



HeartStart AED Troubleshooting

HS1/FRx Battery Insertion Test - BIT

- BIT- Most Comprehensive Test
- Interactive Self Test (Required)
 - Press the Shock Button
 - Press the On/Off button (FRx only)
- Automated Self Test
 - Battery
 - Internal Components
 - Energy Delivery Circuits
 - Calibration Verification
 - Proprietary SMART Pads integrity test
- The green Ready light will be blinking to show the device is ready for use



Using HS1/FRx – CPR Coaching

- Press the flashing blue i-button to activate CPR coaching
- Provides voice instruction in basic CPR, including rate and depth of compressions
- Gives instructions for adult or pediatric CPR based on pads cartridge used (HS1) or infant/child key used (FRx)



HS1/Onsite Infant Child Defibrillation

HS1 infant/child pads cartridge:

- For use *only* with HS1 Defibrillator
- For infants and young children under 8 years old or 55 lbs
- HS1 announces “Infant/Child” Pads
- Pads icons show correct placement
- Automatically reduces energy to 50 Joules, suitable for infant/child
- Single use, disposable



Replacing HS1/Onsite Pads Cartridge

- Remove the pads cartridge from its package.
- Slide the latch at the top edge of the defibrillator. The pads cartridge will be released. Remove the old cartridge.
- Install the desired pads cartridge. Be sure the green handle is pressed down firmly.



FRx Infant Child Defibrillation

FRx Infant/Child Defibrillation

FRx infant/child key:

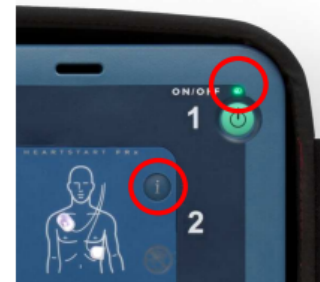
- One pads for adults and infant/child
- For use *only* with FRx Defibrillator
- For infants and young children under 8 years old or 55 lbs
- Insert Key firmly in slot on the face of FRx
- FRx announces “Infant/Child Mode”
- Use icons on Key for correct pads placement
- Automatically reduces energy to 50 Joules, suitable for infant/child



Maintenance – HS1/Onsite & FRx

HS1/FRx Maintenance

- Three different level of Periodic Self-Tests
 - Daily (DPST), Weekly (WPST), Monthly (MPST)
 - Increasing extent of test suites
- Test results displayed in Status Indicator Light
 - Green Light Blinking: On Standby
 - Once every 3 seconds (1/3 Hz)
 - Green Light Off: Needs Attention (See Troubleshooting)
- Do not require user calibration
- Do not require energy verification
- No user-serviceable parts
- No Service/Maintenance/Repair Manuals
- Maintenance Guide is on Owner's Manual



HS1/FRx Maintenance Schedule

- Suggested Maintenance Schedule in Owner's Manual:
 - Periodic check of Status Indicator
 - Periodic check of supplies, accessories, and spares for damage and expiration dating
 - Periodic check of the outside of the device for cracks or other signs of damage
- Do not leave the device without pads installed
- Do not leave the device without a battery installed



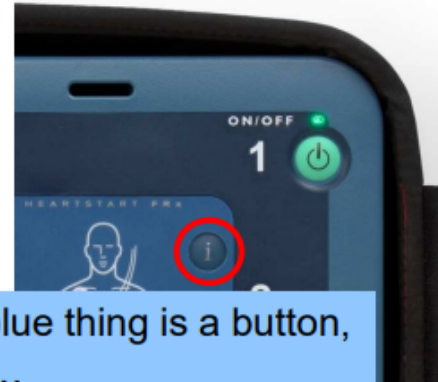
The required maintenance frequency is at the discretion of program's Medical Director

HS1/FRx Status Indicator

Green Light Flashing	Green Light Solid	Green Light Off
		
Blue i-button off	Blue i-button off	Blue i-button blinking or off
No chirping or beeping sound	No chirping or beeping sound	Accompanied by a single or triple chirping, or no chirping
Device ready for use	Device is in use or running a selftest	Device MAY NOT be ready for use
No action required	Busy- Device should soon go to standby, if not in use	Device needs attention, see troubleshooting

HS1/Onsite/FRx Blue i-button

- If device needs attention, the Blue i-button flashes, accompanied by beeps
- A quick press provides information about defibrillator's status
 - Confirms device ready for use
 - If not ready, gives troubleshooting information
- If pressed & held until it beeps, provides last event information:
 - Number of shocks delivered
 - Duration the device was used

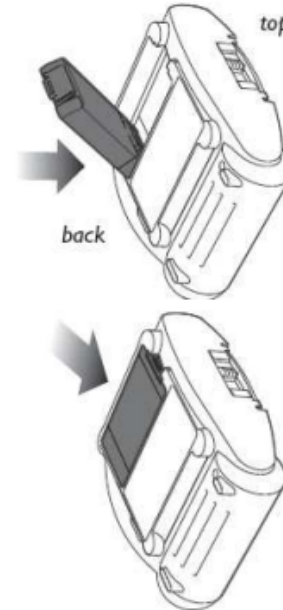


Customers don't always understand that this blue thing is a button, some think it is only a light...

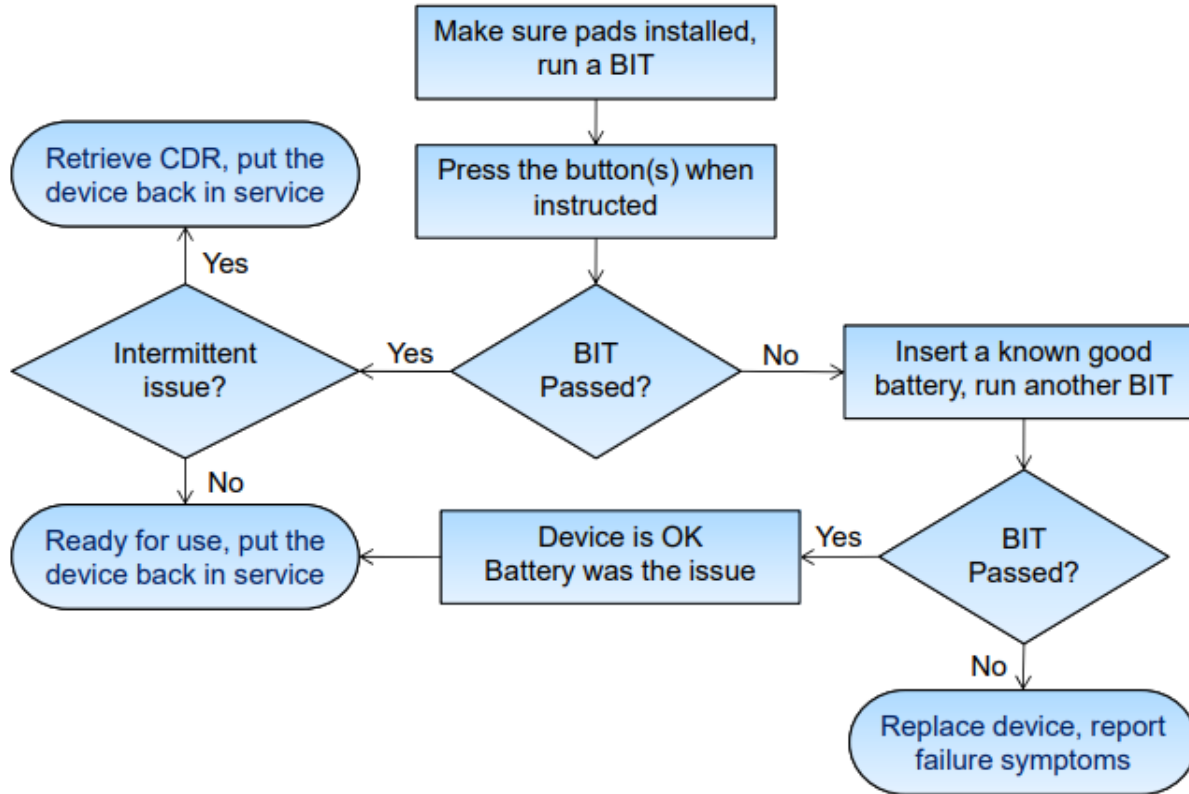
Battery Insertion Test - BIT

Battery Insertion Test (BIT): Most Comprehensive Troubleshooting Tool

- Run a BIT (simply by removing & reinstalling battery after 10 seconds):
 - If status indicator (Green Light) doesn't blink
 - If a problem is suspected
 - After a patient use
 - After a training use
- Before running BIT
 - Make sure pads are installed, connector inserted
- When instructed during the BIT:
 - Make sure to press the Orange shock button
 - For FRx only: also press the On/Off button



Troubleshooting Decision Tree



Why is my AED beeping, and i-button flashing?

- 1. Low Battery**
- 2. Bad Pads**
- 3. Device failed self test**

Troubleshooting Warning Message

Symptoms	Possible Cause	Recommendation Action
Green Light: Off Blue i-button: Blinks at 1/8 Hz (once every 8 s) Audio Signal: Single Chirps at 1/8 Hz (once every 8 sec)	*Low Battery (At least 9 shocks and 15 minutes use remain when the flashing red X first appears)	Press the blue i-button for confirmation prompt. If instructed, replace with a new battery and run BIT
	*Shock button was not verified in last BIT	Press the blue i-button for confirmation prompt. Remove & reinsert battery to run BIT & press the shock button when instructed
	*Error detected during selftest, marginal calibration during selftest caused warning	"Remove & reinsert battery to test". If the warning is not cleared, try one more time with a known good battery. If it fails again, take out of service


***Device with these symptoms may still be used in case of emergency.**

Troubleshooting Warning Message

Symptoms	Possible Cause	Recommendation Action
Green Light: Off	The training pads has been left attached	Remove the training pads and replace it with clinical pads.
Blue i-button: Blinks at 1/8 Hz (once every 8 s)	*Device stored outside range of recommended temperature	Press the blue i-button for confirmation prompt. Remove & reinsert battery to run BIT
Audio Signal: Single Chirps at 1/8 Hz (once every 8 sec)	The defibrillator may have been physically damaged	Take out of service and replace the unit; verify customer abuse

*Device with these symptoms may still be used in case of emergency.

Troubleshooting Pads Warning

Symptoms	Possible Cause	Recommendation Action
Green Light: Off	Pads dried out either prematurely or by customer peeling the pads down	Press i-button to confirm voice prompt "Pads not usable, Replace pads", if so, replace pads
Blue i-button: Blinks at 1/8 Hz (once every 8 s)	Pads cartridge not installed (HS1) or pads connector not inserted fully (FRx)	Make sure the pads cartridge is installed (HS1) or pads connector is fully inserted (FRx)
Audio Signal: Single Chirps at 1/8 Hz	*"Pads cartridge cover not installed" (HS1 only)	Make sure the pads cartridge is properly installed with the hard cover in place
	*Magnet missing from pads cartridge cover (you may hear "Pads cartridge cover not installed")- HS1 only	Verify that magnet is missing from the back of green pull handle, Replace pads cartridge

***Device with these symptoms may still be used in case of emergency.**

Why is my device beeping, and, i-button flashing, **3 times?**

- 1. Nearly Dead Battery**
- 2. Device failed or can't run test**

HS1/FRx Troubleshooting Critical Error



Symptoms	Possible Cause	Recommendation Action
<p>Green Light: Off</p> <p>Blue i-button: Blinks at 3x1/8 Hz (3 blinks/sec, repeat every 8 sec)</p> <p>Audio Signal: Triple Chirps at 3x1/8 Hz (3 chirps/sec, repeat every 8 sec)</p>	Error detected during selftest	i-button press may tell you "Not ready for use" or "Error", and then "Remove & reinsert battery to test". If the error is not cleared, try one more time with a known good battery. If it fails again, take out of service, replace device
	Device cannot run self test	i-button press may not give you any clue! Remove & reinsert battery, or insert a known good battery- device will give 3 beeps without initiating BIT, replace device
	Battery is almost completely depleted	i-button press may not give you any clue! Remove & reinsert battery, device will give 3 beeps without initiating BIT; replace with a new battery and run BIT

My device prompts me to
“Remove & reinsert battery”
over & over, why?

1. Device failed the test

**My device has
No sign of life...
No beeps, No light, why?**

- 1. Dead Battery**
- 2. Device internal failure**

Troubleshooting Dead Device

Symptoms	Possible Cause	Recommendation Action
Green Light: Off Blue i-button: Off Audio Signal: None	Battery is missing or completely depleted	Replace with a known good battery; BIT should pass if battery was the issue
	Device doesn't power up due to internal failure	Replace with a known good battery and run BIT; if the device doesn't power up with a known good battery, device failure is confirmed- replace device

My battery did NOT last for 4 years, why?

1. Partial cell failures
2. BITs, training/patient use?
3. Storage conditions?

Troubleshooting Low Battery

- Low Battery, Replace Battery:
 - There is no battery history with HS1, so we have to guess at the actual usage
 - Get SN of the AED the battery was used in: this will indicate when the AED was manufactured and give some information about the age of the battery
 - The *Install Before* date is 6 years from date of manufacture
 - May need to explain that date on battery is an *Install Before* date, not an expiration date or warranty date
 - Verify the unit was not used for training and no extra BITs performed; replace battery under warranty if there is a chance it didn't last long enough



**My device passes the BITs,
but starts beeping
after about 2 hours, why?**

1. Pads Issue

Troubleshooting Pads Warning

- Voice prompts on i-button press: “Pads not usable, replace pads”
- Most likely because some curious user has peeled the pads down by mistake
- Our policy is to educate the customer, explaining that the pads should remain sealed until ready to use, and replace the pads under warranty the first time only



My HS1/FRx Trainer doesn't advance to analyzing Why?

1. Manikin adaptors?
2. Clinical pads?
3. Old training pads?

Troubleshooting Training Use

- Customer can't train with trainer or training pads
 - Customer doesn't realize they need a manikin adapter
 - Customer is using clinical pads instead of the training pads
 - Training pads are old and need to be replaced



Troubleshooting Training Use

- Training don't last long enough
 - Specified for 100 'uses': customer may not understand that a use is every time the pad is attached and peeled off the manikin
 - Cleanliness of the manikin and cleaners used on it may affect the life of the pads
- Manikin adapter don't last long enough
 - CPR can create cracks in the adapter strips; some users were removing the strips after each training class
 - Replace training pads or adapters for customer satisfaction purposes and use opportunity to educate the user

Data Management Review

- Records all event decisions and 15 minutes of victim's heart rhythm
- Data transferred via infrared port using HeartStart data management software
- EMS may push the blue i-button (hold down until beeps) for summary data at the scene
- Event data will retain for 30 days, and then automatically erased to prepare for next use
- No "Overwrite", so device memory should be cleared for next use



IR ports- line of sight, optimum distance may vary, try 4" to 12"

Transfer data from HS1/Onsite & FRx

Step	FRx	HS1
1	Remove Pads Connector	Remove Pads Cartridge
2	Press & hold i-button until 3 beeps; Voice: "Administration"	Press & hold i-button until 3 beeps; Voice: "Administration"
2a		Press i-button one more time Voice: "Mode 1"
3	Device enters data transfer mode Align IrDA window on AED and IrDA window on computer (or adaptor)	
While in Data Transfer Mode	Voice: "Transferring Data"	Voice: "Sending"
	Will time out in 3 Minutes	Will time out in 30 Seconds