BRISTOL COUNTY REPEATER
ASSOCIATION SOUND CARD INTERFACE

INSTALLATION
and
USERS MANUAL

INTRODUCTION

This kit contains eleven components which combined in the correct order will result in a convenient, single board, isolated, digital interface that works for most all digital modes on HF and VHF/UHF.

This interface works with DIGIPAN, FLDIGI, MTTY, MMSSTV, MixW and most all other sound card programs. The board will work fine for PSK-31, PSK-63, RTTY, SSTV, NBEMS, plus man other modes on your HF or VHF/UHF rig including HT's due to the introduction of the TRRS connections.

This board is housed in a strong plastic case designed specifically for the interface with stand offs and hardware which holds the board secure.

The board is connected to the Radio's external speaker and then communicates with the Computer using the input and output connectors to the computer and to the radio using a DB-9 (Serial Port). The revolutionary part of this interface surrounds the connection to the radio itself. By idealizing a TRRS a versatile audio connector that supports both audio and microphone signals. It is commonly used in devices that require both audio and microphone inputs.

Table of Contents

ACKNOWLEDGMENTS

The following members of the BCRA played an important part of contributing to the success of this kit they are acknowledged here:

- Entire active membership for their support and encouragement
- The Board of Directors who have painlessly listened to the slow progress

Particularly the following tech team:

- Wheat / N1YCQ for engineering, technical support and professional schematic
- Arthur "Skip" / KB1CNB creating, designing and fabricating the interface enclosure
- Kevin / N1KJS for his input and support in availing himself to contact the educators and Lesion to the ARRL
- Mike / KC1LK for the fine logo for our club and also availing himself to be the lesion for coordinating the high school or middle school students
- Jay / KB1NYT for his keen eye on detail and his acute electrical engineering acumen

WITH GRATEFUL APPRECIATION FOR OUR BETA TEST TEAM

This Installation and Users Manual would not have been possible without the following members who helped by building, testing, and offering editorial corrections to the language and design - all the thanks belongs to:

Jay / KB1NYT

Wheat / NN1YCQ

Deb / KC1TOL

Tom / WA1LBK

THE BOX CONTAINS EVERYTHING YOU WILL NEED TO CONSTRUCT YOUR INTERFACE BOARD

This is the container for the interface board and all of the connector. Each Box contains the following from top left to bottom right.

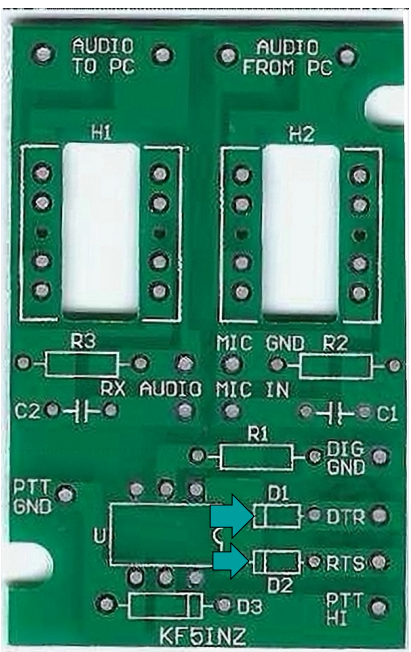
1. Sound Card PCB board with all components
2. Hardware screws to mount the board and cover
3. Phillips head screwdriver
4. Diagonal wire snips
5. TRRS female socket
6. TRRS component plug
7. Db-9 Serial Connector
8. 2- 3.5mm input and output connectors
9. Radio External speaker Input connector
10. Three - 3.5mm stereo connecting jumpers for the radio external speaker and the sound card input and output connectors to the computer.

POPULATING THE SOUND CARD INTERFACE

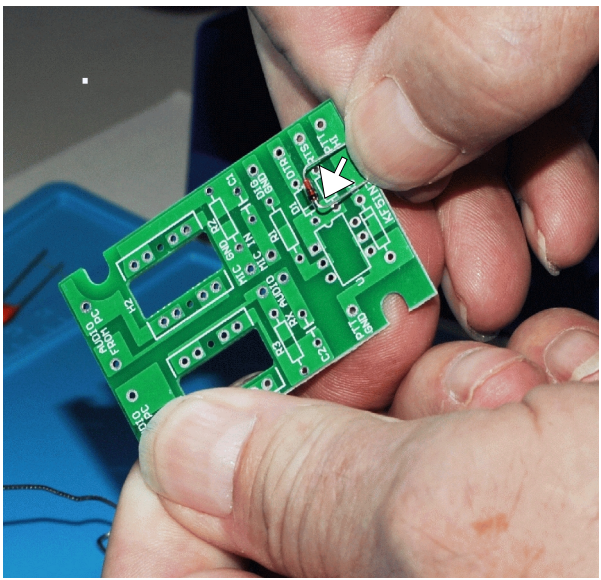
I strongly recommend the following soldering platform. The construction platform is setup with a heat resistant place mat, a soldering station, soldering iron, brass wool to clean the tip of the soldering iron and a canister of flux powder. The area is illuminated by a magnetic sewing machine light.

STEP 1.

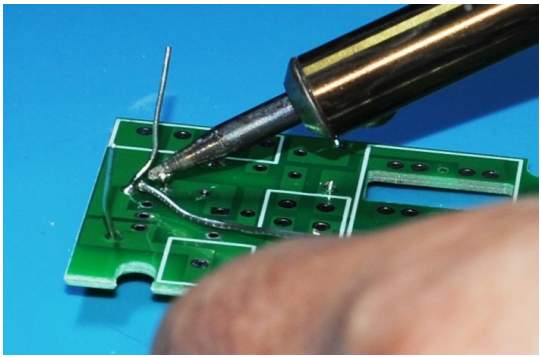
Using the following layout of the interface board, find the locations for the two 1N148 Diodes (D1, D2) and install them
observing the polarity of the diodes. One end has a stripe on it and the corresponding stipe is found on the silk screen of the PCB board



CAUTION !!

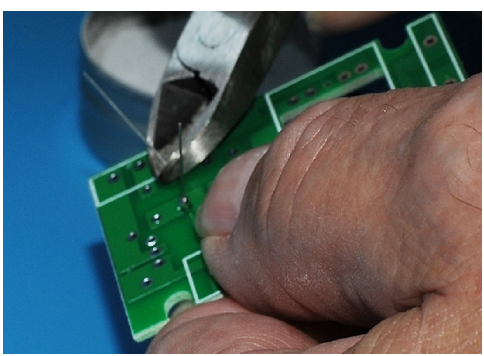


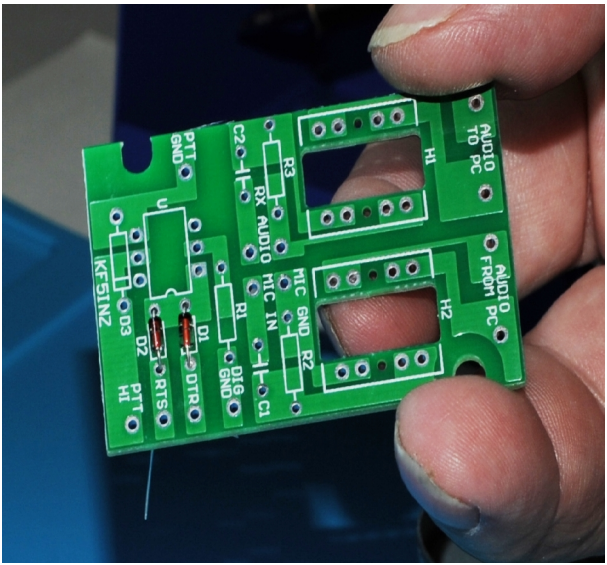
Note the stripe on the diode and the corresponding silk screen representation of the stripe on the PCB once the diode is installed in D1, the leads are bent over to keep them in place while soldering.



Once both leads are soldered check to see if the solder joints are bright silvery and has no holes - *It takes practice.

Now that you are satisfied with the solder joints snip the remaining leads close to the PCB board



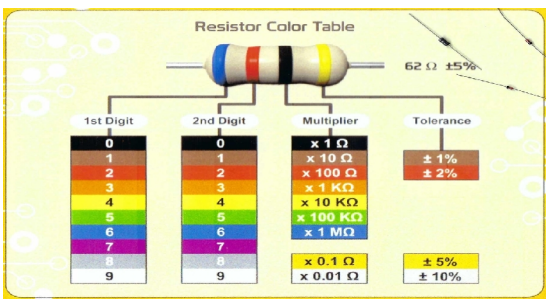


Now that you have installed and soldered both 1N4001 Diodes in place and have snipped the extruding leads from the underside of the PCB board, you are ready for Step 2 of the installation the good news is the following components do not require close attention to the polarity of the items, until we install the third diode.

STEP 2

Find the location of the two 2.2K Ohm resistors on the silk screen PCB board and install them in R2 and R3. Once located the parts included with the sound card interface board contains three resistors. There are 2 - 2.2K Ohm resistors and 1 - 220 Ohm resistor.

The following chart give you the values of the resistors based on a color code of the stripes located on the body of the resistors.

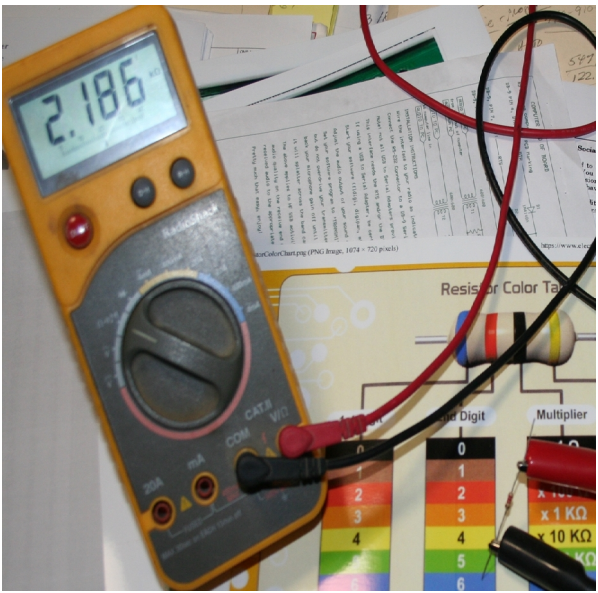


We see from the Resistor Color Table that a 2.2K Ohm will have the following color code on its body:

Stripe in 1st digit is RED for the number 2
Stripe in 2nd digit is also RED for number 2
Stipe in 3rd digit is RED representing x1K Ohm
simple now find the 2 resistors with those color combinations

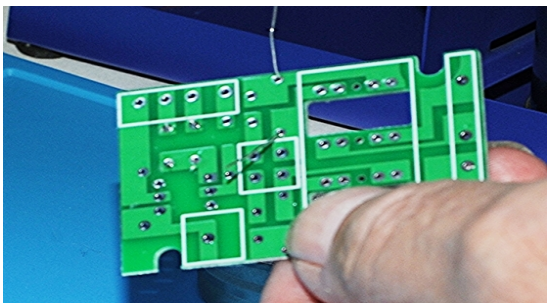
WHAT HAPPENS IF YOU CAN'T SEE THE COLORS?

Test the Resistor using an Ohm Meter and just read the value.

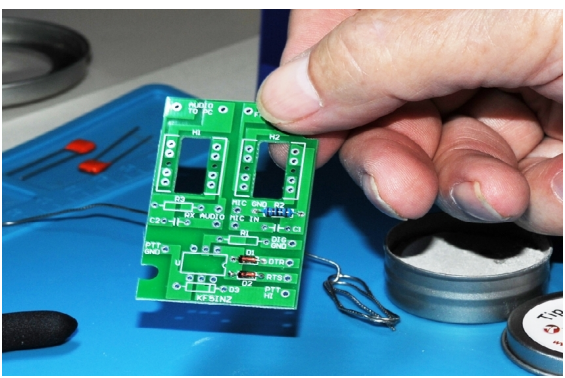


We see that the resistor with RED RED RED is a 2.2K Ohm Resistor with a gold stripe in the forth position which gives the tolerance of the resistor. We see in the digital screen digital notation of 2.186 K Ohm is with acceptable tolerance.

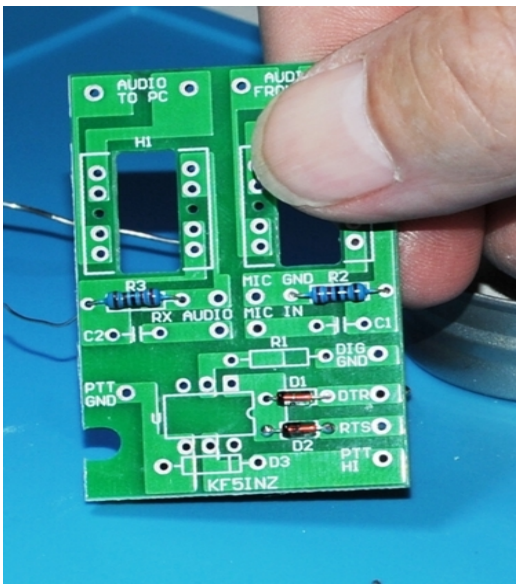
Now install the two 2.2K Ohm resistors in R2 and R3.



solder the Resistor R2 in place and snip the leads when satisfied they are correct.



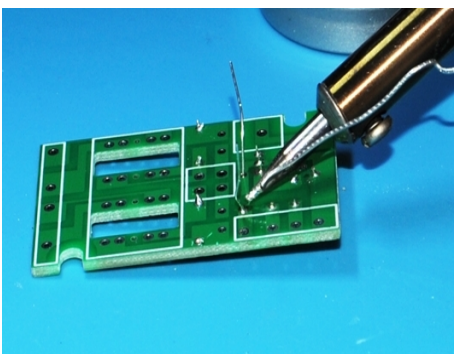
Now that R2 is installed now install R3 in the same manner as you did for R2, remember check the solder joints before snipping the leads



Good solder technique mandates you put the clean tip of your soldering iron on the solder pad and the component lead as it enters the solder pad and then place the solder on the heated lead and pad.

STEP 3

Since we only have one resistor left it is more probably the 220 Ohm resistor which has to be installed in R1. Make sure it is 220 Ohm so the color code should be RED RED BROWN, since Brown is the multiplier of 10.

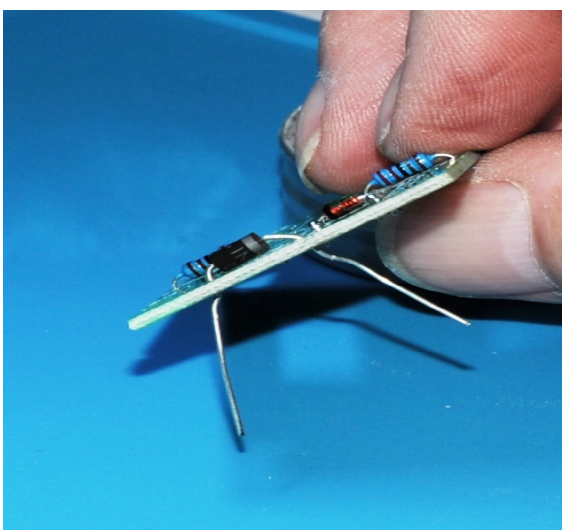


Make double sure you check with the Ohm meter that the resistor is in fact a 220 Ohm resistor and install it in R1. After soldering R1 in place snip the remaining leads close to the PCB board.

STEP 4

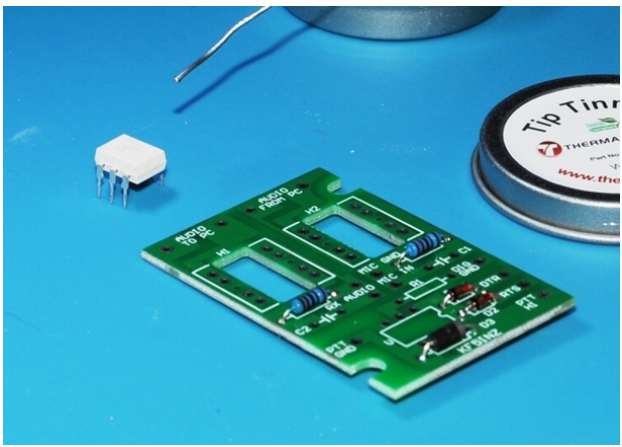
We have the last Diode to install, and like the previous D1 and D2 diodes, we have to make sure we follow the polarity by installing the diode with the stripe on its barrel to the stripe on the silk screen of the PCB board.

Locate the D3 silk screen. Now take the 1N4001 Diode and install it as shown. The stipe on D3 show be opposite the stripes on D1 and D2.



STEP 5

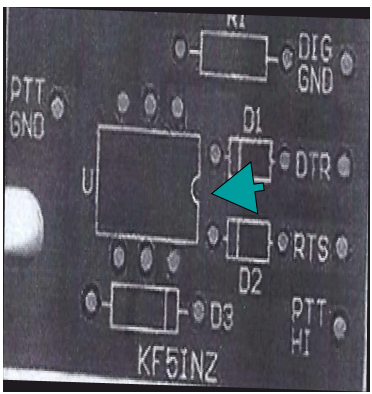
This is the installation of the Optocoupler. It has six leads, very short and has a dot on one end of the device.



The optocoupler sits just above Diode 3 which you can see installed at the bottom of the PCB board. The 'U' is on the left hand side of the board. You will see from the pictures on the next page the proper location for the optocoupler on the PCB board.

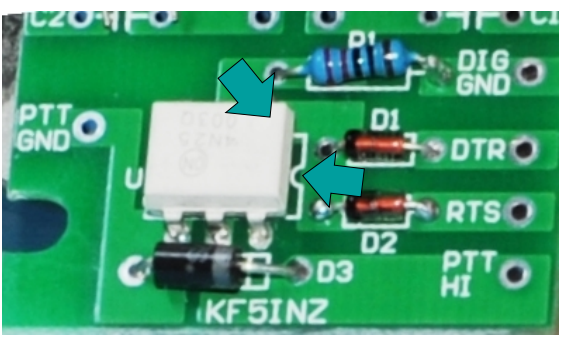
The optocoupler should not be installed in any other position but the one as described

Look as the silk screen board below and notice a notch on the opposite side from the letter 'U' This is the side the "Dot" has to be installed. The numerical pin #1 has to be in pin hole #1 on the PCB board.



Once you have installed the optocoupler in its proper location turn the PCB board over and solder the six leads to the solder pads.

You will not be able to snip the leads from the optocoupler since they are very short. Make sure that you have a good solder joint on all of the six leads and you have not soldered two of the leads together. Make sure that there is no excess solder connecting the leads when you have finished installation.



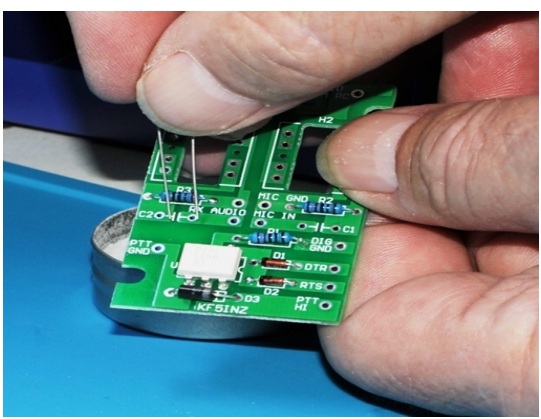
Note: Make sure the D1 and D2 are correct and D3 is also correct. Lastly the 'DOT' on the Optocoupler is on the indented side opposite the 'U' on the PCB board.

STEP 6

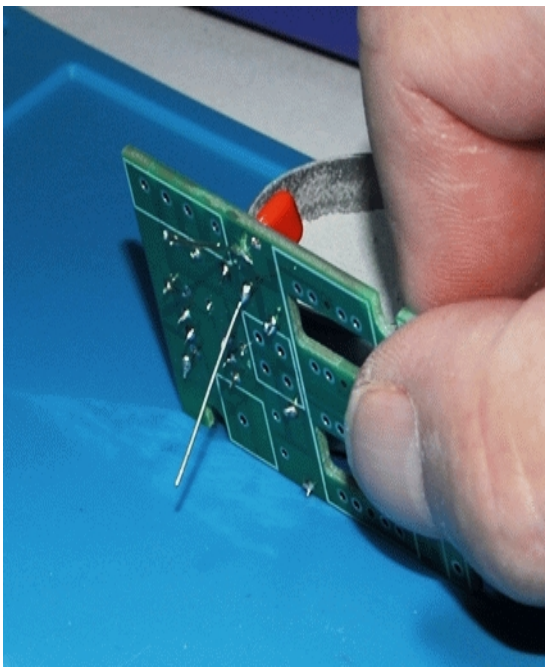
This is the easiest installation of components. We will install the two capacitors they are known as a .2 uf cap. In other words it's a point 2 Micro Farad capacitor. There is no polarity for these installations.

Locate C1 and C2 on the silk screen of the PCB board they are just under the H1 and H2 openings.

C1 is located under R2 and C2 is located under R3 on the PCB board.



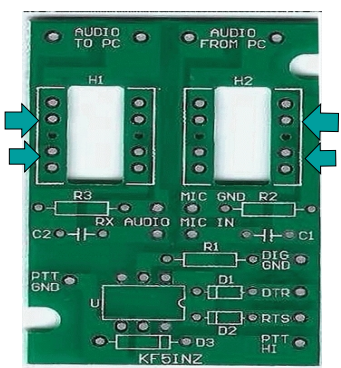
C1 is installed and the lead has to be snipped before we install C2. Now install C2 as with C1, check the solder joints and snip the excess leads



STEP 7 -The Last Step -

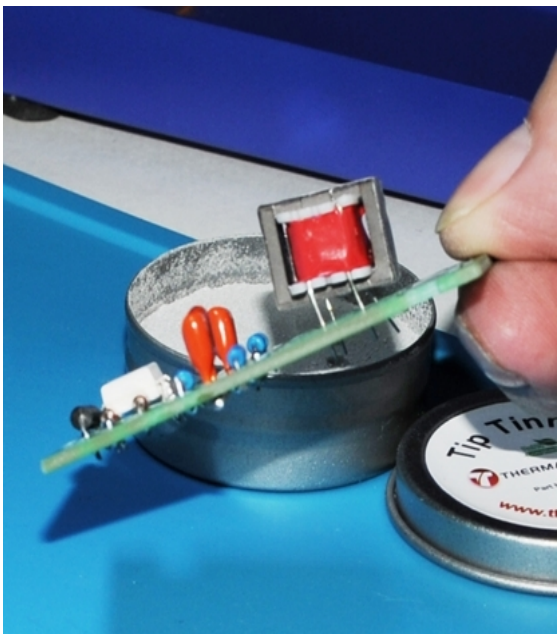
Installation of the audio transformers. They have to be installed length ways. Yes you can install them sideways, but they won't work. The Audio Transformers have four leads or legs and have to be installed in the center holes of the PCB board.

These are the solder pads we will use for each of the audio transformers. Just the center two holes on the PCB Board for H2 and H1. Do not use the upper or lower solder pads to install these devices.

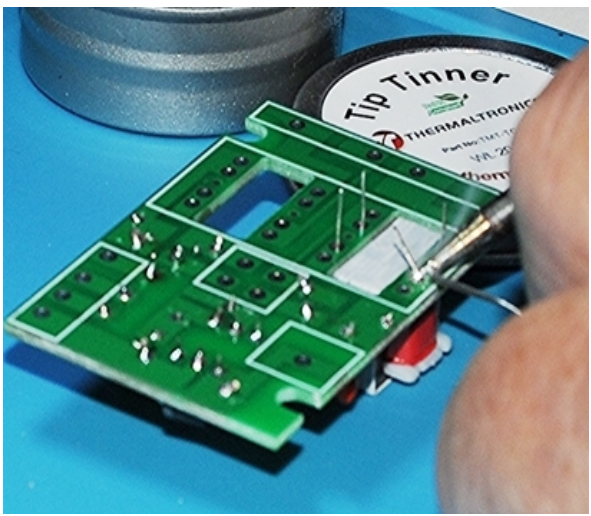


Observe the installation of the audio transformers on the next two pages. Its important you do not install them horizontally.

They have to be installed vertically like the silk screen shows and the resulting underside of the board show the entire space is filled with the transformer body, make sure they are flat on the PCB board before soldering.

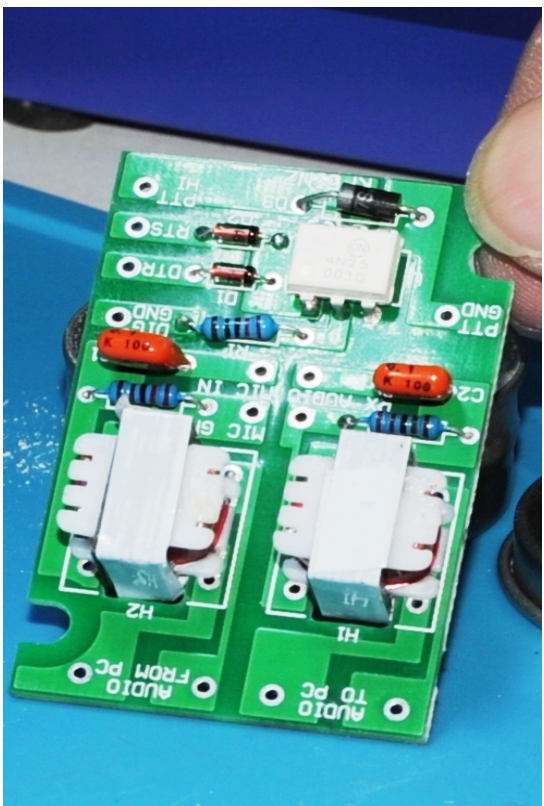


Once soldered snip the excess leads. Note the leads are located in the center holes of the PCB board.



Now install the next Audio Transformer in H2 opening as you did by installing the Audio Transformer in H1. Keep in mind that the center two holes are used for the transformer and the entire body covers the H1 and H2 openings on the PCB board.

Now the population of the sound card interface PCB board is complete. This is the final populated PCB interface board.



ATTACHING PRE-WIRED JACKS TO SOUND CARD PCB BOARD WITH MOUNTING INSTRUCTIONS

INTRODUCTION

Take a quick look at the Schematic offered by Wheat/N1YCQ located in Appendix A. You will see the electronic operation of the sound card is essentially divided between two independent functions (1) the Radio and (2) the Computer.

The sound card interface combines these two independent functioning pieces of equipment by obtaining data from the computer and sending this information to the radio for transmission. .

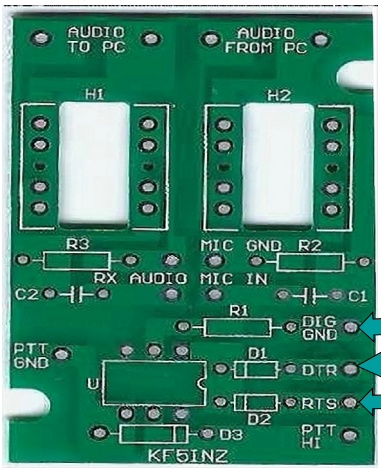
Combining the computer's sound card with this interface, the radio receives characters and sends them to a receiving station. Hence, the sound card interface has two functions. Connecting the Radio with the Computer and vice versa.

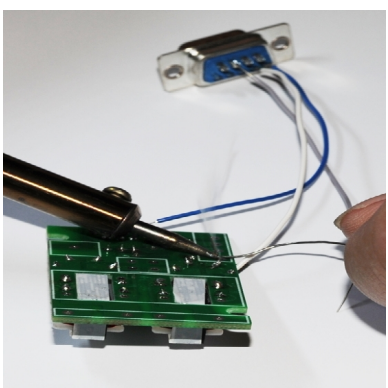
This instruction and users manual will guide you through the necessary steps in connecting the interface components to the radio and computer.

Step 1 Serial Connector

The connector has THREE wires. Pin# 4 (DTR) is Gray, Pin# 5 (Gnd) is White and Pin# 7 (RTS) is Blue. Pins 4 & 7 gives 5-7VDC to the opto coupler. Pin#5 is Ground.

Install the Gray lead into the DTR on the board, Install the White lead into the DIG GND on the board Install the Blue lead into the RTS



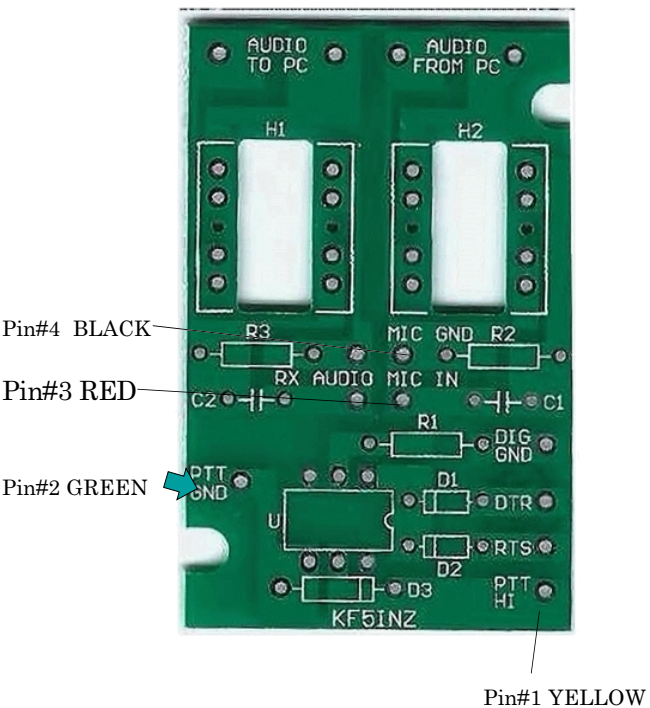


Now solder the leads to their respective solder pads so that the Gray, White and Blue leads are soldered into the correct solder pad

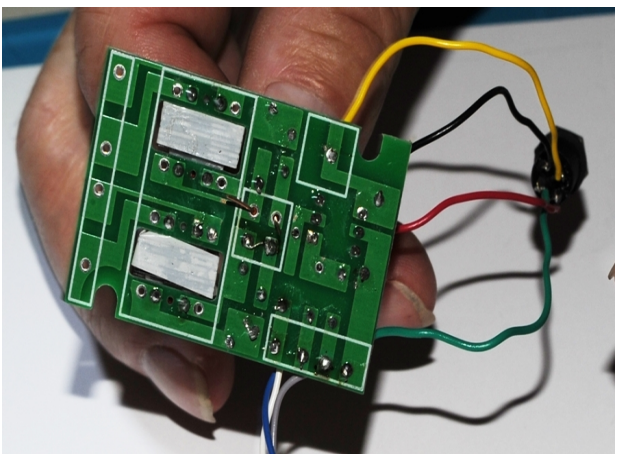
Step #2

Installing the TRRS connecter leads to the following places on the PCB. THIS IS VITALLY IMPORTANT. The TRRS has numbered terminals and each lead will connect to the TRRS plug so that the Radio will transmit and receive based on the critical wiring. Like telephone wire they are #1 Yellow, #2 Green, #3 Red and #4 Black.

Install Pin#1 YELLOW into solder pad PPT HI on the PCB Board. Next, Install Pin#2 GREEN into solder pad PTT GND (NOT MIC IN). Next NOW install Pin#3 RED into MIC IN and lastly Pin#4 BLACK into MIC GND.



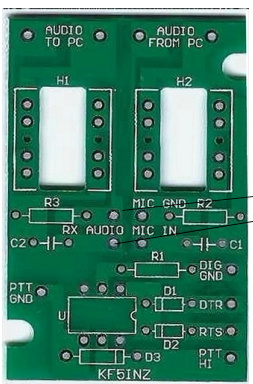
Turn the PCB over without lousing the leads as you have installed them. Bend the leads over to make soldering easier and solder the TRRS leads in place and the pads should look like this the photo below. MAKE SURE TO RECHECK THE LEADS TO MAKE SURE THE RIGHT COLOR IS IN THE RIGHT SOLDER PAD. Once soldered inspect the solder joints and if satisfied, cut the excess leads and close to the solder pad on the PCB.



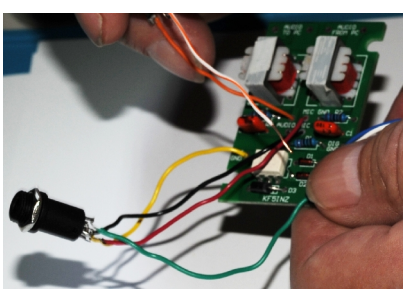
Step 3 Installing the Audio Connectors

Installing the Radio AUDIO IN components and the AUDIO TO PC and the AUDIO FROM PC using the White and Black leads on each of the components.

First is the AUDIO IN FROM RADIO EXTERNAL SPEAKER two leads install them

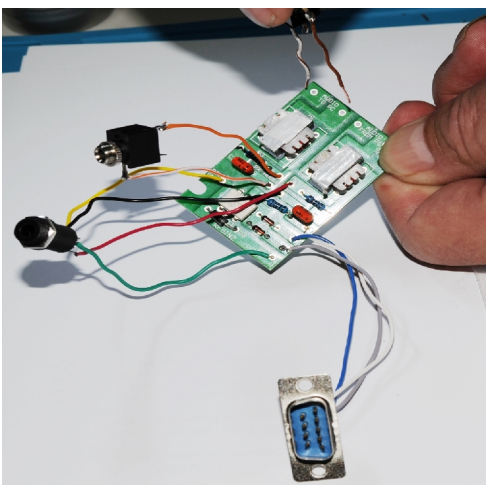


AUDIO IN FROM RADIO EXTERNAL SPEAKER install the Blue and Gray leads to the solder pads, no polarity so either pad is acceptable



Now we see the PCB board populated with the Serial Connector leads, TRRS leads, and the Audio in Radio Connector. Next we will install the computer connectors, both TO and FROM PC.

The audio connectors are just like the Radio connector, except their leads are black and white.

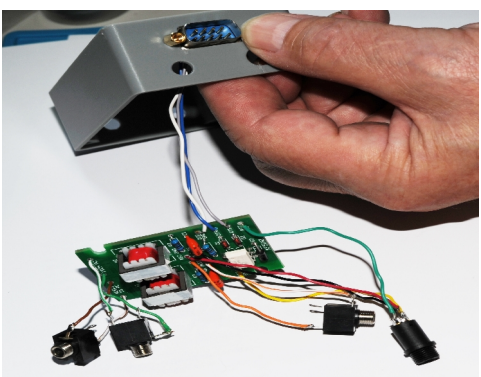


Again, no polarity either solder pad is fine. One connector which is labeled install the connector labeled as TO PC and do the same for the connector labeled FROM PC.

Step 4 Installing the connectors into the custom made enclosure.

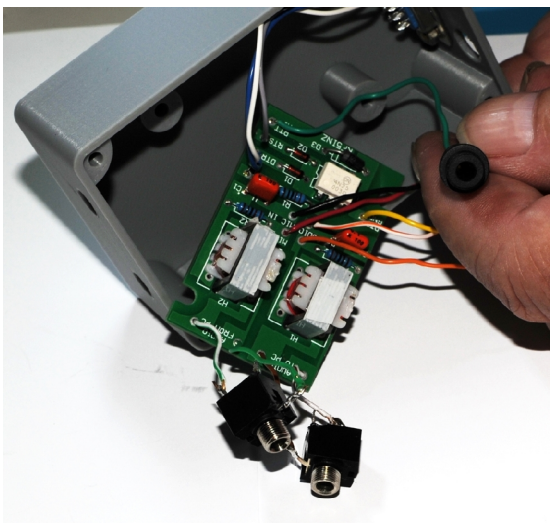
MAKE SURE YOU FOLLOW THE INSTALLATION INSTRUCTIONS, SINCE INSTALLING ONE PART OUT OF SEQUENCE WILL RESULT IN A VERY DIFFICULT INSTALLATION. First is the Serial Connector.

Attaching the retaining nuts is somewhat difficult so by not installing the serial connector first will result in an almost impossible installation.

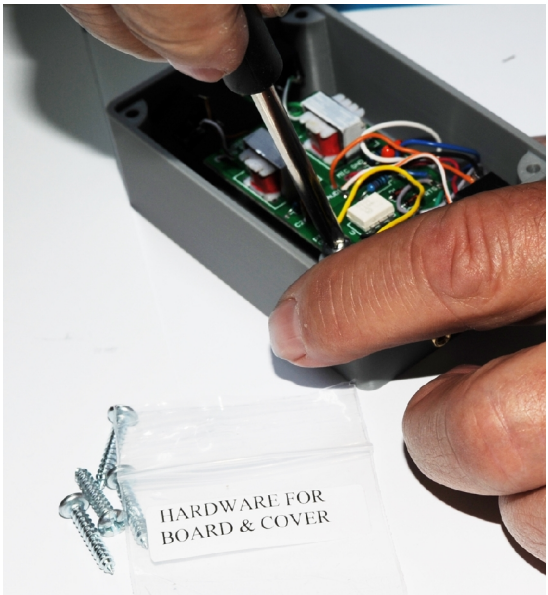


The retaining serial posts holding the Serial Connector is tricky and I found that securing the nut on the inside of the connector has to be done with almost acrobatic skill.

Next is the TRRS connector. It will install just to the left of the Radio Audio Connector and above the serial connector. We are using a female DB-9 Serial connector rather than the male DB-9 as seen in some photos, but installation is the same.



Install the retaining ring on all audio connectors like we did for the TRRS as seen in this photo.



Now to install the PCB board with the small screws in the hardware package.

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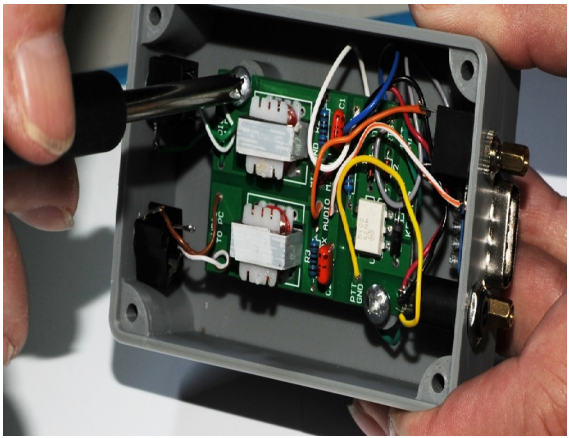
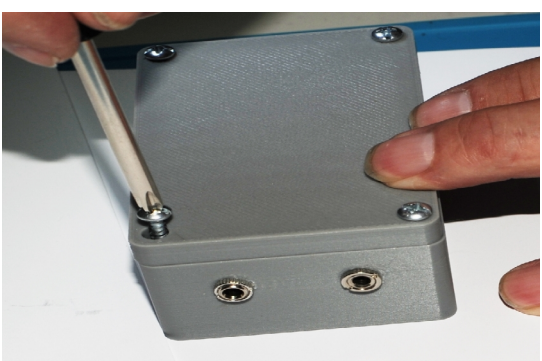
When you manipulate the PCB into position, make sure you do not break any leads or cover them over with the installation of the board.



Almost done before the “Smoke Test” with your Computer / Laptop and HF / UHF / HT radios. Secure the cover with the longer screws provided in the hardware package.



Left to tight will find the following post labels

Post “L”

Post “R”

Post “V”

Post “Gnd”

We need to pay particular attention to this TRRS Plug. The marking do not correspond to the PCB board, so I will give you the connections to your radio.

“L” = PTT GND
“R” = MIC IN
“V” = MIC GND
“Gnd” = PTT HI

So connect your radio based on the pin outs that the radio manufacture has indicated as their particular locations of the above connections.

You want to hard wire the TRRS plug to correspond to your particular radio.

Appendix “B” has the connection for the
8 Pin Radio Connector such as Yaesu

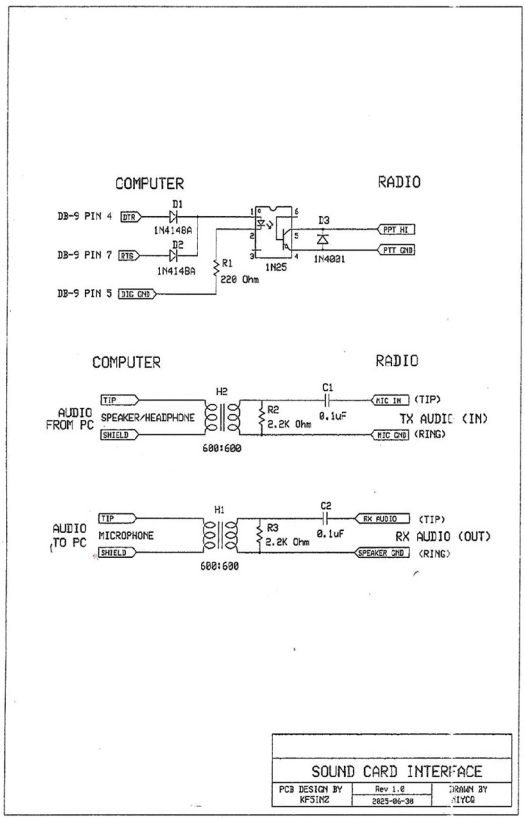
Appendix “C” has the connection for the Icom Mic Pinout

Appendix “D” has the connection for the Kenwood Mic Pinout

Appendix “E” has the connection for the Alinco Mic Pinout

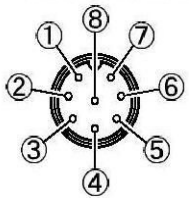
Appendix “F” has the connection for the Home Brew HT pinout

Appendix "A"
Sound Card Schematic



Appendix "B"
Yaesu 8 pin Microphone Radio

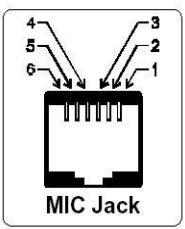
Yaesu microphone connection



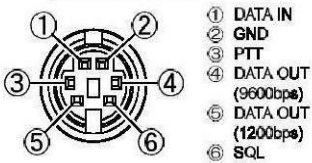
Yaesu Microphone Connection

This 6-pin modular jack accepts transmit audio, and provides 9600 bps data for Packet Operation.

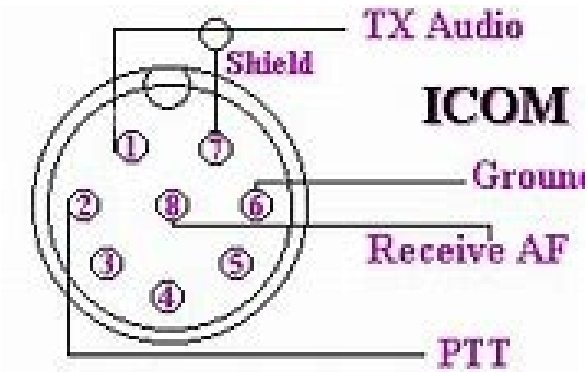
Pin 1: SW 2 (multi-function switching)
Pin 2: 9600 bps Packet Data Output
(Impedance:10 kΩ Maximum Output:500 mV pp)
Pin 3: +9V
Pin 4: GND
Pin 5: Microphone Input
Pin 6: SW 1 (multi-function switching)



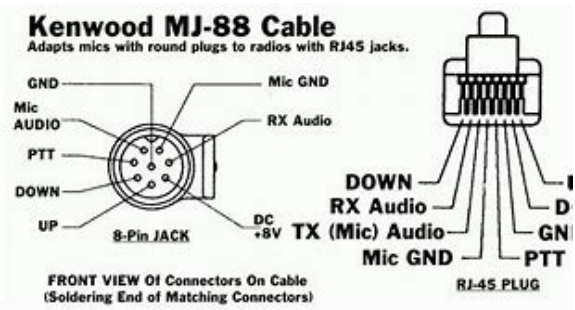
Yaesu Data Plug connection



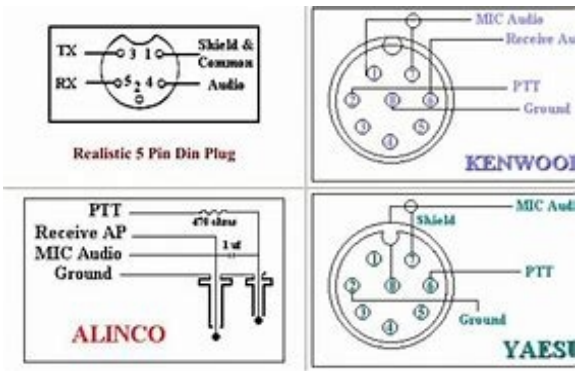
Appendix “C”
Icom Microphone Pinout



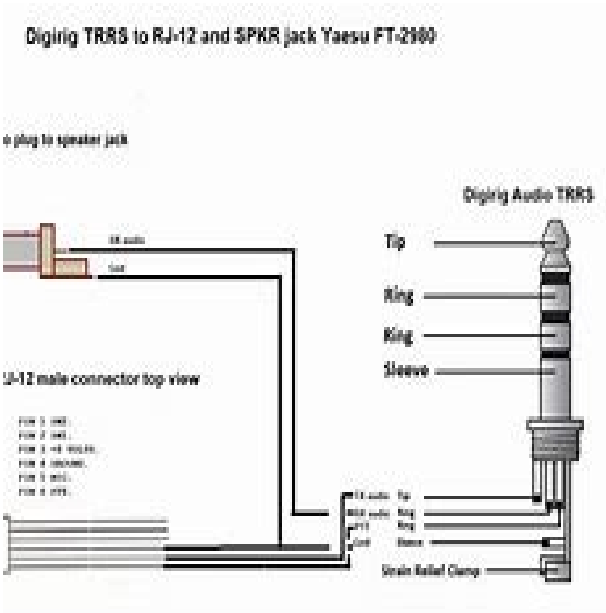
Appendix “D”
Kenwood Microphone Pinout



Appendix “E”
Alinco Mic Pinout



Appendix “F”
HomeBrew HT Pinout



Notes: