

Microphone

(Order Code MCA-BTA)

The Microphone can be used for a variety of activities with sound waves:

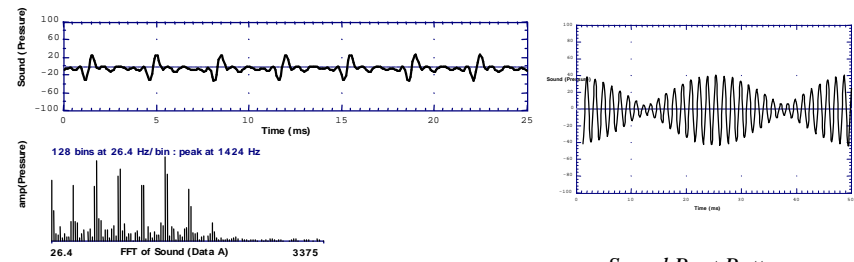
- Demonstrate how the wave pattern changes when frequency and amplitude are changed
- Compare the waveforms from various musical instruments
- Have students capture the waveform of the sound of a tuning fork and model the sine wave using a function
- Measure the speed of sound by using reflected sound waves in a tube
- Demonstrate beat patterns
- Determine the period and then the frequency of a sound by measuring the time between peaks on the waveform
- Display the fast Fourier transform (FFT) of a sound

NOTE: This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.

Using the Microphone with a Computer

This sensor can be used with a computer and either a Vernier LabPro® or a Universal Lab Interface. Here is the general procedure to follow when using the Microphone with a computer:

1. Connect the Microphone to the appropriate port on the interface.
2. Start the Logger Pro® software.
3. The program will automatically identify the Microphone, and you are ready to collect data.¹ Here are some sample graphs made using this microphone and a computer interface:



256 Hz Trumpet

Sound Beat Pattern

¹ If your system does not support auto-ID, open an experiment file in Logger Pro, and you are ready to collect data.

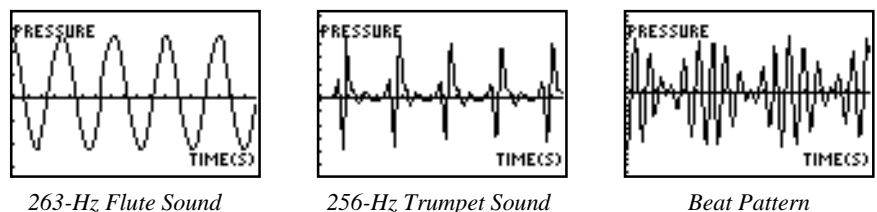


Using the Microphone with TI Graphing Calculators

This sensor can be used with a TI graphing calculator and any of the following lab interfaces: LabPro, CBL 2™, or original CBL™. Here is the general procedure to follow when using the Microphone with a graphing calculator:

1. Load a data-collection program onto your calculator:
 - LabPro or CBL 2–Use the DataMate program. This program can be transferred directly from LabPro or CBL 2 to the TI graphing calculator. Use the calculator-to-calculator link cable to connect the two devices. Put the calculator into the Receive mode, and then press the Transfer button on the interface.
 - Original CBL–Use the PHYSICS program. This program is available free on our web site at www.vernier.com. Our programs can also be obtained on disk. (Contact us for more information.) Load the program into a calculator using TI-GRAPH LINK™ or TI Connect software.
2. Use the calculator-to-calculator link cable to connect the interface to the TI graphing calculator using the I/O ports located on each unit. Be sure to push both plugs in firmly.
3. Connect the Microphone to any of the analog ports on the interface. In most cases, Channel 1 is used.
4. Start the data-collection program. The Microphone will be identified automatically.²
5. You are now ready to collect data.

Here are some sample calculator screens made using the Microphone:



Using the Microphone with a Palm OS device

1. Connect the Palm OS handheld, LabPro, and the Microphone.
2. Start Data Pro.
3. Tap New, or choose New from the Data Pro menu. Tap New again. The Microphone will be identified automatically.³
4. You are now ready to collect data.

² If your system does not support auto-ID, choose SETUP and set up an experiment.

³ If your sensor does not auto-ID, tap Setup and set up an experiment.

Specifications

Frequency range: approximately 20 Hz to 16,000 Hz, but note that the maximum data collection rate of the interface affects the maximum frequency you can effectively sample. With the LabPro or CBL 2, the maximum sound source is 5,000 Hz. With the CBL or ULI, the maximum sound source is 1,000 Hz.

Power: 7.5 mA @ 5 VDC

Stored Calibrations

Slope = 1 Intercept = 0 (arbitrary units)

This sensor is equipped with circuitry that supports auto-ID. When used with LabPro or CBL 2, the data-collection software identifies the sensor and uses pre-defined parameters to configure an experiment appropriate to the recognized sensor. This greatly simplifies the setup procedures for many experiments. Auto-ID is required for the Quick Setup feature of LabPro and CBL 2 when the unit operates remotely from the computer or calculator.

How the Microphone Works

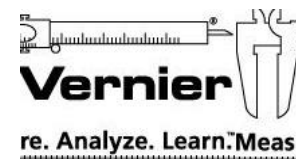
The Microphone uses an electret microphone that has a frequency response covering essentially the range of the human ear. An op-amp circuit amplifies the signal and sends it to the British Telecom connector. Actually the signal is sent to the interface on two different lines. A signal centered at 2.5 volts is on the Vin-low line and a signal centered at 0 volts is on Vin. More information about the input lines on LabPro is available in the LabPro Technical Reference Manual.

The best sound sources to use with the microphone are tuning forks, but you may want to investigate a human voice or a whistle, electronic keyboards, and other musical instruments. Try comparing the wave pattern for different sound sources. Try playing two sounds of nearly the same frequency to produce beat patterns.

Make sure the sound level is in the correct range to produce good wave patterns. If the sound is too loud, the wave pattern will be “clipped off” at the top or bottom. Move the microphone further from the sound source, or turn down the volume of the sound.

Warranty

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty does not cover damage to the product caused by abuse or improper use.



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