How to wire up for data

Alachua County ARES(R)/NFARC

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Why do you WANT to wire up for data?

- Because most off the growth in ham radio is in advanced data modulations – and that includes “voice” on some freq. Eventually it will include HF voice
- Because the data modes are like “texting” which is wildly popular with lots of people.
- Because the data modes have ENORMOUS punch-thru-noise advantages over voice….as much as 1000 to 1…
- And they are FUN!! Even if you have a limited station.

Radios have 4 wires

- Receiver Audio (output) ← --------- RADIO
- Transmitter microphone (input) ----- → RADIO
- Push-to-Talk (input: usually you short it to ground to get the transmitter to transmit) ------ → Radio
- Ground <---------- →
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- THATS ALL THE WIRES THERE ARE!!
- Receiver audio is usually 100 millivolts or so
- Transmitter mic input variable requirements from a few millivolts to 100 millivolts
- Push-to-Talk (modern rigs) only a few volts, only a few milliamps. Generally POSITIVE voltage w/r/t ground. OLDER RIGS: Can be hundred volts positive or negative to a relay!!!
- Ground – a wire.

- Computer has 1’s and 0’s
- Sound card has
  - Analog sound output (we can send to radio microphone)
  - Analog sound input (we can use to listen to receiver output
  - Sound card does NOT have anything to short the PTT to ground.

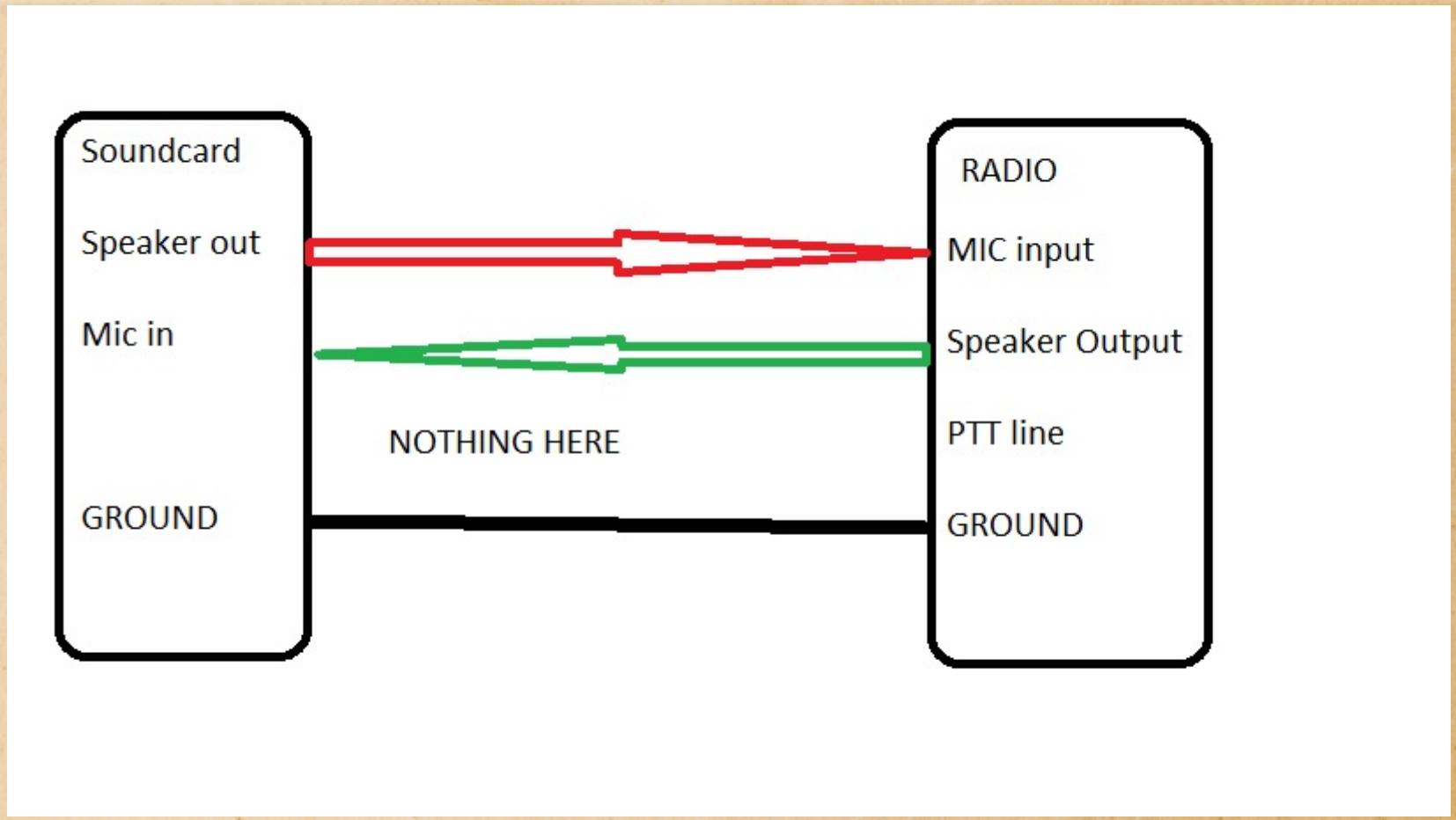
NEWER RADIOS

- Newer Radios (Icom 7300 etc) have all of this taken care of internally.
- They have their own sound card AND interface
- They have their OWN solutions for the push to talk.
- All you do is use a printer cable (or similar) to go from your computer to the newer radio….and load any required drivers. From there on, it is duck soup

OLDER RADIOS

- ICOM 718, Heathkits, anything made long ago will NOT have a built in sound card system…..
- So you just have to do the 4 wires yourself and purchase or build the little circuit that connects the computer to the device, to the radio

How sound card connects



Use the built-in computer sound card?

- Certainly possible
- Risk of hearing “microsoft sounds” – turn off system notification sounds.
- Beware of different “grounds” between radio and laptop…..big problem if the radio “ground” is floating AC line (60volts AC)
- What is the solution for ground issues?
- Remember, a sound card by itself DOESNT HANDLE THE PUSH TO TALK.

TRANSFORMERS

- Audio transformers solve the ground voltage problem
- Allow safe connection between radio and computer or sound card
- You might want to have VOLUME CONTROLS – frequently the computer sound output….is way way over what the radio mic input needs.

How do you handle the push to talk?

- Trying to use the “voice-operated” of your transceiver typically DOESNT work.
- There are TWO MAJOR SOLUTIONS
  - Use a com port on your computer and have your software (if it is able) to send a signal that will create a voltage on an “RS-232” connector that can be recognized by a small circuit and ground the PTT
  - Use a sound-card interface that has a built-in FAST “VOX” system that quickly cycles the PTT
  - BOTH SYSTEMS WORK, but the latter is becoming more common.

Systems that use the RS232

- The “NOMIC” system
- Some versions of “easy-digi”
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- Note that most recent computers don’t have an RS232 com port – they have USB ports – you buy a converter that provides the RS232 port ($15-25)

Systems the include a PTT-VOX

- Signalink
- Our local homebrew circuit board.

Every radio is different.

- Those 4 crucial signals may show up
  - At the microphone jack (Icom 8-pin Octal)
  - On a back panel adapter (Icom 7 or 13 pin, Kenwood)
  - Split between the two.
  - So the radio end of the wiring is unique to each radio….

- RJ-45 (8 pin ethernet-like modular connector) to go to radio.

Our local homebrew solution.

- We often use a RJ-45 connector for the cable to the radio also.
- However we have a FIXED wiring of it.

- RJ-45 wiring for local use:
  - Pin 1 is microphone signal TO the radio (ORG-WHT in standard ethernet twisted pair cable)
  - Pin 2 is GROUND (Orange)
  - Pin 3 is PUSH TO TALK (Green-White)
  - Pin 5 is receiver audio FROM the radio (Blue-White)

- At the other end of that radio cable, you make whatever connections are needed to go to your radio – purchase or find the right connector and solder or crimp onto the right pin.

Signalink makes it both easier and harder.

- They sell the cables ready-made
- But their pins are NOT all the same.
- The pattern that we use locally is what they use for
  - Baofeng transceivers VHF/UHF
  - Mini-DIN cables popular with Japanese VHF/UHF/HF radios

But they DONT always use the same pattern

- Some of their cables (MOST) have a different pin-out at the Signalink end.
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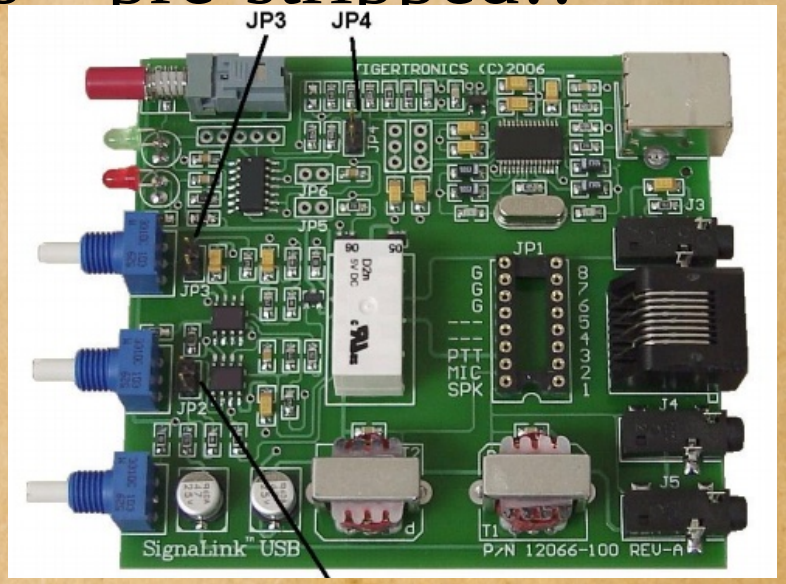
- So how do they deal with that? They add ANOTHER wiring point inside their Signalink and THERE you correct for different cables sold by them.

- You can EASILY read their instructions and put in the little jumpers from the left side of that DIP socket to the proper pin on the right side.
- They even provide the jumpers – pre-stripped!!



- Or you can pay more $$ and purchase one of their pre-wired plug in’s.
- If you have several radios and would like to use one signalink with different types of radios…..you may need to make this easy to change.
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- The way we do it locally with our homebrews is we simply make ALL of our cables to they use the same pins at the soundcard interface side….no further problem.

Important Data Skills

- Overmodulating will cause distortion.
- Most software have a “tune” position – adjust either knobs or computer controls so that you are below where the signal hits “max”
- Quite normal to set the rig for “100 watts” – but adjust the MODULATION for a max of 50. That way you are no where close to distortion.
- Remember, a whisper on SSB isn’t much watts.
- Different from FM.

Popular FREE software packages

- FT8: WSJT-X (does LOTS of special modulations)
- FLDGI: – does keyboard to keyboard modes such as PSK31 (but NOT FT8) and additional optional layers add additional capabilities.
- JS8Call – similar to FT8 but for keyboard chats
- WINLINK – peer to peer or peer to server email
- Soundmodem (gives you “packet”)
- Many others.