

Micro Television and how to build the most simplest TV transmitter



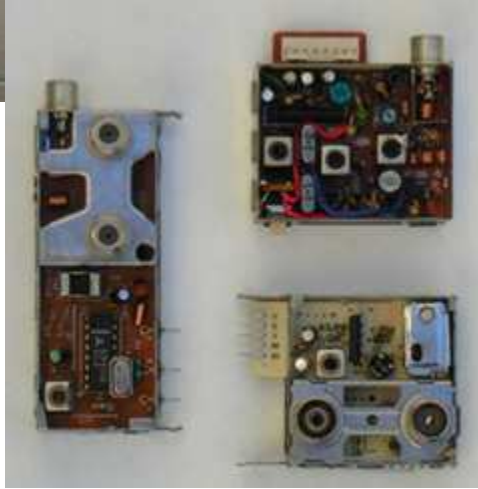
An Introduction

Television is considered as a device of delivering images and sounds. In this respect, television technology has reached to a "perfection". Media art using television would rely on such a "perfect" technology and would be satisfied with merely providing the "contents" to such a delivering device. However, it would be not an art. Art cannot remain the modernist "division of labor" of means and contents. As long as art shares the origin *techne* with *technology*, art should intervene into the technology itself. The artist must start with the process of making the technological system by him/herself. You could just set up the system after buying a ready-made set of television transmission and receiving. But if you dare to build a television transmitter by yourself, you will find a totally different vision of television and a new material of your art. The simplest transmitter is only a beginning.

In the mid-1980s, I was involved in "micro television" that was a television counterpart of "Mini FM" radiko. The easiest way was to use a RF module that was installed in every VCR and TV game machine at the time.



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So, I took out the module from the VCR and soldered it to the booster circuit. Meantime, I obtained RF module units both for VHF and UHF in Akihabara (radio market in Tokyo). Using an unit for UHF, I built UHF TV transmitters. Since there were many choices in frequencies of UHF, the micro UHF stations worked well.

Micro TV project in Shimokitazawa, Tokyo (1987) [RealMedia]

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With the people of PARC (1993) [RealMedia]

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Micro TV transmitter workshop (1994) [RealMedia/no sound]

NTV Project (1994)[RealMedia]

However, this type of attempts of micro television didn't continue so long. This was the difference from micro radio. Why? I think this has a lot to do with our habitual attitude to the video images. Even those who could be tolerant to "low quality" sounds was unable to keep watching snowy images of micro television. Few audience were interested in them as a video art

or a television art, though.

The situation has changed now. Given the "perfect" technology of video manipulation and video synthesizing, "imperfect" and "immature" images of video are no more what they meant. Just as "lowtech" is no more the antonym of "high technology", "low" images would be more viable than "high" images in creative expression.

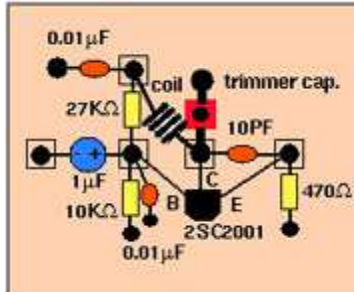
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The micro television system that consists of RF module and the booster is perfect except the limited radius of service area. The RF module is technologically a complete and inexpensive transmitter. But it has only two selections of the channel. Given the technological perfection, it is very difficult to diverse the system.

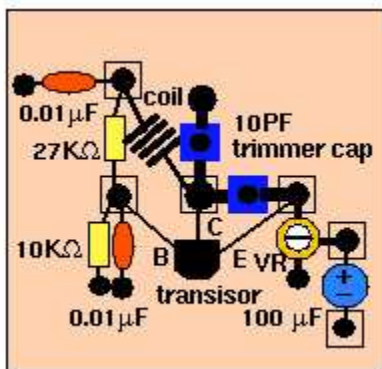
How can we build a simple television transmitter by ourselves? One of the most delicate and therefore complicated sections of TV transmitter is for synthesizing the signals of images and the sounds. But if you give up the sounds, the circuit become far more simpler. If so, why don't you do it? Silent television is now more cooler, isn't it? So, as a first step, I will talk about how to build a television transmitter without sound and look for unique usage of it. Then I will go to an attempt to build a television transmitter with sound as simple as possible.

SIMPLEST SMALL TV TRANSMITTERS

Soundless version



You are familiar with the most simplest FM transmitter" that I designed (left). Let's try to transform it into a TV transmitter. Just change the input from the audio to the video (video camera or VCR) and check the signal at your television set: in Europe, for instance, choose the channel 2 - 4 and turn the trimmercap of the transmitter. You will find some images or might watch a clear image. This suggests that it will be not so difficult to build a TV transmitter.



This should be a practical model of the simplest TV transmitter. You can delicately adjust the conditions to your TV receiver.

The detailed schematic (PDF) with a how-to-build manual.

Cautions:

In case I would like to emphasize that in some area this "simplest" TV transmitter may not work well. Because in some countries, radio and television use very different frequencies. This experimental conversion supposes that you can have TV channels of the frequencies between 76 and 108 MHz, that are the same with the FM radio frequencies in the world.

Also, you have to know that this transmitter cannot be fit for today's "sophisticated" auto-tuning and noise-cutting TV receiver. It recognizes the transmitting signals of this modest transmitter as "irrelevant" noises. This is the irony of the "advanced" technology!

Look for a TV set that was sold before the 1990s.

The first step:

You have to find a vacant channel first and foremost. There are source books in the net such as this. And select the similar frequency as the FM radio (76-90-108MHz).

This is important for making the coil: how many turns you need depends on the frequency you will use.

The lower frequency will enable you to easily build the transmitter because the higher frequency demands you a bit higher skills.

How to build?:

Please see the explanations in the pages of [the simplest FM transmitter](#).

How to operate the transmitter?

(1) Prepare television set(s). It would be better to have two or more sets for adjusting the transmitting frequency. There might several harmonic frequencies of the transmitter and they may confuse you. If you have a frequency counter, it would be perfect.



Connect an "indoor TV antenna" to your television. There are various types of "indoor TV antennas. If you use two TV sets, you need the two antennas. As for the antenna of the transmitter, please check the manual. The distance between the transmitter and the TV set(s) must be close.

(2) Turn on and select a vacant channel of VHF (30 - 300 MHz). There are different plans in countries and areas. Every plan has a set of frequencies of video and sounds. We are now interested in the frequency of the video only. For instance, Japan has 1-12 channels and the vacant video frequencies are 97.25 MHz(2ch), 177.25 MHz(5ch), 189.25 MHz(7ch), 199.25 MHz(9ch), and 211.25 MHz(11ch). Most of the countries have lower frequency. For instance, U.S. has 2-13 channels (55.25-2ch., 61.25-3ch., 67.25 MHz-4ch., 77.25 MHz-5ch., 83.25 MHz-6ch., 175.25 MHz-7ch., 181.25 MHz-8ch., 187.25 MHz-9ch., 193.25 MHz-11ch., 204.25 MHz-12ch., and 211.25 MHz-13ch.), Italy: channel A-H2 (53.75 MHz - 224.25 MHz), France: ch. A(47.75 MHz) to 6 (216.00 MHz), New Zealand: ch.1(45.25 MHz) to ch.9(210.25 MHz), Australia: ch.0 (46.25 MHz) to ch.11(216.25 MHz), Russia: ch1 (49.75 MHz) to ch.12 (223.25 MHz).



(3) Connect the composite signals of your VCR, DVD player, camcorder and so on to the video input of "The most simplest TV Transmitter". There is no problem of the different video formats such as NTSC, PAL, SECAM if you use the same format of video source and television set. Supply the power.

capacitors one after the slowly. You will find a change of the screen and distorted or clear image of source. Two television sets more convenient to adjust



Then turn the two trimmer other very sudden will have a your video would be the exact

frequency for your vacant channel you selected. Turn the capacitor until the all sets get the clearest images together. But in this stage, the images may be distorted.

Turn the variable register of the video input of the transmitter and adjust the proper input. You will get the normal images. These processes need some of skills and the operations would be delicate. Please be patient.

When you succeed in this version to work, you may try the advanced version. In this version, stability and quality are improved. This can have even the audio too. However, in order to complete this, you have to use a proper frequency counter.

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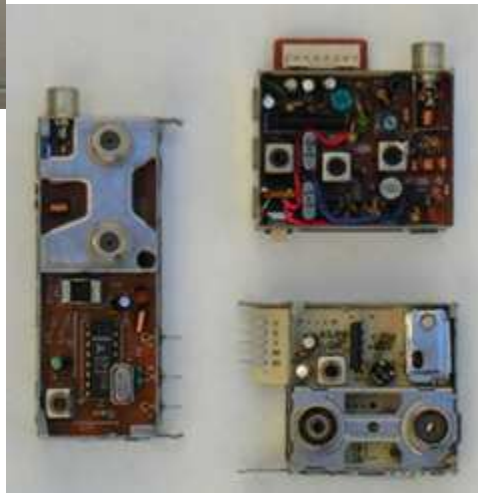
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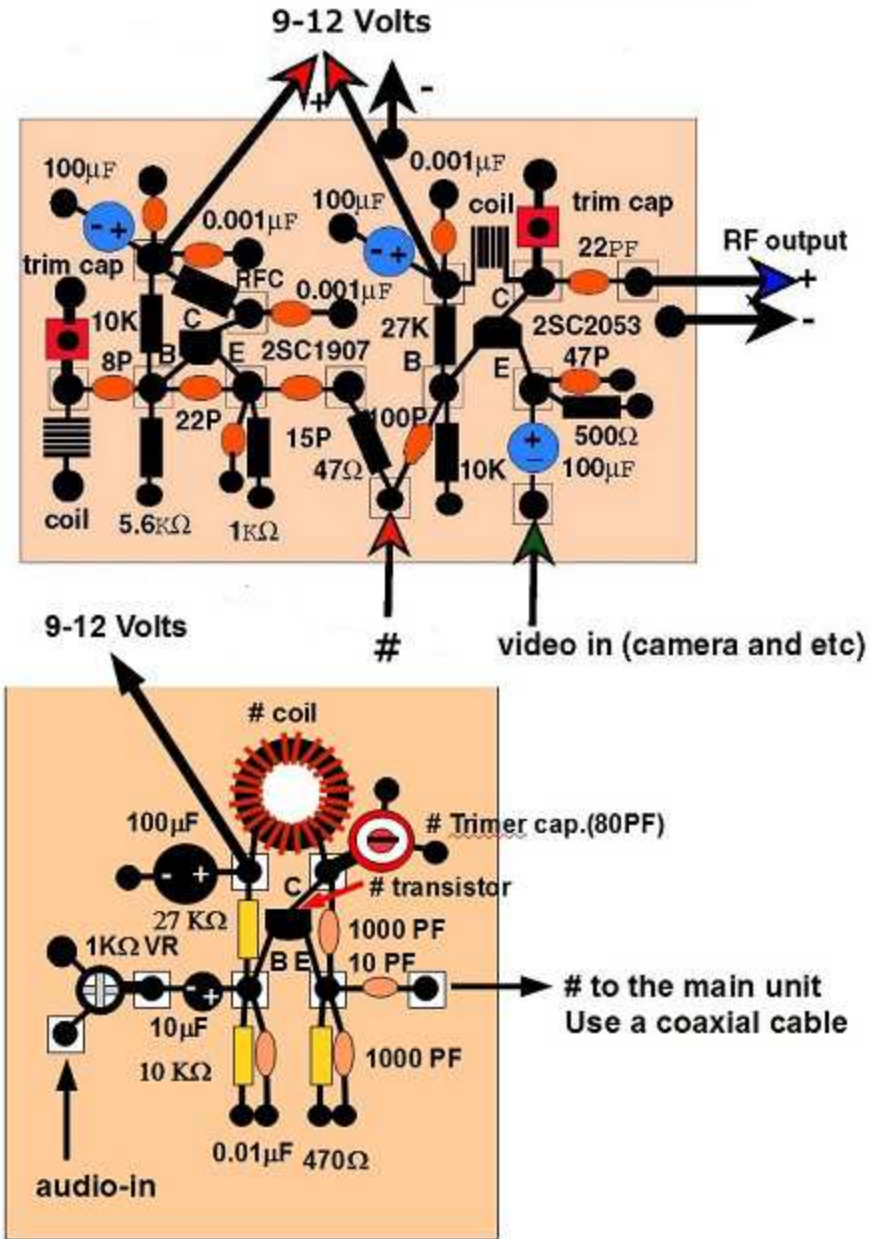
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How to build an advanced TV transmitter with sounds?

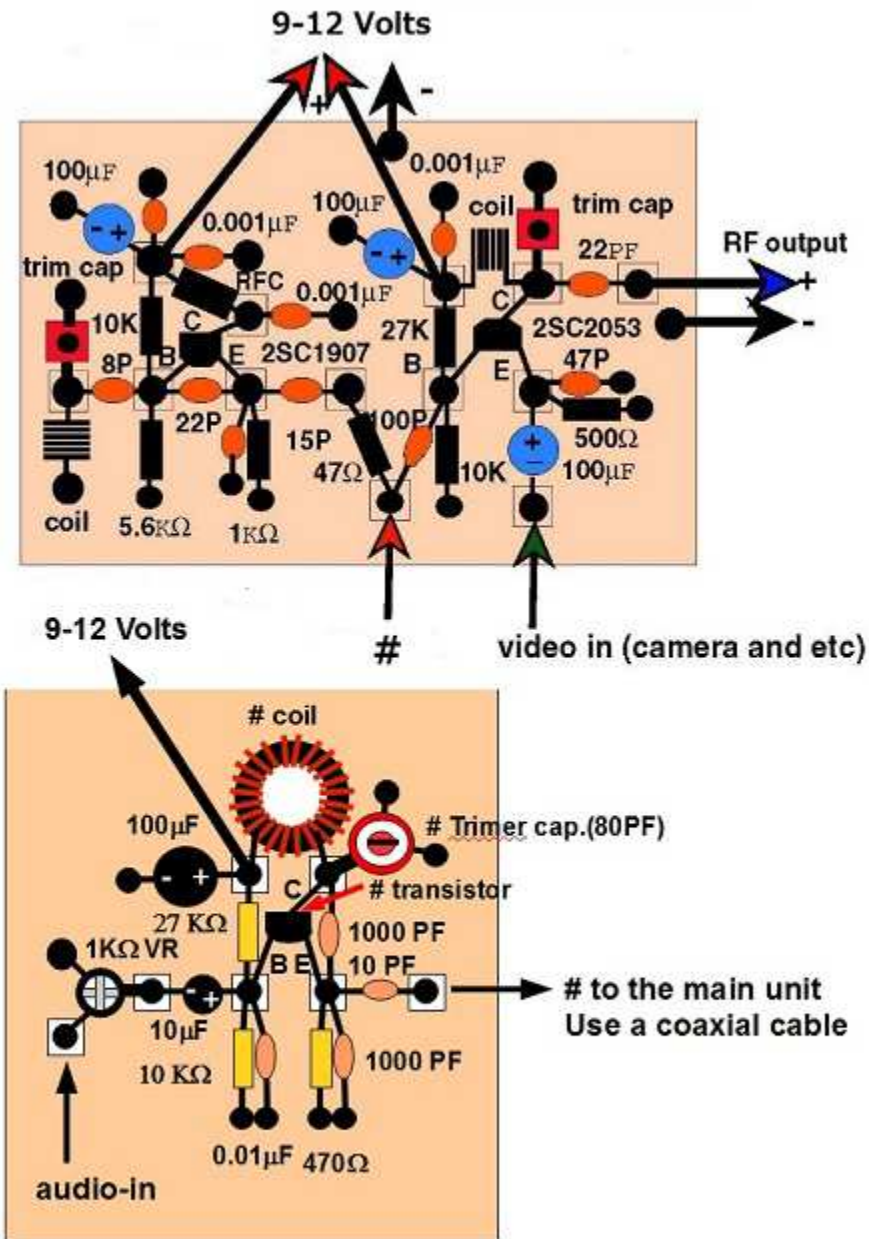


This schmetic consists of the two sections: the one seems to be a video transmitter while the other is for audio amplifying. In fact, however, these are both transmitters. The main one generates video carrier while the smaller one generates the exact 4.5 (5.5 in some countries) MHz FM audio carrier. When it is supplied to the main section, the combination generates the audio carrier that is the total of the video

frequency plus 4.5 MHz (this is the same in the US but different in other countries: 3.5 in the UK, 5.0 in Italy, 5.5 in Australia and so on: see [the channel plans](#)). In the Japan TV plan at the 2nd channel, for instance, the video carrier is 97.31MHz and the audio carrier is 101.75MHz. Therefore $101.75 - 97.31 = 4.5$.

I have been trying to design the 4.5 MHz transmitter without any special tools such as a frequency counter. So far, I didn't succeed in. In order to get the exact 4.5 MHz, you have to use a frequency counter (you can use a tester with such a function). Also, you have to be patient to

get the 4.5 MHz by your cut-and-try works. I will explain how to do:
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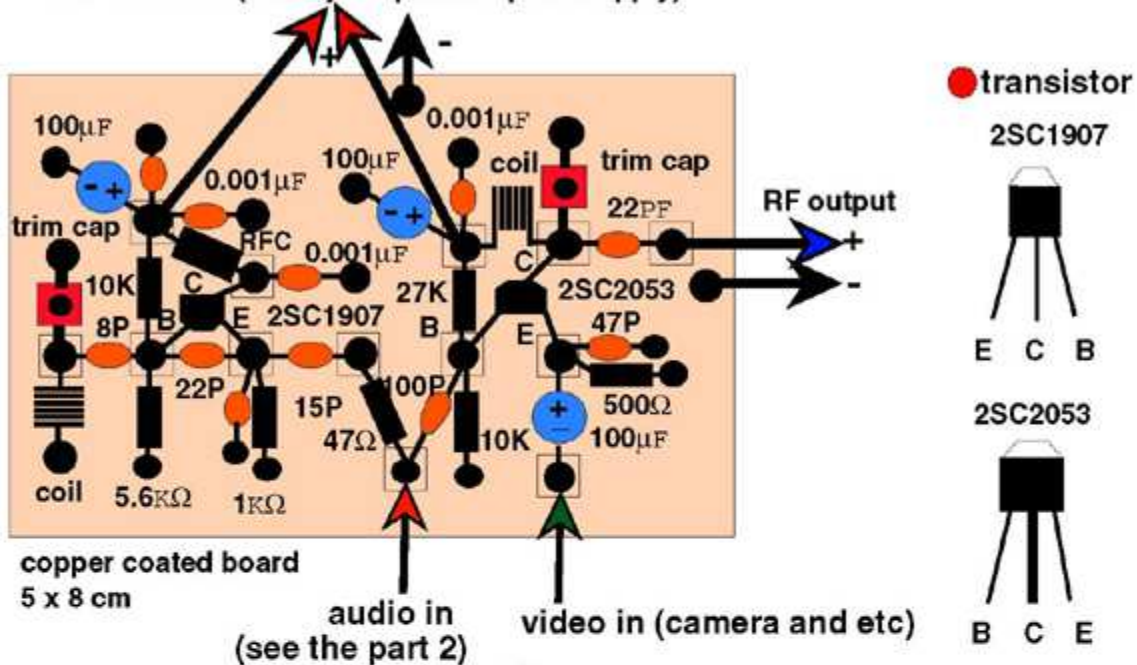
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Making a simple TV transmitter

part 1: the video section

DC 12-13.8V (battery or qualified power supply)



PDF file

How to build an advanced TV transmitter with sounds?

The Audio section

(1) Coil:

The most difficult point is the coil. You can use any type of coil as long as it fits the inductance. But the size of coil for 4.5 MHz is quite large if you use usual type of coils. Here I will use Ferrite Troidal core that is made by Amidon Associates.

Wind 0.2 ECW (enamel-coated wire) around the "FT-50-43" (Amidon) in 24 turns.

(2) Transistor:

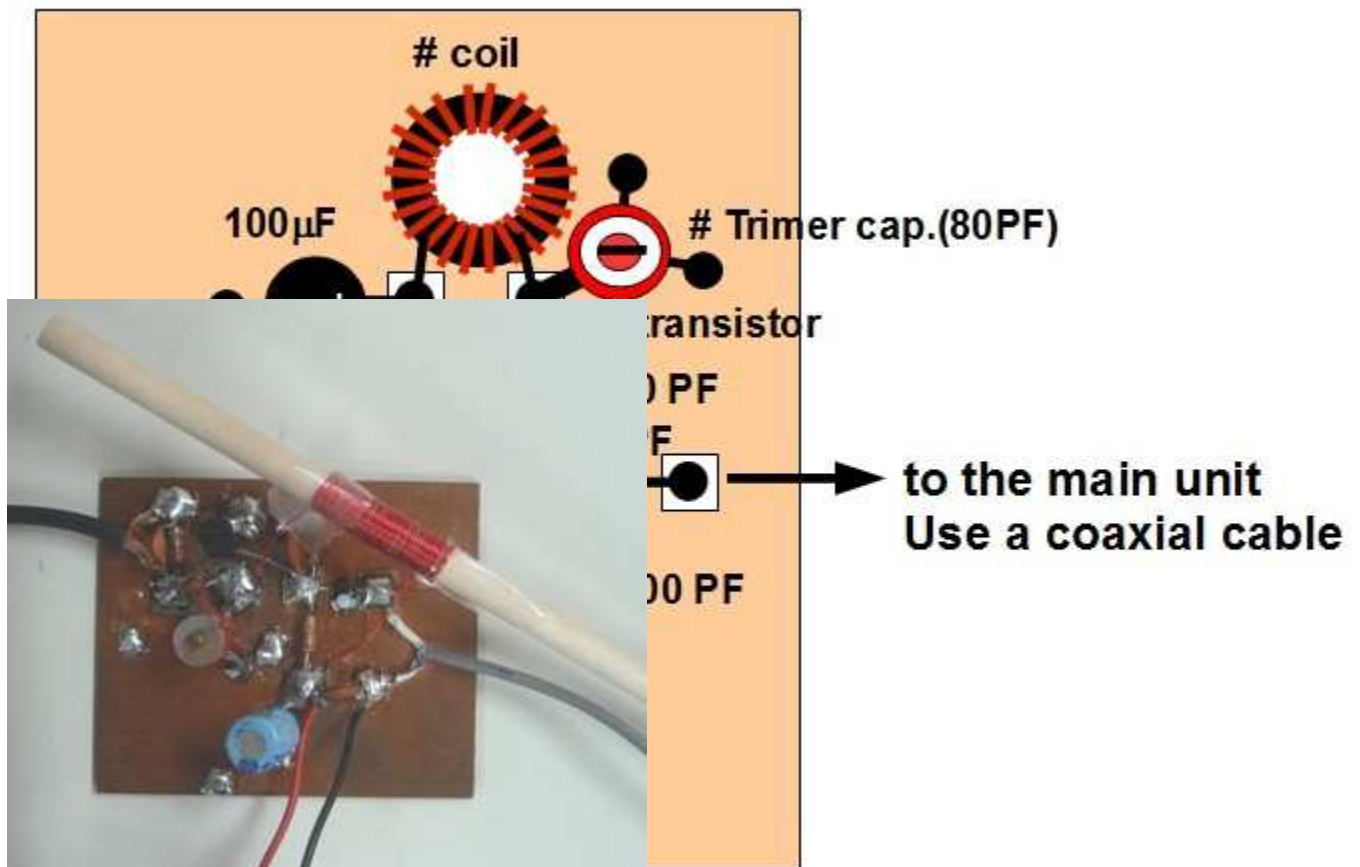
You can use popular ones such as 2SC2001, 2SC1815, 2SC1907, etc. But you must keep the pins (E, C, B).

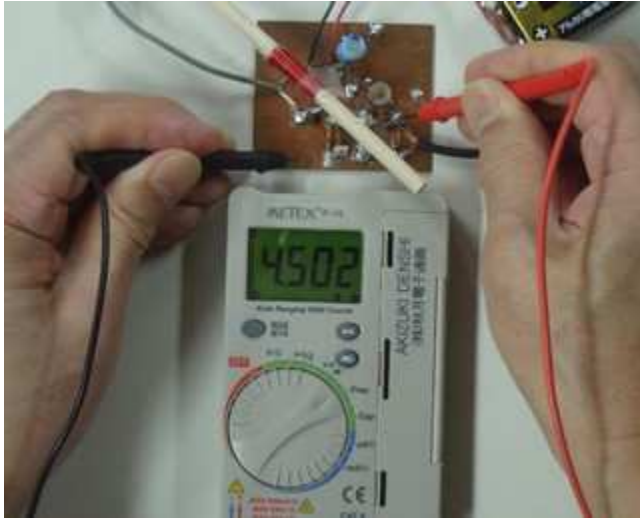
How to adjust:

Connecting the probe of the frequency counter at "#to the audio-in". Then adjust "Trimer cap. (80PF)" as the frequency counter shows exactly 4.5MHz. Sometimes, you have to add some capacitors (depending 100-1000PF) at the "E(mitter)" position of the transistor in order to adjust the frequency.

As an experiment, you can use a simple coil like this:

The core is a wooden chopstick. Wind 0.2 mm wire of the 50 turns or so.





The point is to check the frequency for 4.5MHz in the older(now obsolete because of the digitalization) US/Canada/Japan channel plan.