BUILDING AN INTERFACE FOR PSK31 AND SSTV

By

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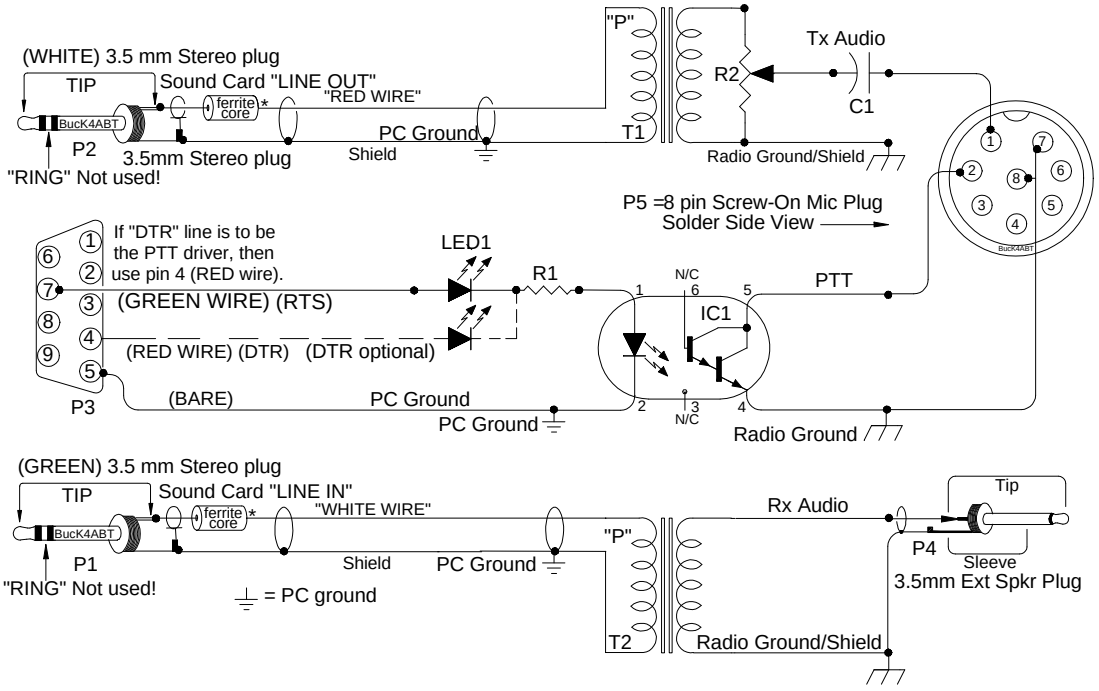


First we open the ***RASCAL*** kit and view the diagram... become familiar with who's on first... and 'what's on third'

RASCAL ™

(***RASCAL*** ™ = "*Radio And Sound Card Audio Link*")

When we receive the ***RASCAL*** ™ ISO-KIT, we examine the parts and open the diagram. Look over the schematic and get an idea of how the parts should be arranged on the PC board (PCB). We look it over and quickly learn that the interface that everyone has been telling you that it is so large and difficult, is not at all complicated. In fact, it is an easy, and straight-forward assembly that can easily be completed in a couple of hours. Soon you are on the air operating PSK31, SSTV, MFSK, RTTY or Packet .

It only takes a few minutes to look over the drawing and become familiar with who's on first... and 'what's on third'!

Use a small tip (pre-tinned preferred), pencil type soldering iron (35-40 watt). If available, use a controlled heat solder station. For instance, I use the Weller WLC-100 variable heat (controlled) solder station with an ST-1 tip installed, when building the pre-assembled sound card to transceiver interfaces. Keep tip clean, I use a small damp (with water, of course) sponge from Radio Shack to keep my tips clean.

THE CAVEATS!!! :

Without beating a subject to bits... and bytes, I want to drive home a simple statement, and request. If you are new to soldering, there is one cardinal rule. ***DO NOT overheat wires that are shielded!*** When soldering shielded wires, the center conductor may have a thin layer of insulation that can melt quickly and allow a short to occur between the center conductor and the shield. When this happens, there will be no output or the shielded cable will not perform the function for which it *was* intended.

Too much heat can be as damaging as not enough heat. As soon as the solder flows in the wire to wire or wire to connection joint, remove the soldering iron. Be sure to use a good rosin-core solder. DO NOT use acid core solder or cleaner. As an added assist, I use a "LUXO" lighted Magnifier to view the small components, and solder traces.... as something happened to my eye-sight when I passed 60 years of age... a few years ago.

AVOIDING RF FEEDBACK (SQUEALS):

While building PSK31, and SSTV, interfaces between PC sound card LINE IN, and LINE OUT to various HF and VHF transceivers, I've learned many valuable lessons. Some of these I'm committing to print to help you resolve a problem before it arises.

The first problem I encountered was when I had my computer too far away from my transceiver. I built the interface, and had long leads (over 4 feet) from the computer Line IN, Line Out, and serial comport (PTT control) to the interface printed circuit board. Then I had another 4 feet of cable from the interface printed circuit board (PCB) to the transceiver input/output (I/O).

This is where most RF problems occur. Although shielded, these long leads tend to capture stray RF and in turn, it would reach the microphone, or accessory I/O jack. Combined with the PSK31 audio signal, this RF component would become 'base rectified' in the transceiver audio circuits, thus creating a squeal in my transmitted (on air) signal. You'll notice in most of my RASCAL and ISO kits, that I provide LINE IN and LINE OUT cables that have large ferrite cores molded into the cables. These ferrite cores serve as RF chokes to prevent RF ingress into the sound card input and output lines. In addition, we can circumvent this problem, by making the leads from the Line IN, Line Out, and serial comport (PTT) to the interface PCB, as short as possible. A two to 4 foot lead length from the PC to the interface control box, on each Line and the serial comport is enough. You'll find that most computers have all the sound card jacks, and comport connections within a few inches of each other on the back of most PCees.

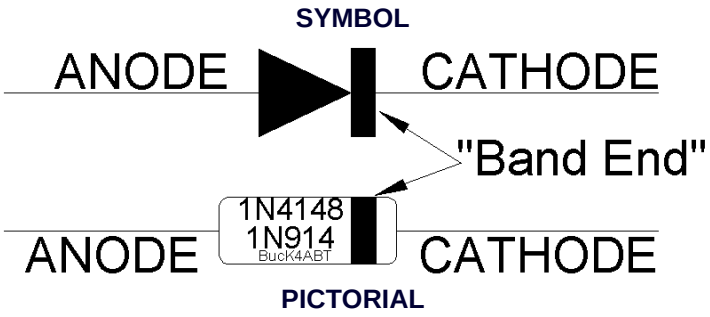
Using the same strategy for the PCB to transceiver input/output jacks, let's try to maintain these leads as short as possible, if possible, less than three feet long. Another RF problem can occur when the interface is placed too close to the PC monitor (screen). Some stray EMF/RF can be induced into the lines or interface transformers and create noise to or from the transceiver. Avoid close proximity between the interface PCB and the PC monitor.

DC BLOCKING CAPACITORS (Tantalytics):

In most ISO-KITS that I distribute, I include a small, tantalytic capacitor (see photo below).

This is a 'polarized' capacitor (NOTE a plus + marking near the positive lead). The value of this compact sized capacitor is around 3.3 ufd, and may be as large as 6.8 microfarad (ufd). The voltage rating should be 25 to 50 volts. The purpose of the cap is to provide DC isolation in the microphone input on transceivers which may supply a low bias voltage to excite 'electret' type microphones. If you find that you have one of these caps in your ISO-KIT, but are not using the microphone input for your PSK31 interface, then lay the small tantalytic aside or, at your option, install it in the transmit audio input to your transceiver anyway. If you elect to use this capacitor, ***BE SURE to install it with the 'PLUS (+) lead towards the microphone input*** or the transceiver audio input. The remaining lead connects toward the (RED) isolation (PSK31 Tx audio out) transformer lead. If the coupling capacitor has no polarity markings, then no specific pin direction or installation scheme is necessary.

UNDERSTANDING DIODE MARKINGS AND INSTALLATION:



To help you fully understand and identify the markings on the diode(s) used in the ISO-KITS, I've drawn a symbol and picture help the user relate the symbol definition to a pictorial of a diode.

The *RASCAL* ™ ISOlation Transformers:

All RASCAL and ISO kits contain isolation transformers. Look at the color of the covering around the transformer winding. A **"RED"** tape/cover indicates a 1:1 turns ratio winding or in the case of the RASCAL, a **600 to 600 ohms** (BUXFMR6K6) isolation transformer. In most (all) applications, a "RED" transformer is used in the transmit (sound card OUT), to accessory jack, Patch In, and microphone inputs.

In many cases, the same type (color) transformer will be used in the accessory, Patch OUT, and Data Out ports. If your kit uses (extracts) audio from the ***external speaker*** jack (usually marked 'Ext Spkr'), one of the isolation transformers may have a **'BLUE'** covering. This is a **1000 ohm to 8 ohm** (BUXFMR1K8) isolation transformer. The 8 ohm side will be wired towards the external (8 ohm) speaker jack of your transceiver, while the 1000 ohm (side marked "P") is wired to the sound card, tip and sleeve (ring is not used) shielded, "LINE IN," (usually a 3.5 mm plug/jack). Please notice in the diagram(s) that the computer sound card is be isolated from the transceiver. This is our main purpose for using the "isolation transformers." Most of my diagrams reflect the correct measures for maintaining the isolation characteristic of the interface.

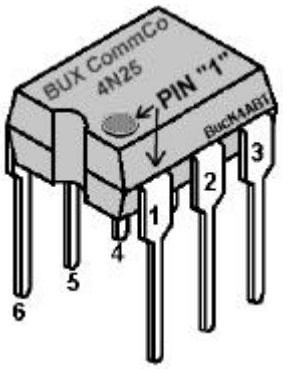
To further define... the ground/shields on the transceiver side of the isolation transformers and Optocoupler may be considered one set (Digital Ground) of grounds, while the shield/grounds on the PC side of the 'isolation' transformers and opto-coupler are considered as a (transceiver/earth grounds) separate ground set.

The transformers used in the RASCAL (BUX CommCo interfaces) will have a "**P**" printed on one side of the **"RED"** and **'BLUE'** transformer winding cover. This "P" indicates the 'Primary' winding, or the first layer placed onto the bobbin, or core. Some diagrams will note the position of the transformer in the circuit, relative to this "P" winding indicator.

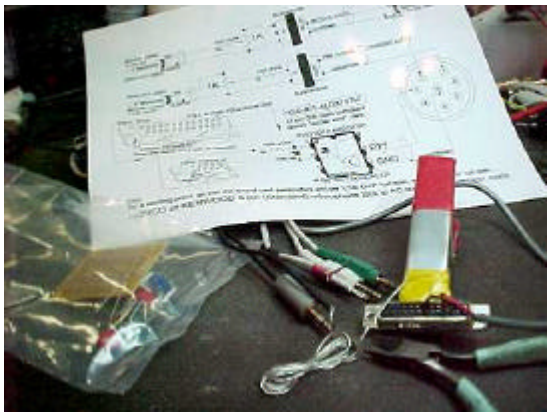
NOTE; On most all isolation transformers, there are three leads on each side. The center lead from each side of the transformer is the "Center-Tap" and is not often used. This center-tap may be cut off, or simply folded back onto the winding, and taped out of the way. Insure that it does not touch any other component or any metallic surface of the transformer.

In some interface part kits, there may be a small electrolytic type capacitor(s). One such kit is the Yaesu FT-847 (RASCAL model 3). Another one is the RASCAL model 20 kit that is used with many hand-held transceivers. ***Notice*** the small print on the capacitor, and note the lead identified with a plus (+) sign. Remember that this is the lead that goes toward the radio Data I/O connector (yep, I had to use my handy magnifier to see it, but it's there).

On most diagrams that I provide for your PSK31 interface, I try to display the I/O (accessory, Mic, Data In/Out, Patch I/O...etc), port connector as a pictorial This is to help you identify of the connector pin-outs. *I draw these diagrams so the connector illustration shows the **back side, or solder side view** of the pins.* Again, a "caveat" PLEASE; Verify the connections against your transceiver/radio manual. I AM NOT RESPONSIBLE FOR MISTAKES, ERRORS, OR OMMISSIONS!



There's always that one final little 'knat-bite' that is the "got'cha" for many new HAMs who've never had the chance to work with integrated circuits. I've drawn an IC (shown above) similar to the 4N33 or 4N37 that are used in many of my RASCAL, PSK31 interfaces. NOTE, that pin 1 is identified by a small, almost obscure circle just above the pin (1) location. IF…. The dot is not on the IC, then use the small notch to help you identify pin one (1). Hold the opto-isolator (IC) so you are looking into the notch. Pin one (1) is the pin on the right side, nearest you. I hope my illustration will clarify pin identification of the 4N33 and 4N37 opto-coupler/opto-isolator/phototransistor.

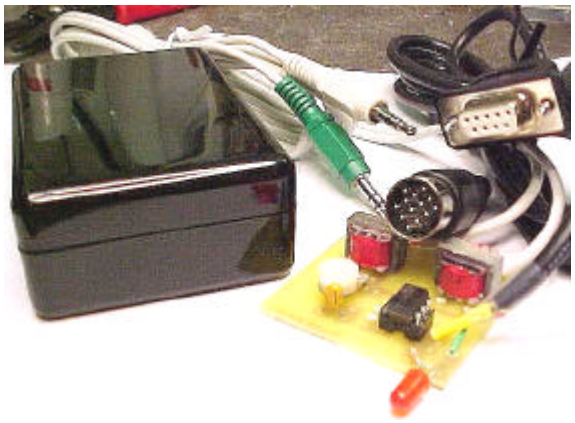


- LEFT: Then we do a parts-check against the diagram.... I always include more parts than are shown on the diagram... (Right Ernie…), including the solder!

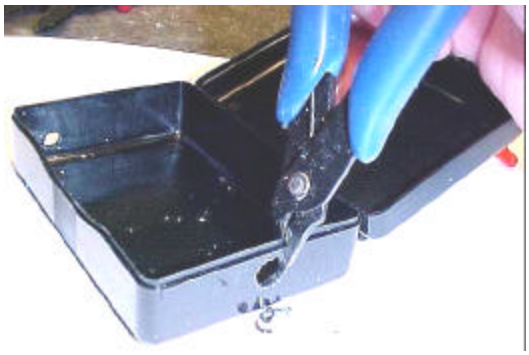
- RIGHT: Carefully follow the diagram and begin the assembly of our interface by dressing the cable ends first.

NOTE 1. NO, the RS-232 is already wired… I placed the DB25 in the photo just to get your attention!!!

NOTE 2. In the sound card cable, the lead with a RED and a WHITE wire…clip or cut off the white wire so that only the **RED** wire and shield remain.



- *(LEFT)* Once completed, the ***'RASCAL'*** printed circuit board is ready to be fitted into its interface case.
- *(RIGHT)* Drill a 3/16 inch exit hole for the RED LED transmit indicator.



- *(LEFT)* Next we drill the interface cable exit
- *(RIGHT)* Once the 3/8 inch hole is made, a pair of dikes can open the exit hole so the input/output cables can drop in.

- *(LEFT)* I use wide "hook-N-loop" (Velcro) to attach the PCB inside the case. And.. if it ever becomes necessary to adjust the transmit "coarse" level, the "live hinge" lid provides easy to access.
- *(RIGHT)* Success and pride are so sweet. Now you're ready to plug-N-play.... PSK31, SSTV, MFSK, RTTY, sound card Packet and more!!!