Simple inexpensive sound card interface

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Front

Rear

Introduction:

Every once in a while I come across something I need for the shack and I wonder if I could turn it into a homebrew project. Such was the case when I decided I needed a sound card interface. While I could have purchased a commercial unit, the ones I looked at either didn't have the features that I was looking for or had many more features then I really needed and were too expensive.. So in the end, I decided to design my own and put together this list of features that were important to me.

- Provide isolation between a transceiver audio output / microphone input and a sound card.
- Provide isolation between the computers serial port and a transceivers PTT keying input.
- Support the popular contest logging software packages including CT, Writelog, and N1MM.
- Support generating keyboard CW and AFSK / FSK RTTY.
- Require no external power supply or internal battery.
- Work with computers having either a standard serial or parallel port.
- Have parts mounted on a PCB with a total material cost of about $25.

After doing a lot of research I came up with this design that I think meets these criteria. The design uses a minimum number of components mounted on a custom PCB. All components are thru-hole so soldering is easy and the case is plastic so no special tools are required to work on it. The sound card interface does require the construction of a

custom interface cable between a transceiver and the sound card. The cable with an 8-pin DIN plug on one end connects to sound card interface while the opposite end gets wired to your transceiver.

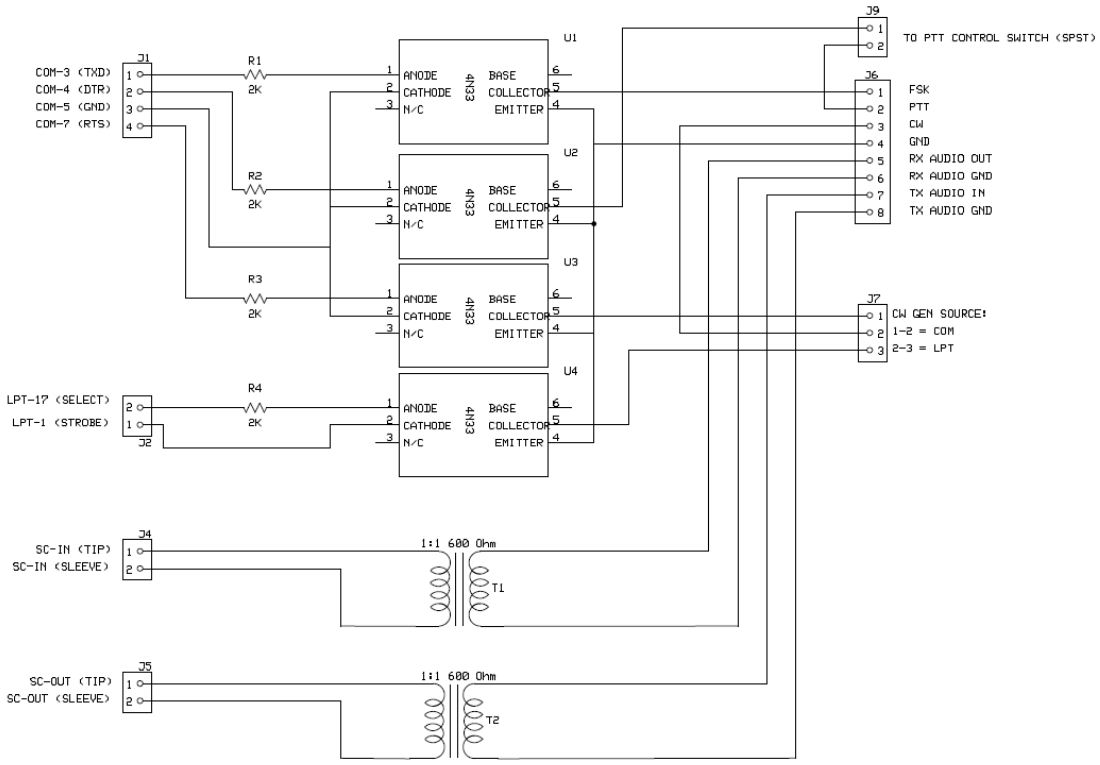

Figure 1 – Schematic

Circuit Description:

Refer to the schematic diagram in Figure 1 for the following description. Optocoupler U1 isolates the serial ports TXD signal path from the transceivers FSK input for FSK RTTY operation. Optocoupler U2 isolates the serial ports DTR signal path from the transceivers PTT keying input. Optocoupler U3 isolates the serial ports RTS signal path from the transceivers CW input. And Optocoupler U4 isolates the parallel ports SELECT path from the transceivers CW input. Header J7 is used to select either the serial CW path or parallel CW path..

Transformer T1 isolates the sound card output from the transceivers transmit audio input (MIC). And transformer T2 isolates the transceivers receive audio output from the sound card input. Header J7 is wired to an 8-pin DIN connector used to route signals to and from the transceiver.

Parts List:

Most of the parts for this project were purchased from www.digikey.com except T1 & T2 which were purchased from http://www.packetradio.com/catalog/.

While the original prototype included connectors between the printed circuit board and the chassis components, I found that the connectors just added extra cost and more work during construction with no real benefit and therefore were omitted from the final design. Also the prototype included a third 1/8-inch stereo jack meant to split the receive audio from the transceiver between the sound card input and a speaker. This speaker jack was omitted from the final design due to excessive loading. If the builder plans to not implement all the functionality, those areas not used do not need to be populated.

REF DES	QTY	DESCRIPTION
R1-4	4	Res, fixed, 2k-Ohms, 1/8 w
U1-4	3	IC, optocoupler, 4N33, DIP-6
T1,2	2	Transformer, audio, 1:1 600-Ohm, pcb mount, BUXCOMM #6K6XFMR
J6	1	Socket STD, female, Din, 8-pin, panel mount
J7	1	3-pin header, 100 mil centers
	1	Plug, circular, DIN, 8-position, straight cable mount
	1	Switch, toggle, SPST, chassis mount
	1	Conn, DB9, female, chassis mount, solder cup
	1	Conn, DB25, female, chassis mount, solder cup
	2	Conn, jack, 1/8-inch stereo, pcb mount
	1	Enclosure, plastic 5-3/4" x 4" x 2"

Table 1 – Parts list

Printed Circuit Board:

In order to produce a clean design I decided to lay out a simple double-sided printed circuit board using free software downloaded from www.ExpressPCB.com. I was able to fit two interface boards on a single panel which was then scored using a sharp utility knife to separate them. Using the ExpressPCB Protoboard service which produces three panels, each interface board cost approximately $10 each.

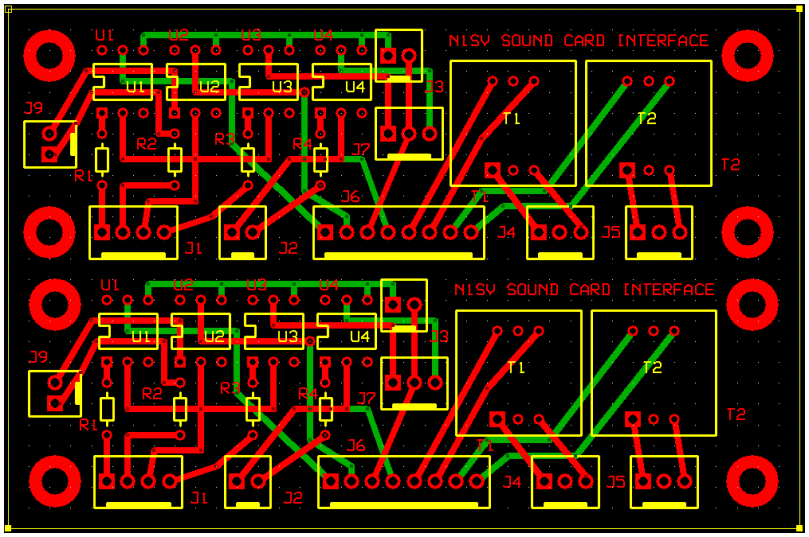

Figure 2 – Printed circuit board lay out

Assembly:

With only thru-hole components, assembly of the printed circuit board is easy and straightforward. That being said, U1-4 can easily be installed backwards so, pay special attention to their orientation. The four large pads at the corners of the PCB are intended to be used for mounting holes. I installed my PCB using short standoffs. Refer to Figure 3 for a view of the printed circuit board with all components installed.

NOTE: All 100 mil headers and mating connectors with the exception for J7 were omitted from the final design.

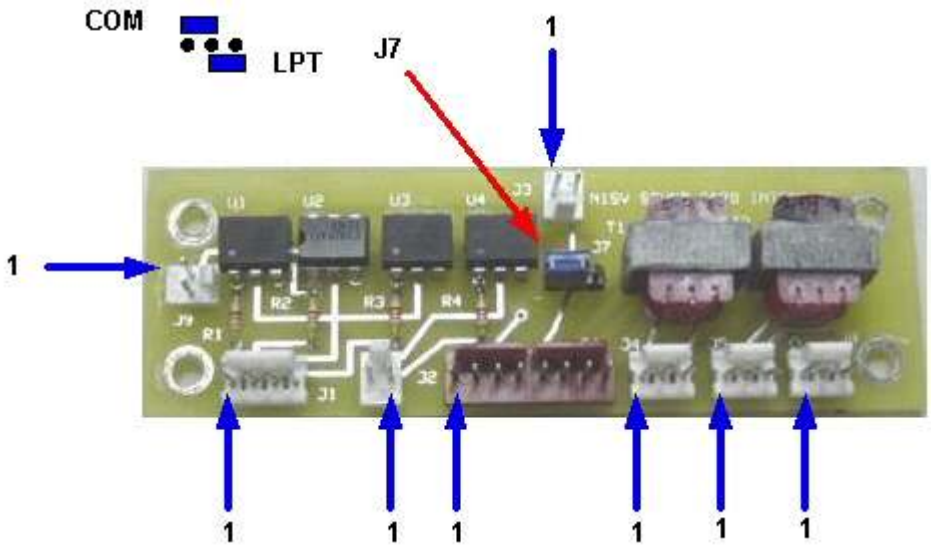

Figure 3 – Printer circuit board with installed components

A standard drill and an Exacto knife were used to cut holes in the chassis for the switch and connectors. On the rear of the chassis make sure all connectors are spread out enough the there will be no problems trying to connect all the cables. I used small bus wire to interconnect chassis connectors / switch with the printed circuit board. Refer to Figure 4 for a top view of the completed chassis.

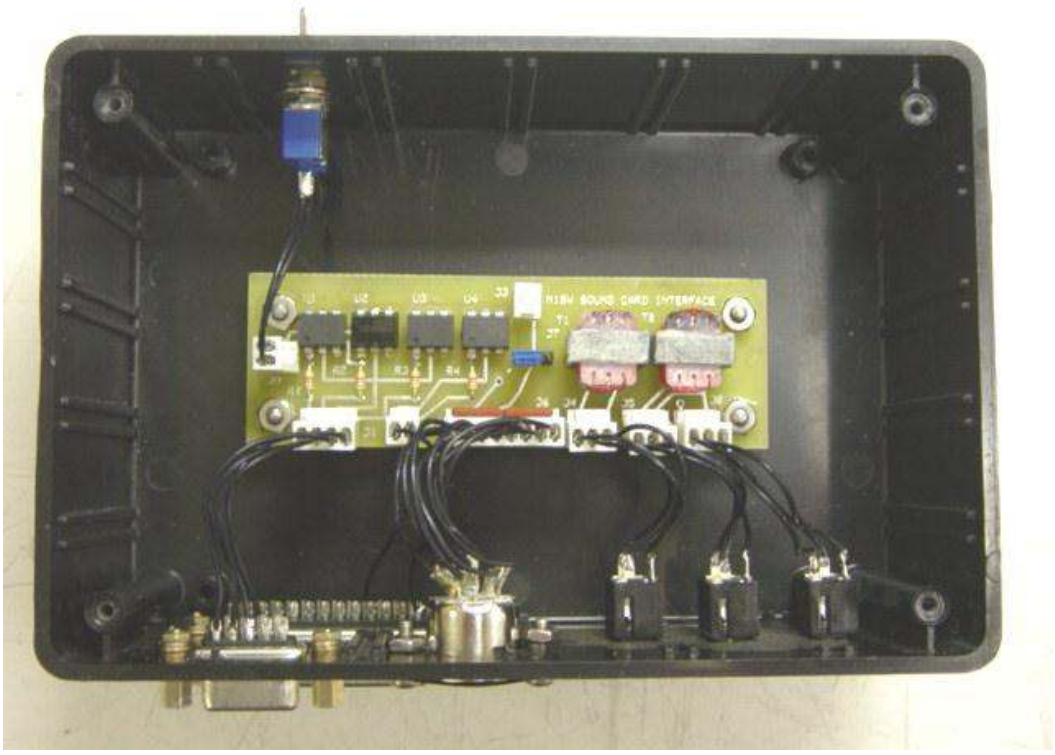

Figure 4 – Top view of chassis

Interface Cable:

In order to be able to connect the sound card interface to your transceiver and sound card, you will need the following cables; (1) two 1/8-inch stereo patch cables, (2) Either a DB9 to DB9 serial patch cable or a DB25 to DB25 parallel patch cable, and (3) a custom interface cable constructed for your specific transceiver. Most transceiver manuals provide a detailed pin-out of their rear panel remote or accessory jacks. These jacks can provide auxiliary audio input and output pins as well as PTT keying, and an auxiliary CW keying inputs. An example of a wiring diagram for an interface cable for my TenTec Orion is shown in figure 5 with the associated wiring list in Table 2.

Figure 5 – Orion interface cable wiring diagram

FROM	TO	DESCRIPTION
J1-1	J2-7	FSK
J1-2	J2-3	PTT
J1-3	J3-Tip	CW
J1-4	J2-2	GND
J1-4	J3-Sleeve	GND
J1-5	J2-4	Right AUX Out (Audio)
J1-6	J1-4	RX Audio GND
J1-7	J2-1	AUX Input (Audio)
J1-8	J1-4	TX Audio GND

Table 2 – Orion interface cable wiring list

Summary:

This sound card interface was easily assembled in a weekend and provides all the basic functionality that I need for contesting and operating RTTY & PSK31. I have used this sound card interface with CT, Writelog, and N1MM with no issues. Several members of my local ham club have also built this sound card interface with good results.