

JC986A half-duplex walkie-talkie experimental kit

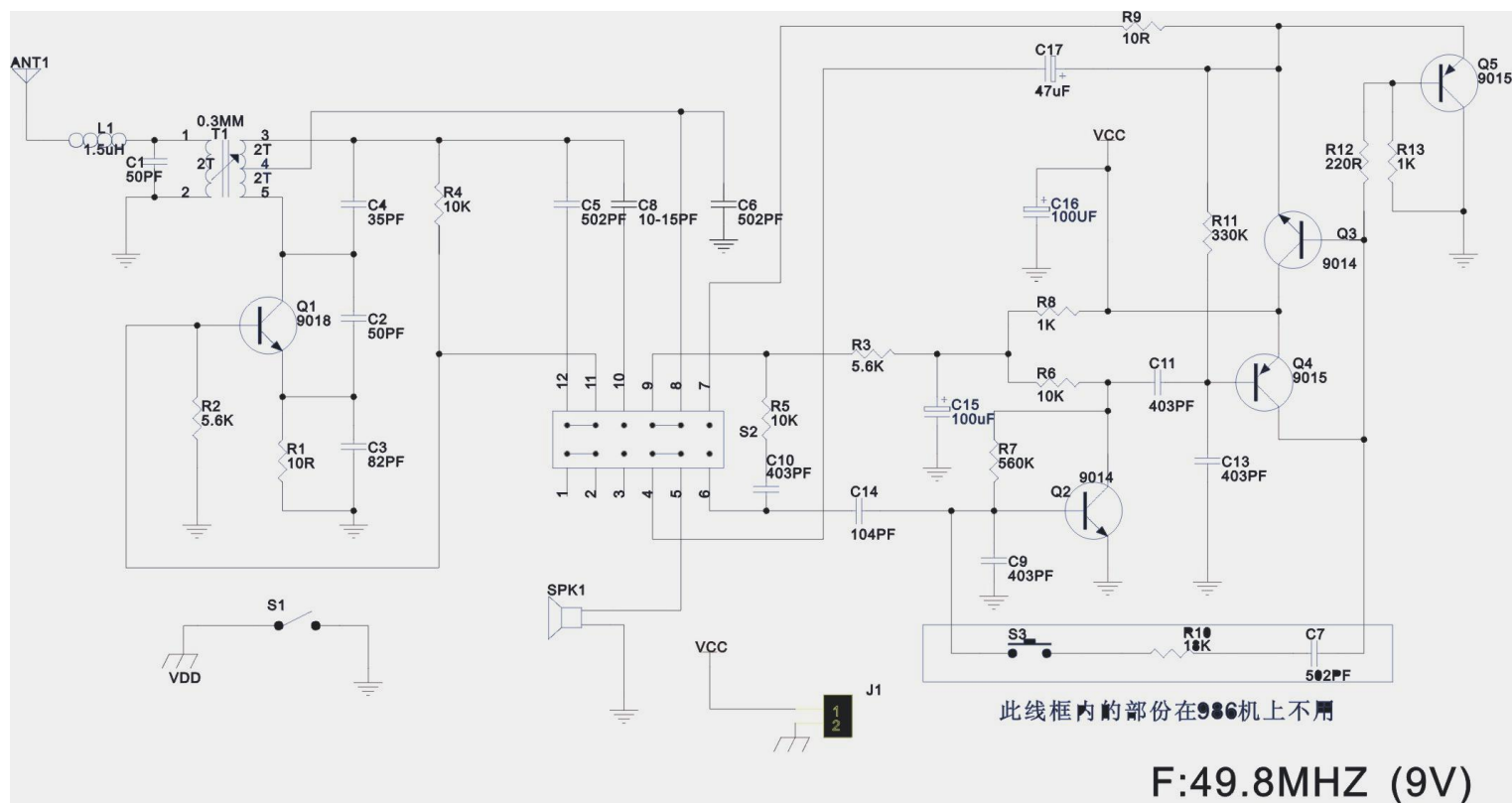
The JC986A half-duplex walkie-talkie is a dedicated walkie-talkie that can only "receive" or "send" letters at the same time. The transmitting frequency is 49.8MHz. Two sets of walkie-talkies form a pair. When used, a 9V laminated battery is used. . The circuit is simple, the whole machine is relatively easy to manufacture, the assembly success rate is high, it has the advantages of long remote control distance (up to more than 100 meters), loud sound, and good sound quality.

This kit uses DIP plug-ins and the circuit board is relatively compact, requiring the maker to be careful and conscientious. This kit is an ideal experimental kit for radio enthusiasts to learn.

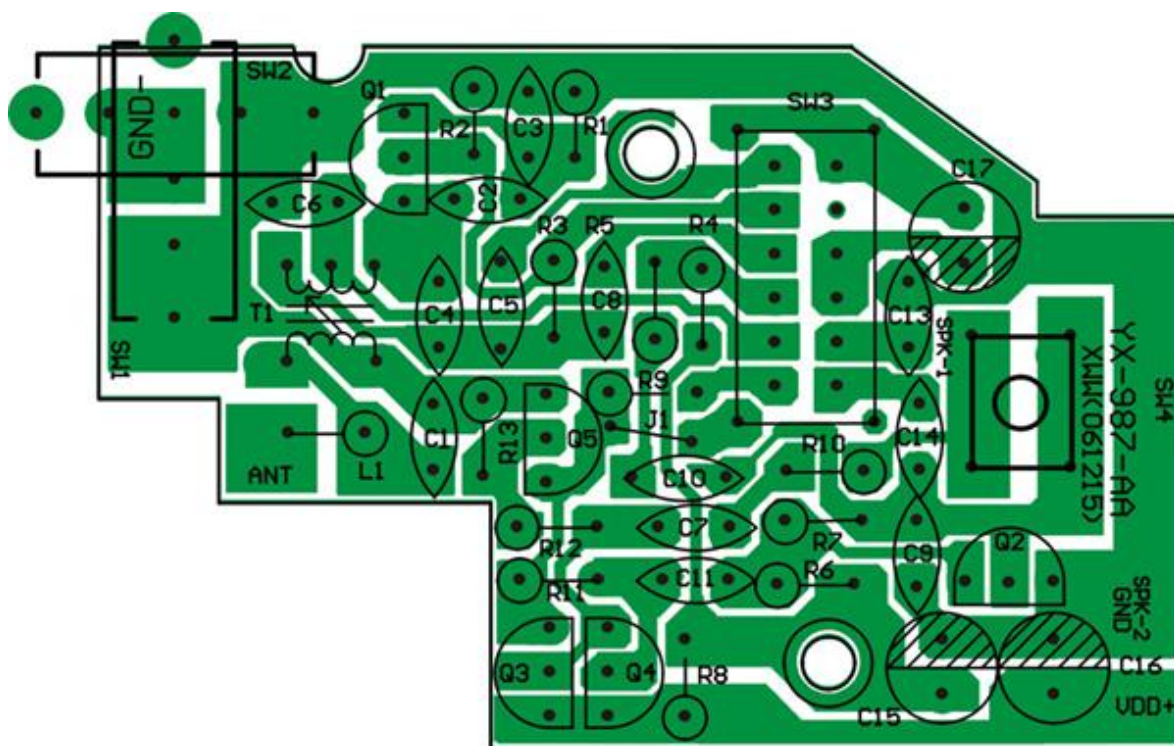
1. Circuit principle and assembly instructions

1.1 Circuit principle

Transistor Q1, coupled adjustable inductor coil T1, capacitors C4, C2, etc. form an oscillation circuit to generate a carrier frequency signal with a frequency of approximately 49.8MHz. Q2 Q3 Q4 Q5 and related resistors and capacitors form a low-frequency amplifier circuit. The speaker SPK1 doubles as a microphone. When the circuit is working in the receiving state, put the receiving/transmitting switch in the "receiving" position (the default state is receiving). The signal received from the antenna ANT1 passes through the antenna matching inductor L1, and then through the adjustable coupling inductor T1 and capacitor C4 , C2 and T1 secondary coils, etc. are used for detection. The detected audio signal is coupled to the input end of the low-frequency amplifier through the center tap of the secondary coil of T1. After amplification, it is coupled by capacitor C17 to drive the speaker SPK1 to sound. When the circuit is working in the sending state, the S2 receiving/transmitting switch is pressed to the "sending" position. The speaker converts the voice into an electrical signal, and then the capacitor C17 is coupled to Q2 Q3 Q4 Q5 and related resistors and capacitors to form a low-frequency amplification After the circuit is amplified, the signal is added to the oscillation tube Q1 through the center tap of the coupled adjustable inductor for signal modulation, so that the bc junction capacitance of the tube changes with the change of the voice signal, and the bc junction capacitance of the tube is connected in parallel with T1 at both ends of the secondary, so the frequency of the oscillation circuit also changes accordingly, realizing the modulation function, and transmitting the modulated wave from the antenna through T1 and L1.



图一 电路原理图



图二 印刷电路图

1.2 Welding and installation, testing and adjustment

After getting the kit, first read the instructions carefully and put all the vitality parts into a container. Resistors, capacitors and other components are very small, so you must carefully identify the parameters to prevent loss. When holding the circuit board, please hold it by the edge, not the surface, to prevent oxidation of the circuit board due to dust on your hands.

All devices are installed vertically, close to the circuit board, and do not fall too high. Pay attention to the polarity when inserting electrolytic capacitors and transistors. Do not break the soldered components and place them vertically. Jumper J1 on the circuit board is replaced with a metal wire cut after welding the resistor. A metal wire is also needed to connect the upper end of the toggle switch to (SW1) on the circuit board. The 6 wires in the kit are connected to the circuit according to the following connection methods:

- 120mm long wire: negative terminal of battery to circuit board (GND—);

- 100mm long wire: battery positive terminal to circuit board (VDD+);

- 2 wires 80 mm long: from both ends of the speaker to the circuit board (SPK2);

- 2 50 mm long wires: one from the antenna lug to one end of L1; one from the middle end of the toggle switch to the circuit board (SW2).

Rotate the black sleeve of the antenna to the spring antenna, fix the lug and spring antenna in the plastic front case with screws, and solder the wire to L1 on the circuit board.

After the 2 sets of kits are welded and carefully checked for errors, the 9V laminated battery can be connected, and the circuit can be energized by rotating the toggle switch button. If the reset button is not pressed, the circuit is in the "receiving" state and the speaker starts "powering up". "converts to "sound", you can hear a sound; press the reset button of the other set to make it work in the "sending" state. At this time, the "sound" of the speaker is converted into "electricity". " function, bring the two sets of walkie-talkie antennas parallel to each other, and use a non-inductive screwdriver to gently adjust the magnetic core of the adjustable inductor T1 to make the receiver's "beep" whistling sound the largest, that is, the transmitting and receiving frequencies of both consistent. Then, interchange the two sets and fine-tune the magnetic core of the adjustable inductor T1 in the same way to ensure that the transmitting and receiving frequencies of the two sets are consistent. This process requires fine-tuning each other several times (including distance adjustment) to ensure that the intercom distance between the two sets is the longest and the sound is the clearest.

After successful debugging, install the "toggle switch plastic knob" and "reset switch plastic button", use 2 screws to fix the circuit board in the front case, clean the wires, and use 5 screws to fix the front and rear covers.

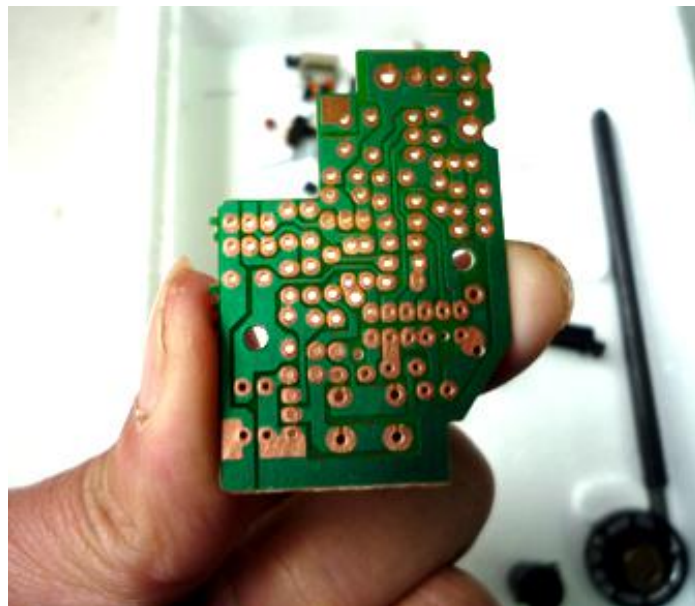
When in use, open the battery box cover, install the 9V battery, and rotate the toggle switch button to energize the circuit. Normally, the circuit is in the "receiving" state. Press the reset button and the circuit is in the "sending" state.

If after installation, there is no "whistle" sound when power is turned on, please carefully check the power cord, speaker wire, vitality parts, etc. for faults such as mis-soldering or short circuit. The inspection must be careful.



Complete set of plastic parts

2.2 When making, put all the vitality parts into the container to prevent loss.



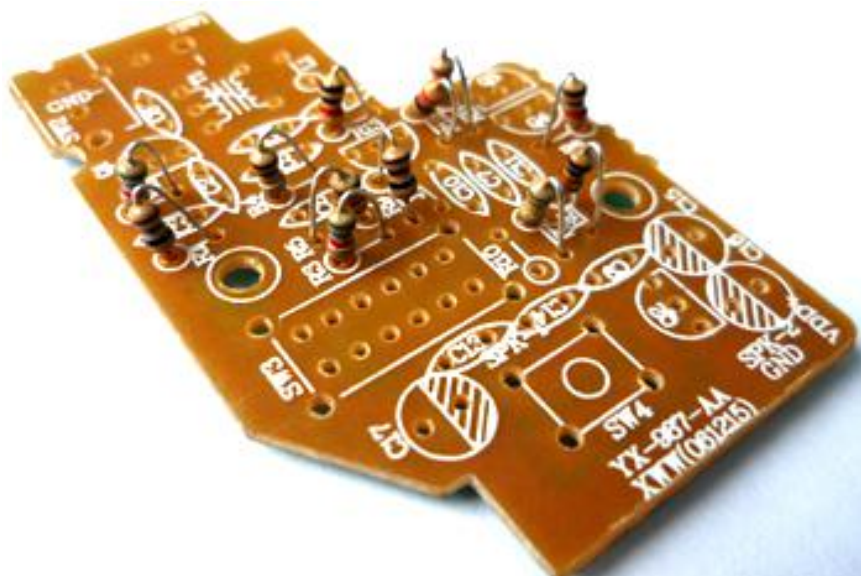
2.3 During the installation process, when the operator holds the circuit board, please hold it by the edge, not by the surface, to prevent oxidation of the circuit board.

2.4 Welding resistors (12 in total)

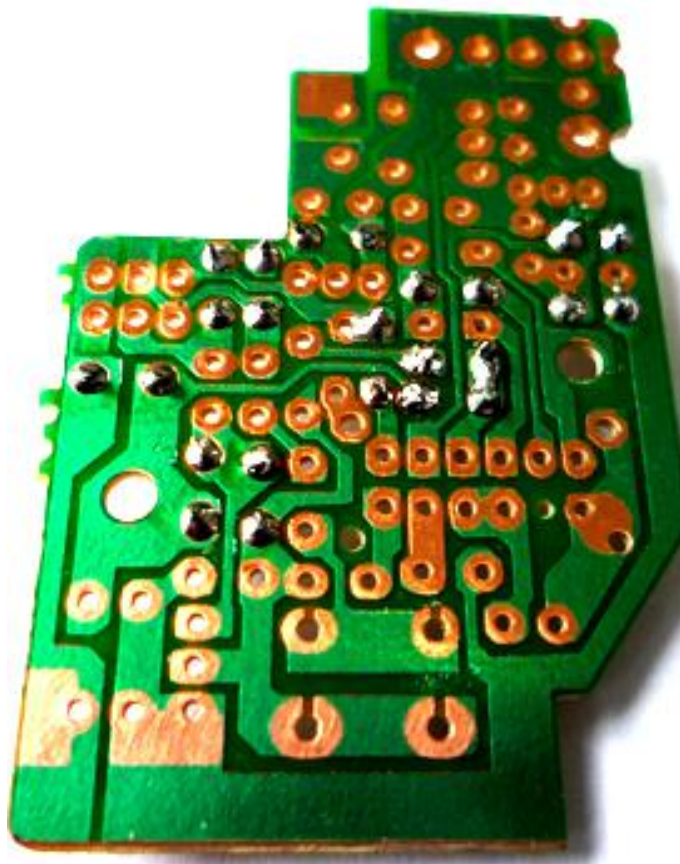
R1: $10\ \Omega$ R2: $5.6K\ \Omega$ R3: $5.6K\ \Omega$ R4: $10K\ \Omega$ R5: $10K\ \Omega$ R6: $10K\ \Omega$ R7: $560K\ \Omega$
R8: $1K\ \Omega$ R9: $10\ \Omega$ R11: $330K\ \Omega$ R12: $220\ \Omega$ R13: $1K\ \Omega$



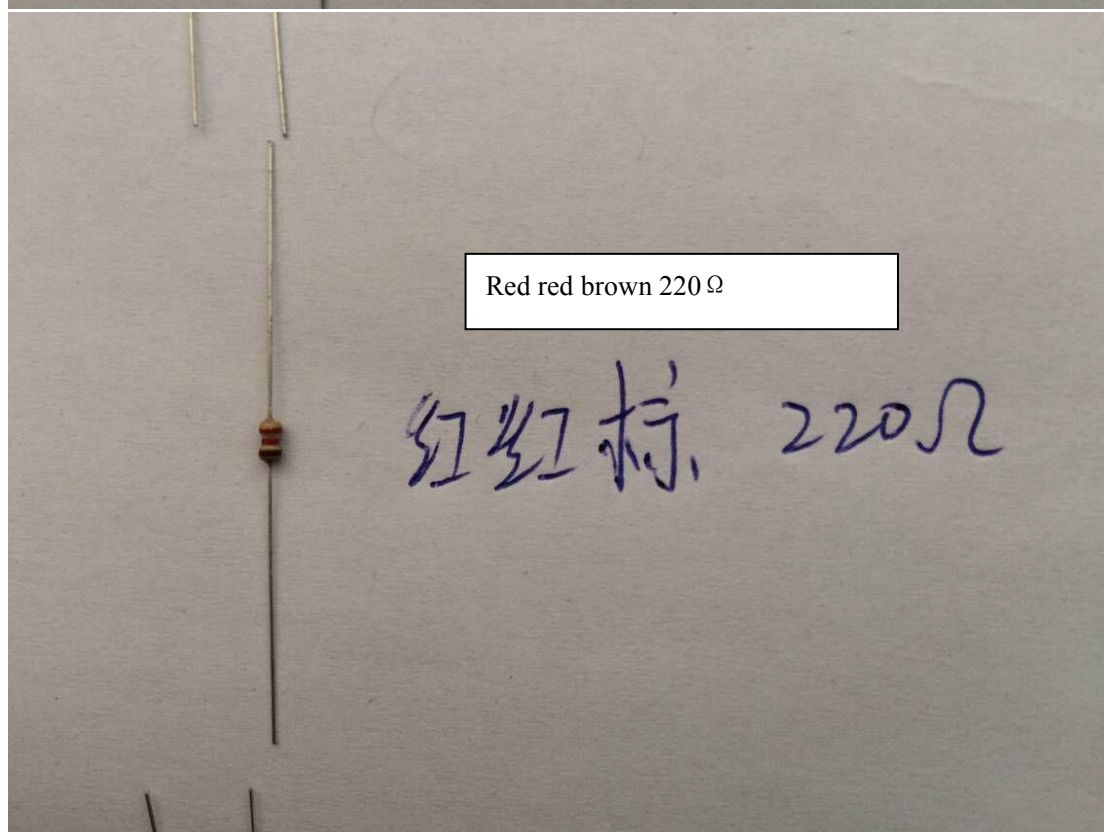
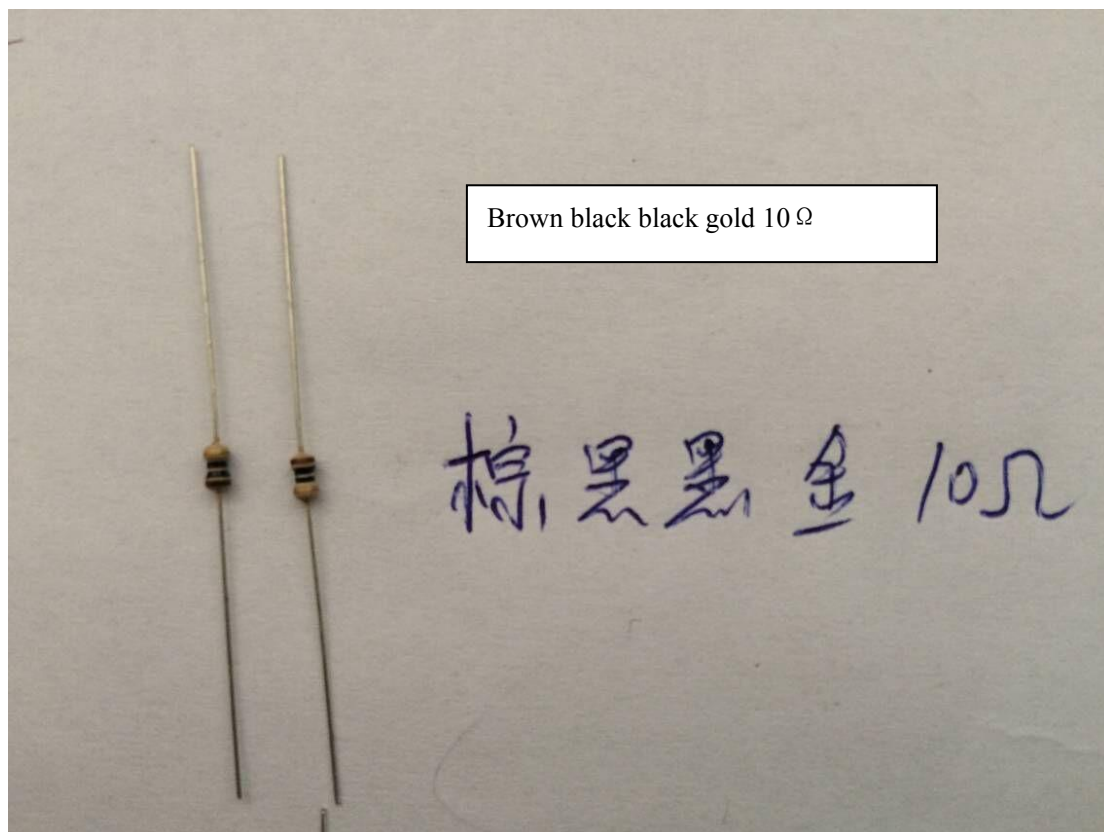
Vertical plug-in
mounting of resistors



Schematic diagram of 12 resistors
after insertion (component side)




Schematic diagram of 12 resistors
after welding (copper clad surface)





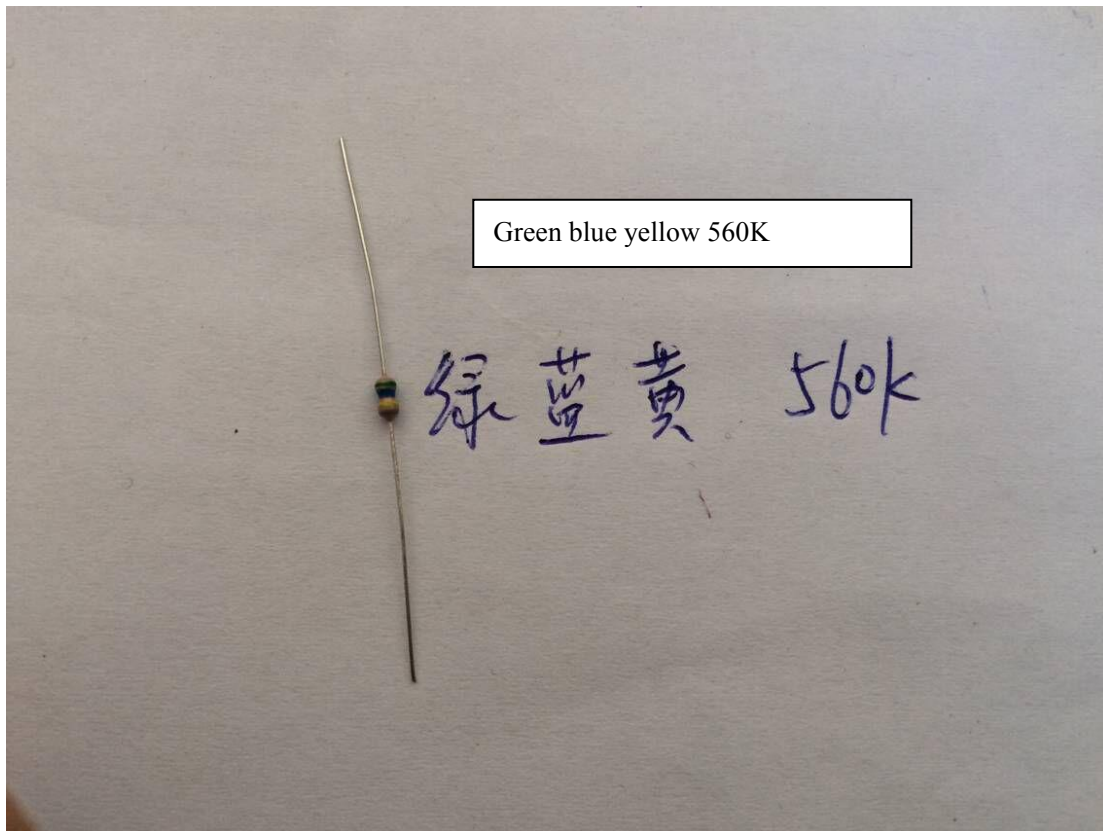
Brown black red 1K

棕黑紅 1k



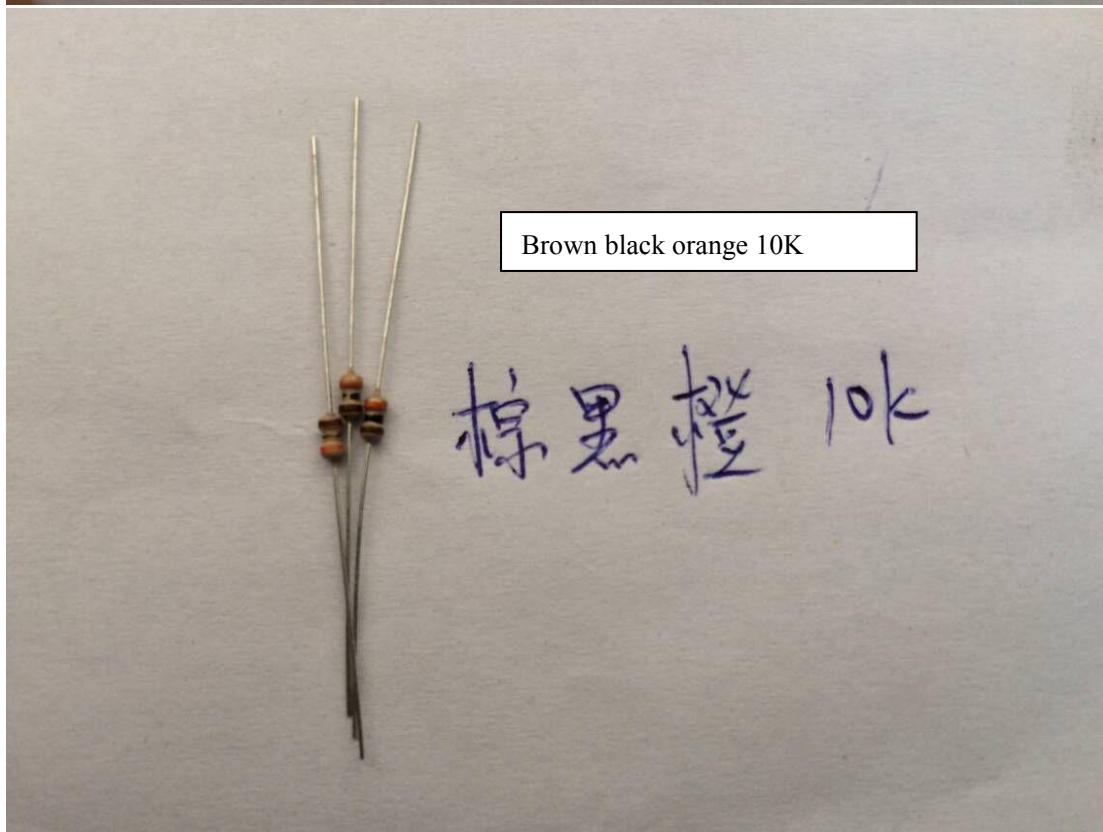
Orange orange yellow 330K

橙橙黃 330k



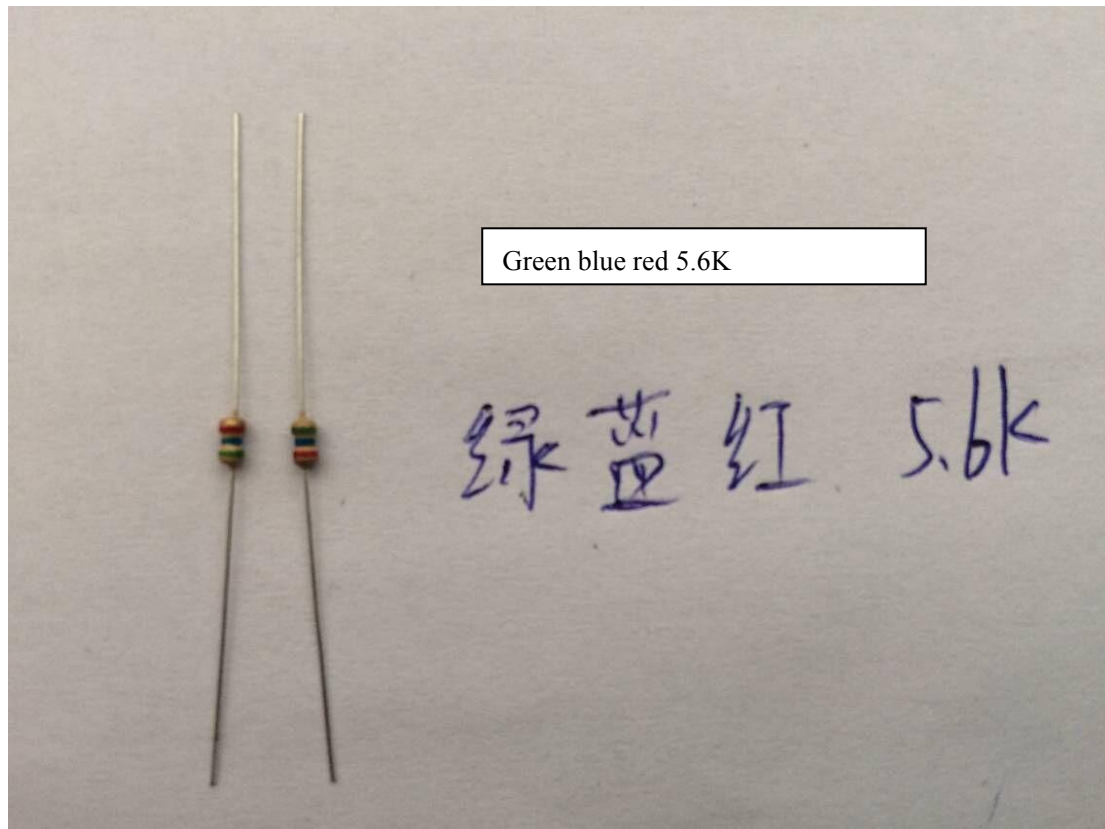
Green blue yellow 560K

绿 蓝 黄 560k

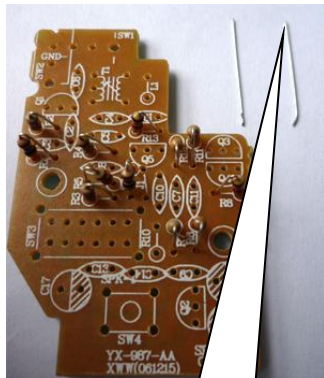


Brown black orange 10K

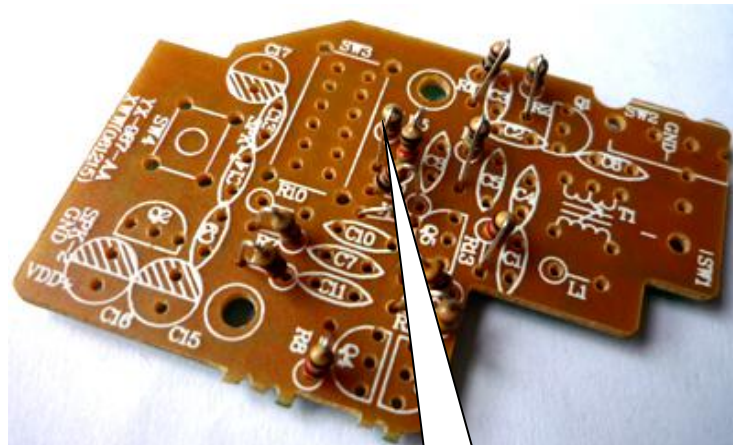
棕 黑 橙 10k



2.5. Welding short wire J1



After soldering the resistor, cut off the excess wire.

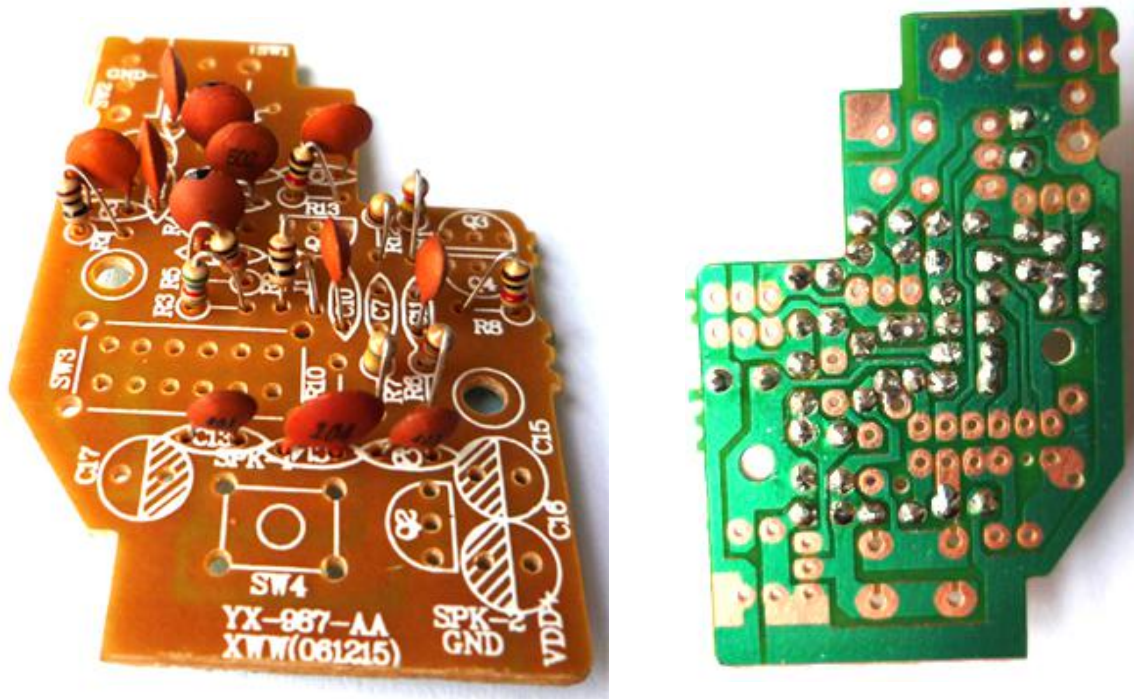


Short wire J1 (you can solder the resistor and cut off the excess wire)

2.6. Soldering ceramic capacitors (12 pieces in total)

C1: 50P C2: 50P C3: 82P C4: 35P C5: 502 C6: 502 C8: 15P C9: 403

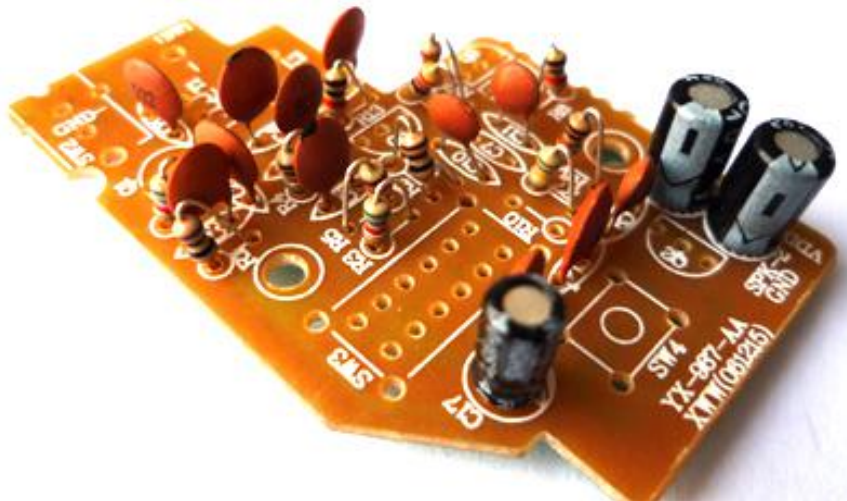
C10: 403 C11: 403 C13: 403 C14: 104



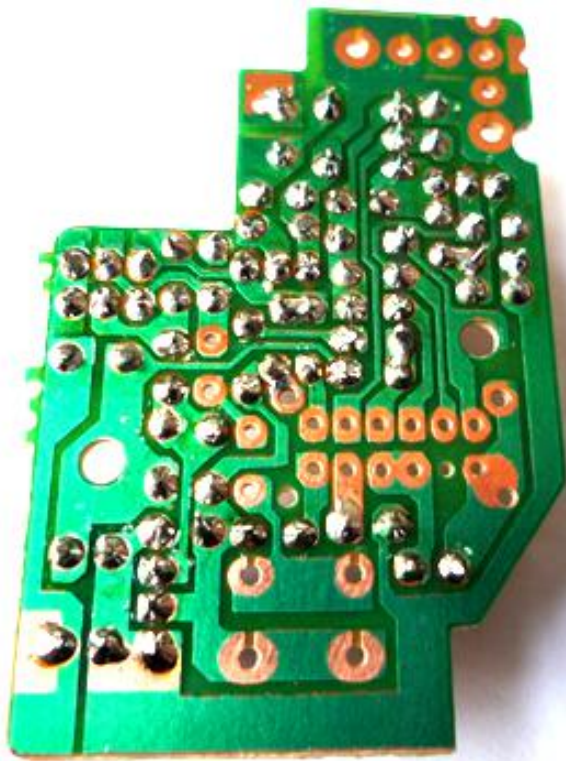
Schematic diagram of 12 ceramic chip capacitors after welding
(component side, copper clad side)

2.7. Welding electrolytic capacitors (3 pieces in total)

C15: 100 μ F C16: 100 μ F C17: 47 μ F



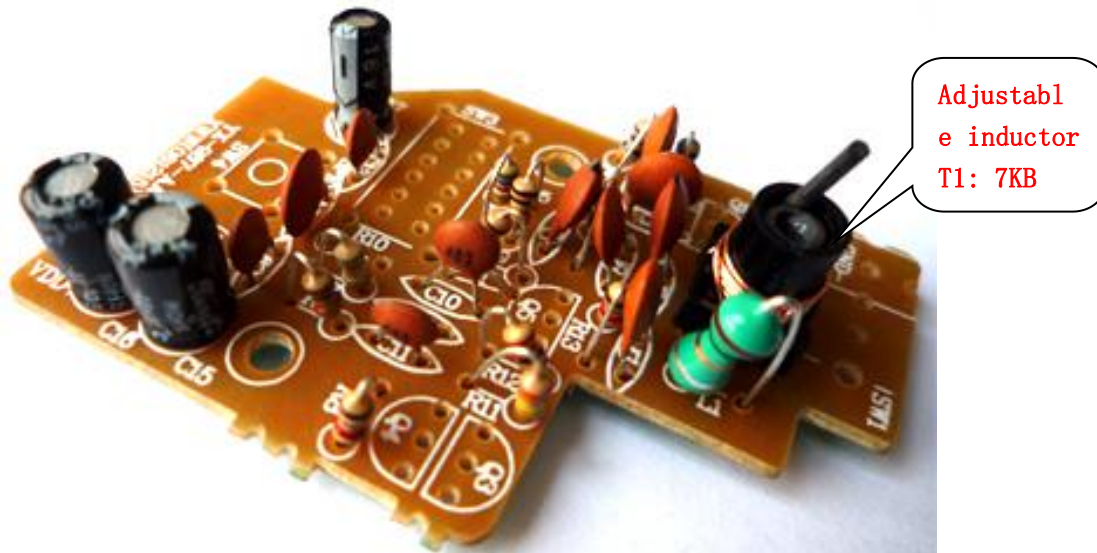
Schematic diagram of 3 electrolytic capacitors after insertion (component side)



Schematic diagram of 3 electrolytic capacitors after welding (copper clad surface)

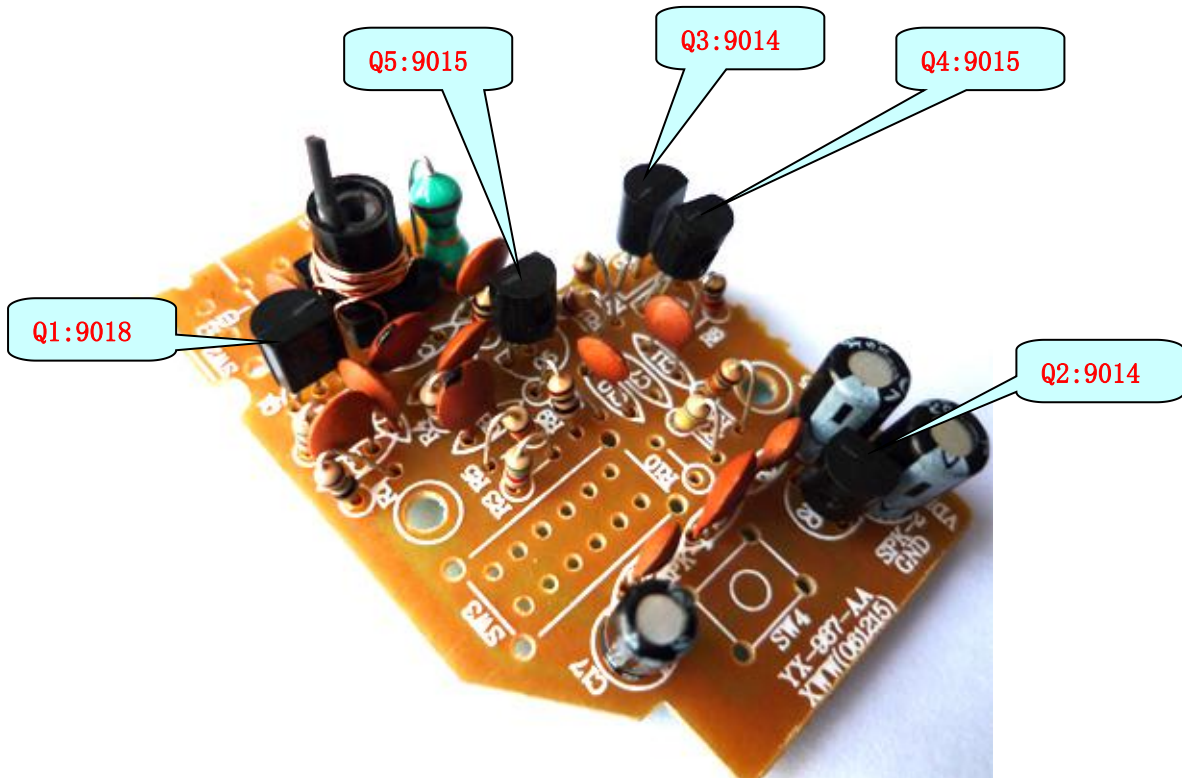
2.8. Welding adjustable inductor and fixed inductor (1 each)

T1: 7KB L1: 1.5 μ H

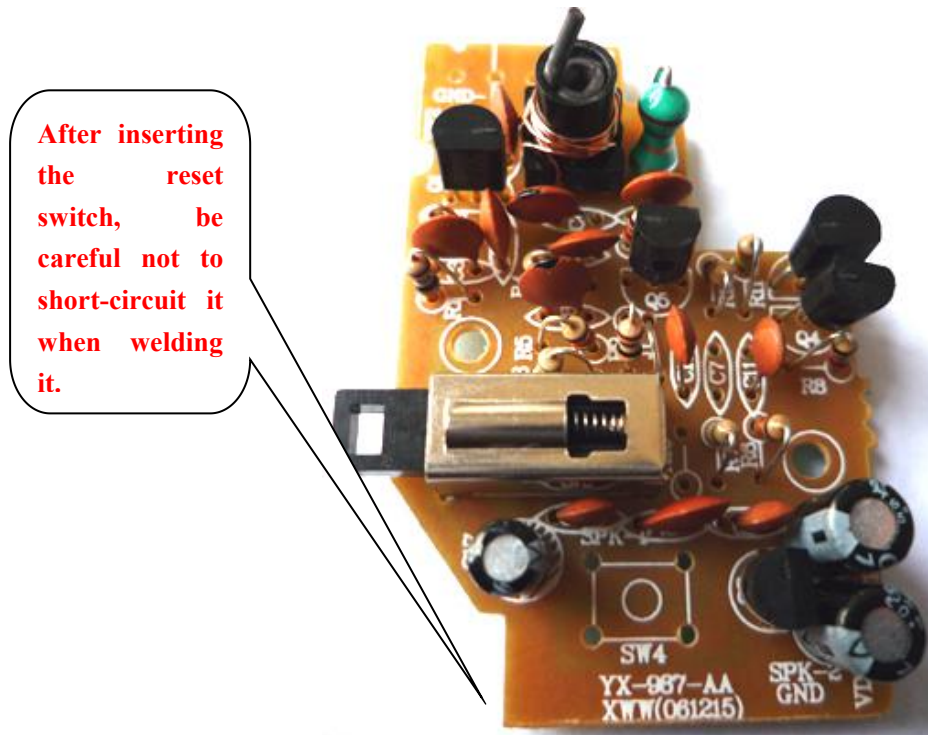


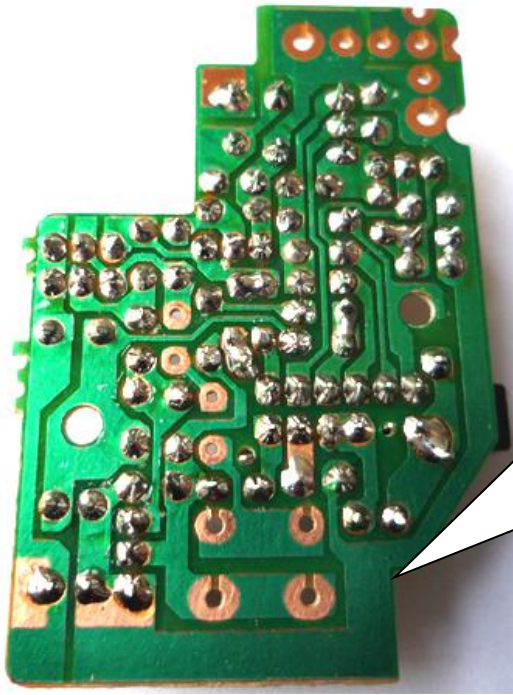
2.9. Welding transistors (5 pieces in total)

Q1:9018 Q2:9014 Q3:9014 Q4:9015 Q5:9015



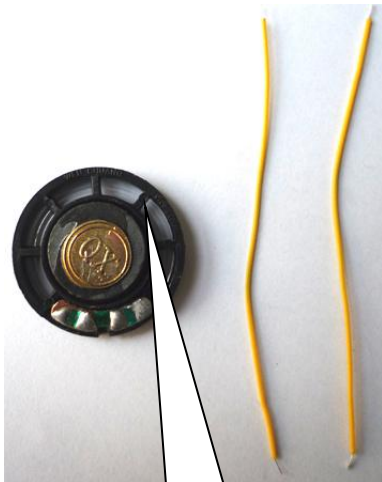
2.10. Weld the "reset switch" (S2, also called "receiver and sender switch")





Be careful not to short circuit the welding points of the reset switch. There is one welding point that does not need to be welded.

2.11. Solder the wires on the "speaker"

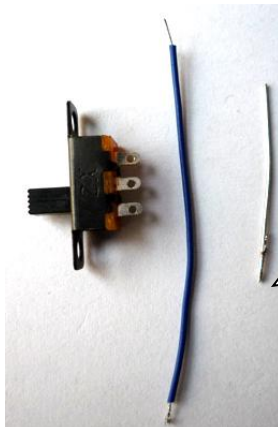


Tin on both ends of the speaker

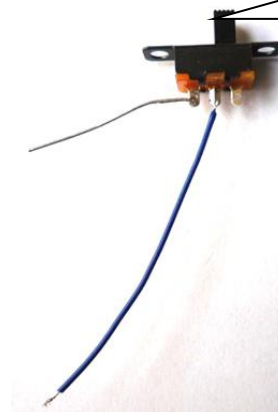


The two wires are soldered to the tinned part respectively.

2.12 Solder the wire on "toggle switch S1"

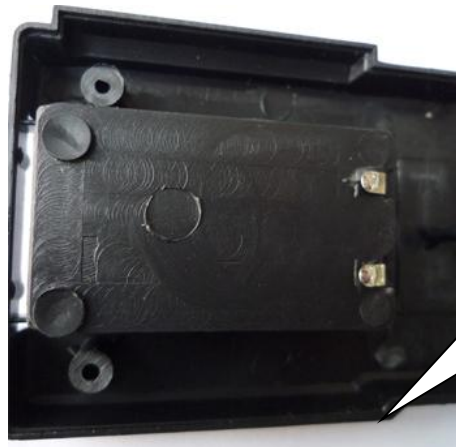


Metal wire, replace it with the metal wire cut off after soldering the resistor

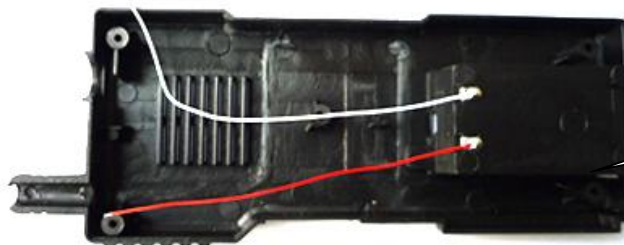


The soft wire is soldered to the middle end of the switch

2.13 Install the battery piece in the plastic case and weld the battery wires

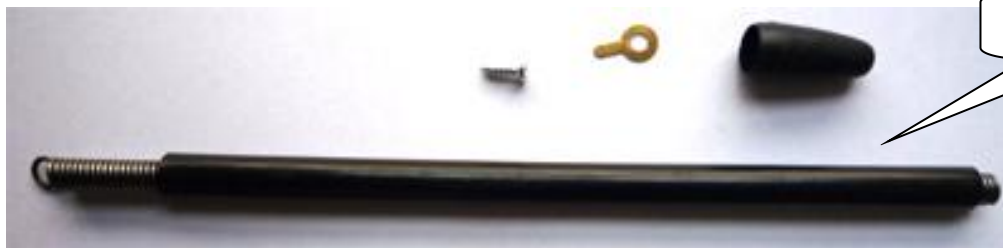


After the battery piece is put in, the other end is bent towards the plastic surface and tinned



Wires are welded to the battery

2.14 Place the antenna in the housing, fix it, and weld the battery wires



black casing





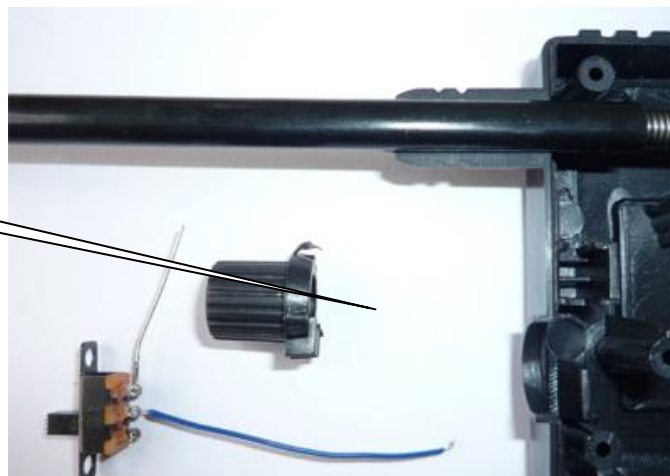
Use self-tapping screws to fix the antenna ears and antenna together on the case.



Tin the antenna ears and solder the wires

2.15 The "fluctuation switch and plastic knob" are placed in the plastic case

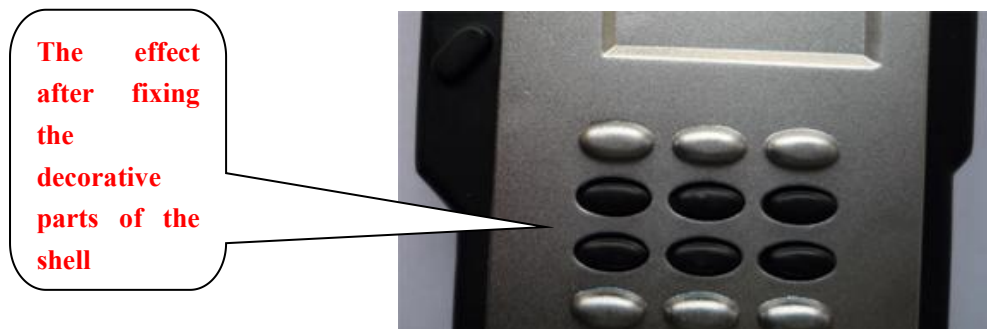
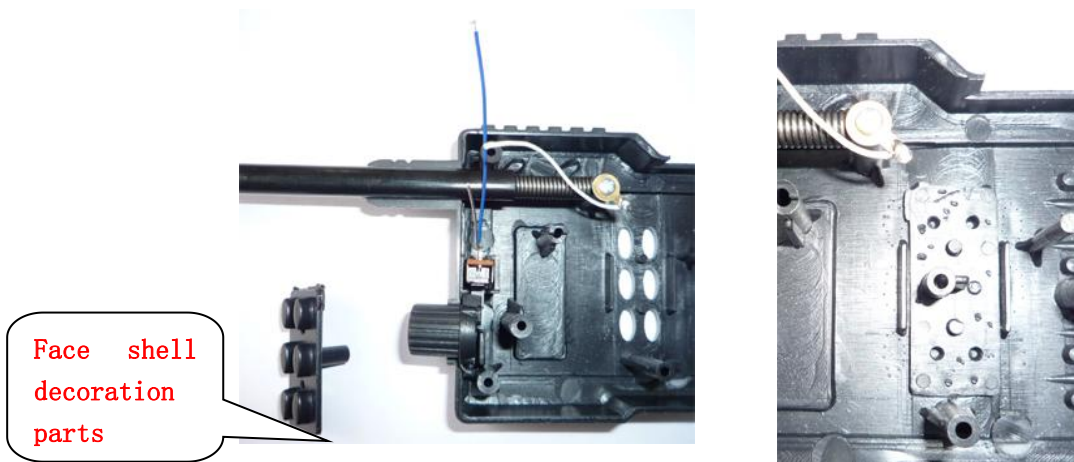
plastic knob



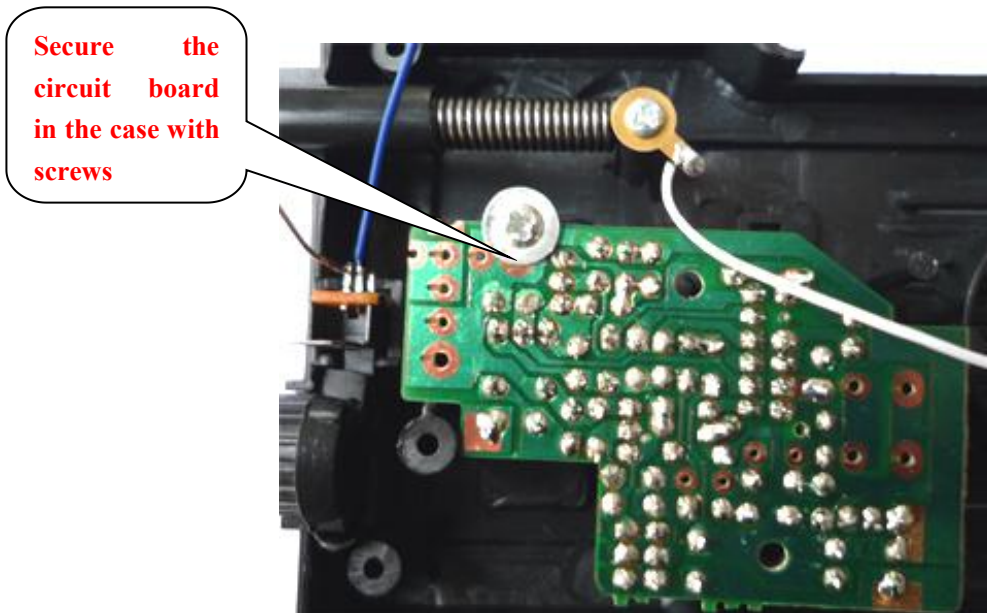
Internal picture after placement



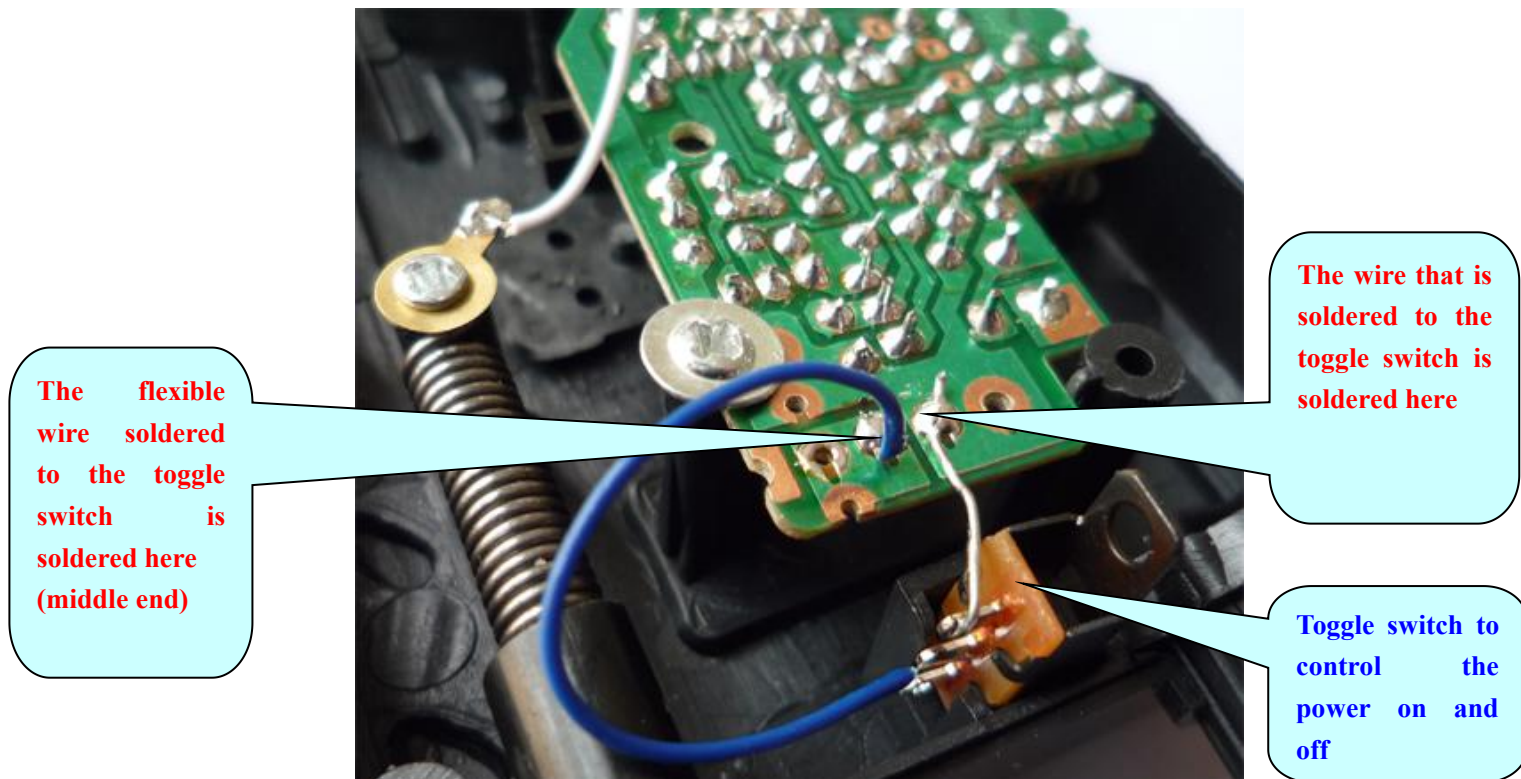
2.16 Place the decorative parts of the dough shell into the dough shell



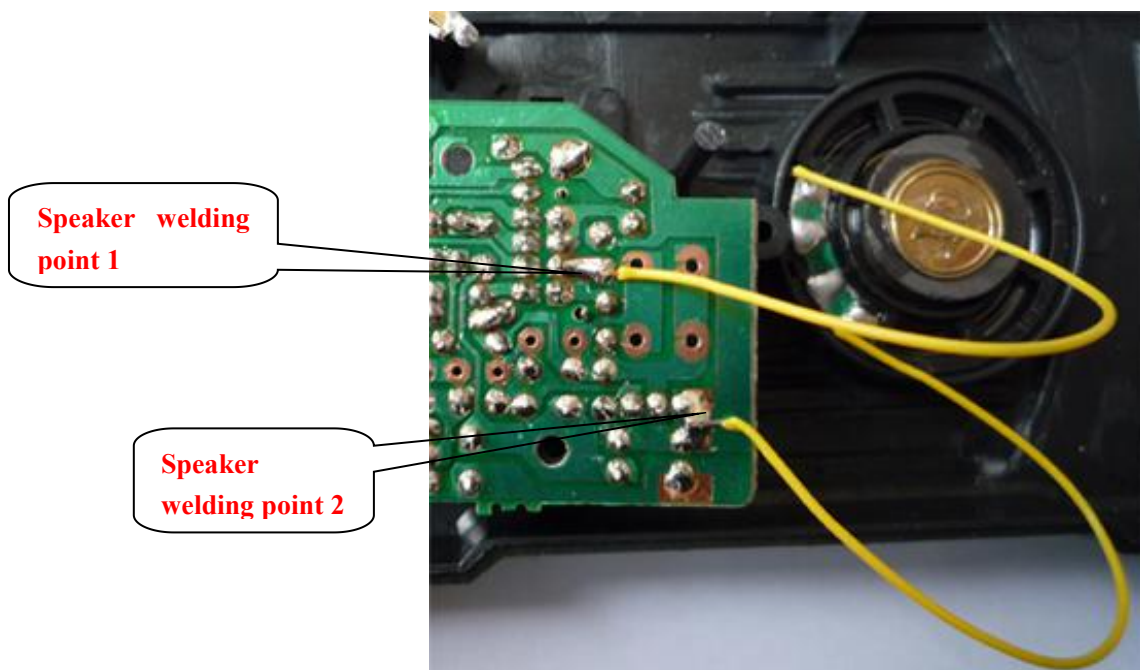
2.17 The circuit board is fixed in the cover with screws



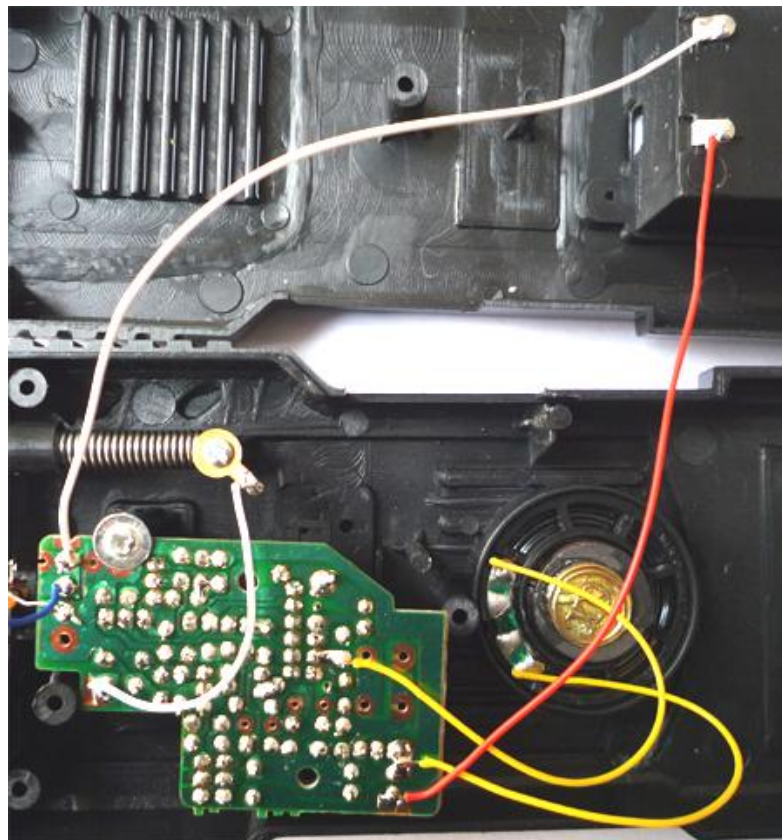
2.18 The 2 wires (metal wires, wires) on the toggle switch are welded to the circuit board



2.19 The wires on the speaker are soldered to the circuit board



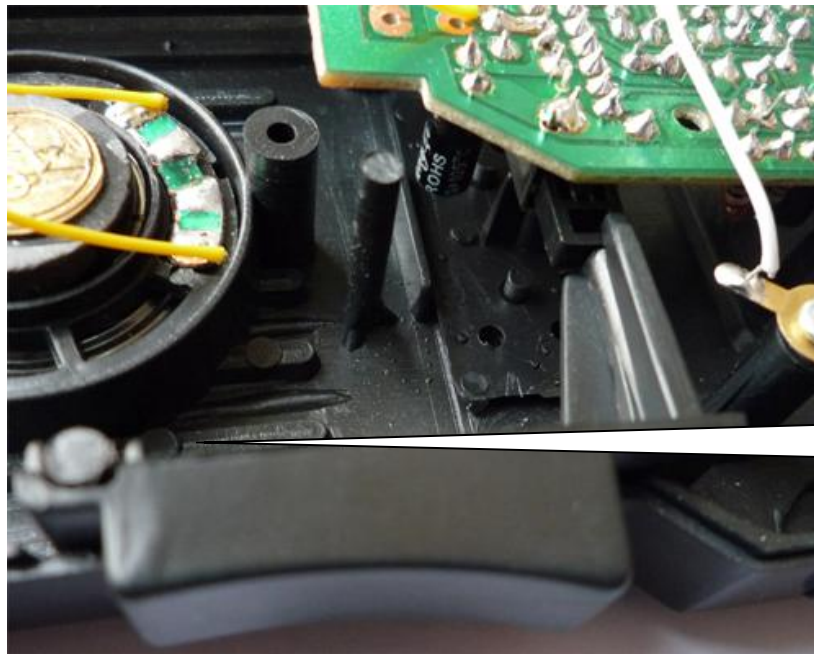
2.20 Connection of the positive and negative wires of the antenna and battery to the circuit board



2.21 The "reset switch button" is placed in the cover



reset switch
button



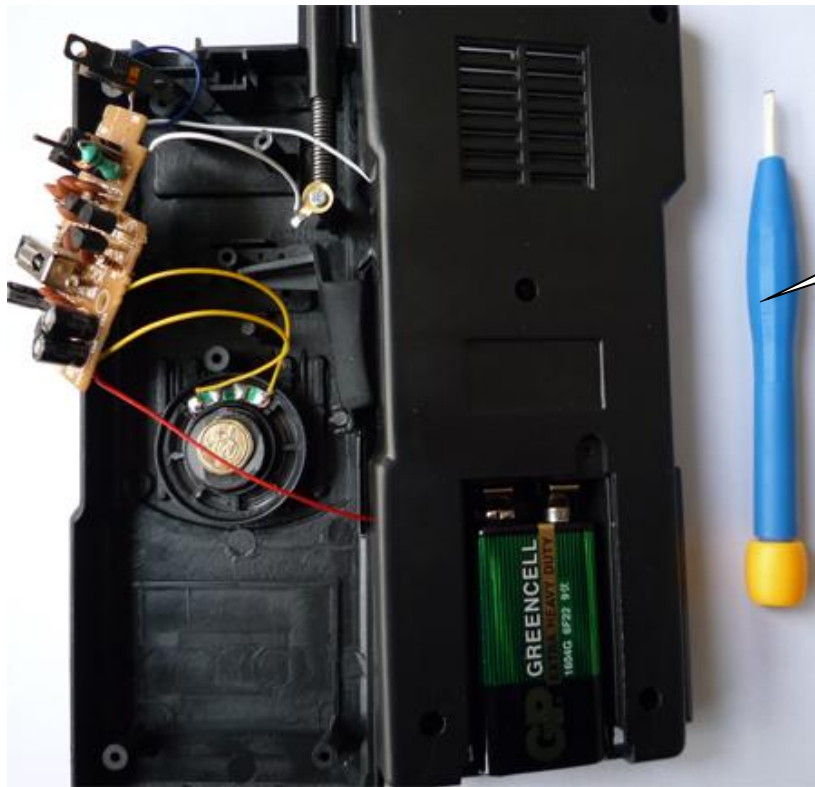
The "reset switch button" is placed in the shell

3. Production and assembly process

Debugging: Use a non-inductive screwdriver to fine-tune the adjustable inductor T1

After the two sets of kits are welded and checked carefully for errors, the 9V laminated batteries can be connected respectively, and the circuit can be energized by turning the switch button.

If you don't press the "reset switch button", the circuit is in the "receiving" state, and the speaker plays the role of converting "electricity" into "sound", and you can hear the "silk" sound; press the other set of reset buttons to make the It works in the "sending" state. At this time, the speaker plays the role of converting "sound" into "electricity". Place the antennas of the two sets of walkie-talkies parallel to each other, and use a non-inductive screwdriver to gently adjust the magnetic core of the adjustable inductor T1 so that The "beep" whistling sound of the receiver is the loudest, that is, the transmitting and receiving frequencies of the two are the same. Then, interchange the two sets and fine-tune the magnetic core of the adjustable inductor T1 in the same way to ensure that the transmitting and receiving frequencies of the two sets are consistent. This process requires fine-tuning each other several times (including distance adjustment) to ensure that the intercom distance between the two sets is the longest and the sound is the clearest.

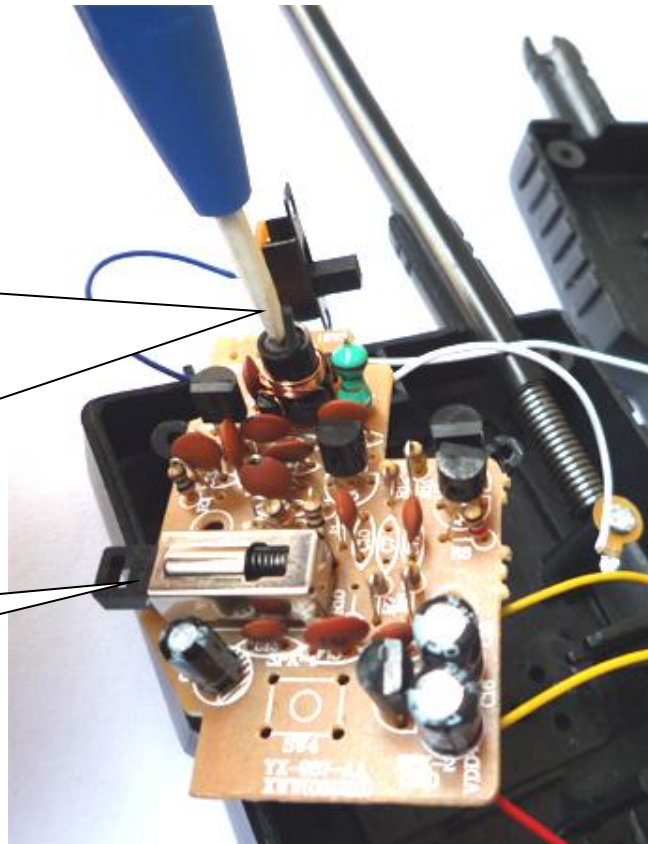


Sensorless screwdriver

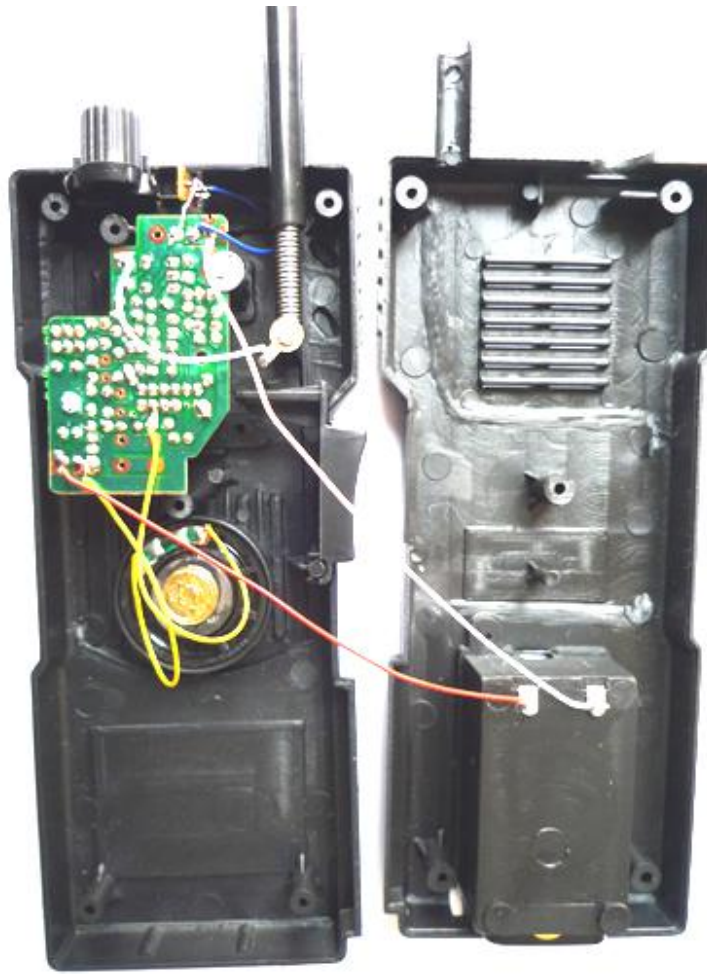
Rotate the "toggle switch button" to energize the circuit. Then press the "reset switch button" and use a sensorless screwdriver to fine-tune T1 to make the other walkie-talkie receive the loudest sound.

Be gentle when debugging, and press repeatedly to make fine adjustments to make the sound the loudest.

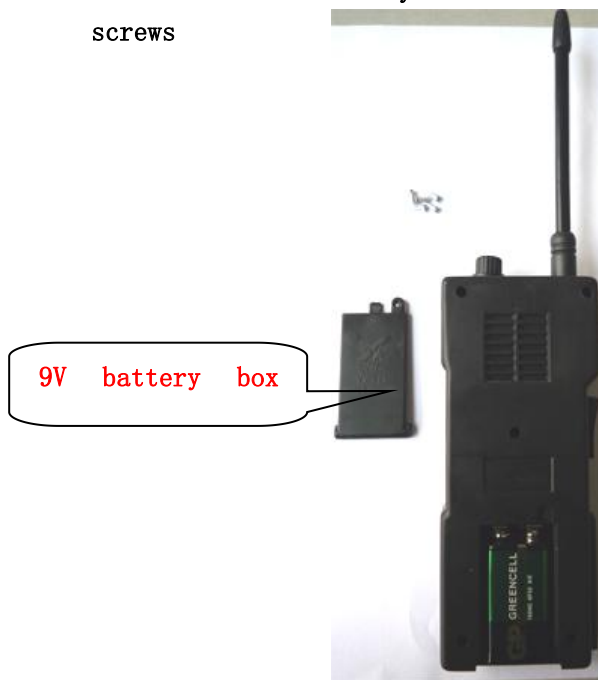
When debugging, press the "reset switch" by hand



3.1 After debugging, the physical picture after fixing the circuit board



3.2 Place the 9V battery into the case, battery box, and front and rear case fixing screws



3.3. Rendering after the decorative paper is applied to the shell (the final actual picture)

