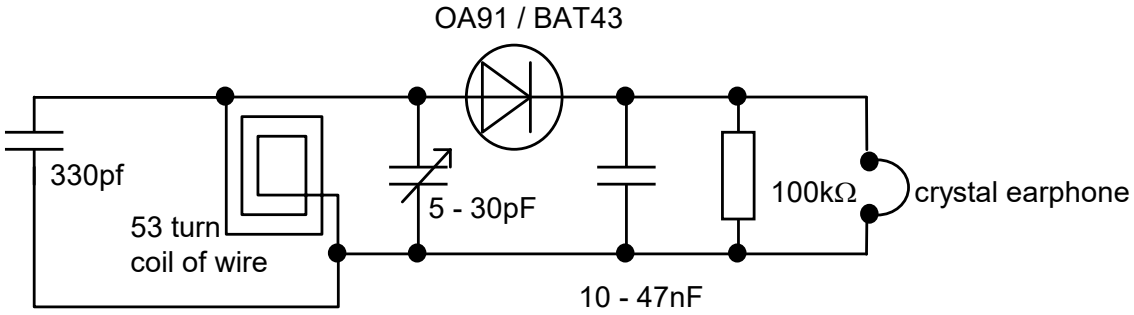
Cornflake Packet Radio Project.
Long Wave Crystal Set

Specification

Does not need a power supply.
Provides reception on the Long wave band.
Receives sufficient energy to power a sensitive crystal earpiece.
Can be used with an external amplifier - i.e. computer speakers.
Uses a loop coil to receive the magnetic field component of the radio waves.

Circuit Diagram



How it works

The Long wave band crystal radio works in the same way as the Medium wave band circuit. However, when the Medium wave circuit is set to receive Radio 4 on the Long wave, it uses a large value capacitor to make the coil receive the signals on 198kHz (Radio4), This is inefficient and so reception is weak.
The Long wave design overcomes this problem by using a coil with many more turns of wire (53 turns). This coil requires a small capacitor (330pF) to receive the 198kHz signals, so making it more efficient. The radio waves will also produce a much larger voltage in the coil, because there are many more turns of wire.

Construction

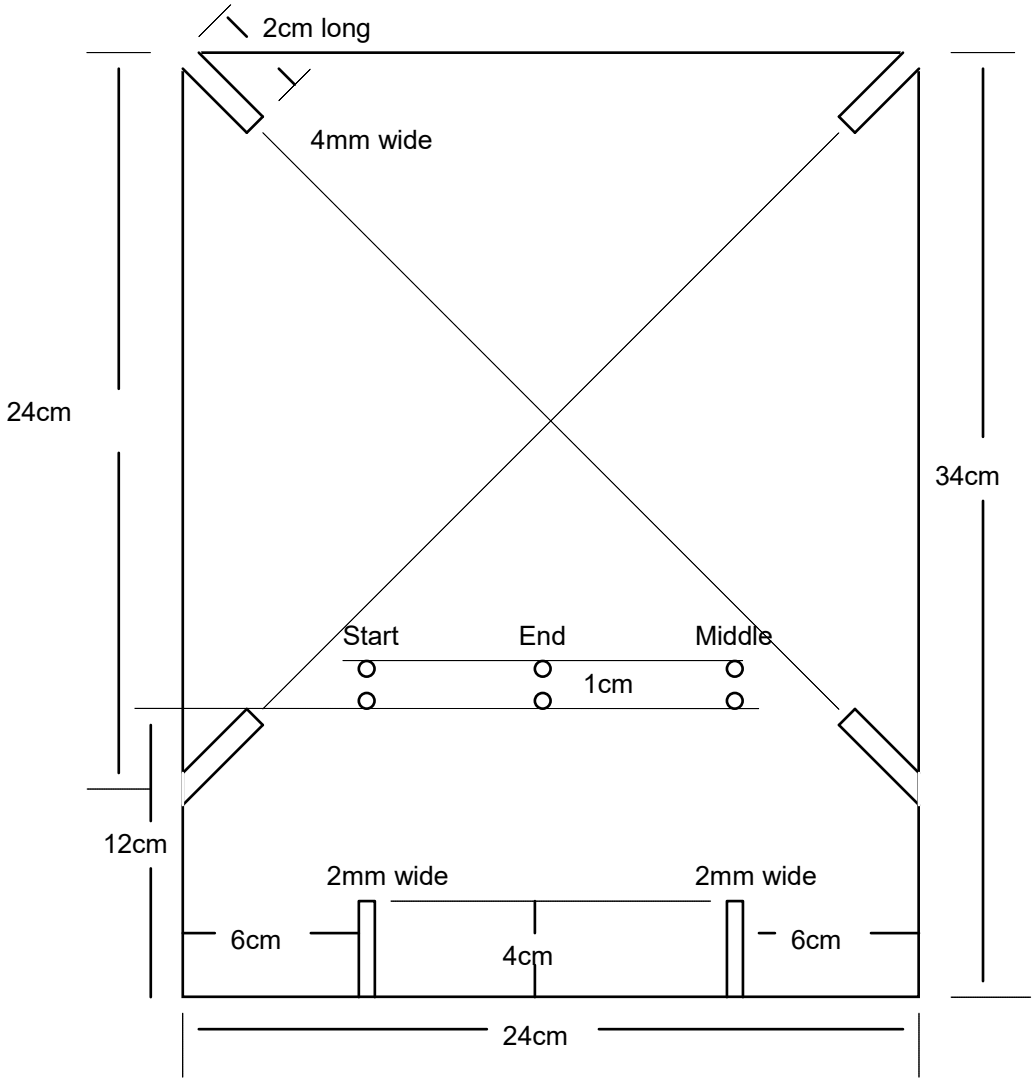
The first thing to make is the coil. This is wound on a piece of thick cardboard/thin wood that is 34cm x 24cm. The original was made from the front and back of a 790g packet of Cornflakes, stuck together with PVA glue to make a more rigid piece of card.
Slots are then cut into the card as shown below, to enable the coils to be wound and to provide a base to stand the card up. The diagram below is NOT to scale.

The diameter of the wire is not critical and 30swg (0.31mm) enamel coated copper wire was used for the prototypes.
The 53 turn coil is split into two to balance the wire better on the cardboard frame.
The wire is secured by passing through the 'start holes'. Remember to leave sufficient wire at the end to connect to the terminal strip circuit. The wire is then wrapped around the corner slots in the cardboard, finishing on the 33rd turn and securing the end by looping through the 'middle holes'.
The second part of the coil is then wound by securing the wire also through the 'middle holes' so that the wire can be wound around the corner slots from underneath the card.
NOTE. It is vital that the second coil is wound in the same direction as the first coil.

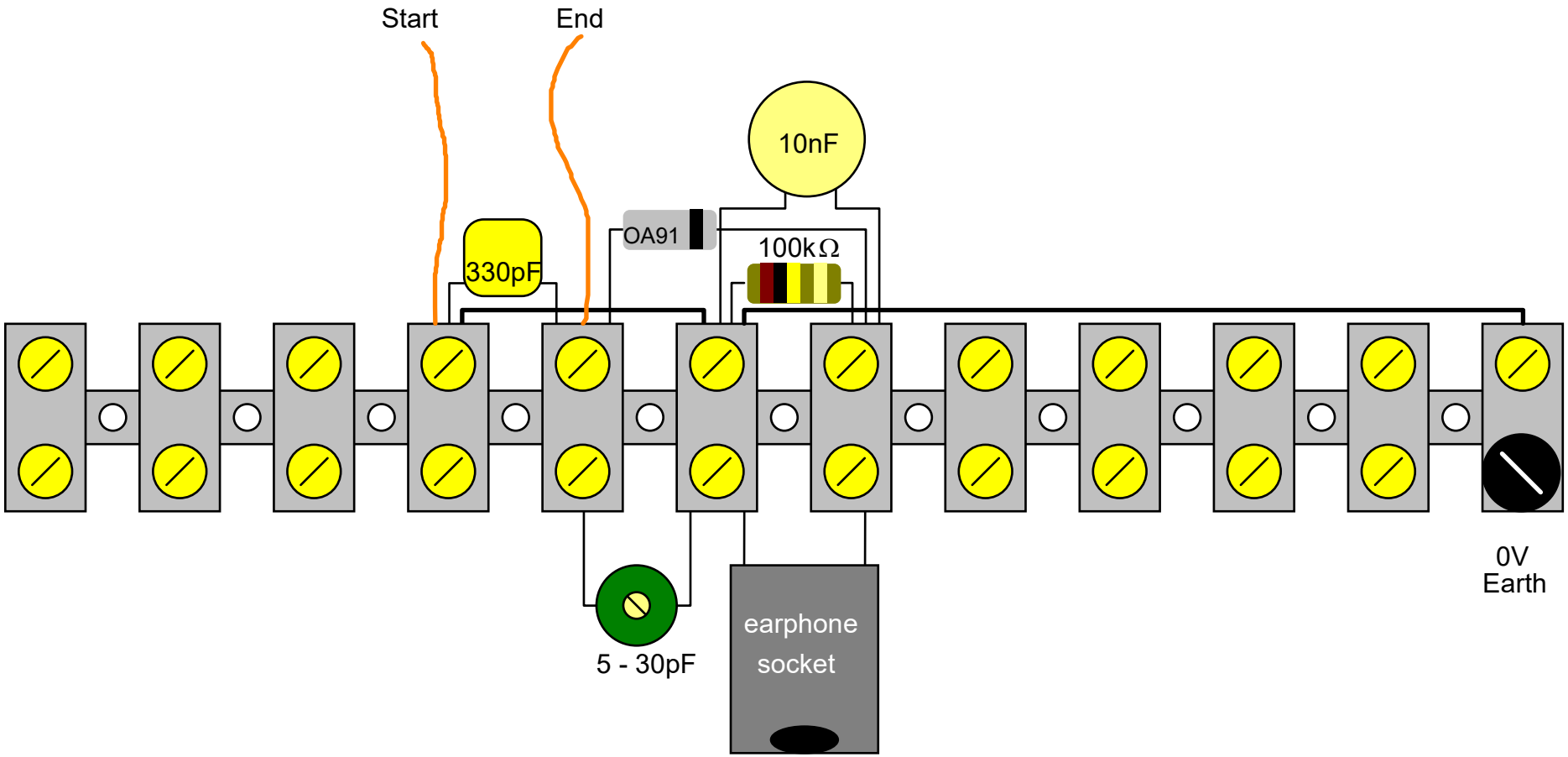
The second coil finishes on the 20th turn and the wire is secured in the 'end holes'.
Again remember to leave sufficient wire at the end to connect to the terminal strip circuit.

The two wire ends at the 'middle holes' need to have the enamel insulation removed from the ends and then joined together. The easiest way to remove the enamel is to use the flame from a match to burn away a cm or so of the enamel at the end of the wire. The ends can then be gently cleaned with a nail file or emery board.

The ends of the wires in the start and end holes also need to be cleaned so that they can be connected to the terminal strip.

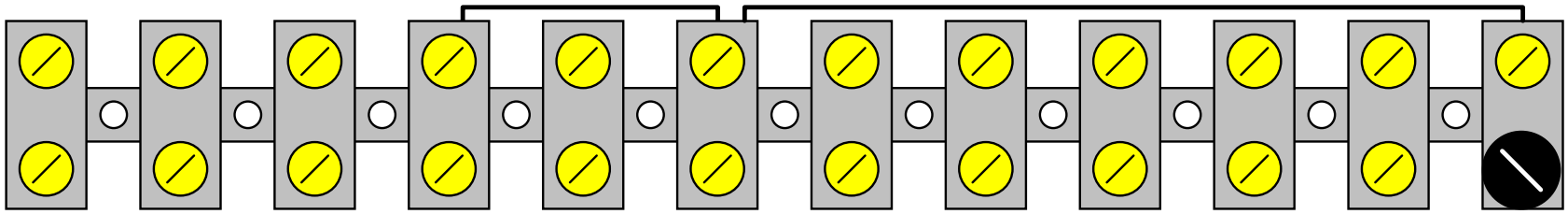


Terminal Strip Layout

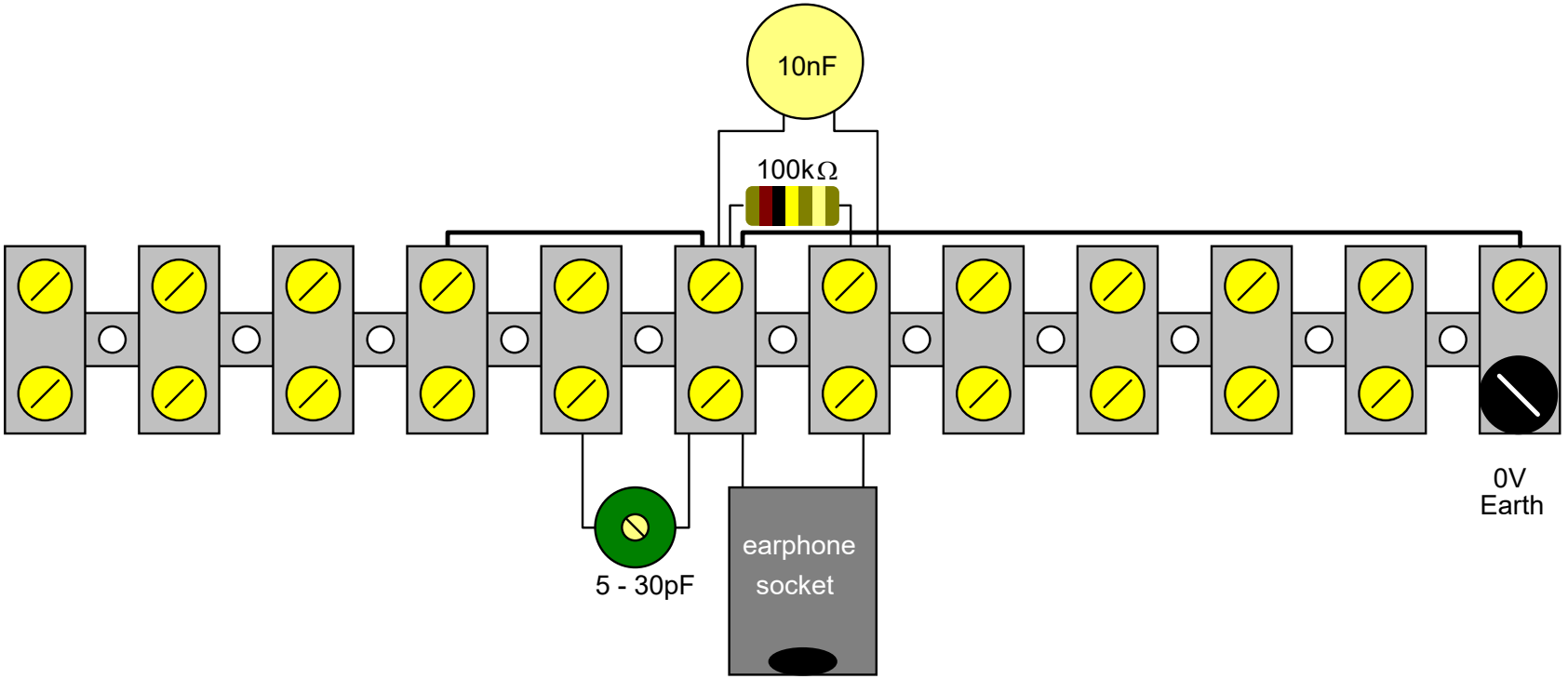


Step by step construction.

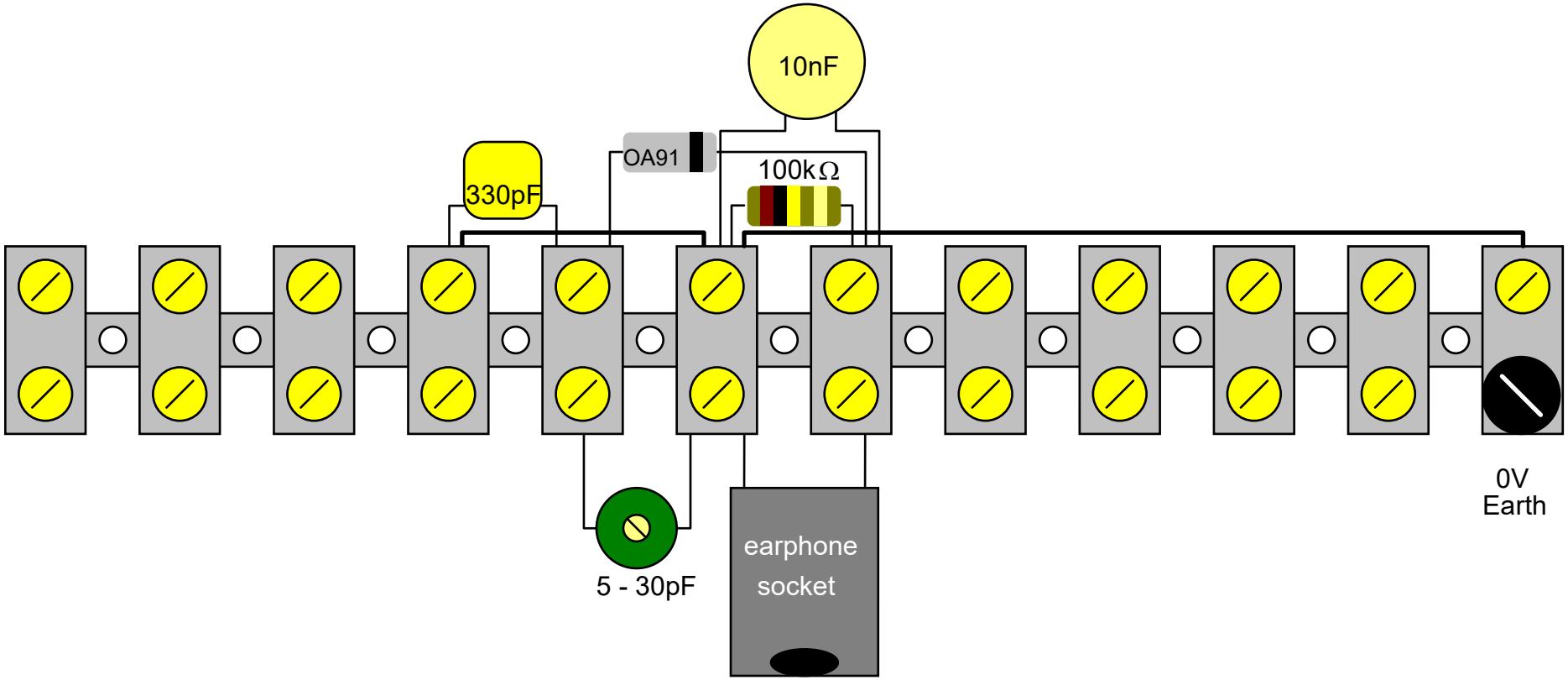
1). Cut two piece of black insulated wire and strip the ends. Bend the ends of the wires so that it will fit as in the diagram below.



2). Take the 100kΩ resistors (brown, black, yellow and gold), the 10nF capacitor, trimmer capacitor and earphone socket. 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 they are connected.



3). Take the remaining capacitor and 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 it is connected.
Take the OA91 diode and carefully bend the leads so that they will fit as in the diagram below. Trim the leads if necessary.
Ensure that it is connected the correct way round.

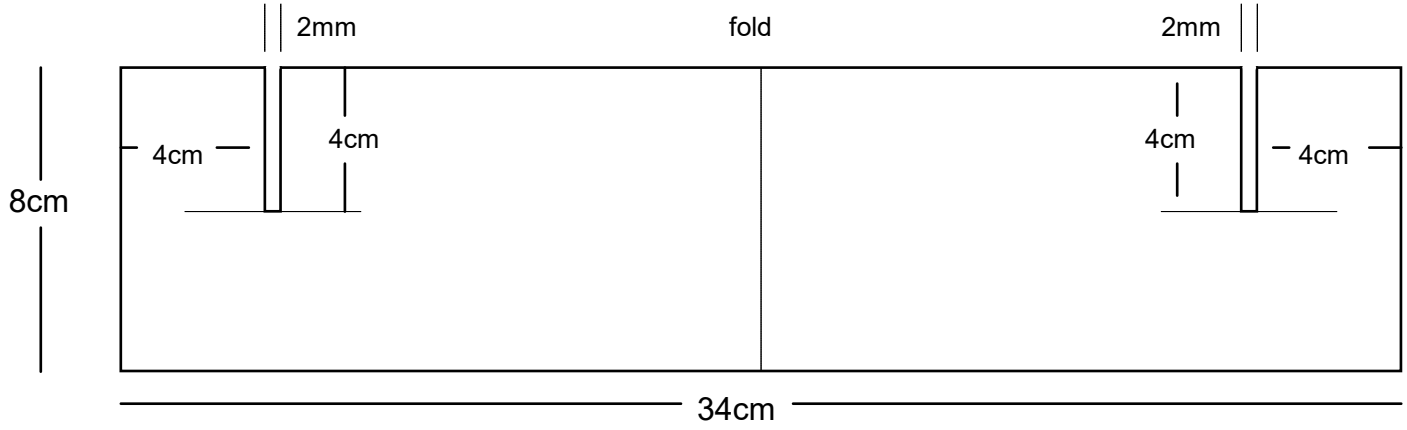


4). Finally connect the wires from the coil to the terminal strip connector and plug in the crystal earpiece to the earphone socket.
With the coil standing vertically you should hear faint sounds in the crystal earpiece - Radio 4. Keeping the coil vertical, rotate the coil horizontally until the sounds are the loudest. Now adjust the trimmer capacitor for the clearest sounds.
Connecting the OV terminal to the mains electricity earth may make the sounds louder.

If no sounds are heard, check the wiring for errors. Check that the enamel has been completely removed from the ends of the coil wires.
Some crystal earpieces are not very sensitive. If the crystal earpiece is suspected, plug computer speakers into the earphone socket, switch on and then try again to tune in Radio 4.

Cornflake Radio Stand

The Cornflake radios work best when the coils are vertical. The narrow sides of the Cornflake packet are used to make the radios stand upright.
Cut the two narrow sides so that they are 34cm × 8cm. Fold these in half (17cm × 8cm), so that the grey side is in the inside of the one and the outside of the other. Apply glue to the grey sides of the card and stick together.
When the glue has dried, cut two slits in the top of the card 2mm wide and 4cm long, 4cm from the ends of the card, as in the diagram below.



This card can now be partially folded and slotted into the slots at the base of the card holding the coil.
If the fold is to the rear of the card holding the coil, it should now stand vertically when placed on a flat surface e.g. a table top.