

10.3: Procedure

1. Mount the microphone on the stand at a comfortable height. Connect a short cable to the microphone. Connect the microphone to the pre-amp. Connect the pre-amp output to channel one of the oscilloscope. Connect the function generator to the power amplifier (if available) and the output of the power amp to the loudspeaker.
2. Depress the oscilloscope's "Quick Menu" button and use the following settings: Input Coupling=AC, Input Impedance=1M, Bandwidth=20MHz. Set the Trigger Source to Channel One.
3. Adjust the oscilloscope time base (Horizontal Scale) to approximately 2 milliseconds per division and the amplitude (Vertical Scale) to 50 mV per division. Position the Trigger Start Position toward the left edge of the display (this is the little orange triangle at the top of the grid; move it using the Horizontal Position knob).
4. Set the function generator to 125 hertz. Set the amplitude level to produce a comfortable volume, sufficient to produce at least 100 mV on the oscilloscope when the loudspeaker is aimed at the microphone about one foot on-axis. Record the actual voltage in column one, row one of Table 1.
5. Repeat the voltage measurement at the other angles, also at one foot distant, indicated in the top row of Table 1.
6. Repeat steps 4 and 5 for the remaining frequencies in Table 1.
7. To determine the decibel values for off-axis rejection, use the following formula:

$$dB = 20 \log \frac{\nu_{off}}{\nu_{on}}$$

Where ν_{off} is the off-axis voltage of interest and ν_{in} is the on-axis voltage for that particular frequency (i.e., the reference level). Utilizing the data from Table 1 and the formula above, fill out Table 2 with the resulting attenuations in decibels.

8. For comparison, consider Table 3, the approximate published data for the Shure SM-58 cardioid microphone.

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