan.
- 3 Position the fan, so that the label on the fan’s hub is facing the external data card guide, and the 2-wire bundle is closest to the speaker microphone assembly. The bottom of the fan contains the molded CE mark.
- 4 Peel off the adhesives backing and install the fan between the two tabs on the PCMCIA sheet metal. Press and hold the fan in place for 10 to 20 seconds to secure it to the PCMCIA aluminum plate.
- 5 Connect the fan cable to the Processor PCA.
- 6 Close the device. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Processor PCA

The Processor PCA contains the device's operating software.

When you install a new Processor PCA you must also:

- Enter the device's serial number and enable options using the Service Mode menus.
- Install the most recent software in the appropriate language using the Software Support tool. See [Table 48](#) on page 205 for part numbers.
- Give the customer the *README* document which contains instructions for downloading the most recent *Instructions for Use* from the Philips' Documentation and Download web site (<http://www.philips.com/ProductDocs>).
- Affix the appropriate Hardware Version label to the back of the device. (See the *Processor PCA Label Instructions* for additional information.)
- Calibrate the NBP and EtCO<sub>2</sub> modules in devices running software versions prior to B.05.

Removing the Processor PCA involves disconnecting many cables and removing many screws. Take your time and be methodical.

### Ⓢ Preparation

- 1 Save the configuration settings to a data card.  
If possible, save the customer's configuration settings to a data card so the configuration can be restored after the repair is complete. See the *HeartStart MRx Instructions for Use* for information.
- 2 Remove the data card tray.
- 3 Open and separate the case. See “[Opening the Case](#)” on page 103.
- 4 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

### Ⓢ Removal

- 1 Remove the SpO<sub>2</sub> PCA. See “[SpO<sub>2</sub> PCA](#)” on page 112.
- 2 Remove the IP/Temp PCA. See “[Invasive Pressure/Temperature \(IP/Temp\) PCA](#)” on page 115.
- 3 Remove the measurement module panel. See “[Measurement Module Panel](#)” on page 117.
- 4 Disconnect all cables.  
See [Figure 68](#) on page 122 and [Table 33](#) on page 122. The order in [Table 33](#) begins with the left edge of the Processor PCA and then works around the front case in a clockwise direction.
- 5 Remove the Bluetooth card, if present. See “[Bluetooth® Card](#)” on page 101.
- 6 Remove the screws. See [Figure 69](#) on page 123.
  - a Loosen and remove the seven T-10 screws.
  - b Loosen and remove the shoulder screw, using the T-10 driver.
- 7 Lift the Processor PCA out of the case.
  - a Be careful to guide the many cables out of the way so the Processor PCA can be lifted clear.
  - b Leave the clock (lithium) battery in place when returning the PCA for repair. This helps preserve information for factory troubleshooting.
- 8 Remove the internal memory card. Press the black eject button and pull the card out.

Figure 68 Processor PCA Connections

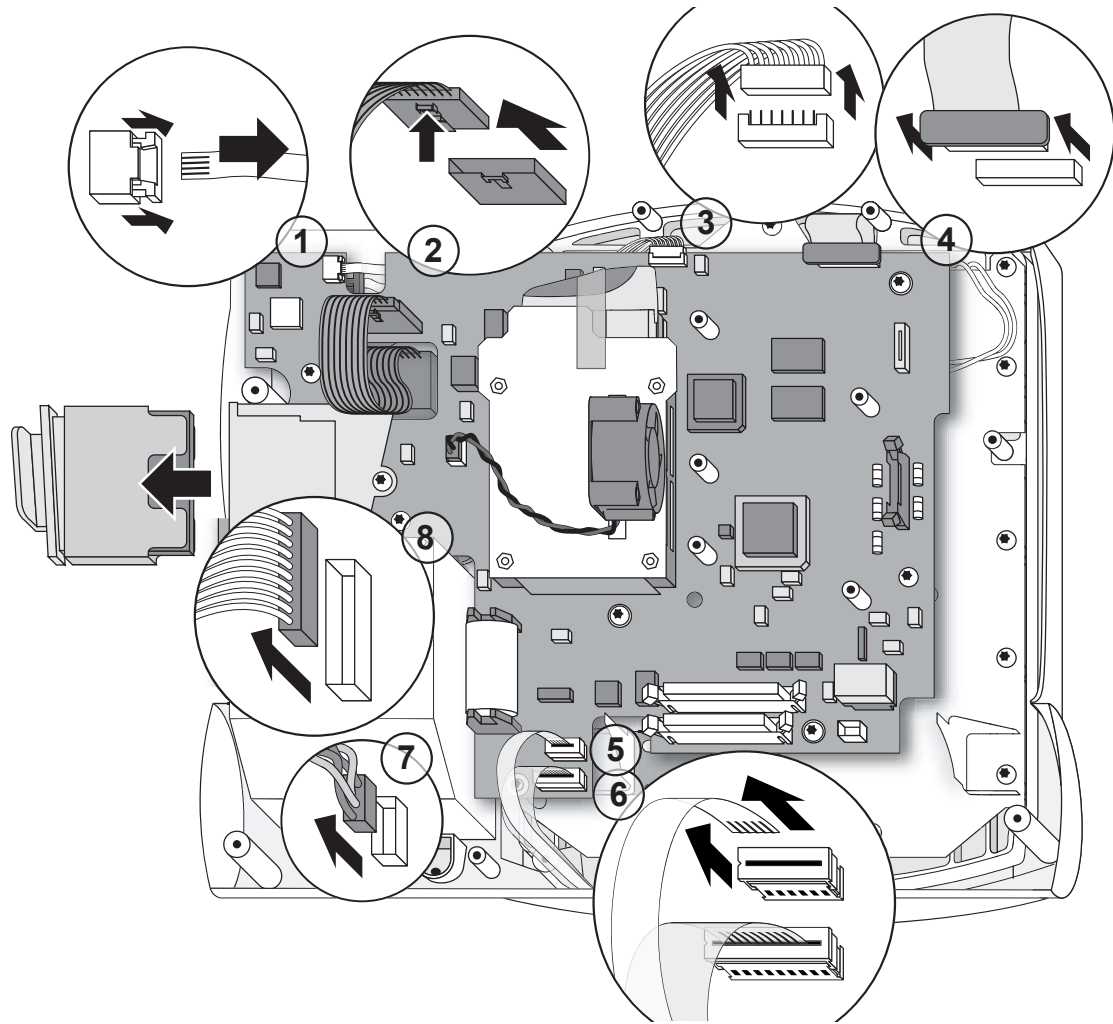
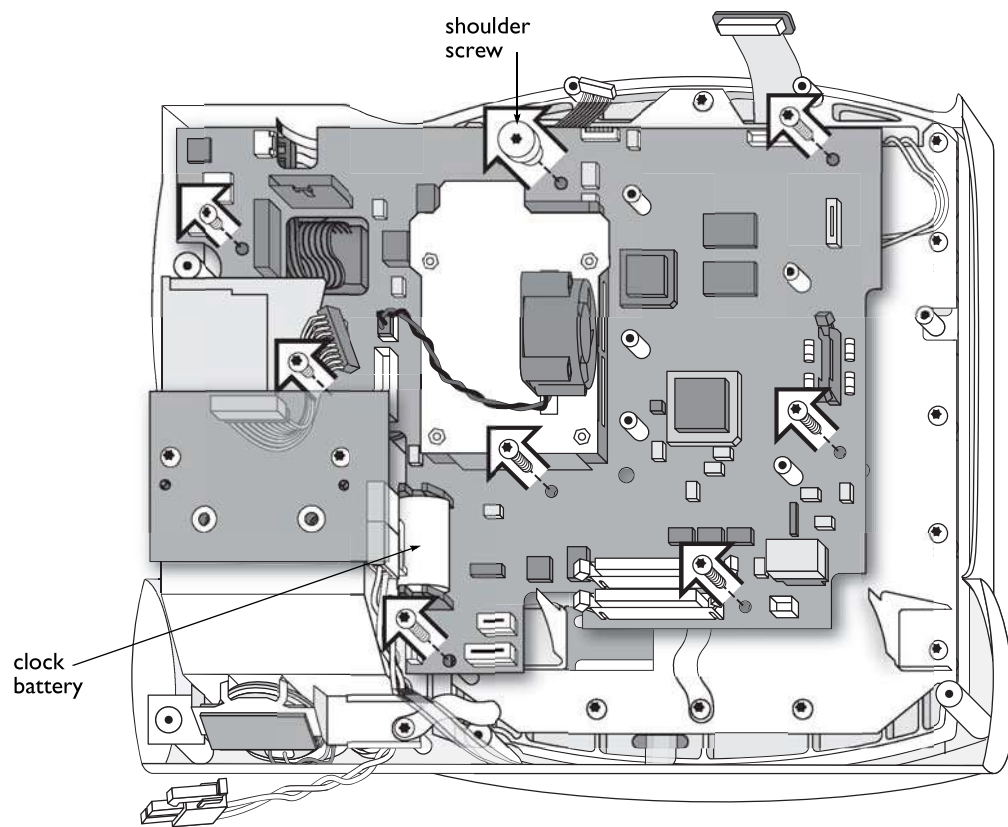


Table 33 Processor PCA Connections

Ref. #	Description	Connects To	Disconnect By
①	small flex circuit	RFU indicator	Push out latch, slide out flex
②	ribbon cable	Therapy switch	Push on latch, pull straight up
③	8-wire bundle	Display	Push on latch, pull straight out
④	flex circuit	Display	Pull or pry straight up
⑤, ⑥	flex circuit	Front Bezel	Pull up on latch to release, pull
⑦	4-wire bundle	Speaker/microphone	Pull, wiggle (use needle-nose pliers, if necessary)
⑧	10-wire bundle	Printer PCA	



Figure 69 Processor PCA Screws



### Ⓢ Replacement

- 1 Install the clock (lithium) battery. Usually the Processor PCA is shipped with the battery installed. Proceed to the next step if the battery is installed. Otherwise see [“Clock Battery”](#) on page 128.
- 2 Install the replacement fan assembly. See [“Fan Assembly”](#) on page 120.
- 3 Replace the internal memory card.
  - a Align the card so that the CE label is facing the Processor PCA.
  - b Insert the internal memory card into the slot farthest from the fan.
  - c Push the card into the slot as far as it can go. The eject button should pop out slightly.
- 4 Replace the Bluetooth card. See [“Bluetooth® Card”](#) on page 101.
- 5 Place the Processor PCA in position.  
Guide the cables out of the way. Line up the holes in the Processor PCA with the threaded standoffs underneath. Make sure there are no cables or wires trapped underneath the PCA.
- 6 Replace the seven T-10 screws and the shoulder screw and tighten. See [Figure 69](#) on page 123.
- 7 Replace the SpO<sub>2</sub> PCA. See [“SpO<sub>2</sub> PCA”](#) on page 112.
- 8 Replace the IP/Temp PCA. See [“Invasive Pressure/Temperature \(IP/Temp\) PCA”](#) on page 115.
- 9 Replace the Measurement Module Panel. See [“Measurement Module Panel”](#) on page 117.
- 10 Connect all cables, see [Figure 68](#) and [Table 33](#) on page 122. The order in [Table 33](#) begins with the left edge of the Processor PCA and then works around the front case in a clockwise direction.
- 11 Close the device. See [“Closing the Case”](#) on page 158.
- 12 Replace the data card tray.

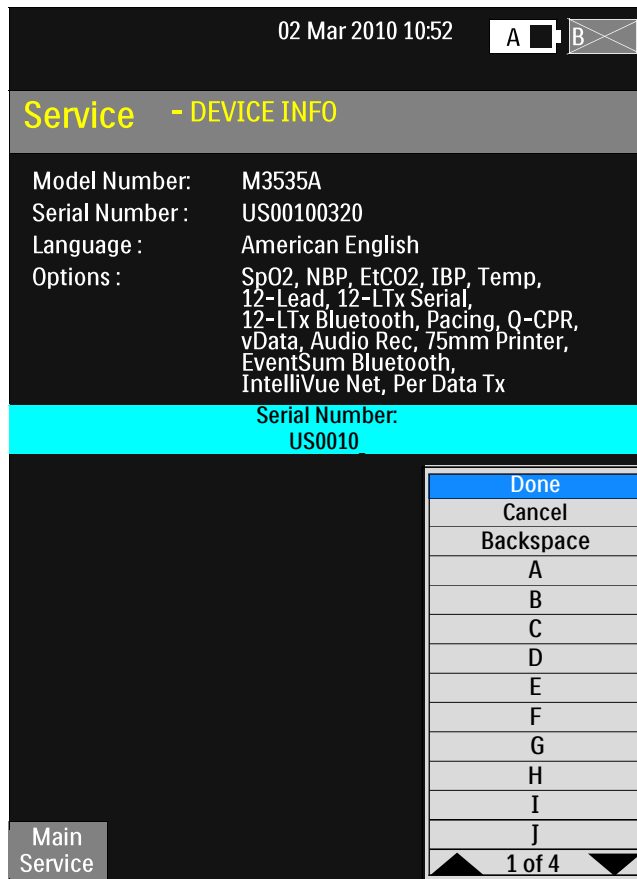
## Entering the Serial Number

After you have replaced the Processor PCA, you must enter the device's serial number in the HeartStart MRx for it to be operational. If the serial number is not entered, the device powers up with the message **Device serial number has not been entered. Service unit.** *Normal operation is not possible*, and the device powers up into Service Mode, where you can enter the serial number.

⊙ To enter the serial number:

- 1 Turn the device off.
- 2 Disconnect all external power and remove all batteries. The primary and secondary labels, which contain the model number, serial number and options key, are now visible.
- 3 Record the model number, serial number, and options key(s) from the labels on the back case.
- 4 Insert the AC power module and a battery (charged to at least 20%) and turn the Therapy Knob to Monitor. The device powers up into Service Mode.
- 5 From the Service Mode Main menu, select **Device Info.**
- 6 From the Device Info menu, select **Model Number.** Select the model number.
- 7 From the Device Info menu, select **Edit S/N.** An alphanumeric menu is displayed, see [Figure 70](#).

Figure 70 Entering Serial Number



- 8 Enter the serial number using the Navigation buttons to scroll through the letters and numbers. Press the Menu Select button to complete each selection. Select **Cancel** or backspace to cancel a selection.
- 9 Scroll through the list and select **Done** when you have finished entering the serial number.

**CAUTION:** Once you have entered the correct serial number, do not change it. If you clear or change the serial number, the options are cleared and you must re-enter the correct serial number and the options key.

## Installing Software

**NOTE:** If the Q-CPR (with Compression Sensor) option is enabled, and version 9.00.00 is installed, you should retain the software at the current level rather than upgrading to the latest. Download software version 9.00.01 from the InCenter.

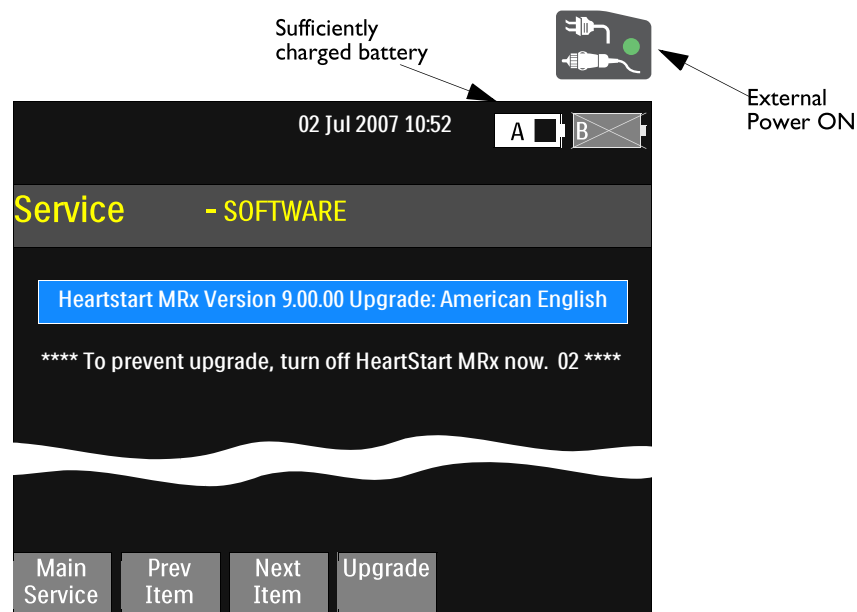
**NOTE:** Upgrading the software to versions 9.00 and above erases patient data from the internal data card. Make sure important data are transferred to proper destinations.

© To install software onto the device or to change the device's language:

- 1 Be sure both an AC power module and battery charged to at least 20% are in place.
- 2 Insert the Software Support Tool into the data card tray and insert the tray into the data card slot.
- 3 From the Service Mode Main menu, select **Software Upgrade**.  
Make sure the software release and language displayed on the screen are correct.
- 4 Press the **Upgrade** softkey.

If you upgrade to versions 9.00 and above, the HeartStart MRx flashes the **\*\*\*\* Upgrade will erase patient data from internal memory \*\*\*\*** message followed by the **\*\*\*\* To prevent upgrade, turn off HeartStart MRx now. *nn* \*\*\*\*** countdown, where *nn* is the number of seconds until the start of the upgrade. You have 10 seconds to safely turn off the HeartStart MRx to prevent data loss. See [Figure 71](#).

Figure 71 **Software Upgrade Screen**



**CAUTION:** After the upgrade start, be careful not to interrupt the software installation process by removing the power source or turning the Therapy Knob.

- 5 The software is installed on the device. This process takes a few minutes. While the software is being updated, progress messages are displayed and the softkeys are disabled.
- 6 When the software or language installation process is complete, turn the device off and on.
- 7 Remove the Software Support Tool from the data card slot.

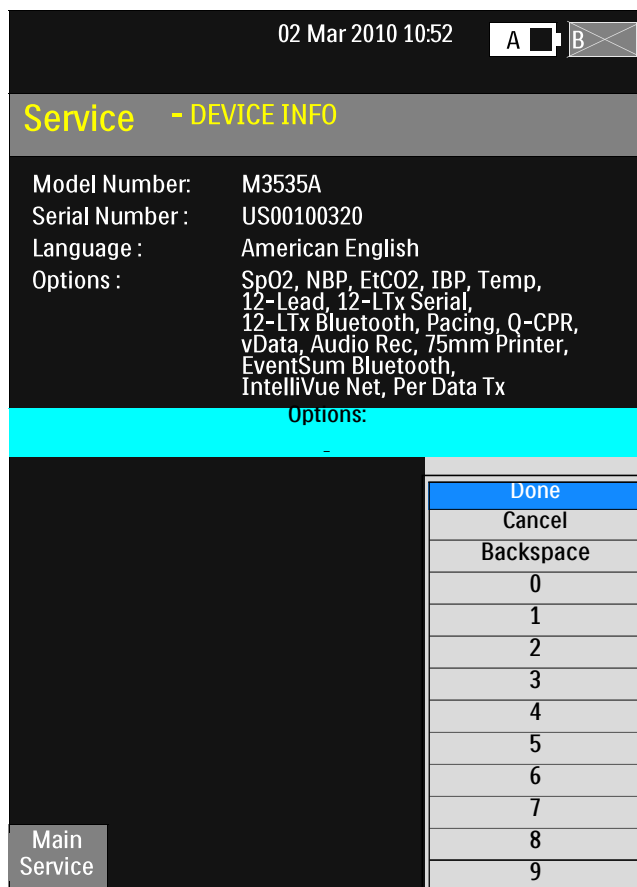
## Enabling Options

Once you enter the serial number and install software, you need to enable the options. If you enter the options key incorrectly, the device's options will not function.

### Ⓢ To enable options:

- 1 From the Device Info menu, select **Options Key**.  
An alphanumeric menu is displayed.

Figure 72 Enabling Options



- 2 Enter the options key using the Navigation buttons to scroll through the letters and numbers. Press the Menu Select button to complete each selection.  
Select **Cancel** or **Backspace** to cancel a selection.  
When the options key has been entered, the corresponding product options are displayed.
- 3 Select **Done** when you have finished entering the options key.
- 4 Repeat [Step 2](#) through [Step 3](#) for each options key.
- 5 Check the information on the screen to ensure it is correct.

**CAUTION:** Once you have entered the correct serial number, do not change it. If you clear or change the serial number, the options are cleared and you must re-enter the correct serial number and the options key.

- 6 Run an Operational Check.
- 7 Review the Operational Check results to ensure all tests have passed.  
See “Weekly Shock Test and Operational Check” on page 33.
- 8 Print the Device Info to ensure the product version and language are correct.  
See “Printing the Device Information” on page 11.

## Completing the Repair

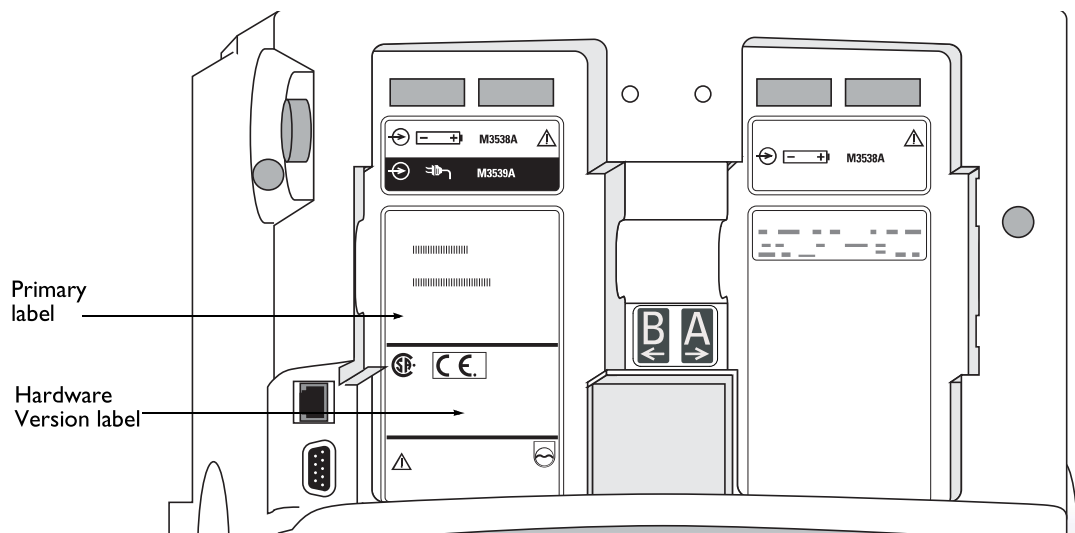
☉ To complete the Processor PCA replacement:

- 1 Affix the Hardware Version Label.

The Processor PCA ships with a set of Hardware Version labels. (See the *Processor PCA Label Instructions* for additional information).

- a Clean the surface with isopropyl alcohol. Allow it to dry.
- b Affix the appropriate label found in the Processor PCA kit to battery compartment B, as shown in Figure 73.

Figure 73 Rear Case Labels



- 2 Give the customer the README  
If you are upgrading the device’s software, it is *essential* that the customer gets the latest Instructions for Use. Make sure the customer gets the README document, which provides instructions for downloading the latest *HeartStart MRx Instructions for Use* from the Philips Documentation and Downloads web site at: <http://www.philips.com/ProductDocs>.
- 3 Set the correct date and time. See the *Instructions for Use* “Configuration” chapter for details.
- 4 Restore the customer’s configuration settings from the data card.
- 5 Run Performance Verification and Safety Testing as described in the “Performance Verification” chapter.

If the device has a software version prior to B.05, the NBP and CO<sub>2</sub> calibration data is not saved. Therefore, it is recommended that you calibrate the NBP and CO<sub>2</sub> modules after a Processor PCA repair in devices with versions prior to B.05.

## Clock Battery

The clock (lithium) battery resides on the Processor PCA. A cable tie wrap and a package of ProGold wipes are included in the replacement kit. Make sure you clean the contact clips and the new battery terminals with a ProGold wipe and replace the cable tie wrap that holds the battery in place.

### ⊙ Preparation

- 1 Open and separate the case.  
See “[Opening the Case](#)” on page 103.
- 2 Position the front case  
Lay the front case on the work surface with the display facing down and the printer in the lower left corner.
- 3 Remove the Processor PCA.  
See “[Processor PCA](#)” on page 121.

### ⊙ Removal and Cleaning

- 1 Remove the battery from the Processor PCA.
  - a Using a pair of fine-nose wire cutters, cut and remove the cable tie wrap that holds the battery in place.
  - b Remove the battery from the holder.
- 2 Thoroughly clean the contact clips and new battery terminals with a ProGold wipe.

### ⊙ Replacement

- 1 Insert the new battery into the holder.

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**CAUTION:** Make sure that you install the new battery with the correct orientation. Follow the polarity markings on the battery holder (under the battery).

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- 2 Secure the battery with the cable tie wrap. Cut off the excess tie wrap.
- 3 Replace the Processor PCA.  
See “[Processor PCA](#)” on page 121.
- 4 Close the case.  
See “[Closing the Case](#)” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Printer Connector PCA

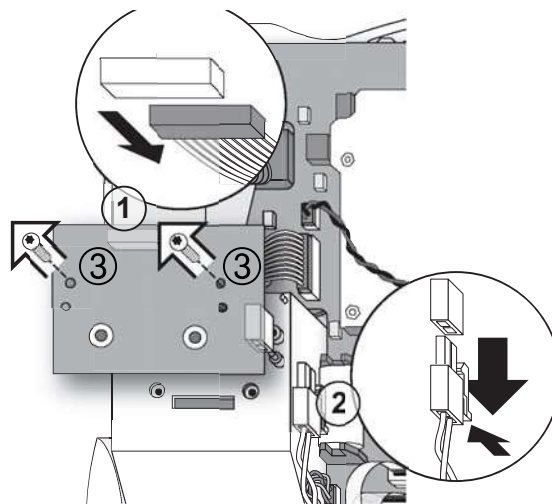
### ⊙ Preparation

- 1 Remove the Printer. See “Printer Assembly” on page 96.
- 2 Open and separate the case. See “Opening the Case” on page 103.
- 3 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

### ⊙ Removal

- 1 Disconnect the Printer PCA, as shown in [Figure 74](#).
  - a Unplug the 10-wire bundle by pulling straight down away from the PCA (①).
  - b Unplug the 2-wire bundle by pushing up on the latch and pulling out (②).

Figure 74 Removing the Printer PCA



- 2 Remove the screws. Loosen and remove the two T-10 screws (③).
- 3 Lift up the Printer Connector PCA. Lift the PCA up off the back of the printer well.

### ⊙ Replacement

- 1 Place the Printer Connector PCA in position.
 

Align the printer connector with the hole in the printer well and lower the PCA into position, with the foam gasket side down. The two locating posts on the back of the well should protrude through the PCA.
- 2 Install the screws. Replace and tighten the two T-10 screws.
- 3 Connect the Printer Connector PCA.
  - a Connect the 10-wire bundle to the Printer Connector PCA by pushing straight up toward the PCA.
  - b Connect the 2-wire bundle to the Printer Connector PCA by pushing in until the latch clicks.
- 4 Close the case. See “Closing the Case” on page 158.
- 5 Replace the printer. See “Printer Assembly” on page 96.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Display Assembly

The Display assembly contains all keypads, one or two PCAs, the display shield, and the metal frame.

---

**NOTE:** Philips supports three different Display Assembly models for HeartStart MRx. Though different in form, all three models are similar in fit and identical in function.

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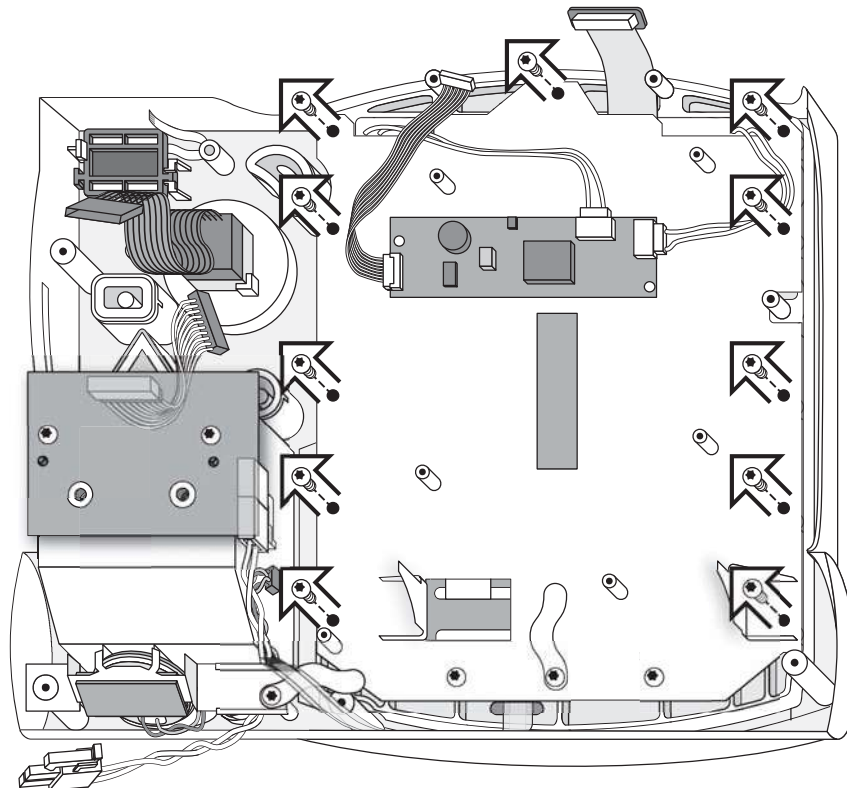
### ⊙ Preparation

- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the front case  
Lay the front case on the work surface with the display facing down and the printer in the lower left corner.
- 3 Remove the measurement module panel.  
See “Measurement Module Panel” on page 117.
- 4 Remove the Processor PCA  
See “Processor PCA” on page 121.

### ⊙ Removal

- 1 Remove the screws.  
Loosen and remove the 11 T-10 screws as shown in [Figure 75](#). Do *not* remove the bottom three screws as they connect the shield to the display.

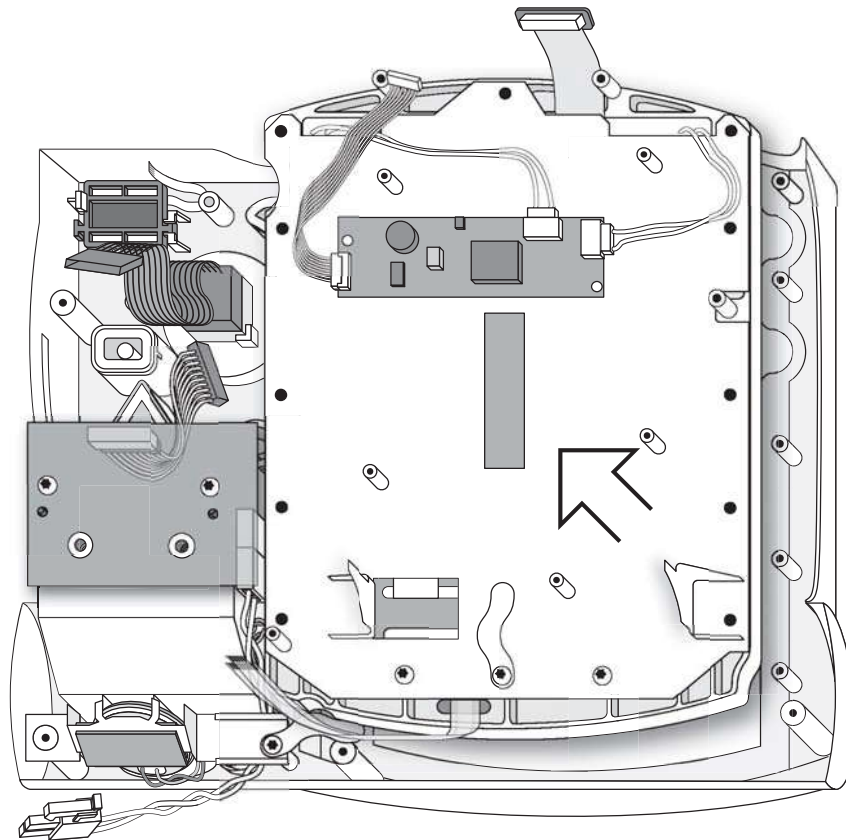
Figure 75 **Display Screws**



- 2 Lift the Display assembly straight up out of the case as shown in [Figure 76](#).



Figure 76 Removing the Display



### Ⓢ Replacement

- 1 Remove the rectangular piece of black foam from the sheet metal.  
The black foam protects the cables during shipment.
- 2 Place the Display assembly into position.  
Lower the Display assembly into position into the front case. Be sure the metal housing fits down over the molded posts in the front case. Make sure that no cables are trapped underneath.
- 3 Replace the screws.  
Replace and tighten the 11 T-10 screws.
- 4 Replace the Processor PCA  
See “[Processor PCA](#)” on page 121.
- 5 Replace the measurement module panel.  
See “[Measurement Module Panel](#)” on page 117.
- 6 Close the case.  
See “[Closing the Case](#)” on page 158.

### Ⓢ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Ready For Use Indicator

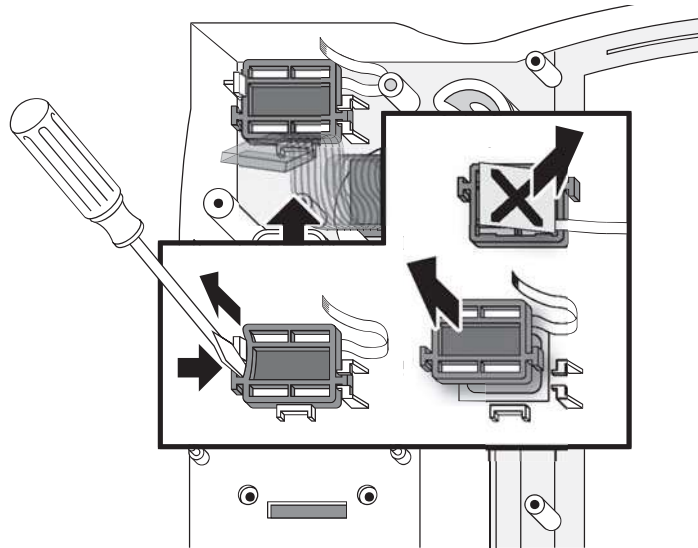
### ⊙ Preparation

- 1 Open and separate the case. See [“Opening the Case”](#) on page 103.
- 2 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.
- 3 Remove the Processor PCA. See [“Processor PCA”](#) on page 121.

### ⊙ Removal

- 1 Pull up the alignment tabs.  
Using a small screwdriver on the black rubber piece, lift the RFU Indicator out of the white tab.
- 2 Lift out the RFU Indicator.  
Lift up on the right end of the RFU Indicator, and slide it out from under the retaining catch. Lift it out of the case.

Figure 77 Removing the RFU Indicator



### ⊙ Replacement

- 1 Remove the protective plastic from the LCD.
- 2 Place the RFU Indicator in position.  
Slide the left end of the RFU Indicator under the retaining catch. Line up the tabs with the alignment slots.
- 3 Press the tabs into place.  
Using a small screwdriver, press each flexible tab down into the alignment slot until it reaches the bottom of the slot.
- 4 Replace the Processor PCA. See [“Processor PCA”](#) on page 121.
- 5 Close the case. See [“Closing the Case”](#) on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the [“Performance Verification”](#) chapter.

## Front Panel Buttons

### ⊙ Preparation

- 1 Open and separate the case.  
See “[Opening the Case](#)” on page 103.
- 2 Position the front case.  
Lay the front case on the work surface with the display facing down and the printer in the lower left corner.
- 3 Remove the Processor PCA.  
See “[Processor PCA](#)” on page 121.

### ⊙ Removal

- ▶ Remove the buttons.  
Grasp each button and pull out from the case.

---

**NOTE:** If your device has a white, hollow plastic insert for the Shock button, discard it and use the clear plastic insert that comes in the replacement kit. If your device already has the clear plastic Shock button insert, you can re-use it and discard the one that came in the kit. Keep the plastic inserts for the other buttons for replacement.

---

### ⊙ Replacement

- 1 Place the buttons in position.  
Slide each plastic insert into its button. Be sure it slides in all the way.
- 2 Insert the buttons into the case.  
Line up the notches on the buttons with the slots in the case and push into place.
- 3 Replace the Processor PCA  
See “[Processor PCA](#)” on page 121.
- 4 Close the case.  
See “[Closing the Case](#)” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

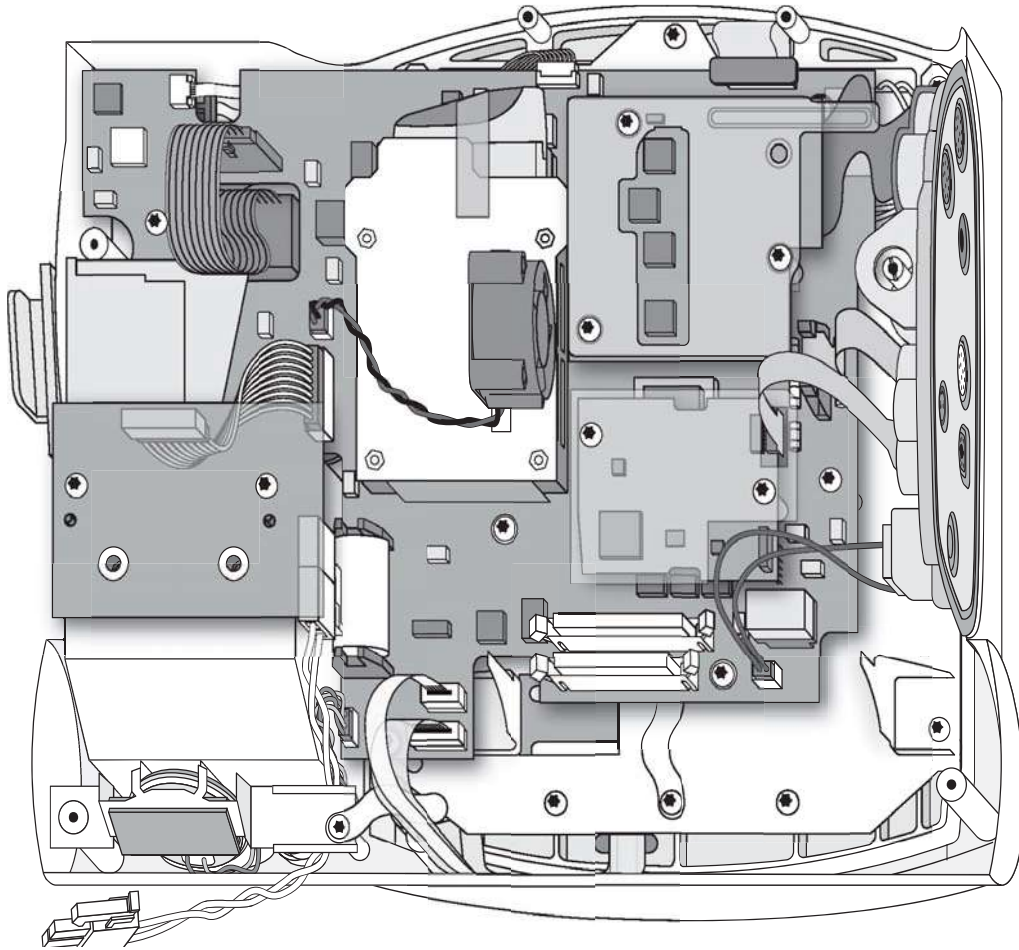
## Front Case Assembly

The front case replacement involves moving existing parts from the old case to the new and replacing the labels.

### ⦿ Preparation

- 1 Remove the printer. See “[Printer Assembly](#)” on page 96.
- 2 Remove the Therapy Knob. See “[Therapy Knob](#)” on page 100.
- 3 Open and separate the case. See “[Opening the Case](#)” on page 103.
- 4 Position the front case. Lay the front case on the work surface with the display facing down and the printer in the lower left corner.

Figure 78 **Front Case Complete**



### ⦿ Removal

- 1 Remove the speaker/microphone assembly. See “[Speaker and Microphone Assembly](#)” on page 110.
- 2 Remove the Printer PCA. See “[Printer Connector PCA](#)” on page 129.
- 3 Remove the SpO<sub>2</sub> PCA. See “[SpO<sub>2</sub> PCA](#)” on page 112.
- 4 Remove the IP/Temp PCA. See “[Invasive Pressure/Temperature \(IP/Temp\) PCA](#)” on page 115.
- 5 Remove the Measurement Module Panel. See “[Measurement Module Panel](#)” on page 117.
- 6 Remove the Processor PCA. See “[Processor PCA](#)” on page 121.

- 7 Remove the Display assembly. See “Display Assembly” on page 130.
- 8 Remove the Therapy Switch. See “Therapy Switch” on page 119.
- 9 Remove the RFU Indicator. See “Ready For Use Indicator” on page 132.
- 10 Remove the front panel buttons. See “Front Panel Buttons” on page 133.

### ⊙ Replacement

- 1 Replace the front panel buttons. See “Front Panel Buttons” on page 133.
- 2 Replace the RFU Indicator. See “Ready For Use Indicator” on page 132.
- 3 Replace the Therapy switch. See “Therapy Switch” on page 119.
- 4 Replace the Display assembly. See “Display Assembly” on page 130.
- 5 Replace the Processor PCA. See “Processor PCA” on page 121.
- 6 Replace the Measurement Module Panel. See “Measurement Module Panel” on page 117.
- 7 Replace the IP/Temp PCA. See “Invasive Pressure/Temperature (IP/Temp) PCA” on page 115.
- 8 Replace the SpO<sub>2</sub> PCA. See “SpO<sub>2</sub> PCA” on page 112.
- 9 Replace the Printer PCA. See “Printer Connector PCA” on page 129.
- 10 Replace the Speaker/Microphone Assembly. See “Speaker and Microphone Assembly” on page 110.
- 11 Close the case. See “Closing the Case” on page 158
- 12 Replace the Therapy Knob. See “Therapy Knob” on page 100 .
- 13 Replace the printer. See “Printer Assembly” on page 96.
- 14 Affix the new labels.

See “Labels” on page 91 for information on removal and replacement procedures. See “Hardware Version (Primary) Label” on page 12 for information on where to affix Hardware version labels.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Internal Assemblies — Rear Case

This section is organized into the following topics:

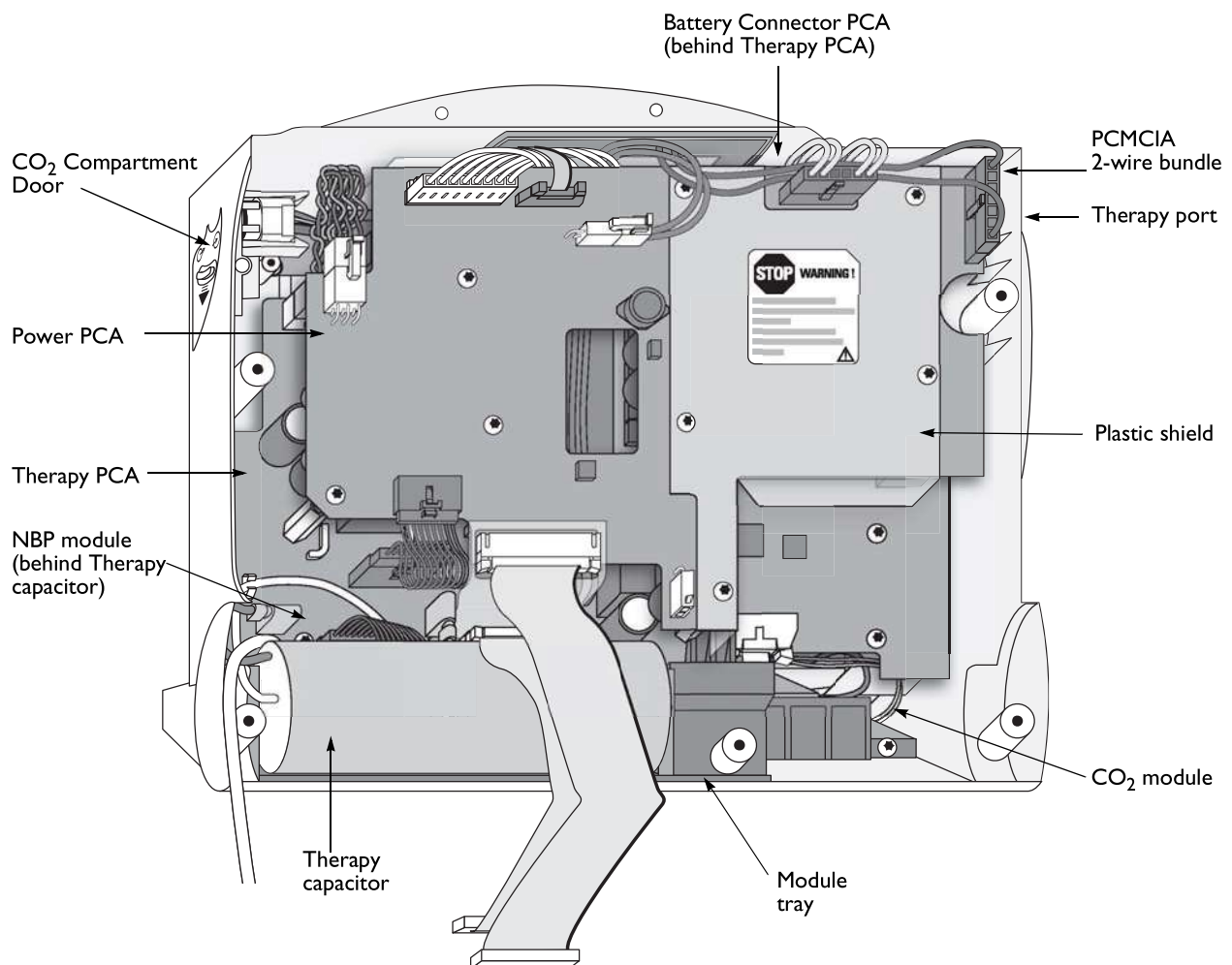
Topic	Page
Therapy Capacitor	137
Power PCA	138
NBP and CO <sub>2</sub> Module Tray	141
Therapy PCA	143
Therapy Port	146

Topic	Page
NBP Module	148
CO <sub>2</sub> Module	149
CO <sub>2</sub> Compartment Door	152
Battery Connector PCA	153
Rear Case Assembly	156

### Overview of Rear Case

Refer to [Figure 79](#) to identify assemblies in the rear case.

Figure 79 **Rear Case Overview**



## Therapy Capacitor

### ⊙ Preparation

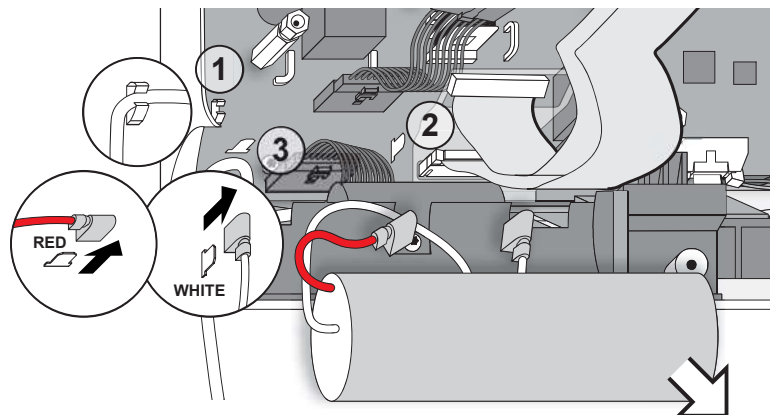
- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the rear case. Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.

**WARNING:** Be sure the Therapy capacitor has been discharged before performing the following steps. See “Discharging the Therapy Capacitor” on page 106.

### ⊙ Removal

- 1 Disconnect the Therapy capacitor. See [Figure 80](#).
  - a Remove the white wire from the clip (①).
  - b Disconnect the white wire from the Therapy PCA, using pliers if necessary (②).
  - c Disconnect the red wire from the Therapy PCA, using pliers if necessary (③).
- 2 Remove the Therapy capacitor. Slide the Therapy capacitor out of the tray.

Figure 80 **Removing the Therapy Capacitor**



### ⊙ Replacement

- 1 Place the Therapy Capacitor into position.
  - a The new capacitor comes with a shorting bar connecting the two terminals. Disconnect the shorting bar.
  - b Make sure the Therapy capacitor wires are parallel to the case and clear of the foam and that the red wire is on top.
  - c Place the side with the wires into the tray first and slide the Therapy capacitor into the tray.
- 2 Connect the Therapy capacitor to the Therapy PCA.
  - a Connect the red wire to the connector labelled red on the Therapy PCA, making sure that the orientation is the same as that shown in [Figure 80](#).
  - b Loop the white wire through the clip and plug it into the connector labelled white on the Therapy PCA.
- 3 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Power PCA

When you install a new Processor PCA you must also install the most recent software in the appropriate language using the Software Support tool. See [Table 48](#) on page 205 for part numbers.

### ⊙ Preparation

- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.

### ⊙ Removal

- 1 Disconnect all cables.  
See [Figure 81](#) and [Table 34](#) on page 139. The connections may be removed in any order. The order in [Table 34](#) begins with the left edge of the Power PCA, and then works around the rear case in a clockwise direction.

Figure 81 Power PCA Connections

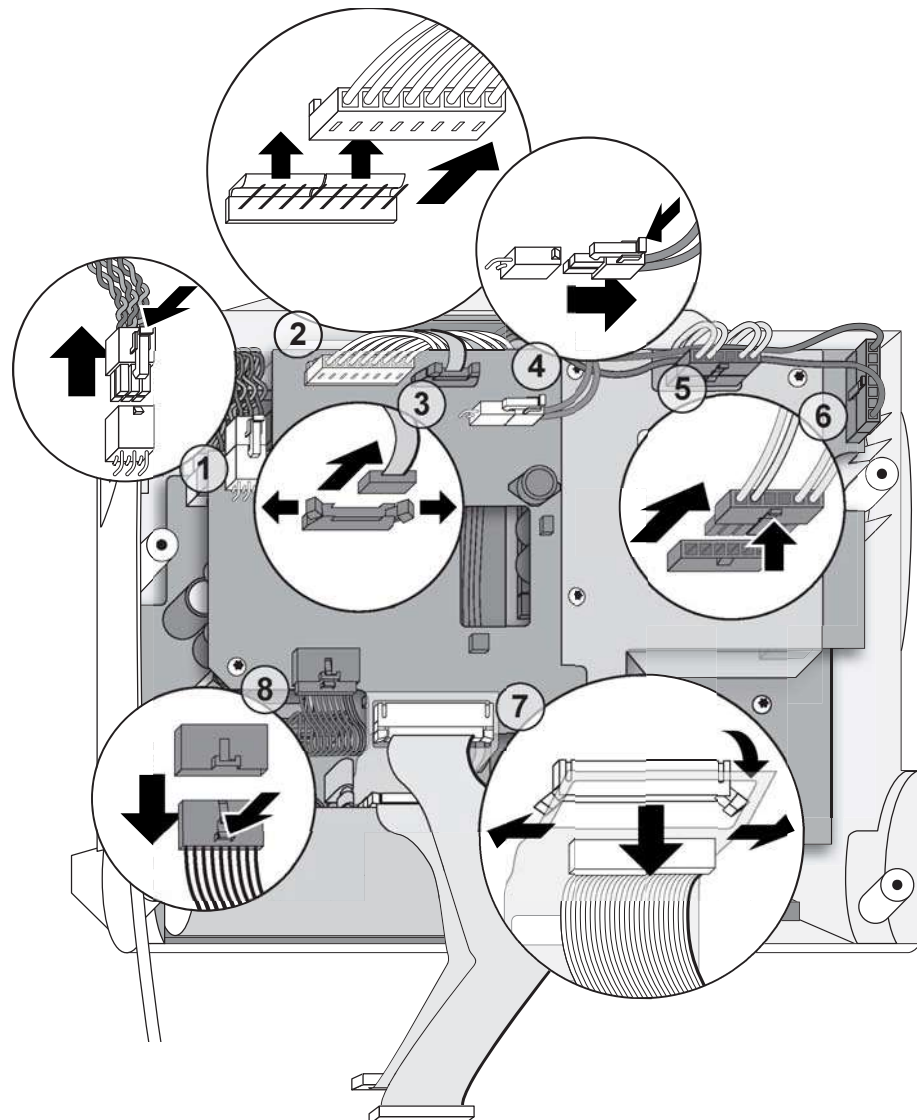




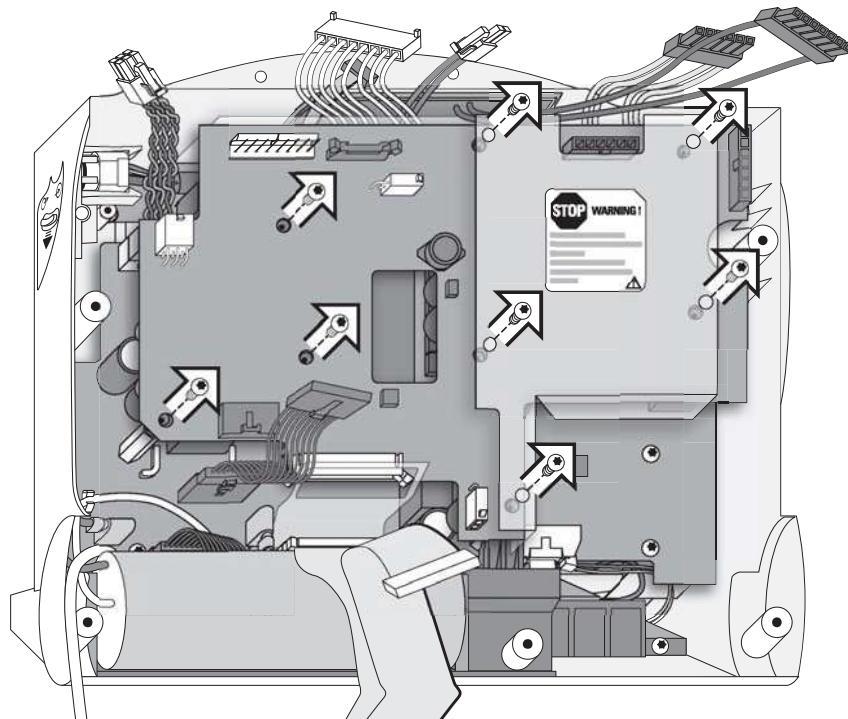
Table 34 Power PCA Connections

Ref. No.	Description	Connects To	Disconnect By
①	6-wire bundle	Therapy PCA	Push on latch to release, pull, wiggle.
②	8-wire bundle	Battery Connector PCA	Gently pull, wiggle with your hand, do not use tools. <b>NOTE:</b> Be careful not to break off the tabs.
③	small ribbon cable	Battery Connector PCA	Pull tabs apart, pull.
④	2-wire bundle	DC Power Connector	Push on latch to release, pull.
⑤	4-wire bundle	Therapy PCA	Push on latch to release, pull.
⑥	2-wire bundle	PCMCIA hole plug	Push on latch to release, pull.
⑦	ribbon cable plastic shield	Processor PCA	Release latches at edges of connector, pull. Close latches to remove.
⑧	9-wire bundle	Therapy PCA	Push on latch to release, pull.

**2** Remove the large plastic shield.

Remove the five screws and plastic shield, as shown in [Figure 82](#) and place to the side. You will need to replace them when you install the new Power PCA.

Figure 82 Removing the Power PCA



**3** Remove the screws.

Loosen and remove the three remaining T-10 screws.

**4** Remove the Power PCA.

Lift the Power PCA straight up out of the rear case.

⊙ Replacement

**TIP:** It may be easier to connect cables ⑦ and ⑧ with the accompanying plastic shield before the Power PCA is placed in the case.

1 Position the PCA in the rear case, lining up its holes with the threaded standoffs. Make sure no wires or cables are caught underneath the PCA.

2 Replace the large plastic shield.

3 Replace the screws.

Replace the eight T-10 screws and tighten.

4 Connect the Power PCA.

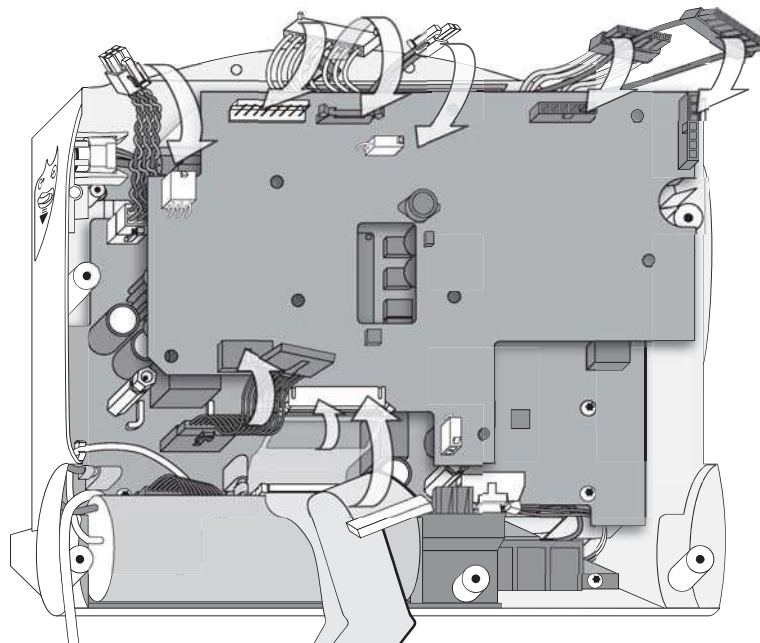
Refer to [Figure 83](#) below and [Table 34](#) on page 139. The connections may be replaced in any order. The order in [Table 34](#) begins with the left edge of the Power PCA, and then works around the rear case in a clockwise direction.

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**NOTE:** Be sure to loop the PCMCIA 2-wire bundle (⑥ in [Figure 81](#) on page 138) underneath the Therapy PCA 4-wire bundle (⑤ in [Figure 81](#)).

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**Figure 83 Replacing the Power PCA**



5 Close the case.

See “[Closing the Case](#)” on page 158.

⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## NBP and CO<sub>2</sub> Module Tray

You need to remove the NBP and CO<sub>2</sub> module tray for several of the rear case assembly replacement procedures.

### ⊙ Preparation

- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Therapy capacitor.  
See “Therapy Capacitor” on page 137.

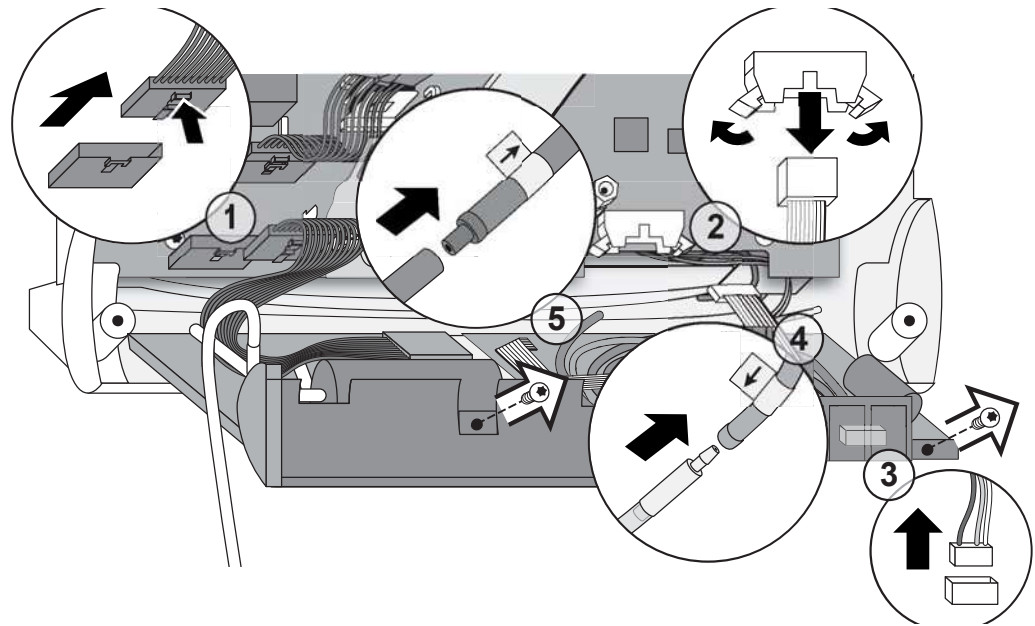
### ⊙ Removal

- 1 Remove the two T-10 screws from the front of the tray.

**TIP:** You may find it easier to stand the device up with the PCAs facing you for the following procedures.

- 2 Disconnect the NBP 10-wire bundle from the Therapy PCA (①). See Figure 84.

Figure 84 Removing the NBP and CO<sub>2</sub> Module Tray



- 3 Disconnect the CO<sub>2</sub> ribbon cable from the Therapy PCA (②).
- 4 Slide the tray out halfway.
- 5 Disconnect the CO<sub>2</sub> 3-wire bundle (③).
- 6 Disconnect the CO<sub>2</sub> intake tube from the CO<sub>2</sub> module.  
The intake tube has an arrow pointing towards the module and connects to the tube with the braided segment (④).
- 7 Disconnect the CO<sub>2</sub> exhaust tube from the CO<sub>2</sub> module.  
The exhaust tube has an arrow pointing away from the module and connects to the tube *without* the braid (⑤).
- 8 Slide the tray out of the case.

**⊙ Replacement**

**TIP:** You may find it easier to slide the module tray in halfway before you connect the cables and tubes.

- 1** Connect NBP 10-wire bundle to the Therapy PCA (①).
- 2** Connect the CO<sub>2</sub> ribbon cable to the Therapy PCA (②).
- 3** Connect the CO<sub>2</sub> 3-wire bundle to the CO<sub>2</sub> module connector.  
If you are installing the M3535-69181 CO<sub>2</sub> module, make sure that you connect the CO<sub>2</sub> 3-wire bundle to the CO<sub>2</sub> module connector that is closest to the front of the device (③).
- 4** Connect the CO<sub>2</sub> intake tube to CO<sub>2</sub> the module.  
The intake tube has an arrow pointing towards the module and connects to the tube *with the braided segment* (④).
- 5** Connect the CO<sub>2</sub> exhaust tube to the CO<sub>2</sub> module.  
The exhaust tube has an arrow pointing away from the module and connects to the tube *without the braid* (⑤).
- 6** Slide the tray the rest of the way into the rear case.  
Be careful not to pinch the wires or tubing between the Therapy PCA and the tray.
- 7** Replace the two T-10 screws and tighten.
- 8** Replace the Therapy capacitor.  
See “[Therapy Capacitor](#)” on page 137.
- 9** Close the case.  
See “[Closing the Case](#)” on page 158.

**⊙ To Complete the Replacement:**

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Therapy PCA

### ⊙ Preparation

- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Therapy capacitor.  
See “Therapy Capacitor” on page 137.
- 4 Remove the Power PCA.  
See “Power PCA” on page 138.
- 5 Remove the NBP and CO<sub>2</sub> module tray.  
See “NBP and CO<sub>2</sub> Module Tray” on page 141. If the device does not have the NBP or CO<sub>2</sub> modules, simply unscrew the tray and slide it out.

### ⊙ Removal

- 1 Disconnect all cables.  
See [Figure 85](#) and [Table 35](#) on page 144. The connections may be removed in any order. The order in [Table 35](#) begins with the top of the left edge of the Therapy PCA, and then works around the Rear Case in a clockwise direction.
- 2 Remove the screws.  
Loosen and remove the three T-10 screws.
- 3 Remove the standoffs.  
Using the S-10 hollow-shaft nutdriver, loosen and remove the eight 5/16-inch hex standoffs. See [Figure 86](#).
- 4 Remove the Therapy PCA.  
Grasp the Therapy PCA by the black square relays and lift the Therapy PCA straight up out of the rear case.

Figure 85 Therapy PCA Connections

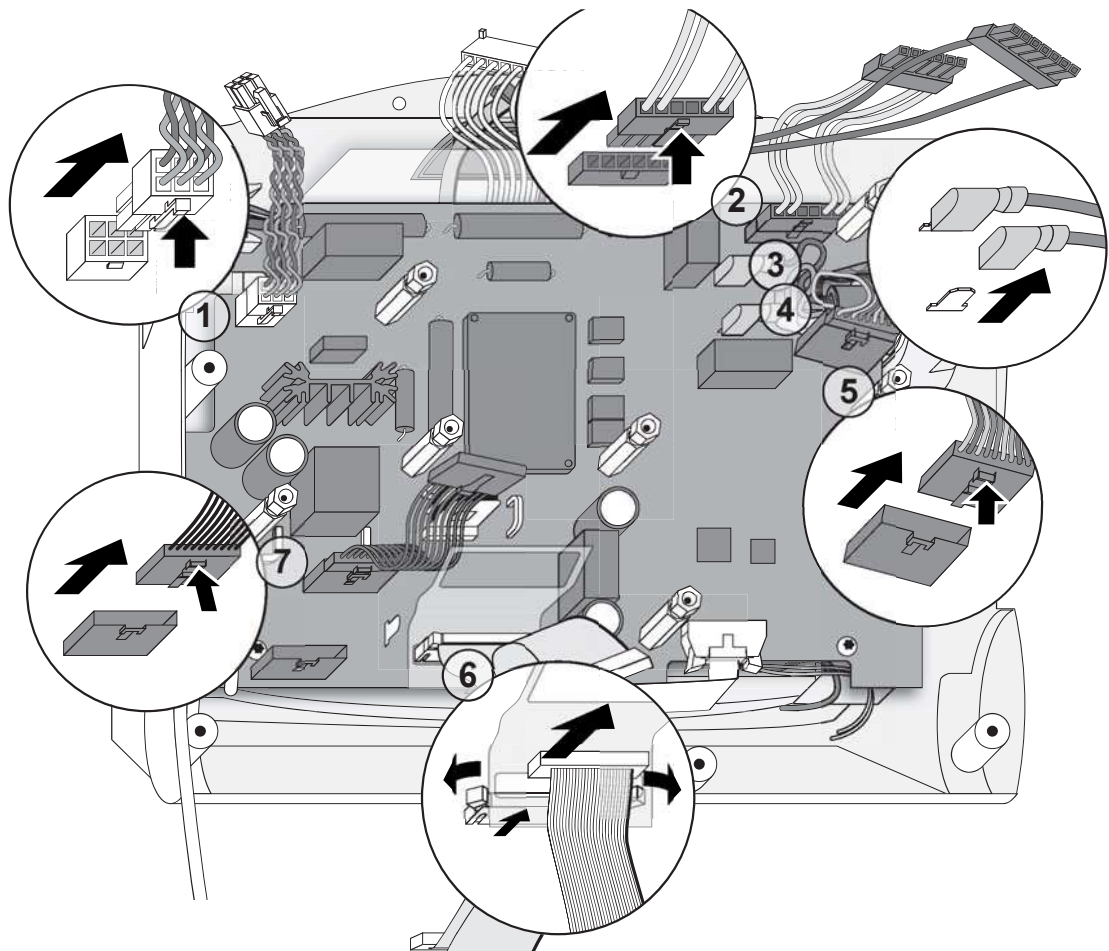
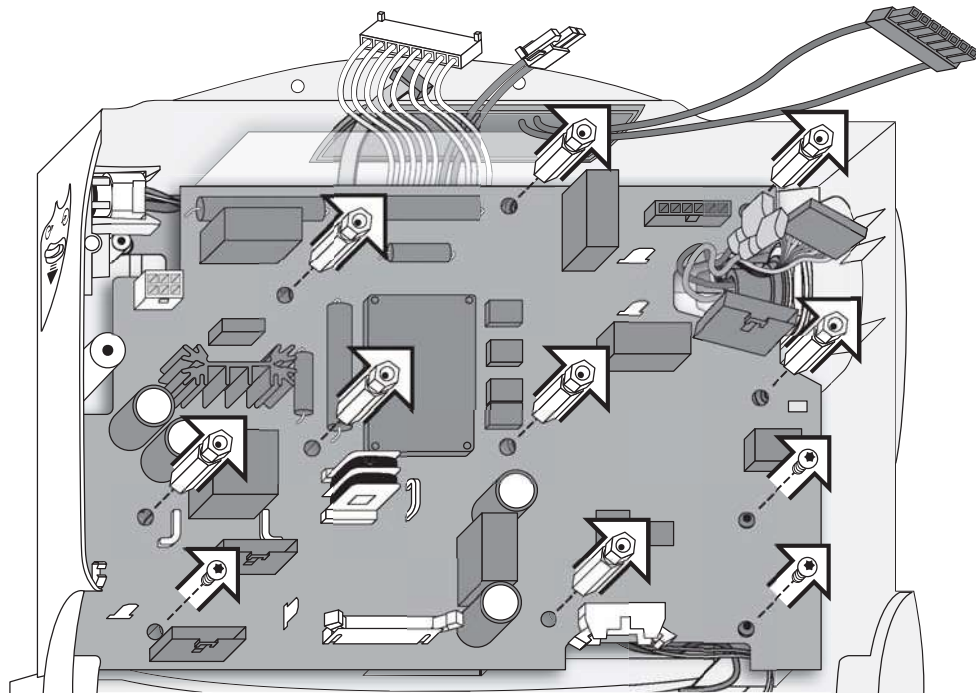


Table 35 Therapy PCA Connections

Ref. #	Description	Connects To	Disconnect By
①	6-wire bundle	Power PCA	Push on latch to release, pull, wiggle.
②	4 wire bundle	Power PCA	Push on latch to release, pull, wiggle.
③	Large spade connector	Therapy port	Pull, wiggle, use pliers if needed.
④	Small spade connector	Therapy port	Pull, wiggle, use pliers if needed
⑤	9-wire bundle	Therapy port	Push on latch to release, pull.
⑥	Ribbon cable plastic shield	Processor PCA	Release latches at edges of connector, pull. Close latches to remove plastic shield.
⑦	10-wire bundle	NBP module	Push on latch to release, pull, wiggle.

Figure 86 Removing the Therapy PCA



### ⊙ Replacement

- 1 Place the Therapy PCA into position.
  - a Position the PCA in the rear case, lining the PCA up on the Therapy port side first.
  - b Line up the PCA holes with the threaded case posts. Make sure there are no wires or cables caught underneath the PCA.
- 2 Replace the screws. Replace the three T-10 screws and tighten.
- 3 Replace the standoffs.
 

Replace the eight standoffs and tighten. Note that on each standoff, the two ends are different: the end with the groove should be up.
- 4 Replace the NBP and CO<sub>2</sub> module tray. See “NBP and CO<sub>2</sub> Module Tray” on page 141.
- 5 Connect the Therapy PCA.
 

Refer to [Figure 85](#) on page 144 and [Table 35](#) on page 144. The connections may be replaced in any order. The order in [Table 35](#) begins with the left edge of the Therapy PCA, and then works around the Rear Case in a clockwise direction.
- 6 Replace the Therapy capacitor. See “Therapy Capacitor” on page 137.
- 7 Replace the Power PCA. See “Power PCA” on page 138.
- 8 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Therapy Port

### ⊙ Preparation

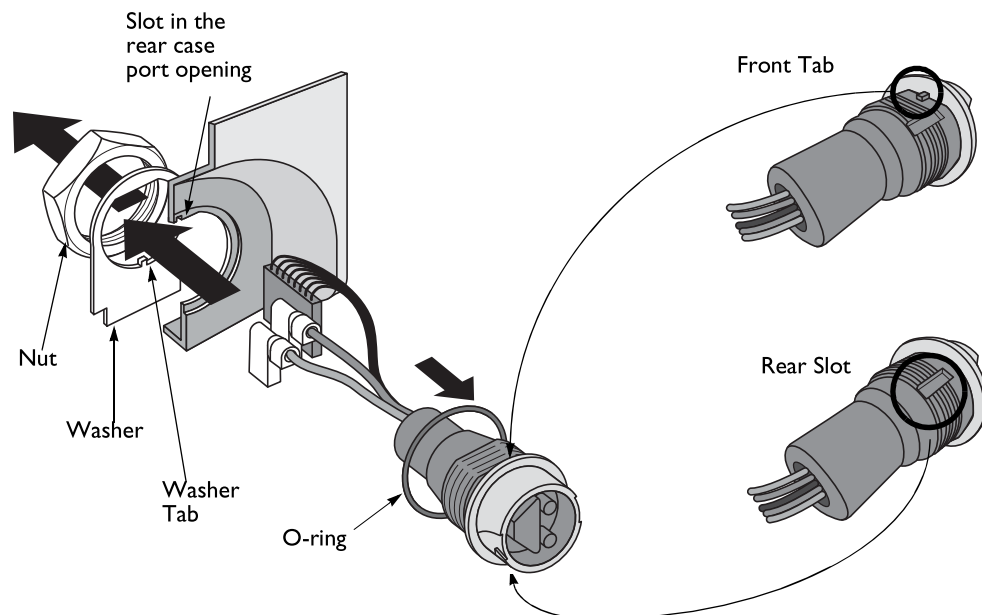
- 1 Open and separate the case.  
See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Power PCA.  
See “Power PCA” on page 138.
- 4 Remove the Therapy capacitor  
See “Therapy Capacitor” on page 137.
- 5 Remove the Therapy PCA.  
See “Therapy PCA” on page 143.

### ⊙ Removal

- 1 Remove the plastic shield.  
Remove the plastic shield from the rear case and place it to the side. You will need to replace this when you finish replacing the Therapy port.
- 2 Unscrew the nut.  
Using a wrench, unscrew the large nut on the back of the Therapy port.
- 3 Remove the hardware.  
Remove the large nut and metal plate from the Therapy port. Guide the wires and connectors through the nut and plate. Turn the 9-pin connector so it passes through sideways.
- 4 Remove the Therapy port.  
Slide the Therapy port out of its hole in the case. Guide the wires and connectors through the hole.

**Figure 87 Therapy Port**

The Rear Case is positioned with the opening facing up and the Therapy Port to the right:





**⊙ Replacement**

- 1** Replace the Therapy port. See [Figure 87](#).
  - a** Install the washer into the guides inside the Rear Case next to the Therapy port opening.
  - b** Install the O-ring onto the Therapy port. .
  - c** Slide the Therapy port into its hole in the case. Guide the wires and connectors through the hole and the washer. Turn the 9-wire connector so it passes through end first.
  - d** Guide the wires and connectors the same way through the nut.
  - e** Hold the O-ring while engaging the Front Tab in the slot in the rear case port opening. Make sure:
    - The O-ring is not visible on either side of the case
    - The washer tab is engaged in the rear slot of the Therapy port.
    - The washer is flush against the rear case wall.
- 2** Replace the nut.
  - a** Manually start the nut to avoid cross-threading the metal nut on the plastic connector.
  - b** Tighten the nut against the metal plate with a wrench at 12.5 lb-ft.  
Do not use pliers with sharp teeth because if they slip, they can create small metal shavings trapped inside the box that may affect performance of your HeartStart MRx.
- 3** Replace the Therapy PCA.  
See [“Therapy PCA”](#) on page 143.
- 4** Replace the Therapy capacitor.  
See [“Therapy Capacitor”](#) on page 137.
- 5** Replace the Power PCA.  
See [“Power PCA”](#) on page 138.
- 6** Close the case.  
See [“Closing the Case”](#) on page 158.

**⊙ To Complete the Replacement:**

- ▶ Run Performance Verification and Safety testing as described in the [“Performance Verification”](#) chapter.

## NBP Module

The NBP and CO<sub>2</sub> modules are mounted onto a tray. To replace the NBP module, you need to remove the tray first, then replace the individual module.

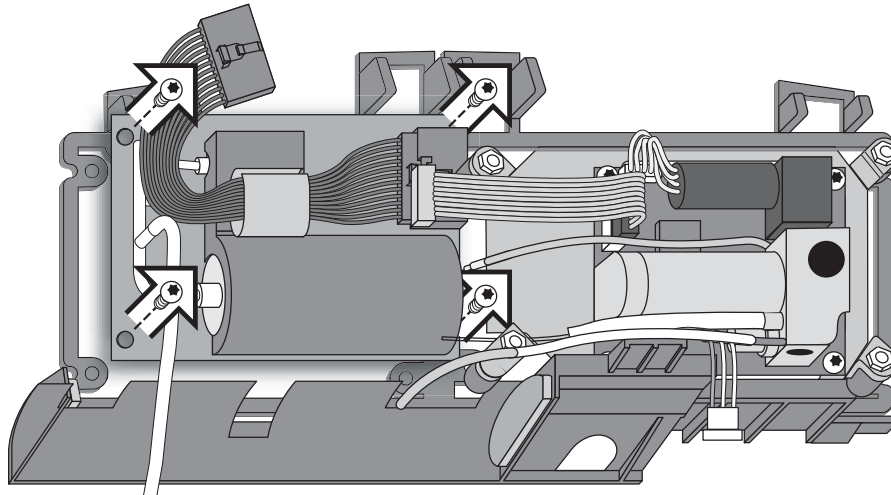
### ⊙ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Therapy capacitor. See “Therapy Capacitor” on page 137.
- 4 Remove the NBP and CO<sub>2</sub> module tray. See “NBP and CO<sub>2</sub> Module Tray” on page 141.

### ⊙ Removal

- ▶ Remove the NBP module and shield.
  - a Loosen and remove the four T-10 screws.
  - b Lift the NBP module and shield straight up out of the module tray.

Figure 88 Removing the NBP Module



### ⊙ Replacement

- 1 Place the NBP module and shield into position. Position the NBP module and shield into the module tray.
- 2 Replace the screws and tighten.
- 3 Replace the NBP and CO<sub>2</sub> module tray. See “NBP and CO<sub>2</sub> Module Tray” on page 141.

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**NOTE:** Connect the NBP tubing when you put the case halves together. See “Internal Assemblies — Front Case” on page 108.

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- 4 Replace the Therapy capacitor. See “Therapy Capacitor” on page 137.
- 5 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## CO<sub>2</sub> Module

Your HeartStart MRx may have one of two CO<sub>2</sub> module installed.

CO <sub>2</sub> module kit number	Hardware Version
M3535-69103	01.xx devices
M3535-69181	02.xx devices

Check the Hardware version label on battery compartment B or print the device info to determine the device's Software version. See “[Hardware Version \(Primary\) Label](#)” on page 12 or “[Printing the Device Information](#)” on page 11.

If your device has an obsoleted Version 01.xx module, replace both the CO<sub>2</sub> module and Processor PCA.

### Module Tray

The NBP and CO<sub>2</sub> modules are mounted onto a tray. To replace the CO<sub>2</sub> module in devices with Hardware Version A (M3535-69181 kit), you remove the tray first, then replace the individual CO<sub>2</sub> module.

The CO<sub>2</sub> module comes already mounted on the tray in kits for devices with Hardware Version B (M3535-69103 kit). If the device has an NBP module, you need to move the NBP module to the new tray (see “[NBP Module](#)” on page 148). Otherwise, install the tray according to the directions in “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.

---

**NOTE:** If you are replacing the CO<sub>2</sub> *module only*, start with “[Preparation](#)”, skip “[Removal of the CO<sub>2</sub> tubing and intake receptacle](#)”, continue with the “[Replacement](#)” on page 151 section, and finish with “[To Complete the Replacement:](#)” on page 151.

If you are replacing the CO<sub>2</sub> *module and intake receptacle and internal tubing*, start with “[Preparation](#)” and follow the instructions all the way through to the end.

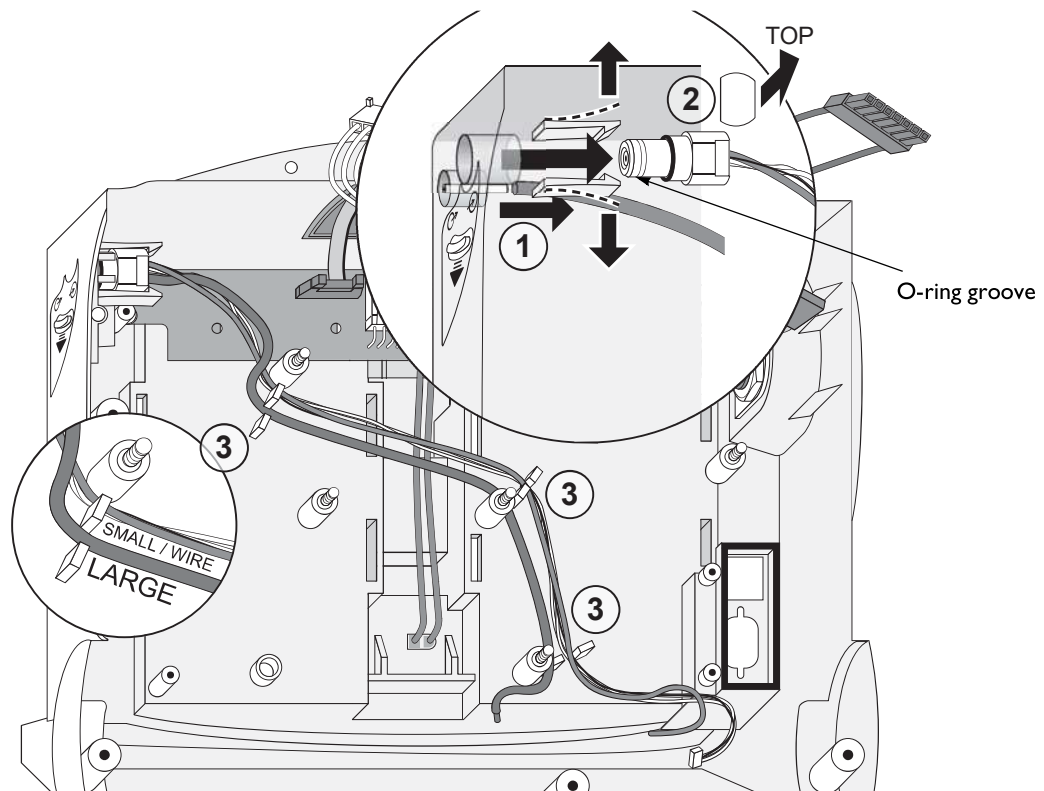
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#### Ⓢ Preparation

- 1 Open and separate the case. See “[Opening the Case](#)” on page 103.
- 2 Position the rear case. Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Therapy capacitor. See “[Therapy Capacitor](#)” on page 137.
- 4 Remove the NBP and CO<sub>2</sub> module tray. See “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.
- 5 Remove the Power PCA. See “[Power PCA](#)” on page 138.
- 6 Remove the Therapy PCA. See “[Therapy PCA](#)” on page 143.

#### Ⓢ Removal of the CO<sub>2</sub> tubing and intake receptacle

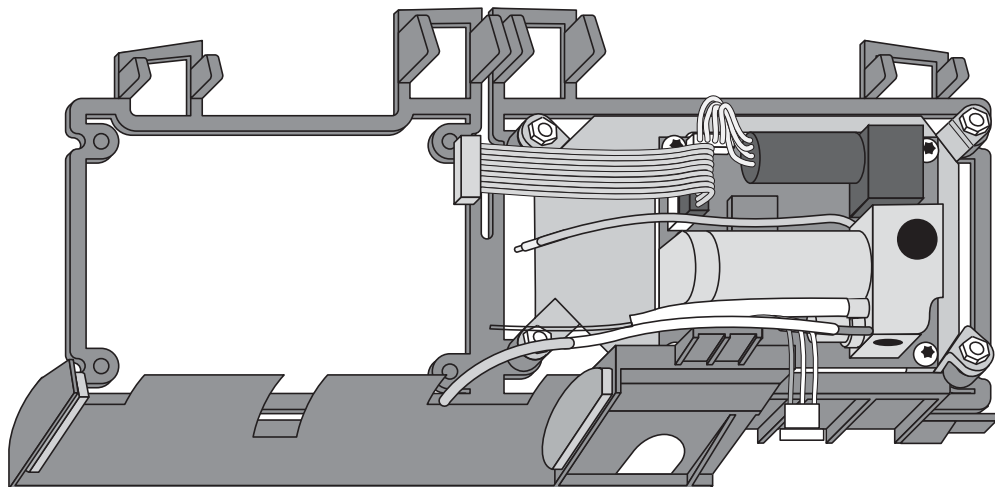
- 1 Remove the plastic shield.  
Remove the plastic shield from the rear case and place it to the side. You will need to replace this.
- 2 Remove the CO<sub>2</sub> compartment door. See “[CO<sub>2</sub> Compartment Door](#)” on page 152.
- 3 Disconnect the CO<sub>2</sub> exhaust tube. See [Figure 89](#) (①).
- 4 Disconnect the CO<sub>2</sub> intake receptacle. See [Figure 89](#) (②).  
Using your index fingers, open the two plastic snaps. From the outside of the case, push the receptacle out with your thumb.

Figure 89 Disconnecting the CO<sub>2</sub> Tubing and Intake Receptacle

### ⊙ Removal of the CO<sub>2</sub> Module

**NOTE:** The replacement CO<sub>2</sub> module kit comes with the CO<sub>2</sub> module mounted on the module tray. Do *not* attempt to remove the CO<sub>2</sub> module from the tray. It is secured to the vibration isolators with a special adhesive.

- ▶ If the device has an NBP module, move the module to the new tray.  
See “NBP Module” on page 148.

Figure 90 M3535-69103 CO<sub>2</sub> Module Kit

Ⓢ Replacement

- 1 Attach the O-ring to the first groove of the intake receptacle, as shown in [Figure 89](#).
- 2 Connect the CO<sub>2</sub> exhaust tube and intake receptacle.
  - a Connect the exhaust tube to the CO<sub>2</sub> outlet port (①).
  - b Make sure that the small face of the CO<sub>2</sub> intake receptacle is towards you and the large face is towards the rear case.
  - c Connect the CO<sub>2</sub> intake receptacle, making sure that it locks into the snaps in the rear case (②).
- 3 Route the tubing through the rear case according to the path shown in [Figure 89](#) (③).

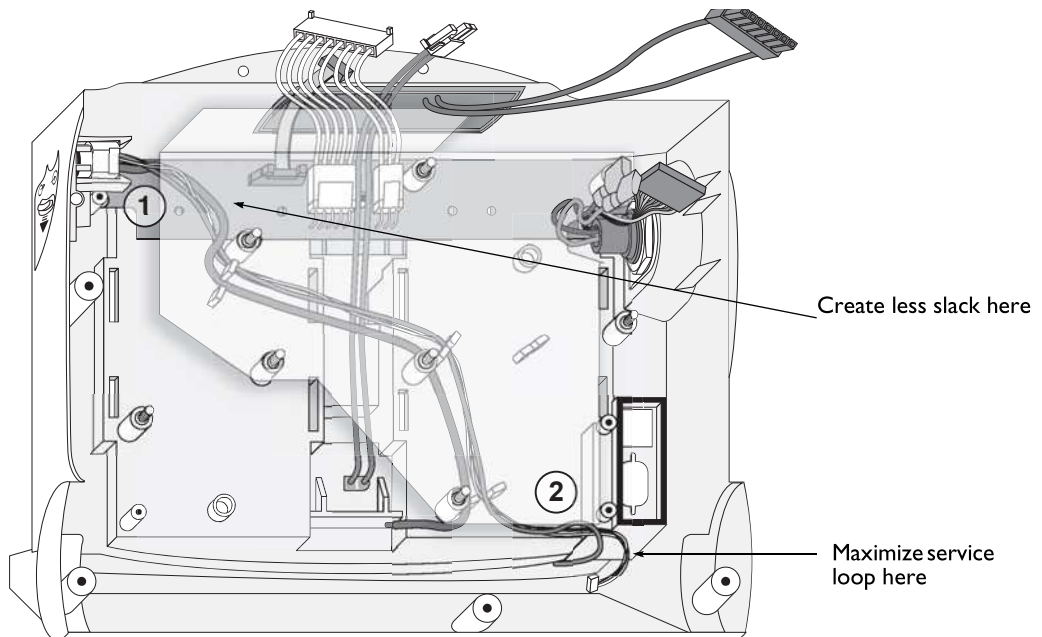
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**NOTE:** Place the CO<sub>2</sub> intake receptacle wires under the tube when routing them through the case, as shown in [Figure 91](#). Create less slack in area ① to maximize the service loop in area ②.

---

- 4 Replace the CO<sub>2</sub> compartment door. See “[CO<sub>2</sub> Compartment Door](#)” on page 152.
- 5 Replace the plastic shield, see [Figure 91](#).

Figure 91 **Rear Case Plastic Shield and Service Loop**



- 6 Replace the Therapy PCA. See “[Therapy PCA](#)” on page 143.
- 7 Replace the NBP and CO<sub>2</sub> module tray. See “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.
- 8 Replace the Power PCA. See “[Power PCA](#)” on page 138.
- 9 Replace the Therapy capacitor. See “[Therapy Capacitor](#)” on page 137.
- 10 Close the case. See “[Closing the Case](#)” on page 158.

Ⓢ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## CO<sub>2</sub> Compartment Door

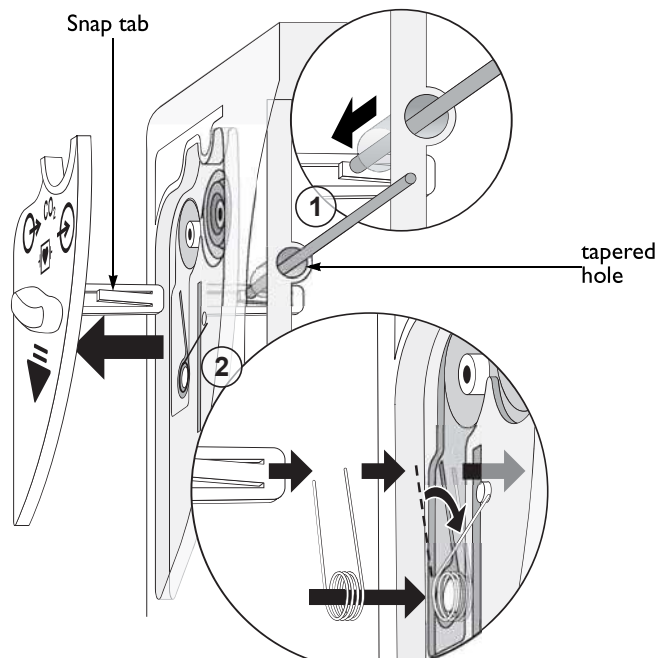
### ⊙ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.

### ⊙ Removal

- 1 Remove the door.
  - a Look down the tapered hole and slide the door past until you see the snap tab. It is the bar in the middle when viewed through the tapered hole.
  - b Using a straightened paper clip, push on the snap tab to release the door (①).
- 2 Remove the spring.

Figure 92 Replacing the CO<sub>2</sub> Compartment Door



### ⊙ Replacement

- 1 Place the spring into the recess and rotate the free end clockwise until it catches behind the post. Make sure that the spring is seated in the recess (②).
- 2 Insert the door into the recess with the snap tab between the spring and the inlet/outlet ports. Make sure that the tab snaps into place.
- 3 Close the case. See “Closing the Case” on page 158.

### ⊙ To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Battery Connector PCA

### ⊙ Preparation

- 1 Open and separate the case. See “Opening the Case” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.
- 3 Remove the Power PCA. See “Power PCA” on page 138.
- 4 Remove the Therapy capacitor. See “Therapy Capacitor” on page 137.
- 5 Remove the NBP and CO<sub>2</sub> module tray. See “NBP and CO<sub>2</sub> Module Tray” on page 141.

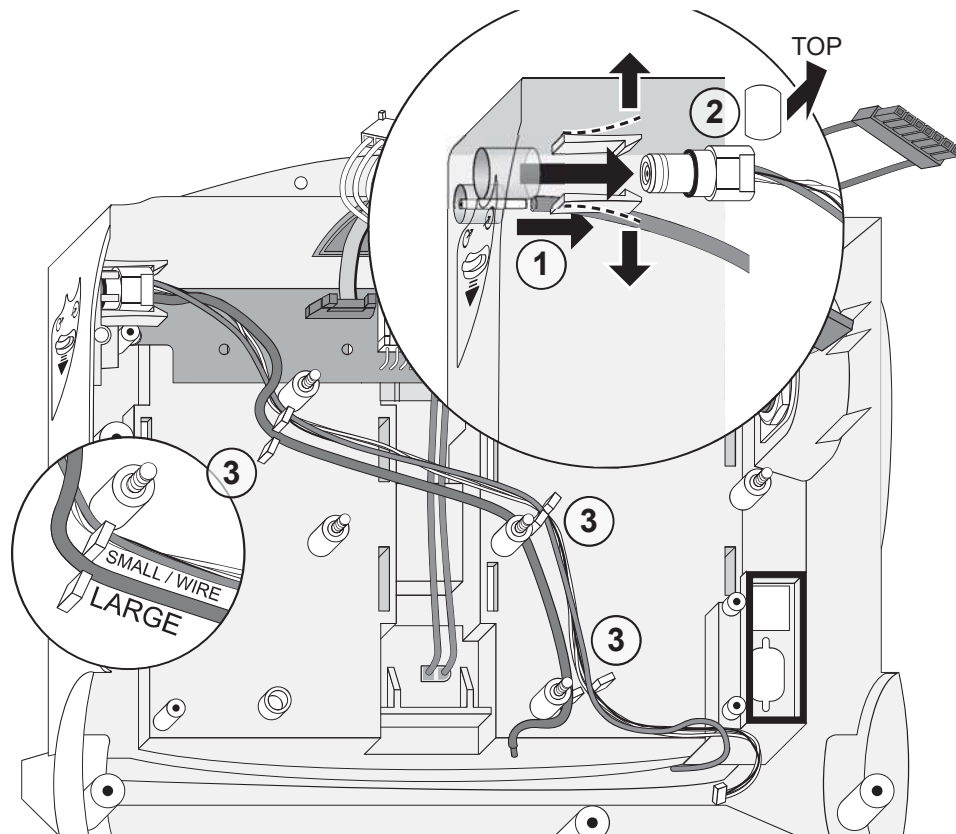
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**NOTE:** If the device does not have the NBP or CO<sub>2</sub> modules, simply unscrew the tray and slide it out.

---

- 6 Remove the Therapy PCA. See “Therapy PCA” on page 143.
- 7 Remove the plastic shield from the rear case and place it to the side. You will need to replace it.
- 8 Remove the CO<sub>2</sub> compartment door. See “CO<sub>2</sub> Compartment Door” on page 152.
- 9 Disconnect the CO<sub>2</sub> exhaust tube (see Figure 93, ①).

Figure 93 **Disconnecting the CO<sub>2</sub> Tubing and Intake Receptacle**

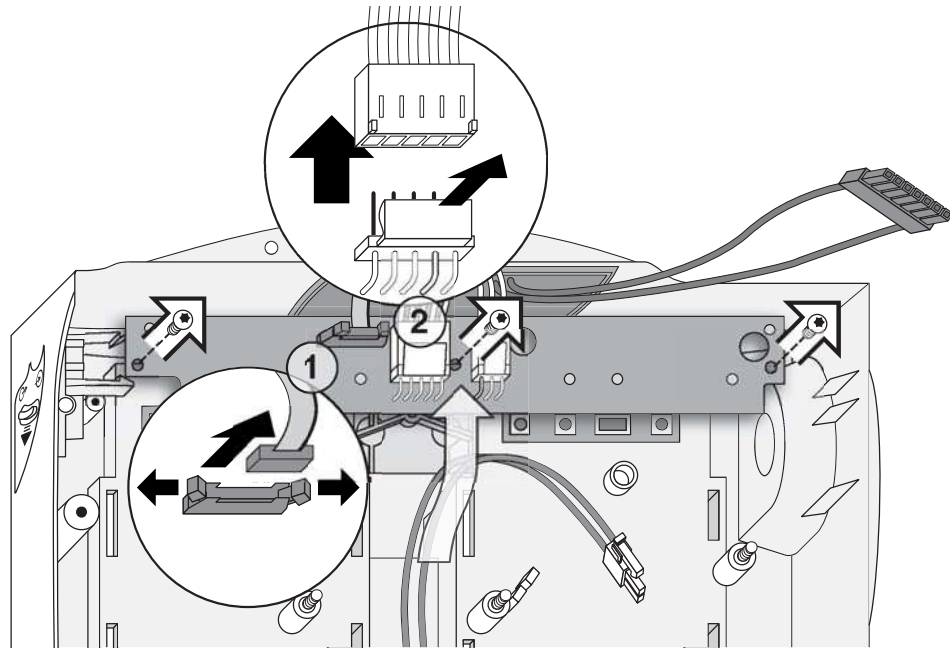


- 10 Disconnect the CO<sub>2</sub> intake receptacle (②).  
Using your index fingers, open the two plastic snaps. From the outside of the case, push the receptacle out with your thumb.

⊙ Removal

- 1 Disconnect the small ribbon cable from the Battery connector PCA (see [Figure 94](#), ①).

Figure 94 Removing the Battery Connector PCA



- 2 Remove the screws.

Loosen and remove the 3 T-10 screws.

- 3 Disconnect the 8-wire bundle from the Battery Connector PCA ②.

- 4 Remove the Battery Connector PCA.

Gently grasp the white 8-wire bundle connector and pull up while tilting the PCA towards you. Use your other hand to wiggle and lift the PCA out from under the Therapy port and rear case.

⊙ Replacement

- 1 Place the Battery Connector PCA into position.

- a Hold the PCA by the white 8-wire bundle connector and slide the end nearest the CO<sub>2</sub> compartment door under the plastic posts.

- b Tilt the PCA towards you and wiggle it to position the PCA into the rear case, lining up its holes with the posts in the rear case. Guide it down over the case posts.

- 2 Replace the screws.

Install the 3 T-10 screws and tighten.

- 3 Connect the CO<sub>2</sub> exhaust tube and intake receptacle. See [Figure 93](#).

- a Connect the exhaust tube to the CO<sub>2</sub> outlet port.

- b Make sure that the small face of the CO<sub>2</sub> intake receptacle is towards you and the large face is towards the rear case.

- c Connect the CO<sub>2</sub> intake receptacle, making sure that it locks into the snaps in the rear case.

- 4 Route the tubing through the rear case according to the path shown in [Figure 93](#) ③.

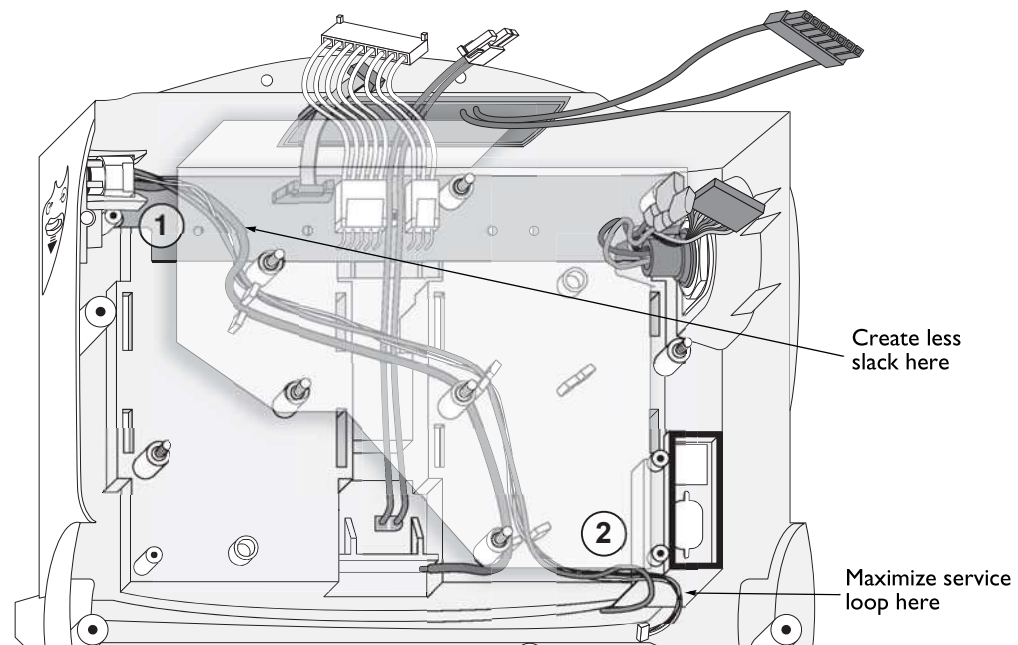
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**NOTE:** Make sure you place the CO<sub>2</sub> intake receptacle wires under the tube when routing them through the case, as shown in [Figure 95](#). Create less slack in area ① to maximize the service loop in area ②.

---



Figure 95 Rear Case Plastic Shield and Service Loop



- 5 Connect the small ribbon cable.
- 6 Replace the plastic shield.
- 7 Replace the CO<sub>2</sub> compartment door.  
See “[CO<sub>2</sub> Compartment Door](#)” on page 152.
- 8 Replace the Therapy PCA.  
See “[Therapy PCA](#)” on page 143.
- 9 Replace the NBP and CO<sub>2</sub> module tray.  
See “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.
- 10 Replace the Therapy capacitor  
See “[Therapy Capacitor](#)” on page 137.
- 11 Replace the Power PCA.  
See “[Power PCA](#)” on page 138.
- 12 Close the case.  
See “[Closing the Case](#)” on page 158.

© To Complete the Replacement:

- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.

## Rear Case Assembly

The rear case replacement involves moving existing parts from the old case to the new and replacing the labels.

### ⦿ Preparation

- 1 Open and separate the case.  
See “[Opening the Case](#)” on page 103.
- 2 Position the rear case.  
Lay the rear case on the work surface with the PCAs facing up and the Therapy port on the right.

### ⦿ Removal

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**NOTE:** When you replace the rear case, save the old case hardware version label (also known as a primary label, see “[Hardware Version \(Primary\) Label](#)” on page 12) or write down the information from the label.

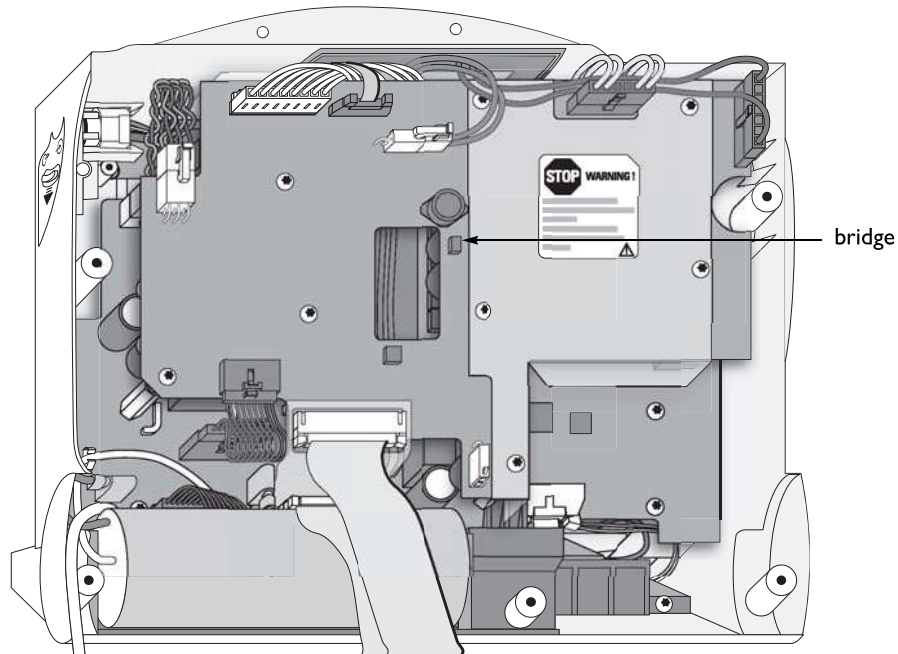
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- 1 Remove the Therapy capacitor  
See “[Therapy Capacitor](#)” on page 137.
- 2 Remove the Power PCA.  
See “[Power PCA](#)” on page 138.
- 3 Remove the NBP and CO<sub>2</sub> module tray.  
See “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.
- 4 Remove the Therapy PCA.  
See “[Therapy PCA](#)” on page 143.
- 5 Remove the CO<sub>2</sub> tubing and intake receptacle.  
See “[Removal of the CO<sub>2</sub> tubing and intake receptacle](#)” on page 149.
- 6 Remove the CO<sub>2</sub> compartment door.  
See “[CO<sub>2</sub> Compartment Door](#)” on page 152.
- 7 Remove the Battery Connector PCA. See “[Battery Connector PCA](#)” on page 153.
- 8 Remove the Therapy Port. See “[Therapy Port](#)” on page 146.

### ⦿ Replacement

- 1 Replace the Rear Case internals. See [Figure 79 “Rear Case Overview”](#) on page 136 for reference.
  - a Replace the Therapy Port. See “[Therapy Port](#)” on page 146.
  - b Replace the Battery Connector PCA. See “[Battery Connector PCA](#)” on page 153.
  - c Replace the CO<sub>2</sub> compartment door. See “[CO<sub>2</sub> Compartment Door](#)” on page 152.
  - d Replace the CO<sub>2</sub> tubing and intake receptacle. See “[Replacement](#)” on page 151.
  - e Replace the Therapy PCA. See “[Therapy PCA](#)” on page 143.
  - f Replace the NBP and CO<sub>2</sub> module tray. See “[NBP and CO<sub>2</sub> Module Tray](#)” on page 141.
  - g Replace the Power PCA. See “[Power PCA](#)” on page 138.
  - h Replace the Therapy capacitor. See “[Therapy Capacitor](#)” on page 137.

Figure 96 Rear Case Complete

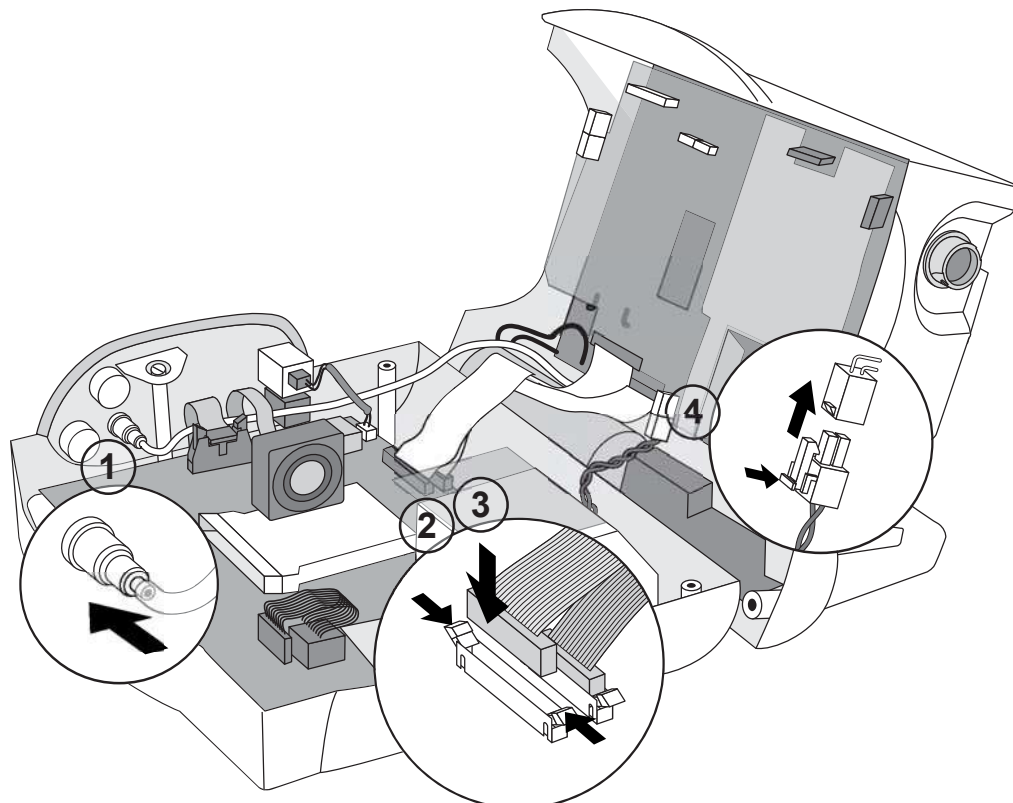


- 2 Close the case.  
See “Closing the Case” on page 158.
  - 3 Affix the new connector labels to the back of the case.  
See “Connector Label Set” on page 91.
  - 4 Request a new hardware version label.  
Call the nearest service center (see “Calling for Service” on page 82) to request a new hardware version label (also known as a primary label, see “Hardware Version Label” on page 91) for your HeartStart MRx. Be prepared to provide the information from the old label.
- © To Complete the Replacement:
- ▶ Run Performance Verification and Safety testing as described in the “Performance Verification” chapter.

## Closing the Case

- 1 Recheck the connections.  
Make sure all connections are fully seated and latched.
- 2 Get the device ready for assembly.  
Place the device on a smooth, flat surface in a clamshell orientation.
- 3 Connect the front to rear case wires and cables.
  - a Connect the NBP tubing to the measurement module panel. Route the tubing as shown in [Figure 97](#) ①. Be sure to route the tube under the measurement module panel wires and flex circuits.
  - b Connect the two ribbon cables to the Processor PCA by pushing in the connectors and closing the latches (②, ③).
  - c Connect the 2-wire bundle from the Printer to the Power PCA (④).

Figure 97 **Front to Rear Case Connections**



- 4 Fit the case halves together.
  - a Lift up the front case and align with rear case.

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**NOTE:** Be careful not to bump the fan against the bridge on the Power PCA, see [Figure 96](#) on page 157.

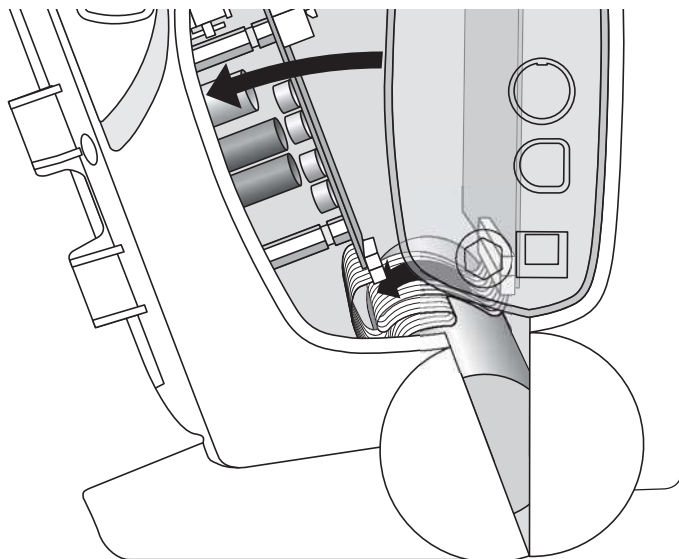
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- b Fold the ribbon cables down over the Therapy capacitor and under the Power PCA connectors.

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**NOTE:** It is *very important* to fold the ribbon cables down to ensure that the case halves fit together properly.

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Figure 98 **Folding Ribbon Cables**

- 5** Place the device on its back and ensure that the case halves line up all around the device. Work the halves together gently, as the case gasket is delicate.
  - 6** Replace the case screws and the Stabilizing Collar (if equipped). Replace and secure the seven T-15 screws. If your M3536A device is equipped with the Stabilizing Collar, then refer to “[Therapy Cable Stabilizing Collar](#)” on page 98.
  - 7** Replace the paddle tray or handle and cap plate. See “[Paddle Tray and Plates](#)” on page 93 or “[Handle and Cap Plate](#)” on page 88.
  - 8** Replace the bedrail hook mount, if present. See “[Bedrail Hook Mount](#)” on page 86.
- ☉ **To Complete the Replacement:**
- ▶ Run Performance Verification and Safety testing as described in the “[Performance Verification](#)” chapter.