IVAARC PSK31 “Penny Pincher” Interface Box

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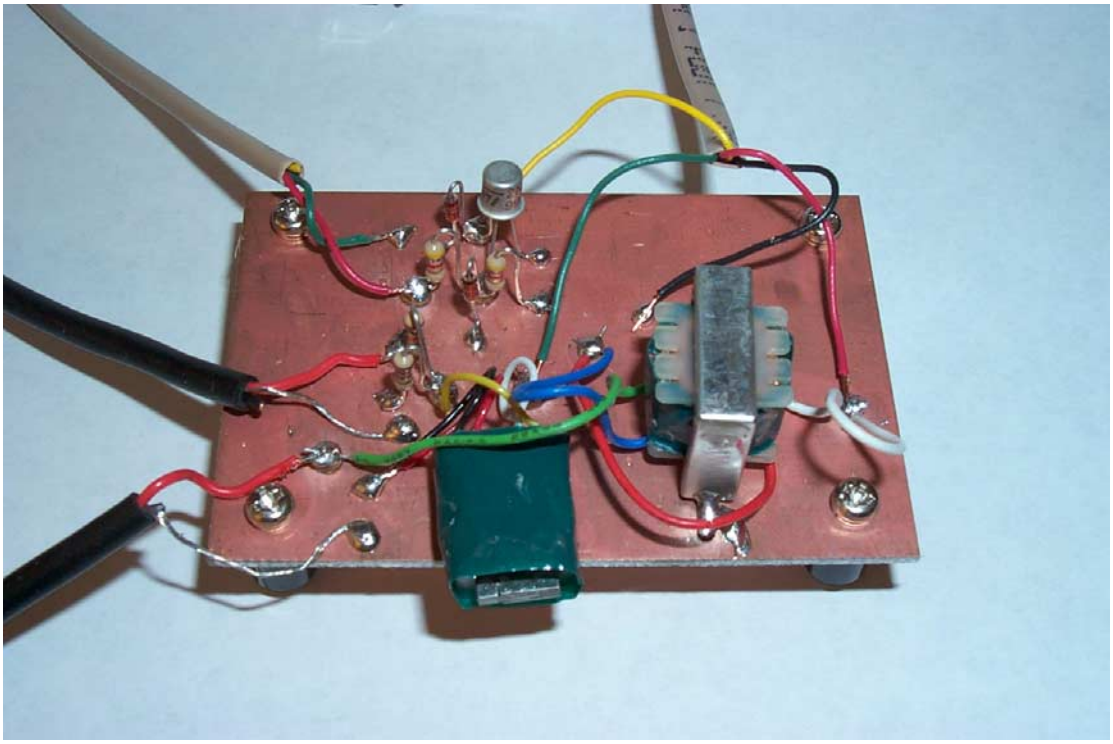
for the
Inland Valley Alliance of Amateur Radio Clubs

Introduction



The Penny Pincher prototype

The IVAARC PSK31 “Penny Pincher” Interface Box is a very low cost, yet very capable interface designed to get hams up and running on PSK31 with minimal effort. This kit also utilizes “Manhattan Style” construction that revolutionizes the building of simple to complex electronic circuits.

The Penny Pincher should work with most modern rigs and should have little problem with Sound Blaster compatible computer sound cards.

This document will not describe PSK31 in any detail so readers are encouraged to find other resources to learn about this fun mode.

While supplied as a kit to participants in the IVAARC PSK31 building project, it should be very easy for anyone to build this kit from parts commonly found at Radio Shack and other electronics stores.

Construction Techniques

Manhattan Style Construction is a technique that utilizes an un-etched copper clad circuit board and small pieces of punched circuit board. The small pieces are punched or cut from another piece of circuit board and are then glued into place on the main board. These form islands or pads to which components can be soldered. The main board provides the common ground connections. Using this technique, builders can easily layout boards because the pads can be directly translated to intersection points on the schematic.

The pads are held in place on the main board using a drop of super glue. See the accompanying Island layout diagram for placement of the islands.

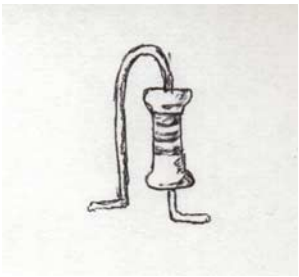


Figure 1

For a complete description of Manhattan Style construction, please refer to Chuck Adam's (K7QO) description that can be found on the web at: http://www.qsl.net/k7qo/manhat.htm

For the Penny Pincher, the resistors and diodes will be mounted vertically so they should be bent like as in Figure 1. For neat construction, if a lead is to be soldered to the ground plane, then it should be a touch longer. Also, as seen in figure one, be sure to bend the ends of each lead to provide enough surface to make a good solder connection.

The best technique that I have found for soldering to the islands is to first wet the pad with a small dab of solder, then, holding the component with a small pair of needle nose pliers, re-wet the pad and slide the component lead in. The lead should be completely covered in solder so you may need to top it off. One of the challenges here will be to not unsolder components that share the same pad. The best solution would be to grow a few extra sets if arms and hands, but since the is not all that viable (yet), you will need to get creative with holding one component in place with a finger or another tool. Be careful, the components can get hot!

To solder a component to the ground plane, find any area convenient for the part and heat it up for a few seconds with the tip of the soldering iron. Make a small puddle of solder there, then reheat the puddle and slide the component lead in.

Manhattan style construction does not provide for very strong mechanical connections. This is not that big of a problem for the components, but can be a problem for off board

wiring connections. I would suggest that when you mount your Penny Pincher into a cabinet you should brace the wiring in such a way that the solder connections are not the only thing holding the cables in place!

Circuit Description

The Penny Pincher circuit is a fairly straight forward design. There are three distinct subassemblies that can be built and operated independently of each other.

Push To Talk (PTT)

The push to talk (PTT) circuit utilizes a 2N2222 transistor (Q1) to provide a switch to ground. The transistor is activated by the signal from the RS232 RTS line from the computer. This part of the board can be used my many contesting software packages to key a receiver.

Sound Card Out

The sound card out section provides a 100:1 voltage divider (R3 and R4) and an isolation transformer (T1). If you cannot get enough audio drive, you may want to reduce the value of R3. Alternatively, you could replace R4 with a potentiometer.

Sound Card In

The sound card in section has an audio transformer (T2) that provides the required impedance match between the radio audio out and the Sound Card In. Normally, the Sound card has an input impedance between 600 and 2000 ohms.

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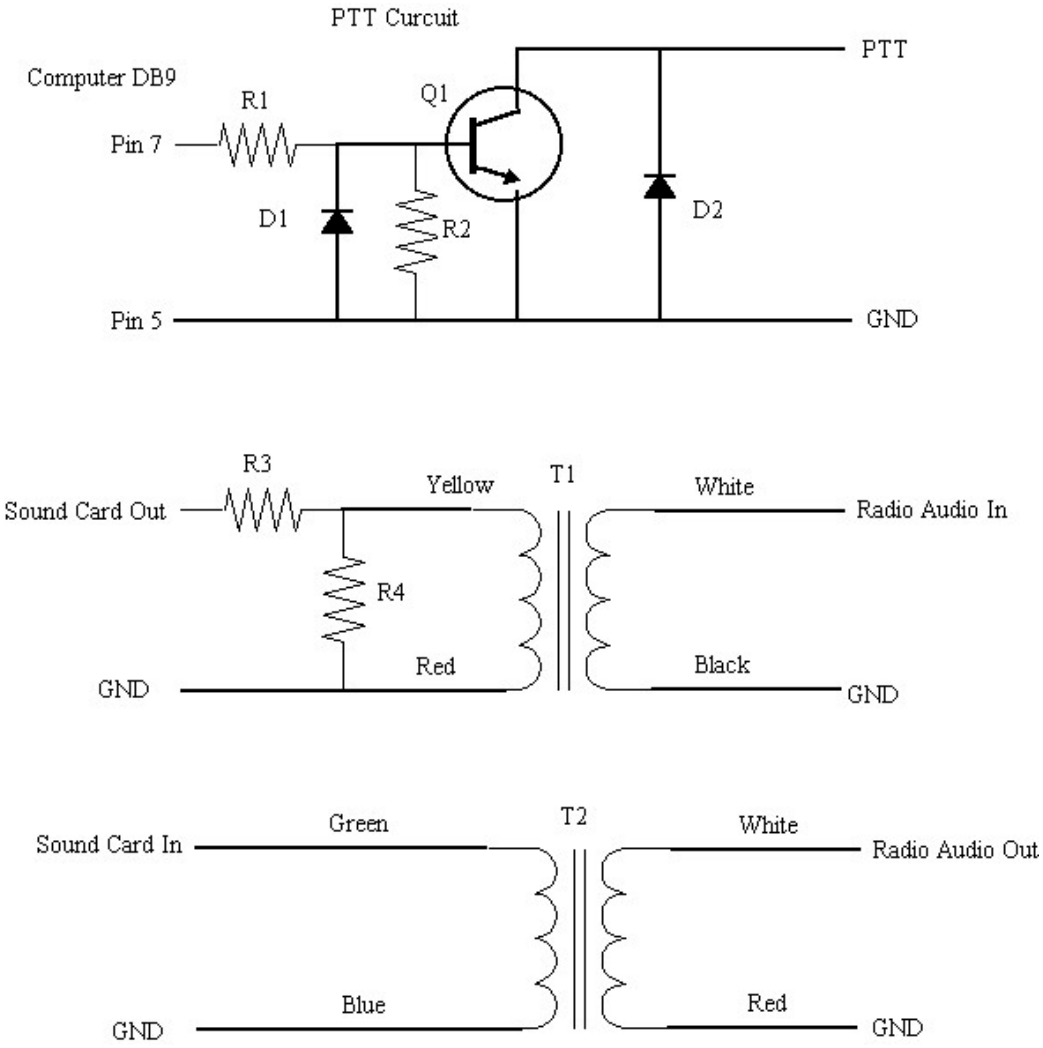
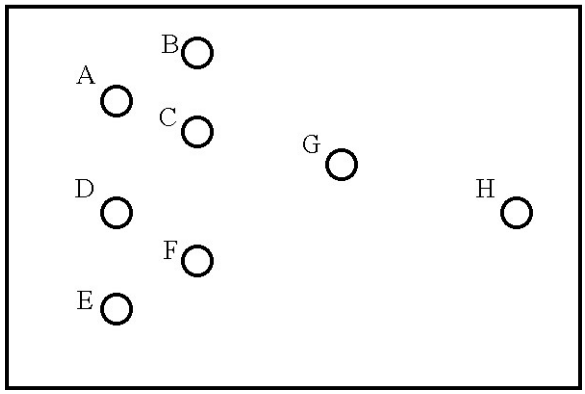


Parts:
R1,R2 4.7K (Yellow-Purple-Red)
R3 10K (Brown-Black-Orange)
R4 100 (Brown-Black-Brown)
D1,D2 1N4148
Q1 2N2222
T1 600 to 600 Transformer (Small Green)
T2 1K to 8 Transformer (Green with Metal Border)
1 Female DB9 connector and hood
2 1/8” Stereo Plugs
1 6 foot section of 3 conductor cable
1 2 foot section of 4 conductor cable
1 Mic plug

Board with islands



Glue the supplied pads onto the main PC board in the pattern show above.
You may want to glue these on as you go to optimize the spacing.

Solder R1 between pads A and C
Solder R2 between pad C and ground
Solder D1 between pad C and ground with the black ring side on pad C
Solder D2 between pad B and ground with the black ring side on pad B
Solder Q1 to pads B, C and ground. The lead adjacent to the tab goes to ground and the center lead goes to C. The remaining lead goes to B
Solder R3 between pads D and F
Solder R4 between pad F and ground
Solder the Yellow lead from T1 to pad F
Solder the White lead from T1 to pad G
Solder the read and black leads from T1 to ground
Bend the tabs on T2 back and solder them to the ground (see prototype)
Solder the Green lead from T2 to pad E
Solder the White lead from T2 to pad H
Solder the Blue and Red leads from T2 to ground

Prepare the Cables

Cut the supplied 6 foot section of 3 conductor cable into three equal 2 foot sections

RS232 Connector:
Using one of the three conductor cables, solder the red lead to pin 7 of the DB9
Solder the green lead to pin 5 of the DB9
Trim the remaining yellow lead (it is not used)
Solder the other end of the red lead to pad A
Solder the other end of the green lead to ground

Sound Card Out:
Using one of the three conductor wires, solder the red lead to the tip of the 1/8” stereo plug.
Solder the Green lead to the base of the 1/8” stereo plug.
Trim the remaining yellow lead (it is not used)
Solder the other end of the red lead to pad D
Solder the other end of the green lead to ground

Sound Card In:
Using one of the three conductor wires, solder the red lead to the tip of the 1/8” stereo plug.
Solder the Green lead to the base of the 1/8” stereo plug.
Trim the remaining yellow lead (it is not used)
Solder the other end of the red lead to pad E
Solder the other end of the green lead to ground

Radio connection:
These steps will be highly dependant on your radio connections and I will only give a rough overview. You should be able to use the supplied four conductor cable.

Solder the PTT line to pad B
Solder the Ground line to ground
Solder the Radio Audio In to pad G
Solder the Radio Audio Out to pad H
Solder the Radio Audio Ground to ground (this may have already been done above)