CF210SP AM/FM Radio DIY Soldering Kit

The CF210SP radio kit is a combined AM and FM radio receiver build around the integrated circuits CD9088 (FM) and CD7642 (AM).

The CF210SP radio kit includes the circuit board, electronic parts, enclosure, speaker and antenna. Building it requires basic soldering experience and about 1 hour of your time.
This little radio is good for listening to news, podcasts and radio shows. Its output is limited, of course, due to the small speaker and the thin plastic enclosure.

The assembling process is easy and does not require more than the included Chinese instruction sheet to match the parts in the bag against the print on the circuit board and the schematic for troubleshooting.

We hope these English instructions provide some additional help for electronic novices.

DESCRIPTION

The CD9088 (compatible to TDA9088) is responsible for FM reception with an IF of about 70kHz and a reception frequency range of about 76-108MHz. It features a frequency locked loop with internal muting of weak signals and external IF filtering.

The AM reception is being achieved with the CD7642 (compatible to TDA7642) in a frequency range of about 525-1605kHz.

The final link in the signal way is a TDA2822 audio amplifier chip that drives the speaker with about 100mW or 32-Ohm headphones with about 20mW of output power.

FM and AM reception are working parallel as soon the radio is turned on, and the AM/FM selector switch only selects the audio path to the amplifier.

A set of 2 AA batteries will power your radio for many days.

PREPARATION

We highly recommend you empty the bag with the small parts into a flat container, then take a sheet of printer paper and put the parts piece by piece on the printer paper and add their name or value on the paper. It will be much easier to match the parts with the print on the PCB, especially if some parts (mostly capacitors) have hard to read prints on them.

“Decoding” the rings on resistors should be common sense for everyone who owns a soldering iron.

Furthermore, you will need a soldering iron with a clean tip and some solder wire (we recommend a leaded type with flux core for easy soldering) and a shear cutter to cut of the long lead ends of the through-hole parts after soldering them to the PCB.

You will need a small Philips screwdriver for mechanical assembling, a small flat screwdriver for tuning, hot glue or super glue to affix the speaker and the antenna rod to the enclosure and 2 AA batteries to make it finally work.

ASSEMBLING

Before you start soldering please clean the PCB from fingerprints and dust. This can be done with an alcohol wipe, for example. After you have all parts laid out, you start with the most challenging and lowest profile part: the SMD receiver IC. The easiest way is to put some solder on 2 diagonal pads of the IC’s footprint on the PCB, bring the IC in place, and re-heat one pad to attach the lead. Then do the same with the second pad. If the IC is perfectly aligned with the pads on PCB and all leads are flat down on the PCB, solder all the remaining pins. Make sure you do not overheat sensitive parts like the ICs by applying heat to every pin for not more than 3 seconds. If you are slow and it takes longer, give it a break to cool down before you proceed with the next pin. As next, insert the bridge “J” (a piece of wire like a cut-off resistor or capacitor lead) and solder it on.

After this is done, you solder the parts step by step in place, beginning with the parts with the lowest height (resistors lying on the PCB) and finishing with the tallest parts.

It is crucial to watch the correct polarity of diodes, transistors, electrolytic capacitors, ICs and power supply (batteries).

The big adjustable tuning capacitor can also be installed only in one direction. It has 2 different sizes tabs on its package, and the bigger one fits in a hole in the circuit board when the smaller one faces the edge of the PCB.

There are 2 small coils in the parts bag, with different counts of windings. The parts name (7T5 and 8T5) explains the number of windings and their diameter. Make sure they go to the right position on your PCB. Since the copper wire of the coils is isolated, you need to mechanically scrape off or burn of the coating on the leads in order to solder them to the PCB. Be careful not to damage the coil when doing so.

Some of the resistors go in vertical direction and are marked with a circle on the PCB where the body goes.

We recommend you solder the included wire (most likely yellow) to the antenna before you install the antenna in the enclosure to avoid melting the plastic. All wire connections are clearly marked on the PCB, like “AM” for the 2 ends of the AM antenna rod, “SP” for the 2 speaker wires and “GB+” and “GB-“ for the battery.

To assemble the AM antenna, check the orientation of the plastic holder and the PCB slot, and glue it into place so it holds the ferrite rod parallel to the PCB. Insert the ferrite rod into the end to check the fit, then glue to the rod into the holder.

Now take the smaller dial for volume and check the indentation for the rectangular brass stud of the switch. Align the switch and use one of the two identical machine screws to fasten. Next, take the larger tuning dial and align the indentation. Then, take the tuning indicator plastic and place over the rear of the dial with the “tail” pointing outward, checking the direction of rotation will move the indicator upwards. Then secure this with the other identical machine screw.

You can remove the self-adhesive backing from the front window and apply it to the front of the casing, checking the orientation. At this stage, we are ready to make the final connections and assemble the unit.

First, slide the battery terminals into place – positive is the top terminal on the front case, negative is the lower terminal. Solder the negative wire to GB-, and positive wire to GB+. Next, solder the speaker wires to the SP terminals. To connect the AM rod antenna wires, make sure you apply enough heat to burn off the coating on the wire tips prior to soldering them to the PCB.

The final connection is the FM antenna connection. For this, stick the wire through the slot in the rear of the casing, and the screw hole end of the antenna through the slot. Lead the yellow wire to the ANT terminal and solder it on. Use the slightly different machine screw to secure the antenna to the rear casing.

Now you can thread the tuning indicator into the front of the case. Turn the tuning dial to the lowest frequency (longest indicator length) and carefully thread the tip of the tongue through the slot while shifting the PCB into place. It should not require force. Once roughly in place, you can take the AM-FM mode switch and push it through the exterior casing over the switch.

COMMISSIONING

Before you close the enclosure, you will need to tune the FM and AM part to “align” the received frequency with the numbers shown on the indicator.

For this step, it is highly recommended that you supply voltage (3V) to the battery contacts using alligator clamps or something that serves the purpose of supplying voltage to the circuit without having the batteries installed inside the enclosure.

Flip the band selector to FM and turn up the volume to a medium level. Use the tuning wheel to move the indicator to a position where you know is a strong radio station. Use another radio to find a station if you do not know the frequencies.

At this time, you will most likely only hear some static noise. Now take a small flat screwdriver and adjust the FM trimmer capacitor until you can hear the station you had dialed in before. The trimmer is the screw on the back of the adjustable capacitor that is closer to the middle of the PCB.

Now do the same thing in AM mode. Flip the band selector, dial in a station you know about or you found with another AM receiver, then adjust the AM trimming capacitor until you can hear the radio station. This time the trimmer is the one on the back of the adjustable capacitor that is closer to the PCB edge.

If you are not able to tune it exactly to the right point, you can stretch the air coils you previously soldered to the PCB a little bit and try to tune it again.

If you are done with tuning you can close the enclosure, insert the batteries, and have fun listening to your little radio.

We recommend the following website for a nice write-up including several photographs of the assembling steps.

https://goughlui.com/2016/09/07/project-paeansonic-cf210sp-cd9088cd7642-amfm-radio-kit/