FM Winlink on a Budget

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FM Winlink Express setups generally require a 2 meter or dual band VHF/UHF radio, a sound card modem, or a TNC. You also need a Windows 10/11 computer or laptop. Older versions of Windows can cause problems, and Macs and Linux are generally not supported at all.

Most people use a name brand Yaseu, Icom, Alinco or Kenwood radio, as they are generally better supported by the TNC and sound card modem hardware suppliers. The cost of these radios can be several hundred to several thousand dollars. TNCs and sound card modems can cost in the hundreds of dollars. I decided to try to build a functional Winlink setup using an inexpensive Anytone AT-778UV radio available on Amazon and other online sources for around $125, and a Masters Communications DRA sound card modem for under $100, plus three readily available cables.

Hardware needed:

Anytone AT-778UV dual band radio:
https://shorturl.at/enIQX

The Retevis RT95 is the same radio, and may be available for slightly less than the Anytone, depending on the vender. Make sure your radio comes with a programming cable.

Masters Communications DRA-39: https://www.masterscommunications.com/products/radio-adapter/dra/dra39.html

I used the DRA-39 Assembled & Tested (With Plastic Case) for $89. They are available from $44 for an unassembled kit, to a pro model in a metal case (DRA-39M) for $104.

A standard Ethernet jumper cable, 2 to 3 feet long, to connect the radio to the DRA:
https://shorturl.at/kqzJM

A standard USB-A to USB-B printer cable to connect the DRA to the computer:
https://shorturl.at/fmCG8
The DRA is normally supplied with one.

A double male 1/8” mono speaker cable to connect the radio speaker output to the DRA. Available from Masters Communication (SPKR-4) or Amazon:
https://shorturl.at/dDNR5

AnyTone
P1
P2
P3
P4
P5
P6
FUNC
MIC
A/B
RX
VOX
VFO W
V/M
145.160 00
SQL
VFO W
RX
MON
431.150 00
VOL
DC-12.3V

A/B
MAIN
DUAL BAND
FM TRANSCEIVER

COMM OK
+5VTP
DRA-39
HB
LED2
LED1
PTT
JU1
JU2
JU4
R14
R16
R12
U1
J2
J3
HASTERS COMMUNICATIONS
DRA-39
REV1
DIGITAL RADIO ADAPTER

Software required:

Winlink Express download: https://winlink.org/WinlinkExpress

VARA FM download: https://rosmodem.wordpress.com/ (select VARA for FM Transceivers)

Soundmodem and PTT.dll: http://uz7.ho.ua/packetradio.htm

Scroll down and select soundmodem114.zip, download and unzip to its own folder. Then download ptt-dll.zip, unzip the files and put the unzipped files in the same folder as the Soundmodem software. **It's very important to have the Soundmodem and ptt files in the same folder.**

Unzip and install all of the software packages listed above. This is not a primer on how to set up Winlink Express or the software packages, but I will show my settings below.

More information on Winlink and Soundmodem: https://shorturl.at/dvxBH . There is also a great deal of information on the Masters Communication website.

Good information on Winlink operations can be found here:

https://drive.google.com/file/d/10QmuevLPQs98OtUn7jE1-O5h5i9AOMkw/view?usp=drive_link

Setup

Hardware

Radio

First, set up your radio and familiarize yourself with it's operation and programming. The AT-778UV has a somewhat complicated user interface, but after a little practice you should be able to operate it without too much trouble. There are MANY videos about this radio on YouTube. **DO NOT try to operate your radio without an antenna or a dummy load attached to the antenna connector.**

The OEM Anytone programming software and cable work reasonably well but like any factory supplied Chinese programming cable, you may encounter driver issues. I generally use RT Systems programming software and cables. You can also program the radio using CHIRP and the OEM cable. Before you purchase the RT Systems software and cable I suggest you try the OEM cable and software or CHIRP. You will need to program at least two Winlink gateway channels into your radio, or you can use VFO mode. All stations will be simplex, and station selection is discussed below. I suggest you turn the Dual Watch function (Menu item 10) **OFF** to simplify the display. This is called "RDW" in the menu.

Sound card modem

Next you need to configure the jumpers on the DRA board. There are two sets of jumpers on the DRA board. Jumpers 1-4 are scattered around the board and are configured by pulling the jumper piece off the pins and replacing it in the proper location. **Don't change any of these jumpers - their default setting is fine.**

There are eight wire jumpers on the sixteen pin IC socket in the lower right hand corner of the circuit board. Remove all eight of these jumpers and replace four of them as follows:

Pin 8 - GND
Pin 7 - PT (PTT)
Pin 6 - MC (MIC)
Pin 5 - GND
No other holes or jumpers are used.

Software

Next, install and set up all of the software packages listed above on your computer or laptop. Put an icon for Winlink Express, Soundmodem and VARA FM on your desktop.

Start up the Winlink Express software and go through the registration process. Next, on the Winlink Express main screen, click on "Settings", then "Winlink Express Setup" and fill in the Properties screen, and press Update.

Next, in the Winlink Express main screen, go to the drop down box in the upper right corner and select "Packet Winlink", and then select "Open Session. If the Soundmodem screen opens up, ignore it for the time being. On the Packet Winlink Session screen, select "Channel Selection", and then "Update Table Via Internet". When the table updates, write down the callsign and frequency of the first two or three stations.

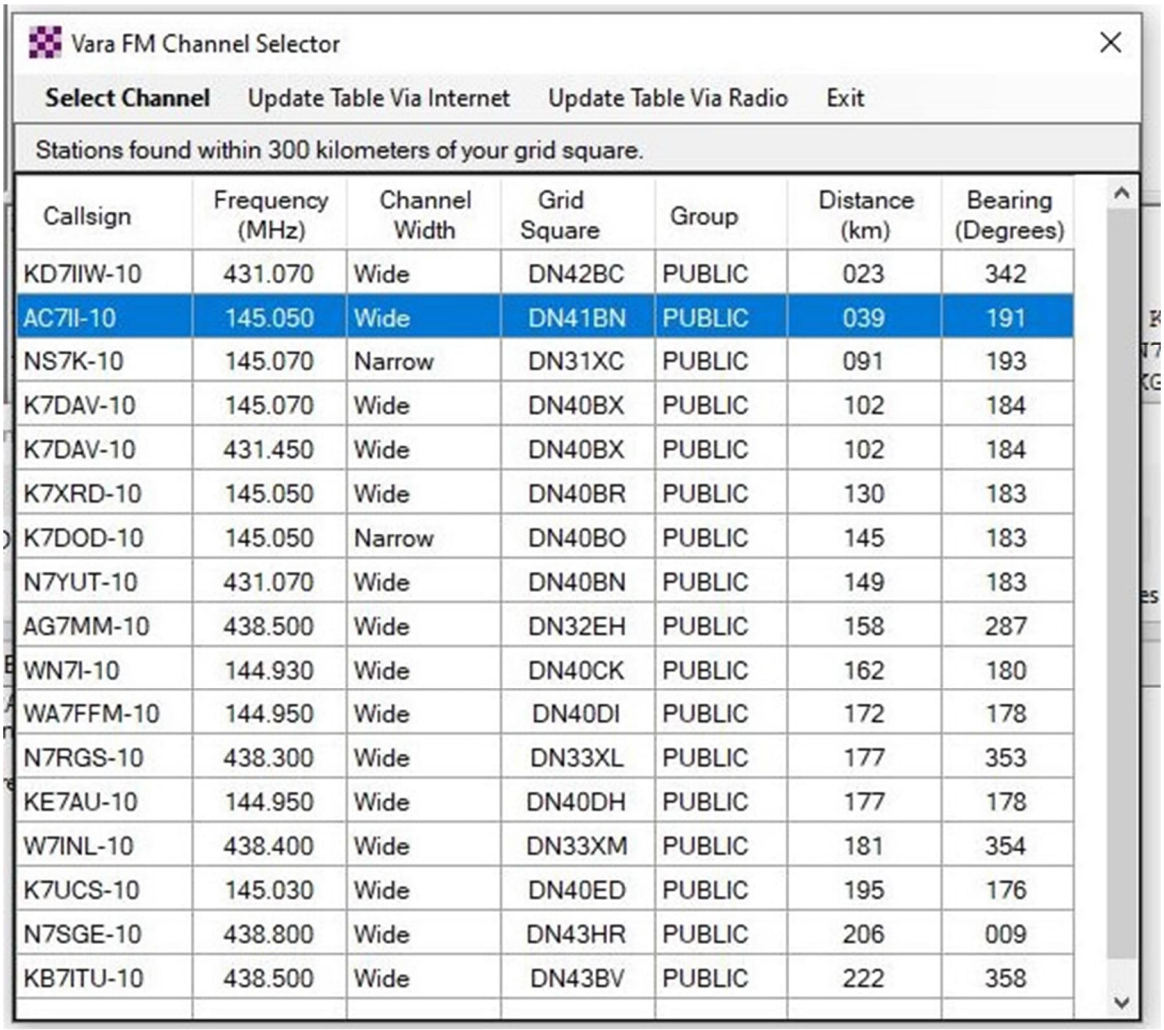
Once you have the Packet Winlink gateways written down, close all the windows except the main Winlink Express window, and from the drop down box, select "VARA FM Winlink". Open the session, ignore all the other windows and on the "VARA FM Winlink Session" window, select "Channel Selection", update the table as above and write down the first two or three gateways. These will be different from the Packet gateways. Close all the windows, and program the Packet and VARA gateway frequencies into your radio channel memories.

When you program the gateways into your radio, you can give them a name such as either the abbreviated call sign, or the frequency. Unfortunately the Anytone doesn't give you enough room for the entire call sign in the "Name" menu. Make sure you can differentiate between the Packet and VARA gateways. On my radio I named them Pkt 1 and Pkt 2, VARA 1 and VARA 2 and made a note of the frequencies for each channel. You can also set the radio display mode to Frequency, but you will still need to keep track of which gateway you are using. If you don't want to bother with programming channels into memory, you can use VFO/Frequency Mode and enter the frequencies directly from the microphone keypad.

Now that you have your channels selected and programmed into the radio, it's time to configure Winlink Express, VARA FM, Soundmodem and your computer's sound settings.

Winlink Express Channel settings

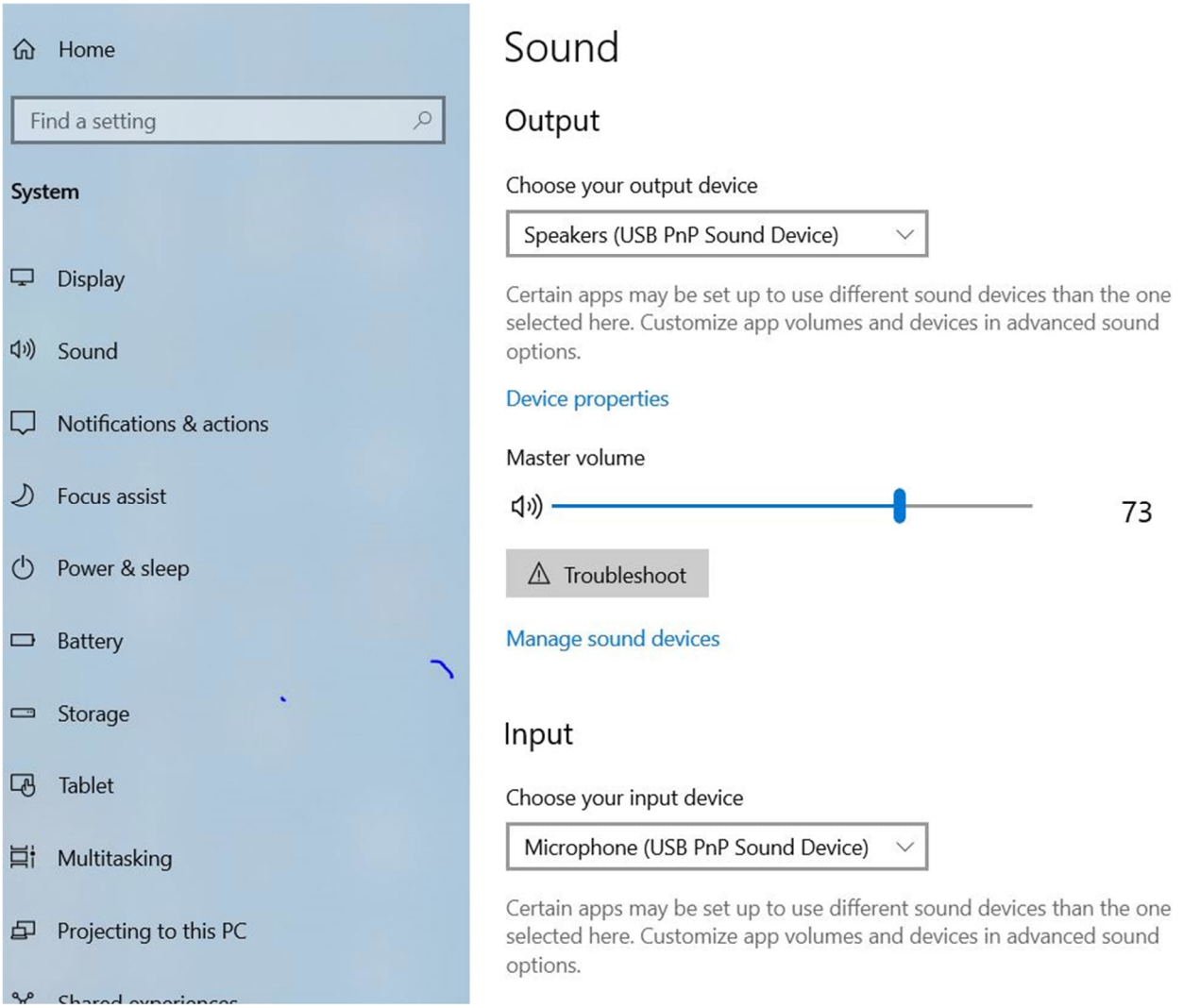
This is the screen used to identify and select Winlink Gateway frequencies as described above. They will be different for Packet Winlink and VARA FM.



Callsign	Frequency (MHz)	Channel Width	Grid Square	Group	Distance (km)	Bearing (Degrees)
KD7IIW-10	431.070	Wide	DN42BC	PUBLIC	023	342
AC7II-10	145.050	Wide	DN41BN	PUBLIC	039	191
NS7K-10	145.070	Narrow	DN31XC	PUBLIC	091	193
K7DAV-10	145.070	Wide	DN40BX	PUBLIC	102	184
K7DAV-10	431.450	Wide	DN40BX	PUBLIC	102	184
K7XRD-10	145.050	Wide	DN40BR	PUBLIC	130	183
K7DOD-10	145.050	Narrow	DN40BO	PUBLIC	145	183
N7YUT-10	431.070	Wide	DN40BN	PUBLIC	149	183
AG7MM-10	438.500	Wide	DN32EH	PUBLIC	158	287
WN7I-10	144.930	Wide	DN40CK	PUBLIC	162	180
WA7FFM-10	144.950	Wide	DN40DI	PUBLIC	172	178
N7RGS-10	438.300	Wide	DN33XL	PUBLIC	177	353
KE7AU-10	144.950	Wide	DN40DH	PUBLIC	177	178
W7INL-10	438.400	Wide	DN33XM	PUBLIC	181	354
K7UCS-10	145.030	Wide	DN40ED	PUBLIC	195	176
N7SGE-10	438.800	Wide	DN43HR	PUBLIC	206	009
KB7ITU-10	438.500	Wide	DN43BV	PUBLIC	222	358

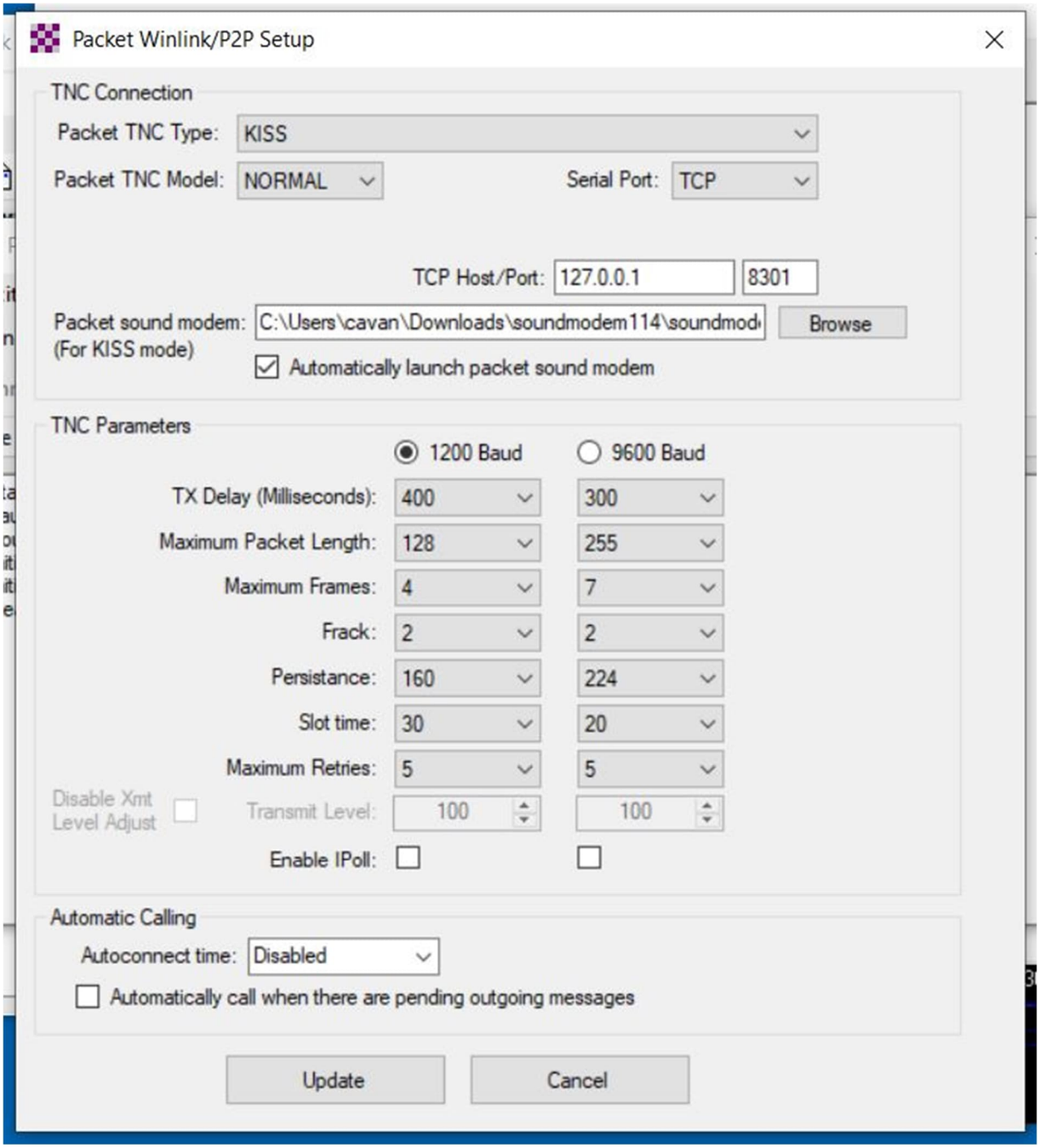
Computer/laptop sound settings

Right click on the sound icon in the lower left of your screen, then click on Open Sound Settings. Your settings should be similar to those shown below under Output and Input. This will insure that your computer sends and receives sounds from the Soundmodem.



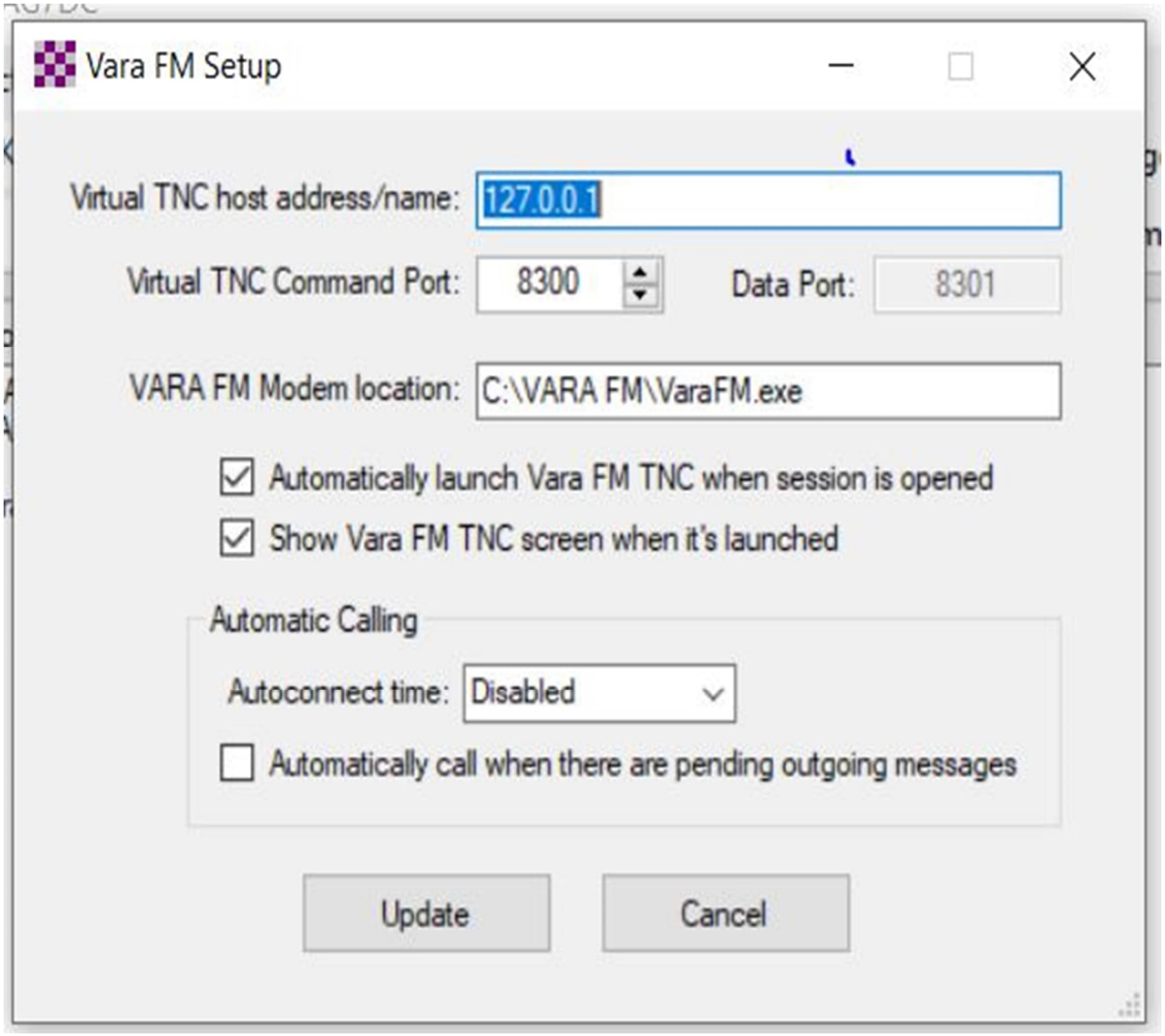
Winlink Express Packet configuration screen

This is the main settings screen for Packet Winlink.



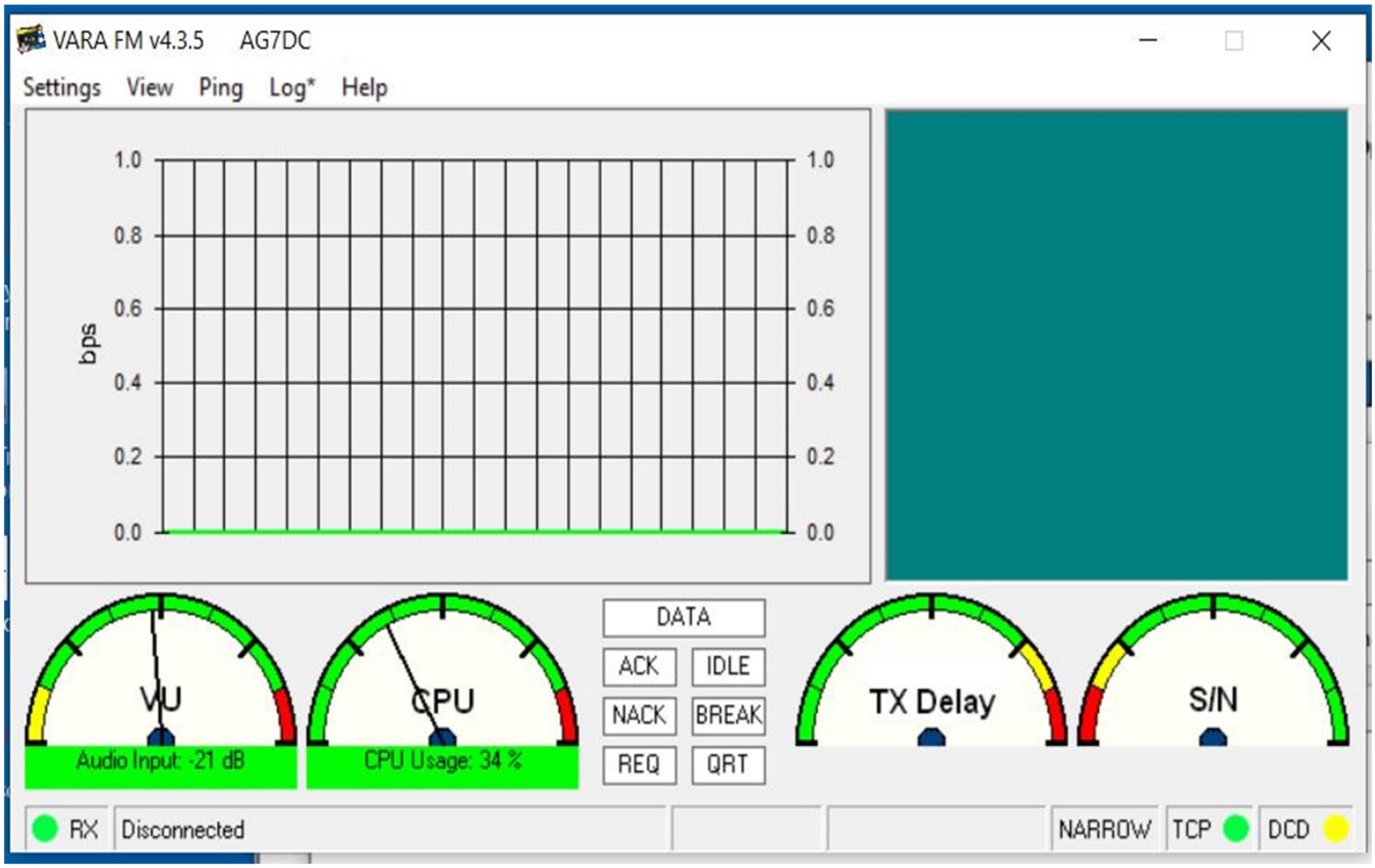
Winlink Express VARA setup:

This is the main settings screen for VARA FM

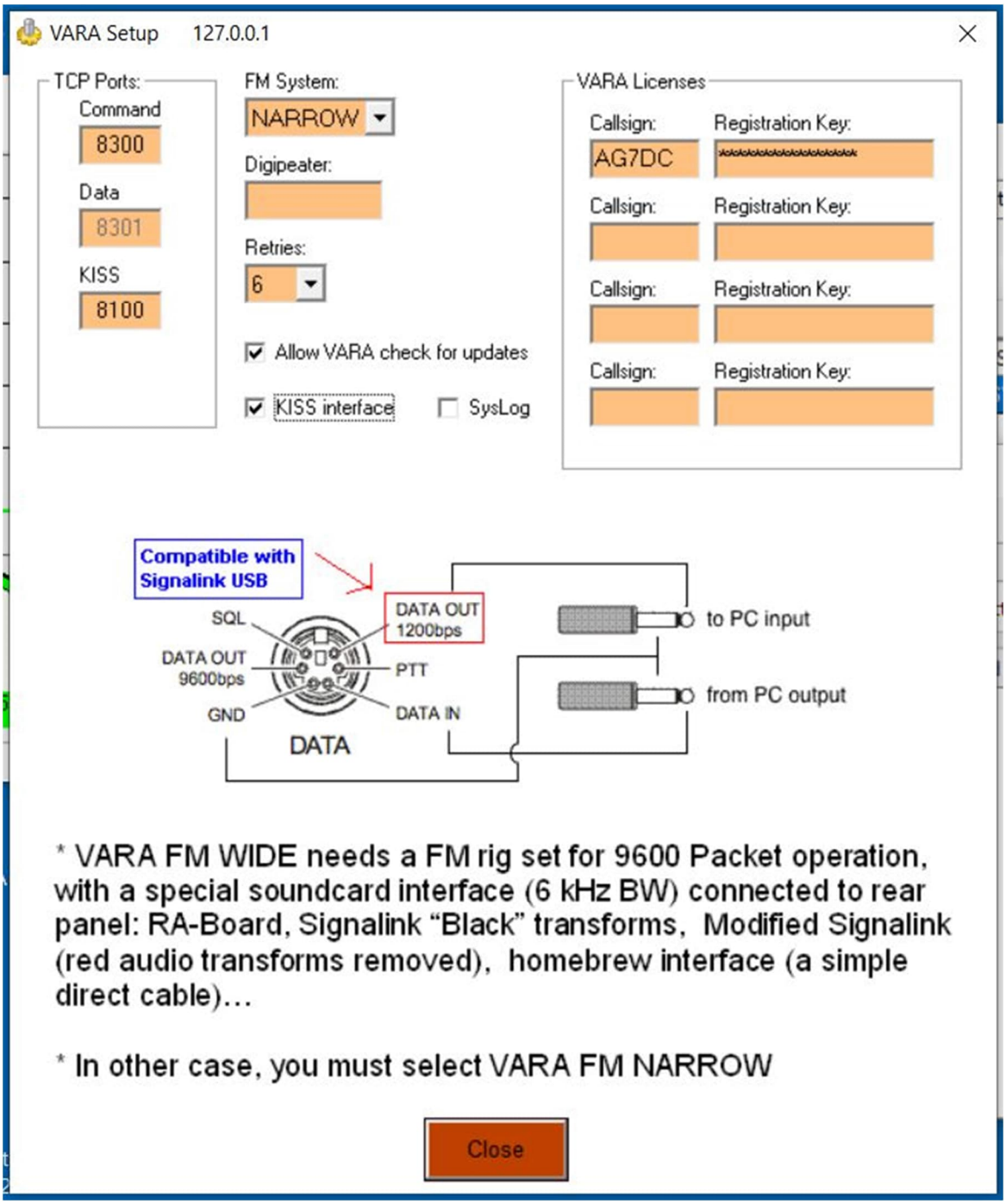


VARA FM Main Screen

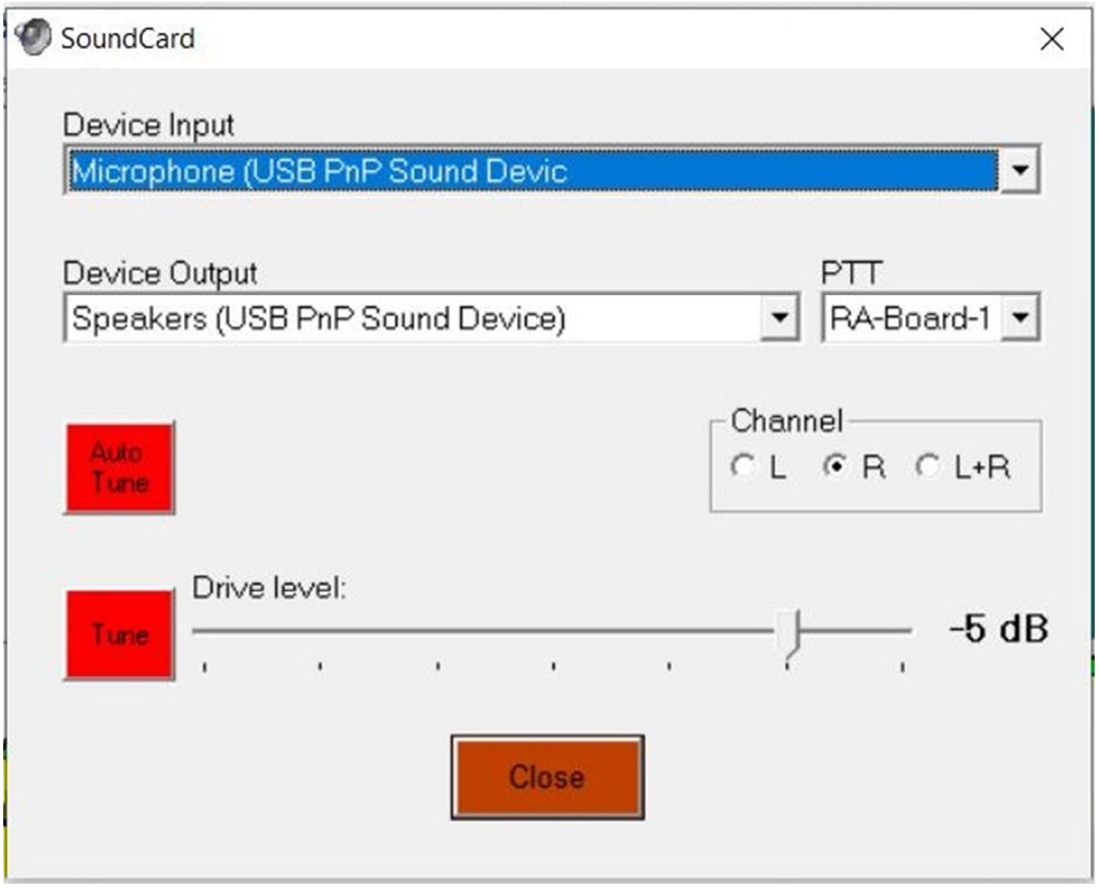
Click on the VARA FM icon on your desktop, or use the VARA FM screen already open if Winlink Express has opened it. Click on Settings, then VARA Setup, Soundcard and PTT.



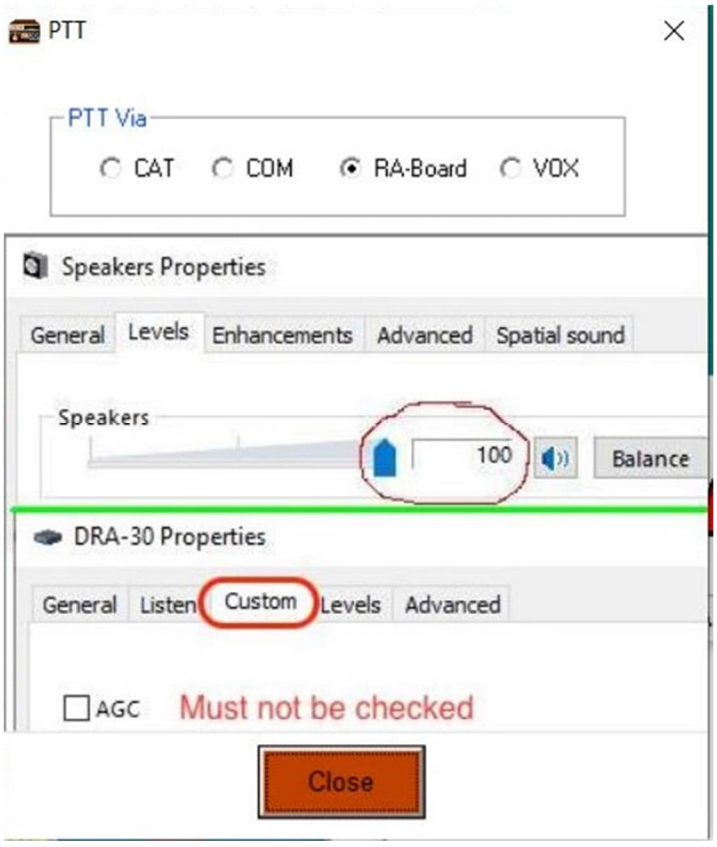
VARA FM Setup settings



VARA FM Sound Card settings

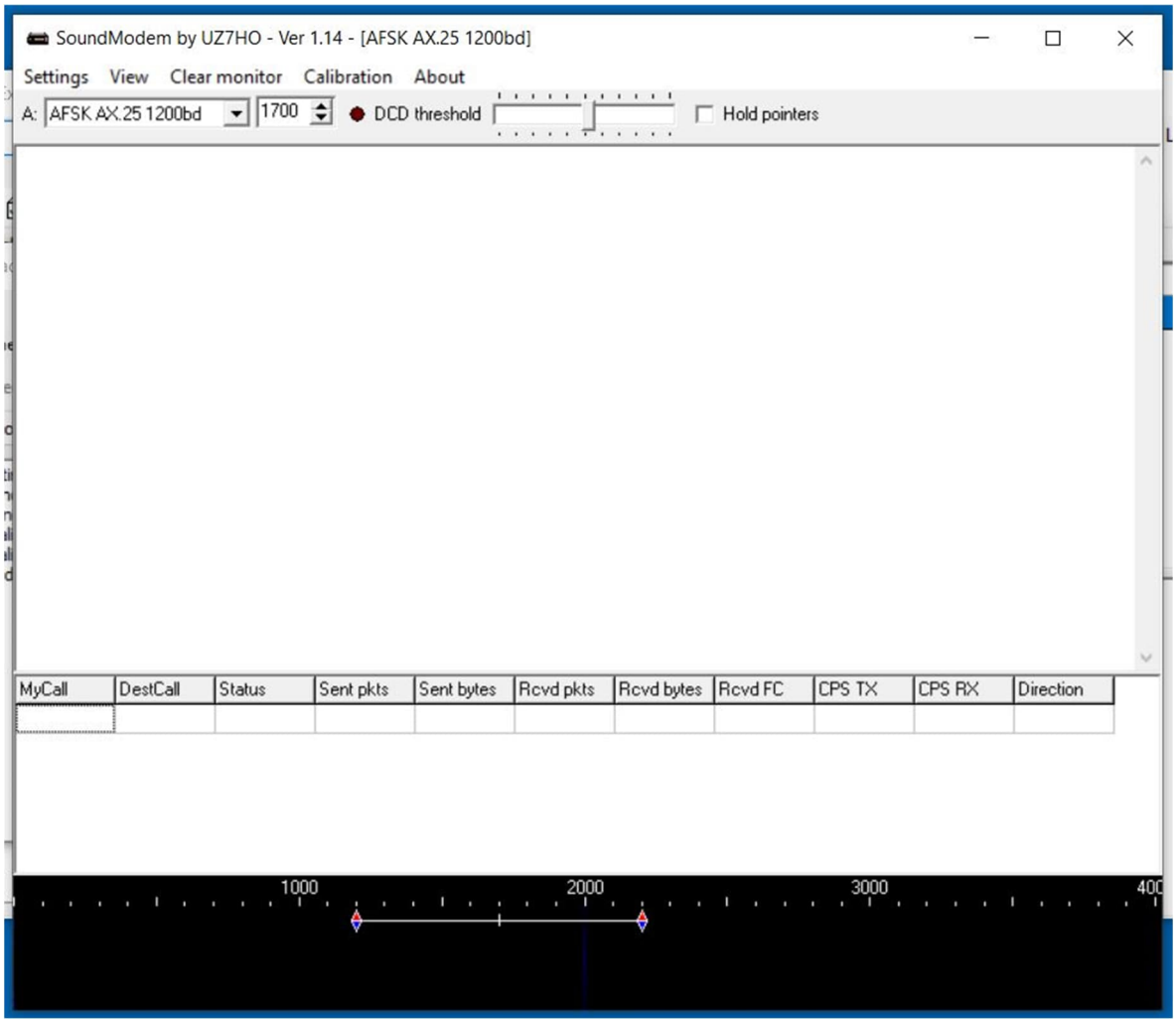


VARA FM PTT Settings

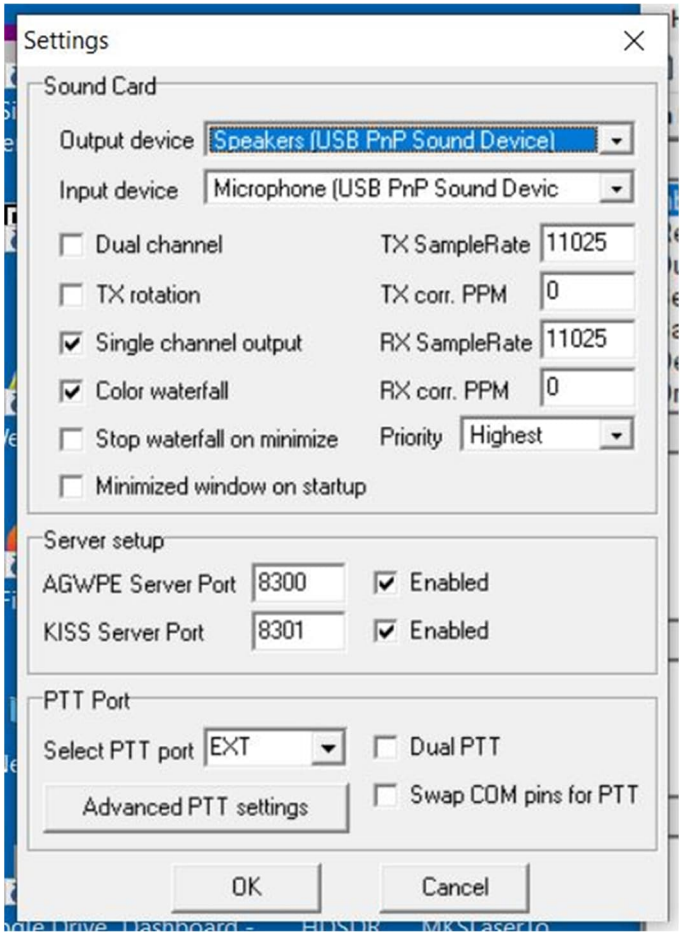


Soundmodem Main settings

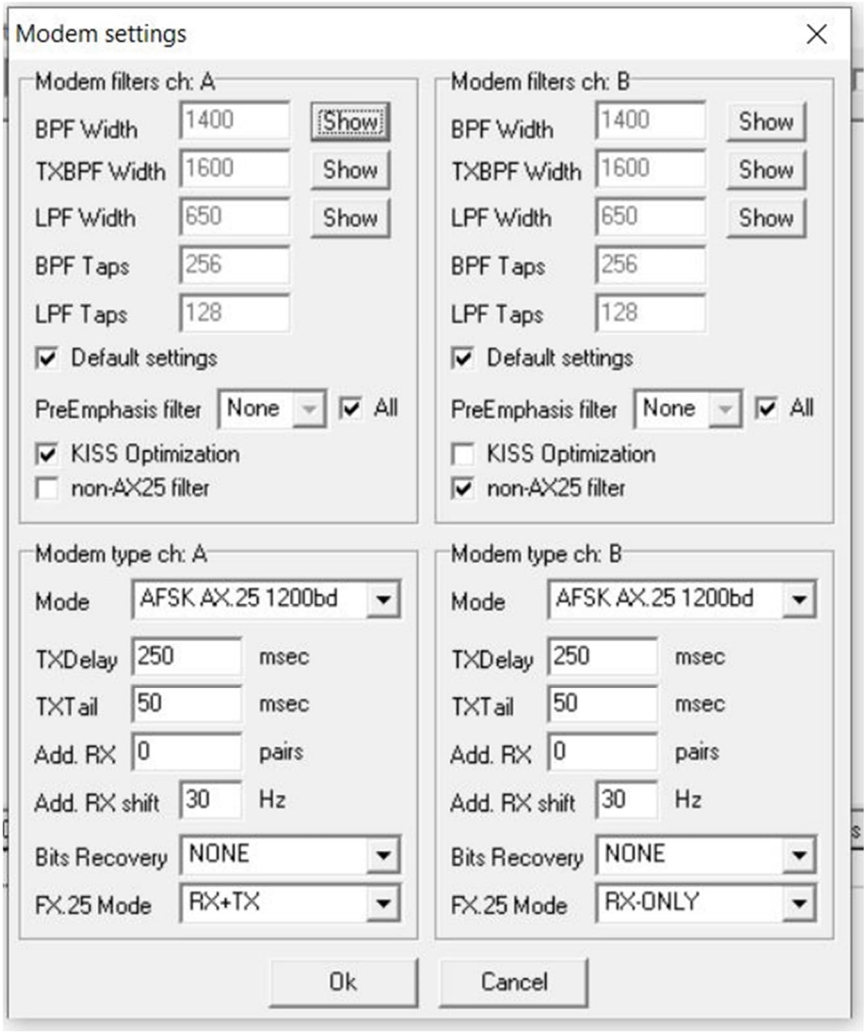
Click on the Soundmodem icon on your desktop, or go to the Soundmodem window if it is already open. From the main screen (below) click Settings. Adjust the Device and Modem settings.



Soundmodem Device settings



Soundmodem Modem settings



All of the above settings are actual screenshots from my computer with settings that work for my setup. You may have to experiment with some of the port settings if your setup doesn't connect, but all of the device settings should be the same.

Assembly/Startup

Once you have your hardware and software configured, connect everything. Remove the microphone from the radio and plug one end of the Ethernet cable into the mic socket. Connect the other end of the cable to the DRA. Next, connect one end of the dual male speaker cable to the speaker port on the back of the radio, and the other end to the DRA

module next to the RJ45 connector. Finally, connect the USB cable to the DRA and the computer.

Start up Winlink Express, select Packet Winlink in the drop down box, then select Open Session. When the Packet Winlink Session window opens, if everything is configured correctly, you should get several lines of text similar to this:

*** Starting WL2K packet session...
*** Launching C:\Users\USU\Downloads\soundmodem114\soundmodem.exe
*** Soundcard modem is running.
*** Initializing KISS over TCP Host 127.0.0.1 Port 8100
*** Initialization complete
*** Ready

Next, click on Channel Selection, and make sure your Winlink Express channel selection matches your radio. Finally, click on **Start**. If everything is working right, the radio will attempt to connect with the gateway and check for mail. If everything is working correctly, close the Packet Winlink window, go back to the Winlink Express main menu, select VARA FM Winlink, and open a session. A message similar to the following should appear:

*** Launching VARA FM TNC: C:\VARA FM\VaraFM.exe
*** Successfully connected to VARA FM TNC at 127.0.0.1 port 8300
*** Ready

Select **Start** and verify that the program connects to the gateway.