



BYP

MAKE YOUR OWN BYP-UNIT

Dear Recipient,

This is your very own Do-It-Yourself Broadcast-Your-Podcast manual.

In most cases this manual is accompanied by a set of all the necessary electronics. If not I would like to point you to one of the last pages of this manual, which lists all the places where I found the cheapest parts online.

It is also accompanied by a DIY BYP match box set, to protect your transmitter. And of course you're receiving a couple of stickers on which you can write your frequency. These you can stick through your neighbourhood to notify your neighbours about your broadcasted podcast.

I hope you first of all get the transmitter working, then love it a lot, and subsequently update your profile on the BYP page, so even more people can know about your broadcasted podcast.

Have a good day and spread the word!

Lotte Meijer

19.06.2006

<http://www.broadcastyourpodcast.com>

THE INGREDIENTS

a piece of copperboard



antenna wire



BC337 transistor



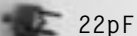
1 uF polarized capacitor



0.01uF capacitor (2x)



10pF capacitor



22pF variable capacitor

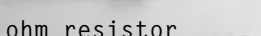
470 ohm resistor



27k ohm resistor



10k ohm resistor



copper wire



a battery clip



3.5mm plug with audio cable

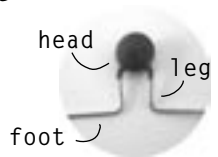


To make a transmitter. you need the following elements:
You should find these all in the little brown bag.

- a piece of antenna wire (1m)
- a 10 cm piece of 0.8mm copper wire
- a 9 Volt battery connector
- a piece of single sided copper board (5.5 x 6.3 cm)
- a 3.5mm audio plug with cable attached to it.

- a BC337 transistor
- two 0.01 uF capacitors
- a 10 pF capacitor
- a 1 uF polarized capacitor
- a 20pF variable capacitor
- a 470 ohm resistor (yellow - violet - black - black)
- a 10k ohm resistor (brown - black - black - orange)
- a 27k ohm resistor (red - violet - black - orange)

I will refer to the components with the words “head”, “leg” and “foot”. You can see on the picture on the right here what is what.

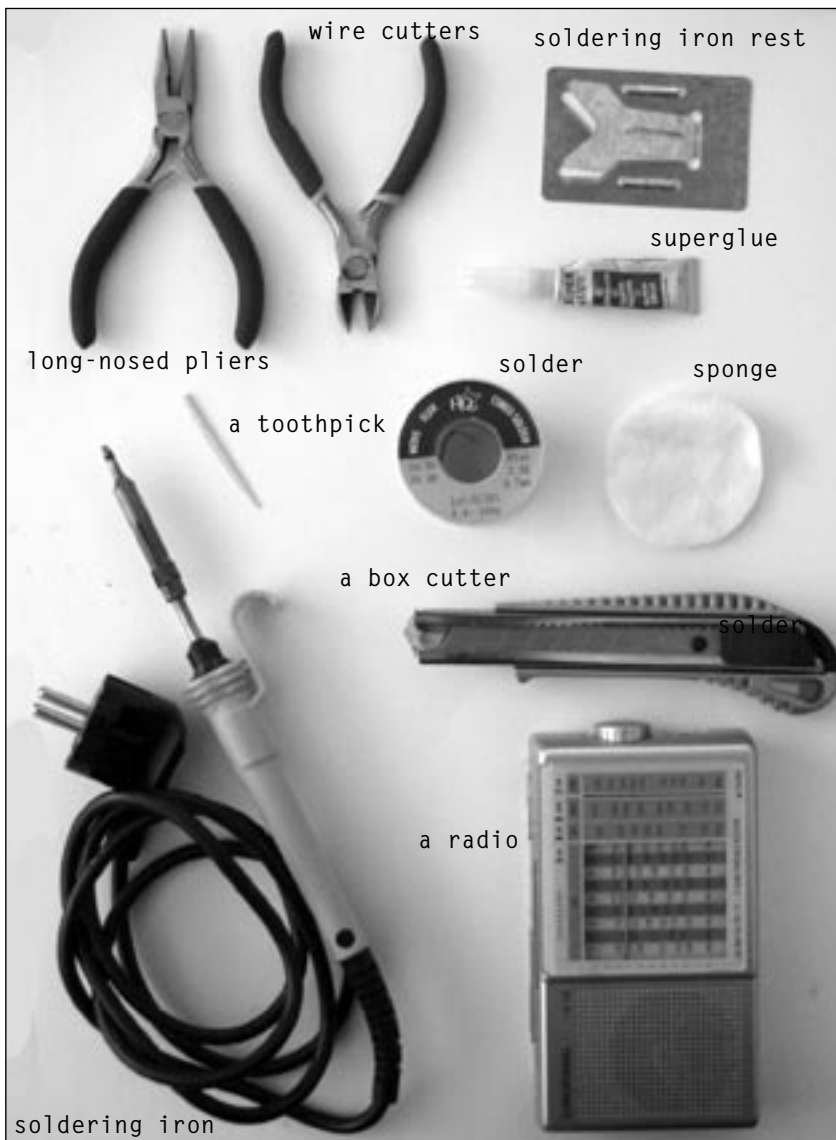


TIPS:

You can see what the value of a capacitor is by looking closely at the head of the capacitor. It is usually written on there in very small print.

All resistors are color coded. You will see five bands on the resistor, the four color codings ending with brown.

THE TOOLS



To make the transmitter, you need the following tools:

For preparing the board:

- a box cutter (or a similar sharp knife)
- superglue

For building the transmitter:

- long-nosed pliers (for holding and bending the parts)
- wire cutters (for cutting the legs off)
- a soldering iron
- soldering sponge (or cotton) to clean your iron
- soldering iron rest
- solder wire (thinner is easier)

For using and testing the transmitter:

- a toothpick or other long piece of wood or plastic
- a sounddevice with a 3.5 mm headphone-output
- a radio
- a 9 Volt battery

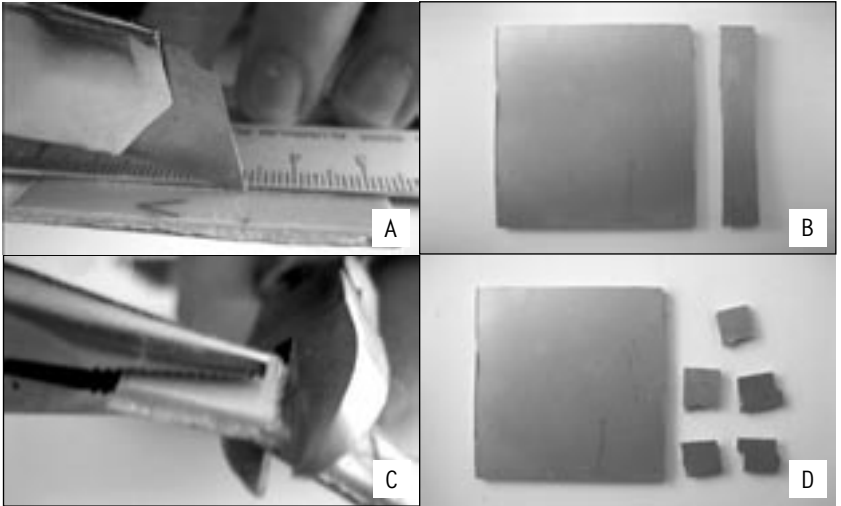


Make sure you've got everything before you start.

TIPS

From now on I will refer to the soldering iron as iron.

STEP 1: CUTTING THE BOARD



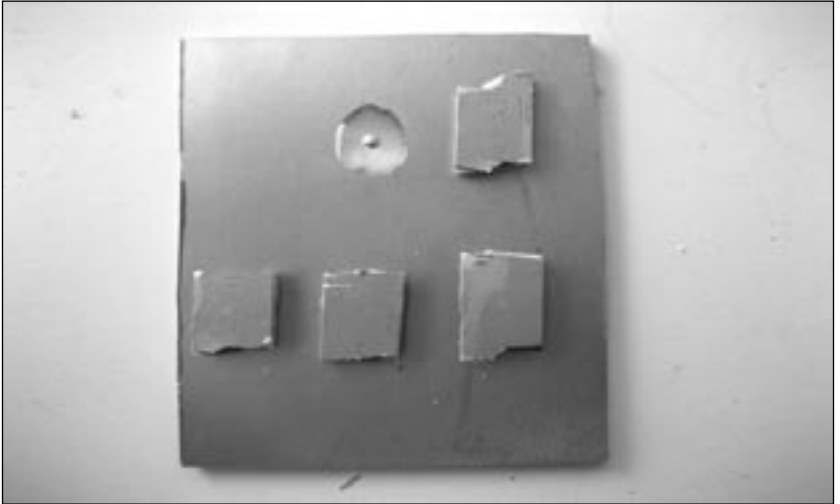
This board is called single-sided copperboard. Which means one side is copper, the other compressed paper. Eventually you want 1 big piece (5 x 5.5 cm) and 5 smaller ones (of 10 x 8 mm). [D]

- Grab your box cutter and something with a straight edge
- Score one long straight 8mm wide strip of your piece of copperboard. [A] Repeat this several times until you feel you can snap the strip with a pair of pliers. [B]

Cut/break five pieces out of this strip:

- First pre-cut the lines with your knife, then
- Hold the strip with your wirecutters, and bend/break the other part off with the long-nose-pliers [C]

STEP 2: GLUEING THE SMALL SQUARES TO THE BOARD



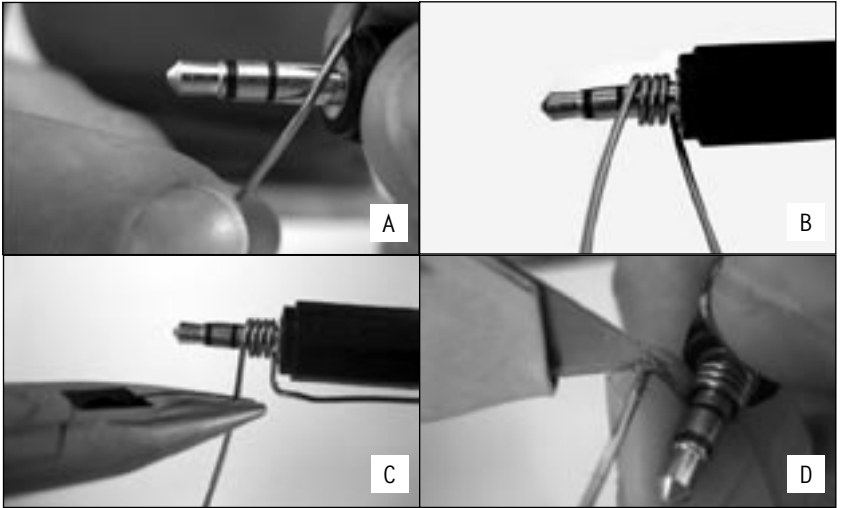
In this step you have to glue the smaller squares to the board.

- First drop five blobs of glue onto the copperboard, Three on the bottom, two on the top. Like you see above.
- Then, using your pliers, place the small squares, with the copper side up, on the glue drops.
- Wait till they dry, and while you wait. turn on your soldering iron, and wet the sponge a bit. Use the soldering-rest to protect your table from burning.

TIPS

Really use the pliers. Super glue on your fingers is super annoying

STEP 3: WINDING THE COIL



Before you begin the actual transmitter building, you need a coil. This coil has to be made of 4 winds of 0.8mm copperwire, and the diametre of each wind should be about 5mm. The mini jack is a perfect tool for this!

- Grab the piece of 0.8mm copper wire and the mini jack.

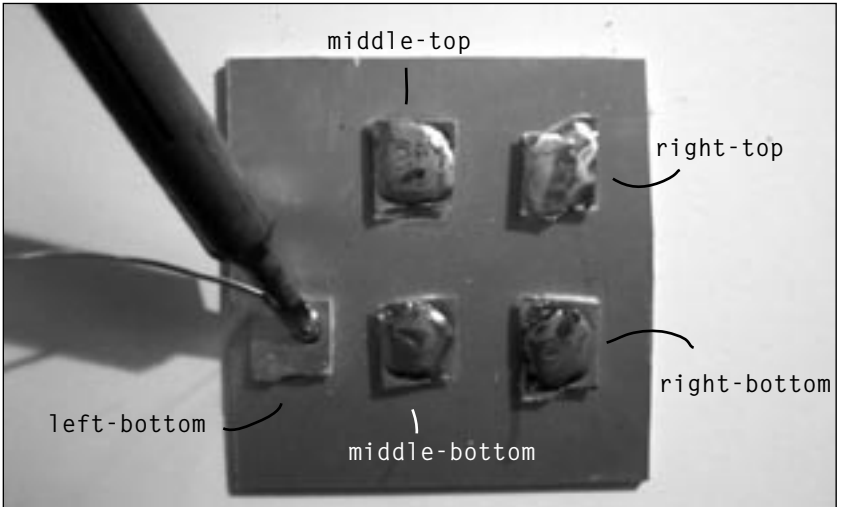
[A]

- Now twist the wire around the plug 3 times. From the top this should look like 4 winds, with the two legs sticking out to the bottom. [B]

- Fold the legs out, so that the wound part, is a bit higher than the feet. [C]

- Because this copperwire is plastic-coated, it will be near impossible to solder on. So you have to scratch the plastic off the feet with the knife. It is easiest if you still hold it attached to the plug. [D]

STEP 4: COVER THE SQUARES IN SOLDER



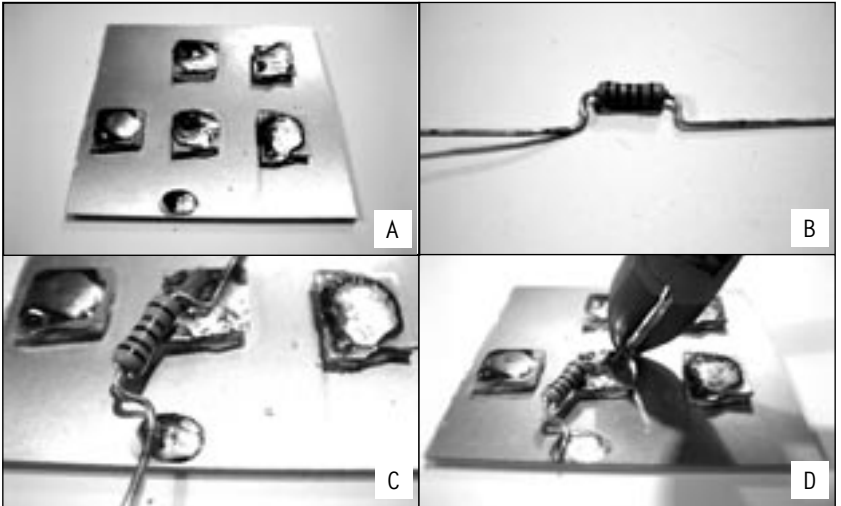
To make life and soldering easier. It is recommended that you first cover the small squares in (melted) solder.

- Hold your hot iron directly onto a copper-square for two to three seconds.
- Then push the solder wire into the point where the soldering iron meets the copper. (hold your iron there)
- Keep pushing the solder wire into the board, until the entire surface of the little square is covered evenly with solder.
- In the rest of the manual, I'll refer to these smaller squares with the names you see written in the picture.

TIPS

I usually stick my board to the table with a piece of tape, so that it doesn't move when I'm working.

STEP 5: SOLDER ON THE 10K OHM RESISTOR



Now we start for real.

- Make one blob of solder on the board a cm below the middle-bottom square. [A]
- Now get the 10k Ohm resistor. This will be the one with the color sequence brown black black orange brown, and bend its legs with the pliers so that it gets little feet. These should be about 1 cm apart and fit between the middle-bottom square and the blob below it. [B]
- Heat up the solder on the middle-bottom square until it melts
- Hold the resistor with the pliers, and stick one of the feet in the hot solder. Take your iron away and wait for it to settle. (this should take seconds). [C]
- Now heat the blob below, and stick the other foot of the resistor in it.
- Cut off the bits of feet that are too long. [D]

STEP 6: SOLDER ON THE 27K AND THE 470 OHM RESISTOR



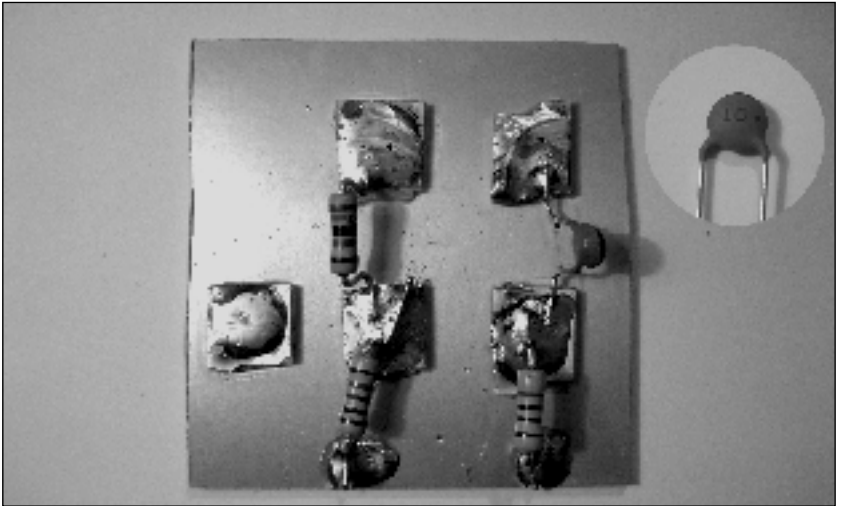
- Put a blob of solder on the board below the right-bottom square.
- Grab the 470 Ohm resistor (yellow violet black black brown), fold its legs, so it gets feet. Solder one foot to the right-bottom square, the other to the blob, and cut off the excess feet.
- Now solder the 27k resistor (red violet black orange brown) between the middle-bottom square and the middle-top square.

TIPS

Make sure the blobs don't merge into each other. If they do: try to separate them, by dragging them out a bit with your soldering iron, or use your knife.

The shorter you make the legs, the further your transmitter will transmit.

STEP 7: SOLDER ON THE 10PF CAPACITOR



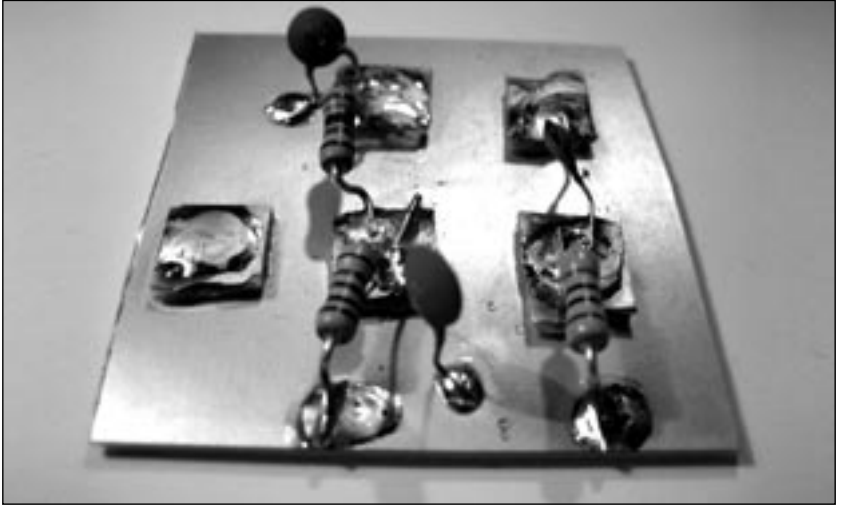
Now we are going to solder the capacitors.

- First get the 10pF capacitor. It probably looks a lot like the 0.01uF one. You can see the difference in the text printed on the head. Usually the 10pF has “10” written on it, the 0.01uF has “103”. You might want to use a magnifying glass, because the type can be very small.
- Bend the legs of the capacitor, so that it fits between the top & bottom right squares.
- Now hold it with the pliers. and solder it down.

TIPS

If you feel like you do not have enough solder, just heat up the solder on the square, and stick the solder wire in it, to create a larger blob. Feel free to mix it all up so it looks pretty and the feet are covered well.

STEP 8: SOLDERING ON THE 0.01UF CAPACITORS



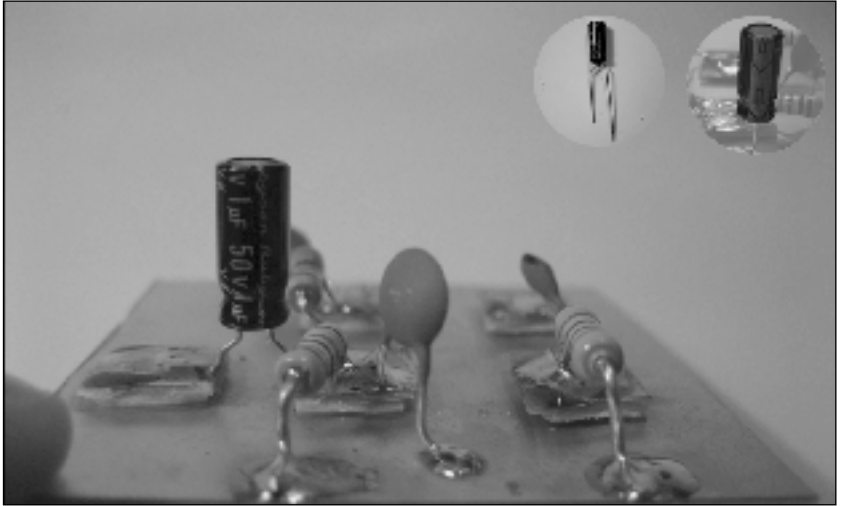
As you read before, you can recognize the 0.01uF capacitors, by the number “103” written on its head.

- Make one blob on the left of the middle-top square, and one blob below the middle-bottom square.
- Bend the legs, solder one of the 0.01uF capacitors between the top square and the blob to its left. And one between the middle-bottom square and the blob below it. And once again cut off the excess feet.

TIPS

Since you're advanced now, you can also pre-cut the feet. This sometimes actually makes it easier, because they don't get in the way of other parts when you try to solder them on.

STEP 9: THE POLARIZED CAPACITOR.



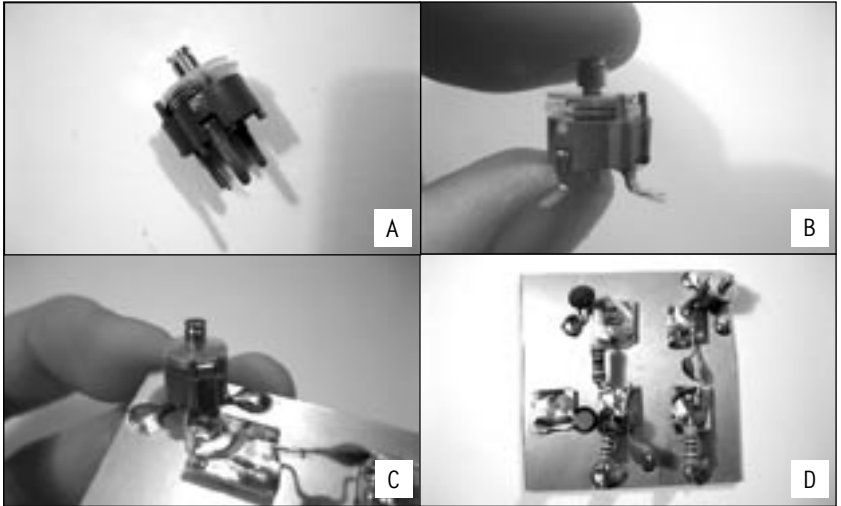
The polarized capacitor is special. This one does need to be soldered on the right way round.

- Pick up the polarized capacitor (it is the part with the big black head, and the long feet). You will see that on one side it has a different color (in this case white) band printed with a dash (-) in it. This is its negative side.
- You want to solder the leg on the negative side to the left-bottom square, and the other (positive) leg to the middle-bottom square.

TIPS

You can also recognize the negative and positive side of the polarized capacitor by the length of its legs. The negative leg is shorter.

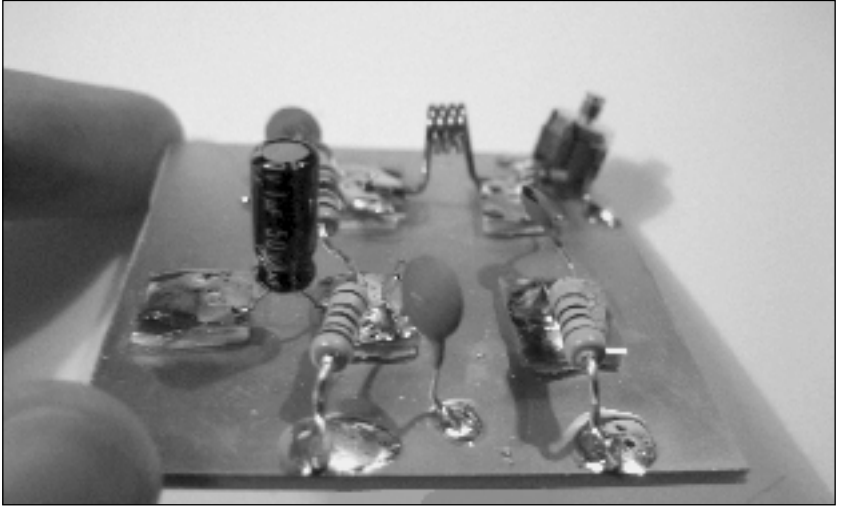
STEP 10: THE VARIABLE CAPACITOR



Now it is time for the variable capacitor. With this part, you can later change the frequency of your transmitter, so it is very useful.

- Try to find it. It is a small green round part with three little feet. [A]
- Fold the feet out to the sides [B]
- Now you want to solder the middle leg to the right-top square, [C] and the two legs opposite of each other to the copperboard. Watch your fingers, because the part gets hot when you're soldering it.
- We are now halfway through! [D]

STEP 11: SOLDERING ON THE COIL



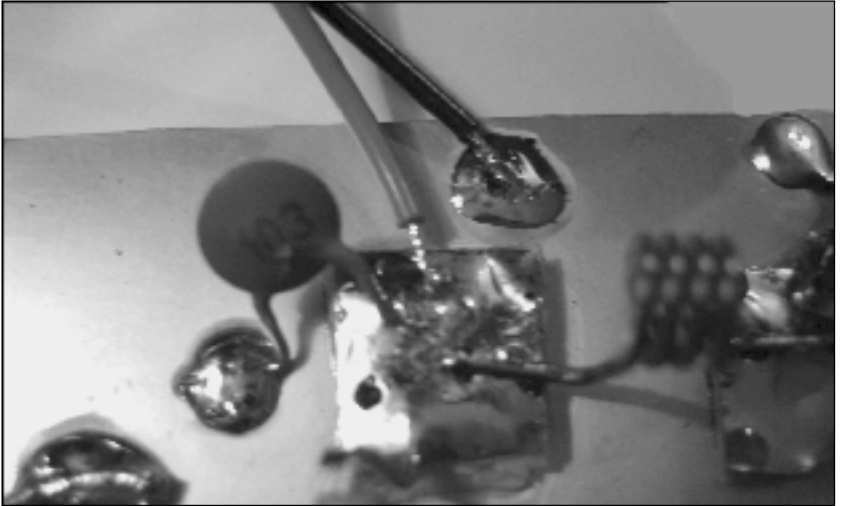
Get the little coil that you made in step 3. This one has to be soldered between the top two squares, and it is tempting to hold it with your fingers, but that's a bad idea. Soldering on the coil is a bit difficult.

- Stick the coil to the mini jack with a piece of tape.
- Make sure there is a lot of solder on the middle-top-square (add a bit if it's not enough)
- Melt the solder on the middle-top square, and stick one foot of the coil in.
- Do the same with the right-top square and the other foot of the coil
- You can now remove the plug.

TIPS

If the solder won't stick to the feet of the coil you need to scratch them a bit more.

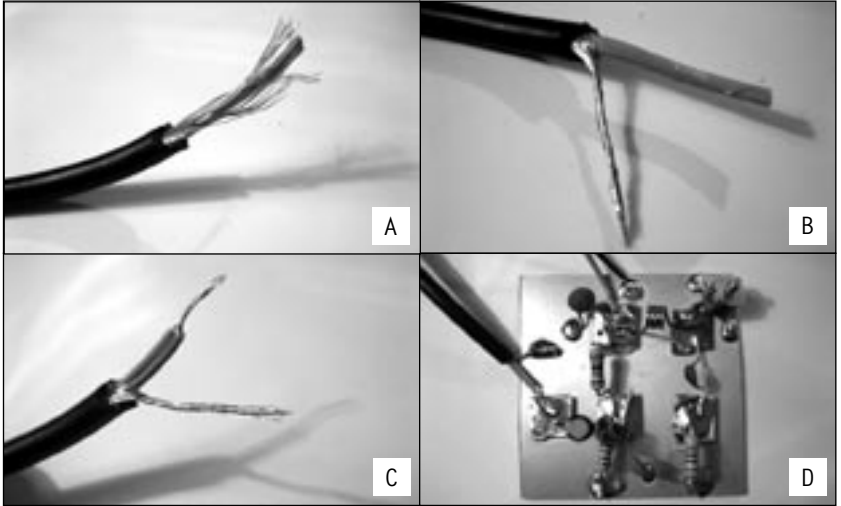
STEP 12: ATTACH THE BATTERY CLIP



The battery clip has got two wires attached to it, one red, one black. The red is the positive one, the black negative.

- Do not attach the battery to the battery clip
- Make a little blob of solder above the middle-top square, and attach the wire sticking out of the black leg to it.
- Solder the foot sticking out of the red leg to the middle-top square,

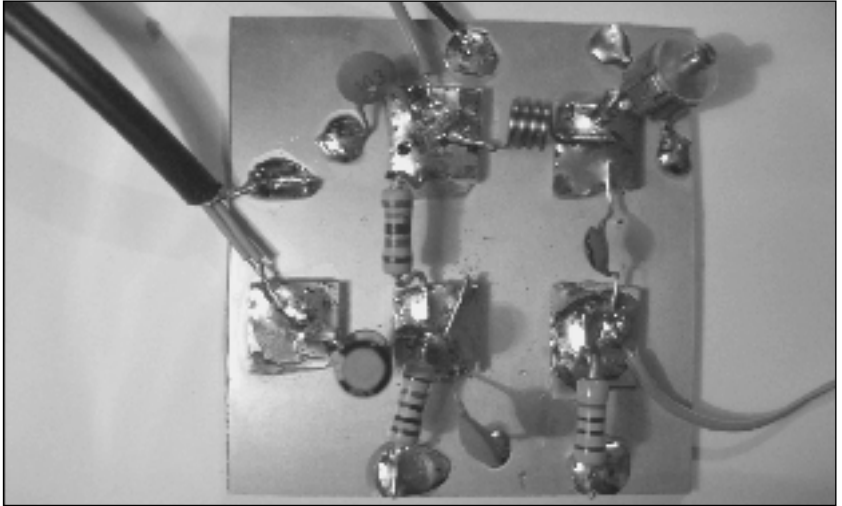
STEP 13: SOLDERING ON THE AUDIO-INPUT



The audio-signal will enter the transmitter through a cable with a mini jack attached to it.

- Cut about two cm of thick plastic off the end of the cable. You will see one (mono) or two (stereo) core(s) covered in colored plastic, and a bunch of wires around it. [A]
- Twist the external wires together. [B]
- Then strip the plastic about one cm off the core(s) (be careful to not cut the wires in it), and twist those wires together too. [C]
- Now solder the core wires to the left-bottom-square, and the other to the board. Make sure the two do not touch! [D]

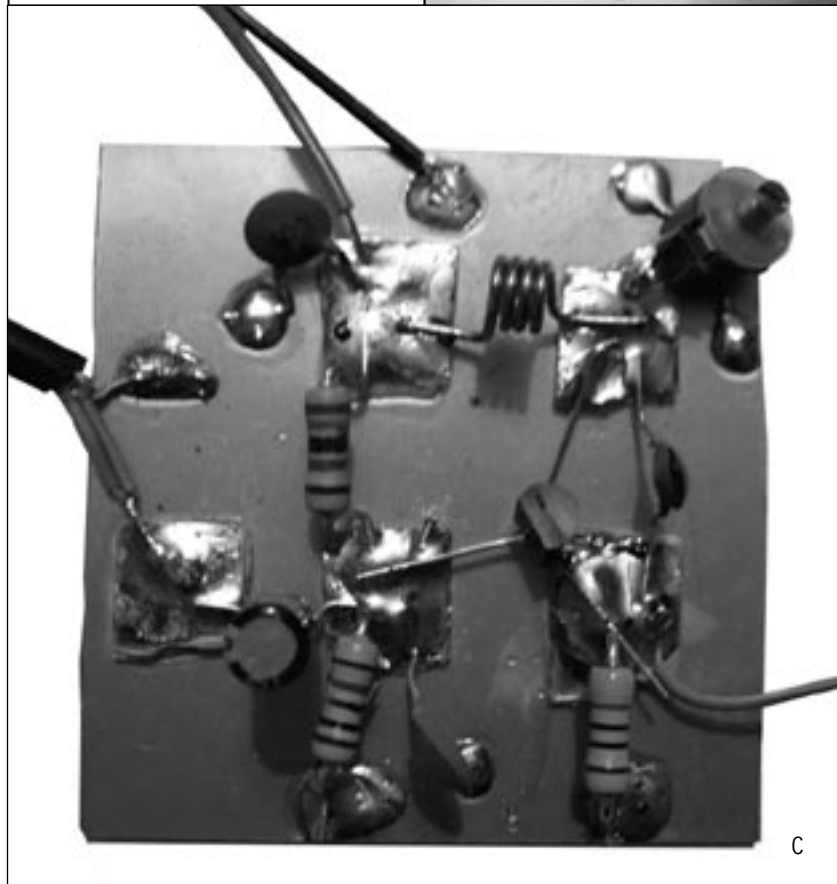
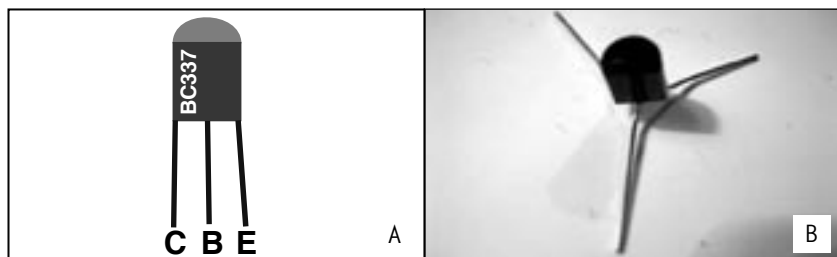
STEP 14: ATTACHING THE ANTENNA



So now you're almost done with the building part. As you will understand, the antenna makes the signal go further. It does not help to make this thing as long as possible, actually every frequency has a preferred antenna length. Which I'll discuss later.

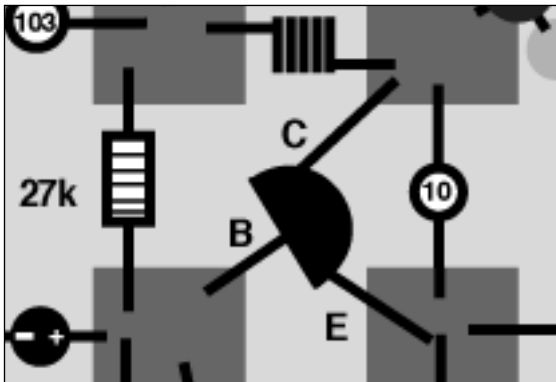
- First strip a cm of plastic off the antenna-wire, to expose the wire.
- Twist the wire inside to one solid wire
- Solder it to the right-bottom square.

STEP 15: THE BC337 TRANSISTOR

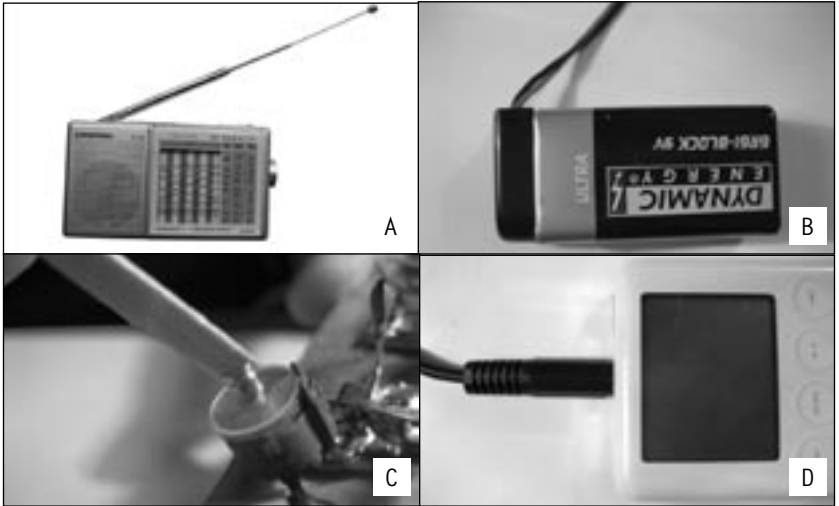


The trickiest part is the BC337 transistor. If this part is not the right-way-round, it will not work.

- You see the part has got three legs. If you keep the flat side towards you, the left leg is called “C”, the middle one “B”, and the right leg is called “E”. [A]
- Fold the middle leg towards the front. the right leg towards the back-right and the left leg towards the back-left. [B]
- Now hold the transistor, so that the middle leg, which you folded to the front touches the middle-bottom square, the right leg touches the right-bottom square, and the left leg touches the right-top square.



STEP 16: TESTING THE TRANSMITTER



It is finally time to test.

- Turn on your radio, and look for an empty frequency [A]
- Attach your battery to the battery clip. [B]
- Now use the toothpick (or another non-conductive (plastic/wooden) stick to turn the little screw on top of the variable capacitor slowly until you hear the static on your radio disappear. [C]
- Now stick the mini jack into the headphones output of a sound device, such as your ipod, cd-player or computer. And set that device to play.[D]

TIPS

Sometimes you have to pick a different frequency. As a last resort you can scan the dial to see if you hear your ipod anywhere.

TROUBLESHOOTING

If you didn't hear your stuff during testing, you can try all the following things:

- Check if all your parts are in the right place.
- Check if polarized capacitor (the black thing in the left bottom) has the negative sign to the left.
- Check if the variable capacitor has its middle leg to the square and the others to the board.
- Wobble all the parts to see that they are attached right. if they get a bit loose: put more solder on. Make sure that each part makes good contact with the copper board or squares. (if possible)
- Melt the solder on the squares, and sometimes put more on, to make sure everything is well-covered/attached.
- Check if your battery is attached well, and that it is not empty.

Test again. If you still don't hear anything (not even scratching if you plug your 3.5mm plug in/out) try the following:

- Unsolder and then rotate the BC337 transistor to test all possible leg-to-square connections (you can limit yourself to the two right squares and the middle-bottom one)
- Try a different frequency on your radio, and set it louder.
- If you still don't hear anything: Take a picture of your transmitter and post to the BYP-forum for help.
<http://www.broadcastyourpodcast.com/forum>

STEP 17: TRIMMING THE ANTENNA



Once you found a frequency which gives you a good reception. You can cut the antenna to the right size to make it better.

The length of the antenna should be longer/shorter depending on the frequency according to the following formula: length in cm = $(300 / \text{frequency}) * 25$

For example, if you are transmitting on 100FM, you antenna should be $(300/100) * 25 = 75$ cm long.

• So calculate the length of your antenna by the formula, and cut it to the right size

TIPS

One centimetre is 0.39 inches

Your transmitter will transmit better when you make the antenna as straight as possible

STEP 18: FANCY BOX



Of course now you can put your transmitter in a pretty box. I had found a batch of old army flashlights from "PERTRIX" in my local army surplus store, which functioned as the first BYP holders.. Unfortunately, they now ran out and I noticed that they're sold for 15-50 Euro's online.

So, I've included a fold-it-yourself match box, the folding should speak for itself.

- I recommend you to build a little cardboard border between the transmitter and the battery, so that if you walk around with it, they don't touch too much.
- To get the 3.5mm plug through the hole: it isn't possible. You have to unsolder it, stick it through and resolder it (right-way-round) to the board.

TIPS FOR USING TRANSMITTER

The frequency of the transmitter can change a bit, depending on how full the battery is.

- If you plan to use the transmitter on one steady location. It might be smart to buy a 9-12 Volt power supply at a local electronics store. You can cut the plug at the end off, and solder the wires of the power supply to the transmitter. DO NOT let the two wires touch, or you'll blow a fuse. (or more) And do not solder the wires while the power supply is plugged in!

SHOPPINGLIST

I've bought most of the parts in bulk online. The code behind the part is the partnumber on the website, to help you search. Your local electronics retailer will probably also sell these parts.

At <http://www.maplin.co.uk> I found:

battery-clips (NE19V)
copperboard (WF38R)
22pF variable capacitor (WL70M)

At <http://www.rs-components.nl/> I found:

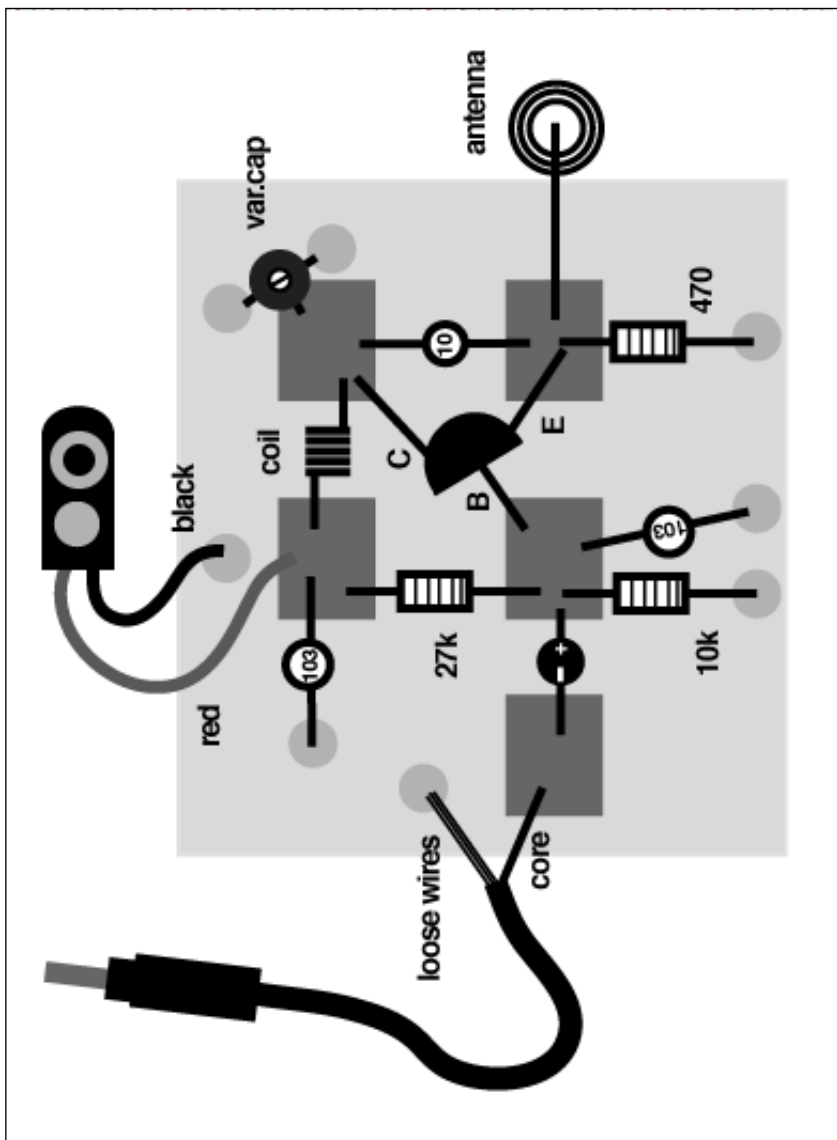
resistors (149-672, 149-818, 149-868
the BC337 transistor (131-1430)
10pF capacitors (829-249)
0.01uF capacitors (829-586)
copperwire (357-772)
antenna wire from flat ribbon cable/wire (105-5281)

I've actually bought the flat ribbon cable/wire at my local electronics store. That way I didn't have to buy 30 metres. There I also found my solder & soldering iron.

The toothpicks, cottonswabs, super glue and 9 Volt battery were bought at my local "euroland", any dollarstore would do.

The 3.5mm plugs I got from the russian electronics market in Riga. These things can be really expensive. The cheapest I've found online were from www.markertek.com.
Part number: M-M-3

DIAGRAM OF TETSUO KOGOWA'S MINI-FM TRANSMITTER



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