W2IHY 8-band EQ – Microphone Compressor

The beginning:

I used my W2IHY 8-band equalizer with several microphones in the past. The main problem on my FT-847 was the overmodulation problem. There's plenty of output level on this EQ – too much for the FT-847. I had to reduce the pot R13 (Mic Out) nearly to minimum to get an acceptable modulation level. Of course I could try a resistor devider between the EQ output and the FT-847 mic input but I wanted to find a better solution first.

The second problem was the possibility of producing AF distortions by overdriving the mic input stage of the EQ. I tried electret capsules, some dynamic microphones and my HEIL Goldline GM-5. If the distance from the mouth to the microphone gets too small the input stage is overdriving (just before you can see it on the red "Mic Level" LED !!). Of course you can hear these distortions on the air on your transmission too.

The third problem was the producing of overmodulation when the EQ was on. To get the sound characteristics I liked I had to move some EQ levels up to +12dB - +16dB. So the output level on the "EQ on" position was too much for my FT-847 even when the "EQ off" position was OK. By reducing the total output level the "EQ on" worked great but then the "EQ off" was much too weak.

The fourth problem was that I didn't want to use an external compressor which probably could add more white noise to the AF line cause of its own amplification.

The solution:

So I tried to find a way to get an ALC, an automatic level control, depending on your microphone input – meaning a simple microphone compressor. This compressor should retard the "EQ on" level jump too.

After several tests I find out the final circuit below which works great with my HEIL Goldline and a lot of other microphones I tried.

Of course the results are depending on your own equipment (microphone, rig, additional accessories) so I can't give you a 100% "set-it-and-forget-it" solution. Just try it out if you like.
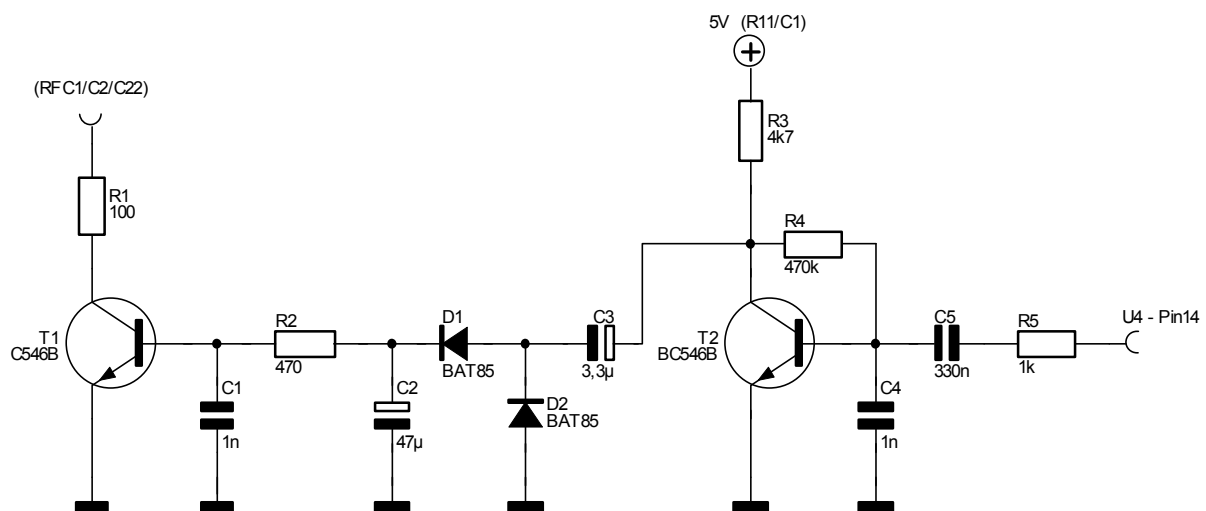
And I did those changes **on the EQ board** too:

- **C10** (100µF) → **470µF**
  This lowers the input highpass filter to let the basses through even when the compressor is working hard and therefore the input resistor is lowered by the compressors additional 100 ohms resistor (R1).
  But there's another possibility to get a "DX punch" compressor behaviour. By reducing the value of C10 you get a variable highpass function. When you're far away from the microphone the compressor shouldn't work or only work on its minimum. Then the input impedance is only defined by the resistors R21a (680 ohms) or R23 (200 ohms), selectable by the jumpers on the bottom of the EQ. The input highpass is defined with C10 and the selectable input resistors. The compressor attenuator resistor R1 (100 ohms) is in parallel with the selectable resistors. So by reducing C10 to about 10µF there's a highpass function depending on the input level and how strong the compressor works. This makes the modulation sounds "sharp, crisp and punchy" when speaking real close to the microphone while having the fullrange sound again by settle back on the chair. Just try it out if you like that. For me the "fulltime" full audio range is the better choice.

Some additional remarks:

- The compressor attenuator with R1 (100 ohms) is working <u>after</u> the input suppressor coil RFC1. This prevents RFI problems from outside going into the compressor stage.

- The input of the compressor stage comes from Pin 14 of U4. This Pin has the switchable AF output of the pre-stages. Here the separate "non-EQ" and "with-EQ" AF lines are added to one audio line again. With his solution the compressor can prevent distortions of the EQ (when using high amplifications with +16dB) too !! Strong EQ levels are compressed to. This prevents overmodulation without loosing the EQ sound characteristics. Great !!!

- A 1-stage amplifier (T2) was necessary to get an audio level which can drive the attenuator stage (T1). The original level on Pin 14 / U4 was too low to drive T1 directly.

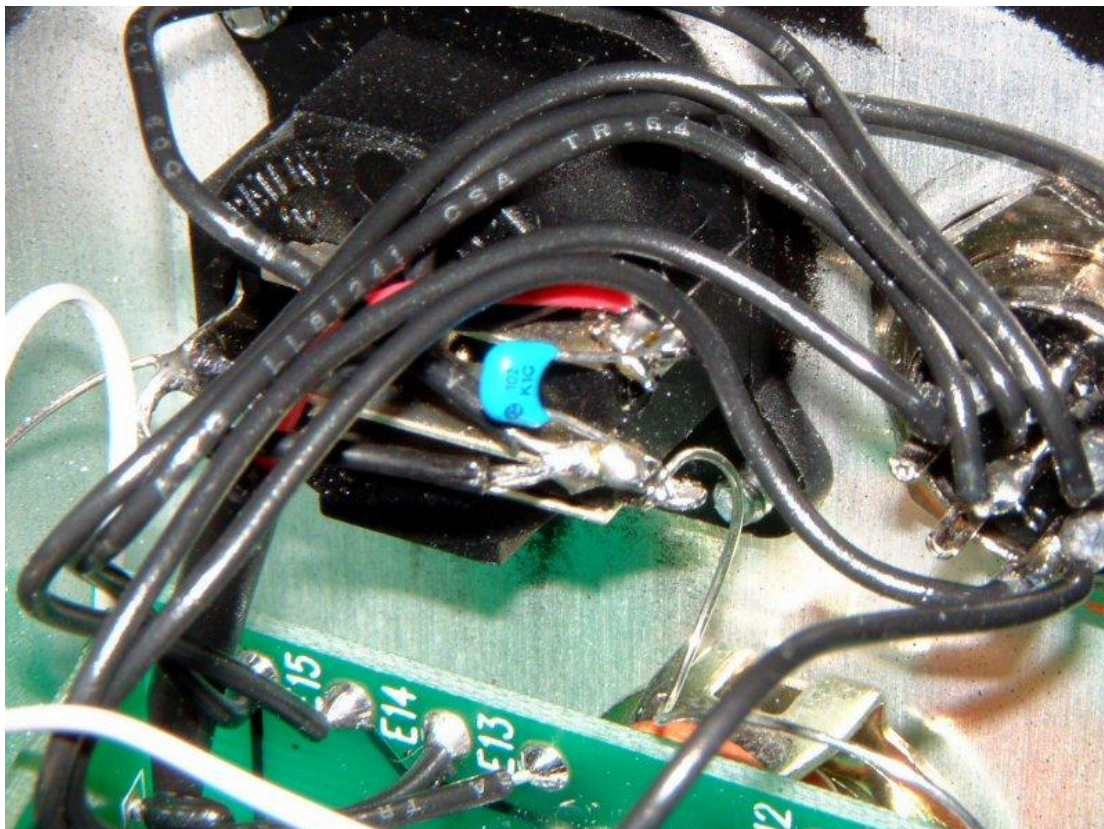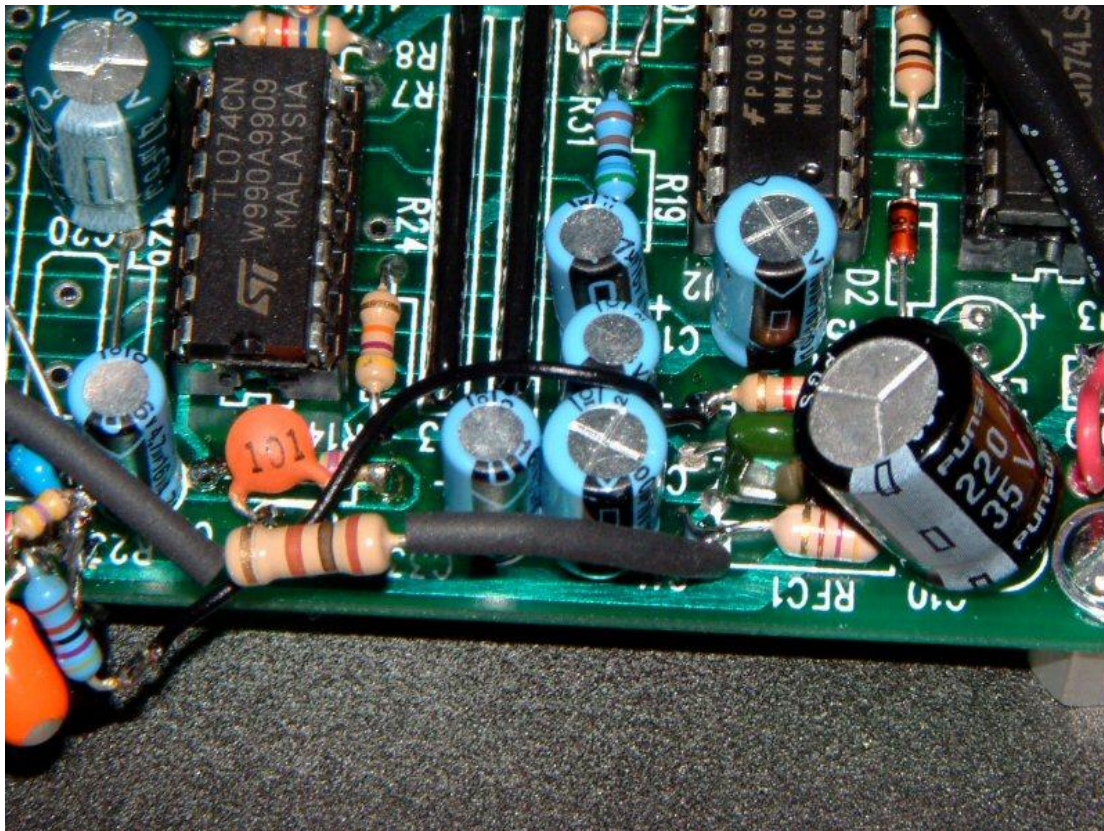# W2IHY 8-band EQ – Microphone Compressor

- I'm using two schottky diodes BAT85 as D1/D2. These diodes only have a forward voltage of 0,3 V instead of 0,7V on most cheap universal diodes. This gives a better low signal detection behaviour. Maybe other types would work well too or you have to change the gain of the T2-amplifier to get a higher output to drive them.

- The compressor works real fast with the shown C2 (47µF) without having any "pumping" effects. It opens after ½ seconds without voice input. If you like a longer delay time you could try 220µF instead of 47µF. Then the delay time should be about 1,5 seconds I guess. A value lower than 22µF will produce pumping effects !

- I did a "flying" circuit soldering like shown below. This works great but a small PCB would be more stable on the mechanic side.

- I added a 1nF capacitor on the 3-pole Mic In socket too to prevent RFI problems.

Some photos:
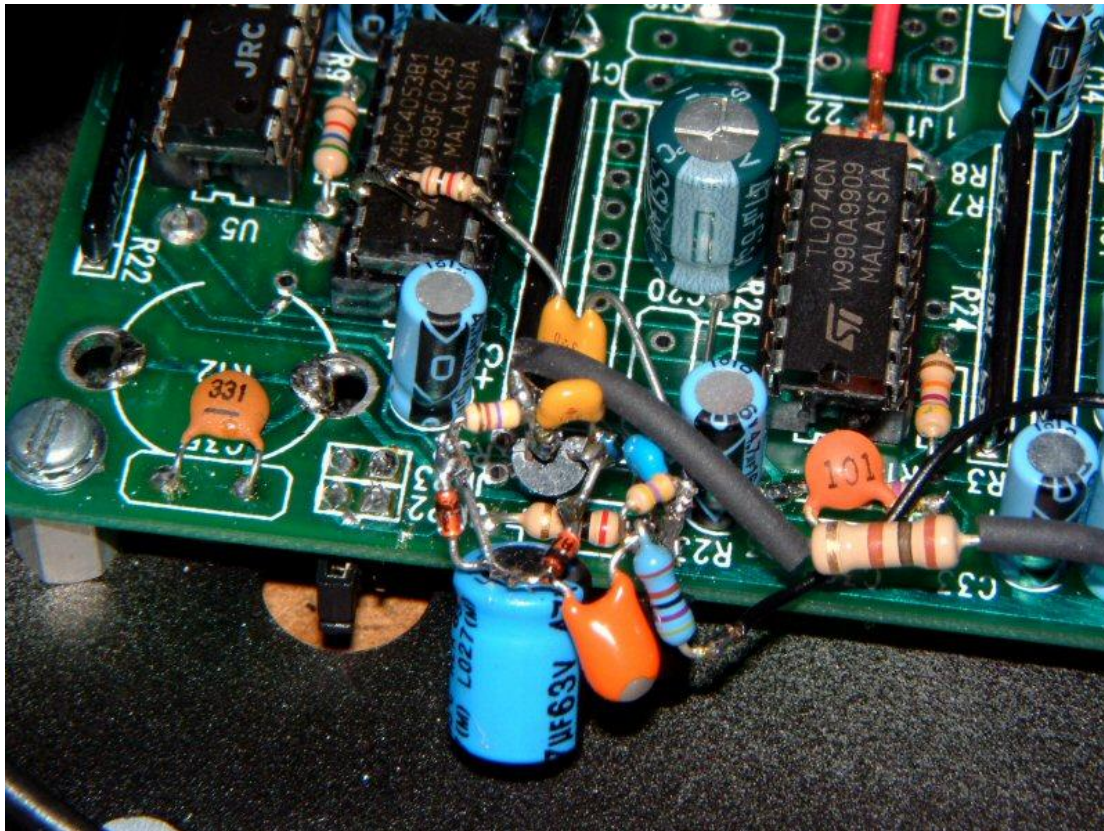
The blue 1nF RFI blocking capacitor on the backside 3-pole mic socket "J9".

Now I can vary the "mouth-to-mic" distance from 2 meters close to only 5 cm without having remarkable variations on the mic input level on the FT-847.

Best 73,
Jochen Heilemann, DG2IAQ

W2IHY 8-band EQ – Microphone Compressor

Disclaimer • Disclaimer of liability

This modifications mostly need to be done by a electronic specialist who had enough practise and who has knowledge in SMD soldering. **You do the modifications on your own risk !**

Radio modifications shown here are provided for properly licensed operators only! The user is solely responsible for making sure that any modifications made to the radio unit must meet all Federal and State Regulations or the Country of use! Liability of damages to any equipment is the sole responsibility of the user! Downloading , viewing, or using any information provided on these pages automatically accepts the user to the terms of this agreement! Modifications are provided for information purposes only!

Although the greatest care has been taken while compiling these documents, we cannot guarantee that the instructions will work on every radio presented.

Copyright

The author intended not to use any copyrighted material for the publication or, if not possible, to indicate the copyright of the respective object. The copyright for any material created by the author is reserved. Any duplication or use of objects such as diagrams, sounds or texts in other electronic or printed publications is not permitted without the author's agreement.

Some circuit details are password-protected because of legal reasons. Please contact me via e-mail.

If your company would like to provide technical information to be featured on this pages please contact me at: dg2iaq@web.de