W2IHY 8-band equalizer

The W2IHY equalizer from Julius is a great product which I ever wanted to have to improve my modulation in a significant way. I heard the MP3 files of his homepage and loved the improvements. Fortunately I got one via eBay now.

I'm using an AF wide-range modificated YAESU FT-847, an 2.8 kHz INRAD filter on TX + RX and a HEIL Goldline microphone.
As I set up the W2IHY equalizer like in its description (there just is a combination of the FT-847 and the Goldline) I recognized that the modulation on the OFF position was darker than before. So I had a look into the schematic, checked some stages with my electronic audio range program (www.win-elektronik.de) and found out that the modulation is narrowed by the W2IHY even on the OFF position. I guess Julius did this to reduce the noise which the stages produce by their amplification.

> This was mainly provoked by **C35** with its original value of 1nF. This produces an AF lowpass, OK so far. But the more you need MIC GAIN (variable R12) the deeper gets this lowpass. Too deep ! On the amplification of ½ there's a lowpass of already 3.200 Hz while on full amplification of R12 we have a lowpass of about 1.600 Hz ! You can try to compensate this with the equalization ON, but not on the OFF position.

So I did some modifications on mine W2IHY equalizer which widens the audio range a lot and the result works real great ! The voice on the EQ OFF position is real great and natural with my HEIL Goldline. And with this basic position the EQ can do magic.

For final of my mods I build in a rogerbeep circuit too.

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Modifications

| Original value		Replace with	Description
Main Board			
C1 (4,7µF)		100µF	Less DC ripple for the supply of an electret capsule. Maybe this could reduce the possible DC noisefloor of the capsule.
C2 (10µF)		47µF	More basse.s
C4 (4,7µF)		47µF	More basses.
U1b	▼	Adding 2 MΩ and 120pF	A tip from Julius, W2IHY. This reduces the popping effect of the noisegate significant. A much smoother attack behaviour with even fast response and no missing of the syllables. See picture below. I'm using 2,7MΩ / 100pF with superb results too.
C9 + C29 (4,7µF)		22µF both	More basses.
C31 (100µF)	▼	470µF	More basses for the Headphones output f low: 200 Hz → 40 Hz on 8 ohms
C33 (4,7µF)	▼	22µF	More basses.
C35 (1n)	▼	330pF	Open the lowpass edge to let the heights through but reduces the amplifiers white noise of the stage above 5 kHz. 1.600 Hz → now 4.800 Hz on full amplification. On lower amplification the upper edge is raised even more.
C36 (120pF)	▼	330pF	Reduction of lowpass to reduce noise amplifier white noise. ***I didn't do that on mine.***
C38 (4,7µF)		100µF	More basses. ***I didn't do that on mine.***
D1 (1N914)	▼	BAT85 Schottky diode	Reduction of the forward noisegate detection level from 0,7V down to 0,3V. Much better and more sure action of the noisegate behaviour, even on the quieter speech.
R9 (5,6kΩ)	▼	4,7nF parallel	Lowpass on 6.000 Hz to reduce headphone amplifier white noise.
R11 (2,2 kΩ)	▼	5,6 kΩ or 6,8 kΩ	Only needed for users with an electret capsule, DC powered by the W2IHY. Much higher sensitivity of an electret capsule. Means much wider range an operator can vary to/from the microphone without loosing too much audio level. Superb for the shack. On high background environments you should leave the original 2,2 kΩ for suppressing the background noise. And the operator has to talk closer to the mike capsule to have enough audio level. On a distance more than 20cm away from the electret capsule the audio level falls down rapidly.
R13 (20 kΩ)	▼	1nF parallel	Lowpass on 8.000 Hz on full amplification, even higher frequency edge on lower amplification. Lowpass is working AFTER all stages to reduce the totally amplification noise.
R19 (6,8 kΩ)		47 kΩ	A tip from Julius, W2IHY, to improve the noisegate behaviour in addition to the C8 mod to eliminate popping effects. ***I didn't do that on mine.*** This reduces the input sensitivity and the optimum result is fairly depending on your used mike.
R20 (10 kΩ)		33 kΩ	A tip from Julius, W2IHY, to improve the noisegate behaviour in addition to the C8 mod to eliminate popping effects. ***I didn't do that on mine.*** This slows down the delay time of the noisegate to get nearly the same behaviour like before with the original C8 of 22µF.
EQ Board			
R10	▼	1nF parallel	Reduces amplifier white noise when EQ is ON by adding an AF lowpass of 16 kHz.
R19 (pot)	▼	5,6 kΩ parallel	Finer variation of the Noisegate working area.

The marked as (▼) are the "must have" modifications. The others are optional to get a real wide audio range.

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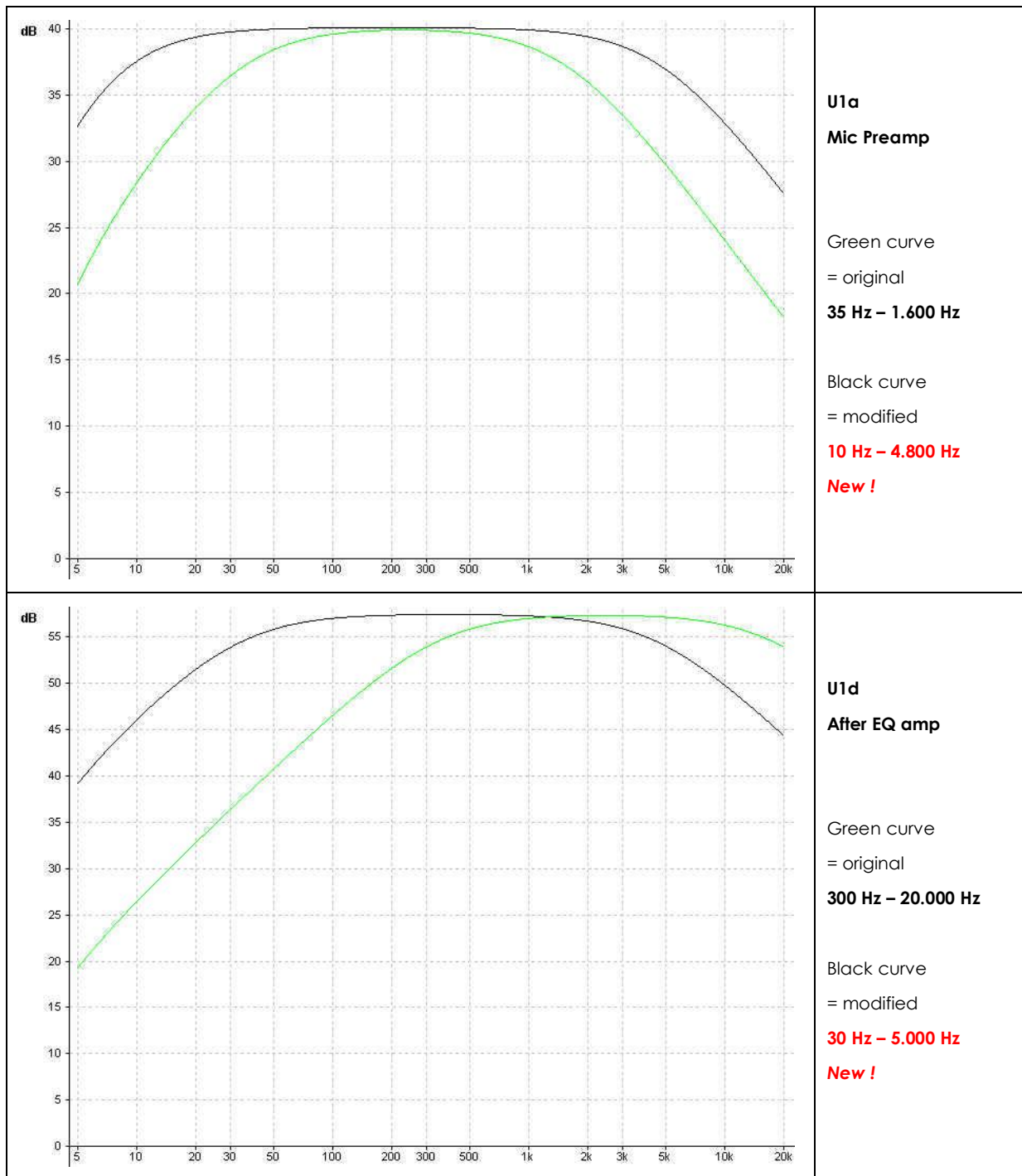
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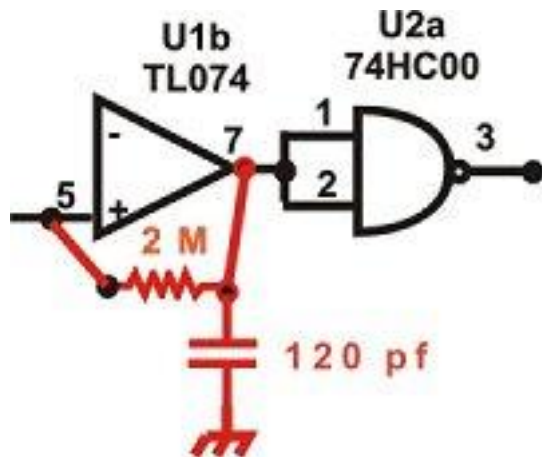
The "noisegate anti-popping" modification from Julius, W2IHY.

Works great !
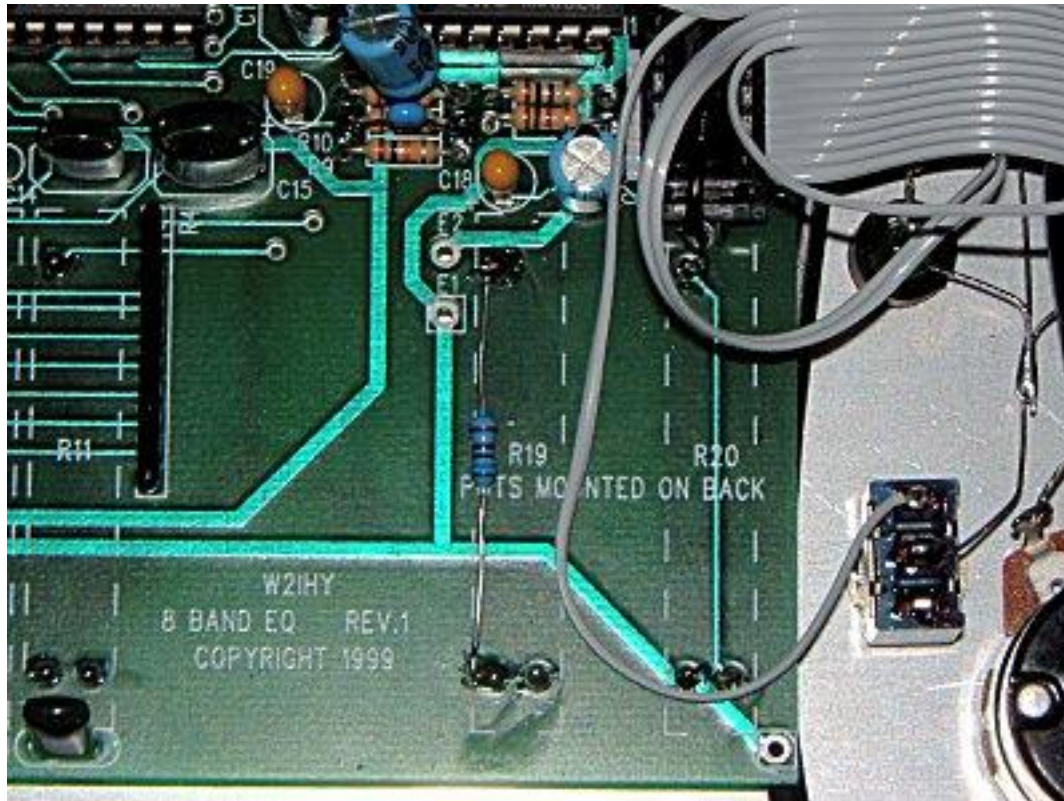
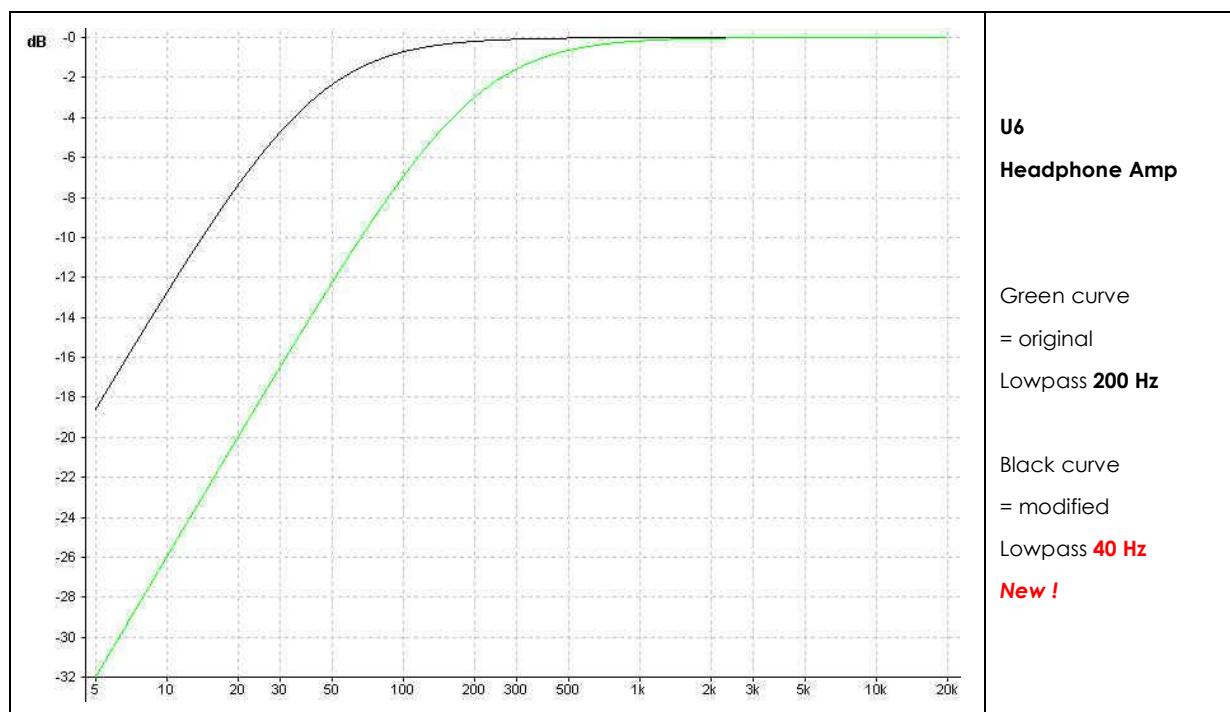Solder a 5k6 parallel to the "Noise Gate Level" Pot to get a finer alignment range.

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U1a

Mic Preamp

Green curve

= original

35 Hz – 1.600 Hz

Black curve

= modified

10 Hz – 4.800 Hz

New !

U1d

After EQ amp

Green curve

= original

300 Hz – 20.000 Hz

Black curve

= modified

30 Hz – 5.000 Hz

New !

W2IHY 8-band equalizer

U6

Headphone Amp

Green curve

= original

Lowpass **200 Hz**

Black curve

= modified

Lowpass **40 Hz**

New !

W2IHY 8-band equalizer

Alignment Charts

TRX:
Mic:

Mic IN Jumper   ☐ 200 Ω   ☐ 600 Ω   ☐ High Impedance

Ragchewing

dB/Hz	50	100	200	400	800	1.600	2.400	3.200
+16								
+12								
+8								
+4								
0								
-4								
-8								
-12								
-16								

X = just remark your values in the sheets

DX

dB/Hz	50	100	200	400	800	1.600	2.400	3.200
+16								
+12								
+8								
+4								
0								
-4								
-8								
-12								
-16								

Individual

dB/Hz	50	100	200	400	800	1.600	2.400	3.200
+16								
+12								
+8								
+4								
0								
-4								
-8								
-12								
-16								

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Rogerbeep

I build in a simple rogerbeep circuit.
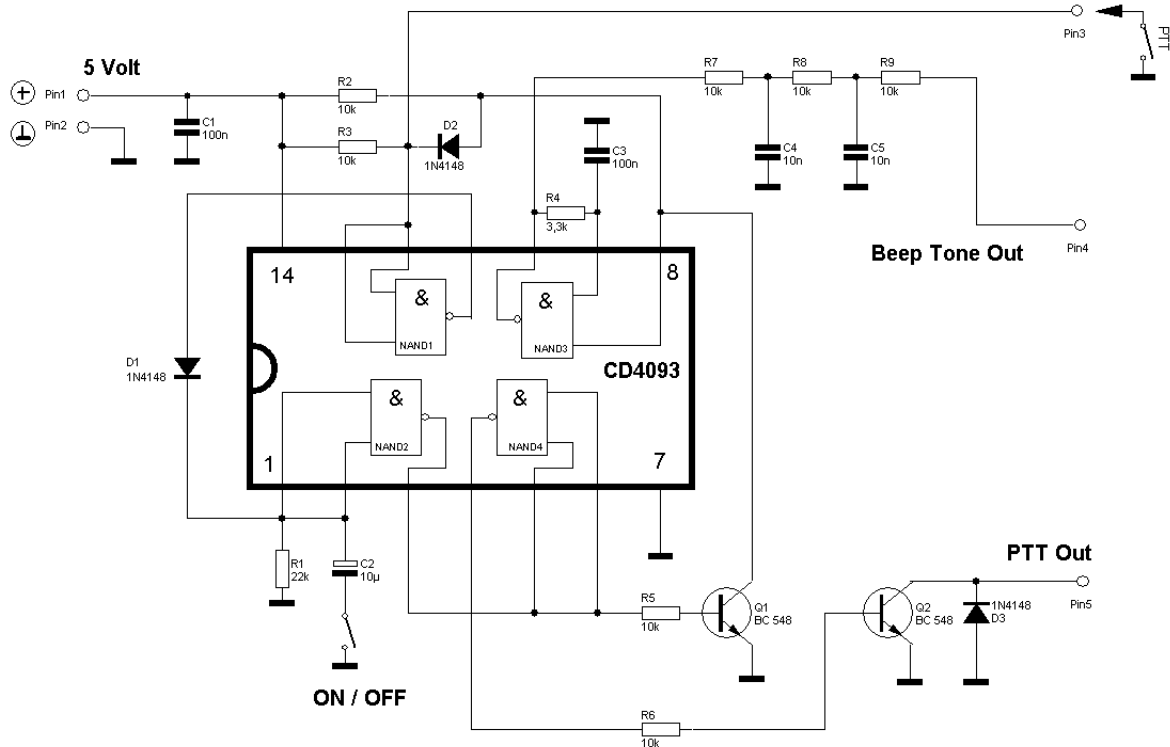
If you want to vary the tone frequency and the time length of the beep you can use 47k trimmers instead of the fixed R1 (tone length) and R4 (tone frequency). I'm using 10-turn mini-trimmers on my PCB like shown below.

The given fixed R1 + R4 give a typical "spaceshuttle" beep with a frequency at about 2.500 Hz and 0.2s long.
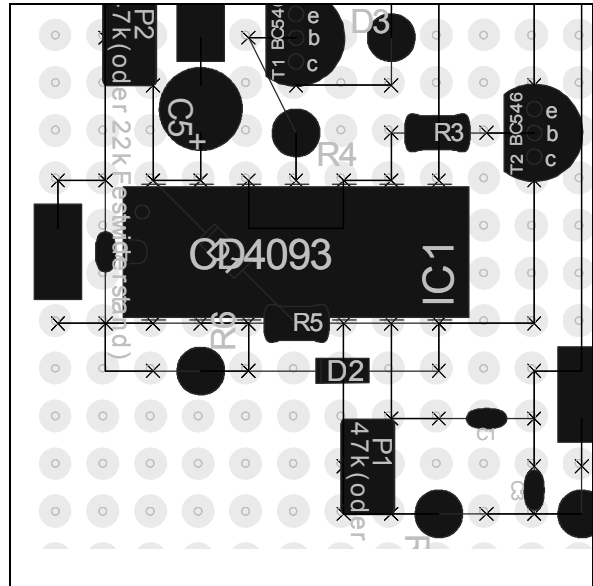
$$f = 0,825 / (R4 * C3) \quad \text{Hz} / \Omega / F$$
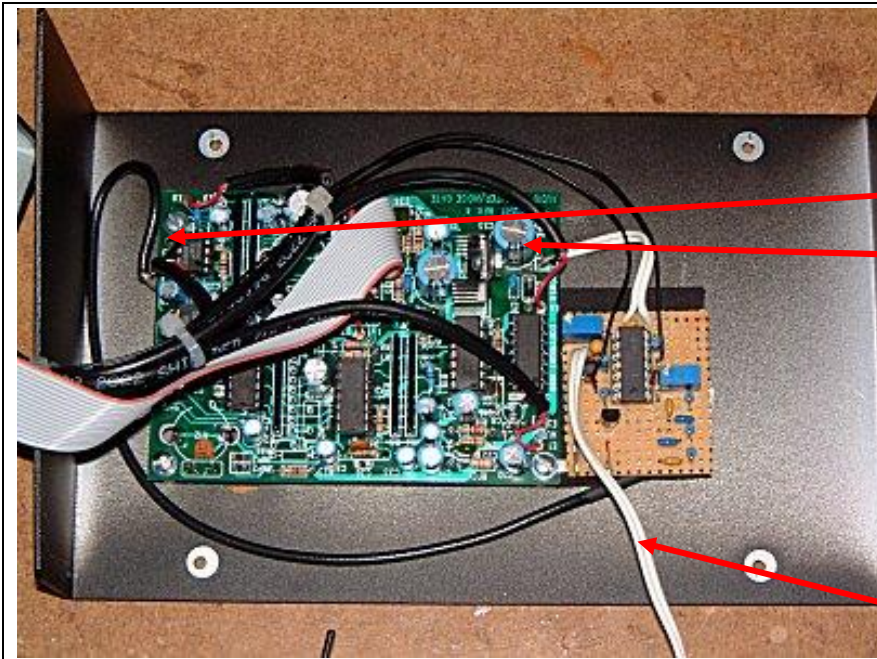
$$t = R1 * C2 \quad \Omega / F$$

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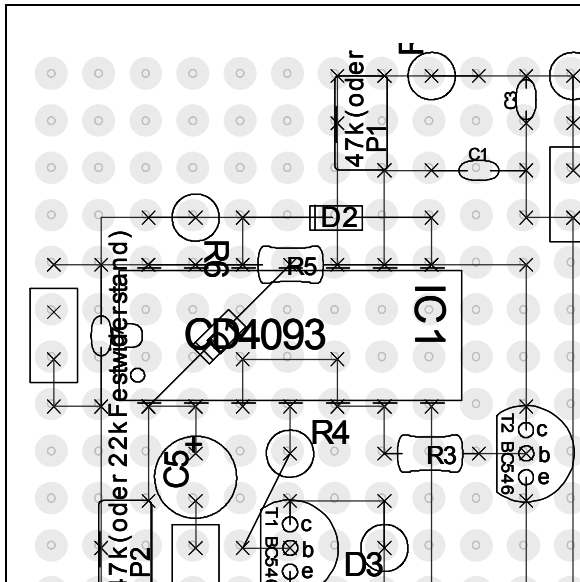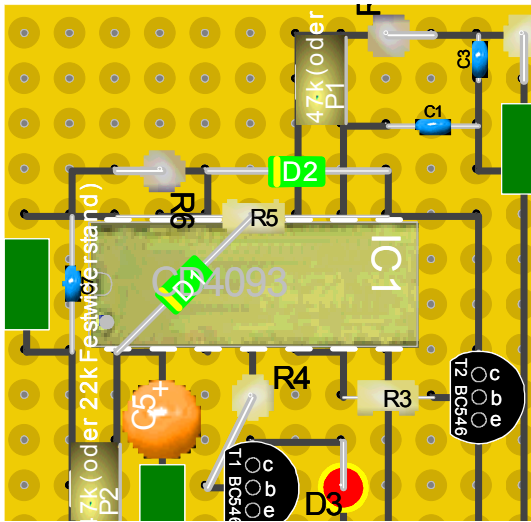
Parts side

Solder side
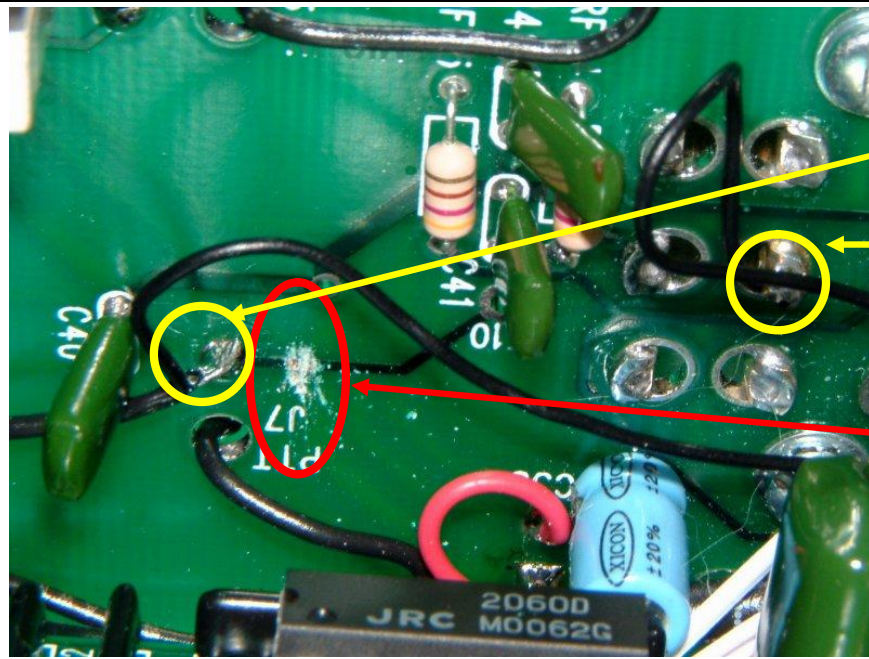
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Beep out (= Pin 4)
Is connected to **E3** or **E5**. This is the output line going to the AF transformer on the backside PCB.

The plus- and minuspole are soldered parallel to C24 (470µF). This is after the constant voltage regulator REG1 (7805) and gives a stable power supply of 5 volts to the rogerbeep circuit.

2 wires to a new switch, mounted on the frontside of the W2IHY. This switches the rogerbeep ON/OFF.
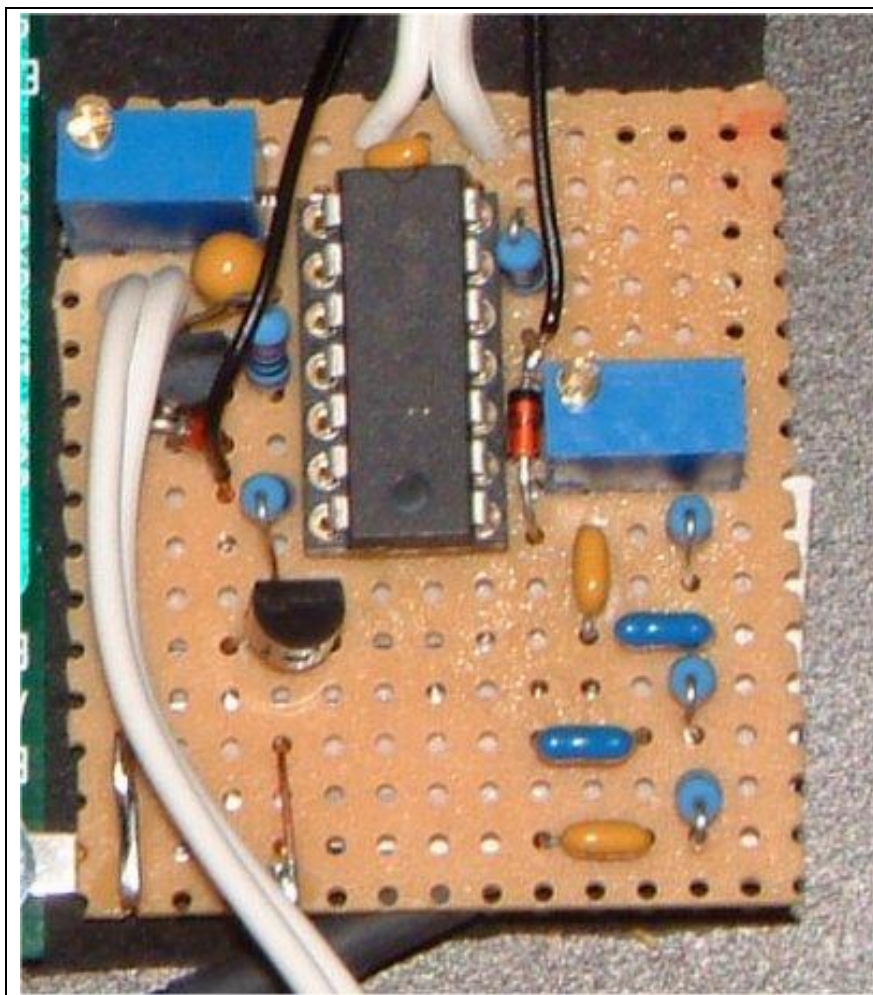

On the backside PCB.

PTT IN (= Pin 3)

PTT OUT (= Pin 5)

Cutoff the PCB here to fit in the PTT stage of the Rogerbeep.

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← **Time length**

A value of 22kΩ should be OK to have a short, pregnant tone.

← **Tone frequency**

A value of 3,3kΩ gives the 2.500 Hz spaceshuttle sound.

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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 !**

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