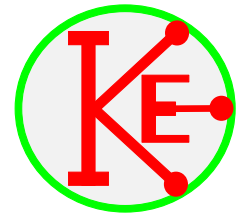


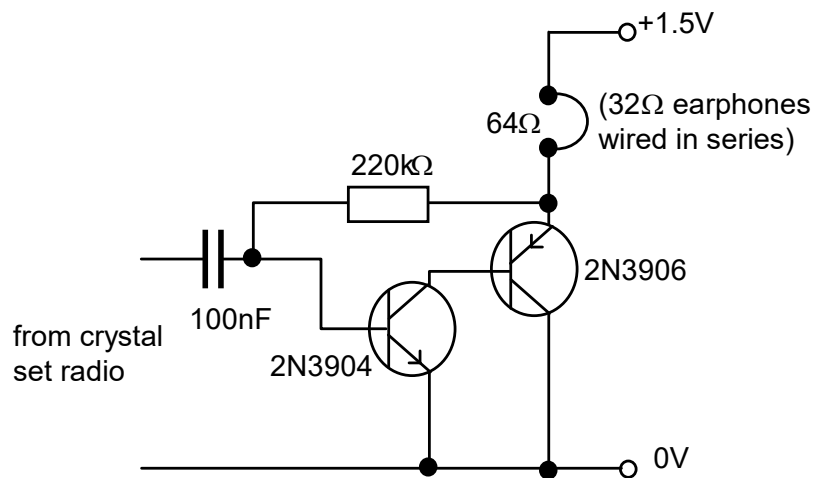
# Cornflake Packet Radio Project. Audio Amplifier



## Specification

- Operates from a 1.5V power supply.
- Provides approximately x10 voltage gain.
- Provides sufficient output to drive a 64Ω load.
- Built onto the same terminal strip as the crystal set radios.
- Uses a current of approximately 10mA.
- Removing the earphones switches off the amplifier.

## Circuit Diagram



## How it works

The 2N3906 transistor operates as an emitter follower and makes the 64Ω earphones appear as a much larger resistance at its base connection. This larger resistance acts as the collector load for the 2N3904 common emitter amplifier, which provides the voltage amplification.

The 220kΩ resistor provides the bias current for the 2N3904 transistor as well as negative feedback to stabilise the current passing through the transistors and to improve the quality of the audio signal. The 100nF capacitor blocks the direct voltage produced by the crystal set but allows the audio signal to pass to the amplifier.

When the earphones are removed, the connection between the 1.5V cell and amplifier is broken so switching off the amplifier.

If an external amplifier (e.g. computer speakers) is to be connected to the output, then a 100Ω resistor will need to be connected across the earphone socket in order to bias the two transistors correctly. However, removing the jack plug from the earphone socket will then not disconnect the circuit from the 1.5V cell.

## Construction

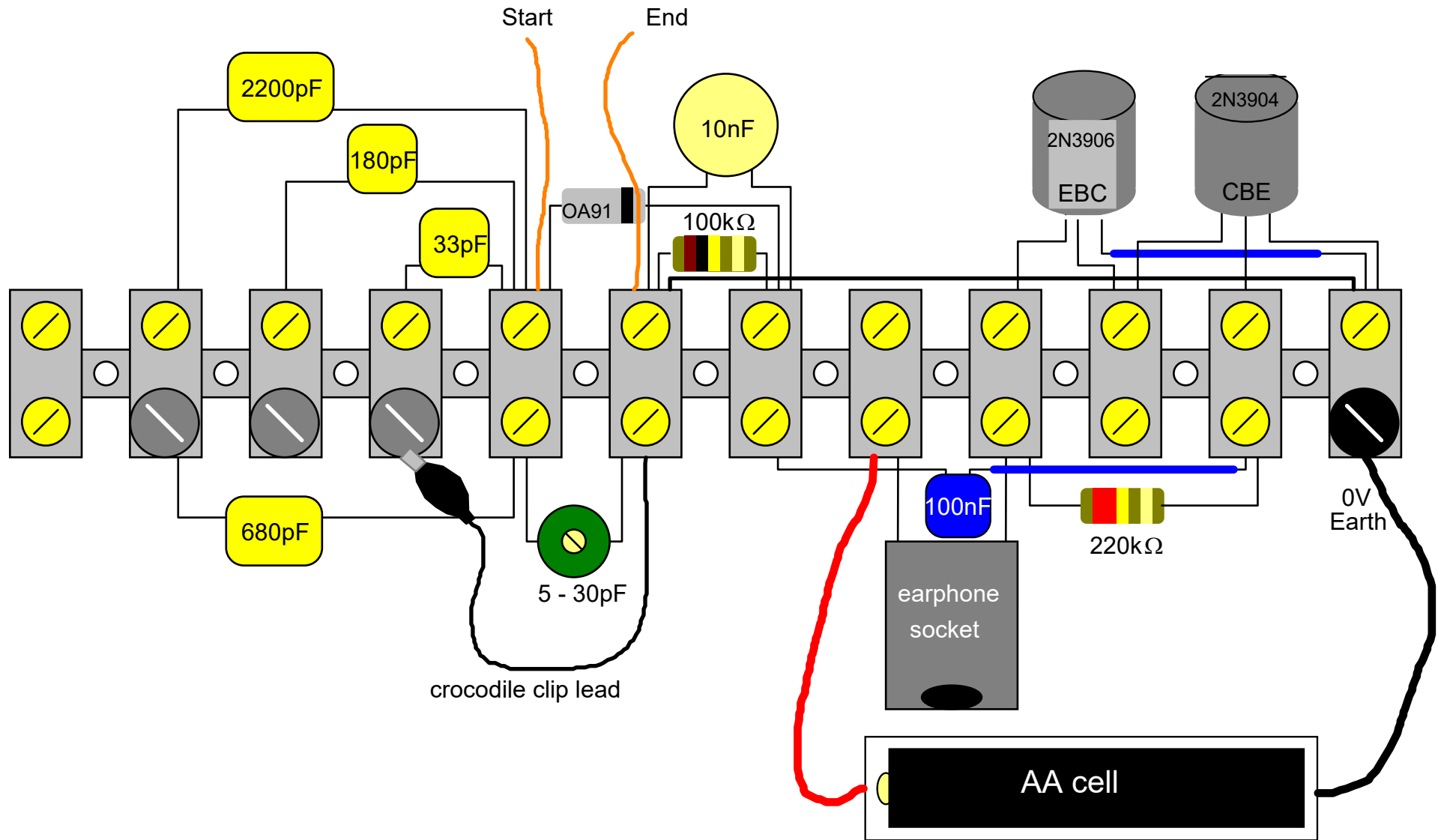
The amplifier is built onto the same terminal strip as the crystal radio.

It is advisable to remove the terminal strip from the crystal radio to prevent breaking the wires from the coil.

The earphone socket should then be removed.

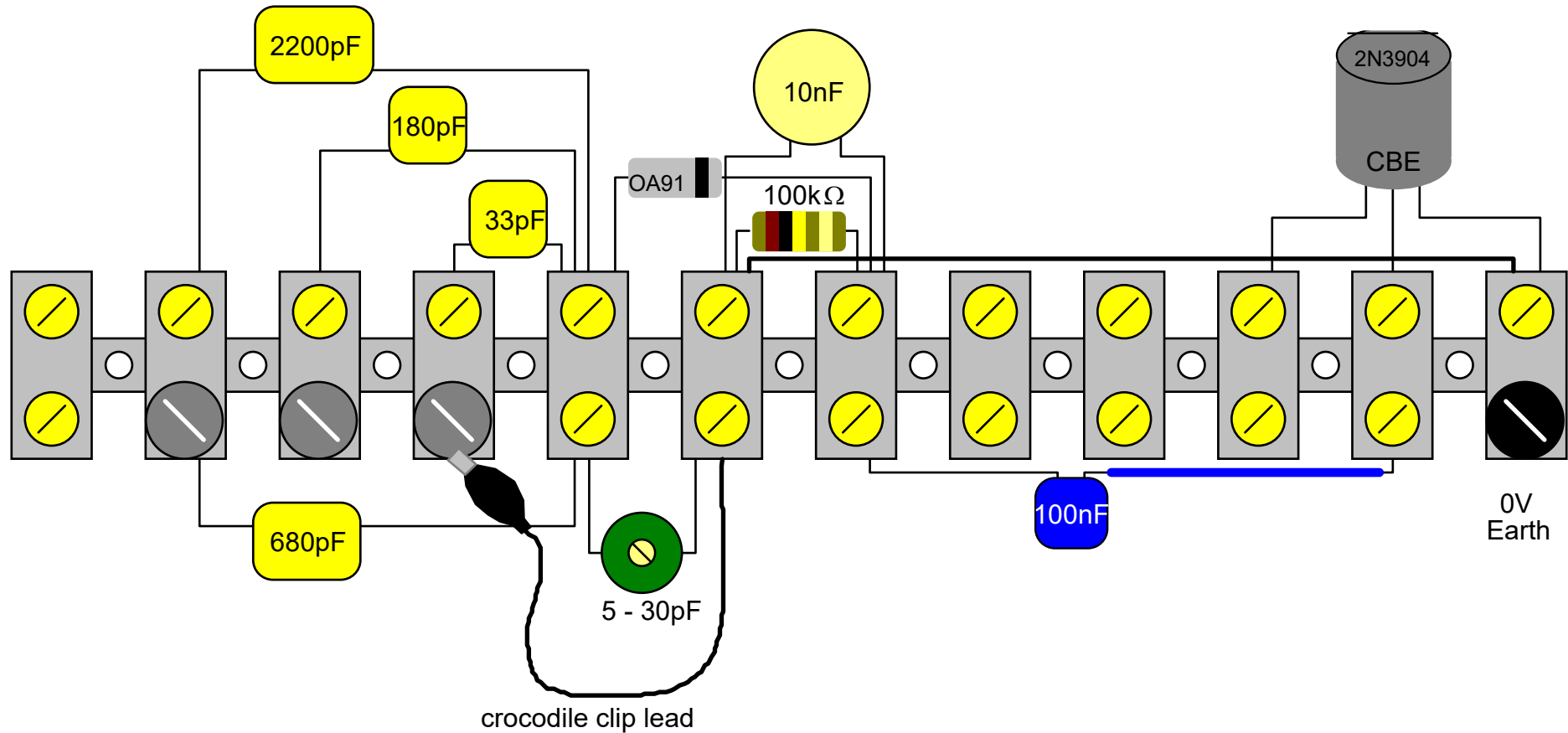
The completed amplifier and crystal set terminal strip layout is shown below.

# Terminal Strip Layout

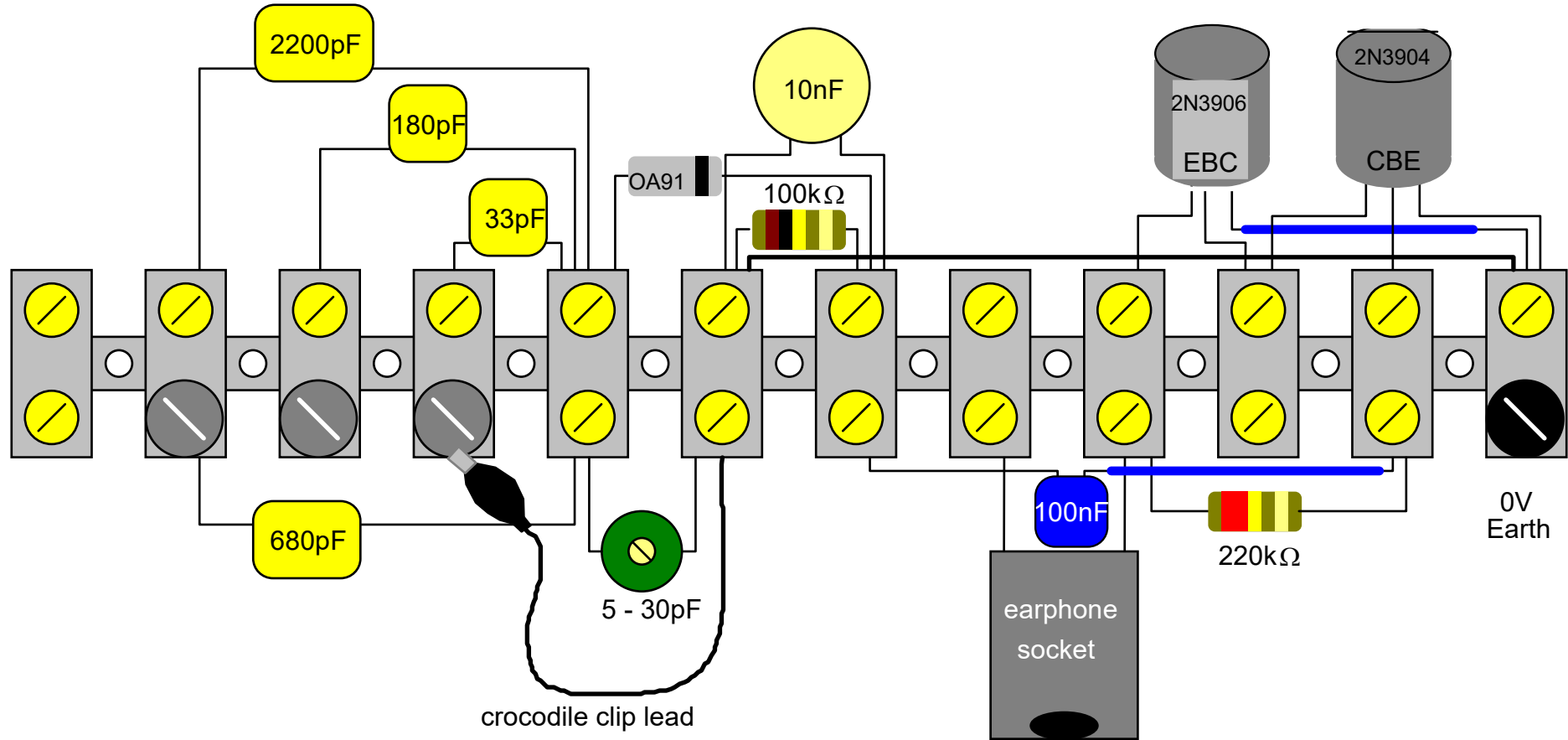


## Step by step construction.

- 1). Take the 100nF capacitor and the 2N3904 transistor. Add a piece of insulation to the one lead of the capacitor (shown in blue in the diagram). Carefully bend the leads so that they will fit as in the diagram below. Trim the leads if necessary. It does not matter which way round the capacitor is connected but ensure that the transistor is connected correctly.



- 2). Take the 220kΩ resistors (red, red, yellow and gold), the earphone socket and the 2N3906 transistor. Add a piece of insulation to the collector lead of the transistor (shown in blue in the diagram). Carefully bend the leads so that they will fit as in the diagram below. Trim the leads if necessary. It does not matter which way round the resistor is connected, but the transistor must be connected correctly.



- 3). Finally connect the battery, the coil wires and a earphones. Select a radio station and if all is well, the radio station will be heard in the earphones. Volume can be controlled by rotating the coil horizontally. If all is not well, disconnect the battery and check for wiring errors or for wires not being secure in the terminal strip connectors.