TA7642 Radio Project Guide

In this project, we will create a simple AM radio. But first, we have to understand what an AM radio is, and how it works.

An AM radio is a receiver that can receive electromagnetic waves. AM stands for amplitude modulation, and it is a way of transmitting radio signals. There are other types of modulations such as FM, but AM is the simplest. AM radio has many usages, such broadcasting news, music, or entertainment.

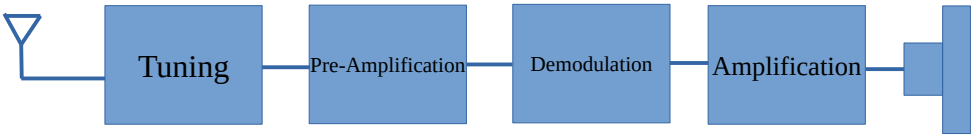
In 1901, Guglielmo Marconi did an experiment. He used a primitive spark gap to create oscillations, this was then transmitted through the air. Although his receiver only could receive a very short distance, he still showed that signals can be transmitted without a wired connection. Later, people added new parts to the transmitter so that it could broadcast radio signals that carry sound.

You can also make your own transmitters to broadcast your own radio signals. But, that will be in other projects. You might be wondering if we don't have a transmitter, then what do we receive? Thankfully, there are many radio stations that are around the country that we can receive.

In this project you learn how an AM radio works, the basics of soldering, and how to check and test the radio circuit.

The theory of the AM radio

There are three main stages of this simple AM radio, tuning, demodulation, preamplifier, and amplification.



Tuning

The tuning stage consists of the inductor L1 and the capacitor C6. This circuit selects one out of all the radio stations, so that you properly hear one radio station instead of hearing all the stations at once. To wind the inductor take the wires and wind the coil with each winding touching the previous winding but not overlapping the it. After you are done, wind on a second layer the same way except this time you wind in the opposite direction.

Pre-Amplification

This stage is all embedded inside the TA7642. This stage first amplifies the signal before demodulating it so that the signal can be stronger.

Demodulation

The demodulator circuit is after the pre-amplification and is also embedded inside the TA7642 IC. What a demodulator does is it separates the audio signal from the carrier wave. The carrier wave is the wave that is transmitted with the audio signal so that it can be transmitted for long distances. But this signal cannot be heard because its frequency is too high for our ears to hear. So we have separate it from the audio wave, so we can hear the audio signal clearly. Along with the TA7642, there are other components that are needed outside of the IC; R3, PR1, and C3. PR1 is a potentiometer, or a variable resistor. It is used to adjust the gain of the amplifier inside the IC. R3 is used to keep the resistance of PR1 and R3 greater than 270 so that the supply voltage isn't directly feed into the TA7642.

Amplification

Even though the pre-amplifier and demodulator inside the TA7642 can demodulate the signal, it is still not enough to be heard by normal headphones. So that is why we need an audio amplification stage. The audio amplification stage amplifies the output audio signal of the TA7642 IC so that it can be heard by headphones. The component of the amplification stage include C5, R5, and Q1. Q1 amplifies the signal, while R5 gives the base of the transistor a bias voltage to make the transistor work properly.

Soldering Tips

- Use around 25 watt soldering iron
- Solder in this sequence: resistors, capacitors, transistor, TA7642, inductor.
- If you are soldering the TA7642 or the transistor put a alligator clip on the legs of the component. This way the alligator clip can act as an heat sink so that the semiconductor wouldn't get excessive heat.

Adjustment:

If you find

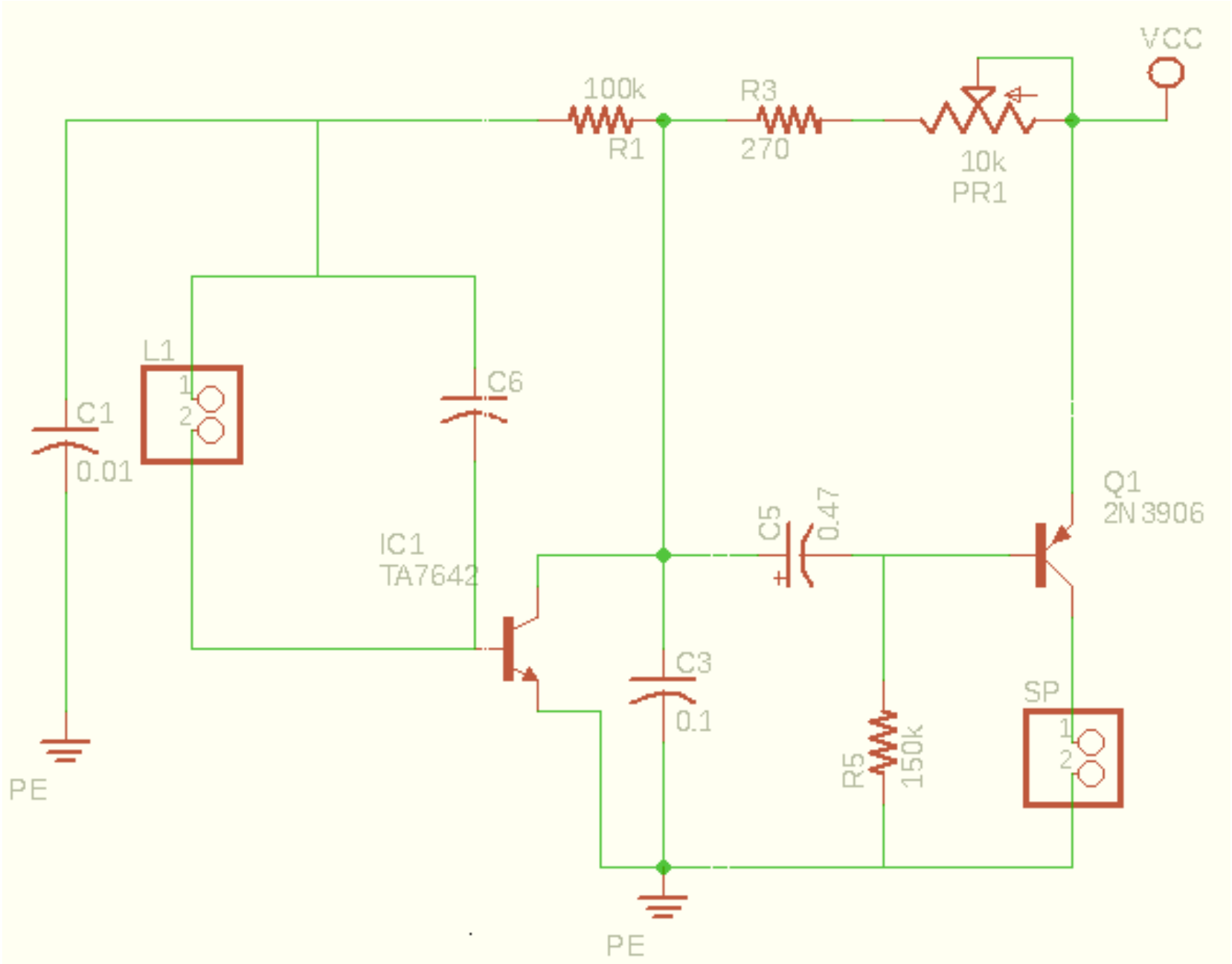
What's next for Kids Kits?

- case for the radio
- kits for other AM radio types
- FM radios kits
- transmitter kits

Component list

Resistors
R1 100k
R3 270 ohms
R5 150k
PR1 10k variable resistor
Capacitors
C1 0.01uF
C3 0.1uF
C5 0.47uF
C6 can be changed
IC:
IC1 TA7642
Transistors
Q1 S8550
I know it says on the schematic 2n3906, that is a mistake.
Coil
L1 variable
Pin Headers
PW 2x1 female or male header
SP 2x1 female or male header

Some component names aren't in order, because of my lack of experience. Even though they aren't correct they still will work.


VCC
100k
R1
R3
270
10k
PR1
L1
1
2
C1
0.01
C6
IC1
TA7642
C5
0.47
Q1
2N3906
C3
0.1
R5
150k
SP
1
2
PE
PE