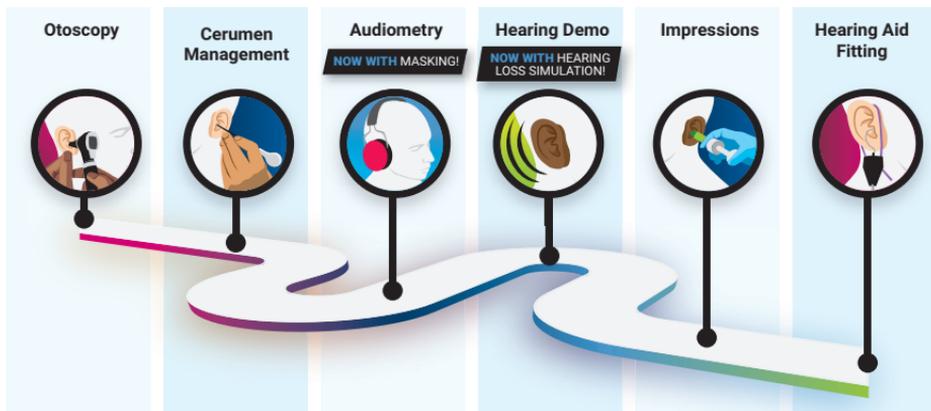


# CARL Pro

## User Manual

**Congratulations on Your New CARL Pro!**  
Use this quick view chart to start using your CARL asap!

**Note:** Due to the many uses of your CARL Pro, it must be configured for the specific use you are intending to ensure maximum realism and longevity of the unit and ears.



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### **CARL Set Up**

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Realistic  
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**Page 6**

### **CARL Set Up**

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Realistic  
Ears

# Audiometry with your CARL Pro

To use your CARL for Audiometry and Masking, there are three steps that must be completed before use:

## 1. Ensure mic ears are installed

CARL will arrive from factory with the Mic Ears pre-installed. Please open CARL's head-cap and ensure the cords are plugged into the ears. If you have used CARL for another purpose first, re-install the ears and ensure proper connection.



## 2. Follow the Set Up instructions to gain access to the CARL software included with the unit

## 3. Calibrate your CARL to your environment and transducer

**Note:** Monthly calibration of CARL is recommended to ensure accurate responses. Calibration is also required whenever it is used in a new location, or new equipment or transducer is used with CARL. Re-calibration is also the first step in troubleshooting if unexpected results are occurring.

- A. Ensure you have a calibrated Audiometer and Navigate to the "Calibration" page in the CARL software
- B. Click "Begin Calibration" where CARL will measure the noise floor of your current environment. If you are happy with the results of your noise floor, click "Accept". If not, adjust your environment and try again.
- C. Present a 70dB HL signal at each of the frequencies requested by the software
  - a. The first tone will be 250 Hz at 70 dB HL on the left ear (seen by the icon ☒)
  - b. Present each tone until the frequency you are presenting is displayed in the software. Once the CARL detects the tone, it will automatically apply an offset (if required) and move to the next frequency
- D. After calibrating CARL for each frequency in both ears, he will display the noise floor values once more to inform you what the least-amount of hearing loss you can test with CARL based on your environment
  - a Ex. if you are not in a sound booth, you will likely need to give CARL a moderate-severe hearing loss to respond accurately
- E. He is ready to have his hearing tested!

For additional questions, visit [aheadsimulations.com](https://www.aheadsimulations.com)

## Customizing Your CARL Pro Audiograms

While CARL comes with pre-loaded standardized audiograms, you can create any audiogram you would like for unmasked or masked audiograms.

**Note:** For more information on the pre-loaded audiogram cases included with CARL and the relevant research, please visit <https://aheadsimulations.com/pages/audiometry>

**Step 1:** Access the Admin Screen of CARL at the top right of the interface (password is "AudioCARL")

**Step 2:** Select "Create an Audiogram"

- Here you will have an option to create a masked or unmasked audiogram with a wizard to guide you through creating the case

**Step 3:** Create a Playlist

- If you would like to stack audiograms to be tested in a row, use the "Playlist" functionality to group audiograms to be tested in a row

When you have completed creating your Audiogram cases, click "Exit Admin"

## Testing an Unmasked Audiogram

**Note:** You can identify which Audiograms do not require masking based on the icons used beside the Audiogram name. There are three types of Audiograms, (1) Unmasked, (2) Masking-thresholds only, and (3) Complete Audiogram.

**Step 1:** Click an Audiogram from the list with only the unmasked icons coloured

- When you click on this audiogram, CARL's shoulders will light up to signify that he has accepted the new audiogram
- The interface at the bottom will change to say "CARL Pro is Listening"

**Step 2:** As you test thresholds, CARL's shoulders will light up to signify hearing a tone, instead of a patient raising their hand or clicking a button (*both shoulders light up regardless of right/left presentation*)

- As you test CARL's hearing and mark/set thresholds on your Audiometer, you can replicate these thresholds in the CARL software

**Step 3:** When you have completed your test, click "Finish" to see what the actual audiogram is that was given to CARL

- With your thresholds in the software, you will receive results at each frequency

For additional questions, visit [aheadsimulations.com](https://aheadsimulations.com)

## Testing a Masking-Only Audiogram

**A Masking-Only Audiogram is an audiogram in the list which only has the masking threshold icons coloured.**

This functionality can be used as a way to teach or test the competency of masking. It will give the user the unmasked thresholds in advance so they can solely focus on masking.

When you select an audiogram, the audiogram will be pre-populated with the unmasked thresholds in the "Better Ear" along with a shaded region demonstrating the crossover/ interaural attenuation.

	250	500	750	1000	1500	2000	3000	4000	6000	8000
<b>CIRCUMAUURAL<sup>1</sup></b>	48.0	65.0	65.5	66.0	61.0	59.0	66.0	68.0	73.0	66.0
<b>INSERT<sup>2</sup></b>	81.0	69.0	65.0	62.0	68.0	70.0	74.0	80.0	74.0	68.0
<b>SUPRAAURAL<sup>3</sup></b>	54.0	58.0	60.0	65.0	58.0	55.0	63.0	64.0	59.0	69.0

1. "Data from Brannstrom & Lantz 2010", 2. "Reported by Munro and Agnew", 3. "Reported by Bransstrom & Lantz"

When you have completed finding your masked thresholds, click 'finish' to see results

## Testing a Complete Masked Audiogram

**A Complete Masked Audiogram is an audiogram in the list which has both unmasked and masked thresholds which must be found with no clues beforehand.**

When you select this audiogram, you will see a blank audiogram. You will have the open option to test CARL's hearing however you please, and select which icons you are using at any time.

When you have completed, clicking "Finish" will show you what the final thresholds are with the correct icons

- It will not give you feedback on unmasked thresholds you found initially if a masked threshold has 'overtaken' at that frequency as the real threshold

## Using the Playlist Feature

Upon clicking "Playlists" in the header, you will see a list of playlists instead of individual Audiograms. The key difference with utilizing playlists is that the user will not receive feedback until the whole playlist has been completed, making it a good option for practical tests

For additional questions, visit [aheadsimulations.com](https://www.aheadsimulations.com)

# Creating a Hearing Demo (Recording)

Before using the recording feature, please ensure the Mic Ears are installed and plugged in the CARL Pro. Note: You do not need to calibrate your CARL to get a recording.

**Note:** While there are many options here, many users will still want to export the .wav file that you get from CARL into a signal processing program of your choosing for further analysis and manipulation.

## Recording Type

- No Hearing Loss: Records the raw signal from CARL's eardrum
- Through Hearing Loss - uses an audiogram as a filter to only let sounds inside the audiogram pass through

**Headroom:** For high gain hearing aids or very loud environments, you may want more headroom (High) to ensure your recording and signal does not clip

**Ear Canal Transforms:** Ear canal corrections to correct CARL's ear canal response to an average adult, while providing an open or closed option depending on if CARL's ear canal is closed or open upon recording

**Audiogram:** Selecting an Audiogram is an option if you have selected the Audibility Simulator or the Hearing Loss Simulator. This drop-down gives you access to the all the audiograms in your CARL. You can create a new audiogram through the "Admin" page

For additional questions, visit [aheadsims.com](https://aheadsims.com)

## CARL for Otoscopy & Hearing Aid Fitting

For utilizing CARL for Otoscopy and Hearing Aid Fitting, ensure you have the 'Realistic Ears' installed in your CARL.

### Tips for Otoscopy:

- Ensure CARL is securely attached to a height-appropriate table or stand before use
- While CARL doesn't have a realistic-looking tympanic membrane (eardrum), you should still be able to identify the eardrum from the ear canal walls as a landmark, and effectively locate the first and second bend

### Tips for Hearing Aid Fitting:

- Ensure CARL is mounted at the correct height for use of your equipment (as a patient may be positioned)
- While CARL's ear canal acoustics are within clinical norms, it may still appear slightly 'peaky' as the eardrum does not reflect sound the same way a human does.

## CARL for Cerumen Management & Impressions

For utilizing CARL for Cerumen Management and Earmold Impressions, ensure you have the 'Durable Ears' installed in your CARL.

### Tips for Cerumen Management:

- Ensure CARL is securely attached to a height-appropriate table or stand before use
- For recommended recipes to simulate cerumen, visit [www.aheadsimulations.com](http://www.aheadsimulations.com)
- CARL can be used for all forms of cerumen management, including Irrigation as the ear canal is completely sealed. If you are performing this on a CARL Pro unit, please ensure that the ear is securely attached and there are no rips in the ear that could cause damage to the electronics inside

### Tips for Earmold Impressions:

- Ensure CARL is securely attached to a height-appropriate table or stand before use
- CAUTION: Be positive that the Durable ears are installed as damage will occur to the Realistic ears immediately if used for impressions
- While waiting for the impression material to cure, please expect slightly longer cure times as CARL does not have body heat to accelerate curing of the impression
- If you are only performing impressions for custom hearing aids or earmolds, see our "Earmold Network" at [www.aheadsimulations.com](http://www.aheadsimulations.com) for vendors in North America who already have the earmold on file

For additional questions, visit [aheadsimulations.com](http://aheadsimulations.com)

## Updating Your CARL

You will be notified of a software update to your CARL Administrator's email address provided to AHead. If you do not know who this is or want to include multiple contacts, please email [info@aheadsimulations.com](mailto:info@aheadsimulations.com).

If you would prefer a video walkthrough, see [www.aheadsimulations.com](http://www.aheadsimulations.com)

### Wireless

**Step 1:** Disconnect from CARL and sign back into your Wi-Fi network

**Step 2:** Navigate to [www.aheadsimulations.com/pages/updates](http://www.aheadsimulations.com/pages/updates) and download the latest update file

**Step 3:** When the download is complete re connect to the CARL Pro network and navigate to [192.168.55.1/#/update](http://192.168.55.1/#/update)

**Step 4:** Click on select files and select the file you just downloaded, click start download and CARL will do the download and then reboot

### Wired

**Step 1:** Navigate to [192.168.55.1/#/update](http://192.168.55.1/#/update), click the button for "Visit update site" and download the latest update file

**Step 2:** When the download is complete click on select files and select the file you just downloaded, click "start download" and CARL will perform the download and then reboot



*Note: Once the the lights flash on CARL indicating that the reboot has occurred you may need to reconnect to the Wi-Fi or refresh the page.*

## Caring for Your CARL

**Secure Your CARL During Use:** For the maximum lifespan of your CARL, be sure to properly secure him to whatever workstation or set up you have at your site. Using a mount or surface which the suction cups stick well to is recommended to prevent accidental falls.

**CARL Ear Care:** For the CARL ears, if they are actively used for invasive procedures such as earmold impressions and cerumen management, please clean the ears afterwards with warm water and soap to prevent build up from things such as artificial cerumen.

**Effective Storage When Not In Use:** When the ears are not being used, ensure they are stored safely, preferably in the bags in which they were included with in the original box.

For additional questions, visit [aheadsimulations.com](http://aheadsimulations.com)



For additional resources and  
information, please visit

[www.aheadsimulations.com/pages/education](http://www.aheadsimulations.com/pages/education)

or reach out to our team - we're here to help!

+1 855-560-2275

[support@aheadsimulations.com](mailto:support@aheadsimulations.com)

[www.aheadsimulations.com](http://www.aheadsimulations.com)

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