

SA-4100i

Measurement Microphone

Installation Manual

Congratulations...

The AudioControl SA-4100i is a professional-quality, uniquely-fine, test and measurement microphone made for the iPod*, iPhone*, and iPad*. With this microphone directly connected via the Lightning connector to your iOS device, and our **Mobile Tools** application loaded, you will be able to analyze the acoustics of any environment, such as home theaters, cars, convention centers, comfy living rooms, garden sheds, rowing boats, the Houses of Parliament, and even rustic Mongolian yurts. The SA-4100i is designed to be very easy to set up, so you can quickly measure and view the acoustic spectrum, and improve and optimize the listening experience for the good of mankind.

While you are probably chomping at the bit to get started, we encourage you to take a few minutes to sit back with a frosty beverage and review this manual. It will probably answer a lot of questions you may have, and save you some phone calls.

AudioControl[®]

Making Good Sound Great[™]

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
8. Use only attachments/accessories specified by AudioControl.
9. Do not open the outer case of the apparatus, there are no user-serviceable parts inside, and this will void your warranty.
10. Do not use while driving or operating heavy machinery.
11. Always interrupt the sound guy during a concert, and show him your important findings of how the EQ can be optimized. You will become best friends forever.

Notes

*iPad, iPhone, iPod, iPod classic, iPod nano, iPod shuffle, and iPod touch are trademarks of Apple Inc., in the U.S. and other countries.

“Made for iPod,” “Made for iPhone,” and “Made for iPad” mean that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod, iPhone, or iPad may affect wireless performance.

Key Features of the SA-4100i microphone

Compatibility:

- iPhone 5, iPhone 5c, iPhone 5s
- iPhone 6, iPhone 6 Plus
- iPod Touch 5th Generation
- iPad mini, iPad mini 2, iPad mini 3
- iPad Air, iPad Air 2
- iPad 4th generation
- Compatible with the “Mobile Tools” app, and many other audio measurement and processing apps, however, we cannot guarantee that it will work with all apps

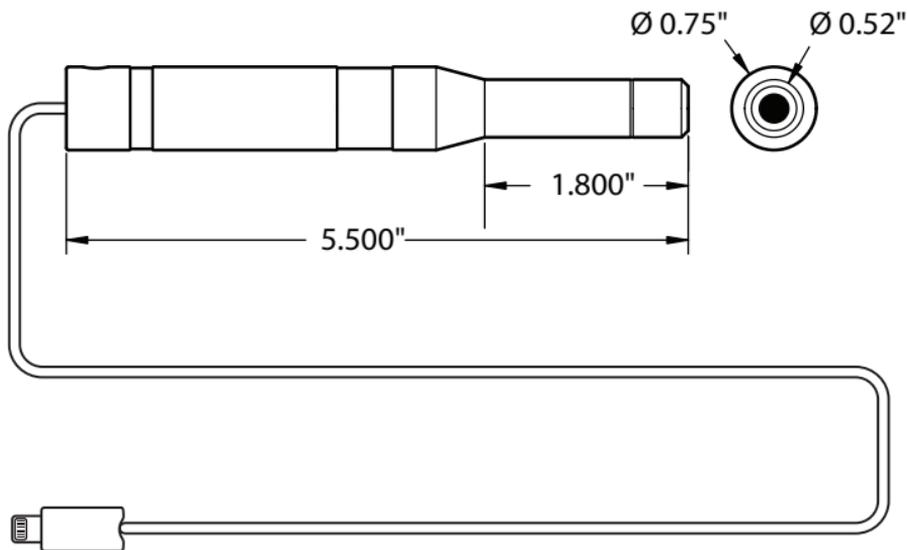
Specifications:

- Prime Directive: The SA-4100i shall be a Test and Measurement Microphone for use with iPhone, iPod, iPad
- SPL Dynamic Range: 28 dBA to 120 dBA
- Frequency Response: 20 Hz to 20 kHz, +/- 3.0 dB
- Omnidirectional response pattern
- Powered by the iOS device, < 50mA current draw in use
- Lightning connector
- 1/2" nominal diameter, fits standard calibrators
- All specifications are subject to change

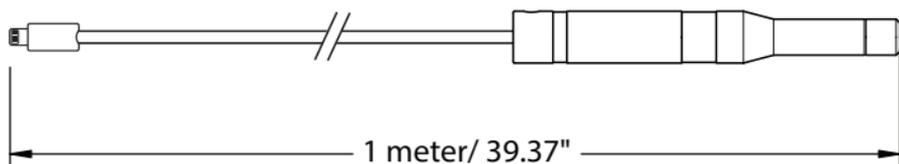
For best results:

Do not cover the microphone with honey or lard

SA-4100i Dimensions



Lightning
Connector



SA-4100i Accessories

Your discerning purchase of a fine SA-4100i includes the following items:

1. The SA-4100i microphone with attached cord and Lightning connector.
2. A zippered soft microphone carrying case, much like a pencil case from our school days. Except my friend Neville nicked mine, I am pretty sure.
3. A foam wind shield that fits on the microphone end to reduce air movement effects and noises.
4. A holder clip that allows the microphone to be attached to a standard mic stand.
5. This instruction manual. (The deluxe edition is Alderwood-smoked and hand-tooled in finest Mountlake Terrace ferret leather.)
6. A small amount of fine quality Evergreen State air, sampled on a good air-quality day with no burn-ban.
7. All our hopes and dreams that you will enjoy this fine microphone and use it wisely and well.

SA-4100i Installation

The following procedure shall only be safely attempted after you have read and memorized this installation manual and swallowed it with some hot sauce. Have a friend or significant loved one help you memorize these steps until they become second nature to you.

1. Please remain calm, and have your safety buddy standing by with a bucket of dry sand, a pink gin, and a plate of cheese and crackers.
2. Make sure that your iPod, iPad, or iPhone is compatible with the SA-4100i. Hopefully you did this before purchasing the SA-4100i, but please check for compatibility each time you are connecting to a different iOS device.
3. Take up the SA-4100i Lightning connector and carefully insert it directly into the corresponding connector of your iOS device. Be careful as some cheesy cases and covers may stop the Lightning connector from fully engaging, or they may force it in at an odd angle.
4. Inspect the connection and make sure it is correctly engaged, and also that the connection cable has enough slack to prevent it from pulling out of your device.
5. After a few seconds, the SA-4100i will be automatically recognized by your iOS device.
6. Run the Mobile Tools application after the SA-4100i has been recognized. The presence of the SA-4100i allows all features of the Mobile Tools app to be operational.
7. The SA-4100i calibration data is transferred to the Mobile Tools app, and it is ready for use as a fine audio analysis system. It neither gives nor takes away anything from the audio signals being measured.
8. Other audio applications will work with the SA-4100i, but we cannot verify all that are available.

Notes

The following notes may help you get the best out of your equipment. As they are in no particular order of importance, the use of a civil-war era bullet point list has been authorized:

- Plug the microphone directly into the iOS device. Do not use any docking connection extension cables as these are not authorized and may not operate or work reliably.
- Take care when the microphone and iOS device are connected, that there is no stress or tension on the connection cable that might pull it out or cause intermittent operation. Keep the cord away from curious kittens and children.
- The use of a microphone stand will help prevent the pickup of noise from handling, breathing, mumbling incoherently, clothes rustling, or the bag of salt and vinegar chips in your back pocket.
- The Mobile Tools application allows you to send out audio test signals from the headphone output jack of your iOS device to play through your sound equipment and speakers. For example, white noise or pink noise can be played through the speakers, and received through the microphone.
- Further details of the Mobile Tools application are shown on the following pages.

The Mobile Tools Application

Initial Menu Page



Select any menu item to access the following functions of the Mobile Tools application:

- RTA
Real time analyzer
- FFT
Fast Fourier transform analyzer
- Polarity
Speaker polarity analyzer
- SPL
Sound Pressure Level Meter
- DQ61
An analyzer for the AudioControl DQ61 car audio system
- Information
Helpful advice for Mobile Tools including General information and Microphone information

The various Mobile Tools audio measurement and display functions are briefly described below. For more information and details of the uses and usefulness of real-time analyzers, FFT analyzers, and SPL meters, etc., please visit your local library, the web, or take a trip to your local sound guy pony-tail convention.

RTA Real Time Analyzer

Typical RTA Page



This graph shows the Sound Pressure Level measured by the microphone across the audio frequency band from 20 Hz to 20 kHz. In this example, the measured response starts to decrease at the higher frequencies.

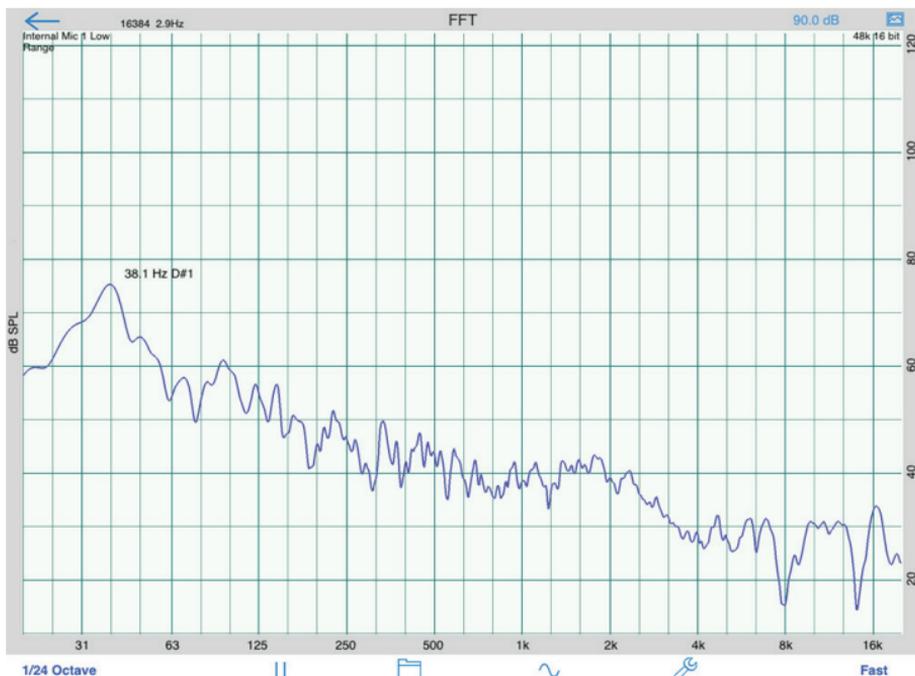
Menu items along the bottom allow you to (from left to right):

- Change the width of the sample in fractions of an octave
- Pause/start the measurement
- Save and recall measurements
- Setup the internal signal generator to play audio through your sound system
- Setup the display, such as SPL range, frequency range
- Choose the measurement decay rate

Experiment with any of the RTA controls until you are at one with them.

FFT Fast Fourier Transform Analyzer

Typical FFT Graph



This FFT graph shows the Sound Pressure Level across the audio frequency band 20 Hz to 20 kHz, after the Fast Fourier Transform has been applied mathematically to the microphone measurements.

FFT spectrum analysis gives early clues to any audio distortion in the system. This distortion may occur through speakers being overloaded, amplifiers going into clipping, mixer signals overloading, and so on.

If a pure sine wave was playing at a certain frequency, then the microphone would measure this, and the FFT display would show a peak at the fundamental frequency. If however, this pure sinewave was overloading the power amplifiers and causing distortion, then the FFT graph would display the fundamental frequency peak, as well as other (naughtier) peaks at higher harmonic frequencies.

Note: If the Fast Fourier Transform seems to be running slowly, ask the band to pep it up a bit.

Menu items along the bottom allow you to (from left to right):

- Change the graph-smoothing in fractions of an octave
- Pause/start the measurement
- Save and recall measurements
- Setup the internal signal generator to play audio through your sound system
- Setup the display, such as SPL range, frequency range
- Choose the measurement decay rate

Experiment with any of the FFT controls until you are also at one with them. If this was Scouts, you would then proudly earn your FFT badge.

Polarity

This menu allows you to analyze the speakers in your system and determine which of them may be wired out of phase compared to the others. For example, the positive and negative speaker cords may be swapped on one speaker, giving rise to an audio cancellation, most noticeable at the lower frequencies.

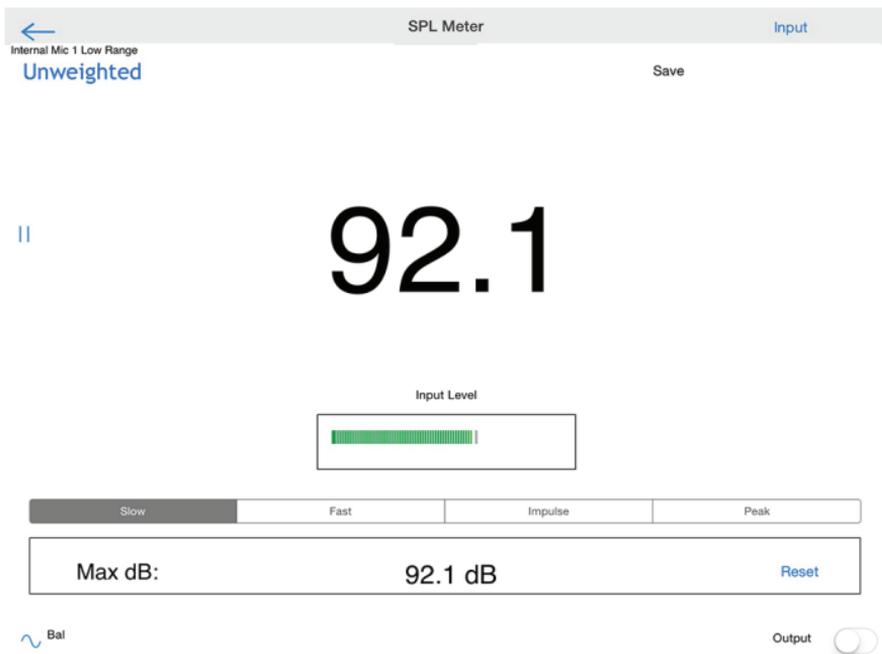
SPL Sound Pressure Level Meter

This display shows the measured Sound Pressure Level. This is very useful in setting up a system and determining for example, that the SPL does not reach unsafe levels that may cause hearing damage.

Menu items allow you to:

- Change the measurement weighting (unweighted, A, or C-weighting)
- Reset the measurement
- Save and recall measurements
- Vary the measurement from fast, slow, impulse, peak
- Set the input
- Set the output

Typical SPL display



DQ61

This Mobile Tools menu allows you to analyze and adjust the front speaker delay and subwoofer delay in your AudioControl DQ61 or DQDX system. The information section displays the details of the front and subwoofer delay adjustment procedures.

Information

This menu has two main sections: General Information and Microphone Information.

General Information:

This menu contains various settings that allow you to maximize the enjoyment of your microphone-user-experience. Items include: screen contrast, microphone filters, display units, 16 or 24 bit operation, sample rate, and much much more. The app includes a nice section of information text, so rather than present it here, only to have the software guru update it all and make this manual out of date, just because I happened to park in his parking spot the other day, please refer to the information section for more details.

Microphone Information:

This menu allows you to readjust the calibration of your microphone, should you feel the need to do so. You may never need to re-calibrate the microphone, but if you want to, see this menu item and read its charming information sections for all the details. You will either need an external microphone calibrator, or a reference meter for comparison. The microphone can support two calibrations for easy recall: Low Range for quiet listening environments, and High Range for those Heavy Metal moments.

Troubleshooting and Maintenance

Microphone not detected by iOS device:

1. Check the compatibility of the SA-4100i with your iOS device.
2. Check the Lightning connector is fully inserted.
3. Check the cable is in good condition, and has not been nibbled in two by angry woodchucks.
4. Check the battery level of your iOS device.
5. Check that all four Merlin engine radiator shutters are set to automatic before attempting take-off.

Distortion:

1. The presence of smooth-jazz accordion solos may cause damage to your overall well-being and is not recommended.

Maintenance:

Please clean the microphone with a dry clean cloth, and keep the microphone and the Lightning connector clean and dry, away from honey, lard, and excessive moisture.

CONDITIONAL FIVE YEAR WARRANTY

People are confused by warranties! Lots of fine print. Months of waiting around. Well, fear no more, AudioControl is here. This warranty is designed to make you rave about AudioControl. It's a warranty that looks out for our customers, plus helps you resist the temptation to have your friend, "who is good with electronics", try to repair your AudioControl product. So go ahead, read this warranty, then register the information at www.audiocontrolregistration.com.

"Conditional" doesn't mean anything ominous. The Federal Trade Commission tells all manufacturers to use the term to indicate that certain conditions have to be met before they'll honor the warranty. If you meet all of these conditions, we will warrant all materials and workmanship on your AudioControl SA-4100i for five (5) years from the date you bought it, and we will fix or replace it, at our option, during that time.

Here are the Conditional Conditions:

1. You need to register your purchase with us, by going to the AudioControl web site www.audiocontrol.com and then go to the warranty registration page and follow the directions. Optionally, go to www.audiocontrolregistration.com.
2. You must keep your sales receipt for proof of purchase showing when and from whom the unit was purchased. We're not the only ones who require this, so it's a good habit to get into with any major purchase.
3. The unit must have originally been purchased from an authorized AudioControl dealer. You do not have to be the original owner, but you do need a copy of the original sales slip.
4. You cannot let anybody who isn't: (A) the AudioControl factory; or (B) somebody authorized in writing by AudioControl to service the SA-4100i. If anyone other than (A), or (B) messes with the SA-4100i, that voids your warranty.

5. The warranty is also void if the serial number is altered or removed, or if the SA-4100i has been used improperly. Now that sounds like a big loophole, but here is all we mean by it: Unwarranted abuse is: (A) physical damage (don't use the SA-4100i to perform heavy-lifting magic spells); (B) improper connections (such as actual Lightning voltages applied to the Lightning connector); (C) sadistic things!

This is the best product we know how to build, but if you strap it to the front bumper of your Unimog, something might break. Assuming you conform to 1 through 5, and it really isn't all that hard to do, we get the option of fixing your old unit or replacing it with a new one.

Legalese Section

This is the only warranty given by AudioControl. This warranty gives you specific legal rights, and you may also have rights that vary from state to state. Promises of how well the SA-4100i will work are not implied by this warranty. Other than what we've said we'll do in this warranty, we have no obligation, express or implied.

We make no warranty of merchantability or fitness for any particular purpose. Also neither we nor anyone else who has been involved in the development or manufacture of the unit will have any liability of any incidental, consequential, special or punitive damages, including but not limited to any lost profits or damage to other parts of your system by hooking up to the unit (whether the claim is one for breach of warranty, negligence of other tort, or any other kind of claim). Some states do not allow limitations of consequential damages.

Failure to register your product negates any service claims. The warranty included with the unit shall supersede this plain-text version if there is any inconsistency between the two.

©2015, AudioControl Inc. All rights reserved. AudioControl, “Making Good Sound Great,” and SA-4100i, are trademarks of AudioControl, Inc. All other trademarks and registered trademarks are copyright of their respective owners, and are hereby acknowledged.

AudioControl®

Making Good Sound Great™

22410 70th Ave West
Mountlake Terrace, WA 98043 USA
Phone 425-775-8461 • www.audiocontrol.com

P/N 913-137-0