

**DIGITAL 101**  
Hardware LunchNLab  
August 15 2020

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Since the early 1900's and the invention of voice radiotelephony there have been four wires (or signals) of importance

(Looked at from the standpoint of the RADIO)

- MICROPHONE input to the transmitter
- RECEIVER AUDIO output from the receiver
- Push-to-Talk input to the transmitter (generally, you ground this wire to cause transmissions)
- GROUND

The same four wires are used in

- Repeater building
- RTTY
- Single Side Band
- Amplitude modulated
- FM
- and just about any thing else you can think of.

In the 1970's the telephone companies began to use TONES of different audio frequencies across telephone circuits to represent 1's and 0's and digital telephony was born. Amateur radio operators took this up as well. AX.25 was a standard of using two tones of different frequencies across a radiotelephone circuit (could be AM, FM, SSB, didn't matter). RTTY ("frequency shift keying") is similar but not as many layers. FLDGI provides many protocols that use these same ideas, and when higher level layers are added, become similar to WINMOR / ARDOP / PACTOR and VARA.... Systems that combine both the lower level protocol as well as some higher level management of error correction etc.

For our purposes, we merely need to handle those FOUR WIRES and get them properly connected to a SOUND CARD, which is then generally connected to a computer by a USB CABLE, and then the magic is done by SOFTWARE on the computer.

For our purposes in Alachua County, we have tried to standardize on putting those FOUR WIRES always on a certain set of pins of an RJ-45 modular plug. The RJ-45 plug is used all over the world for ethernet and business telephony and many other purposes; it is a general purpose 8-pin plug.

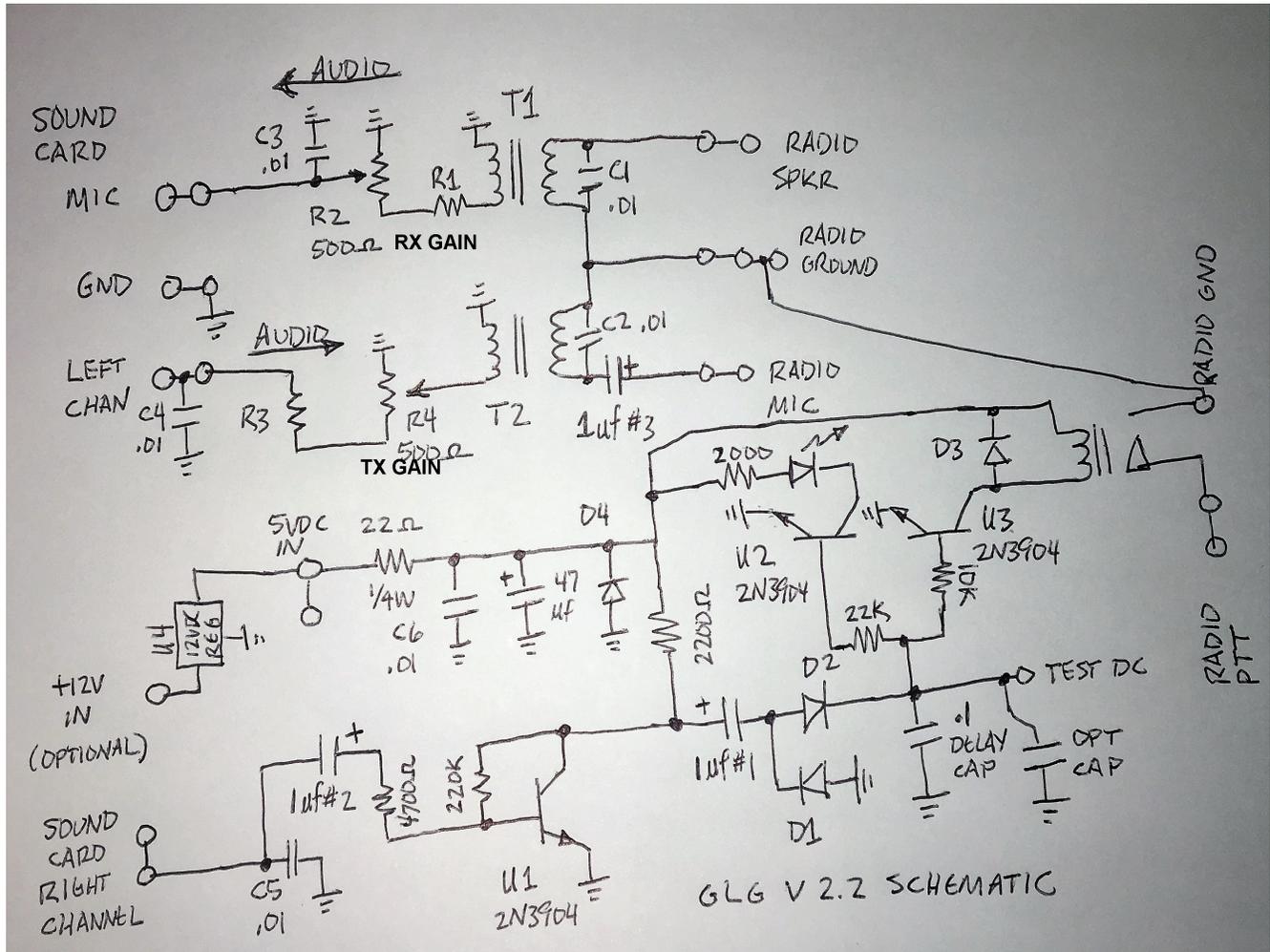
We try to always use the following pins and the following colors for those four signals:

Signal	Pin	Color
Microphone	1	White-Orange

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Ground	2	Orange
PushToTalk	3	Green-White
Rcvr Audio	5	Blue White

Typical Interface Circuitry



Notice how the

- Microphone of the soundcard connects to the receiver audio output of the radio
- Soundcard left channel output goes to transmitter microphone INPUT
- Sound card right channel goes to circuitry that uses relay to the push to talk