

MCHF Building tips!

I am by no means an expert, but this is my experience in the building of the wonderful mCHF radio by Chris M0NKA.

This is the neatest radio I have ever had. It is amazing in what it will do, and a real fun experience (albeit a trying one at times hi hi) to build and get working.

OK, here we go!

If you bought the kit from Chris M0NKA with all of the parts , you will pleasantly find that they are separated into 2 bags RF and U board SMT and RF and U boards Post assy parts.

If you bought just the boards bare and ordered all of the parts. I STRONGLY recommend that you get a bunch of little zip bags and do the same.

NOTICE!! If you are going to want to run more than 5 watts, you need to change all of the RF circuit caps to 200v caps.

**Check the RF Board schematic, there is a note for each circuit that needs these changed
Power amp, LPF, Ant switch**

Sort your parts by value eg.. all of the .1 uf caps in one bag for each board and mark which parts they are (C1, c2 etc...)

The RFC's were in with the resistors.

NOTICE! There are parts in the kit that are for optional circuits!! Like R47b ,c d, and e. DON'T install them, it will mess you up!! (Don't ask!)

I know this sounds like a pain but you will be happy that you did it!

Step 1:

Install the CPU first. This is the most critical component on the board. If it don't work nothing works! There are several methods for mounting SMD chips, you can see YOU TUBE vids of this, take the time to watch them!!

After it is installed CHECK and CHECK and then CHECK again that you have NO shorts between the pins. Then I find where the pin connects and check for continuity from the pin to there to make shure the pin is soldered to the pad.

Next I repeated the process with the chips with the smallest pins (like the codec) as they are the hardest for me. Repeat the checking process!

Of course you can skip all this checking, and do it later with a populated board when it doesn't work hihi.

Step 2:

Now this is your choice, you can pick the bag of caps or resistors and have at it!!

Even after I checked every component that I soldered, I came back later in trouble shooting and found several that looked soldered but where not , so again get GOOD magnifiers!!

If you picked capacitors as your first bag, PLEASE do not install any of the aluminum electrolytics until you have installed all of the other SMD components as you can knock these loose if you aren't careful (Don't ask !)

Step3:

Of course now you pick the bag you didn't pick in the previous step hihi.

Step 4: WASH THE BOARD!! Use alcohol, soap and water and alcohol again, dry with a blow dryer, you need to remove all of the flux you have acquired.
Now for the post assembly parts.

Caution! If you install one of those 90 deg headers for P6 jumper, it WILL hit the shield between the boards when you assemble the radio in Frankies case!

Also if you are planning to use Frankies case from China you will need to order these low profile headers from Samtec: part number CLT-120-01-F-D, <https://www.samtec.com/products/clk-120-01-f-d>, this is a dual header , you will have to carefully slice it in half (YOU MIGHT WANT TO ORDER 2 JUST IN CASE, again, Don't ask)

Let's talk about the mods for a sec.

Unless you really can't live without 10 watts on 12 and 10 meters, you do not have to do the T7 or SWR Mod, It will work fine without them.

AND THERE IS NO GUARANTEE THAT YOU WILL GET 10 WATTS WEVEN WITH THE DOUBLE T7 IT IS A CRAP SHOOT, LOL

You will have lower power on 12 and 10 meters, but hey it is a QRP rig!!!

The swr meter works well. You just have to check it with a dummy load and know that whatever reading it is, that is your lowest SWR.

I did the SWR mod and don't really see any difference. My lowest SWR is 1.5 so I know if I have 1.5 it is tuned.

You do want to do the T5 mod use this doc: http://www.m0nka.co.uk/wp-content/uploads/2016/03/transformers_winding.pdf

Step 5: Post assy.

Now you can just finish the post assembly parts as you wish.

Much, much , much information is here on the Wiki hub: <https://github.com/df8oe/mchf-github/wiki>

All you need to know about bootloader , firmware, calibration adjustments etc... can be found here thanks go out to [Andreas DF8OE](#) and the great bunch in the German group that is supporting this radio.

WHAT IF IT DOESN'T WORK WHEN I TURN IT ON!!

Well, that can open up a whole new world for you!

I have received some great advice from [Chris M0NKA](#) and [Andreas DF8OE](#).

Here is kind of a compiled bit of troubleshooting info.

VER 6 ONLY

The display will be white until you have firmware.

If after you have firmware the display is still white, you probably have jumper issues R30 to R34

Here is some more info about the screen if it is White:

For TP controller to work You need your SPI bus to be extended to TP, and command and control connected as below.

Data	TP_SDI	R31	MOSI	PC3
Clock	TP_SCK	R32	SCK	PB13
Data	TP_SDO	R30	MISO	PC2
Interrupt	TP_IRQ	R34a	IRQ_a	PA4
Chip Select	TP_CS	R33a	CS_a	PA9

If your firmware will be able to talk to TP chip, it will let you know on the startup flash screen. If not and all you connections are correct - I would say try another Display unit, or replace the TP chip, they are cheap.

Here is a nice trouble shooting technique from [Andreas DF8OE](#):

You can split touchscreen function into two independent blocks:

BLOCK1:

PRESSING ANY POINT ON LCD WILL CAUSE A "BUTTON PRESSED SIGNAL". YOU CAN CHECK THAT FUNCTIONALITY IN BUTTON TEST MODE OF FIRMWARE.

TO ENTER THE TEST MODE, PRESS AND HOLD ANY BUTTON ON "POWER UP" AND THE RADIO WILL GO INTO TEST SCREEN MODE.

IF IN BUTTON TEST MODE TOUCHING LCD GIVES NO "BUTTON PRESSED"

THEN, TP_IRQ IS NOT CONNECTED

SO YOU CAN HAVE A BAD SOLDERING JOINT, BAD TRACE, OR LCD (TC-CONTROLLER) FAULTY.

THIS FUNCTION WILL WORK WITH "TOUCHSCREEN N/A" BECAUSE IT IS A SIMPLE BUTTON-PRESS-FUNCTION.

BLOCK2:

TRANSFERRING DATA FROM/TO TOUCHSCREEN TO MCU.

THIS IS DONE VIA SPI.

AT STARTUP FIRMWARE TESTS TO SEE IF COMMUNICATION WITH TC-CONTROLLER WORKS.

AND IF SO, IT SHOWS "TOUCHSCREEN: XPT2046" IN SYSTEM INFO MENU.

THIS MEANS COMMUNICATION IS WORKING PROPERLY.

IT DOES NOT / CANNOT CHECK IF BUTTON-FUNCTIONALITY WORKS.

THE SCREEN TEST PROCESS WORKS LIKE THIS:

IF YOU TOUCH ANY POINT ON LCD,THE FIRMWARE GETS INFORMATION THAT TOUCHSCREEN IS PRESSED. NOW FIRMWARE LOOKS VIA SPI WHAT COORDINATES HAVE BEEN TOUCHED.

END OF VER 6 ONLY DATA

ON TO BOOTLOADING

If you can't get it to go into the bootloading process and you are SURE that you are doing it right, you probably have a solder bridge at the CPU. (back to check and re-check) I know, but that's how I found my problems.

Once the bootloader and firmware are installed

Setting the Bias:

If you can't get the bias up to 500ma

This is per freitag.wilhelm on Yahoo Groups

1. Set PA Bias=0
2. Switch off and add a 3k resistor across U18 PIN1-4.
3. Switch on and adjust PA Bias to reach the idle current 2x0.25Amp.

TRANSMIT SIGNAL PATH

The transmit path starts at the Codec. You need to see a signal from pin 12 and 13, (260 mv) you will need a scope with a .10 cap isolation to the probe. And it is a small signal here.

C7 and C8 (260mv)

This goes into the Quad amp circuit, you need to see four sine waves at C109 – C112. (260mv)

This heads to the TX Mixer, you will have all four of these signals as well as you clock signals at pins 2 and 14 of U17.

From here you check Pin 9 of U1, Pin 9 of U2. (35 mv)

From here it goes to the TX Pre-Amp C113 (35 mv) input C116 (1300mv)output.

Next collector of Q3 and Q4. (4 v pp)

Next the Drain of Q5 and Q6. (35vpp)

These should be increasing in amplitude as you go.

If all this is good and you have no output, you probably have a short or open in the LPF, Ant SW or SWR circuit.

I have found solder bridges in all of these locations and it can take you all day to find it hihi!

RECEIVE CHECKING

If you have no receive, CHECK the RF Gain first!, for some reason it comes on line all the way down!

That can be confusing!!

To troubleshoot the receive circuit, I usually start at the BPF, I take a piece of wire and touch it to R1 then R3 and see if you can hear the noise signal come up. If it does but you have no receive, then there is a solder bridge somewhere in the LPF SWR or Ant Sw circuit.

If you do not hear the noise floor come up then the problem is on the other side of the BPF.

I thought I had a problem with too much power out on the low bands, but there is a config menu selection to lower the power on low bands.

I hope that this information is of help to any of us that build the MCHF radio.

I know that it is not a complete work, but it is a place to start, and I know with the help of Chris MONKA and Andreas DF8OE, and the rest of the group we can make it better and our experience can be more satisfying.

Take care, and happy building,

Chuck WD8BXS