

Using The HESS Doppler App

Healthcare Education Simulation Station

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www.BetterNurseEducation.com

PLEASE READ

DISCLAIMER

The information in the HESS is not intended or implied to be a substitute for professional medical expertise, advice, diagnosis or treatment.

There is no representation and no responsibility for the accuracy of information contained within the HESS.

The HESS is only intended to be used as an instructional aide by qualified medical educational professionals.

About The HESS Doppler App

The HESS Doppler App was created to let healthcare professionals conduct learning exercises that involve a hand held Doppler device in a safe and “low stakes” environment.

The Doppler App can be used to simulate venous and maternal Doppler vitals and sounds on both Manikins and Standardized Patients (actors) where a real Doppler would either display the healthy vitals of the Standardized Patient or read no vitals from an artificial Manikin limb.



Tablets Suitable To Run The HESS Doppler App

The HESS Doppler App can run on Android tablets with Version 8 or above of the Android operating system and with a screen size of approximately 7 inches. The 7 inch screen size is a common Android tablet size that can allow the tablet to still be hand held.

Android tablets with screen sizes smaller than 7 inches may not display the Doppler App screen elements correctly.

The Doppler App can be run on larger screen sizes if the educational exercise dictates using a larger tablet – such as displaying the Doppler App screen on a monitor or projector.

HESS Vitals Accepted By The HESS Doppler App

The HESS Doppler App will recognize and use the following vitals transmitted from the HESS Instructor tablet.

1. Doppler Vitals

The Doppler Vitals that the Doppler App recognizes and uses are the Doppler Pulse Rate (BPM) and the Doppler Waveform which defines the audible sound pattern.

Using The HESS Doppler App

1. Starting the Doppler App



The HESS Doppler App can be started by touching the HESS Doppler App icon on the Android tablet.

2. Starting the Doppler Vitals Display



AFTER the Doppler Vitals have been transmitted successfully from the HESS Instructor App, the “power” button can be used to start and stop the Doppler Vitals display and the audible sound pattern.

Note: If the Enable Smart Cable and/or Enable Smart Location are set to “Yes” in the Doppler App Settings, the “power” button will not appear on the screen and there will be no way to manually start and stop the Doppler Vitals display and the audible sound pattern. With these options set to “Yes”, the Doppler App is expecting the use of an Ink Sensor Smart Cable to automatically control the starting and stopping of the Doppler Vitals display and the audible sound pattern.

HESS Doppler App Settings

The HESS Doppler App has the following Settings available via the Android “3 dots menu” in the upper right corner of the Doppler App screen:

1. Flip Doppler Ultrasound Display

Flips the Doppler App screen to enable easier access to tablet ports – such as the charging port, Smart Cable (USB) port or the audio jack – during use.

2. Default Doppler Waveform

Sets the default Doppler Waveform upon startup of the Doppler App. (Used only with HESS Instructor App versions prior to V4.0).

3. Suppress Background Sound

Turns the Doppler App background sounds on or off. Background sounds make the audio sounds of the Doppler App more realistic, but also more challenging for less experienced learners.

4. Suppress Pulse Rate Display

Turns the Doppler App Pulse Rate display on or off. This allows simulation of real Doppler units that only play audio sounds and do not have a Pulse Rate display. This also can enable a more challenging learning exercise – for example in a Maternal/Fetal/OB scenario where learners are challenged to recognize the fetal heart rate audibly without seeing a number on the display.

5. Device Address

The Doppler App receiving address for the Vitals – which must match the transmission address for the Vitals in the HESS Instructor App. Device Addresses are 4 characters made up of the characters 0-9 and A-F. **DO NOT USE** “0000” or “FFFF” as Device Addresses. “0000” and “FFFF” have special uses within the HESS. Using these special Device Addresses can cause unpredictable results.

HESS Doppler App Settings

The HESS Doppler App has the following Smart Cable Oriented Settings:

6. Enable Smart Cable

Requires use of the Ink Sensor Smart Cable.

With “Enable Smart Cable” set to “Yes”, the Doppler App requires the learner to place the Ink Sensor Smart Cable “probe end” against a flat surface so that “darkness” is sensed. Once “darkness” is sensed, the Doppler App will display the Doppler Vitals and play the Doppler audio sounds.

DO NOT select “Yes” for this option unless an Ink Sensor Smart Cable is being used in the learning exercise.

7. Enable Smart Location

Requires use of the Ink Sensor Smart Cable **AND** “Enable Smart Cable” set to “Yes”.

Smart Location requires a surface Marker color to be learned by the Doppler App and will only display the Doppler Vitals or play the Doppler audio sounds when the Ink Sensor Smart Cable senses BOTH:

- a) “darkness” (“probe end” against a flat surface), **AND**
- b) the learned Marker color at the specific location of the Marker on the surface.

See the **Setting The Ink Sensor Smart Cable Marker Color** section for more information.

DO NOT select “Yes” for this option unless an Ink Sensor Smart Cable is being used in the learning exercise.

8. View Marker Sensor Data

Displays the status of the Marker data being sensed by the Ink Sensor Smart Cable – so that Instructors can diagnose and troubleshoot the Ink Sensor Smart Cable setup and function.

9. Smart Cable Vendor ID

Used ONLY if a “non-HESS” (3rd Party) Ink Sensor Smart Cable has been built to be used as the Ink Sensor Smart Cable. This should be zero if using a genuine HESS Ink Sensor Smart Cable OR if not using a Smart Cable.

10. Smart Cable Product ID

Used ONLY if a “non-HESS” (3rd Party) Ink Sensor Smart Cable has been built to be used as the Ink Sensor Smart Cable. This should be zero if using a genuine HESS Ink Sensor Smart Cable OR if not using a Smart Cable.

HESS Doppler App Usage Notes

1. Bluetooth Reset Button



If, after numerous attempts, the Doppler App is still not receiving Vitals transmissions – even though the Instructor transmission and the Device receiving addresses match – the “Bluetooth Reset” button in the upper right corner of the screen can be used to reset the Android tablet’s Bluetooth functions. This often will resolve Bluetooth oriented issues without having to stop or disrupt the app.

2. Issues When Using Very Low Heart Rates

The Doppler App is “driven” by a simulated cardiac cycle. The Doppler App will finish any currently established cardiac cycle before moving to new Vitals values even if the new Vitals transmissions have been successfully received. In cases of very low heart rates – such as 10 BPM or lower – it can take some time before changes appear. As an example, in an extreme case of a heart rate set to 1 BPM, the cardiac cycle would be 60 seconds in duration and it could take 1-2 minutes for changes transmitted to take effect. This can make the app appear unresponsive even though it is working properly.

3. When Done, “Power Off” Tablets – Don’t Just “Suspend” Them

The Android tablets should be completely “powered off” when stored or the battery will drain to 0% charge. Completely drained batteries can then take 20-30 minutes of charging just to get the tablet to power up for usage. Even if the tablet screen is dark it can be misleading because the tablet may only be “suspended”. Pressing the power button for ½ second will indicate if the tablet is completely powered off – by either “unsuspending” the tablet screen if the tablet is only “suspended” – or remaining dark if the tablet is completely powered off.

HESS Ink Sensor Smart Cable

The HESS Ink Sensor Smart Cable was created to attach to an Android tablet running the Doppler App.

To use the Ink Sensor Smart Cable, the Settings of the Doppler App must have the “Enable Smart Cable” option set to “Yes”.

To attach the Ink Sensor Smart Cable, insert the USB plug of the Ink Sensor Smart Cable into a suitable USB Adapter cable - which should be plugged into the USB port of the tablet running the Doppler App. Such a USB Adapter cable allows attachments with full sized USB plugs to be used with tablets – which usually have smaller “mini-USB” or “micro-USB” ports.

A USB extension cable will also likely be desired in this setup (e.g. a 6 ft USB extension cable) to serve as the cord to allow the learner to use the Ink Sensor Smart Cable like a Doppler probe.



If the Doppler App is running you will need to provide Permission in a popup window to use the attached Ink Sensor Smart Cable.

Once the Ink Sensor Smart Cable is attached and communicating properly - the text in the blue toolbar at the top of the Doppler App will be green rather than white. This green text is the “Smart Cable Indicator” that confirms the Ink Sensor Smart Cable is working.

This text should stay green for the duration of the learning exercise. The text may briefly turn blue when a Bluetooth transmission is received – or even briefly turn white – but it should quickly return to green to indicate proper communication with the Ink Sensor Smart Cable.

If the text remains white or blue for more than a second, the Ink Sensor Smart Cable is not communicating properly and should be reset using one of the following steps (AND any vitals should then be re-transmitted to the Doppler App):

- a. Try detaching and then reattaching the USB cable as in the initial installation.
- b. Try closing and restarting the Doppler App and reattaching the USB cable.
- c. In very rare cases, try powering off the Android tablet and then restarting it.

HESS Ink Sensor Smart Cable

If a surface Marker color is also going to be used, the “Enable Smart Location” option must be set to “Yes”.

By rubbing a small amount (about the size of a dime or quarter using a QTip) of Luminescent Ink at the spot on a Manikin or Standardized Patient where a real Doppler Ultrasound Probe could be held to find a pulse, the Ink Sensor Smart Cable will be able to “see” the Luminescent Ink and cause the Doppler App to display the Doppler Vitals and play the Doppler audio sounds. The Luminescent Ink is usually invisible to the eye requiring the learner to know the correct placement of the Ink Sensor Smart Cable to hear the sound.



Luminescent Inks

One source of Luminescent Ink that the Ink Sensor Smart Cable can use is available from www.directglow.com. Be sure to use **ONLY** use the type that is **safe for use on skin** and **NOT the type designed for printers or industrial use**.

A UV Flashlight can be extremely helpful in seeing things when using Luminescent Inks on surfaces.

See www.BetterNurseEducation.com for more information about use of the Ink Sensor Smart Cable.

HESS Ink Sensor Smart Cable

The Doppler App needs to “learn” the color of the Luminescent Ink after it has been applied to the “skin” (Manikin or Standardized Patient) surface.

Setting The Ink Sensor Smart Cable Marker Color

To make the Doppler App “learn” a Marker color, use “Set Markers” in the Doppler App options via the Android “3 dots menu” in the upper right corner of the Doppler App screen. The “learned” Marker color will be saved in the Doppler App – but will ONLY function properly on the **specific Manikin’s/ Standardized Patient’s** “skin” surface and ONLY using the **same Ink Sensor Smart Cable** – so if the Ink Sensor Smart Cable is used with another Manikin or Standardized Patient, the Marker color will need to be “re-learned” for that Manikin’s/ Standardized Patient’s “skin” surface.

The Ink Sensor Smart Cable must **already be properly connected** to use the “Set Markers” function.

1. Choose “Set Markers” from the options menu via the Android “3 dots menu” in the upper right corner of the Doppler App screen.
2. Once in the Set Markers option, **Detach and Re-Connect** the Ink Sensor Smart Cable from the USB port of the tablet - and **provide Permission in a popup window** to use the Smart Cable. This is required to comply with Android permissions for use of an attached device.
3. Touch “**FIND MARKER**” – then hold the Ink Sensor Smart Cable **completely** over the Marker spot to be learned. Wait to hear the 3 beeps indicating that the Marker spot color has been learned.
4. Touch “**SAVE AS MARKER**” to save the Marker color learned.
5. **Detach** the Ink Sensor Smart Cable from the USB port, then use the Android “back” arrow to return to the Doppler App screen.
6. On the Doppler App screen, **Re-Connect** the Ink Sensor Smart Cable to the USB port - and **provide Permission in a popup window** to use the Smart Cable. This is required to comply with Android permissions for use of an attached device. (Watch for the “green” text...)
7. Transmit Doppler Vitals to the Doppler App.
8. Test the Ink Sensor Smart Cable on areas of the surface that do not contain the Marker color spot - and then on the Marker color spot - to make sure the color has been learned correctly.

Notes:

1. Turning “View Marker Sensor Data” on in the Settings can help with testing that the Marker color was learned properly. The Sensor Data will display:
 - the currently sensed color components (R: G: B: C:)
 - if the sensor is currently sensing “darkness” (S:true),
 - if the sensor is currently sensing the saved learned Marker color (M:true).
 - the saved learned Marker color components (R: G: B: C:)
2. If the R: G: and B: components are not at least 20 with a C: of at least 60, the sensor is likely not reading any replicable Marker color under UV light and results can be unpredictable.
3. A bright white LED will turn on briefly after the Ink Sensor Smart Cable is connected – and then turn off. This is normal. The white LED is not used during operation.