USB Radio Interface

By Paul Smart M0ZMB, 2E0PSM & M6AVL

Assembly Document

Contents

Version Control

Version	Date	Author
1.0	9th May 2014	Paul Smart (2E0PSM)
1.1	10th May 2014	Paul Smart (2E0PSM)
1.2	7th September 2014	Paul Smart (M0ZMB)

Changes

Changes between 1.0 and 1.1	
Change	**Detail**
1	On Main Board new track cut at 4 across,3 down
2	On Main Board link between 3,4 and 3,6 deleted
3	On Main Board link added between 5,4 and 5,6
4	On Main Board 1K ohm Resistor added between 3,3 and 3,8
Changes between 1.1 and 1.2	
1	System diagram added

1. Introduction

This manual aims to assist Amateur Radio Enthusiasts in the assembly of the 2E0PSM USB Radio Interface.

The radio interface is constructed from readily available cheap USB modules and a percentage of recovered parts.

The primary aim of the Radio Interface is to provide one single unit for interfacing a Radio to a PC with the minimum of cables whilst still allowing the PC's main soundcard to be used for normal multimedia use.

A standard USB B interface is provided with a standard Yaesu 6 Pin Mini DIN radio connection (pinouts should still be checked).

1.1 History

Versions of this unit were first built in 2012 containing different layouts and USB modules. The main idea has remained stable however in that the minimum of cables should be used in a module size similar to other commercial units.

In addition to the single unit documented here the author also utilises a dual unit allowing simultaneous data use of both HF and VHF.

1.2 System Diagram

The below system diagram shows the general arrangement of the modules within the unit.
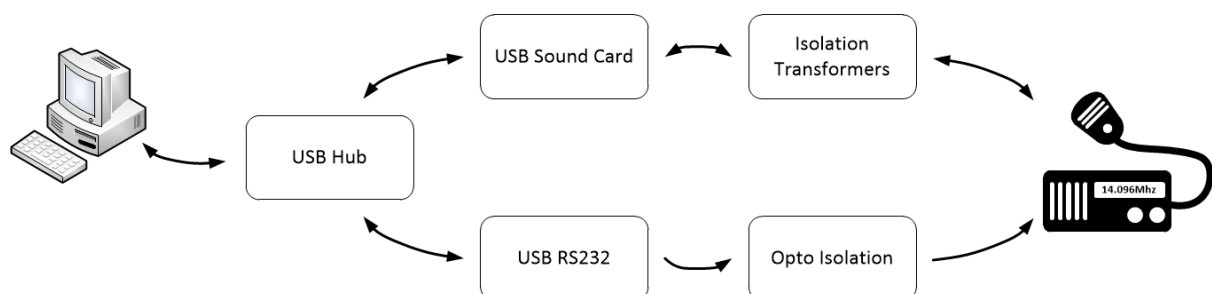
2. Assembly

A sub board design has been chosen for the main audio isolating components. This approach was chosen primarily to allow the sub board to be re-used on other projects.

The USB units are prepared by removal of their cases and removal of all connectors. Connector pins should be cut wherever possible and de-soldered individually. Extreme care should be taken not to damage the USB PCBs.

The USB Hub is mounted to the Main Board by the 4 0.1" headers used. Take note of the USB hub version used by comparing the USB input pins with the two options available. If a further version is suspected please contact the author for assistance and documentation.

The USB Sound card and USB to RS232 module are mounted to the main board by the use of double sided adhesive foam pads.

Whilst connecting the USB modules it is recommended to connect the hub to the USB input initially. Test this against a computer then connect either the sound card or RS232, test and finally connect the last module.

3.   Test

Final unit testing should be completed in three phases.

3.1   USB connectivity

Plug the units USB cable in. The PC should recognise the USB Hub, Sound Card and RS232 unit and install the appropriate drivers. The Green LED should illuminate.

3.2   PTT testing

Using your favourite application perform a test transmission ensuring that the PTT LED illuminates. This may be dimly lit depending upon the USB units voltage. A resistance of 0 ohms should be measured between pins 1 and 4 of the 6 pin mini DIN connector.

3.3   Audio testing

Audio testing can only be accomplished via connection to a radio unless audio testing equipment is available. It is recommended that a dummy load is used against a local radio or low power to test with a nearby amateur.

4.   Parts List

The following two sections detail the parts lists for the two boards used within the unit.

4.1   Main Board

Item	Description	Qty	Cost	Supplier
3	PVA3354 Opto Isolator	1	Recovered	2E0PSM
4	Right angle Green LED	1	Recovered	2E0PSM
5	Right Angle Amber Led	1	Recovered	2E0PSM
6	USB to RS232	1	£1.44	2E0PSM
7	USB Sound Card	1	£0.99	2E0PSM
8	USB Hub	1	£0.99	2E0PSM
9	USB B Socket	1	£0.20	2E0PSM
10	6 Pin Mini Din Socket	1		
12	10nF Ceramic Disc	2		
13	1N4148 Diode	1		
14	1K 0.25W resistor	3		
15	0.1" headers Split into 3+3+2+6+4+3	22 pins		
17	Vero Board 24 strips by 42 holes	1		
19	6 Pin Mini Din Plug or old Keyboard cable	1		
20	suitable plugs for required radio	1		
21	USB A to B cable	1		
22	Wire wrapping wire Yellow	200mm		
23	Wire wrapping wire White	200mm		
24	Wire wrapping wire Red	200mm		
25	Wire wrapping wire Black	200mm		

4.2   Sub Board

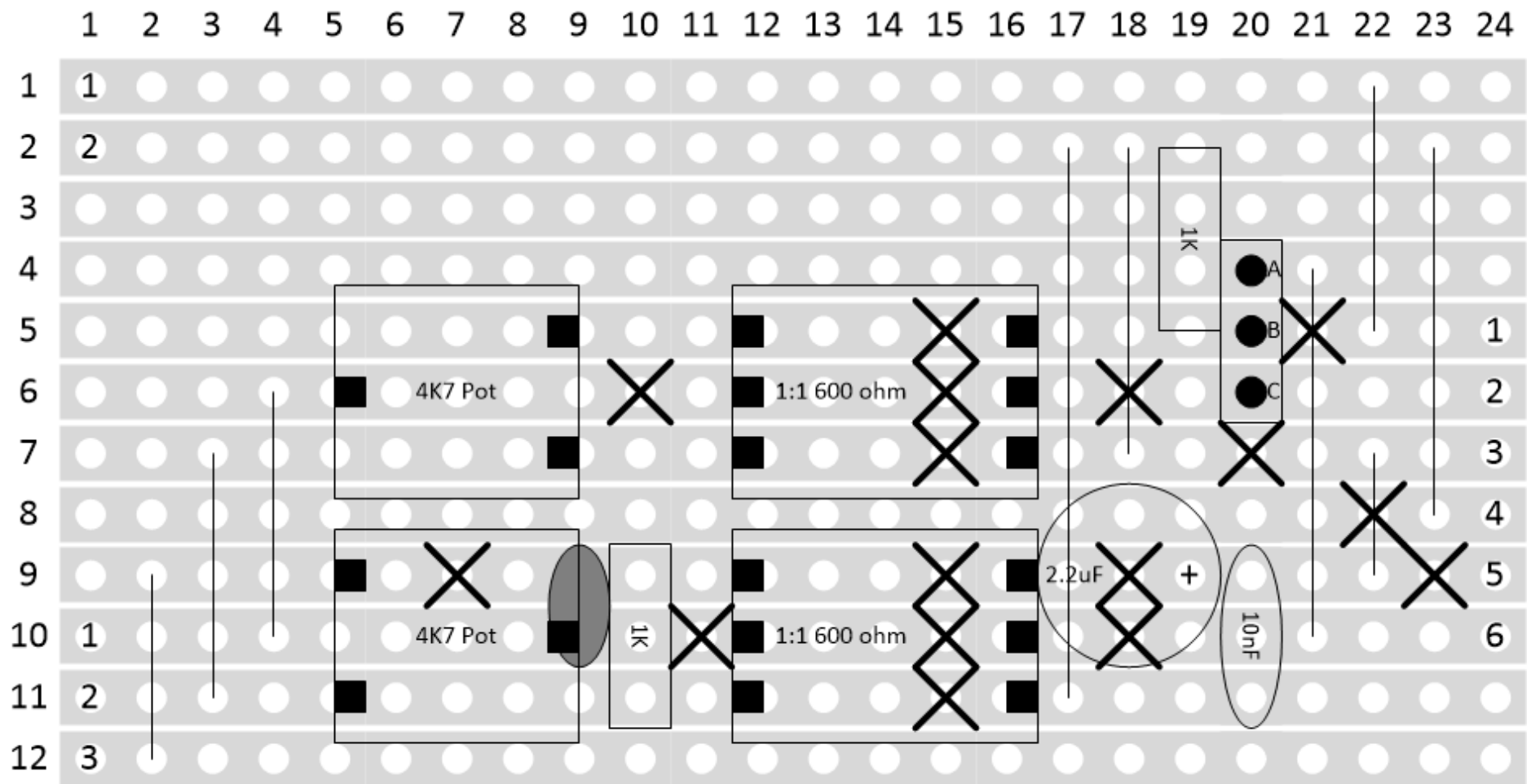| Item	Description	Qty	Cost	Supplier
1	Surface Mount Etal P2781 600 ohm Transformer	2	Recovered	2E0PSM
2	4K7 linear preset pot	2		
11	2.2UF 50V Electrolytic	1		
12	10nF Ceramic Disc	1		
14	1K 0.25W resistor	2		
15	0.1" headers Split into 3+3+2+6+4+3	3 pins		
16	0.1" Link	1		
18	Vero Board 12 strips by 24 holes	1		

5. Main Board
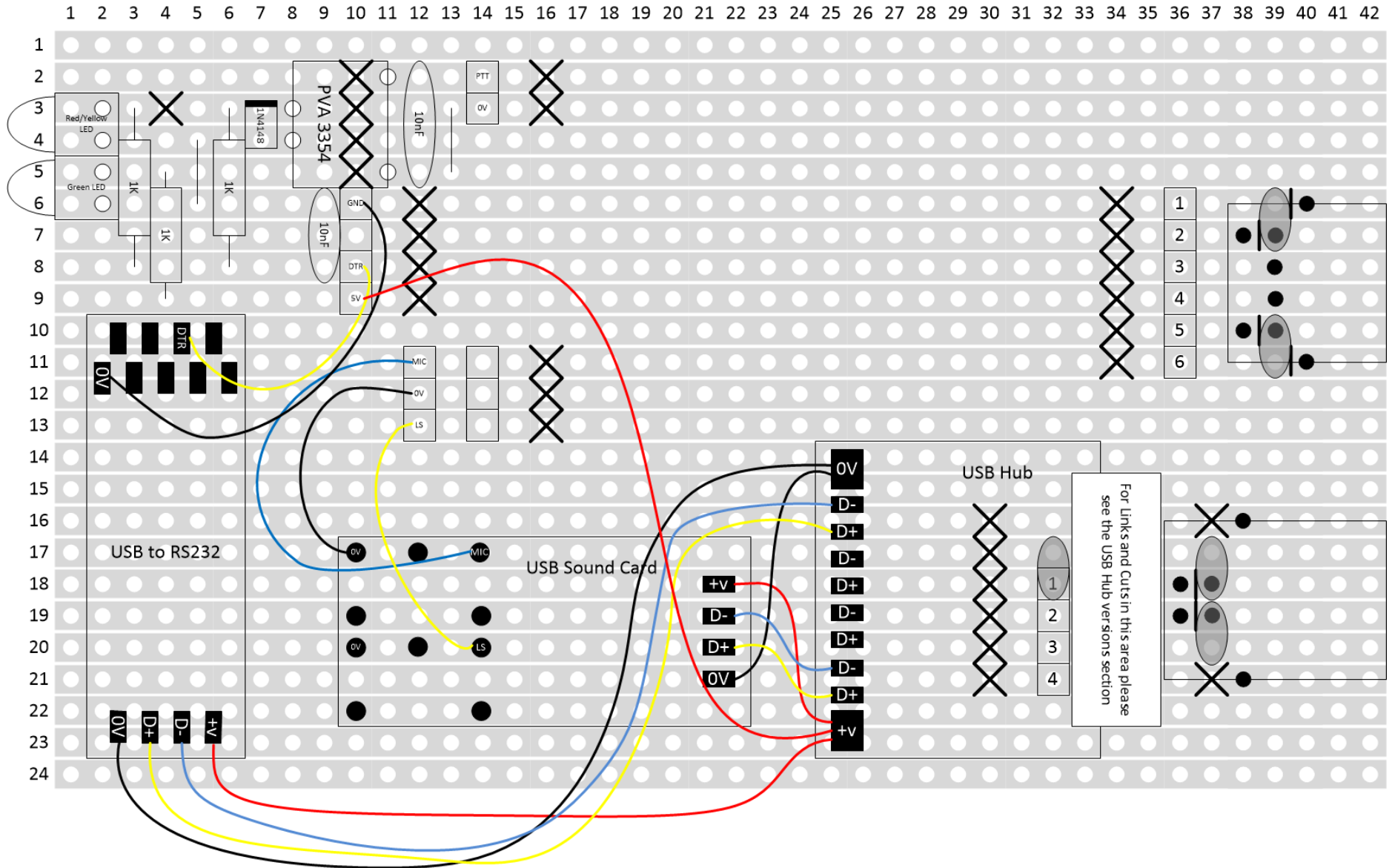
6. USB Hub Versions
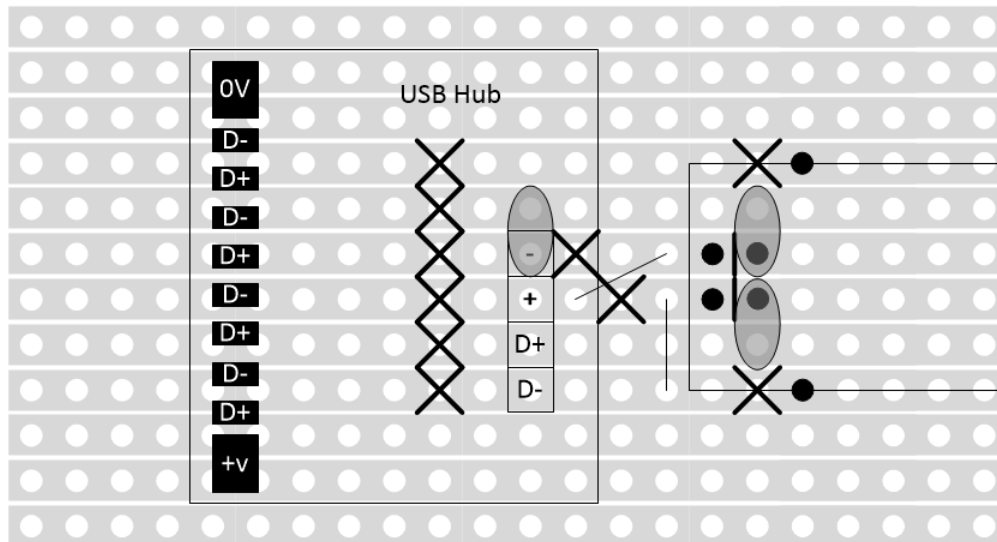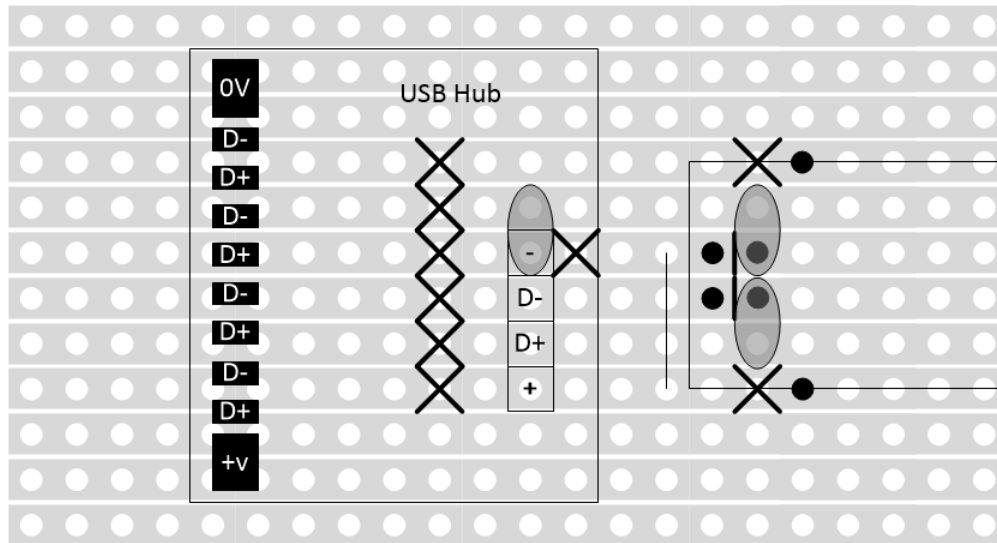
7. Sub Board

8.   Board Legends

The following board legends have been used in the previous two sections.

Track Cut

Track Cut
between holes

Wire Link

Solder Link

9. Radio Connections

As stated earlier the radio interface is based on the 6 pin mini DIN interface used on some Yaesu radios. Using a pin for pin cable the interface can be connected to the Yaesu FT-857 and FT-8900R plus others.

The pinout below can be used to manufacture cables for other radio makes and models.