

EMIS Guide

January 2013

M ECHANICAL

C IRCULATORY

S UPPORT

O RGANIZATION

This guide is produce by MCSO –
The Mechanical Circulatory Support Organization
It is produced by VAD Coordinators from some of
the largest and most successful VAD implantation
hospitals in the US. It has been vetted by experts
on VADS in Air Medical Transport and EMS. It
should not replace the operator manual as the
primary source of information.

Questions and Answers

What is a Ventricular Assist Device (VAD)?

A ventricular assist device (VAD) is a mechanical pump that's used to support heart function and blood flow in people who have weakened hearts.

How does a VAD work?

The device takes blood from a lower chamber of the heart and helps pump it to the body and vital organs, just as a healthy heart would.

What are the parts of a VAD?

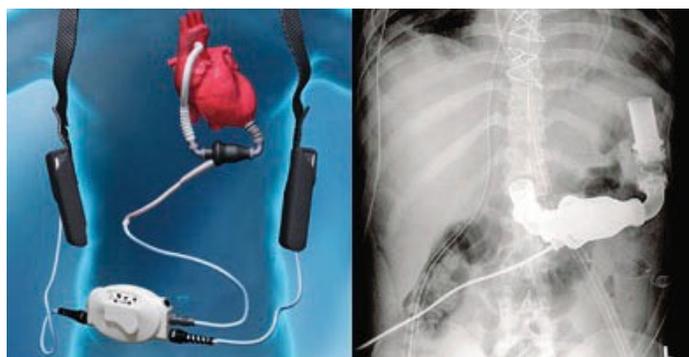
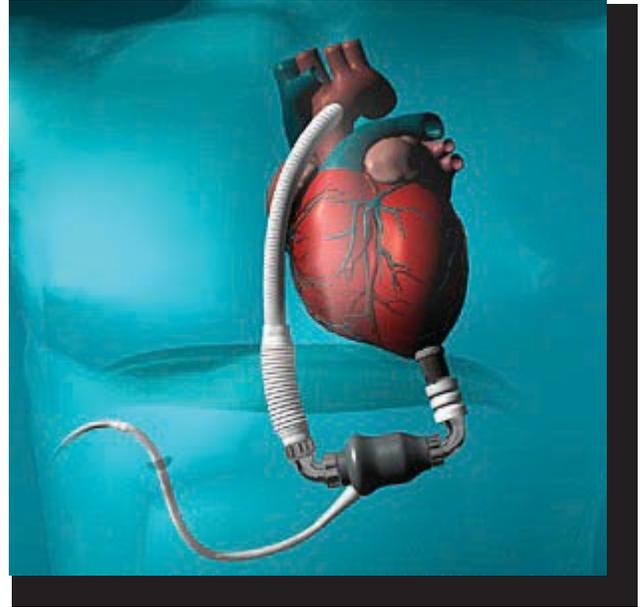
The basic parts of a VAD include: a small tube that carries blood out of your heart into a pump; another tube that carries blood from the pump to your blood vessels, which deliver the blood to your body; and a power source.

What is the power source?

The power source is either batteries or AC power. The power source is connected to a control unit that monitors the VAD's functions. The batteries are carried in a case usually located in a holster in a vest wrapped around the patients shoulders.

What does the control unit or controller do?

The control unit gives warnings, or alarms, if the power is low or if it senses that the device isn't working right. It is a computer.



The portability of the HeartMate II enables patients to resume many of their normal daily activities.

Color Coding System



MOST patients have a tag located on the controller around their waist that says what type of device it is, what institution put it in and a number to call. Most importantly is the color of the tag – it matches this EMS Field Guide and allows you to quickly locate the device you are caring for.

HEARTMATE II

HEARTWARE

JARVIK 2000

HEARTMATE XVE

THORATEC PVAD/IVAD

FREEDOM DRIVER
Total Artificial Heart

DURAHEART

HeartMate II®

- 1. Can I do external CPR?**
Only if absolutely necessary
- 2. If not, is there a “hand pump” or external device to use?**
No.
- 3. If the device slows down (low flow state), what alarms will go off?**
A red heart alarm light indicator and steady audio alarm will sound if less than 2.5 lmp. Can give a bolus of normal saline and transport to an LVAD center.
- 4. How can I speed up the rate of the device?**
No, it is a fixed speed.
- 5. Do I need to heparinize the patient if it slows down?**
Usually no, but you will need to check with implanting center.
- 6. Can the patient be defibrillated while connected to the device?**
Yes.
- 7. If the patient can be defibrillated, is there anything I have to disconnect before defibrillating?**
No.
- 8. Does the patient have a pulse with this device?**
May have weak pulse or lack of palpable pulse.
- 9. What are acceptable vital sign parameters?**
MAP 70 - 90 mm Hg with a narrow pulse pressure
- 10. Can this patient be externally paced?**
Yes.

FAQs

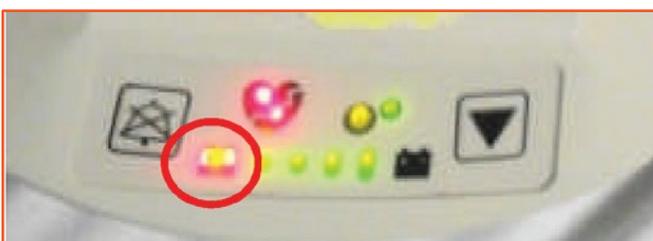
- May not be able to obtain cuff pressure (continuous flow pump).
- Pump connected to electric line exiting patient's abdominal area and is attached to computer which runs the pump.
- Pump does not affect EKG
- All ACLS drugs may be given.
- No hand pump is available.
- A set of black batteries last approximately 3 hours, gray batteries last 8-10 hours.
- Any emergency mode of transportation is ok. These patients are permitted to fly.
- Be sure to bring **ALL** of the patient's equipment with them.

Adapted from Sweet, L. and Wolfe, Jr., A. Mechanical Circulatory Devices in Transport in ASTNA: Patient Transport Principles and Practice, 4th ed., Mosby, 2010 in press.

Trouble Shooting HeartMate II® When the Pump Has Stopped

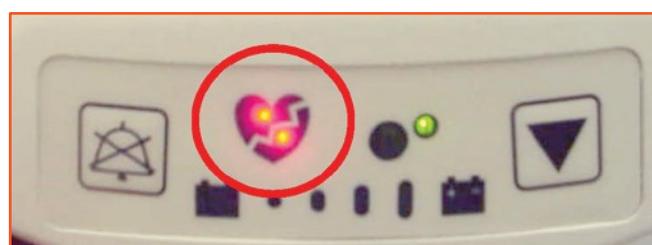
- I Be sure to bring ALL of the patient's equipment with them.
- I Fix any loose connection(s) to restart the pump.
- I If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. *(see changing batteries section on next page)*
- I If pump does not restart, change controllers. *(see changing controllers section on next page)*

Alarms: Emergency Procedures



Yellow or Red Battery Alarm: Need to Change Batteries. See changing batteries section on next page.

Red Heart Flashing Alarm: This may indicate a Low Flow Hazard. Check patient--the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure-- treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed in the section above.



Trouble Shooting HeartMate II®

Changing Batteries

WARNING: At least one power lead must be connected to a power source **AT ALL TIMES**. Do not remove both batteries at the same time or the pump will stop.

- I Obtain two charged batteries from patient's accessory bag or battery charger. The charge level of each gray battery can be assessed by pressing the battery button on the battery. (Figures 3 and 4)
- I Remove only **ONE** battery from the clip by pressing the button on the grey clip to unlock the battery. (Figure 1)
- I Controller will start beeping and flashing green signals.
- I Replace with new battery by lining up **RED** arrows on battery and clip. (Figure 2)
- I Slide a new, fully-charged battery (Figure 4) into the empty battery clip by aligning the **RED** arrows. The battery will click into the clip. Gently tug at battery to ensure connection. If battery is properly secured, the beeping and green flashing will stop.
- I Repeat previous steps with the second battery and battery clip.



Figure 1



Figure 2



Figure 3



Figure 4

Changing Controllers

I Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient's travel case.

I Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.

I Attach the battery clips to the spare controller by lining up the half moons and gently pushing together and attach the batteries to the spare controller by aligning the **RED** arrows. **ALARMS WILL SOUND-THIS IS OK.**



Half-Moons

I Depress the silence alarm button (upside-down bell with circle) until the alarm is silenced on the new, replacement Controller.

I Rotate the perc lock on the replacement controller in the direction of the "unlocked" icon until the perc lock clicks into the fully-unlocked position. Repeat this same step for the original Controller until the perc lock clicks into the unlocked position.



Perc Lock

I Disconnect the perc lead/driveline from the original controller by pressing the metal release tab on the connector socket. The pump will stop and an alarm will sound.

Note: The alarm will continue until power is removed from the original Controller. **Getting the replacement Controller connected and the pump restarted is the first priority.**

I Connect the replacement Controller by aligning the **BLACK LINES** on the driveline and replacement Controller and gently pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:

Step 1. Firmly press the Silence Alarm or Test Select Button to restart the pump.

Step 2. Check the powersource to assure that power is going to the controller.

Step 3. Assure the perc lead is fully inserted into the socket by gently tugging on the metal end. **DO NOT** pull the lead.



I After the pump restarts, rotate the perc lock on the new controller in the direction of the "locked" icon until the perc lock clicks into the fully-locked position. If unable to engage perc lock to the locked position, gently push the driveline into the controller to assure a proper connection. Retry to engage perc lock.

I Disconnect power from the original Controller. The original Controller will stop alarming once power is removed.

