

# **Crystal Radio Engineering Component Sources**

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The following are some sources for components for your crystal radio. Many sources have minimum handling and shipping charges so I suggest that a group of interested people pool their money and make a single order – one set of charges can be amortized over the group – everyone saves! Be sure to order extra parts to have to replace parts you accidentally break.

## **Antenna insulators and wire**

Check with your local hardware store. You will probably not find insulators but there are all kinds of methods to improvise such as using plastic pipe. Some mail-order hobby electronics sources sell insulators made for wire antennas. The antenna wire can be #14, #16, or #18 stranded wire. Solid wire is fine but is harder to work with. I recommend the use of insulated wire.

## **Ground wire**

Check with your local hardware store. The ground wire can be #14, #16, or #18 stranded wire. Solid wire is fine but is harder to work with. You may need a ground clamp if you are connecting to a metal water pipe.

## **Coil form**

The coil form should be roughly two to six inches in diameter and can be plastic pipe, a cardboard tube, etc. An oatmeal box is a very good size although it is not very strong.

## **Wire for coil**

Check with your local hardware store. Use the chapter on winding coils to make the best decision about wire size for your particular coil form and desired inductance. For large diameter (six inches) coil forms, #14 insulated wire is a good choice. For small diameter coil forms (2 inches), #18 insulated wire is a good choice. Magnet wire (solid copper wire with a thin enamel insulation) has been popular over the years. Use as large a gauge (i.e. large diameter) as you can as that will have lower losses. See the chapter on winding coils – for best results the turns should not be packed together – that is hard to do which is why I recommend insulated wire instead as the insulation forms the spacing between turns.

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### Variable capacitor

Classic variable capacitors of the past are hard to find these days. You are generally looking for one with a maximum capacitance of around 365 pF. Some hobby electronics sources sell miniaturized versions using plastic film insulation and these are fairly inexpensive.

### Detector diodes

I make reference to a 1N277 germanium diode. The following diodes are candidates. These are available from Mouser Electronics, <http://www.mouser.com>

<u>Mouser #</u>	<u>Description</u>	<u>March 2008 Price</u>
526-NTE109	This is a generic germanium diode like 1N277 This is the part the author uses and is probably the best.	\$1.31
610-CDSH270	This is a Schottky improved replacement diode This part has higher conductivity at higher forward voltages but the author has not evaluated the part at very low forward voltages – it is not expected to be as good as a true germanium diode like the 1N277 but that experiment remains to be done.	\$0.35
630-1N5711	This is a Schottky diode that should work well This is a good general purpose Schottky diode. The author has not evaluated this part for operation at very low voltages. It is not expected to be as good as a true germanium diode but that experiment remains to be done.	\$1.70

### Audio Transformers

The following audio transformers are good candidates.

<u>Mouser #</u>	<u>Description</u>	<u>March 2008 Price</u>
42TM006-RC	20K – 1K transformer	\$1.91
42TM117-RC	50K – 1K transformer	\$1.91
42TU013-RC	1K – 8 Ohm transformer	\$2.19
42TL017-RC	20K – 600 Ohm transformer Series secondary – 600 ohms, parallel – 150 ohms This transformer may work very well with high impedance headphones -- most cheap headphones are low impedance in the 16 – 33 ohm range.	\$1.86

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### Headphones

These are easily available from most any local electronics/audio store. You do not need expensive phones (those typically are inefficient – not suitable for crystal radios) – the cheap phones (under \$20) can work very well for crystal radios. Most all common headphones are low impedance in the 12 to 33 ohm range and will need a transformer for matching to the diode detector. Look for a sensitivity of at least 95 dBa / 1 mW. The most sensitive headphones known to the author are rated at 108 dBa / 1 mW (Sony model MDR-ED12LP, ~\$15 at Best Buy – each phone is 16 ohms – 8 ohms when in parallel). Note that these are stereo headphones and the net impedance presented to your radio will be twice the stated impedance if the left and right sides are connected in series and half the stated impedance if connected in parallel. Use the series or parallel connection that best matches your transformer secondary rating. Sensitive headphones are a must – an excellent crystal radio will make no audible sound in insensitive phones – thus resulting in much frustration.

### Speakers

Do not even think about a speaker until you have a working crystal radio that can drive loud volume in a headset. When you are ready, then you are looking for an inexpensive speaker in the four to eight inch diameter range that is mounted in an enclosure and that has an output of at least 85 dBa / 1 Watt (1 meter distance). If you look around you might find a speaker rated in the 90s which is significantly better. You are looking for efficiency, not fidelity. Often, high fidelity speakers are inefficient. The impedance of the speaker should be 8 ohms and you will need a transformer to match the speaker to the several thousand ohms impedance of the diode detector.