

# Microphone

By Rafael Lozano-Hemmer



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## **General important information**

# Microphone (2008), recording and playback unit combined inside a vintage microphone.

Edition of 6 +1AP

By Rafael Lozano-Hemmer

## Description

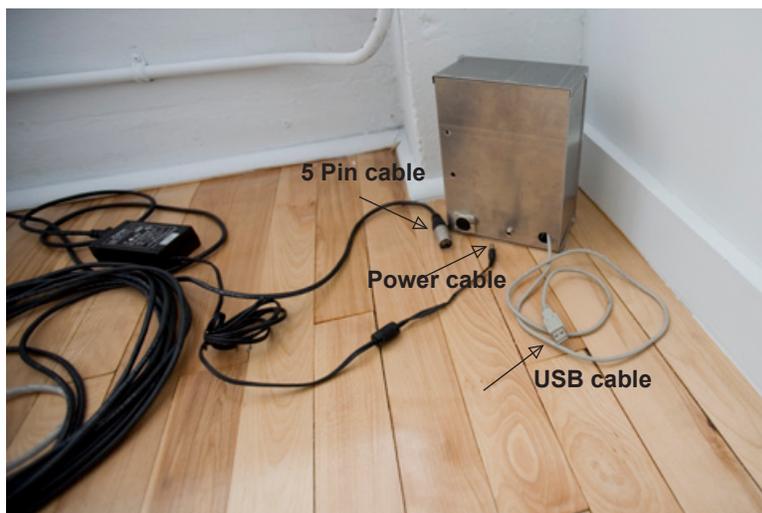
“Microphone” is an interactive installation featuring a 1939-vintage design Shure microphone, placed on a microphone stand in the exhibition room. The microphone has been modified to contain a tiny loudspeaker and a circuit board connected to a hidden control computer. When a public member speaks into the microphone, it records his or her voice and immediately plays back the voice of a previous participant, as an echo from the past. The result is surprising because the sound comes directly from the microphone, which “speaks back”, and because it is a memory of what already has been said. People initially only say something short like “hello” or “I am the decider” but as they realize that the resulting echo is actually recordings from previous participants they start giving longer speeches, they sing, or they play “exquisite corpse”. Half the time the microphone plays back the voice that was just recorded, while the other half it reproduces a recording at random from up to 600,000 that can be stored. This distribution allows the participant to understand the interaction but it also creates an experience that is out of his or her control. Ultimately, the piece’s content is entirely generated by the participation of the public.

## Operation

You may connect the piece to 100-120V 60Hz (American) or to 210-240V 50Hz (European) electrical outlets, as all the gear inside has auto switching power supplies.

1. The metal amplifier box has three connectors - Power, 5 Pin XLR cable and a USB cable.

Connect the long black 5 pin XLR cable to the amplifier box and the other end to the microphone base. Please note that this cable is custom-made and cannot be replaced by a normal 5 pin XLR cable. Connect the Extron (12VDC) power supply to the amplifier box. Connect the USB cable to the USB port on the mac laptop.



2. Turn on the software running on the mac laptop. The software’s icon can be found in the Dock or in the Applications folder. Navigate to the icon with the name “Monitor”. Double click the icon. The monitor

software should start, which in turn should start the “Microphone” software. Now the piece is ready.

3. Stand in front of the microphone about 5 - 10cm away from the microphone’s head and speak. The microphone will start recording everything you say until you have paused for at least 2 seconds. Once a pause is detected the last few seconds of what was just said are echoed back. Following the echo, one of the previously recorded clips will be played back. The echo is about 50% quieter than the clip. Over time, 600 000 clips will be archived inside this piece.

4. To turn the piece OFF, brighten the screen by pressing F2, then shut down the computer via the Apple menu, and optionally unplug the Extron power supply from the amplifier box.

## **Cleaning**

The metal stand and base of the microphone can be cleaned with a wet cloth and a bit of liquid soap.

## **Placement Instructions**

1. To ensure the piece operates as it should, place the microphone in a room that is not subject to recurrent or constant loud noises. Such sounds would trigger the microphone and generate unwanted recordings.

Position the microphone in a way that ensures that people intuitively speak into the correct side of the microphone’s head. One side has a loud speaker, the other has a the actual microphone inside; the flat side with the little Shure logo is what public participants should be speaking into.

Adjust the height of the microphone to fit the average person’s height. Turn the cylindric handle on the mic stand counterclockwise to loosen the extension pole, move it to the right height and turn the handle clockwise to tighten it again.

2. Make sure participants cannot accidentally step on the 5 pin cable connector at the base of the microphone.

3. Find a place for the mac laptop and the amplifier box. From there you can run the 8 meter long black 5 pin cable to the microphone’s base.

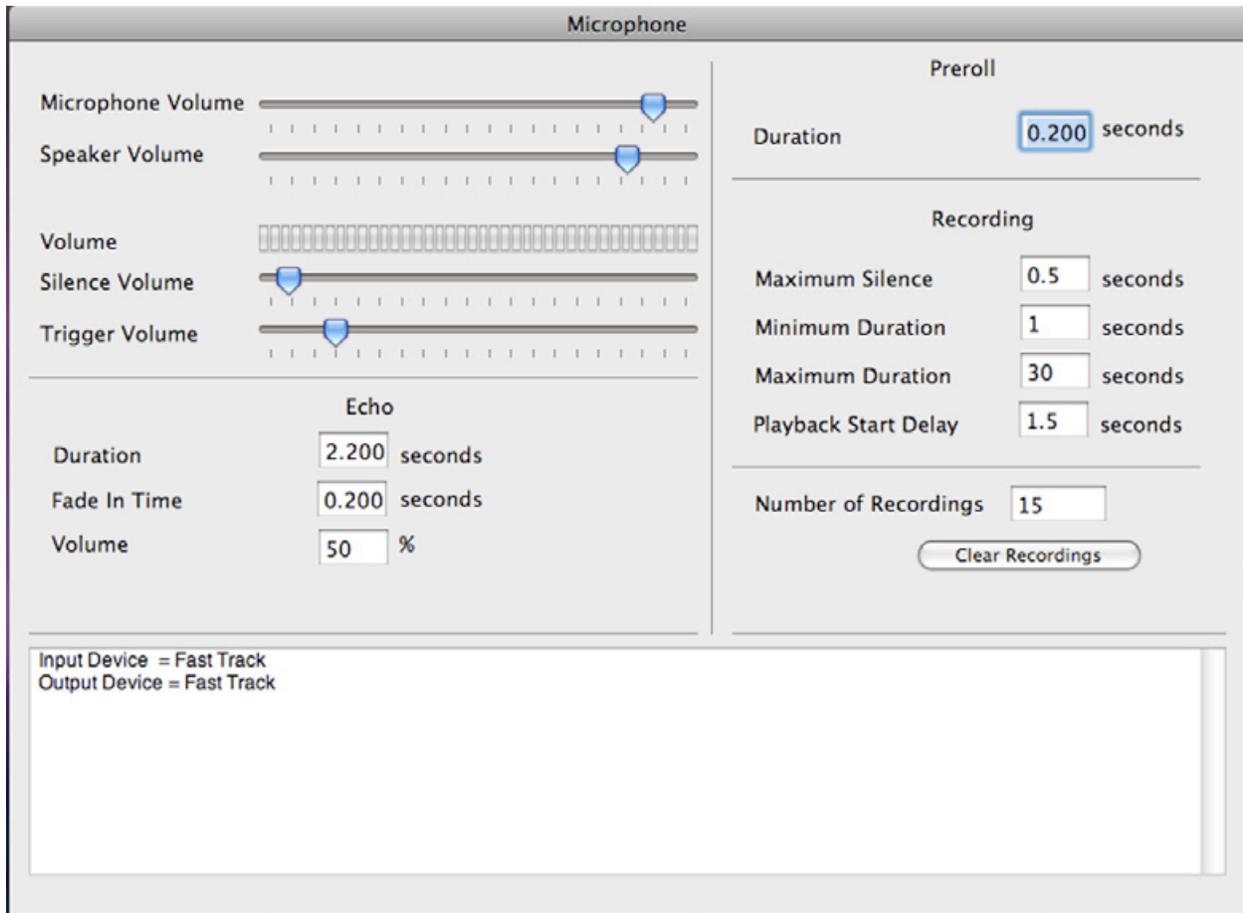
Do not close the laptop, as this would put it to sleep. Instead leave it open and dim the screen with the F1 button on the laptop’s keyboard.

4. A great way to illuminate the piece is to shine a spot light such as an ETC “Source Four“on to the microphone to get a shadow of the piece and the participant on the neighbouring wall.

## Software

The piece includes custom-made software that automatically starts up when the mac laptop turns on. This software can be used to adapt some of the piece's behaviour to a particular context.

A software application called "Monitor" runs along, checks, and restarts the main application called "Microphone"



### The following settings are available in the Microphone software

Note: All settings marked "Do Not Change" should be left untouched, as they are responsible for the artistic feel of the piece.

**Microphone Volume** – This slider allows one to adjust the sensitivity of the microphone. Moving the slider to the right increases the responsiveness of the **Volume** indicator explained below, while moving it to the left decreases this responsiveness.

**Speaker Volume** – This slider grants control over the volume of the audio output of the speaker embedded in the microphone. If you want the echo and archived clips to be louder move the slider further to the right. Move it to the left to make the piece more quiet.

**Volume** (Digital Display) – This display shows the current volume currently being perceived by the microphone, which is a result of real world sound combined with the sensitivity of the microphone as defined by the **Microphone Volume** setting. The color of this display changes in relation to **Silence Volume** and **Trigger Volume**, explained below.

**Silence Volume** – This slider is used to determine when to stop recording. It defines the level at which

ambient noise such as air conditioning and outside traffic is considered silence. When the **Volume** display drops below the threshold defined by this slider for longer than the time defined in the **Maximum Silence** field described later, the recording process stops until it is triggered again. If this slider is set too much to the left, recording will continue for their **Maximum Duration** regardless of whether someone is still speaking or not. If it is set too much to the right, those who speak quietly will have a hard time recording entire sentences before being interrupted by the echo.

**Trigger Volume** – This slider is used to determine when to start recording. It determines the level at which the noise heard by the microphone is loud enough to presume a participant is speaking. This setting should always be higher than **Silence Volume**. Once the software detects a sound that is loud enough to move the volume color bar past the trigger volume pointer, the recording process starts. If this slider is set too much to the left, recordings will be triggered too easily, perhaps before a participant has spoken. If it is set too much to the right, recording will be too difficult to trigger, requiring participants to scream into the microphone.

**Echo Duration** (*Do Not Change*) – This value sets the duration of the echo that is played back before the memory recording. It should be set to 2.2 seconds unless instructed otherwise by RLH or someone from his studio.

**Fade In Time** (*Do Not Change*) – This value sets the length of the fade-in for the audio clips played by the microphone, which makes for a smoother listening. It should be set to 0.2 seconds unless instructed otherwise by RLH or someone from his studio.

**Echo Volume** – This value defines the volume of the echo playback in relation to the volume of the archived clips. At 100%, the volume of the echoes equals that of the archived clips. The default is for the echoes to be quieter, at 50%.

**Preroll Duration** (*Do Not Change*) – This value sets the amount of pre-trigger time that will be included in a recording. This ensures that the beginning of a new recording is not cut out. It should be set to 0.2 seconds unless instructed otherwise by RLH or someone from his studio.

**Maximum Silence** (*Do Not Change*) – This value sets the amount of time the **Volume** digital display can fall below the **Silence Volume** slider before an active recording is stopped. It should be set to 0.5 seconds unless instructed otherwise by RLH or someone from his studio.

**Minimum Duration** (*Do Not Change*) – This value sets a minimum duration for a recording to be confirmed as such. It is useful in ignoring loud, punctual noises such as dropping an object. It should be set to 1 second unless instructed otherwise by RLH or someone from his studio.

**Maximum Duration** (*Do Not Change*) – This value sets a maximum duration for all recordings. If a recording continues until the amount of time defined here, it is automatically terminated as if silence had suddenly been perceived, and the echo plays back as normal. This value should be set to 30 seconds unless instructed otherwise by RLH or someone from his studio.

**Playback Start Delay** (*Do Not Change*) – This value sets the amount of time between the end of a recording and the playback of a recorded sound clip, regardless of the length of the echo which may overlap with the playback. This value should be set to 1.5 seconds unless instructed otherwise by RLH or someone from his studio.

**Number of Recordings** (*Not Editable*) – This uneditable text field displays the number of recordings that have been archived on the hard drive.

**Clear Recordings** (Warning) – This button is used to clear all the archived recordings saved to disk.

**Deleting specific audio clip** – To delete a specific audio clip navigate to the following folder:

Macintosh HD/ Users/ *YourUserName*/ Library/ Caches/ com.antimodular.Microphone

There you will find all the clips that have been recorded. Find the audio file you want to delete for and place it in the trash bin.

**To back-up and save audio clips** – select the audio clips that you would like to back up from

Macintosh HD/ Users/ *YourUserName*/ Library/ Caches/ com.antimodular.Microphone and copy them to an external hard drive, or CD.

## Detailed technical information

# Components of the piece

## Metal Amplifier Box

This box contains an M-Audio Fasttrack USB-Interface which receives the microphone input signal and passes it on to the mac laptop. It also receives the processed audio from the mac laptop and passes it on to the Extron audio amplifier. The Extron audio amplifier boosts the audio output signal of the Fasttrack and passes it on to the loud speaker inside the microphone's head.

## Power Supply

The Extron 12VDC power supply connects to the amplifier box and powers the Extron audio amplifier. The power supply is able to handle 100-240V 50-60Hz meaning it can be used anywhere in the world.

## Base

The round microphone base is very heavy to increase the stability of the microphone. On the side it has an inlet for the 5 pin microphone cable.

## Stand + Head

The stand can be removed from the base by turning the whole stand counter clockwise. Inside the stand is a cable that connects via a plug inside the base. You can unplug the cables from each other inside the base and transport the base and the stand separately.

The head has a very sensitive microphone and a high quality loud speaker inside. The microphone is on the flatter side of the head, the one with the Shure logo on it.

## Computer

An Apple Laptop computer is provided with the piece. This has 2 Gigabytes of RAM, at least a 2.0GHz dual core Intel processor, at least 128MB of VRAM, and MacOSX 10.5 or greater running. The computer comes with a one-year warranty and can be easily removed for future replacement. The system preferences have been altered so that the computer never goes to sleep. Also, when booting the computer, the microphone software automatically starts.

## Software

The project software is entirely programmed in Objective-C and the source code is open to the collector for future compilation to accommodate forthcoming operating systems or hardware. Engineer Gideon May programmed the software and can be contacted through the Lozano-Hemmer studio.

# Troubleshooting

## The Laptop is not turning on

Ensure the power supply is connected to the laptop and plugged into the power outlet in the wall. If this is already the case, try pressing the power button for 5 seconds, then pressing it again as normal.

## The Microphone is not recording

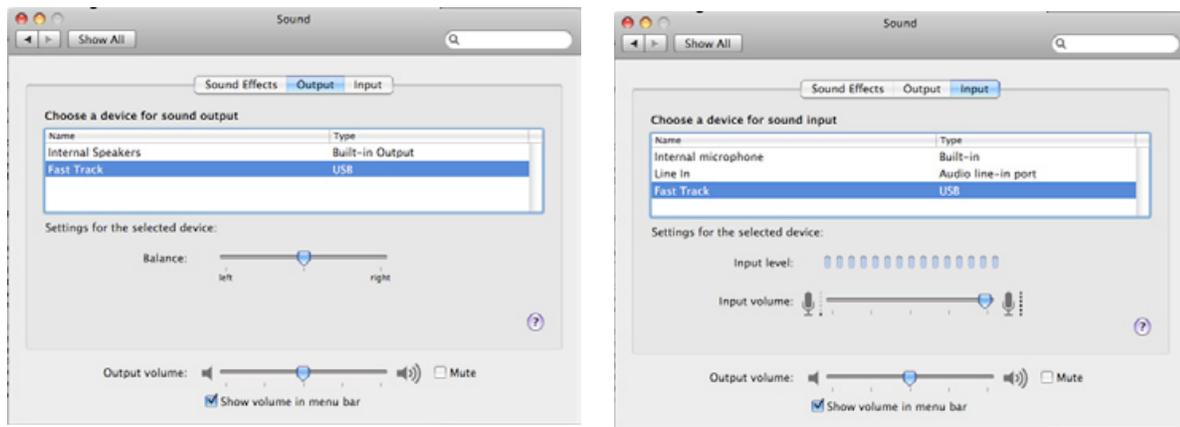
When you speak in to the microphone, the **Volume** color bar indicator on the software interface should change color. If this is not the case, it may be that the Mac laptop is not receiving an audio signal.

1. Quit the Monitor software and then the Microphone software.

Check the System Preferences. Click on the apple logo on the top left of the screen, select System Preference. In the window that opens select the Sound icon. Select the Output tab. Under “Internal Speakers” the “Fast Track” should appear and should be selected.

Select the Input tab. Under “Internal microphone” and “Line In” the “Fast Track” should appear and should be selected. Please select “Fast Track” by clicking on it, now it should be highlighted.

Restart the Monitor software, which in turn will start the Microphone software automatically.



2. Ensure that all the cables - power, 5 pin cable on amplifier box and base, usb cable - are plugged in tightly.

Open the amplifier box by unscrewing all 4 screws and check if all cables inside are connected tightly. Refer to the image below.

## Sound comes out of the laptop

1. Quit the Monitor software and then the Microphone software.

Check the System Preferences. Click on the apple logo on the top left of the screen, select System Preference. In the window that opens select the Sound icon. Select the Output tab. Under “Internal Speakers” the “Fast Track” should appear and should be selected.

Select the Input tab. Under “Internal microphone” and “Line In” the “Fast Track” should appear and should be selected. Please select “Fast Track” by clicking on it, now it should be highlighted.

Restart the Monitor software, which in turn will start the Microphone software automatically.

## **The microphone makes strange noises**

Quit the Monitor software and then the Microphone software, unplug the USB cable from the computer and unplug the power cable from the amplifier box.

Plug everything back in to place and restart the software.

## **Crash**

Restart the computer.

## **Support**

If you would like support for the piece please feel free to contact Rafael Lozano-Hemmer's studio in Canada:

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output volume for loud speaker

bass control for loud speaker

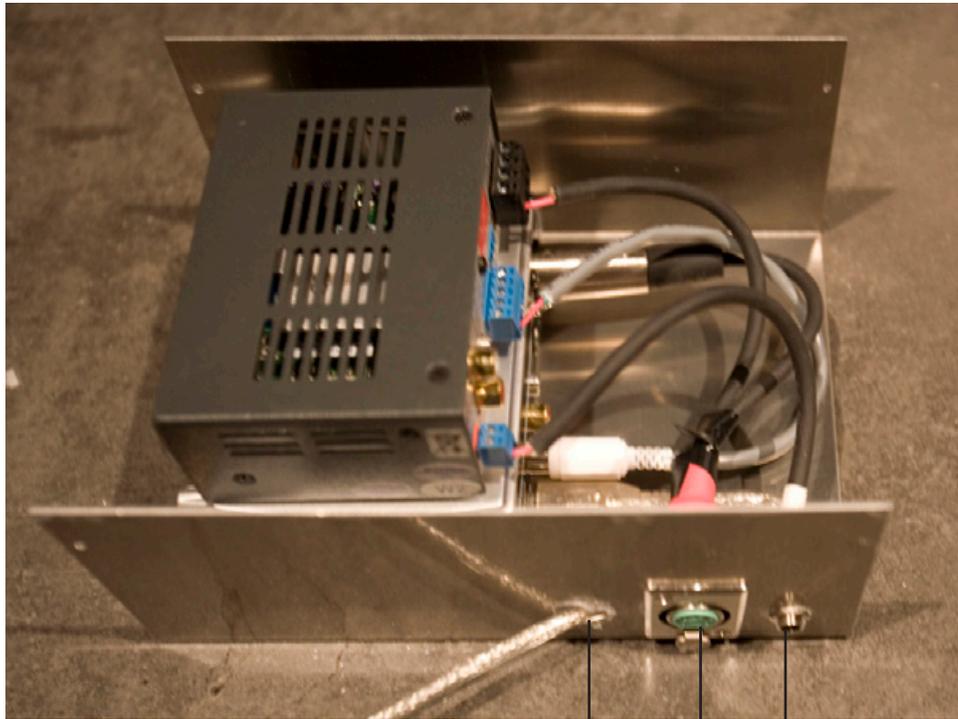
output volume for loud speaker

mix - to the far right

sensitivity for mic input

opened amplifier box with M-Audio Fasttrack and Extron amp - front

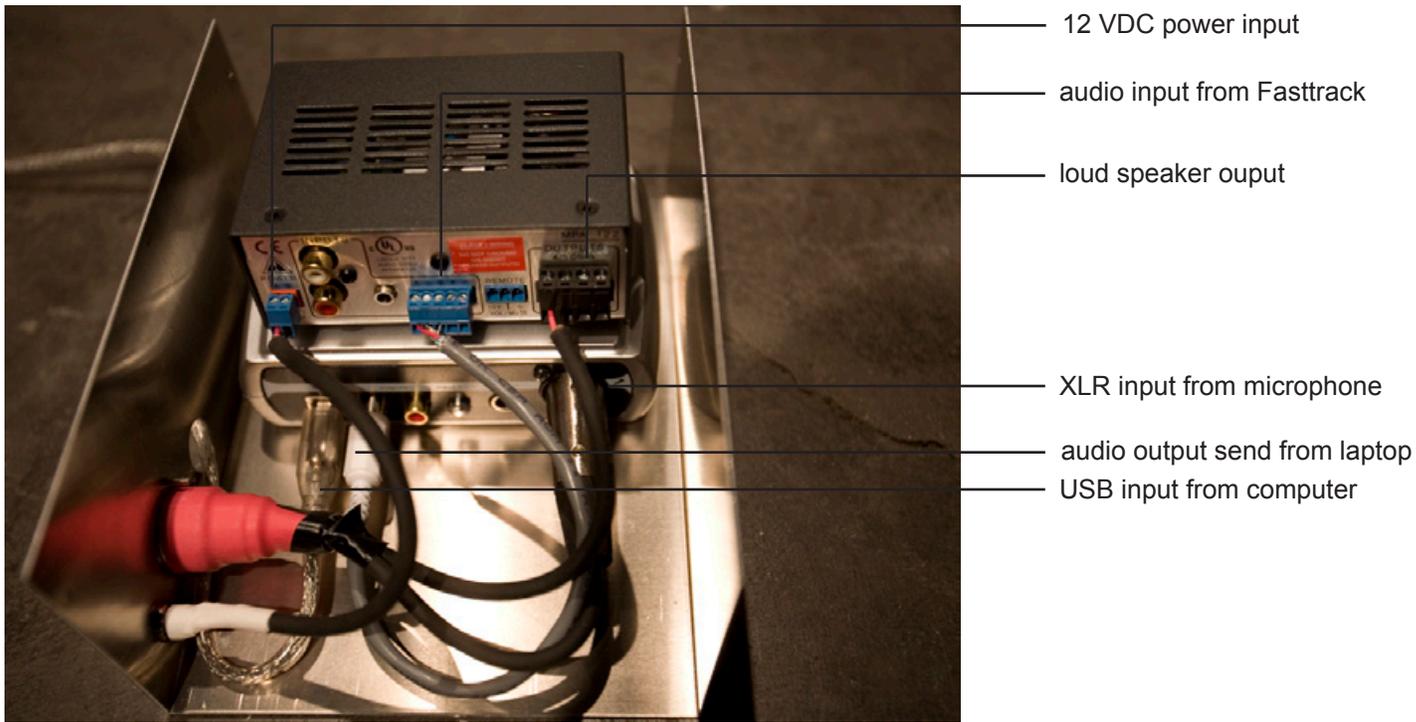
opened amplifier box with M-Audio Fasttrack and Extron amp - side



12 VDC power supply inlet

5 pin mic cable to mic base

USB cable to computer



opened amplifier box with M-Audio Fasttrack and Extron amp - back