Andreas Stefan, DL5MGD, Tratberg Nord 20, 83734 Hausham
e-mail: dl5mgd@darc.de Homepage: http://www.dl5mgd.de
Echolink Node: 123393, Link to DB0PM 439.075 MHz

ECHOLINK INTERFACE WITH GALVANIC SEPARATION AND DTMF DECODER

This is a controller-board to decode touch-tone-signals (DTMF) and connect a Wireless-Radio Transceiver to the PC to operate ECHOLINK.

You can also use it for other operating modes (i.e. PSK31). All connections from and to the PC and the Radio are galvanic separated. The DTMF de-coding is done with the MT8870. The communication and control with Echolink is done with a Processor PIC16F84 or alternatively with PIC16F627. The programming source-code is free available and may be modified. For the PTT-signal you can either use the RTS-signal or serial-data in ASCII-format which Echolink uses.

For the receiving-signal-detection you can use either the integrated VOX of Echolink or the COR-signal of your receiver.

Power-Supply

Operating voltage can be supplied in a wide range between 9V to 15V. The LED D6 indicates the supply.

Audio-Path Description:

Audio-Signal From The Receiver

The audio-signal is galvanic separated via the transformer TR1. With the potentiometers R9 and R10 you can adjust bass and treble. Adjust the audio-amplitude (on your receiver) going to the PC with R16 so that during reception of a DTMF tone the LED D7 will light stable.

Audio-Signal To The Transceiver

The audio-signal from the PC line-out to the transceiver is galvanic separated via the transformer TR2. Adjust the audio-level with R6.

Audio-Signal Mute

During radio-transmission the receiver audio is cut off with transistor T2. With R21 you can set a time delay to suppress i.e. noise from closing squelch.

Audio-Signal Detection From The Receiver

If you have a COR signal from your receiver available, you can use this signal instead of the built-in VOX detection of Echolink. With this signal (coming from the DCD-line of the RS232 interface) Echolink will "know" that the receiver is receiving a signal. If your COR-signal is positive (high-level) during reception then the switch S2 must be set to the up-position. The LED D5 will light if the receiver is hearing a signal. With negative COR-logic, set S2 to the low-position. In this case LED D5 will always light during no-reception and go off during reception.

PTT

The PTT-line is galvanic separated. With the switch S1 you decide which PTT source is used. If S1 is closed (switch low-position) then the RTS-signal of the serial interface will be used as PTT source. If S1 is open (switch up-position) the PTT-source is the serial data-stream send via the RS232 interface from Echolink.

Set-Up

The Controller is build with a single-sided copper-clad board, dimensions 84,5 mm * 146,7 mm, without any SMD parts but can also be build on a standard hole grid board.
The total cost with all electronic components (incl. power supply and case) will be approx. 40Euro.

Options

Automatic volume control is available with a small additional circuit (hooked in instead of C21). Herewith the audio-signals will be automatically adjusted to a constant level transmitted via the internet which will help if the radio partners modulation is to low.

Componentlist for the Echolinkinterface

Bauteil	Bauteilwert	Raster	Bestellnr. C: Conrad R: Reichelt	Einzelpreis in Euro (ca.)
Bu1	BATT-BU-2.1M/M		C: 737992-33	1,25
C1	100n	5 mm	R: Z5U-5 100N	0,06
C10	4µ7	2,5 mm	R: RAD105 4,7/100	0,04
C11	1n	2,5 mm	R: Kerko 1,0N	0,04
C12	1µ Elko	2,5 mm	R: RAD105 1,0/100	0,04
C13	1µ Elko	2,5 mm	R: RAD105 1,0/100	0,04
C14	1µ Elko	2,5 mm	R: RAD105 1,0/100	0,04
C15	1µ Elko	2,5 mm	R: RAD105 1,0/100	0,04
C16	100n	2,5 mm	R: Z5U-2,5 100n	0,06
C17	10µ Elko	2,5 mm	R: RAD105 10/63	0,04
C18	3n3 **Folienkondensator**	2,5 mm	R: MKS-02 3,3n	0,11
C19	33n **Folienkondensator**	2,5 mm	R: MKS-02 33n	0,13
C2	100n	2,5 mm	R: Z5U-2,5 100n	0,06
C20	33n **Folienkondensator**	2,5 mm	R: MKS-02 33n	0,13
C21	4µ7 Elko	2,5 mm	R: RAD105 4,7/100	0,04
C22	1n	2,5 mm	R: Kerko 1,0n	0,04
C23	47µ Elko	2,5 mm	R: rad 47/35	0,04
C24	100n	2,5 mm	R: Z5U-2,5 100n	0,06
C25	1n	2,5 mm	R: Kerko 1,0n	0,04
C26	10µ Elko	2,5 mm	R: RAD105 10/63	0,04
C27	100n	5 mm	R: Z5U-5 100n	0,06
C28	4µ7 Elko	2,5 mm	R: RAD105 4,7/100	0,04
C29	4µ7 Elko	2,5 mm	R: RAD105 4,7/100	0,04
C3	100n	2,5 mm	R: Z5U-2,5 100n	0,06
C30	10µ Elko	2,5 mm	R: RAD105 10/63	0,04
C31	10µ Elko	2,5 mm	R: RAD105 10/63	0,04
C32	3n3 **Folienkondensator**	2,5 mm	R: MKS-02 3,3n	0,11
C4	10µ Elko	2,5 mm	R: RAD105 10/63	0,04
C5	100n	5 mm	R: Z5U-5 100n	0,06
C6	100n	2,5 mm	R: Z5U-2,5 100n	0,06
C7	15p	2,5 mm	R: Kerko 15p	0,04
C8	15p	2,5 mm	R: Kerko 15p	0,04

C9	1n	2,5 mm	R: Kerko 1,0n	0,04
D1	1N4148	7,62 mm	R: 1N 4148	0,02
D2	1N4148	7,62 mm	R: 1N 4148	0,02
D3	1N4148	7,62 mm	R: 1N 4148	0,02
D4	1N4148	7,62 mm	R: 1N 4148	0,02
D5	LED low current grün	2,5 mm	R: LED 5mm 2MA gn	0,09
D6	LED low current rot	2,5 mm	R: LED 5mm 2MA rt	0,09
D7	LED low current grün	2,5 mm	R: LED 5mm 2MA gn	0,09
IC1	MT8870	DIL18	C: 173193-33	4,22
IC2	PIC16F84-04P **oder** PIC16F627-04P, **jeweils mit entsprechender Software**	DIL18	R: PIC 16F84A-04P oder PIC 16F627-04P	3,15 **oder** 2,45
IC3	MAX232	DIL16	R: MAX 232 CPE	0,75
IC4	74HC04	DIL14	R: 74HC 04	0,18
IC5	TL081	DIL8	R: TL 081 DIP	0,27
IC6	7805	TO-220 stehend	R: µA 7805	0,23
IC7	CNY17/IV	DIL6	R: CNY 17/IV	0,24
IC8	CNY17/IV	DIL6	R: CNY 17/IV	0,24
IC9	CNY17IV	DIL6	R: CNY 17/IV	0,24
K1	D-SUB9 Printeinbau, männlich		R: D-SUB ST 09EU	0,27
K2	WESTERNBUCHSE_8-POLIG		C: 716148-33	0,54
K3	Printeinbaubuchse 3.5mm stereo		R: EBS 35	0,20
K4	Printeinbaubuchse 3.5mm stereo		R: EBS 35	0,20
K5	Printeinbaubuchse 3.5mm stereo		R: EBS 35	0,20
Q1	3,579545MHZ	HC-18U	R: 3,579545-HC18	0,35
R1	100k	10,16 mm	R: 1/4W 100K	10 Stück: 0,33
R10	100k Trimmpoti PT6/10LV	5 * 5/5 * 7,5 mm	R: PT 6-L 100K	0,21
R11	10k	10,16 mm	R: 1/4W 10K	10 Stück: 0,33
R12	10k	10,16 mm	--	--
R13	10k	10,16 mm	--	--
R14	10k	10,16 mm	--	--
R15	1k	10,16 mm	R: 1/4W 1,0K	10 Stück: 0,33
R16	100k Trimmpoti PT6/10LV	5 * 5/5 * 7,5 mm	R: PT6-L 100K	0,21
R17	12	10,16 mm	R: 1/4W 12	10 Stück: 0,33
R18	1k	10,16 mm	--	--
R19	1k	10,16 mm	--	--
R2	100k	10,16 mm	--	--
R20	1k	10,16 mm	--	--
R21	100k Trimmpoti PT6/10LV	5 * 5/5 * 7,5 mm	R: PT6-L 100K	0,21

R22	4k7	10,16 mm	R: 1/4W 4,7K	10 Stück: 0,33
R23	470	10,16 mm	R: 1/4W 470	10 Stück: 0,33

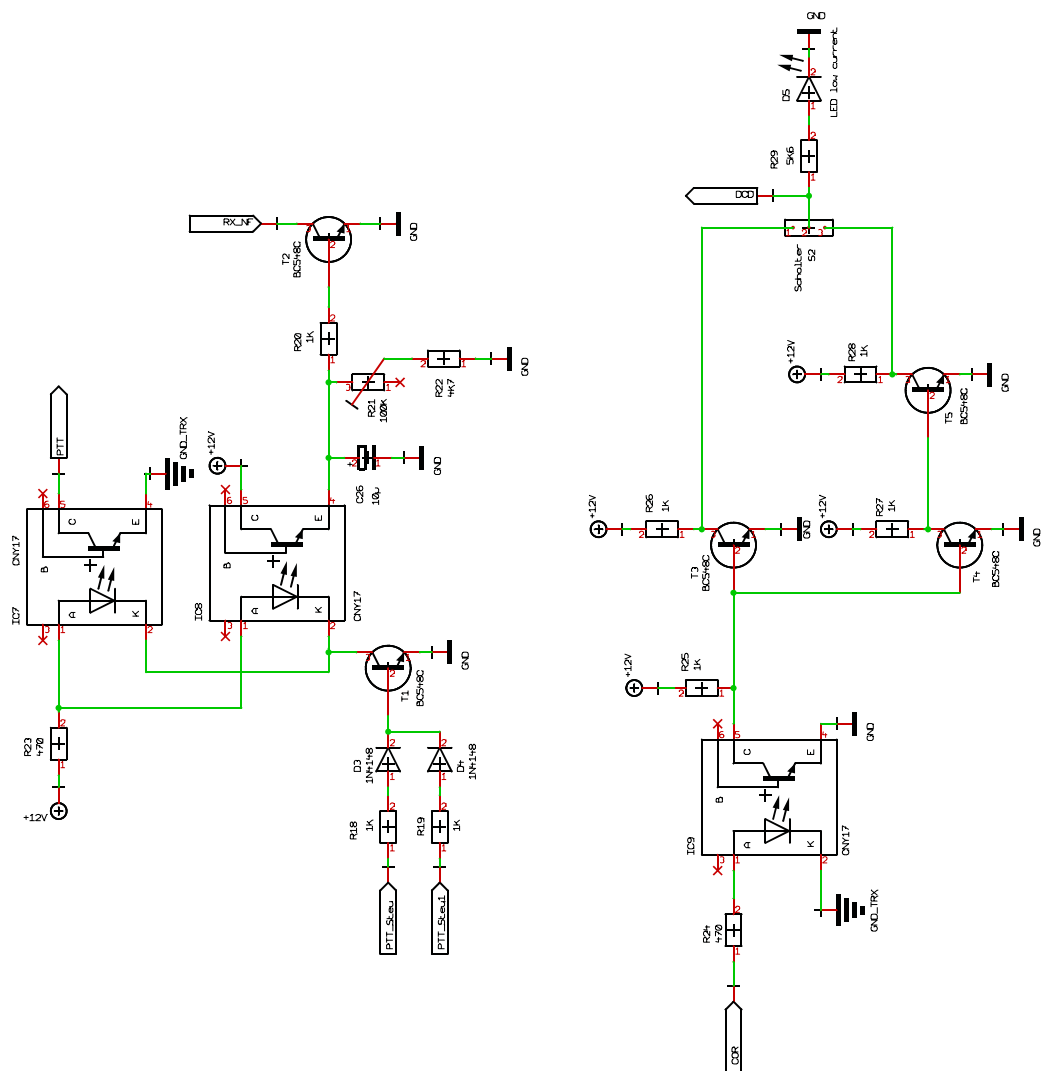| R24	470	10,16 mm	--	--
R25	1k	10,16 mm	--	--
R26	1k	10,16 mm	--	--
R27	1k	10,16 mm	--	--
R28	1k	10,16 mm	--	--
R29	5k6	10,16 mm	R: 1/4W 5,6K	10 Stück: 0,33
R3	390k	10,16 mm	R: 1/4W 390K	10 Stück: 0,33
R30	6k8	10,16 mm	R: 1/4W 6,8K	10 Stück: 0,33
R31	1k8	10,16 mm	R: 1/4W 1,8K	10 Stück: 0,33
R4	270	10,16 mm	R: 1/4W 270	10 Stück: 0,33
R5	10k	10,16 mm	--	--
R6	100k Trimmpoti PT6/10LV	5 * 5/5 * 7,5 mm	R: PT6-L 100K	0,21
R7	47k	10,16 mm	R: 1/4W 47K	10 Stück: 0,33
R8	47k	10,16 mm	--	--
R9	100k Trimmpoti PT6/10LV	5 * 5/5 * 7,5 mm	R: PT6-L 100K	0,21
S1	Printschalter 1 * um		R: MS 500AVT	1,38
S2	Printschalter 1 * um		R: MS 500AVT	1,38
T1	BC548C	TO-92	R: BC 548C	0,04
T2	BC548C	TO-92	R: BC 548C	0,04
T3	BC548C	TO-92	R: BC 548C	0,04
T4	BC548C	TO-92	R: BC 548C	0,04
T5	BC548C	TO-92	R: BC 548C	0,04
Tr1	NF-Ü-1:1	10 * 12.5 mm	R: NFÜ 1:1	2,40
Tr2	NF-Ü-1:1	10 * 12.5 mm	R: NFÜ 1:1	2,40
Sonstiges				
Platine	Platine 147 * 85 mm einseitig			
IC Fassungen	3 mal DIL 6 1 mal DIL 8 1 mal DIL 14 1 mal DIL 16 2 mal DIL 18		R: GS 6P GS 8P GS 14P GS 16P GS 18P	0,07 0,09 0,17 0,18 0,19
Kabel	1 mal 9pol Sub D, 1 zu 1, weiblich ➔ männlich		R: AK 230	0,54
Kabel	2 mal 3.5 mm Klinke auf Klinke Stereo		R: AVK 119	0,61
Kabel	1 mal RJ45 8 pol Stecker		R: Patchkabel 05 RT	0,48
Netzteil	1 mal Steckernetzteil 12 V/500mA, geregelt		R: MW 500-GS	4,00
Gehäuse	Stratubox Kunststoff Halbschalengehäuse	Stratubox Typ 7050	C: 524000-33	5,75
Schrauben	4 mal M3 *16 mit Muttern		div.	
Software für PIC				
			Gesamt ca.	40 Euro

C: Conrad: http://www.conrad.de
R: Reichelt: http://www.reichelt.de

Circuit page 1:

Echolink Controller

Circuit page 2:
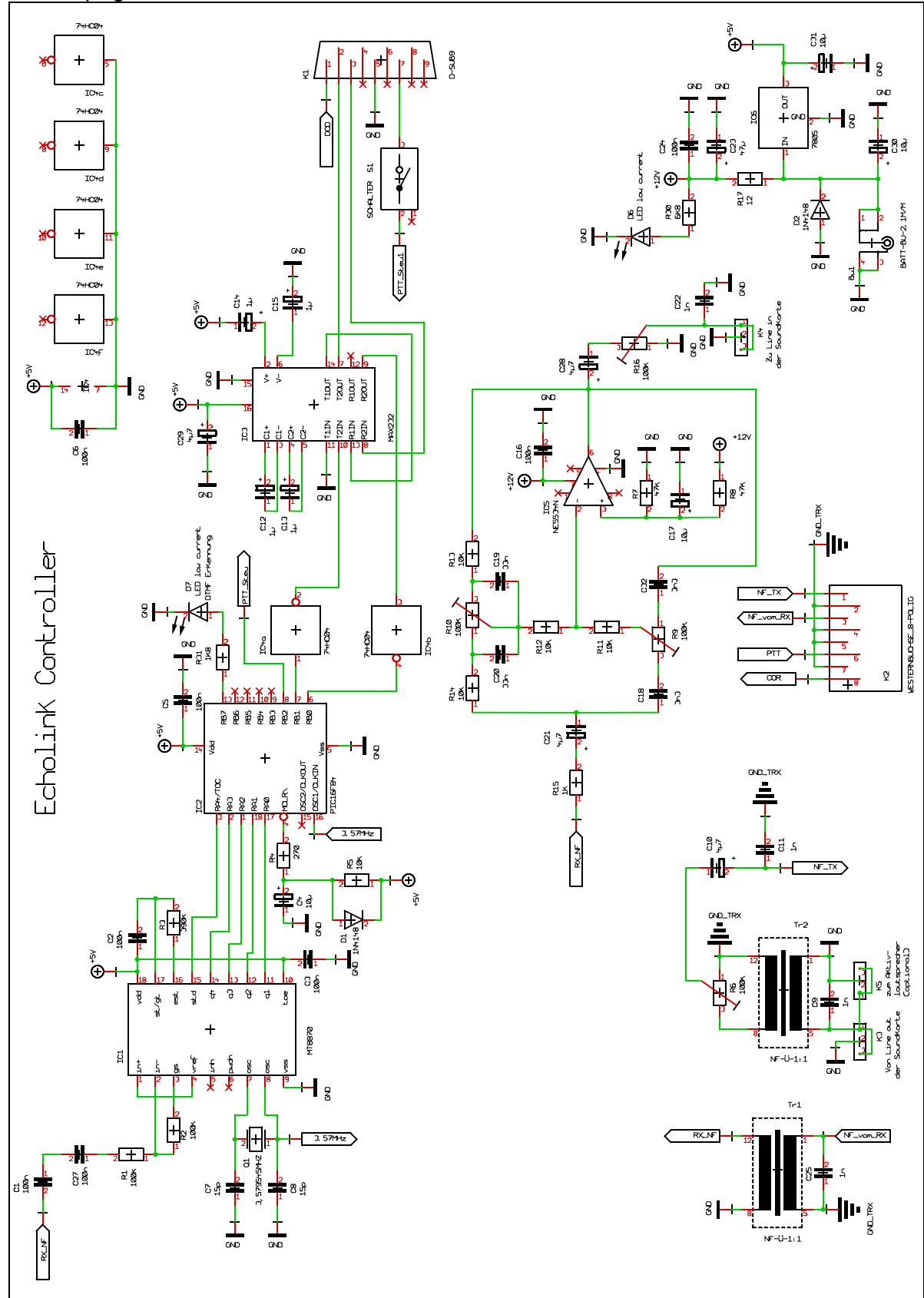
Echolink Controller

Layout:

Stromversorgung

Stromversorgung

DTMF Erkennung

COR Auswahl

COR Signal
Erkennung

PTT Auswahl

Anschluss RS232

Anschluss TRX

Line out auf
aktiven Speaker
(optional)

NF zu Line in   NF von Line out   Line out
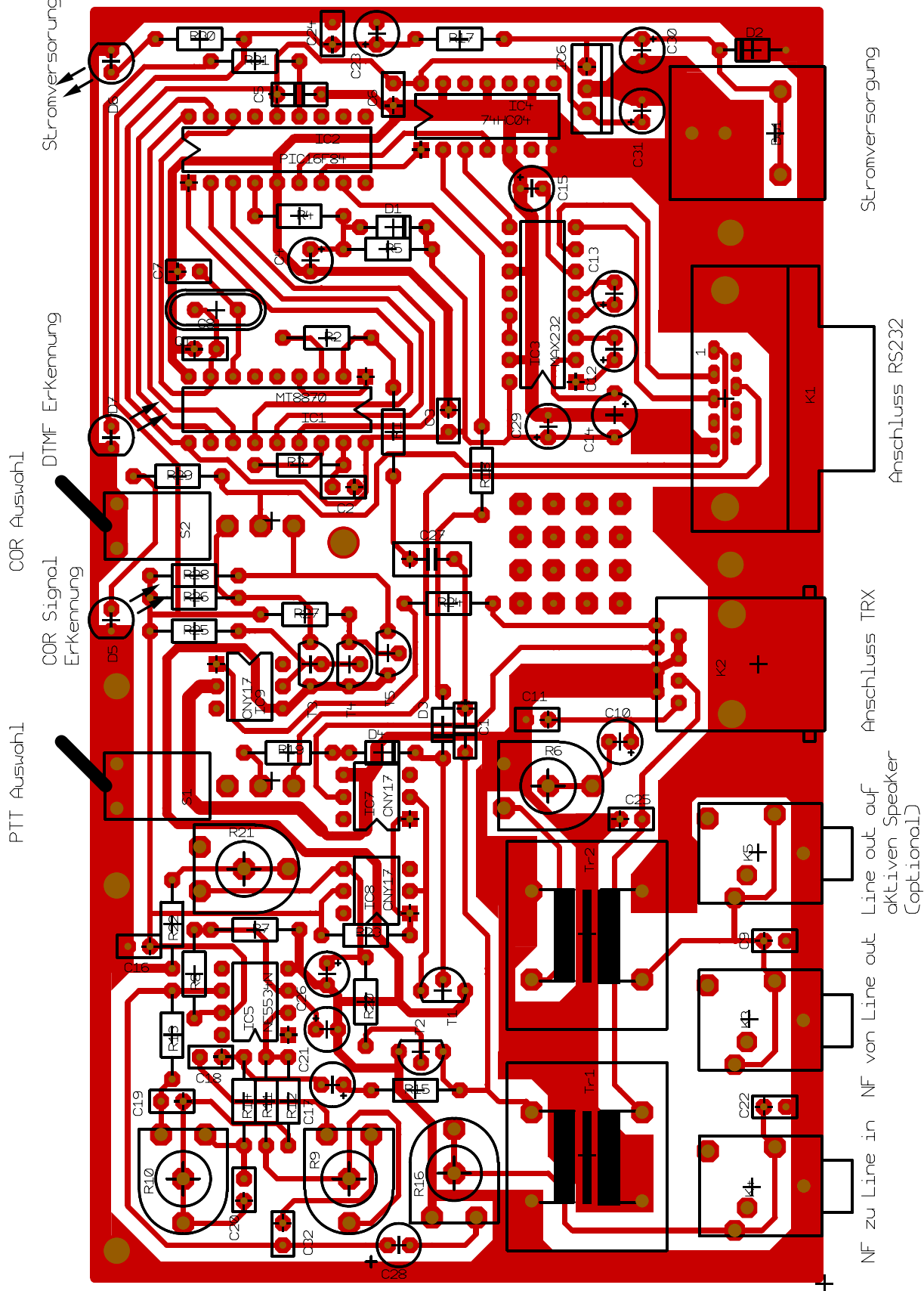
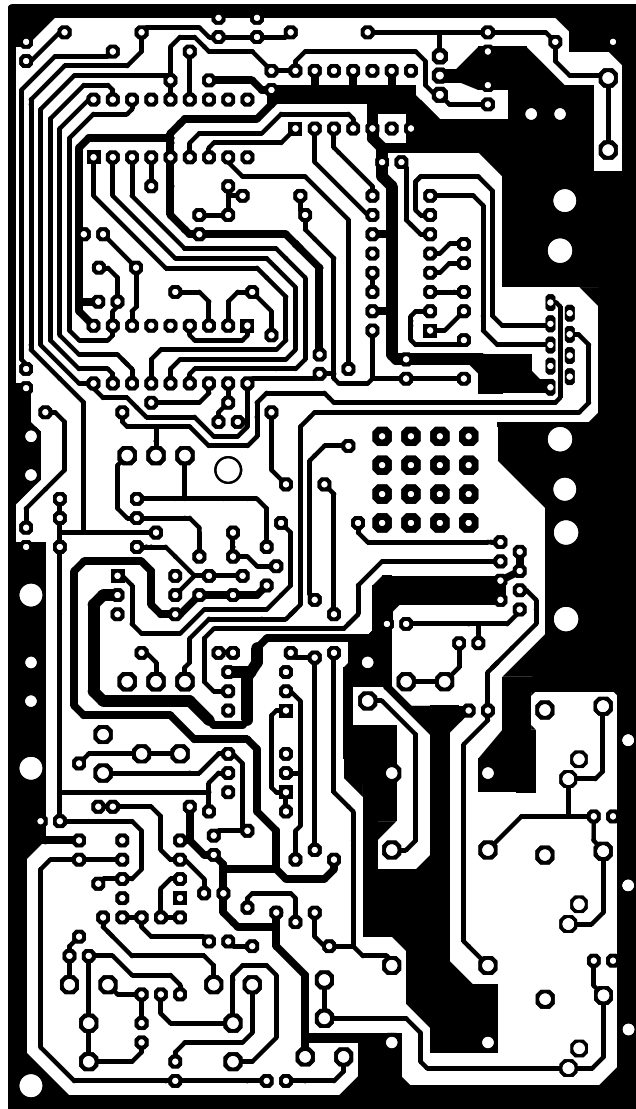## Layout 1 : 1:

Connections to TRX:

Sicht auf die RJ45 Buchse (K2)
(von vorne)

GND GND

NF vom RX   PTT

GND   GND

NF zum TX   COR vom RX

Platine