# Vocal Lab User Manual

Vocal Lab helps you train to sing on key. It listens while you sing and displays the pitch of your voice on a graph, in real time. All you have to do is watch the graph while you sing and try to stay near the lines. With a little practice you can greatly improve your intonation. Vocal Lab can identify problem areas in your singing, and can also help improve your intonation on various instruments – Violin, Brass, and Woodwinds.

Laidman & Katsura thank you for your interest in our products. We have an entire line of tuning products, and we hope that one will suit your needs.

Requirements: Mac OS X 10.2 or later. Audio input device.
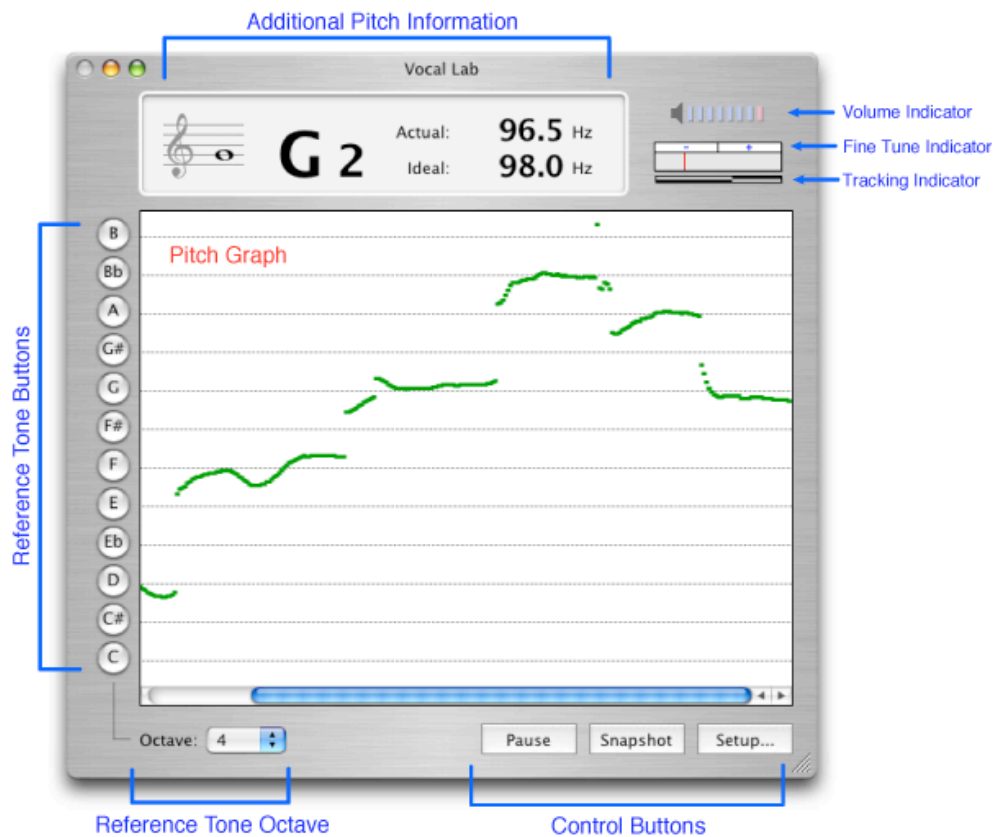
GETTING STARTED

 Inspect the Volume Indicator

Talk or play something while watching the volume indicator. Several lighted blue bars (4–7) should appear then vanish again. If no bars appear, too few bars, or the red bar appears often, please read the section entitled, 'Selecting the Microphone'.

 Inspect the Tracking Indicator

Sing or play a note and hold it. The tracking indicator should advance steadily while you hold the note. The tracking indicator advances one (very small) unit every time a successful pitch determination is made. A smooth procession

indicates great success.

Now you're ready to begin. Your results should be nothing short of spectacular! If you're having trouble or feel your results are less than ideal, please read the sections entitled, 'Selecting the Microphone', and 'Best Results'. Microphone placement is very important for Vocal Lab. This topic is covered in 'Best Results'.

SELECTING THE MICROPHONE

Laidman & Katsura tuning programs work by 'listening' through your Microphone. Because your Mac may support more than one sound input device (Microphone, Line Input, etc.) you may need to choose one. From the Tuner Microphone Menu, select "Configure..." and then choose a device for sound input; generally this will be 'Internal microphone'. You may also be able to use 'Line In' for direct instrument connections, such as a guitar or keyboard.
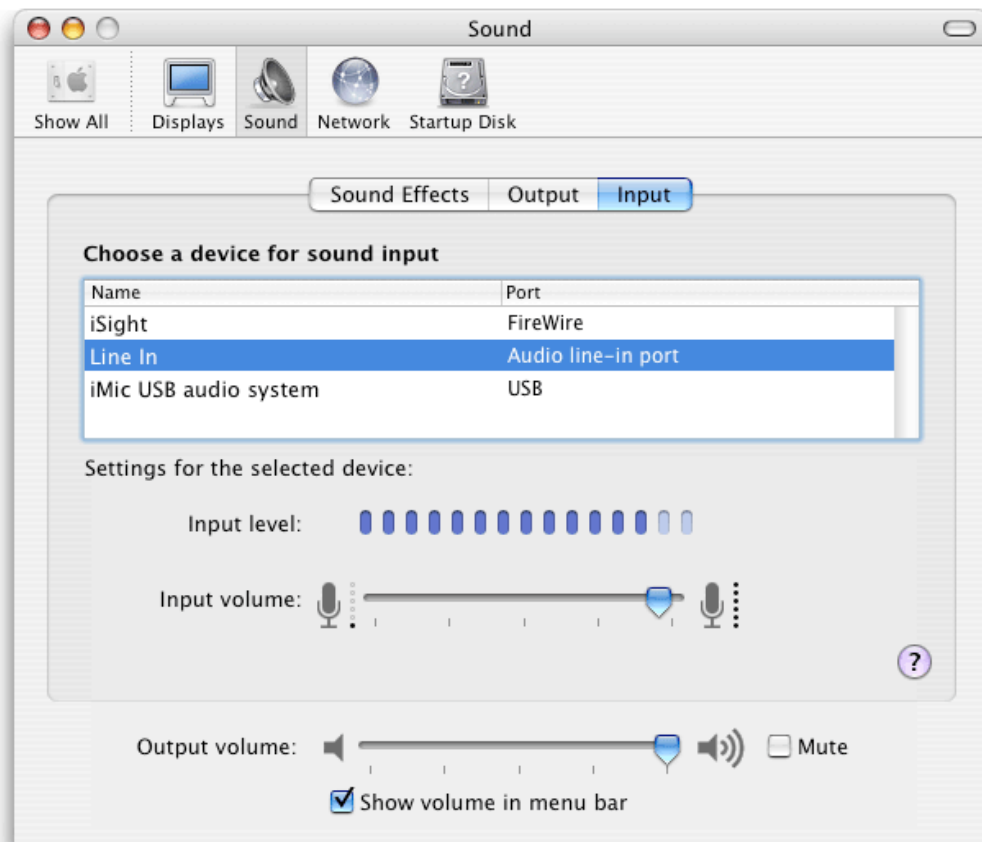
Verify that the Input level indicator is active. As you talk (or play) the bars should light up and vanish again. Adjust the Input volume slider so that *most* of the bars light up when you talk the loudest. (You don't want all the bars to light up, just most of them, then you know you have the Input level set correctly.)

BEST RESULTS

Once you're certain the Microphone is working, here is how you can obtain best results...

Microphone placement

Place the microphone near you, or position yourself near the microphone. The microphone should generally be located as near to the sound source as possible. However, singing too close too a microphone may create "popping" effects. A good starting point is about 2 feet distance. A little experimentation may improve results. Avoid handling the microphone because it introduces rattling noises.

 If you have an external microphone, try making contact between the microphone and instrument. For example, when singing, hold the microphone to your neck, near the vocal chords.

Direct Audio Connections
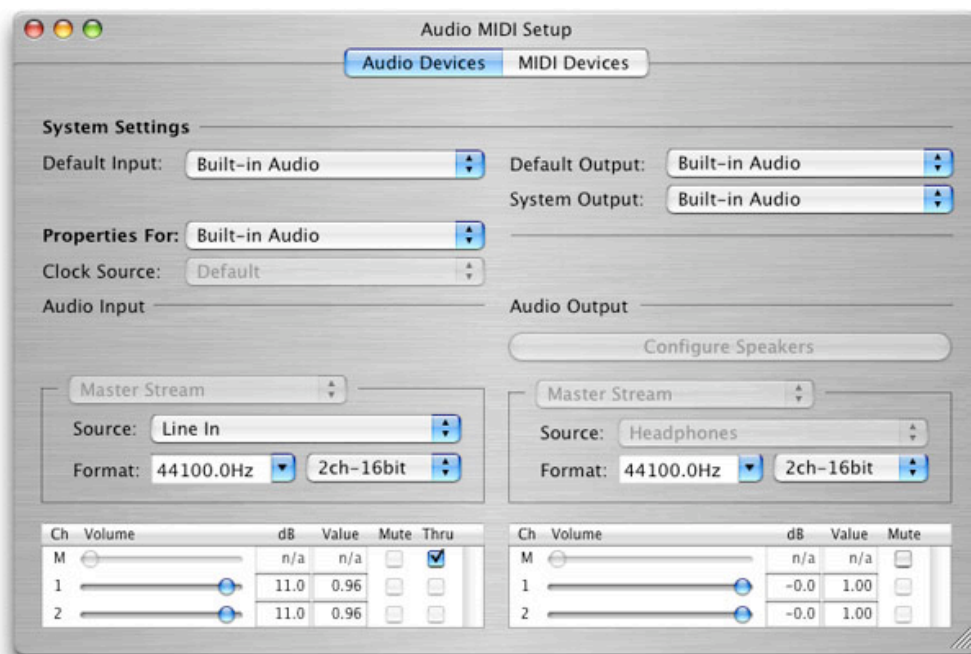
Headphone
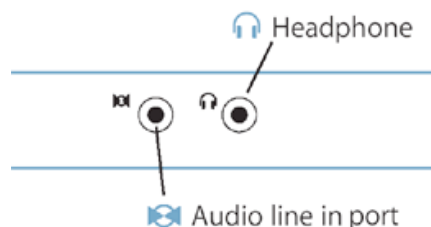
Audio line in port

Instead of using the internal Microphone on your Macintosh, you may use an external microphone connected to your computer's Audio line in port. (Better results will usually be attained by using an external microphone.) If your computer does not have an internal microphone or Audio line in port, you can purchase a low-cost third party device such as the iMic USB Audio system.

Connecting an electronic instrument directly to the Audio line in port will achieve better results than using a microphone because 'ambient' noise is eliminated. Typical instruments that you might connect are Electronic Keyboard and Guitar. You may need a cable adaptor to make this connection. Use either Line output or Headphone output of your instrument.

If your electronic instrument or external microphone produces a very low signal, such as an unamplified electric guitar or external microphone, you can use the iMic USB audio system as a 'pre-amp'.

Whenever you connect an electronic instrument to your computer, be sure to set the output level (volume) appropriately. Begin with the volume level of the instrument turned all the way down, then turn it up slowly while watching the level indicator in the Sound Input control panel. With the input level slider all the way to the right in the Sound Input Control panel, the volume level of your instrument should just peak the meter. **CAUTION: Never use an electronic device that exceeds 'line level' which is a standard for audio equipment.**

Advanced – Audio Midi Setup Utility (Optional)

Audio MIDI Setup

Audio Devices   MIDI Devices

System Settings

Default Input: Built-in Audio   Default Output: Built-in Audio
                                        System Output: Built-in Audio

Properties For: Built-in Audio
Clock Source: Default

Audio Input   Audio Output

                                        Configure Speakers

Master Stream   Master Stream

Source: Line In   Source: Headphones
Format: 44100.0Hz 2ch-16bit   Format: 44100.0Hz 2ch-16bit

Ch	Volume	dB	Value	Mute	Thru
M		n/a	n/a	☐	☑
1		11.0	0.96	☐	☐
2		11.0	0.96	☐	☐

Ch	Volume	dB	Value	Mute
M		n/a	n/a	☐
1		-0.0	1.00	☐
2		-0.0	1.00	☐

Advanced Users may find additional configuration items using the Audio-Midi Setup Utility included with your Mac. Here you may choose the 'Thru' item to monitor the input device through speakers or headphones.

One Note Only!

The pitch detection algorithm can only detect one note at a time! It cannot distinguish individual notes among chords. When using an instrument capable of producing more than one note, avoid notes which continue to sound after a new note is introduced. For example, avoid the sustain pedal when playing the piano, or open strings on a guitar. Also avoid reverb and echo effects.

Avoid background noise when using a Microphone. Common sources of background noise include talking, television, and air conditioner.

FEATURES

Graph

The main feature of Vocal Lab is the graphing area. As you sing or play, your pitch is plotted on the graph in real time. The trace advances only when the pitch of a note is identified, so it is important that you set up for 'best results'. The Vocal Lab graph looks something like a polygraph or seismograph.

The horizontal lines across the graph are placed at the 12 chromatic tones. The "register" of the note (which octave it is in) is ignored; all notes wrap around to the 12 notes of the display. The objective is to stay as near to these lines as possible, while you sing or play. The further you stray from the lines, the more out of tune you are. This plot shows in great detail the pitch history and helps isolate problem areas in your intonation. For example, you may tend to start flat and glide up to the note, or you may drift flat as you hold a note. Nobody can sing "perfectly" in tune such that they always stay on the lines, but, that is the objective. Some people may have a hard time accepting that they are really that much out of tune, but the graph does not lie!

Reference Tone Buttons

Click these buttons to generate an audible reference tone, if desired. The reference tones are mathematically generated to provide a precise frequency reference. The timbre of the reference tones may not be 'pleasing' depending on speaker quality.

If you press the shift key or the control key when you click these buttons, it generates an octave higher or lower reference tone.

Note: Because of a phase cancellation phenomenon caused by close location of the speaker to the microphone, the pitch detection algorithm may have trouble identifying some reference tones produced by itself! (To bypass this phenomenon connect the headphone output directly to the microphone input, and select Line Input.)

Reference Tone Octave Popup Button

Click the button to choose an octave for the audible reference tone, if desired. The reference tone may not be audible if you set it too high or too low.

Note: The typical reference pitch is A4 = 440Hz (Note A, Octave 4).

Indicators

These standard indicators – Volume, Fine Tune, and Tracking are essential for operation. You should monitor them occasionally to see that conditions are right for pitch detection. The Volume indicator shows the input signal level. The Tracking indicator advances a small amount for every successful determination. The fine tune indicator shows the result, in terms of deviation from ideal frequency. Each pixel of this display represents one cent, which equals 1/100 of a semitone. This is an extremely fine scale, and it is impossible to hold a note with your voice exactly at the center of this meter. 10 pixels either direction of center is excellent!

Additional Pitch Information

This indicator window shows pitch information in several useful formats. The nearest note (G in example) is displayed in a large letter. The octave number (3) shows which octave or register this note is in. "Ideal" shows the frequency (in Hz) of nearest semitone. "Actual" shows the frequency of the note under observation. (The fine tune indicator represents deviation of Actual from Ideal.) The note is also represented on a g–clef. (The register is not considered on the g–clef, the note simply wraps around between middle C and B.)

PREFERENCES
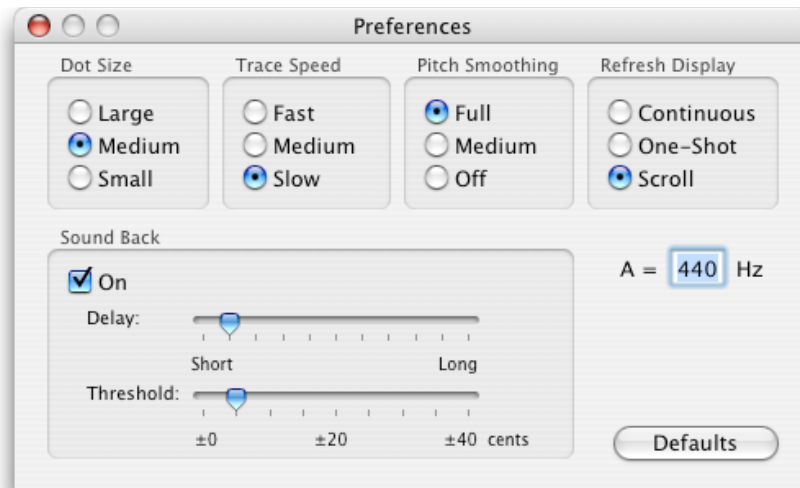
A=440

This preference setting determines the 'A' reference. By convention, 'A' is typically set at 440Hz. However, there may be situations where you want to tune slightly higher or lower. Changing the 'A' reference effectively shifts the entire tuning spectrum, so that all notes will be in tune with the reference you enter.

Pitch Smoothing

Pitch Smoothing averages the input pitch over time. The trace of the graph will have a smooth connected appearance, as opposed to scattered dots. However, the trace may 'glissando' through frequencies that were not actually present in the input. (This is the nature of "averaging".) We suggest that you select Full pitch smoothing, unless you specifically do not want to smooth the display.

Dot Size

How large the dot that makes the trace, use in conjunction with Trace Speed.

Trace Speed

The horizontal spacing between dots, use in conjunction with Dot Size. The effect of this setting is to control how fast the trace moves across the screen.

Refresh Display

In One-shot mode, the trace will stop when it reaches the right-hand side of the graph. This allows you to examine the screen at your leisure. Press the pause button to continue. In continuous mode, the screen is automatically erased and a new trace starts from the left side of the graph and runs continuously. In scroll mode, the screen scrolls as a new trace goes beyond the right side of the graph and runs continuously until you click on the Pause button or hit the delete key to erase.

Sound Back

Sound Back automatically generates a reference tone, as an auditory guide. The reference tone selected is the nearest chromatic note. Reference tones are relative to the 'A' reference and are always exactly on pitch with the chromatic scale. 'Delay' specifies the time interval before the reference tone is generated. 'Threshold' specifes an acceptable error between the input and reference tone. For example, if you need the reference pitch only when the input is off by 20 cents or more, set the threshold to 20 cents.

CONTROL BUTTONS

Pause – Pause (or restart) the display. In "one-shot" mode, it is necessary to press the pause button to restart the display.

Snapshot – Takes a picture of the display graph and places it in the clipboard.

Setup – To bring up the preferences dialog. (The preferences dialog may also be invoked from the application menu.)

VOCAL LAB DOCUMENT MENUS

You can open, save, and print the current Vocal Lab pitch graph and the previously saved Vocal Lab pitch graphs.

To create a new Vocal Lab pitch graph document, choose the New menu item from the File menu or press command – N. A new Vocal Lab pitch graph document contains a copy of the current Vocal Lab graph from the main window.

To open a previously saved Vocal Lab pitch graph document, choose the Open menu item from the File menu or press command – O.

To save a Vocal Lab pitch graph document, choose the Save menu item from the File menu or press command – S.

To setup the paper size and the orientation to print, choose the Page Setup menu item from the File menu or press command – shift – P.

To print a Vocal Lab pitch graph document, choose the Print menu item from the File menu or press command – P.
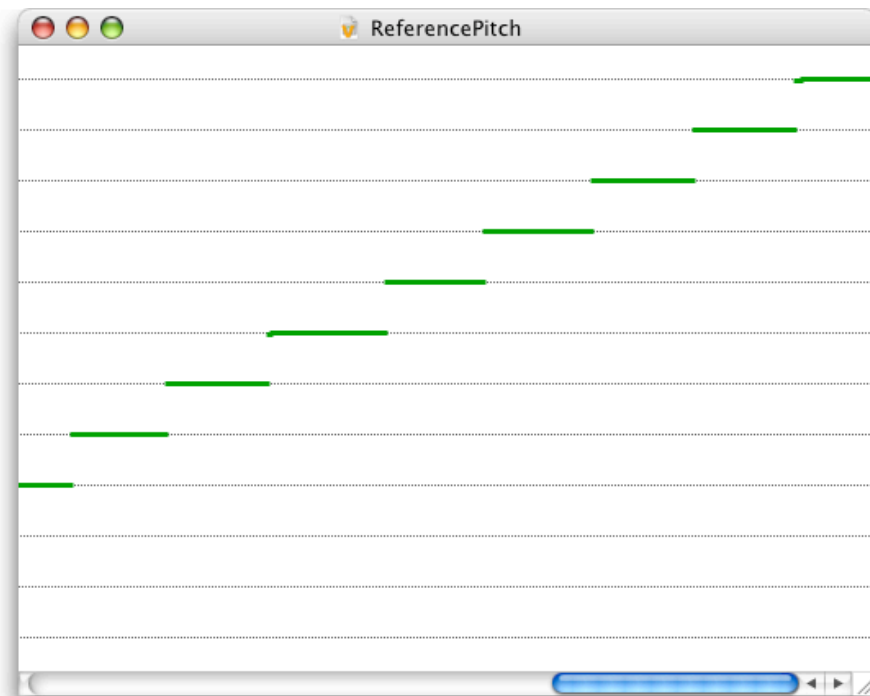
For further assistance visit us at www.rustykat.com