User Manual

Classroom Infrared Emitter (CIE)

Used with the HeartMan® Infrared Headphone

Cardionics™
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CE
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Introduction

Thank you for purchasing the Cardionics Classroom Infrared Emitter. The Classroom Infrared Emitter was designed to transmit sound using infrared technology within a classroom of 35 or less students wearing the Cardionics HeartMan® Infrared Headphone.

Safety Precautions

The following symbols are applicable to the device.

	Attention: Read and understand all warnings and cautions before use.
IPX0	No degree of protection against ingress of water.
	This product does not contain natural rubber latex.

 Caution:

- Before each use check both ear tips on the HeartMan® Infrared Headphone for secure fit. Do not use if missing or loose.
- Use only 9V (IEC 6LR61) alkaline batteries with the HeartMan® Infrared Headphone. Properly dispose of, or recycle, spent batteries.
- Disconnect all cables and remove the battery before performing any cleaning procedures. Use standard alcohol swab or wipe (70% Isopropyl Alcohol). Do not immerse any part of the Classroom Infrared Emitter or HeartMan® Infrared Headphone.
- No serviceable parts. Do not attempt to repair or service the Classroom Infrared Emitter or HeartMan® Infrared Headphone. Return to Cardionics for any and all repairs. Call 281-488-5901 for service directions before returning.

Getting Started

Congratulations on the purchase of the Classroom Infrared Emitter (CIE). To get up and running quickly, perform the following steps:

❖ Setting up the Classroom Infrared Emitter (CIE)

The CIE transmits using infrared light that is invisible to the human eye. To alert the user that the CIE is operating there are two indicator lights on the front that will illuminate when powered on.

1. Place the CIE on a table or flat surface that is visible to all students wearing HeartMan® Infrared Headphones (HIH). Note: It is important to minimize obstructions between the CIE and HIH for a successful sound experience. Elevating the CIE will help increase coverage.
2. Connect the desktop power supply to an AC outlet and the CIE DC In.
3. Connect the Sounds In cable to the CIE and a Cardionics sound source.
4. Turn the CIE power on (located on the rear panel). Two indicator lights on the front panel will illuminate green.

❖ Setting up the HeartMan® Infrared Headphones (HIH)

The HIH receives infrared light that is invisible to the human eye. Keep the front of the HIH facing out to allow the photo detector to receive the infrared light.

1. Verify that both ear tips are secured tightly to the binaural.
2. Place the binaural into the ears with the front of the device facing outwards toward the CIE.
3. Rotate the volume switch up to turn the HIH on. There should be a click felt from the switch.
4. Increase the volume slowly to a comfortable level.

❖ Adding a second CIE

Expanding coverage can be doubled by connecting a second CIE. Sounds broadcasted by the first CIE can be synchronized with a second.

1. Follow the steps found in Setting up the Classroom Infrared Emitter (CIE) above for the first CIE.

2. Connect a desktop power supply to an AC outlet and the second CIE DC In.
3. Connect a stereo cable from the first CIE (Signal Out) to the second CIE (Signal In).
4. Turn the second CIE power on (located on the rear panel). Two indicator lights on the front panel will illuminate blue.

Classroom Infrared Emitter (CIE)

The CIE is a desktop style device supporting an array of infrared LEDs on a sloping front panel. The rear panel contains signal ports for cable connections and controls for power and channel selections.

❖ CIE Front Panel Overview

The figure and table that follow describe the features of the front panel CIE.

Figure 1: CIE Front Panel

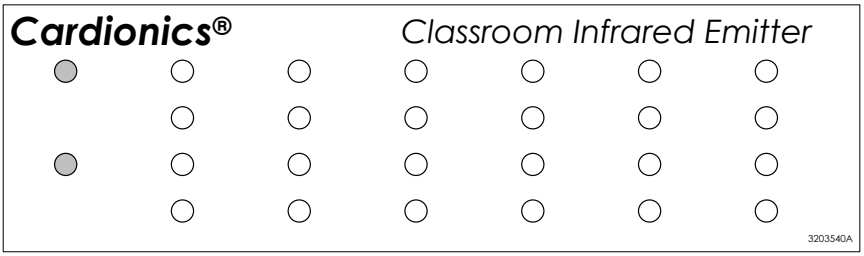

Table 1: CIE Front Panel Features

Name	Function	Icon
Indicator LED	Illuminates either green or blue when the CIE is transmitting (2 total). Green represents master or standalone mode. The Sound In port located on the rear panel is the sound source being broadcasted. This is the most common mode. Blue indicates the CIE is connected to a second CIE via the Signal In port located on the rear panel. The CIE broadcasts the Signal In from the master CIE only. During this mode the Sound In port and Channel	

Name	Function	Icon
	selector are disabled.	
Infrared LED	Transmit infrared light (24 total). Infrared is invisible to the human eye. Two indicator lights will illuminate to signal that the infrared LEDs are transmitting.	◯

❖ CIE Rear Panel Overview

The figure and table that follow describe the controls and features of the rear panel CIE.

Figure 2: CIE Rear Panel

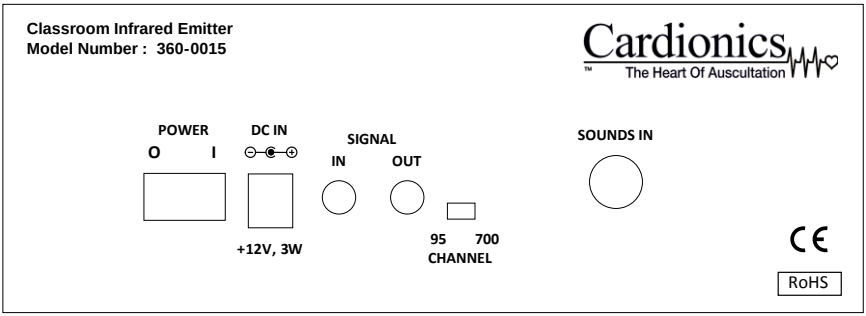

Table 2: CIE Rear Panel Features

Name	Function
POWER	Powers the CIE on or off.
DC IN	Supplies power to the CIE. Use only the 12 Volt DC power supply provided by Cardionics.
SIGNAL IN	The Signal In port is used to combine multiple CIEs together to increase broadcast coverage. Connecting to this port will disable the Sounds In port and Channel selector. The CIE will switch modes from master to slave and broadcasts the same signal presented by the master CIE. The indicator lights on the front panel will illuminate blue.
SIGNAL OUT	The Signal Out port is used to combine multiple CIEs together to increase broadcast coverage. This port is for sending a signal to a second CIE to synchronize transmission. The sound from the Sounds In port is broadcasted on all connected

Name	Function
	CIEs. The indicator lights on the front panel will illuminate green.
CHANNEL	The Channel selector controls the broadcast frequency. The HIH receives channel 95 and is the most common. Transmitting at 700 requires a different model HIH designed to receive 700. Some of the newer energy efficient fluorescent lights interfere with channel 95 and require 700 to work effectively. The HIH does not have a channel selector. They come from the factory predefined.
SOUNDS IN	Sound source to be broadcasted. Only when the CIE is in master or standalone mode will the CIE broadcast the signal from the Sounds In port. The indicator lights on the front panel will illuminate green to signify master or standalone mode. The CIE can be used with any of the Cardionics products like the SAM II, CardioSim, and Ausculette. It is also compatible with the Harvey manikin. The maximum input signal accepted is 5 Volts peak-to-peak.

HeartMan® Infrared Headphones (HIH)

The HIH is a headphone with binaural style ear tips that resembles a stethoscope. The HIH receives sounds by infrared light picked up by a photodiode detector located on the front.

❖ HIH Overview

The figure and table that follow describe the controls and features of the HIH.

Figure 3: HIH Front Panel

Table 3: HIH Front Panel Features

Name	Function	Icon
LOW BATTERY	Flashes red when the battery has reached depletion and requires replacement. The HIH will continue to function but will eventually shut down unexpectedly.	
VOLUME On / OFF	A thumbwheel style switch located on the side turns the HIH on and off and controls the volume level. Rotating the volume wheel up from the off position will produce a mechanical click as it enters the On position. Rotating further will increase the volume level. To turn off reverse direction until the mechanical click is heard again and the wheel reaches the stop position.	
Photo detector	Receives infrared light where it is converted to sound. Make sure to keep this area clear and facing in the direction of the transmitter.	

Troubleshooting

Table 4: Troubleshooting Guide

Issue	Cause / Solution
Poor reception or static heard while listening with the HIH.	Objects or furniture blocking the view between the HIH and CIE. Move the CIE right, left and/or possible to a higher location. Make sure the CIE is facing the audience.
	Verify the HIH is worn with the front label facing out and towards the CIE.
	Some types of florescent lights interfere with channel 95. Try dimming the lights or increasing the CIE broadcast coverage by placing it on a taller stand or table.
No sound heard through the HIH	Verify the sound source cable is plugged into the CIE Sounds In port and the indicator lights on the front panel are illuminating green. The Sounds In port is disabled if the indicator lights are blue.

Issue	Cause / Solution
	Verify the sound source volume level is turned up and producing sound.
	Verify the volume level on the HIH is turned up.
	Verify that the battery in the HIH is new and the low battery indicator is not flashing.
	Make sure the position of the HIH is hanging down under the chin and is not tilted. An angle greater than 60 degrees may cause older HIH equipped with an internal tilt switch to turn off.

Specifications

❖ CIE Specifications

Table 5: CIE Specifications

Parameter	Value	Unit
Enclosure	8 x 7 x 3.1	in
Weight	1.6	lb
Power Requirements	12 VDC, -15% / +20% 3 Watts	-
IR Wavelength	880	nm
Transmission Range	30 – 50 Feet (Line of sight)	-
Modulation Frequency	Channel 95: 95 KHz, ±50% Channel 700: 700 KHz, ±15%	-
Sounds In	¼" Phone Jack (Mono) Input ±2.5 $V_{PEAK-TO-PEAK}$ (max)	-
Operating Temperature	32°F – 104°F (0°C - 40°C)	-
Operating Humidity	0 – 95 Relative Humidity	%
Operating Altitude	<6,561 Ft (<2,000 Meters)	
RoHS Compliant	Yes	-

Parameter	Value	Unit
Safety Compliance	EN 60950-1:2006 + A12:2011	-
EMC Compliance	EN 55022:2010 & EN 55024:2010	-

❖ HIH Specifications

Table 6: HIH Specifications

Parameter	Value	Unit
Enclosure	15.5 x 2.5 x 1	in
Weight	0.4	lb
Power Requirements	9V Alkaline Battery	-
IR Wavelength	880	nm
Frequency	Channel 95: 95 KHz, ±50%	-
Operating Temperature	32°F – 104°F (0°C - 40°C)	-
Operating Humidity	0 – 95 Relative Humidity	%
Operating Altitude	<6,561 Ft (<2,000 Meters)	
RoHS Compliant	Yes	-
Safety Compliance	EN 60950-1:2006 + A12:2011	-
EMC Compliance	EN 55022:2010 & EN 55024:2010	-

Cleaning

The CIE and HIH can be cleaned using a standard alcohol swab or wipe (70% Isopropyl Alcohol). Do not use excessive liquid or immerse any part of the CIE or HIH. Doing so may result in moisture getting inside the unit.

Transport and Storage

The CIE and HIH can be safely stored or transported without the battery with the following environmental conditions: -20°C – 65°C (-4°F – 149°F), <95% relative humidity.

Limited Warranty

❖ What this warranty covers

1. Cardionics warrants this product to be free of manufacturing defects in material and workmanship for a period of one (1) year from the date of original consumer purchase from Cardionics or an authorized dealer.
2. This written warranty is limited to the original consumer purchaser, transferable only by written authorization of Cardionics.
3. All warranties, expressed or implied, made by Cardionics, including warranties of merchantability and fitness are limited to the one (1) year period of this warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.
4. This warranty is limited to repair of the product or replacement thereof, at the discretion of Cardionics.

❖ What this warranty does not cover

1. This warranty does not cover defects or damage resulting from use of the product other than its normal, intended and customary use. This warranty does not cover defects or damages from abnormal use, abnormal conditions, improper storage, exposure to moisture or liquid, unauthorized modifications, repairs made by unauthorized personnel, unauthorized connections (those not described in this manual), misuse, neglect, abuse, accident, alternation, improper installation or other acts which are not the fault of Cardionics, including damage caused by shipping.
2. Devices which have had the serial number removed or made illegible.
3. Damage resulting from use of non-Cardionics approved accessories.