RF INTERFACE CONSTRUCTION NOTES

When building the RF interface, the builder is expected to have some experience in constructing electronics kits. For general construction hints, refer to the Morse-Phone construction manual.

OPERATION

The RF interface is connected to the Morse Phone through a 12-pole connector. The RF interface offers the ability to connect two Morse Phones via a radio connection. The Morse-signals can be transmitted and received wireless. A number of settings can be made on the RF interface. There is a possibility of forwarding the received signals via the fixed line to the radio connection. Alternatively, one can choose to forward the radio Morse-signals be forwarded to the line.

The signals transmitted via the radio signals are ASK modulated (Amplitude Shift Keying). The modulation frequency can be set with the tone generator (approximately 400Hz..3kHz). The receiver is coupled to a tone decoder. This can be set to a tone of approximately 400Hz ... 3kHz. Only if the received signal is in accordance with the set frequency, the Morse Phone will react. This makes the system less sensitive to other (data) traffic on the (free) RF frequency (433.92MHz).

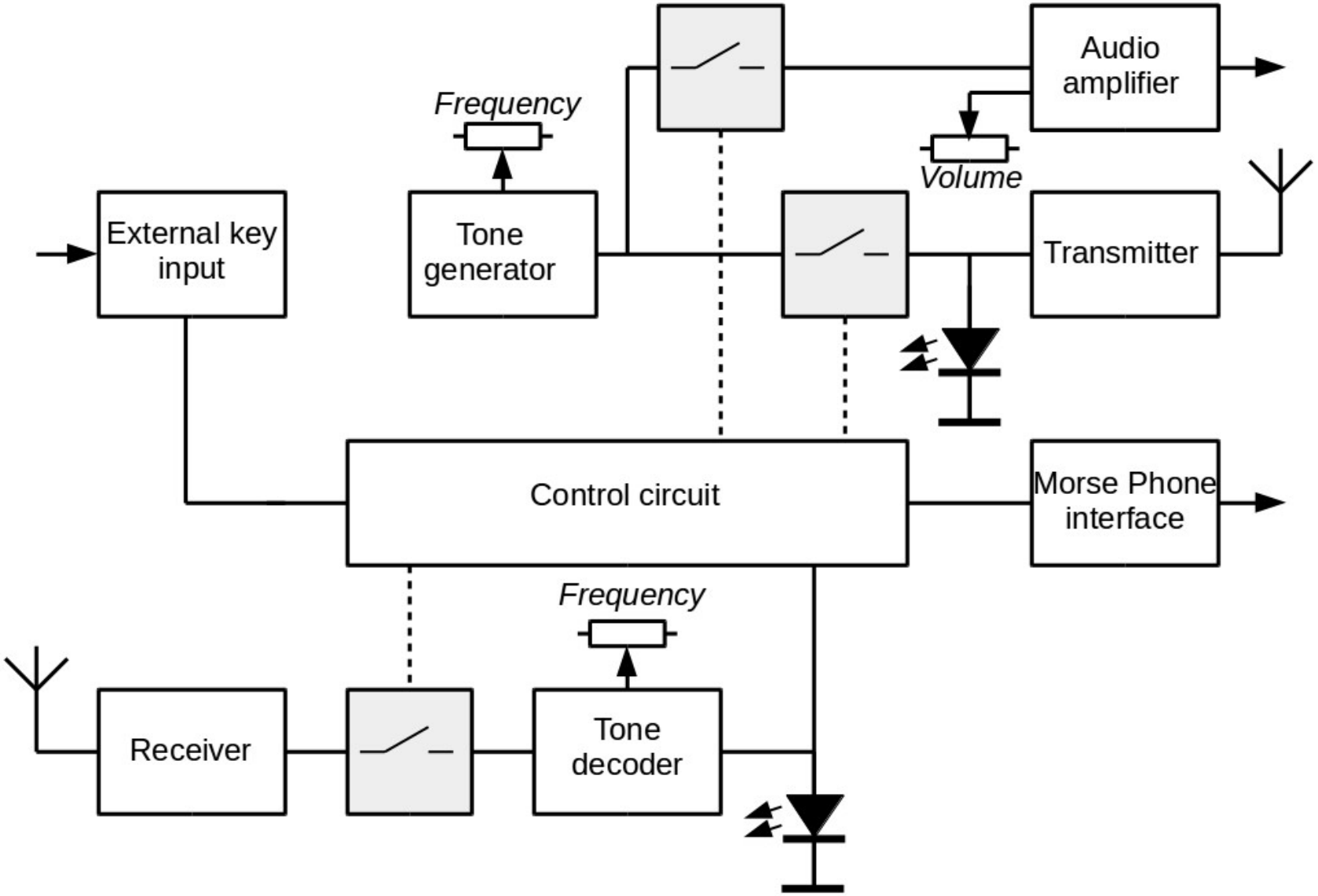
If one wants to match the tone to be sent and the tone to be received, the tone generator and the tone decoder can be connected internally with a switch. Thus, the tones can easily be matched to each other.

Additionally, the RF interface offers the ability to connect a headset. The audible tone can be set with the tone generator. By activating the buzzer mute switch, the buzzer on the Morse Phone is turned off, the Morse tones are now solely audible in the headset. Alternatively a morse decoder may be connected to this port.

The volume control allows you to adjust the volume of the tone in the headphone.

The "key" connection can be used for an external Morse key. The Morse key must make a connection to Earth / GND to give a tone. Via a jumper the 5 Volt can be connected to the connector.

The RF interface is powered from the Morse-Phone battery. Alternatively, a power supply can be connected to the RF interface (network adapter), which will then power the Morse-Phone as well.



Block-diagram of the RF-interface.

DIRECTIONS FOR USE

The switch S1 consists of four switches, with which the following functions can be set:
1. RF → Line: When this switch is switched to “on”, a signal that is received by the radio and detected positively by the tone decoder, the signal will be forwarded to the line connected to the Morse Phone. If this switch is off, the signal will not be forwarded.
2. Line → RF: With this switch you can select whether a signal coming into line of the Morse Phone is transmitted by the radio. If this switch is on, the signals will continue.
3. Buzzer mute: When this switch is on, the buzzer on the Morse Phone will be turned off. This can be convenient if you want to listen to the signals via the headset.
4. Tone test: When this switch is on, the tone generator and tone decoder are connected. For example, Rx tone (tone decoder) and Tx tone (tone generator) can be adjusted to the same frequency. Note the Receive-Rx LED, which will illuminate when the tones are equal.

Variable controls:
Rx tone: Adjusts the tone to which the tone decoder will respond.
Tx tone: sets the transmit tone. This is the same tone that can be heard in the headphone. Note: The tone of the Morse Phone itself will not change!
Volume: Adjusts the volume of the tone in the headset.

Connectors:
P1: This is the connector used to connect the RF interface to the Morse Phone.
P2: This connector can be connected to the fixed line, these correspond to J1 and J2 on the Morse Phone. This can be convenient when the RF interface and Morse Phone are built into a housing.
P3: An external power supply (e.g. a 9 volt power adapter) can be connected to this connector. Do not connect a battery at the same time!
J1: An external key may be connected to this connector. 5V is available on this connector when jumper W1 is connected.
J2: A headset can be connected to this connector. By installing W2, the connector is suitable for a mono headphone (without W2 (default) for stereo).

LEDs:
Receive-Rx: This LED will light up if a tone of the correct pitch is captured.
Transmit-Tx: This LED will light up when the transmitter is active and transmits a tone.

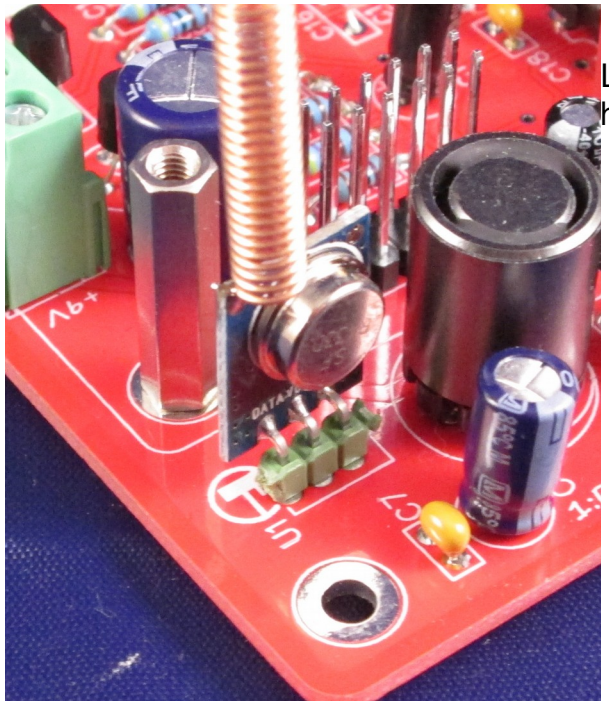
CONSTRUCTION

Using the component list and the print layout, the PCB can be populated. For general construction instructions, it is advisable to consult the Morse Phone manual.

Take note of the following when constructing the RF-interface:
A. The supplied LEDs do not have a flat side. When correctly positioned, the short connecting leg is on the flat side of the silk-screen symbol, the long leg on the round side of the symbol.

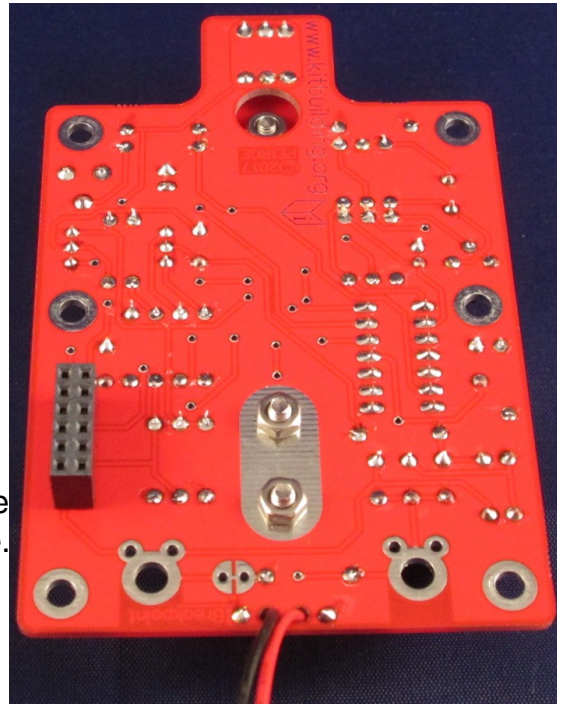
B. The 12-pole female connector (separate bag) is soldered on the underside of the Morse Phone. The long pins (2 x 6 pins) are placed on the RF interface print. To adjust the distance correctly, the connector can best be placed in the female connector of the Morse Phone. The RF interface and the Morse Phone can be mechanically connected to each other using the 20mm spacers. Now the 12 pin connector can be properly soldered on the RF interface print.

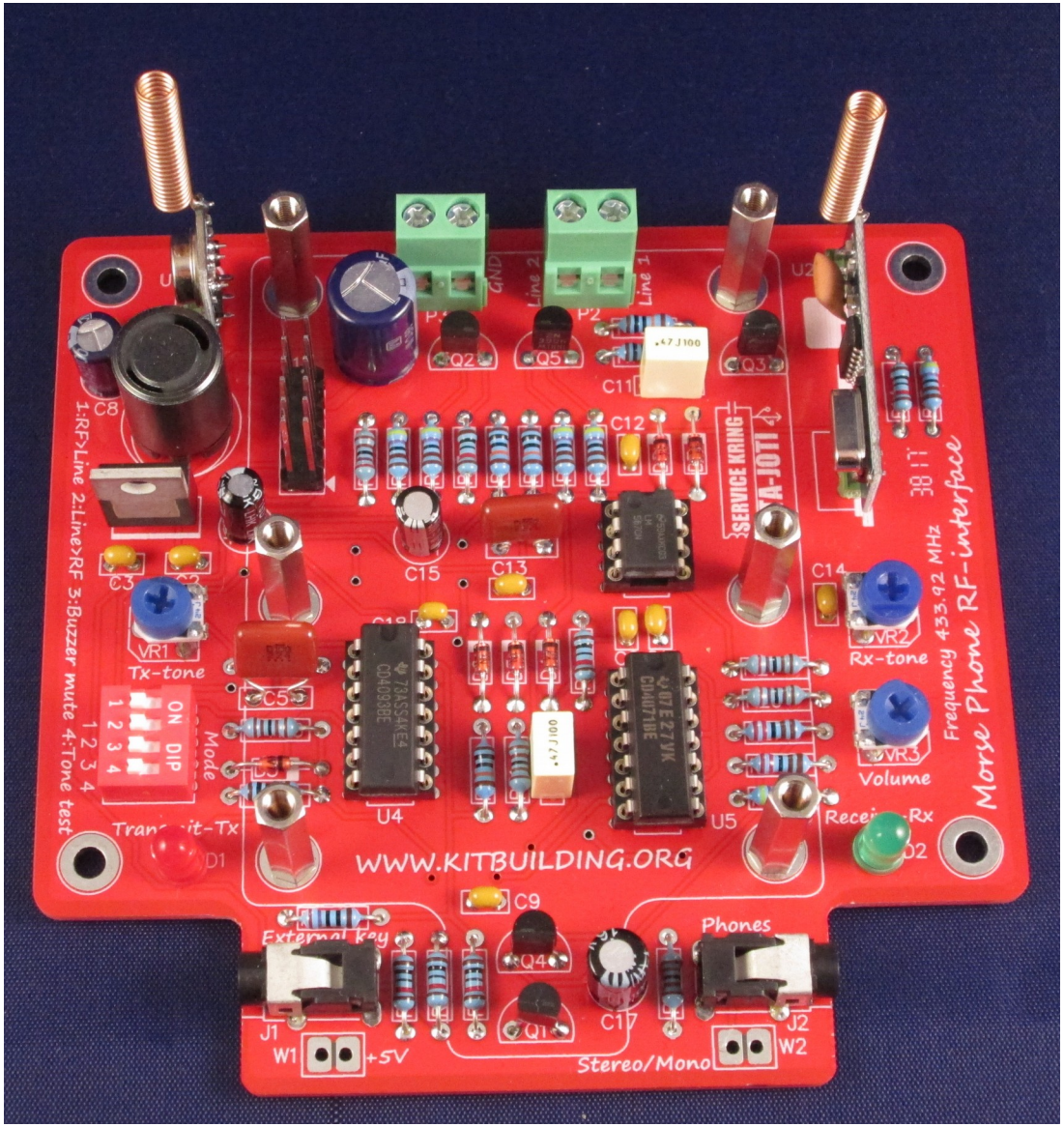
C. The Rx and Tx module are mounted on the RF interface print with the angled header. The angled header (contact pins) can easily be cut to size with a cutter. Take note of the silk-screen on the PCB to see how the modules should be mounted.



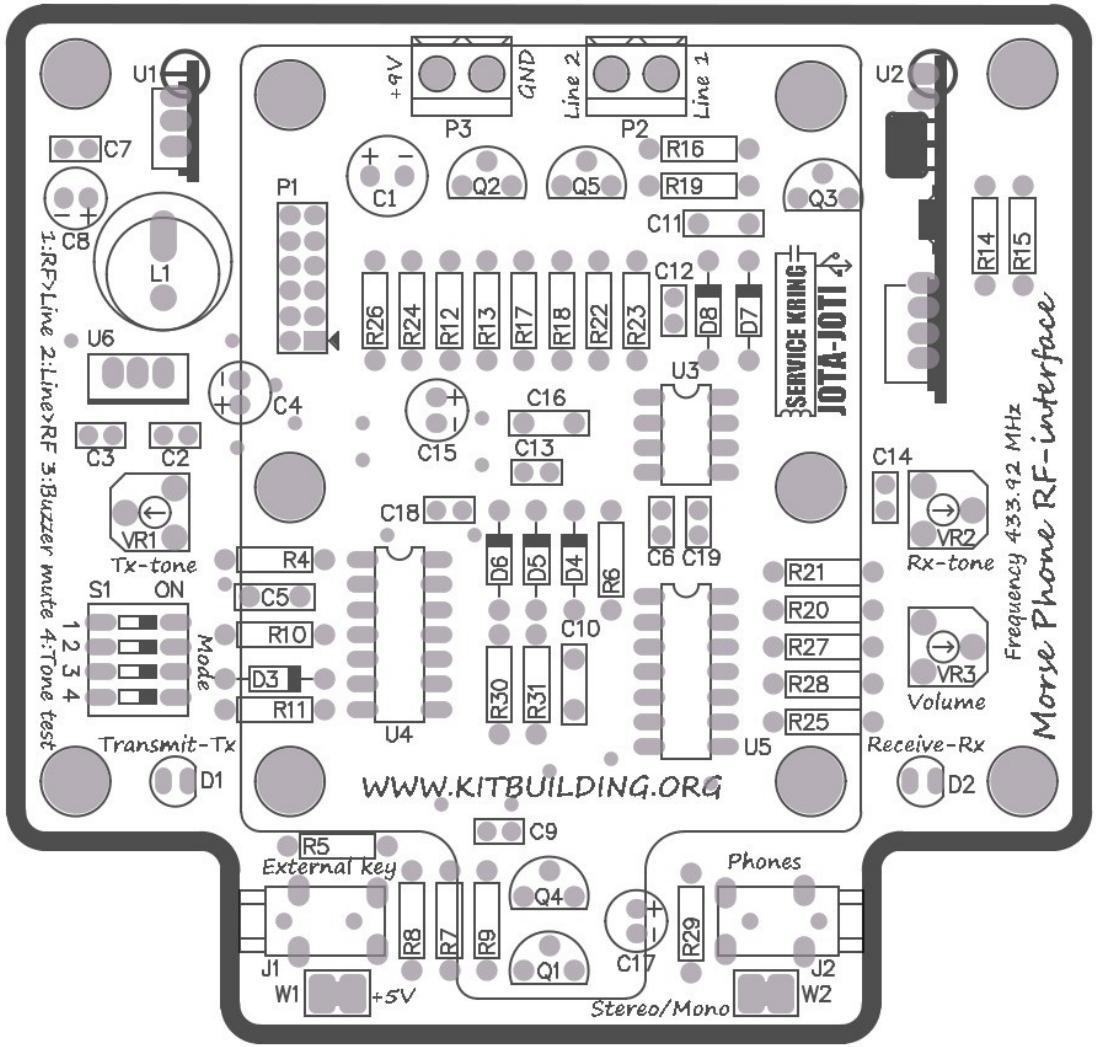
Left: mounting the RF-module with the angled header.

Right: connector on the bottom-side of the Morse Phone.



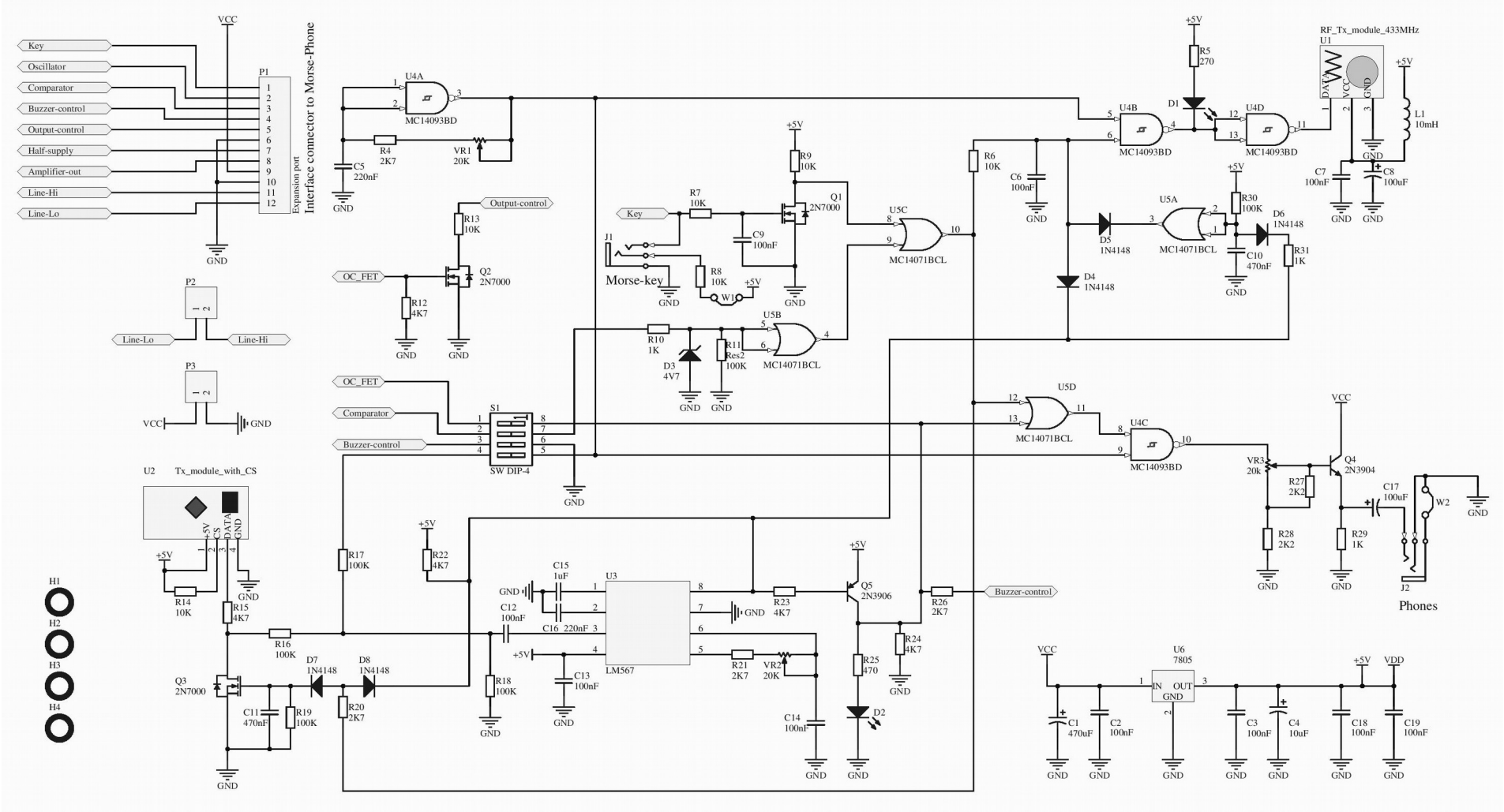


Completely build RF-interace. This is a photograph of the prototype, some components supplied with the kit will be different.

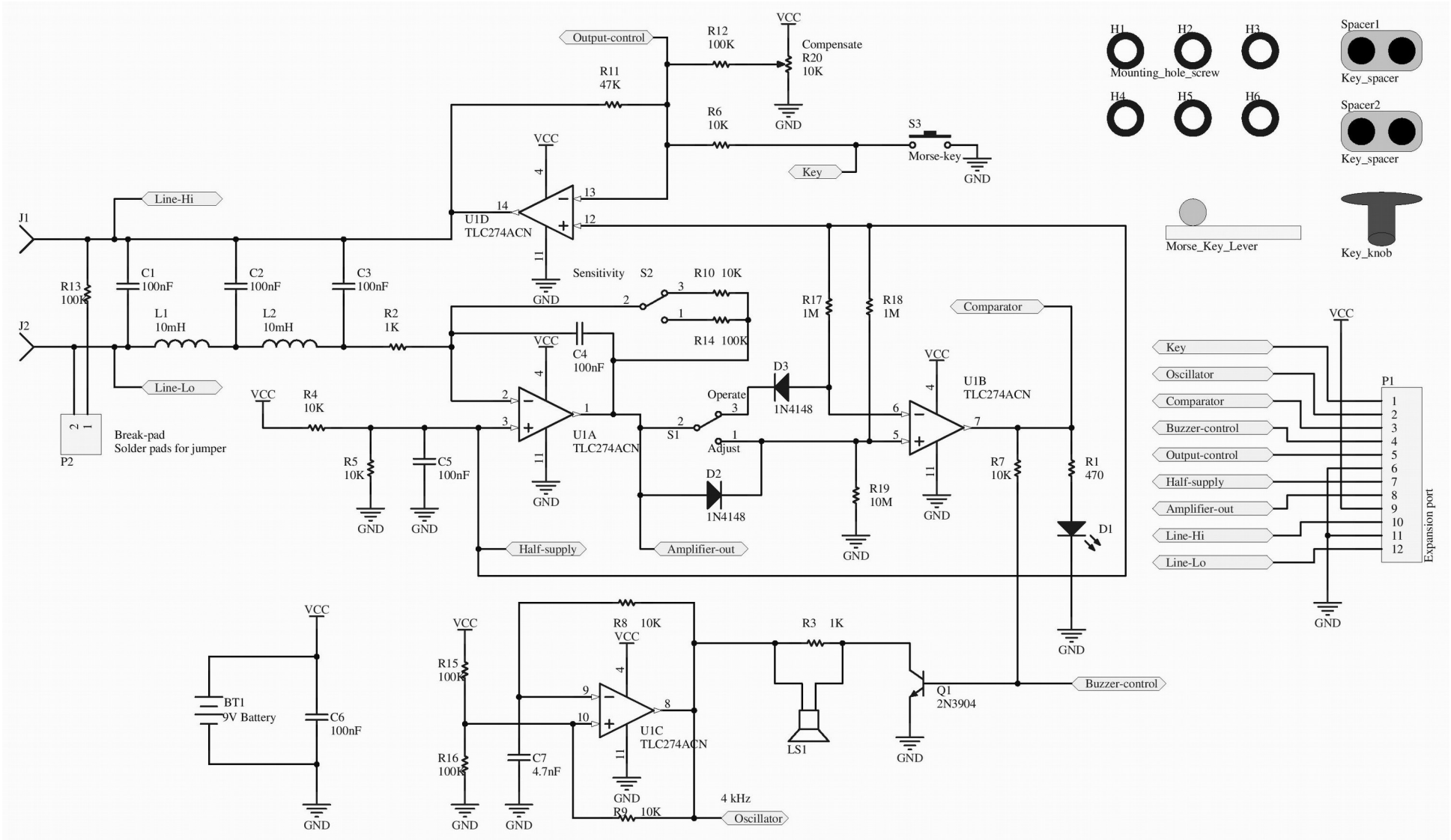


Silk-screen of the component side of the board.

Component	Waarde	Aantal	Plaats op print	Opmerkingen
Variable resistor	20kOhm	3	VR1, VR2,VR3	Marking 203
Resistor	2,7 kOhm	4	R4,R20,R21,R26	Red-Purple-Red-Gold
Resistor	270 Ohm	1	R5	Red-Purple-Brown-Gold
Resistor	10 kOhm	6	R6, R7, R8, R9,R13,R14	Brown-Black-Orange-Gold
Resistor	1 kOhm	3	R10,R29,R31	Brown-Black-Red-Gold
Resistor	100 kOhm	6	R11,R16,R17,R18,R19,R30	Brown-Black-Yellow-Gold
Resistor	4,7 kOhm	5	R12,R15,R22,R23,R24	Yellow-Purple-Red-Gold
Resistor	470 Ohm	1	R25	Yellow-Purple-Brown-Gold
Resistor	2,2 kOhm	2	R27,R28	Red-Red-Red-Gold
Elco	470 uF / 16V	1	C1	Note the polarity
Ceramic capacitor	100 nF	10	C2,C3,C6,C7,C9,C12,C13,C14,C18,C19	Marking 104
Elco	10 uF / 16V	1	C4	Note the polarity
Ceramic capacitor	220 nF	2	C5,C16	Marking 224
Elco	100 uF / 16V	2	C8,C17	Note the polarity
Ceramic capacitor	470 nF	2	C10,C11	Marking 474
Elco	1 uF / 100V	1	C15	Note the polarity
Ferrite-inductor	3900 uH	1	L1	Marking 392
FET	2N7000	3	Q1,Q2,Q3	Note the flate site of the housing
Transistor NPN	2N3904	1	Q4	Note the flate site of the housing
Transistor PNP	2N3906	1	Q5	Note the flate site of the housing
LED	Red, 5mm	1	D1	Note the polarity
LED	Green, 5mm	1	D2	Note the polarity
Zenerdiode	4,7V	1	D3	Note the polarity
Diode	1N4148	5	D4,D5,D6,D7,D8	Note the polarity
Transmit-module	STX882	1	U1	
Receiver-module	SRX882	1	U2	
IC	LM567	1	U3	Note the notch
IC	4093	1	U4	Note the notch
IC	4071	1	U5	Note the notch
Voltage regulator	7805	1	U6	Note the metal tab
DIP-switch	4 switches	1	S1	Note the orientation
J1, J2	3,5mm jack	2	J1, J2	MX387GL
P1	12 pole connector	1	P1	Longe pins, mate with 12p. Connector
P2, P3	2 pole screw terminal	2	P2, P3	
IC-socket	14 pins	2	U4, U5	Note the notch
IC-socket	8 pins	1	U3	Note the notch
Female connector	12 pole connector	1		Mounted on the Morse Phone
Header	10 pole header	1		For mounting U1 and U2
Spacer	M3, 20mm	6		For mounting the Morse Phone
Screw	M3 x 10mm	12		For mounting the Morse Phone
PCB	RF-interface	1		



RF-interface schematic diagram.



Morse Phone schematic including the Expansion Port P1.