A12 - User Manual

Year: 2024 **Semester:** Spring **Team:** 12 **Project:** Microphone Interface
Creation Date: April 13, 2024 **Last Modified:** September 15, 2024
Author: Liam Roach **Email:** leroach@purdue.edu

Assignment Evaluation: See the Rubric in the Brightspace Assignment

1.0 Product Description

The Microphone Interface is a small, lightweight, and portable device capable of applying audio effects to a connected microphone, or other audio source, in real time. Careful consideration has gone into designing the Microphone Interface's controls, so as to maximize the speed and convenience of using the device. The device features two buttons, and three knobs for quick and convenient control over effect parameters. The Microphone Interface also prominently features an LCD display which simultaneously shows which effect parameters are currently selected to be changed and their values, as well as the values of other effect parameters that are not currently selected. The effects that the Microphone Interface can produce are five band equalization, delay, and distortion. For each band of the equalizer, center frequency, width, and level can be changed. For the delay, time and feedback can be changed. Finally, for the distortion, amplitude and cutoff can be changed.

2.0 Product Illustrations

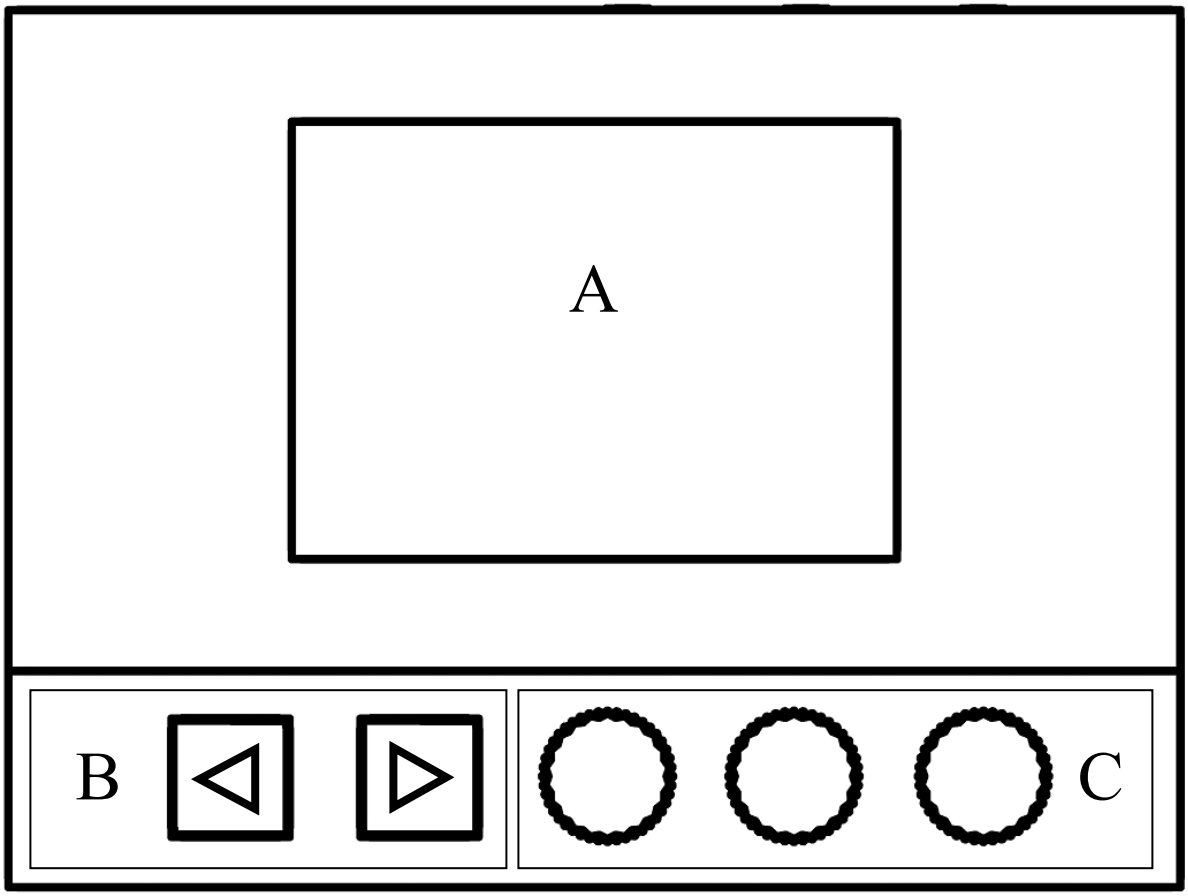

Figure 1: Top view of the Microphone Interface

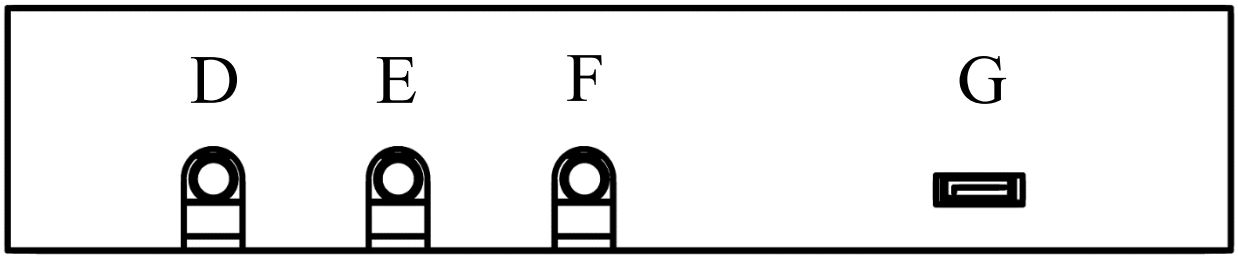

Figure 2: Ports on the back of the Microphone Interface

A: LCD screen
B: Left and right buttons
C: Knobs
D: Stereo audio output
E: Stereo audio input
F: Unused port
G: Power port (micro USB B)

Figure 2: First effect page

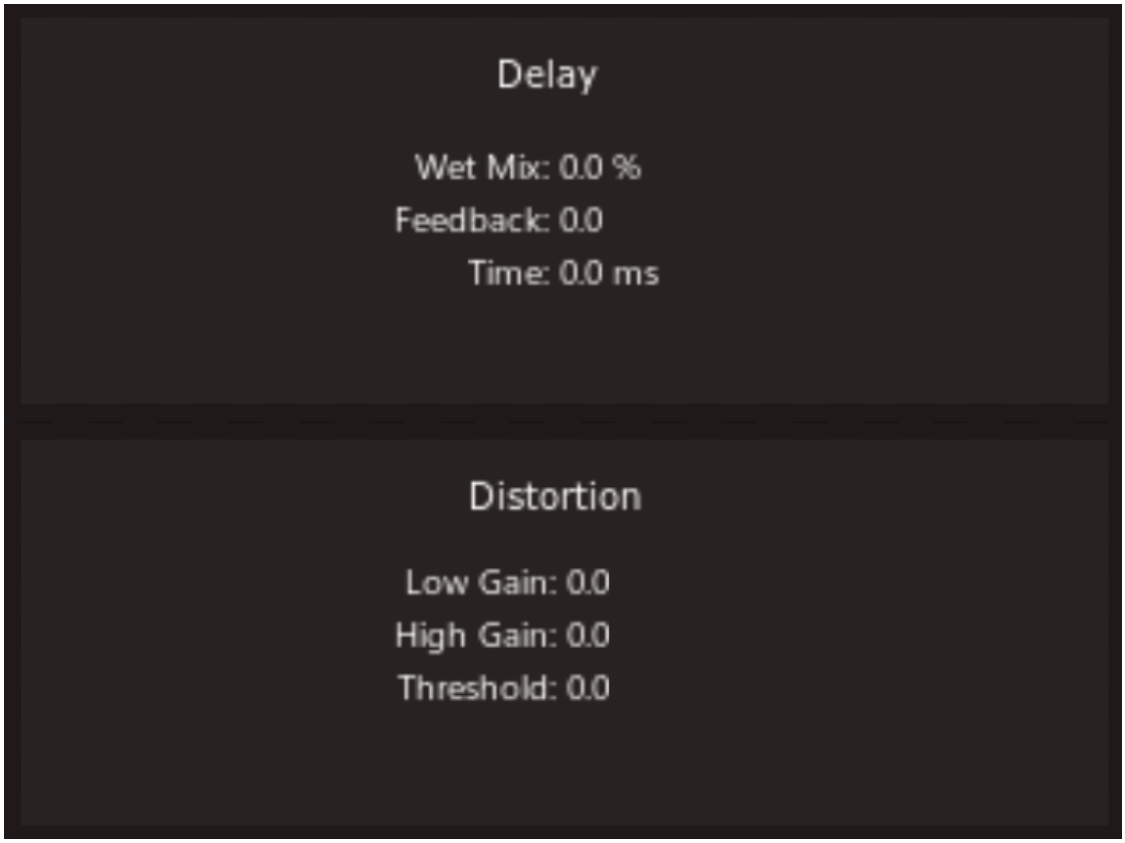

Figure 3: Second effect page

3.0 Setup Instructions

Setup of the Microphone Interface is very simple, the following steps outline the procedure:

1. Connect the Microphone Interface to any USB power source using a micro USB B cable. Upon doing so, the screen (A) should turn on and look similar to Figure 3.
2. Using 3.5mm cables, connect a microphone or any other audio source to the stereo audio input (D), and connect headphones, speakers, or other audio device to the stereo audio output (E).
3. Verify that audio going into the input can be heard on the output.
4. When powering down the device, be sure to remove any audio cables before disconnecting the power.

If an issue is encountered in any of these steps, refer to section 5.0.

4.0 Usage Instructions

After the Microphone Interface has been setup, effects can be applied and configured to your liking.

- Use the left and right buttons (B) to change which effect parameters are being affected by the knobs (C). Parameters are navigated circularly in the following order: equalizer band 1, band 2, band 3, band 4, band 5, delay, distortion.
- Each band of the equalizer can be modeled as a band pass filter with centerline frequency defined by “f0”, gain by “G”, and band-width by “BW”.

  TIP: Overall volume can be adjusted by uniformly changing all of the gains for each band.

- The delay effect adds to the current audio signal, a secondary signal that is delayed by “Time” milliseconds, that is attenuated by “Feedback”. “Wet Mix” controls the volume ratio between the current audio signal and the delayed audio signal.
- The distortion effect amplifies the input signal by “Gain” and clamps any values that exceed “Threshold”.

5.0 Troubleshooting Instructions

- *The device isn’t turning on:*
  Check that the power cable is properly plugged in and connected to a power source capable of outputting 3.3V. If necessary, the device can be disassembled to check power LEDs. If the device is receiving power, D5 should be lit. If the microcontroller is functioning properly D1 should be lit as well. If D5 is lit, but D1 is not, then the power source might not be delivering enough power, or the board may be damaged.

- *There is no audio or audio sounds weird:*
  Check audio connections; disconnect, then reconnect everything. Power cycle device to reset parameters. If this doesn’t work, then the board may be damaged.

- *The screen doesn't turn on, but there is sound:*
  Disassemble and check the screen cable; reseat if necessary. If problem persists, the screen, the cable, or the board could be damaged.

- *The controls are unresponsive:*
  Try power cycling the device. If problem persists, the board may be damaged.