USB DigiVOX Interface

Schematic diagram and notes

Mark A Phillips G7LTT/NI2O
markp@enicomms.com

http://www.goboxgizmos.com/usbdigivox.html

ENIcommuncations Corp
70 Brookside Road
Randolph
NJ 07869
973 828 1625

Installation Notes

Thank you for purchasing the GoBoxGizmo's USB DigiVOX Interface. For updates to this document visit http://www.goboxgizmos.com/usbdigivox.html.

Your USB DigiVOX Interface is a sound card and sound card modes interface all rolled into one. It's all you need to get onto PSK31 tonight! The USB DigiVOX Interface is supplied as a "semi kit"; the surface mount part of the kit is already built leaving you with just the regular sized components left to build.

Another useful feature of your USB DigiVOX Interface is that unlike other USB devices it requires no drivers. You can use your Interface with Windows, Mac and Linux without having to look for those elusive drivers. Simply plug it into your computer's USB port and wait for it to be set up.

Construction

Construction is quite straightforward. Parts orientation is obvious but take care to observe the polarity of the diodes and the primaries of the transformers (marked with a P on the primary side).

Construction should take you a little less than an hour. Inspect your work. Grab a cup of well earned coffee.

Testing and setup

Close all the applications running on your computer and then connect the USB DigiVOX Interface to it. You should notice the light on the Interface come on. If you're using Windows (sorry about that!) you'll get the usual USB wizard pop up offering to install your newly added hardware. Follow the wizzard through to its completion. Linux/Mac users will find the device under ALSA/PulseAudio/Jack/etc as a USB Audio Codec.

Fire up your favorite sound card mode software (we use Fldigi) and configure it to use the new USB Audio Codec device. Set the volume on your sound card mixer software to maximum. Press the "tune" button in your software (if you don't have a "tune" button force the software to transmit).

With your volt meter measure the DC voltage between the left hand end of D2 and the right hand end of D1. Anything more than 2 VDC is more than enough to key up your radio.

If you have access to an oscilloscope check that you have audio on the primary and

secondary sides of TR1 and on the wiper of R4. The AF voltage should change as you fiddle with the pot.

Make up an interface cable suitable for your radio's data facilities and connect it between the radio and the Interface. Many modern rigs have a data port on the back which offers a fixed voltage output independent of your volume and mic controls. This would be the ideal place to attach your USB DigiVOX Interface. Otherwise, plug the Interface into the mic and speaker sockets on your radio.

You should immediately notice the waterfall display in your software change and if you are tuned in to a PSK31 frequency (e.g 14.070MHz) you should start to see stripes appear representing the different signals you are receiving. Clicking on a stripe should result in the data being decoded and printed on your screen.

There is no adjustment possible with the Codec chip on your Interface so if the incoming audio level is not enough try removing R1 and if that's still not enough replace R2 with a wire link. Conversely, if you have too much audio signal coming in reduce the volume on your radio.

We need to set up the TX levels of your Interface such that we get the most RF out of the radio (where appropriate) without over driving the mic input. Over driven signals lead to bad data on the air which in turn lead to unintelligible signals.

Connect your rig into a dummy load and a power meter capable of handling the rig's maximum RF power output. Turn the RF power up to maximum. Press the tune button in your software and observe the power output from your radio. Adjust the pot on your Interface such that you measure roughly 90% of your peak power output. A 100 Watt rig should easily achieve 90 Watts with this Interface.

When you are satisfied that your Interface and radio are set up correctly, you might like to find some 1.75" heat shrink tube (not included) to enclose your Interface. Slide the heat shrink tubing over the Interface and apply some heat (a small butane pencil torch is good for this). You'll notice that the sleeve is significantly larger than the Interface. Make sure to center the Interface in the sleeve as you apply heat evenly over all surfaces.

As the sleeve shrinks ensure that the Interface remains centered. The sleeve will shrink to the point where it tightly grips the Interface and you should see vague component outlines pressing against the plastic. Set to one side for about 15 minutes to properly cool off.

Get yourself a beer. You deserve it!

Operation

It is beyond the scope of this document to teach you how to use your chosen software package. However, following these simple guidelines will allow years of on air operation of both your Interface and more importantly, your rig!

Less is more: The DSP abilities of your Interface mean that you can receive many QRP signals with 100% accuracy. Signals below the perceived noise floor are quite commonly decoded as if they were next door. Do yourself and your fellow operators a favor and reduce the RF power of your rig to the minimum level required for the contact. Most sound card modes are Continuous Wave in nature and so the duty cycle for your radio can get up to 80%+ during a busy data swapping session. Most operators reduce their output to around 25W for this reason and they find it more than sufficient to work the world.

More is less: A badly configured Interface and radio will lead to splattering on the bands. In turn this splattering prevents other operators from using the sub-band for your chosen mode. With narrow band modes such as PSK31 we are able to cram 100's of signals into the same space your voice would consume. Worse still, your harmonics could be arriving in another sub-band altogether!

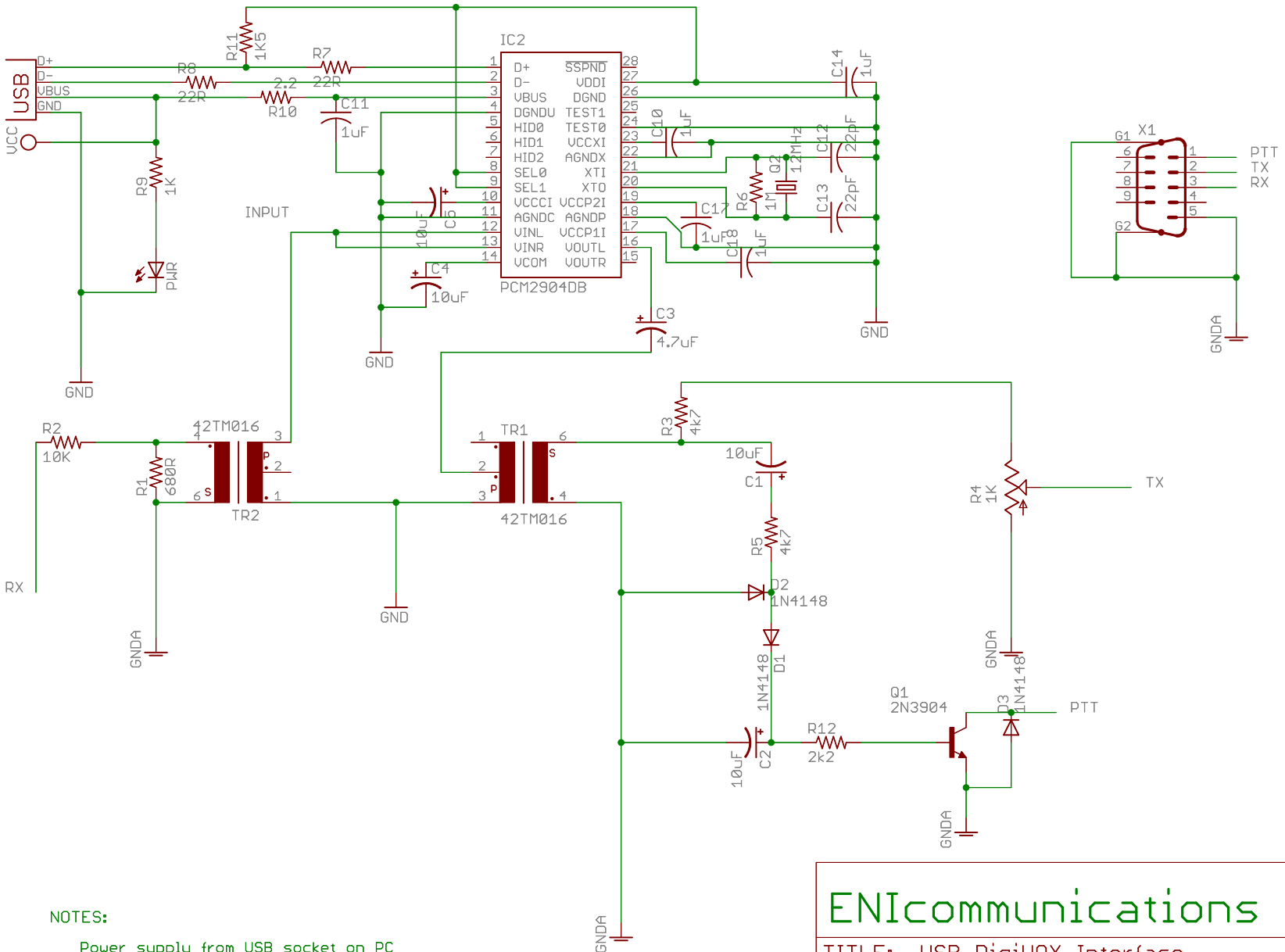
Have fun on the air!

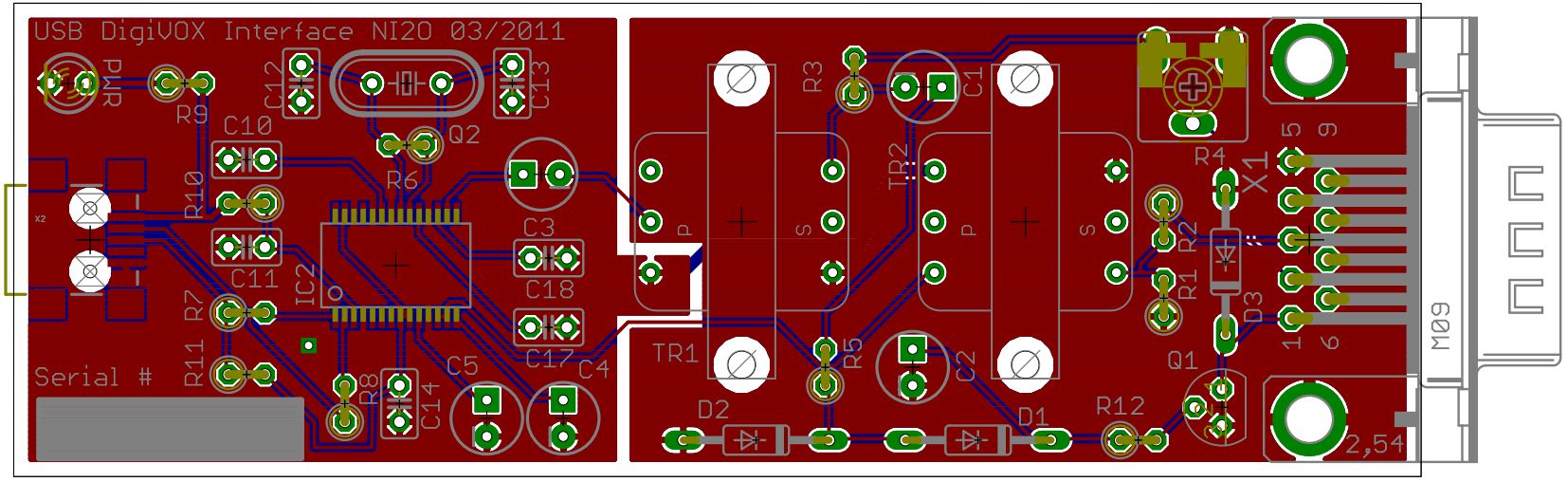
Warranty and limitation of liability

No warranty is given or implied with this device. ENIcommunications Corp accepts no liability for damages caused by this device.

Credits

Based in part on Howard Teller, KH6TY's sound card interface project; QST March 2011.


USB
D+
D-
VBUS
GND
VCC
R11
1K5
R7
22R
R8
22R
2.2
R10
C11
1uF
R9
1K
PWR
INPUT
IC2
PCM2904DB
C5
10uF
C4
10uF
C3
4.7uF
C14
1uF
C10
1uF
C12
22pF
Q2
12MHz
R6
1M
C13
22pF
C17
1uF
C18
1uF
X1
PTT
TX
RX
GNDA
GND
R2
10K
R1
680R
42TM016
TR2
TR1
42TM016
R3
4k7
10uF
C1
R5
4k7
D2
1N4148
D1
1N4148
R4
1K
TX
RX
Q1
2N3904
D3
1N4148
PTT
R12
2k2
10uF
C2
GNDA
NOTES:
Power supply from USB socket on PC
USB sound adapter chip requires no drivers
ENIcommunications Corp
TITLE: USB DigiVOX Interface
Document Number:
REV:
Date: 5/24/11 5:15 PM
Sheet: 1/1


USB DigiVOX Interface NI2O 03/2011
PWR
R9
C10
C12
C13
Q2
R6
R10
C3
C11
C18
IC2
R7
R11
C17
C4
C5
R8
C14
Serial #
TR1
R3
C1
TR2
P
S
R4
X1
R2
R1
D3
Q1
R5
C2
D2
D1
R12
M09
2,54

Partlist

Exported from USB DigiVOX Interface.sch at 6/19/11 10:44 AM

EAGLE Version 5.11.0 Copyright (c) 1988-2010 CadSoft

Part	Value	Device	Package	Library	Sheet
C1	10uF	CAP_POLPTH2	CPOL-RADIAL-10UF-25V	SparkFun	1
C2	10uF	CAP_POLPTH2	CPOL-RADIAL-10UF-25V	SparkFun	1
C3	4.7uF	CAP_POLPTH2	CPOL-RADIAL-10UF-25V	SparkFun	1
C4	10uF	CAP_POLPTH2	CPOL-RADIAL-10UF-25V	SparkFun	1
C5	10uF	CAP_POLPTH2	CPOL-RADIAL-10UF-25V	SparkFun	1
C10	1uF	C-US025-025X050	C025-025X050	rcl	1
C11	1uF	C-US025-025X050	C025-025X050	rcl	1
C12	22pF	C-US025-025X050	C025-025X050	rcl	1
C13	22pF	C-US025-025X050	C025-025X050	rcl	1
C14	1uF	C-US025-025X050	C025-025X050	rcl	1
C17	1uF	C-US025-025X050	C025-025X050	rcl	1
C18	1uF	C-US025-025X050	C025-025X050	rcl	1
D1	1N4148	1N4148	DO35-10	diode	1
D2	1N4148	1N4148	DO35-10	diode	1
D3	1N4148	1N4148	DO35-10	diode	1
IC2	PCM2904DB	PCM2904DB	SSOP28DB	texas	1
PWR		LED3MM	LED3MM	led	1
Q1	2N3904	2N3904	TO92	transistor-npn	1
Q2	12MHz	CRYSTALHC49S	HC49/S	crystal	1
R1	680R	R-US_0207/2V	0207/2V	resistor	1
R2	10K	R-US_0207/2V	0207/2V	resistor	1
R3	4k7	R-US_0207/2V	0207/2V	resistor	1
R4	1K	TRIM_US-CA6V	CA6V	pot	1
R5	4k7	R-US_0207/2V	0207/2V	resistor	1
R6	1M	R-US_0207/2V	0207/2V	resistor	1
R7	22R	R-US_0207/2V	0207/2V	resistor	1
R8	22R	R-US_0207/2V	0207/2V	resistor	1
R9	1K	R-US_0207/2V	0207/2V	resistor	1
R10	2.2	R-US_0207/2V	0207/2V	resistor	1
R11	1K5	R-US_0207/2V	0207/2V	resistor	1
R12	2k2	R-US_0207/2V	0207/2V	resistor	1
TR1	42TM016	42TM113	42TM	trafo-xicon	1
TR2	42TM016	42TM113	42TM	trafo-xicon	1
X1		M09HP	M09HP	con-subd	1
X2	USBSMD	USBSMD	USB-MINIB	SparkFun	1