DYI Ribbon Microphone
How I built it

This document broadly describes how I built and made a functional ribbon microphone using mostly recycled materials and basic electronics.

1. Structure Construction

I started with a long, square steel profile, from which I cut a section about ten centimeters long using an angle grinder. I then cut it diagonally along one of its corners, running the cut along the full length of the piece. This allowed me to open it up (NOTE: heating the metal with an oxy-gas torch or even a small camping Bunsen burner makes the bending process much easier), shaping it into a C using an anvil and a hammer — in my case, the "anvil" was the head of another hammer.

At this point, I fixed two copper wires to the profile:

- One at the top of one of the side walls, tightened to the metal using a screw, a nut, and a washer (to improve electrical contact);
- The second one, using the same system, was attached to the lower part — or in any spot that wouldn't be in the way.

The latter acts as one of the two output terminals of the microphone, while the first also serves to support the aluminum foil ribbon.

The base of the microphone was built using scrap wood. It can be any shape; in my case, I intentionally made it large, since I planned to include the preamplifier immediately after the microphone output.

The steel profile was mounted to the base using an L-shaped aluminum bracket made from recycled sheet metal. I drilled a couple of holes in the center of the steel body (spacing as needed) to fix the bracket, but **only after electrically insulating** the body from the bracket, to avoid interference from ground noise.

The insulation was achieved by wrapping some paper tape around the center area and inserting two homemade rubber spacers (plastic washers would have been more effective, but I wanted to recycle as much as possible). After preparing the insulation, I drilled two evenly spaced holes in the bracket and then inserted screws and nuts to fasten everything securely.

> **NOTE:** To verify that the body and the bracket were properly insulated, I used a multimeter in continuity mode. By touching the metal body with one probe and the bracket with the other, no sound should be heard. If you hear a beep, you need to double-check the insulation.

Once everything was mounted to the wooden base, I added another copper wire underneath the steel body. This wire serves as the second terminal supporting the aluminum strip. Once the ribbon is attached, you should be able to measure electrical continuity between the first terminal and this one.

Finally, I glued six small neodymium magnets per side to the inner faces of the steel profile, all aligned in the same direction to create a magnetic field in the central space — the space that would later be occupied by the aluminum strip. Their role is essential: they enable the generation of the electrical signal by detecting variations in the magnetic field each time the ribbon moves.

2. Ribbon Preparation

The vibrating element was made from ordinary kitchen aluminum foil, folded accordion-style to increase its sensitivity to air pressure variations. Once folded, it measured about 12 centimeters in length and around 1.5 cm in width.

I gently stretched the ribbon between the two magnet rows, connecting its ends to the copper wires mentioned earlier. This closed the circuit so that, each time the ribbon vibrates — according to **Faraday's Law** — a small alternating current (on the order of microvolts or even nanovolts) is generated and flows through both terminals.

3. Step-Up Transformer Connection

To increase the output signal strength from the microphone, I used a **step-up transformer**, connecting the winding with lower resistance (fewer turns) to the microphone and using the higher-resistance winding (more turns) as the output. This increases the voltage generated by the ribbon, making the signal easier to amplify.

I reused a small 1:2 transformer (25 ohms primary, 50 ohms secondary). Even though this ratio is not ideal (commercial ribbon mics typically use a 1:35 ratio), it was sufficient to produce a readable signal on an oscilloscope.

4. Preamplifier

The preamplifier was built from a circuit originally designed for magnetic tape playback heads (audiocassettes) and uses two transistors. It is powered by a 9V battery, although the circuit works properly within a range of 7.5 V to 12 V.

5. Oscilloscope Connection

To verify that the system was working, I connected a small portable oscilloscope to the preamp output. In DC mode, I could observe both the offset and the signal variations. Touching the ribbon clearly produced visible waveforms.

Improvements

The ribbon can be attached to the copper wires using **conductive copper tape**, which ensures better electrical contact between the parts. This helps reduce the overall resistance of the microphone and, consequently, allows for a wider and cleaner signal.

Using a transformer with a **higher transformation ratio** could further improve the amplification of the raw signal output from the microphone. Likewise, proper **input impedance matching** on the preamp is crucial: 500 ohms, while acceptable for basic testing, is too high for a ribbon microphone, which typically performs better with much lower load impedances.

Conclusion

This project demonstrated that with simple materials, patience, and a bit of trial and error, it's possible to build a functioning ribbon microphone by hand. The experience helped me better understand **electromechanical transduction**, **low-level audio signal management**, and **practical analog electronics**.