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USB-Programming Interface for Yaesu VX-2

Modern Transceivers are equipped with several hundred memory cells, whose programming is mostly not possibly convenient. For this case, it is reasonable to manage the memory cells on the pc and afterwards to transfer them to the radio. Because of this, a modern USB-programming interface for the yaesu VX-2 was developed. But it works not only with this radio, but also with some other transceivers.

There are many construction manuals available through the internet, e.g. [1], to connect the transceiver with the RS-232 interface of the pc. But modern laptops or some inexpensive home PCs are not longer equipped with the RS-232 interface. It was replaced by the USB-interface. The possibility, to supply a simple circuit like a programming interface with power directly from the USB-interface, makes this interface furthermore very attractive.

At times of RS-232 the programming interface was considerably used to match the voltages between the transceiver (TTL) and the pc ($\pm 15V$). Mostly it was additionally necessary to combine the two data wires for sending and receiving to one line. Even modern transceivers, like the Yaesu VX-2, transmit their data still at one line with TTL level. For the pro-

gramming of the transceiver using the USB-interface, an adapter is needed, which converts the USB to the RS-232 interface and thereby matches the voltage levels.

1 The Hardware of the programming interface

The idea was to develop the whole USB-programming interface, which includes all the necessary parts at one small circuit board. With the FT232BM from Future Technology Devices International Ltd. [2] it is possible to build such an interface with small expense. This integrated circuit consists of a complete interface converter from USB to RS-232. There are just a few external parts left, to complete the programming interface. Figure 1 shows the circuit diagram.

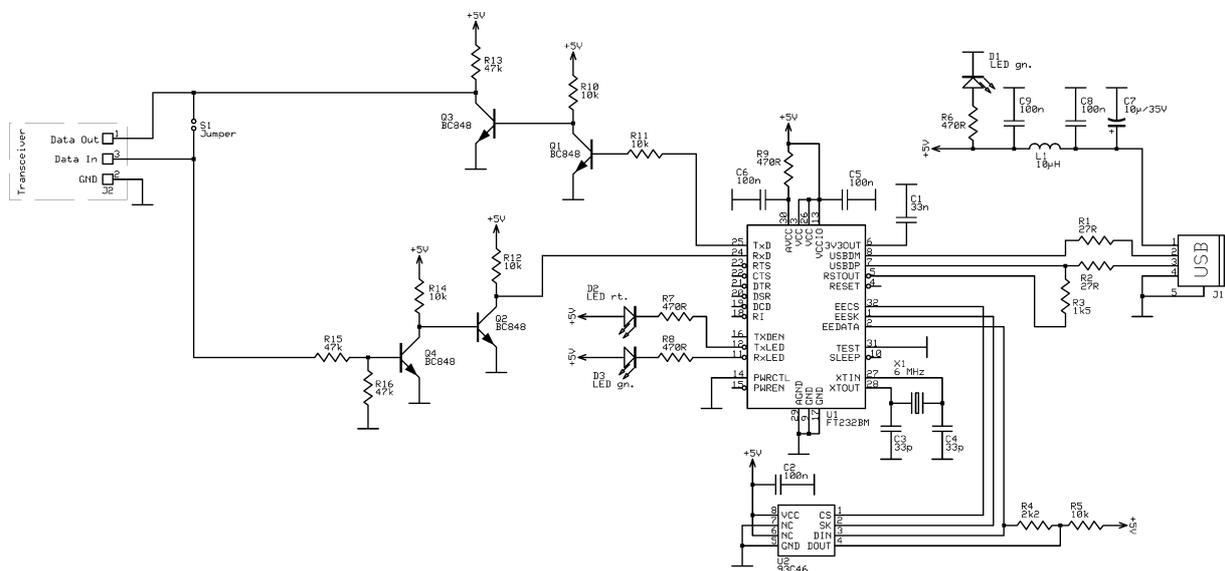


Fig. 1 The circuit diagram of the programming interface.

The circuit is supplied with 5 volts from the pc via PIN 1 of the USB-connector. The light emitting diode D1 acts as a power indicator. The main part of the programmer is the integrated circuit U1. It converts the USB-interface of the pc to a RS-232 one, from which only the both data wires RxD (receive) and TxD (send) are used. These wires are buffered with the transistors Q1 to Q4 for the connection with the Yaesu VX-2. With the jumper S1 they can be connected together, which is necessary for all

communication transceivers like the VX-2, which uses only one wire for sending and receiving data. The use of this jumper makes the programmer more all-purpose usable. Two LEDs D2 and D3 shows if the PC receives (green) data from the VX-2 or is just sending (red) data to it. With the eeprom U2 it is possible to save different parameters, like the name with which the programmer is identified after plugging the usb-connector into the pc.

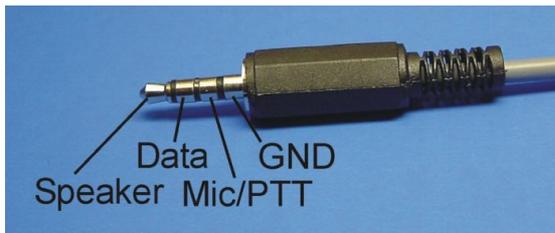


Fig. 2 Pin assignment for the 4 pole 3.5mm connector of the VX-2. Only the pins for GND (4) and data (2) are used.

The connection from the programming interface to the VX-2 is made by using a 2 wire shielded cable with a four pole connector at one side and the pcb-contractor at the other. Figure 2 shows the pin assignment for the four pole 3.5 mm connector. For the pcb connector J2 it does not matter whether the data in or data out pin is connected to the data pin of the VX-2, because the two pins are already joined together with the jumper S1.

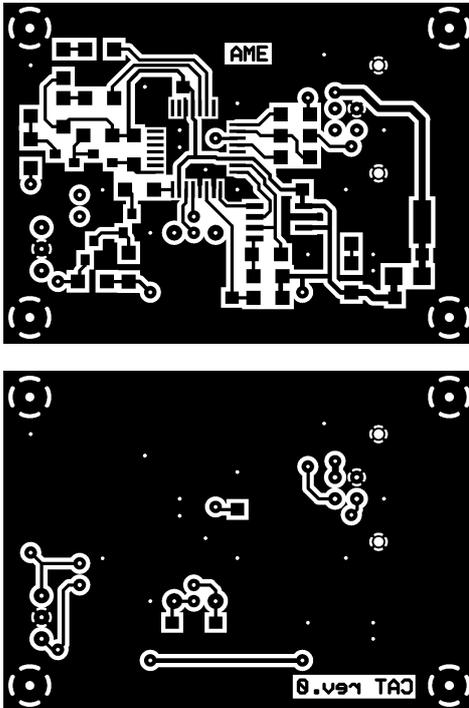


Fig. 3 Circuit layout (original 55 by 40mm).

The circuit layout for common epoxy boards with 1.5 mm thickness is shown with figure 3. One can get the layout from the author by e-mail [3] as a pdf-file for etching. Unsoldered pcbs are also available at request. Figure 4 shows the component placement of the double sided pcb.

When building the interface, the surface mounted parts are soldered at the board in the beginning. For the USB-circuit U1 one needs a good experience with soldering small smd parts, because the pin spacing is very small!

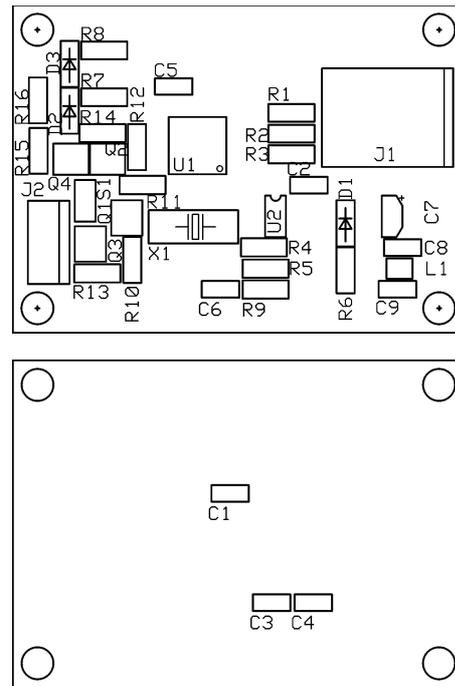


Fig. 4 The component placement for the interface. Nearly just only surface mounted parts are used.

When soldering the smd leds, one has to pay attention for the correct polarity. At last, the connectors and the quartz are soldered to the board. It is recommended to put the pcb in a shielded metall housing. The housing has to be joined with the gnd of the pcb.

Please be careful when handling a pcb which is already connected to the pc. If you accidentally short the 5 volt supply, the inductor L1 formates smoke... So take care!

2 The installation at the pc using a virtual com interface

The driver for the interace can be downloaded at the webpage of FTDI [2] for all common operating systems. It instals a virtual com interface (e.g. com 3) at the pc, with which the programming interface can be addressed. This means, that the interface is addressed at the PC like a conventional seriell RS-232 interface! For this, most of the programs which have been written for the RS-232 interface can also be used with this interface. For the handhelds from yaesu it is suggested to use the free (!) "VX-Commander" [1] from Jim Mitchell (KC8UNJ). Figure 5 shows a screenshot. For other Yaesu radios, Bob Freeth, G4HFQ, has written some inexpensive programming software [4].

Additionally there is a tool at the FTDI-Webpage for downloading. It is used to program the eeprom U2. In here you can give the programming interface a name, which is shown on the pc when plugging the USB connector.

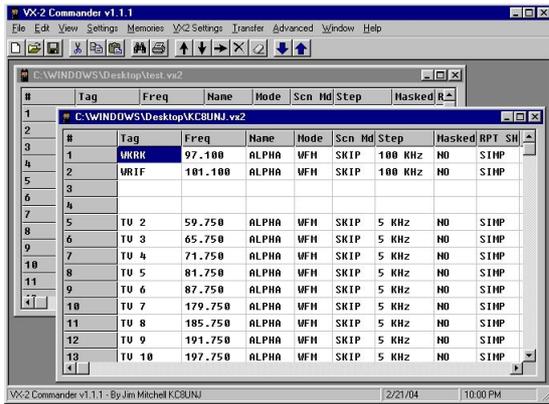


Fig. 5 The free programming software for the VX-2 from KC8UNJ [1].

A friend of mine, Gary (DF2RG), has also tested the interface successfully with his Icom IC-746 and some other software. Bob, G4HFQ, has tested the interface with a Yaesu VX-150, VX-170, FT-60, FT-7800, FT-8800 and a FT-8900. Some people have tested the interface also with their Yaesu VX-7. But with any other transceivers or software, the interface has not been tested.

Figure 6 shows a completed pcb. It should be noticed, that the buiding and the using of this interface is at your own risk!

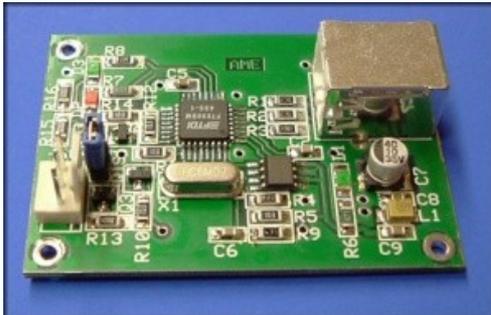


Fig. 6 The USB-programming interface.

3 List of Parts

27 Ohm 1206	R1, R2
470 Ohm, 1206	R6-R9
1,5 kOhm, 1206	R3
2,2 kOhm, 1206	R4
10 kOhm, 1206	R5, R10-R12, R14
47 kOhm, 1206	R13, R15, R16
33pF 0805	C3, C4
33nF 0805	C1
100nF 0805	C2, C5, C6, C8, C9
10µF/35V SMD electrolytic	C7
10µH 1210	L1
LED green 1206	D1, D3
LED red 1206	D2
Quarz 6 MHz HC49/U	X1
FT232BM SMD	U1
93C46 SMD	U2
BC848	Q1-Q4

Jumper RM 2,54	S1
USB-connector for pcb	J1
PCB-connector. RM 2,54	J2
Circuit board [3]	-

4 References

- [1] Webpage Jim Mitchell, KC8UNJ, <http://www.kc8unj.com>
- [2] Future Technology Devices International Ltd., 373 Scotland Street, Glasgow G5 8QB, Scotland, UK, www.ftdichip.com
- [3] Alexander Meier, Kapellenweg 8, 92366 Hohenfels, Germany www.dg6rbp.de
E-Mail: alex@ame-engineering.de
- [4] Webpage Bob Freeth, G4HFQ, <http://www.g4hfq.co.uk>

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