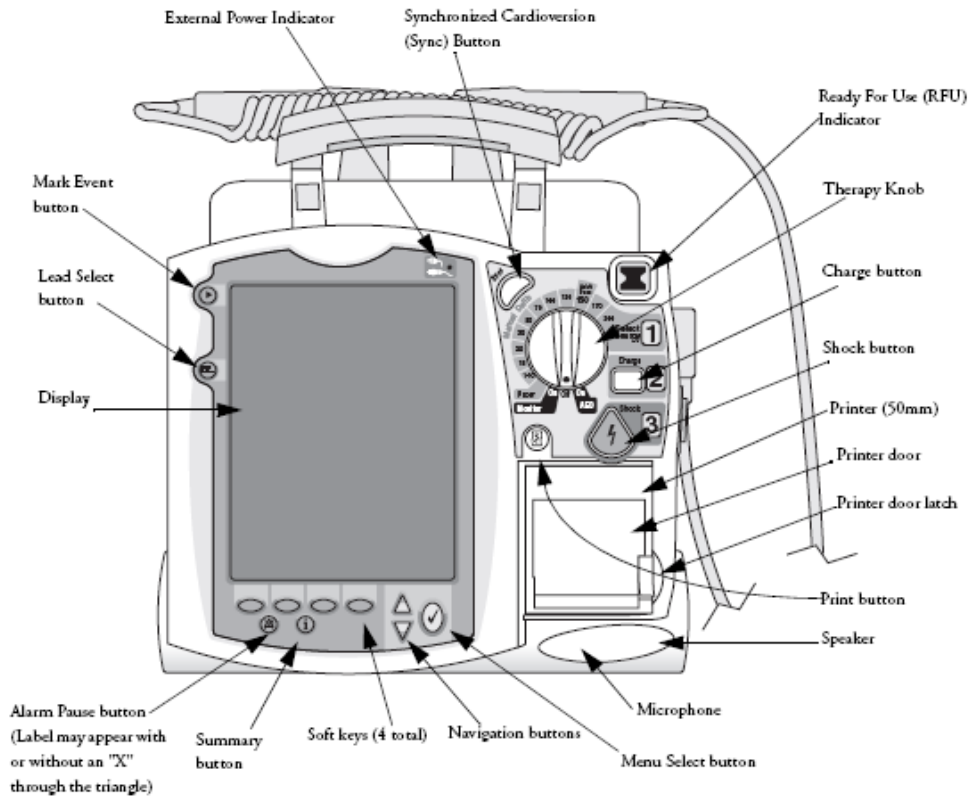


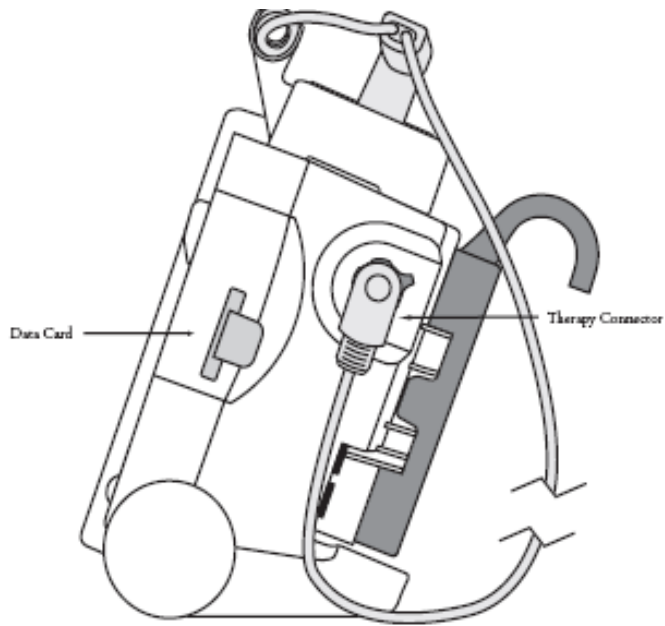
# Philips HeartStart MRx

## Introduction

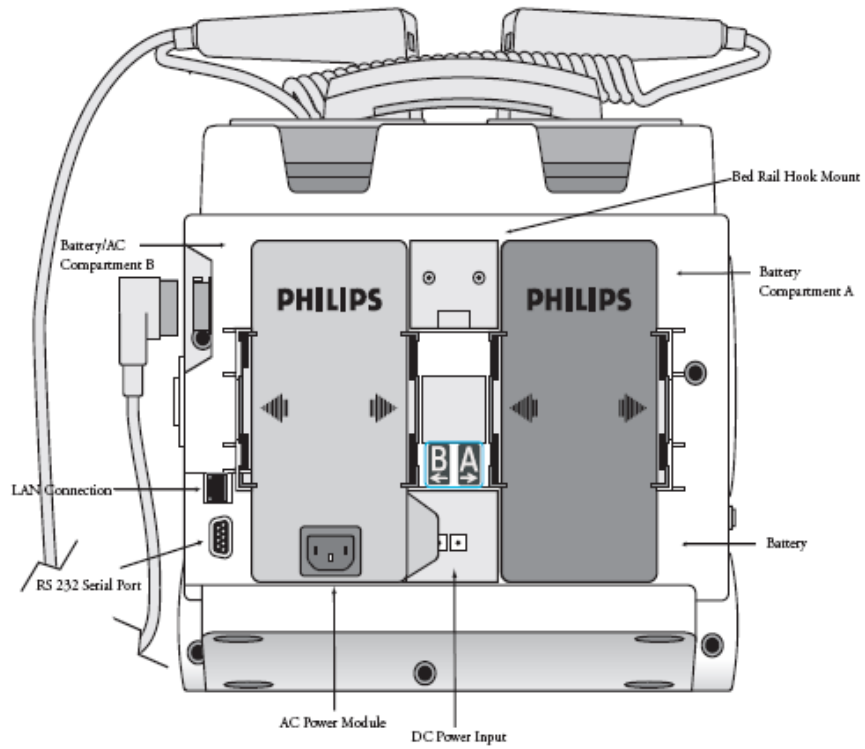
This module is designed as a reference when using the Philips HeartStart MRx. Content from has been taken from the Philips HeartStart MRx Users Manual. Additional information specific to UVA Health System has been included.

## Device Overview





## Back Panel



# ECG and Arrhythmia Monitoring

## Lesson Introduction

This lesson describes the basic ECG and arrhythmia monitoring functions of the HeartStart MRx. It briefly examines Monitor View, monitoring preparation, alarms, annotated ECGs, and arrhythmia learning/relearning.

**Cardiac Monitoring**  
Dial your “Therapy Knob”  
to select **Monitor**



## Preparation

Follow the steps below to prepare for monitoring using multifunction electrode pads or electrodes.

### Multifunction electrode pads

1. Prepare the patient's chest (i.e., remove clothing, remove moisture from chest, and remove excessive hair).
2. Apply multifunction electrode pads to the patient according to the pads package directions or your organization's protocol.
3. If not pre-connected, insert the pads cable into MRx's green Therapy port.
4. Connect the pads to the pads cable.

### Electrodes

1. Prepare the patient's skin at appropriate electrode sites.
  - If necessary, clip hair at the electrode sites (or shave sites if needed).
  - Clean and abrade the skin at each electrode site.
  - Dry the electrode sites briskly to increase capillary blood flow in the tissues and to remove oil and skin cells.
2. Attach the snaps to the electrodes.
3. Apply the electrodes.
4. If not pre-connected, connect the ECG patient cable to the MRx.

### Lead Selection

Use the Lead Select button to select the ECG lead for Wave Sector 1. To select a lead for Wave Sectors 2-4:

1. Press the Menu Select button.
2. Select Displayed Waves and press Menu Select.
3. Select the appropriate Wave Sector and press Menu Select.
4. Select the desired lead (with the clearest signal) and press Menu Select.

# Heart Rate and Arrhythmia Alarms

## Introduction

The ST/AR Basic Arrhythmia Algorithm generates heart rate and heart rate alarms, and can never be disabled. Here are the various alerts MRx generates:

- Red alarms
- Yellow alarms
- INOP messages

### HR/Arrhythmia Red Alarms

Alarm Message	Condition	Indicator	Latching/ Non-Latching
Asystole	No detectable beats for four seconds in the absence of Vfib	Red alarm message, alarm tone	Latching
VFIB/VTACH	A fibrillatory wave detected for four seconds	Red alarm message, alarm tone	Latching
VTACH	Consecutive PVCs and HR exceed defined limits	Red alarm message, alarm tone	Latching
Extreme Brady	10 bpm below HR Low limit, capped at 30 bpm	Red alarm message, alarm tone	Latching
Extreme Tachy	20 bpm above HR High limit capped at 200 bpm (adult) or 240 bpm (pedi)	Red alarm message, alarm tone	Latching

### HR/Arrhythmia Yellow Alarms

Alarm Message	Condition	Indication	Latching/ Non-Latching
HR High	The HR exceeds the configured HR high limit	Yellow alarm message, alarm tone	Non-Latching
HR Low	The HR is below the configured HR low limit	Yellow alarm message, alarm tone	Non-Latching
PVC/min. High (value > limit)	The number of detected PVCs in a minute exceeds the limit of 15 (adult/pedi)	Yellow alarm message, alarm tone	Non-Latching
Pacer Not Capture	No QRS following a pacer pulse	Yellow alarm message, alarm tone	Latching
Pacer Not Pacing	No QRS or pacer pulse detected	Yellow alarm message, alarm tone	Latching

# Semi-Automated External Defibrillation

## Lesson Introduction

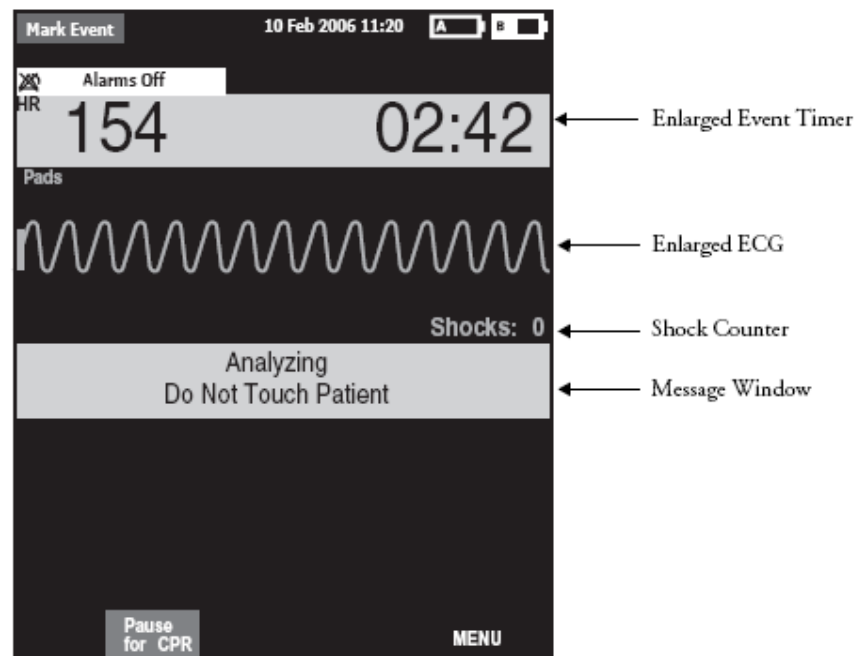
This lesson describes how to use AED Mode. It highlights the AED display view and explains the steps and associated prompts that guide users through the defibrillation process.

**AED Mode**  
Dial your "Therapy Knob"  
to select **AED**



## AED View

Turn the Therapy Knob to AED to display the AED View.



## Preparation

To prepare for AED defibrillation:

1. Confirm the patient's condition (i.e., unresponsive, not breathing, and/or pulseless).
2. Prepare the patient's chest.
3. Apply multifunction electrode pads using the anterior-anterior electrode placement.
4. If not pre-connected, insert the pads cable into the green Therapy port.
5. Connect the pads to the pads cable.

## AED Mode

To defibrillate in AED Mode:

1. Turn the Therapy Knob to AED.
2. Follow the voice and screen prompts.
3. Press the orange Shock button, if prompted.

# Manual Defibrillation and Cardioversion

## Lesson Introduction

This lesson explains how to prepare for and perform manual asynchronous and synchronous (cardioversion) defibrillation using multifunction electrode pads and external/internal paddles.

## Manual Defibrillation

### Manual Defibrillation

Dial your “Therapy Knob” to select desired energy level.

For adults:

150 Joules

**Note:** *Energy does not escalate*

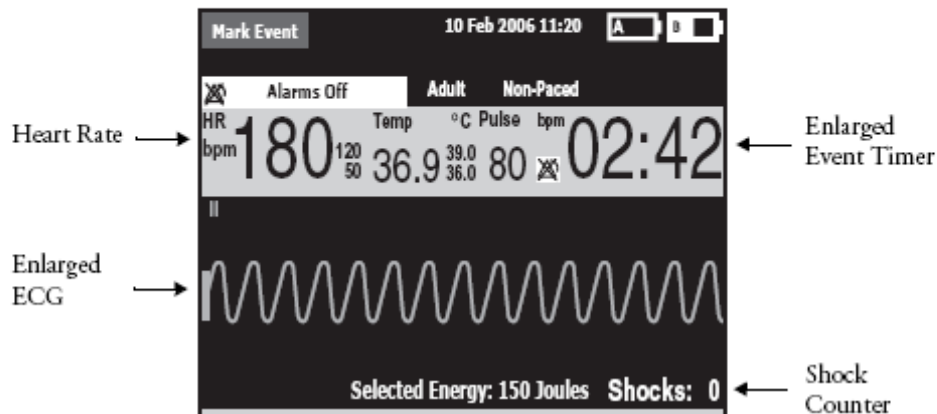
For pediatrics:

As directed by your advanced care provider



## Code View

Turn the Therapy Knob to Manual Defib to display the Code View.



## Manual Defibrillation Preparation

Follow the steps below to prepare for manual defibrillation using multifunction electrode pads or external paddles.

### Multifunction Electrode Pads

1. Confirm the patient's condition (i.e., unresponsive, not breathing, and/or pulseless).
2. Prepare the patient's chest.
3. Apply multifunction electrode pads to the patient according to pads package directions or your organization's protocol.
4. If not pre-connected, insert the pads cable into MRx's green Therapy port.
5. Connect the pads to the pads cable.

### External Paddles

1. Confirm the patient's condition (i.e., unresponsive, not breathing, and/or pulseless).
2. If not pre-connected, insert the paddles cable into the green Therapy port.
3. Remove the paddles from paddle tray.
4. Apply the paddles to patient's bare chest, using the anterior-anterior placement or your organization's protocol.

### Internal Paddles

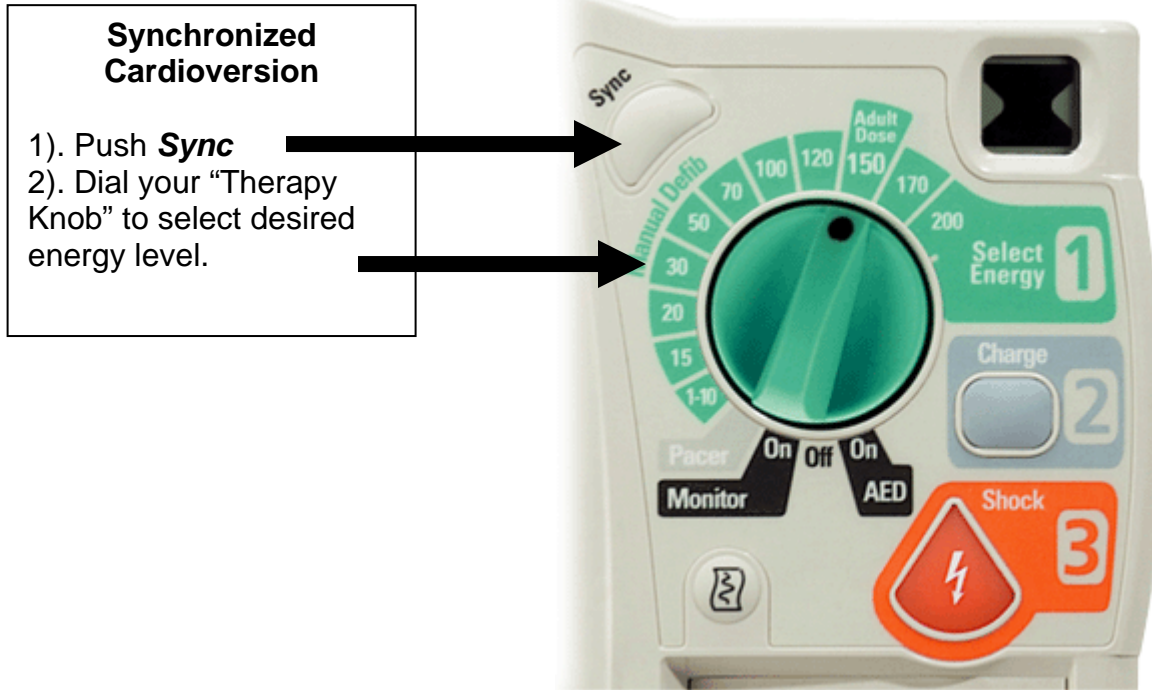
1. Select the appropriate switched or switchless paddle electrode size.
2. If using switchless paddles, connect the paddles to the M4740A Paddle Adapter Cable.
3. Connect the paddles cable (or the paddle adapter cable) to the MRx.

## Manual Defibrillation

To defibrillate in Manual Mode:

1. Turn the Therapy Knob to Manual Defib and select an energy setting.
2. Press the Charge button on the MRx (or external paddle).
3. Make sure no one is touching the patient or anything connected to the patient before shock; call out loudly and clearly "Stay Clear!"
4. Press the orange Shock button on the MRx (or the shock buttons on the external or switched internal paddles).

# Synchronized Cardioversion



## Synchronized Cardioversion Preparation

Follow the steps below to prepare for synchronized cardioversion.

1. Perform the steps as described in the previous *Manual Defibrillation Preparation* topic.
2. If monitoring through a 3-, 5-, or 10-Lead ECG cable, plug the cable into MRx’s ECG port and apply monitoring electrodes to the patient.
3. Press the Lead Select button to select Pads, Paddles, or a lead from attached monitoring electrodes.

## Synchronized Shock Delivery

To deliver a synchronized shock:

1. Turn the Therapy Knob to Monitor position and press the Sync button.
2. Confirm that the Sync marker appears with each R-wave.
3. Turn the Therapy Knob to Manual Defib and select an energy setting.
4. Press the Charge button on the MRx (or external paddle).
5. Make sure no one is touching the patient or anything connected to the patient before shock; call out loudly and clearly “Stay Clear!”.
6. Press and hold the orange Shock button on the MRx (or the orange shock buttons on both paddles) until the shock is delivered.

# Noninvasive Pacing

## Lesson Introduction

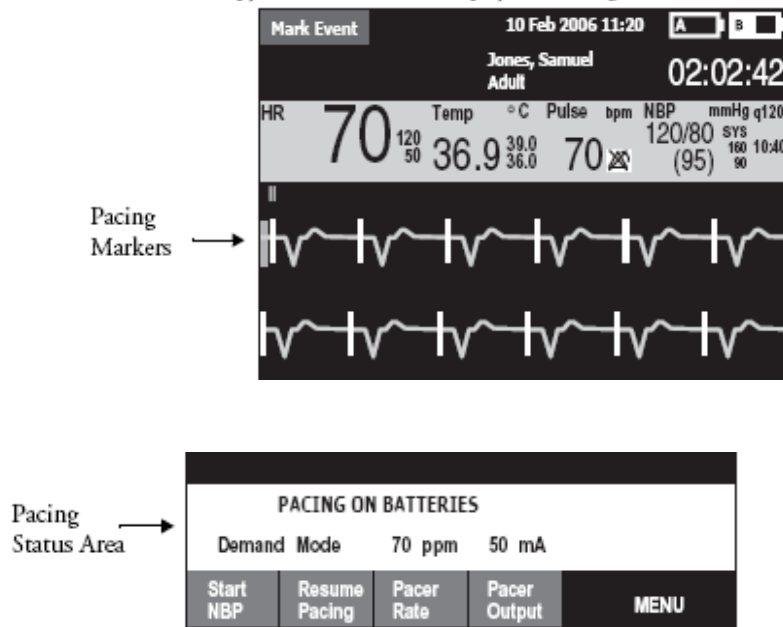
This lesson describes the noninvasive transcutaneous pacing option available with the HeartStart MRx and how to perform pacing.

**Pacing**  
Dial your "Therapy Knob" to **Pacer**.



## Pacing View

Turn the Therapy Knob to Pacer to display the Pacing View.



## Demand vs. Fixed Mode

### Demand mode

- Pace pulses are delivered when the patient's heart rate is lower than the selected pacing rate.
- This mode uses monitoring electrodes AND pads for pacing.
- Demand mode is the suggested pacing mode.

### Fixed mode

- Pace pulses are delivered at a selected rate.
- Use when motion artifact or ECG noise makes R-wave detection unreliable or when monitoring electrodes are not available.

## Preparation

Follow the steps below to prepare for pacing.

1. Prepare the patient's chest. Wipe moisture away and, if necessary, clip or shave excessive chest hair.
2. Apply multifunction electrode pads to the patient as directed on the pads packaging or according to your organization's protocol.
3. If not pre-connected, connect the pads cable to green Therapy port on the MRx.
4. Connect the pads connector to the pads cable.
5. If pacing in demand mode, apply monitoring electrodes and connect the ECG cable to the ECG port on the MRx.

## Demand Mode Pacing

To pace in demand mode:

1. Turn the Therapy Knob to the Pacer position.
2. Press the Lead Select button to select the best lead with an easily detectable R-wave.
3. Verify white R-wave markers appear above or on the ECG waveform, with a single marker for each R-wave. If no R-wave markers appear or coincide with the R-wave, select another lead or increase wave size.
4. Press the **[Pacer Rate]** soft key and use the Navigation and Menu Select buttons to select the desired number of pace pulses per minute.
5. If needed, adjust the initial pacer output. Press **[Pacer Output]** and use the Navigation and Menu Select buttons to select the desired output.
6. Press **[Start Pacing]**.
7. Verify white pacing markers appear above or on the ECG waveform.
8. Press **[Pacer Output]**. Then use the Navigation and Menu Select buttons to adjust the output to the lowest level that still maintains capture.
9. Verify the presence of a peripheral pulse.
10. Press **[Pause Pacing]** to stop pacing. Press **[Resume Pacing]** to resume delivery, as appropriate.

Note: You may also stop pacing by turning the Therapy Knob from Pacer to another position.

## Fixed Mode Pacing

To pace in fixed mode:

1. Turn the Therapy Knob to Pacer.
2. Change the pacer mode to Fixed.
3. Press the Lead Select button to select the desired lead.

Note: The remaining steps are similar to demand mode pacing.

4. Press **[Pacer Rate]** and use the Navigation and Menu Select buttons to select the desired number of pace pulses per minute.
5. If needed, adjust the initial pacer output by pressing **[Pacer Output]** and using the Navigation and Menu Select buttons to select the desired output.
6. Press **[Start Pacing]**.
7. Verify the presence of a peripheral pulse.
8. Press **[Pacer Output]** and use the Navigation and Menu Select buttons to adjust the output, as needed.
9. Press **[Pause Pacing]** to stop pacing.

## Defibrillating During Pacing

To defibrillate, turn the Therapy Knob to Manual Defib or AED. Note that:

- Pacing stops in either Manual Defib or AED Mode.
- Pacing settings selected prior to defibrillation are retained once pacing recommences.

# Data Management

## Lesson Introduction

This lesson describes the data management features of the HeartStart MRx.

### Marking Events

To annotate the Event Summary and the ECG strip with an event:

1. Press the Mark Event button.
2. Using the Navigation buttons, select the desired event from the Events menu and press Menu Select.

### Printing the Event Summary

- Press the Summary button and select Event Summary from the Print menu to print the current or most recent Event Summary.
- To print an Event Summary stored on the removable data card, download the information to the HeartStart Event Review Pro data management system.

# Maintenance

## Lesson Introduction

This lesson describes how to care for your HeartStart MRx and includes a brief look at battery maintenance and cleaning.

### Automated Tests

Three automated tests assess MRx's operational performance and notify you of any problems.

- Hourly: Tests batteries, internal power supplies, and internal memory.
- Daily: Tests batteries, internal power supplies, internal memory, internal clock battery, defibrillation, pacing, monitoring parameters, Bluetooth, and printer.
- Weekly: Performs the Daily test and delivers a high energy internal discharge to further exercise the defibrillation circuitry.

Test results include Pass, Fail/DX (device error that may affect therapy), Fail/BF (battery failure), and Fail/D (device error that does not affect therapy).

### Ready For Use Indicator

The Ready For Use (RFU) indicator provides four statuses:

- Blinking black hourglass: sufficient battery power and is ready for use.
- Blinking red "X" with or without a periodic chirp: low battery or no battery.
- Solid red "X" and a periodic chirp: device failure that may prevent shock delivery, pacing, or ECG acquisition.
- Solid red "X" without a periodic chirp: no power or device failure.

### Shift Check

- The American Heart Association (AHA) recommends completion of a checklist (shift check) at the beginning of each change in personnel to ensure that defibrillators are ready when needed.
- Checklist activities include:
  - Device exterior
  - Cables
  - Connectors
  - Paddles/Pads
  - Monitoring electrodes
  - Batteries
  - AC/DC power
  - Printer paper
  - Data card

## Daily Shock Test

### Shock Test Process

#### Using Multifunction electrode pads (hands-free):

1. If you are using multifunction electrode pads, attach a test load to the end of the patient Therapy Cable
2. Turn the Therapy Knob to 150 joules
3. Press the Charge Button

**Note:** If it becomes necessary to disarm the defibrillator, press **DISARM**

4. Press shock
5. Press the print button to print a strip. Confirm on the printed strip that the energy delivered to the test load is 150 J +/- 23 joules (127J to 173J). If not, take the device out of use and call Clinical Engineering for service.

#### Using Paddles:

1. If you are using paddles, make sure the paddles are secure in their pockets and the Patient Contact Indicator LEDs located on the sternum paddles are NOT lit. If the LEDs light, adjust the paddles in their pockets.
2. Turn the Therapy Knob to 150J
3. Press the Charge Button

**Note:** If it becomes necessary to disarm the defibrillator, press **DISARM**

4. Simultaneously press the shock buttons located on the paddles to deliver a shock into the test load.
5. Press the print button to print a strip. Confirm on the printed strip that the energy delivered to the test load is 150 J +/- 23 joules (127J to 173J). If not, take the device out of use and call Clinical Engineering for service.

### Cleaning Instructions

- Use isopropyl alcohol, mild soap and water, chlorine bleach, or quaternary ammonium compounds on the exterior surfaces of the HeartStart MRx, as well as the batteries and data card.
- Use a soft cloth on the display to prevent scratching.
- The MRx, along with its accessories and supplies, may not be autoclaved, ultrasonically cleaned, or immersed unless otherwise indicated in the MRx *Instructions for Use* that accompany the accessories and supplies.
- Do not use abrasive cleaners or strong solvents such as acetone or acetone-based cleaners.
- Do not mix disinfecting solutions (such as bleach and ammonia) as hazardous gases may result.
- Do not clean electrical contacts or connectors with bleach.
- Disinfect the device as determined by your organization's policy to avoid long-term damage to the device.

### Reference:

M3535A/M3536A  
User Training Workbook