

Title: Acoustic Magic Voice Tracker II array microphone improves operation with VoIP based Adobe Connect Meeting

URL: www.AcousticMagic.com

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Search keywords: Connect, Meeting, Collaboration, Voice over IP, VoIP, Acoustic Magic, audio, web conferencing, microphone, best practices

Requirements

- Connect Meeting account
- Acoustic Magic Voice Tracker II™ array microphone
- USB connection, or Mic in or Line in connection (on sound card)

Table of Contents

- Introduction
- The Voice Tracker Array microphone
- When to use the Voice Tracker
- Using the Voice Tracker with Connect Meeting
- Voice Tracker II Set up for Full Duplex VoIP telephony/conferencing
- Controls
- Positioning the Voice Tracker
- Talker location signal
- Where to go from here

Introduction

Many Connect Meeting (VoIP) users have employed the Voice Tracker array microphone because it is important to have a microphone that can clearly pick up the various participants spread out around the room. Acoustic Magic's Voice Tracker™ array microphone uses sophisticated algorithms and digital signal processing to filter out interfering noise at ranges up to 30 feet, creating a crystal clear audio signal to meeting participants. The Voice Tracker eliminates the need to use headset microphones, is reasonably priced, and easy to install and setup.

An important factor in a good audio experience is the elimination of acoustic echo. With an open mic, sound from the far end talker (through the loudspeaker) is picked up by the microphone and sent back to the far end talker. This "echo" is annoying. The original Voice Tracker reduced this echo by instructing the Voice Tracker™ not to listen to certain locations (where the loudspeaker was placed). But this solution placed restrictions on near-end talker positions and speaker location. The Voice Tracker™ II improves acoustic echo reduction by adding in a rapidly converging acoustic echo canceller to the Voice Tracker's DSP. This AEC eliminates acoustic echo even as the Voice Tracker™ automatically scans the entire room.

The Voice Tracker II™ array microphone



The Voice Tracker II™ employs an array of six microphones and “beamforming technology” to reduce sound interference. This unique technology locates a talker, and automatically (and electronically) steers a “listening beam”, like an acoustic searchlight, in that direction. This creates spatial filtering; sounds from other parts of the room are diminished. The “listening beam” can scan a full 360°. In addition, the Voice Tracker samples stationary background noise (fans, etc.) and subtracts it. This dual-mode noise reduction, coupled with increased sensitivity since the Voice Tracker II's six microphone elements are utilized continuously and constructively, gives the Voice Tracker outstanding range and sound quality.

Key Features of the Voice Tracker

1. The sensitivity and noise reduction of the Voice Tracker array microphone allows it to clearly pick up talkers disbursed throughout a conference.
2. The Voice Tracker's built in AEC eliminates the annoying acoustic echo effect from loudspeakers in the room.
3. The Voice Tracker's ability to follow talkers as they move provides an un-tethered feel, even for non-conference oriented VoIP telephony/collaboration.

The Voice Tracker Array microphone can eliminate the need for headsets and provide a great experience for users who use VoIP as the communication vehicle in their meetings. Because of the Voice Tracker Array's high sensitivity and background noise filtering, it can cover large rooms, and can be used for large-group web conferences as well as single user meetings.



When to use the Voice Tracker

There are three primary uses where using the Voice Tracker can provide a more natural experience for Connect Meeting users while still allowing them to use integrated VoIP capabilities.

Case 1. A collaborative meeting in a conference room

When a group of people are gathered in a conference room for a collaborative meeting, they often want to include remote participants as well without having to think about audio setup. This can be done easily and seamlessly with Connect Meeting and the Voice Tracker microphone.

Today, most Connect Meeting attendees use headsets when they are sitting at their desk. But when people are physically gathered for a meeting wearing a headset is not natural or intuitive, they want to speak freely and move about like they would for any in-person meeting.

With a Voice Tracker microphone in the conference room, meeting participants can talk freely from anywhere in the conference room, and without interruption. Remote attendees are included through Connect Meeting's VoIP capabilities and hear each person clearly. When a remote participant speaks, they can be heard through desktop speakers located in the room without feedback or interference.

Case 2. A classroom session being conducted in-person and virtually

A similar situation is found in training sessions, where there is a main class gathered physically in a classroom, and remote attendees are included using Connect Meeting. Instructors want the ability to walk around the classroom and interact with both local and remote students.

With a Voice Tracker in the classroom the instructor can move about naturally and speak from anywhere in the room. Questions and comments by the students are picked up clearly. The Voice Tracker's ability to follow talkers as they move provides an un-tethered feeling. Remote attendees in the Connect meeting will hear the instructor clearly as well as any discussion in the class. You *won't* have to repeat questions to remote users as you maybe used to. The energy of a live

classroom is maintained, keeping the session more interesting and allowing the instructor to be more engaging.

Case 3. Personal use

While the previous examples speak to situations where there is a physical group, it's also worth mentioning that even if you are attending a Connect meeting while sitting alone in an office the Voice Tracker provides a more natural experience. You can comfortably move around in your office, or ask another person to come in and join a discussion without having to think about how your audio is setup or wear a headset.



Using the Voice Tracker with Connect Meeting

The Voice Tracker's algorithms run on an internal digital signal processor. There is no software to load; the Voice Tracker is truly plug-and-play. To use the Voice Tracker with Connect, a meeting host needs to connect the Voice Tracker to a host's computer before entering the meeting. Just connect the Voice Tracker II array microphone to the computer using the USB cable. Power for the Voice Tracker II is provided from the computer through the USB connection. Audio output is through the USB connection: the PC's audio record setup must be configured to receive USB audio input from the "Voice Tracker II" connection.

Then, once the host has entered the meeting, simply initiate VoIP audio by clicking on the "Start my camera and voice" button in the Camera and Voice Pod. The Voice Tracker should be the default selection for the audio input.



Voice Tracker II Set up for Full Duplex VoIP telephony/conferencing

For full duplex operation, a sample of the far end talker signal must be transmitted to the Voice Tracker II (for acoustic echo cancellation) by the included audio cable. This signal is obtained by using the included splitter so part of signal from the speaker out jack on the PC goes to the Voice Tracker's reference in jack, and the other part goes to an external speaker.

Make the reference connection to the VT II before the USB connection so that the USB connect sound turns on the AEC. Otherwise, AEC may take a few seconds to engage.

A view of the connections for full duplex operation is shown in figure 1.

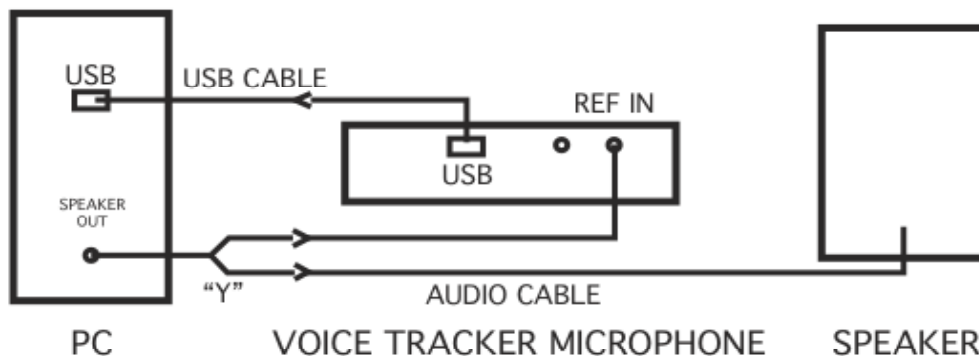


Figure 1 – Audio and AEC Connections

Controls

The Voice Tracker II has a pushbutton mute switch. Press the button once to put the Voice Tracker II into mute mode. The five green LEDs will blink (continuously), indicating that the

microphone is in mute mode. Press the button again to return to microphone to listening mode (the LEDs will “track” the active talker).

If the Voice Tracker II is to be connected to devices that require an analog signal (such as a handheld recorder or video camera), its output is available in analog format at mic level or line level through the “Audio Out” 3.5 mm jack. The included audio cable could be used for this connection if AEC isn’t used; otherwise, a 2nd audio cable will be required.

The toggle switch on the unit allows selection of mic level or line level analog output. If the switch is used to change output levels, the Voice Tracker II must be rebooted (powered off and then on).

Since the Voice Tracker II is now not connected to a PC, power needs to be provided by connecting the USB cable to an optional USB wall power converter.

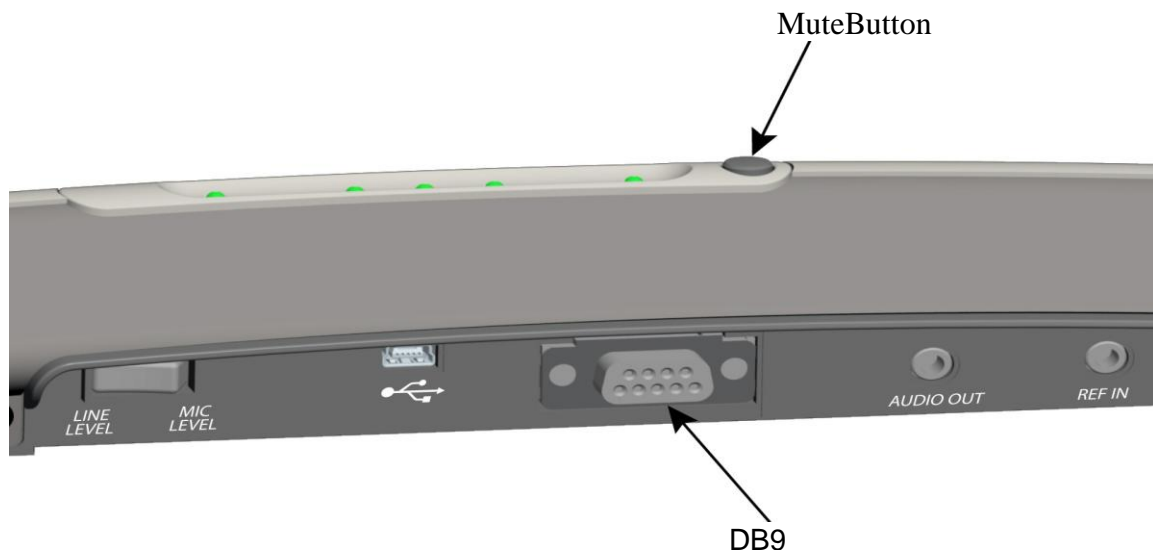


Figure 2 – Mute Button and Connectors

The green position lights provide feedback on the operation of the array. They indicate where the array’s listening beam is pointing. When the array recognizes a relevant sound, one of the 5 lights will be illuminated. For example, if a talker is directly in front of the array, the middle light will be illuminated. If the talker is to one side, a light on that side will turn on. If the talker moves across the field of view of the array, the lights will track the talker’s motion. When two users are sharing the array, the light will indicate the direction of the active talker. When there is no active talker, the LEDs will be off.

Positioning

The Voice Tracker II scanning listening beam can pick up sound from a full 360° field of view. However, the Voice Tracker II is more sensitive to sound from the front than from behind.

For use with a PC (speech recognition or VoIP telephony/conferencing) the Voice Tracker II can be placed under or next to the display.

In a conferencing application, it is best to place the Voice Tracker II on one end of the table with its front pointing towards the far end.

Voice Tracker II can also be mounted (with an optional bracket) on walls or on the ceiling to reduce clutter.

To maximize acoustic echo cancellation, use only one loud speaker, and place it to one side of the Voice Tracker II.

Talker location signal

Since the Voice Tracker automatically points a “listening beam” at the loudest talker, it knows the location. This signal is made available as a digital word through the DB9 connector (cable is optional).

The RS 232 serial output signal consists of 8 bit words, no parity, 1 stop bit; commonly referred to as 8,N,1. Data is between 0 and 250, corresponding to talkers from the far left in front of the Voice Tracker (0) to the far right (250). If the talker is directly in front of the Voice Tracker, the data will read 125.

Note that the Voice Tracker picks up sound from the behind. So a reading of 125 could mean the talker is directly in front or directly behind the Voice Tracker.

When the Voice Tracker detects no talker, the location signal reads 255.

The user will have to create application SW to calibrate these signals into degrees

Where to go from here

The Voice Tracker™ array microphone sells for \$360. This is significantly less expensive than conventional conferencing microphones. Although headset microphones can be even less expensive, if several are needed for the meeting, a single Voice Tracker can have cost advantage compared to headset microphones, not to mention the convenience and natural feel that users will experience. With The Voice Tracker™ II array microphone this will be an identical experience to using a traditional speakerphone, but with better range and sound quality.

The Voice Tracker can be purchased directly from Acoustic Magic's online store:
<http://www.acousticmagic.com/online-store.html>

About the author

Bob Feingold is the founder of Acoustic Magic. He has a BS (Engineering Physics) degree from Columbia, an MS in Physics from the University of Pennsylvania, and an MBA from Harvard. Bob has been a VP/General Manager of major divisions of high-tech companies such as Philips and Teradyne.