



WHAT IS BOWL CALIBRATION?

Bowl calibration refers to the process of telling the Musical Mushroom at what frequency to mechanically vibrate the singing bowl using the glued exciter in order to make it sing. This only needs to be done once each time you install the Musical Mushroom in a new bowl. The Musical Mushroom remembers its settings even when the power is switched off, therefore no further calibration is required if you keep using the same Musical Mushroom in the same bowl (you can use labels to always match them together). Doing a new calibration overwrites the old one. You can also wipe all settings by doing a factory reset (optional).

Each singing bowl is different (size, material, shape, wall thickness) and will resonate at different frequencies when you tap on it or rub the mallet against it. There is a fundamental frequency at which the bowl will vibrate the loudest. That is called the bowl's "resonant frequency" or "fundamental frequency". However, there are also higher order overtones and harmonics (higher pitch frequencies) where the bowl will also vibrate. The Musical Mushroom has the ability to try and measure these frequencies automatically by sweeping all the frequencies between 150Hz and 1,500Hz and listening to the resulting vibrations to find the loudest resonance peaks. However, this is a complicated operation and can easily fail for many reasons. Below are a few tips for you to try in case of calibration failure. The good news is that when all else fails, it is always possible to manually enter the frequency information yourself to make it work. A step-by-step troubleshooting guide is provided below in case calibration fails. Manual calibration instructions are also provided.

START WITH A BOWL CALIBRATION

As a first step, follow the instructions in the getting started manual to install the exciter and the Musical Mushroom in the bowl and perform an automatic calibration. If the process fails to find the correct frequency, the bowl will feel like it is vibrating but it won't resonate loudly when you hover your hand over it. This is because it is vibrating the bowl at the incorrect frequency to make it sing. It might also not find any strong resonance (when it speaks: "RESONANT FREQUENCY ZERO HERTZ").

The automatic calibration method is provided for convenience. However, it is complex and can fail because of the large variety of bowls and the different environmental conditions which cannot all be anticipated. Failure of the calibration does not mean that there is anything wrong with the Mushroom or with your bowl. It simply means that the Mushroom will need a bit of help to find the correct frequency. If all else fails, you can always manually program the resonant frequency to make your bowl sing.

WHAT TO TRY WHEN THE AUTOMATIC CALIBRATION FAILS:

(1) SELECT THE NEXT HARMONIC FOUND

The calibration might actually have succeeded, but the Mushroom might have incorrectly identified a lower resonant frequency due to the mechanical rattling of the exciter / cable / mushroom unit as the bowl's fundamental frequency. If that happens, you will hear a faint or muffled vibration when placing your hand over the bowl instead of a loud resonant sound. In that case, we just need to select the next resonant frequency found after this one using the MENU buttons.

To do this, perform the following sequence:

MENU->MENU->MENU->MENU "SELECT BOWL RESONANT FREQUENCY"->SELECT->SAVE/EXIT

This selects the 1st overtone (next frequency up from the incorrect one). If the bowl resonates after doing this, then problem solved. It will remain at that frequency until next calibration. You can repeat this a 2nd and a 3rd time but usually the problem is solved the 1st time.

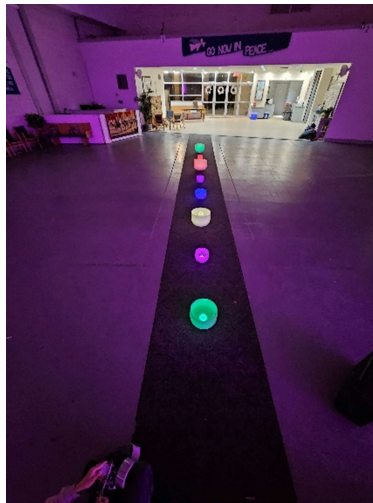


(2) IS THE MUSHROOM VOLUME SET LOUD ENOUGH?

The Mushroom needs to physically vibrate and hear the sound of the bowl in order to be able to analyze its resonances. If a calibration fails, an easy thing to try is to set the volume LOUDER by rotating the volume dial towards the + and trying again. After a successful calibration, you will lower the volume to an adequate setting for normal play.

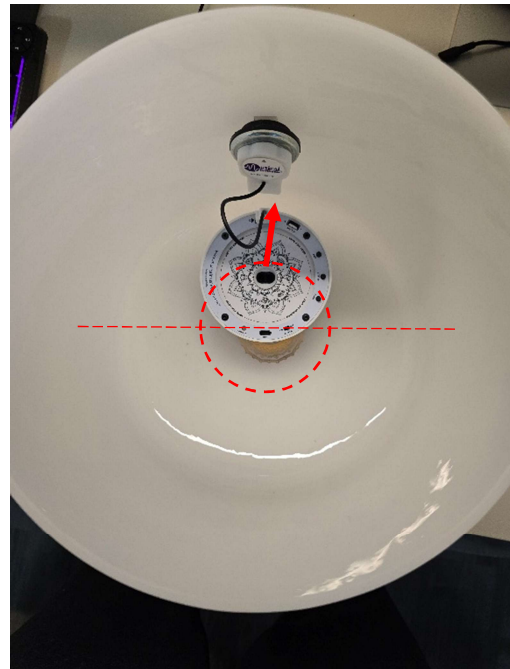
(3) IS THE ROOM AMBIENT NOISE LEVEL TOO LOUD?

A calibration cannot be successfully done if there the room is noisy or if people are speaking at the same time while the audio sweeping sound is happening. During this time, the microphone is listening. The ONLY sounds that it should hear are the sounds coming from the bowl and not from the environment, otherwise it will fail. The simple solution is to do the calibration in a totally quiet room, maybe at home before a concert.



(4) TRY MOVING THE MUSHROOM A BIT OFF-CENTER IN THE BOWL

During normal operation, the Mushroom is usually centered in the middle of the bowl. During calibration, however, this is not ideal because it places the Mushroom's internal microphone close to the center of the bowl. Because of the bowl's symmetrical geometry, the sound wavefronts generated by the bowl tend to cancel out in the exact center because they come equally from different directions. If you could place your ear exactly at the center, you would hear a relatively quiet sound at that point. Therefore, you don't want the Musical Mushroom's microphone to be exactly in the center of the bowl during calibration. The loudest point is actually close to the sidewall of the bowl. Try and shift the Mushroom off-center as shown in this image. Just make sure no part of the Mushroom or cable touches the vertical wall to cause any rattling or dampening of the bowl's vibrations. You can even hold the Mushroom up in the air right next to the vibrating sidewall using your hands during the calibration.



(5) TRY TAPPING THE Mallet DURING CALIBRATION

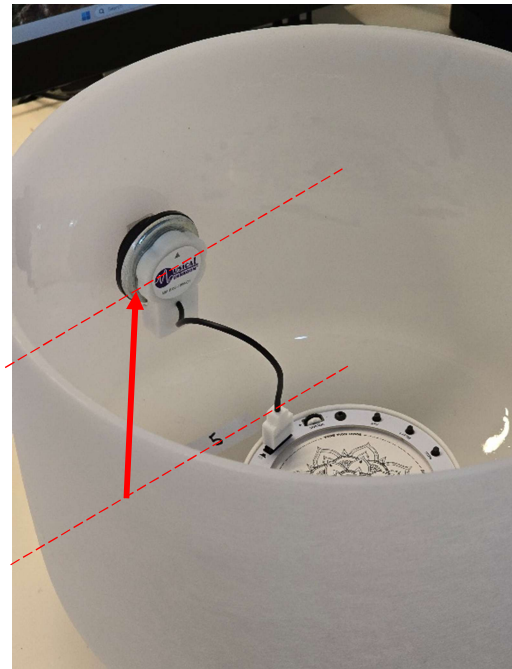
Take a rubber or felt mallet and repeatedly tap the side of the bowl (TING-TING-TING) twice per second while you hear the frequency sweeping sound. This can help with the calibration. As long as the sound heard comes entirely from the bowl itself, it should help.

(6) IS THE FIRMWARE UP TO DATE?

Check on the firmware version of your Musical Mushroom. Press MENU repeatedly until you hear "UNIT INFO", then press SELECT. Listen for the firmware version number. There might be a newer version available with some fixes to the calibration algorithm. See website video instructions for details found at: www.musicalmushroom.com/support

(7) IS THE EXCITER MOUNTED AT THE CORRECT HEIGHT?

If the exciter is mounted too high, it might dampen the bowl's resonance and not work as well similarly to holding a little finger against the bowl when it vibrates. Mounting it too low, will also fail to resonate the bowl much. Try and experiment with a mounting height between $\frac{1}{3}$ to $\frac{1}{2}$ of the vertical height of the bowl.



(8) ARE YOU HEARING A RATTLING SOUND?

If you hear a loud rattling sound, the exciter may not be screwed on tightly enough. It should be finger tight so that nothing moves, but not too tight to rip off or damage the adhesive. Alternatively, the problem might be the vibrating body of the exciter that is touching the bowl's sidewall when the volume is loud enough. To fix this, you might need to relocate the exciter so its body doesn't come into contact with the bowl. You can first unscrew the exciter. Then, using either your fingertips or the removal tool, remove the mounting plate. Once this is done, screw the mounting plate back onto the exciter and re-glue the exciter onto the sidewall again, but either slightly higher or even upside down (grey arrow pointing down) which will prevent the body touching the bowl.



(9) HOW TO MANUALLY CALIBRATE A BOWL

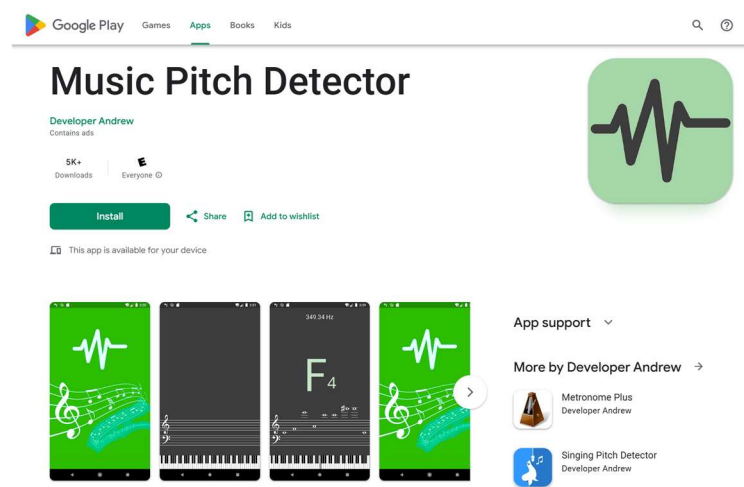
When all else fails, manual calibration is the only remaining option. Some bowls are difficult to calibrate automatically. If the calibration fails to identify the correct resonant frequency (the bowl vibrates but doesn't sing when you place your hand over it) or finds "ZERO HERTZ" as the resonant frequency (signaling failure to find it), then you can still do a manual calibration and enter the bowl's resonant frequency in the Mushroom using a PC or a MAC computer with the USB cable. Below are the steps required to do a manual calibration.

STEP (1) – Measure your bowl's resonant frequency using an app on your smartphone.

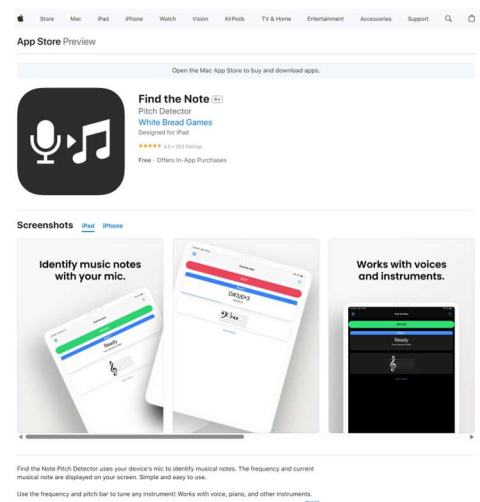
In the Android/Apple app store, search for a music "pitch detector" app that will listen to a sound and provide the frequency of the sound in Hertz (Hz).

Here are some example free apps:

ANDROID: "Music Pitch Detector" free app.



APPLE: "Find the Note" free app



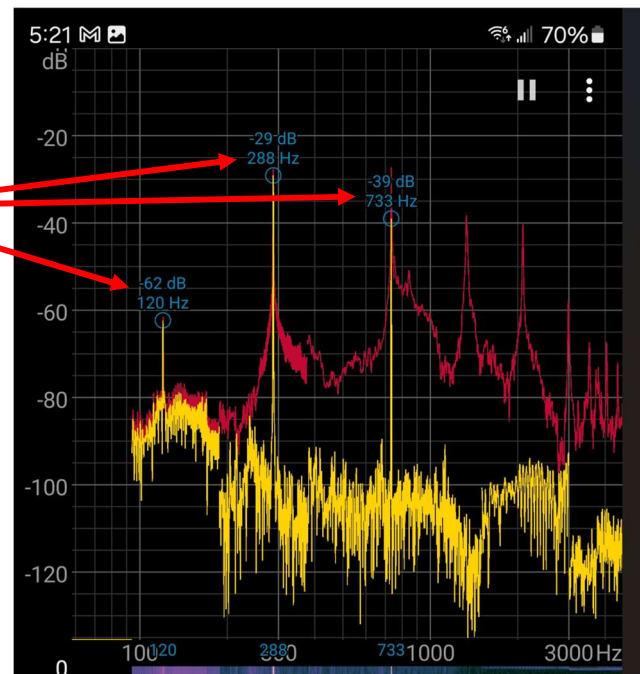
Simply launch the app and place your phone next to your bowl and strike it with a mallet (you may need to unscrew the exciter and remove the Mushroom from your bowl for this step). The screen of the app will show the frequency in Hz. Note down that frequency including only the first decimal digit. Use a .0 as the first decimal digit if not available. As an example for this document, we shall use the frequency **258.0 Hz** (different value than what is shown on the app picture on the right). Yours will be different. Now that we know the bowl's frequency, we can go to the next step (2).



OPTIONAL PRO TIP:

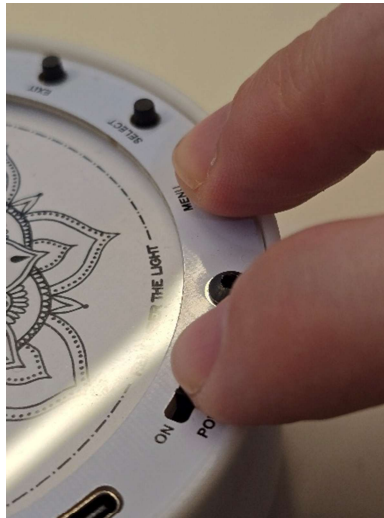
More advanced users may decide to instead use the "Spectroid" app (Android) or equivalent for Apple. This app will plot the entire sound spectrum graphically, allowing you to see all the resonant frequencies as you tap the bowl. You can then determine the fundamental and the first three overtones (if they exist).

This is not necessary, however. The simpler pitch detector apps above will typically give you at least the first fundamental frequency.

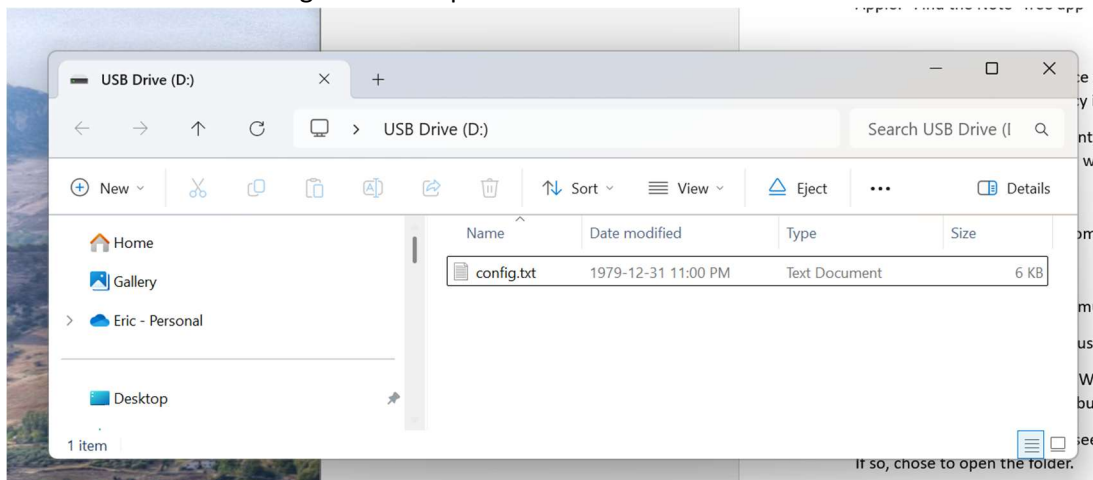


STEP (2) – Connect the mushroom to your computer and edit the config.txt file

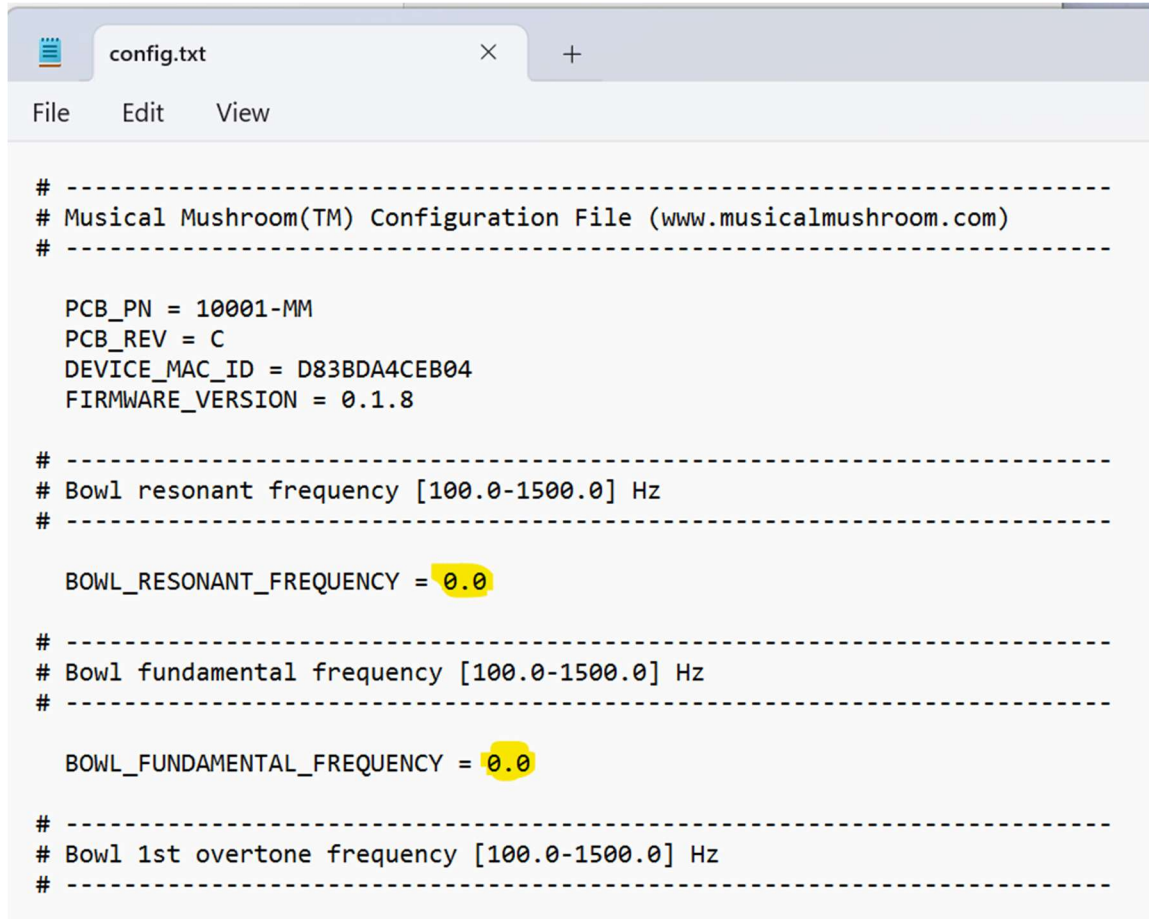
1. Switch the power button to the OFF position on your mushroom.
2. Plug the USB cable from the Mushroom to your PC (MAC) computer.
3. Hold down the MENU button. While holding down the MENU button, switch ON the power button and keep holding down the MENU button for a few seconds until the LED's light up blue. You can now let go.



4. On your PC(MAC), you should see either a file folder pop up or a notice that a USB device was detected. If so, chose to open the folder. If you don't see it, you can always unplug and re-plug the USB cable while the unit is blue. It should “ding dong” and show you the folder again.
5. You will see the folder and a file called config.txt
6. Double click on the config.txt file to open it with a text editor



7. Find the labels BOWL_RESONANT_FREQUENCY and BOWL_FUNDAMENTAL_FREQUENCY.

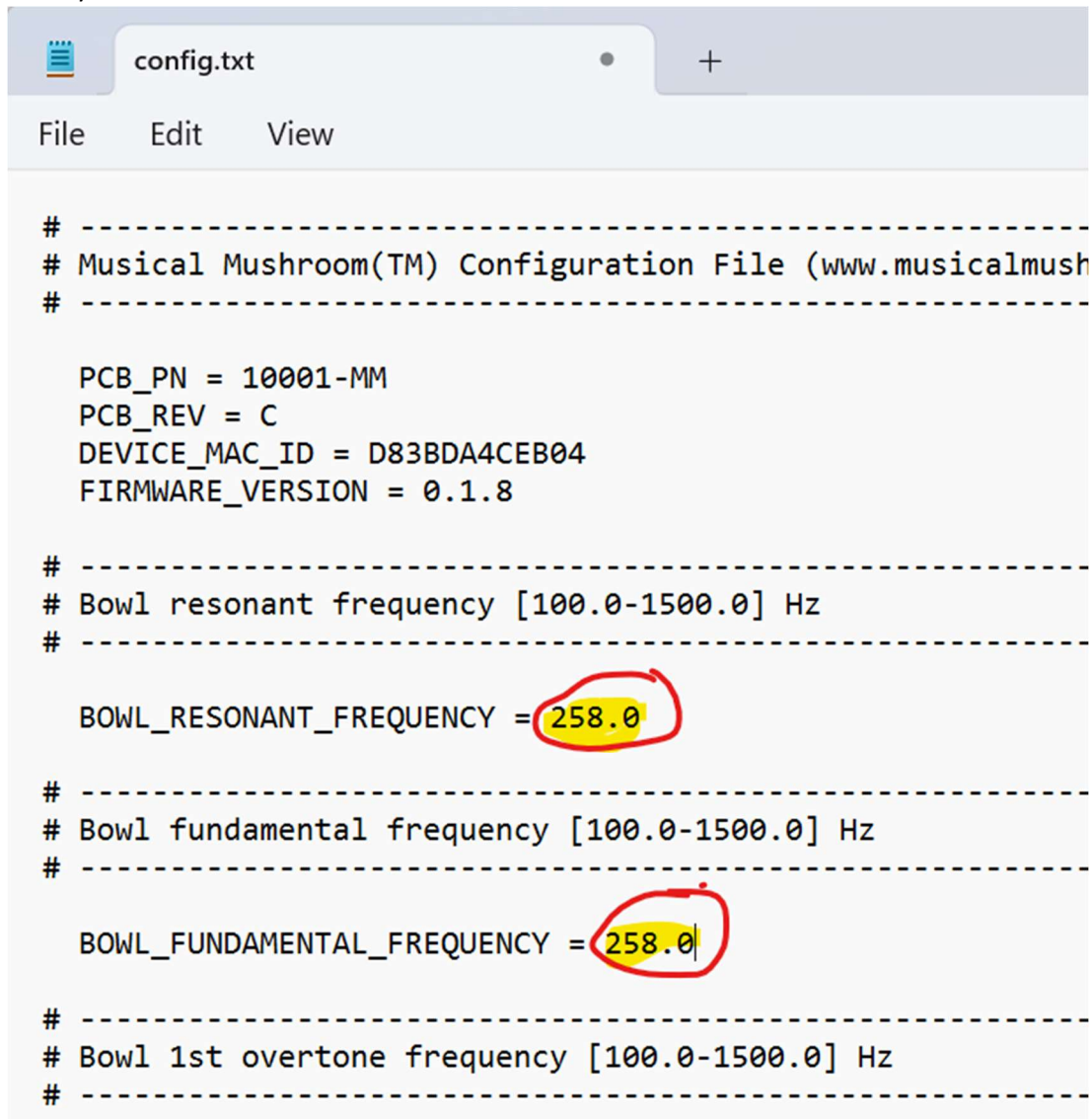
A screenshot of a text editor window titled "config.txt". The window has a menu bar with "File", "Edit", and "View". The text inside the editor is as follows:

```
# -----  
# Musical Mushroom(TM) Configuration File (www.musicalmushroom.com)  
# -----  
  
PCB_PN = 10001-MM  
PCB_REV = C  
DEVICE_MAC_ID = D83BDA4CEB04  
FIRMWARE_VERSION = 0.1.8  
  
# -----  
# Bowl resonant frequency [100.0-1500.0] Hz  
# -----  
  
BOWL_RESONANT_FREQUENCY = 0.0  
  
# -----  
# Bowl fundamental frequency [100.0-1500.0] Hz  
# -----  
  
BOWL_FUNDAMENTAL_FREQUENCY = 0.0  
  
# -----  
# Bowl 1st overtone frequency [100.0-1500.0] Hz  
# -----
```

The values "0.0" for both BOWL_RESONANT_FREQUENCY and BOWL_FUNDAMENTAL_FREQUENCY are highlighted in yellow.

8. Edit the numbers to the new frequency you desire (258.0Hz in this case). Make sure you add the single digit decimal place at the end. If it is a round number like 258Hz, type it as **258.0**

10. Here is the modified file for the 258Hz example. Don't delete or add any white spaces. Just exactly as shown below.

A screenshot of a text editor window titled "config.txt". The editor has a menu bar with "File", "Edit", and "View". The text content is as follows:

```
# -----  
# Musical Mushroom(TM) Configuration File (www.musicalmush  
# -----  
  
PCB_PN = 10001-MM  
PCB_REV = C  
DEVICE_MAC_ID = D83BDA4CEB04  
FIRMWARE_VERSION = 0.1.8  
  
# -----  
# Bowl resonant frequency [100.0-1500.0] Hz  
# -----  
  
BOWL_RESONANT_FREQUENCY = 258.0  
  
# -----  
# Bowl fundamental frequency [100.0-1500.0] Hz  
# -----  
  
BOWL_FUNDAMENTAL_FREQUENCY = 258.0  
  
# -----  
# Bowl 1st overtone frequency [100.0-1500.0] Hz  
# -----
```

The values "258.0" are highlighted in yellow and circled in red.

11. You can optionally add additional frequencies for the overtones if you want lower in the file. When you use the menu buttons for the "SELECT RESONANT FREQUENCY" option, it will just rotate through all these frequencies.
12. Save the file (FILE->SAVE)
13. Unplug the USB cable
14. Switch OFF the mushroom.
15. Switch ON the mushroom. It should now play the selected frequency!

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www.musicalmushroom.com

