VARA FM SET UP USING DRA-50 & DIGIRIG SOUND CARD

KB7RHI

What is VARA?

VARA is a software program that serves as a sound card TNC for use with your radio

Jose Alberto Nieto Ros EA5HVK developed this program which brings **military grade** technology to the digital radio community

VARA is a **game changer** for the digital radio community

Two popular Winlink versions are **VARA FM** and **VARA HF**

Will be sharing information about **VARA FM** today

VARA FM versus 1200 baud packet for sending messages

- Regular Winlink 1200 baud packet sends data in packet frames, if there is just one bit error in a frame, the entire data frame needs to be resent
- VARA FM uses FEC Forward Error Correction and can correct minor bit errors on the fly by sending redundant data

VARA FM VERSUS 1200 BAUD PACKET

- Vara FM is rate adaptive, meaning it adjusts to the strength of the signal
- VARA FM can adjust the signal rate if experiencing weak signal conditions
- 1200 baud packet is not rate adaptive and does not do rate adjustments

VARA FM versus 1200 baud packet

- VARA FM program has data compression which allows the message to be sent faster
- 1200 baud packet does not have data compression

VARA FM is a fast digital mode (relative to 1200 baud packet radio) that works well for sending images using your FM radio

- **VARA FM WIDE** has 13 speed levels, you need an FM radio with a **data port** capable of 9600 baud packet operation…that provides a **6Khz bandwidth,** with a speed up to **25,210 bps**
- How fast is **25,210 bps**? You can send a **100KB** picture across your county in about **1.5 minutes**…depending on terrain and distance

VARA FM Narrow

- If using a microphone and speaker connection for digital radio, you will be limited to **VARA FM NARROW** with speeds up to **12,750 bps**, because bandwidth is now limited to **3Khz**
- You will need to select 1200 baud packet in your radio menu

VARA FM NARROW is still much faster than regular 1200 baud packet radio

- VARA FM NARROW has 11 speed levels
- VARA FM can be used with a regular 1200 baud Winlink RMS station to accept both **1200 baud packet** and **VARA FM NARROW** connections
- VARA FM NARROW can use **regular voice repeaters** without a squelch tail or with **some crossband repeaters** (at somewhat slower speeds)
- Yaesu FTM-400 in crossband works ok, was unable to get my FTM-300 and FTM-150 to work with VARA FM NARROW

VARA FM WIDE requires a one-time license

- The one-time license fee costs **$69**
- It is good for **both VARA FM and VARA HF**
- NOTE: If you already own an ICOM 7300 HF radio, that radio has a built in sound card and with the VARA license, you can start using VARA HF right away to send email at nearly Pactor 3 speeds, no sound card needed ☺

What happens if I do not buy a VARA license?

- Without a VARA license, you will be limited to the following: (You will not be a happy camper)
- 1) Compression is turned off
- 2) Speed is limited to level 2 (1,188 bps)
- 3) You can be a Digipeater, but you can not use a Digipeater
- 4) You will see a perpetual nag screen to purchase the license

Lets see what you can do with a VARA license…demonstrations today

- 1) Show the station view when **sending** out an email message with a **picture**
- 2) Show the station view when **receiving** a **picture**
- 3) Show connecting to a VARA FM Gateway

More demonstrations today

- 4) Will show how to do an Auto Tune with a P2P station…(same method used when using an RMS Gateway) later in this PPT
- 5) Will show how to PING a nearby station to check pathway quality later in this PPT

Clark County, WA simulation

- 6) Simulate an earthquake has just happened and there are several radio team members in your county who have stood up their portable VARA FM station. A voice net has been set up at a command post and a request has gone out to please send in pictures of significant damage…(A picture is worth a thousand words)…in this scenario, your Clark County ARES/RACES team is responding to the request

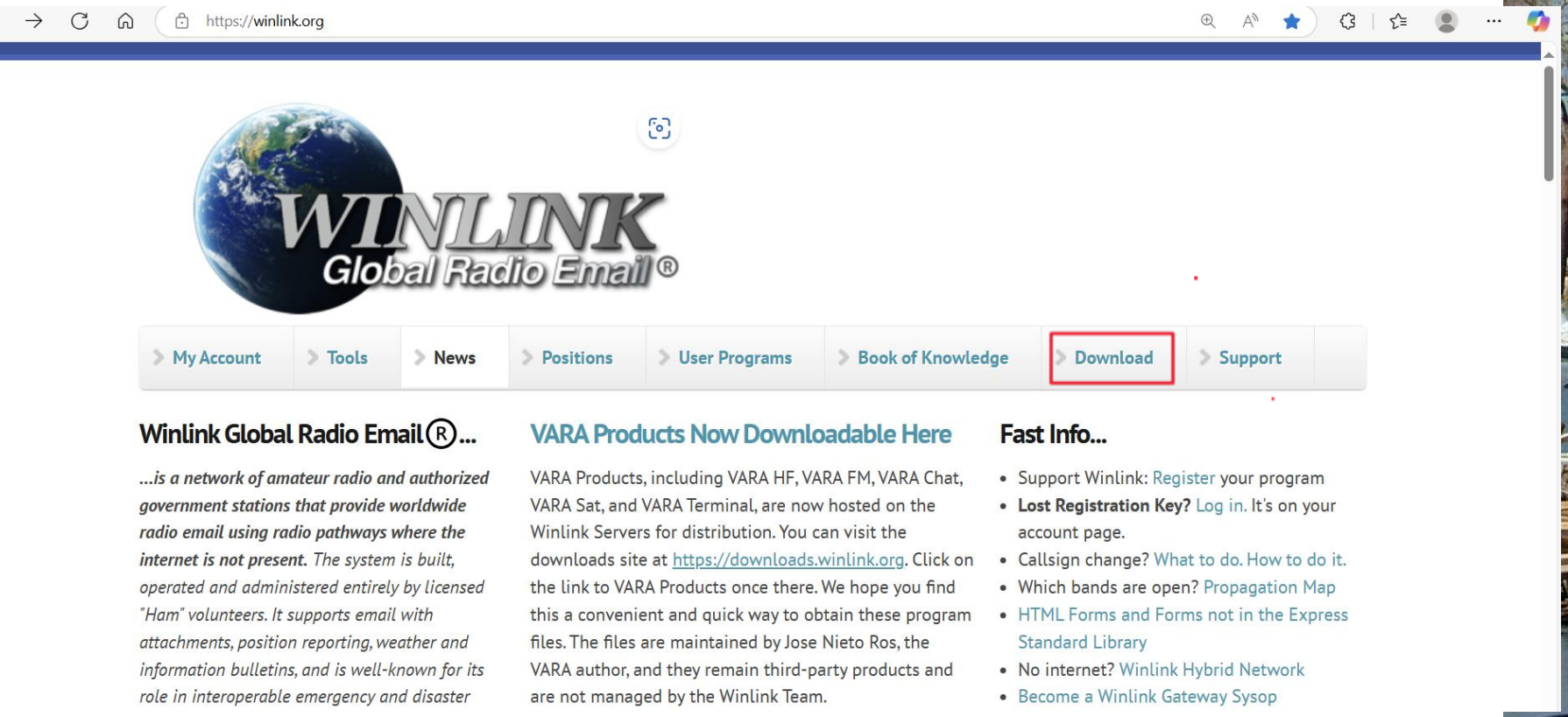
Grid down and networks down, set up one Starlink site in your county

- With one **Starlink site set up**, you can relay regular email messages into and out of your county
- **Couple** the Starlink to a Winlink VARA FM WIDE **RMS Gateway**, add any needed Digipeaters to expand coverage, and you have a powerful comms capability
- Have the Winlink RMS Gateway use a higher gain Omni antenna up on a mast for best area coverage

Steps to take to download your VARA program software

- Go to the Winlink.org website first

Click on “Download”



Winlink downloads has the software for the VARA programs

https://downloads.winlink.org

downloads.winlink.org - /

1/27/2025	2:36 PM	<dir>	Sysop Programs
5/5/2025	4:05 PM	<dir>	User Programs
3/18/2025	10:08 AM	<dir>	VARA Products

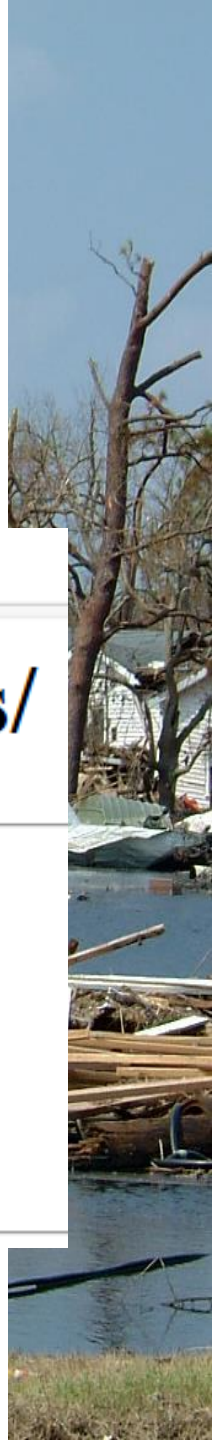
Download VARA FM and follow the installation steps

https://downloads.winlink.org/VARA%20Products/

downloads.winlink.org - /VARA Products/

[To Parent Directory]

10/20/2024	4:49 PM	758074	VARA Chat v1.4.1 setup.zip
3/18/2025	10:08 AM	6331538	VARA FM v4.3.8 setup.zip
3/18/2025	10:07 AM	4511570	VARA HF v4.8.9 setup.zip
3/18/2025	10:08 AM	2345231	VARA SAT v4.4.4 setup.zip
10/20/2024	5:15 PM	328407	VARA Terminal V1.2.2 setup.zip



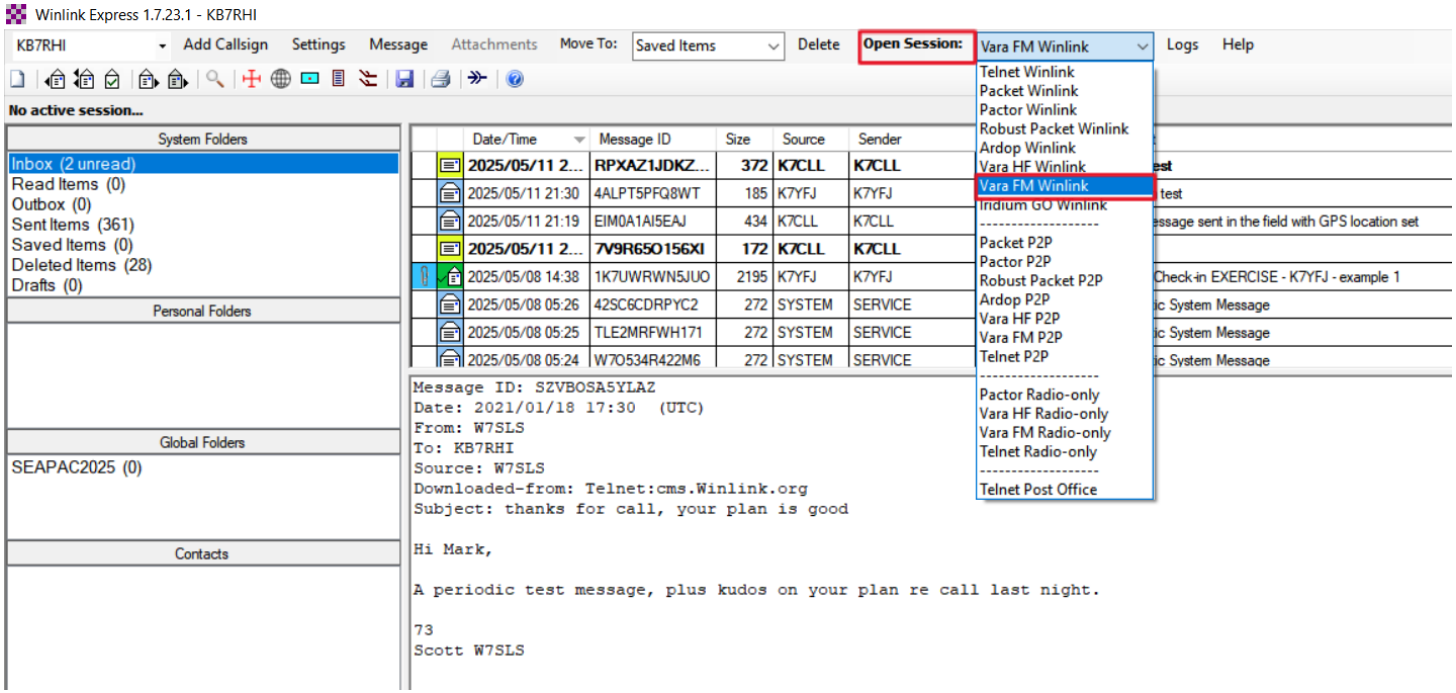
Let’s see how to set up your VARA FM station

- You have a Winlink station and registered call sign already
- You have purchased a VARA license
- You are ready to setup your VARA FM station

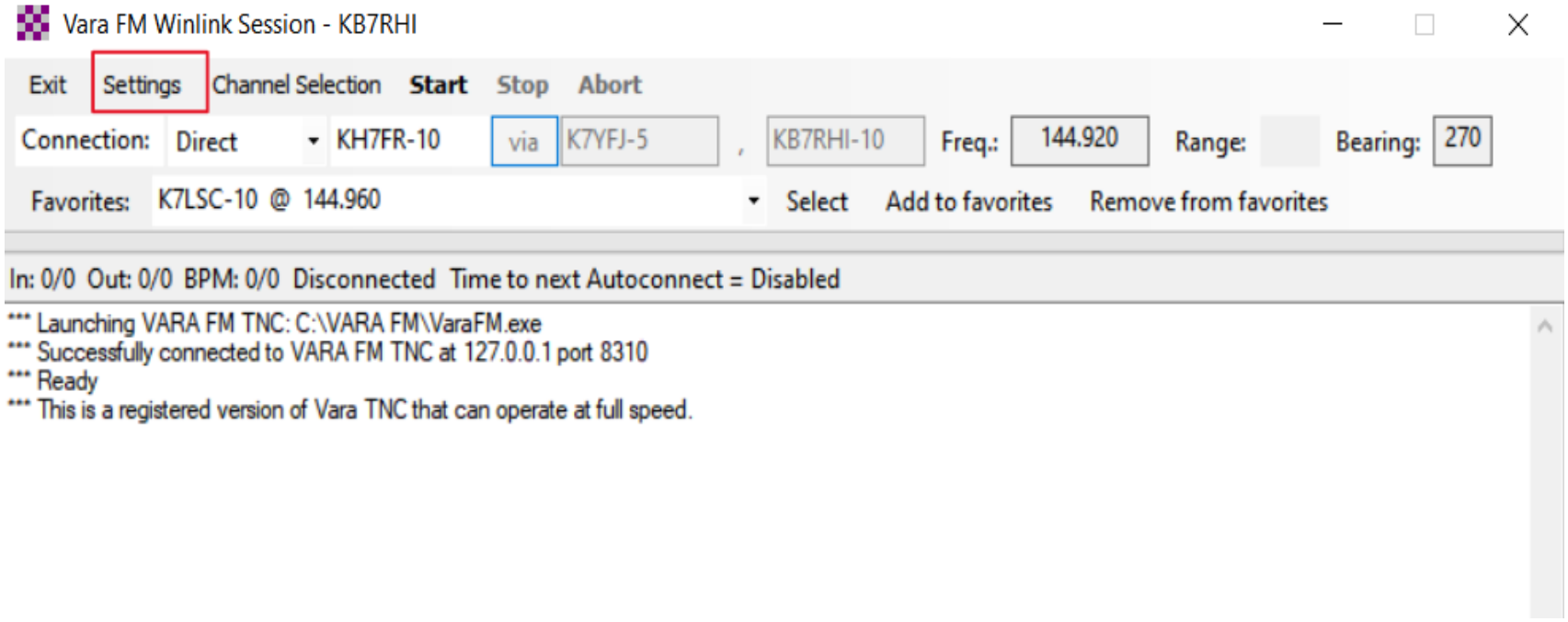
Setting up VARA FM for your station

- Most FM mobile radios with a data port capable of 9600 baud packet will work
- In the radio menu, set the packet rate to 9600 baud, have radio APRS turned off
- Connect the cable that goes from your **radio to the modem**, turn on your radio…in this example I will be showing a DRA-50M ordered from masterscommunications.com
- Connect the **modem to the laptop**, this provides power to the modem
- You are now ready to set your audio input and drive levels to optimize your VARA FM station

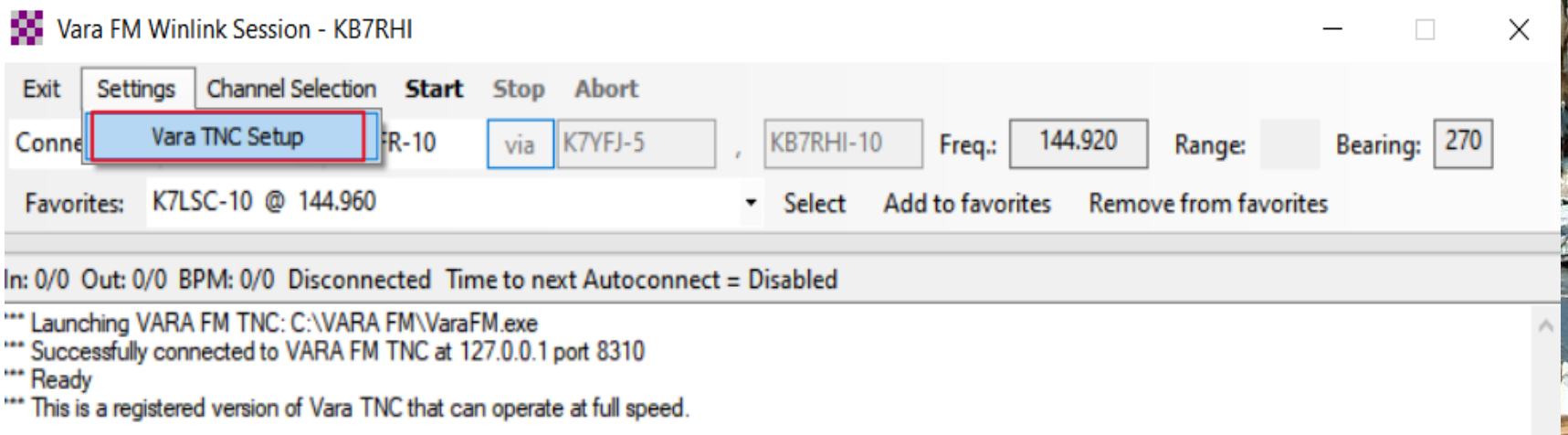
In the Open Session box, use the drop down menu to select “Vara FM Winlink”



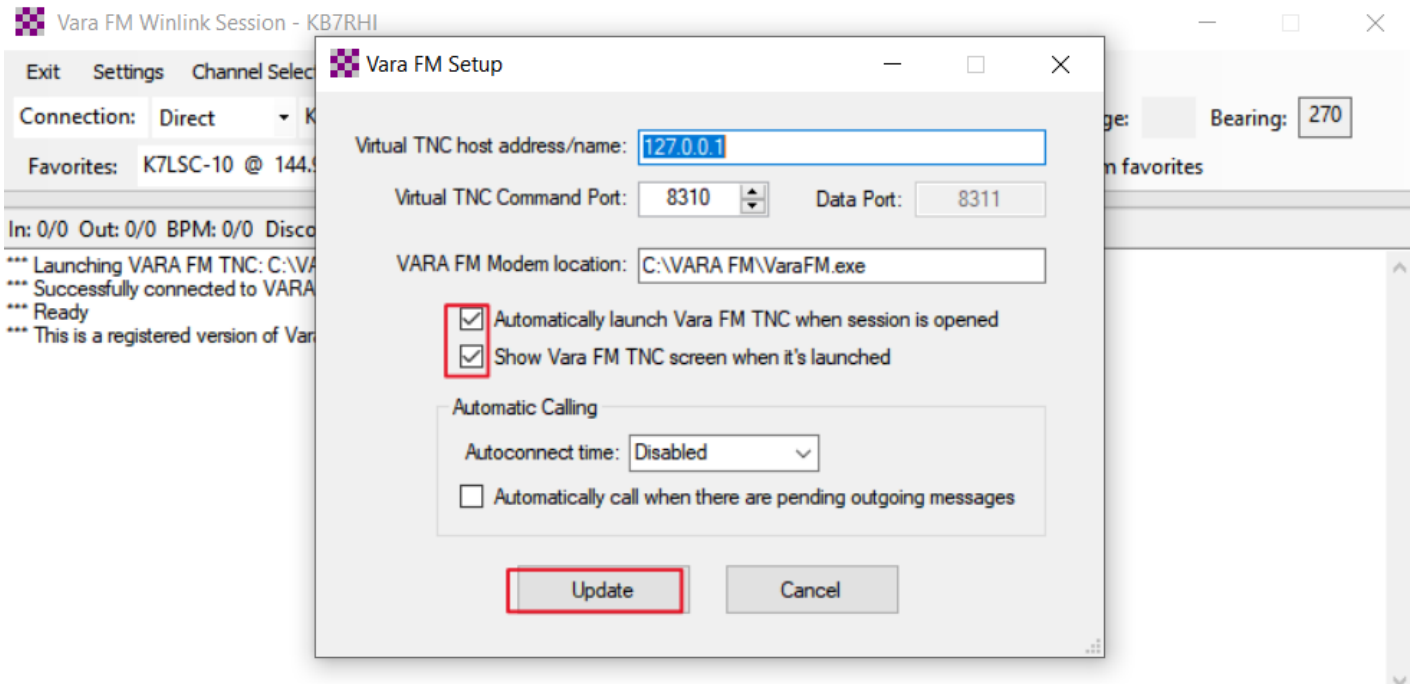
This is the Vara FM Winlink Session screen, next click on “Settings”



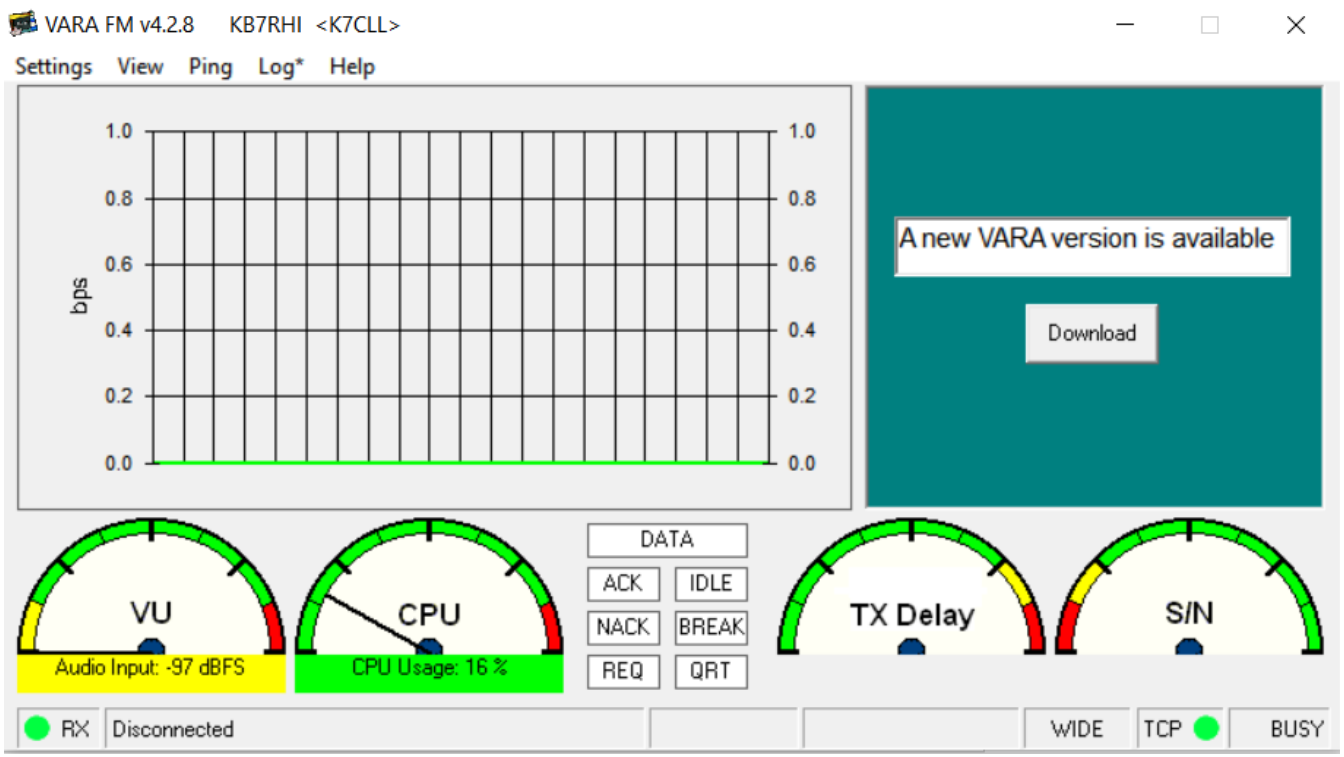
Click on “Vara TNC Setup”



You will see the Vara FM Setup screen, check the “Automatically launch Vara FM…”box, and the “Show Vara FM TNC screen when it’s launched” box, click on “Update”



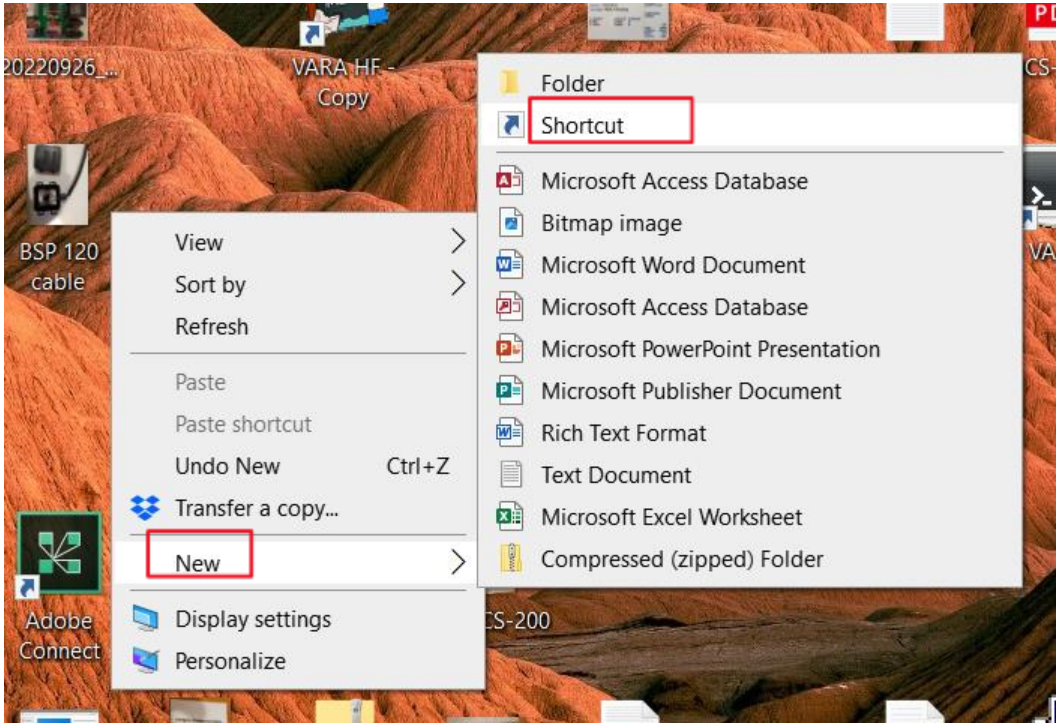
If the VARA FM program did not open up, close the VARA FM session and try again now that you have checked the boxes to automatically open



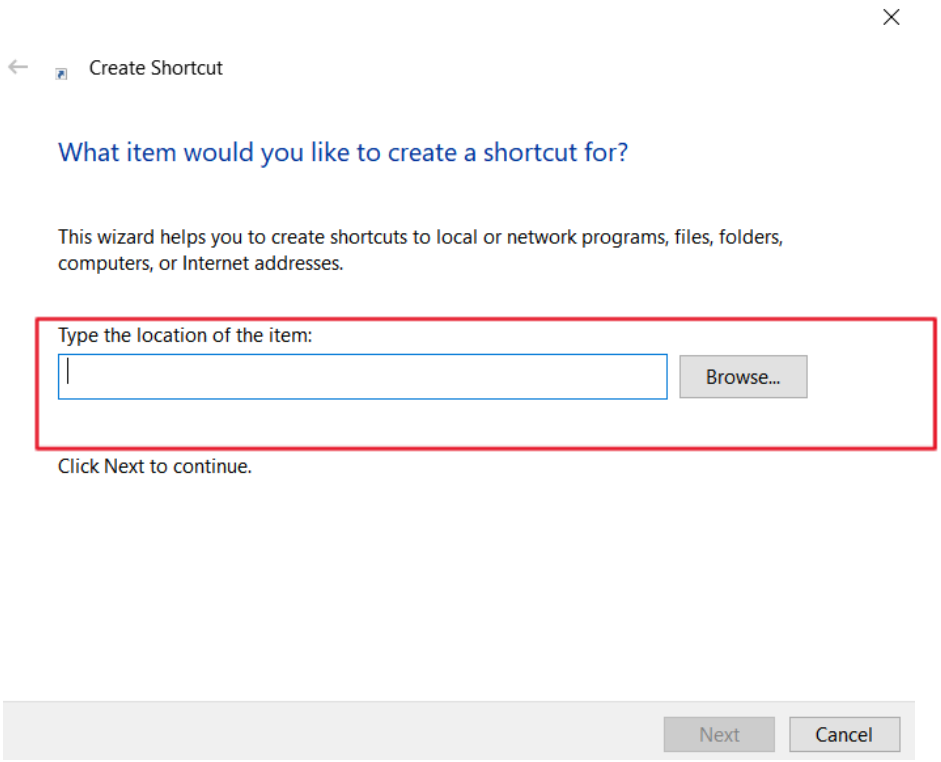
Soundcard Shortcut

1) Right click on laptop desktop
2) Select “New”, then “Shortcut”
3) This shortcut is needed to check your computer sound card settings each time you operate VARA FM
4) You will do an initial setup and then need to double check if any changes are needed with each VARA FM session you do

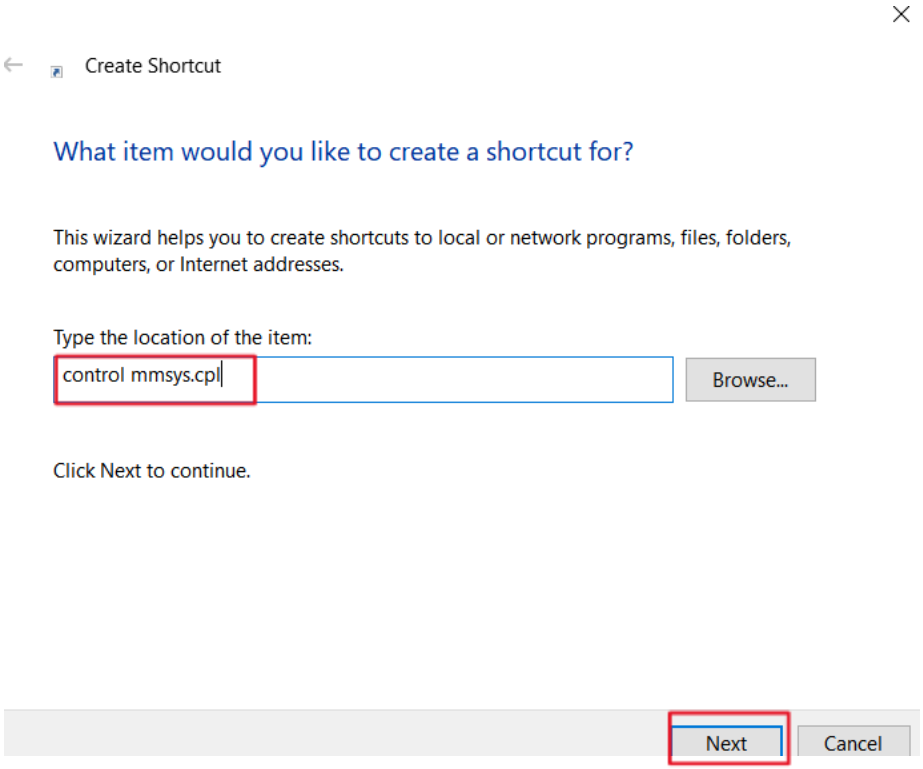
Soundcard shortcut…Right click on your computer desktop, select New, Select Shortcut



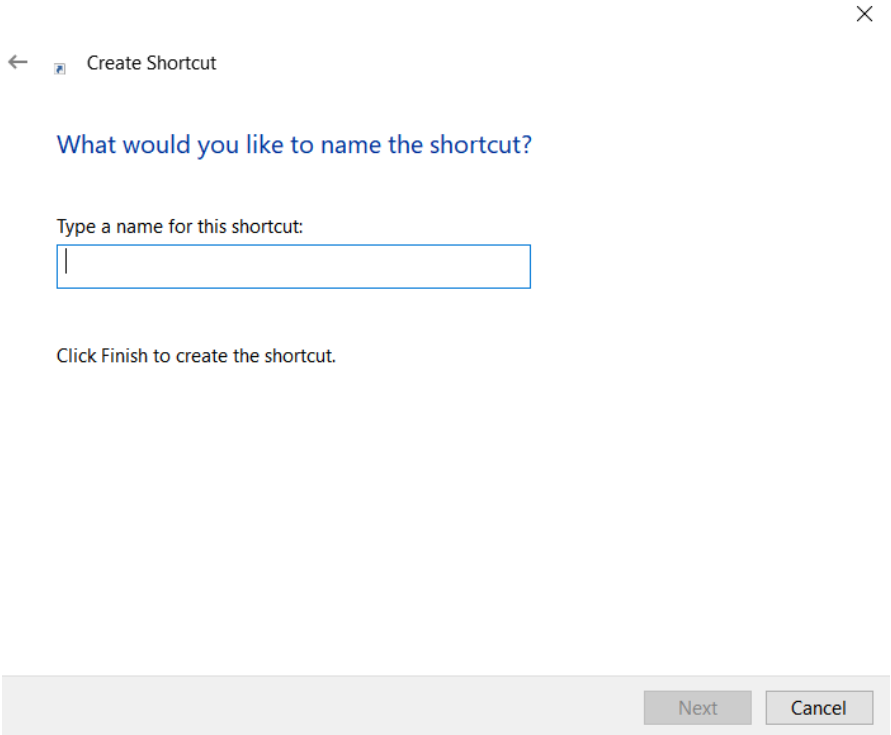
In the “Type the location of the item:” box, enter “control mmsys.cpl”



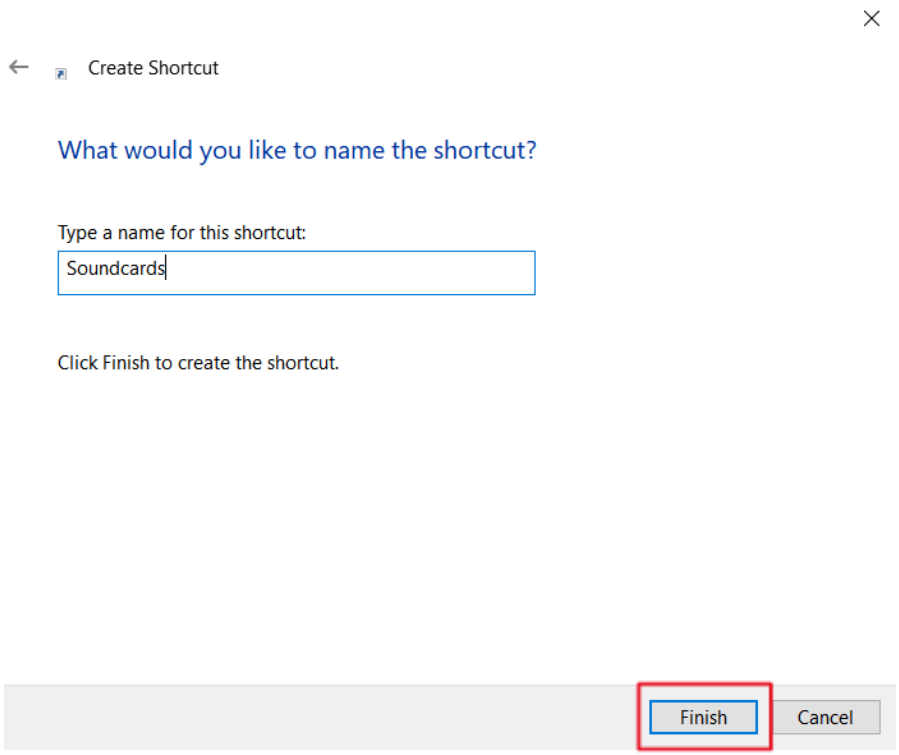
You entered control mmsys.cpl, now click on Next



Now enter the name you want for this Shortcut…I use Sound Cards



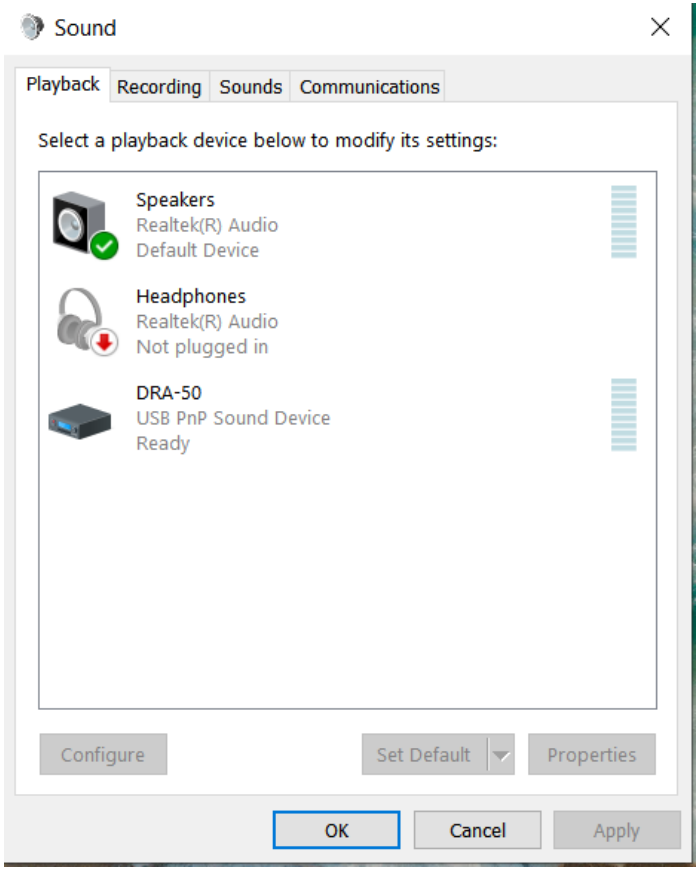
Click on Finish, you now have a Shortcut for adjusting settings for the VARA Program



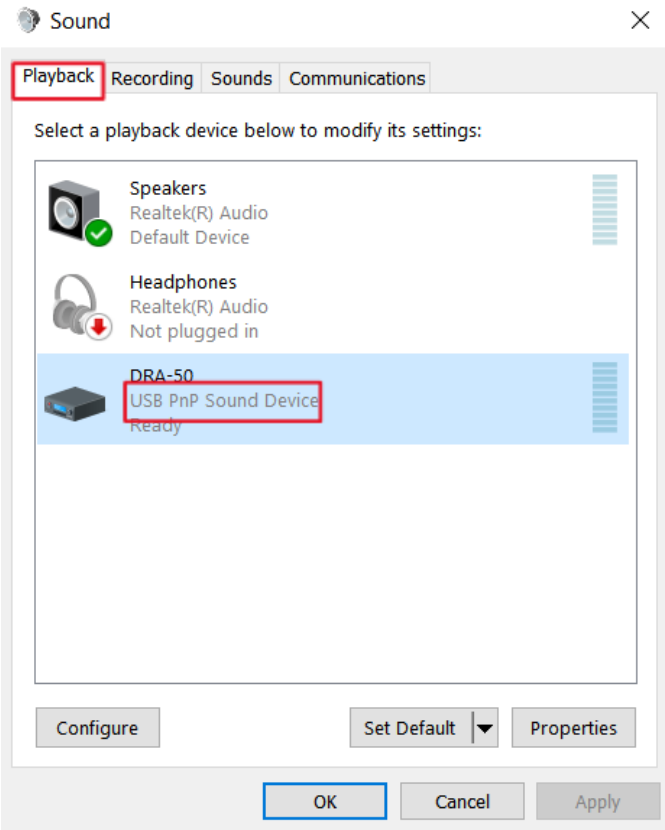
Configuring your computer sound card settings

- You need to configure your computer sound card settings so the VARA FM program is the **only device** using the your external sound card
- These settings need to be rechecked each time you start up your computer, the computer tends to change them, and you put any changes back in order

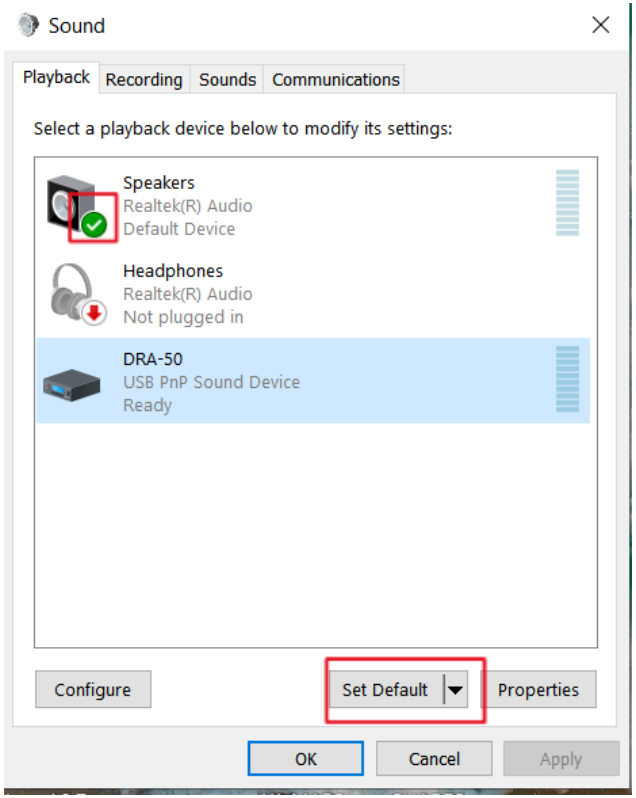
Open up the Sound Cards shortcut



Playback tab, select and click on USB PnP Sound Device



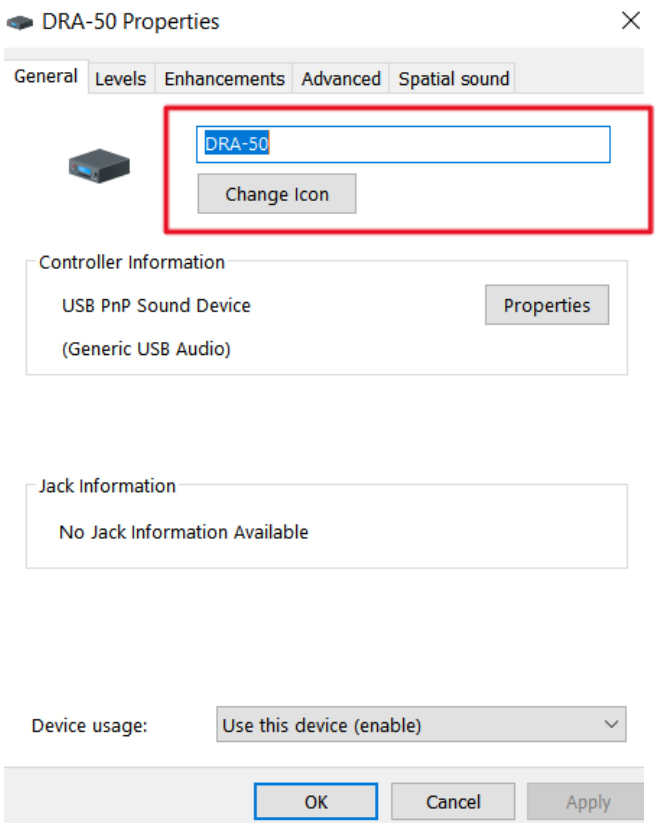
If the Green circle (Default icon) is on your sound card, highlight speakers, then click “Set Default” button in the lower section



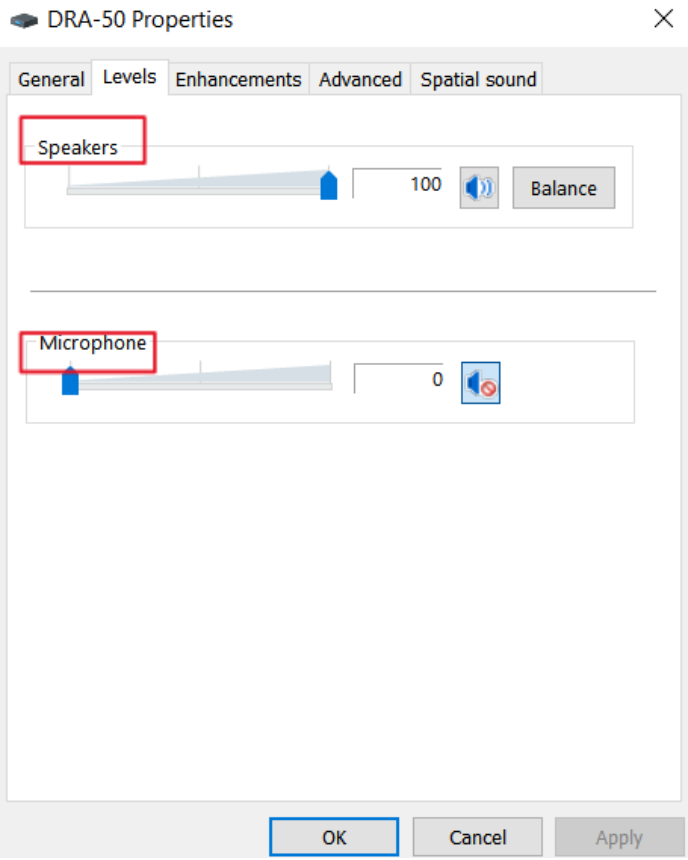
The Windows computer sounds will be sent to the sound device with the Green circle with a check mark inside it

- You do not want computer sounds interferring during a radio transmission
- Look to see if your sound card has the Green circle default icon, if so, change it to another sound device

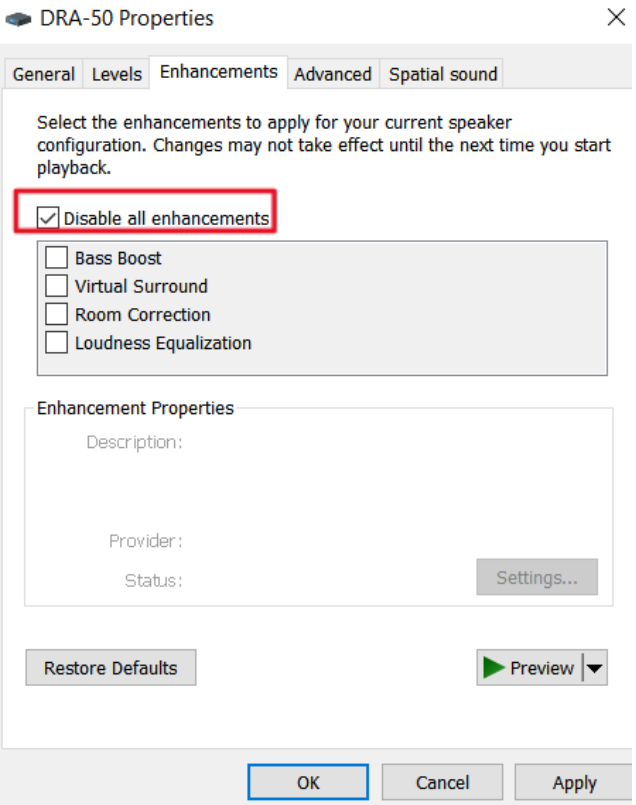
PLAYBACK “General” tab, you can change name and icon of your modem



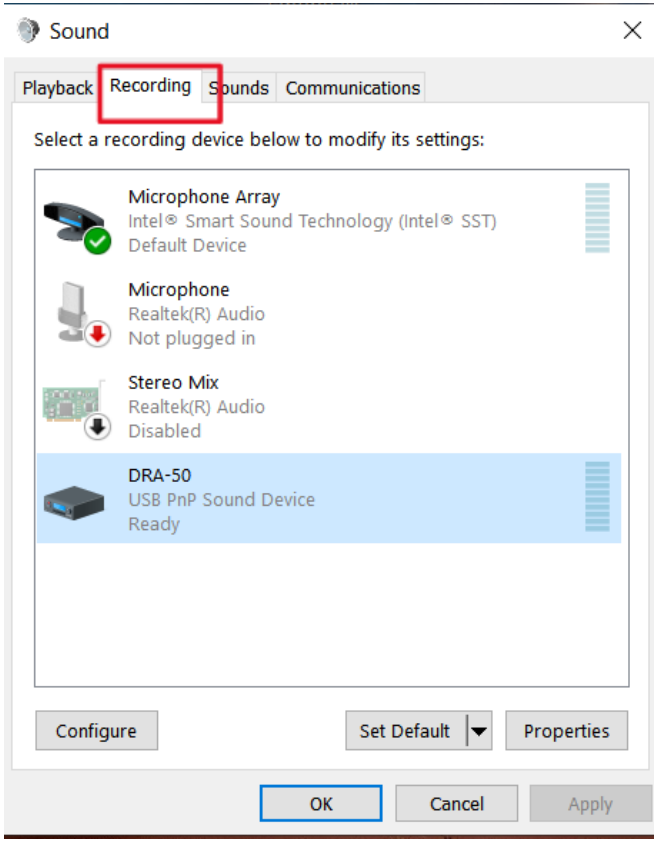
PLAYBACK Levels tab, set “Speakers” to 100% and “Microphone” to zero, (Drive Level Settings)



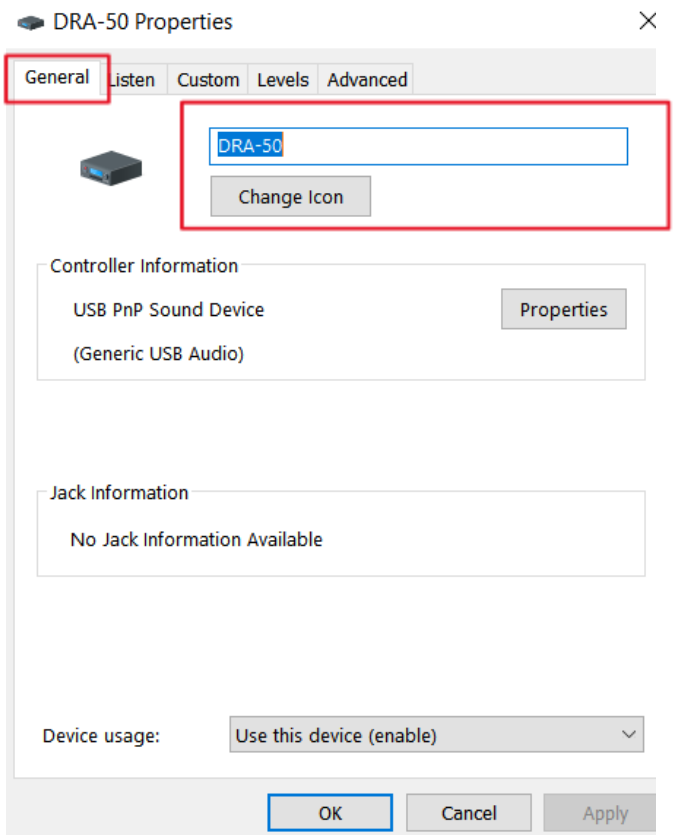
PLAYBACK Enhancements tab…check “Disable all enhancements” box



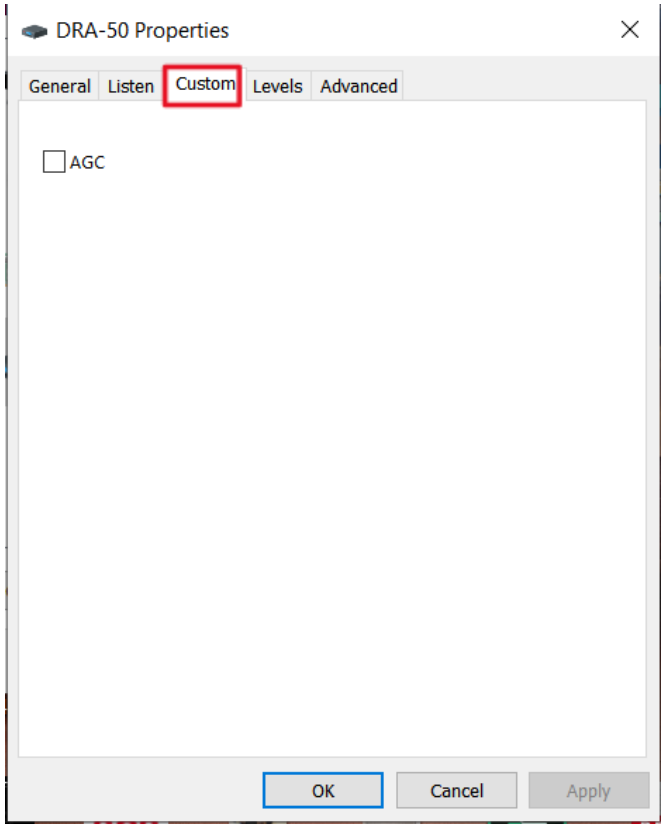
Go to Recording tab, then select and click on USB PnP Sound Device (Audio input level)



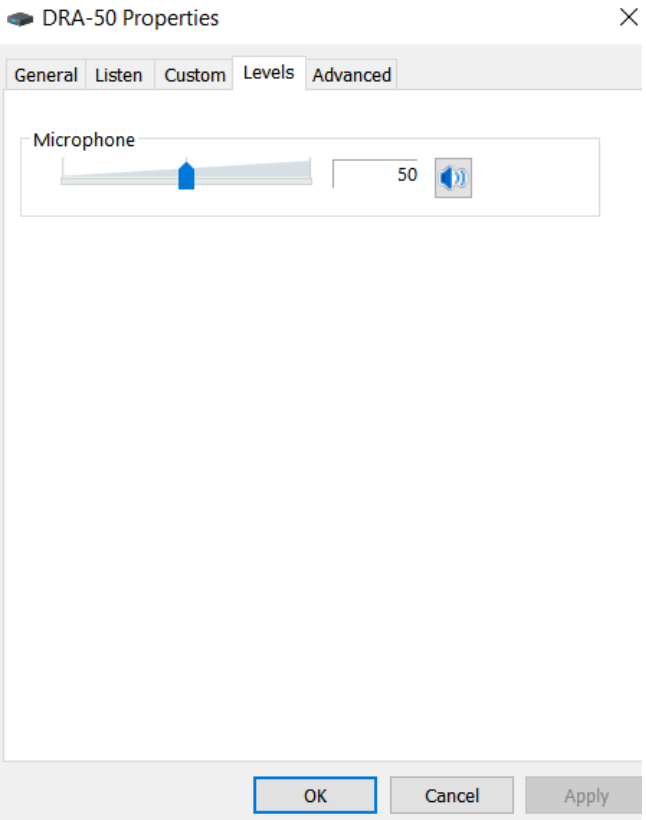
Recording General tab, you can change name and icon of your modem



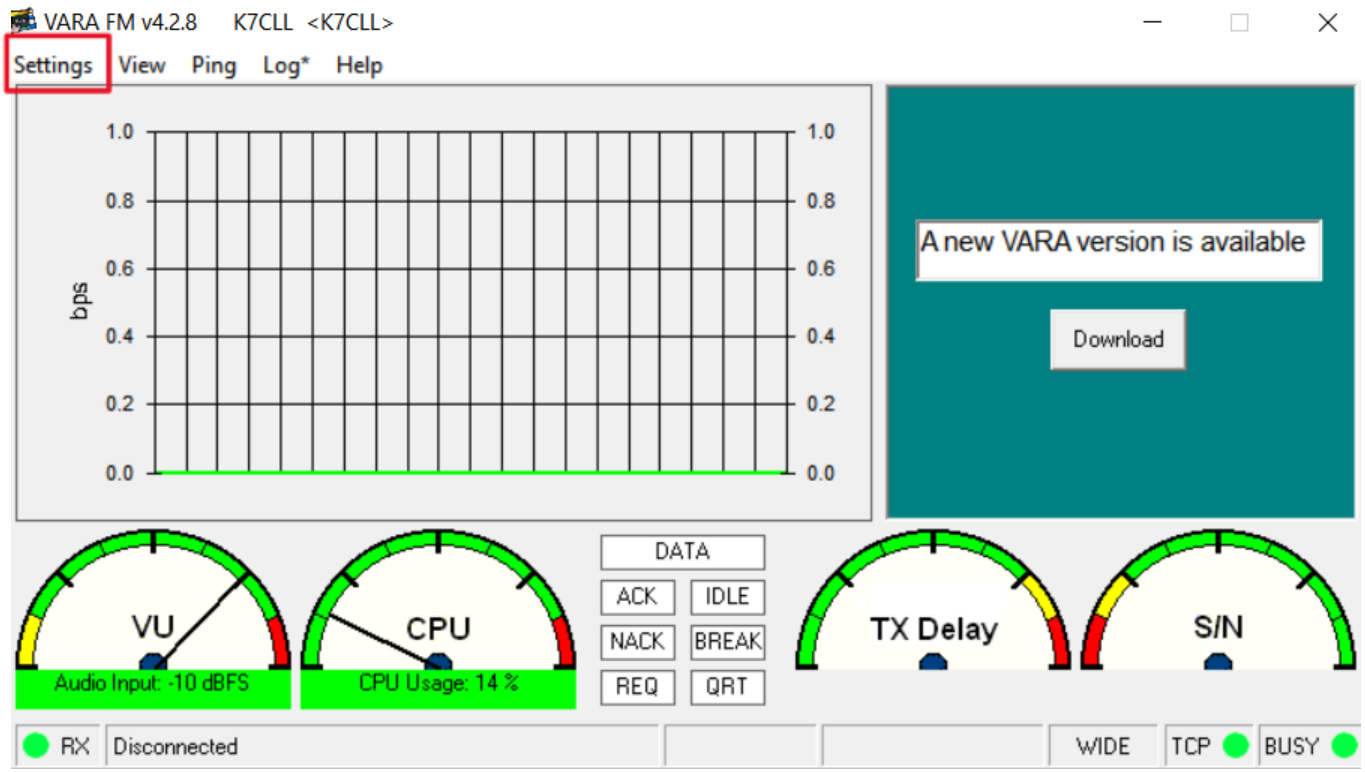
Recording Custom tab, uncheck AGC box



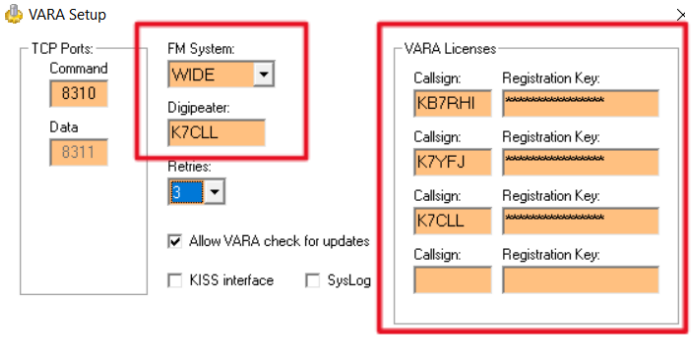
Recording levels tab, set microphone to 50%, may adjust later as needed

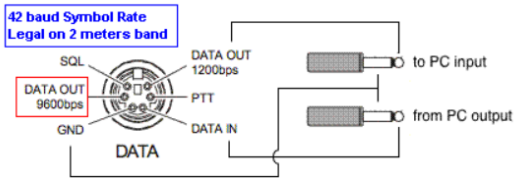


Open up VARA FM program, go to upper left and select “Settings”, “VARA Setup…”



FM System:…Select “WIDE”, VARA Licenses…Enter licensed “Callsign” and “Registration Key”, Digipeater: Call sign must be a licensed call sign, can be different from current Winlink program call sign being used



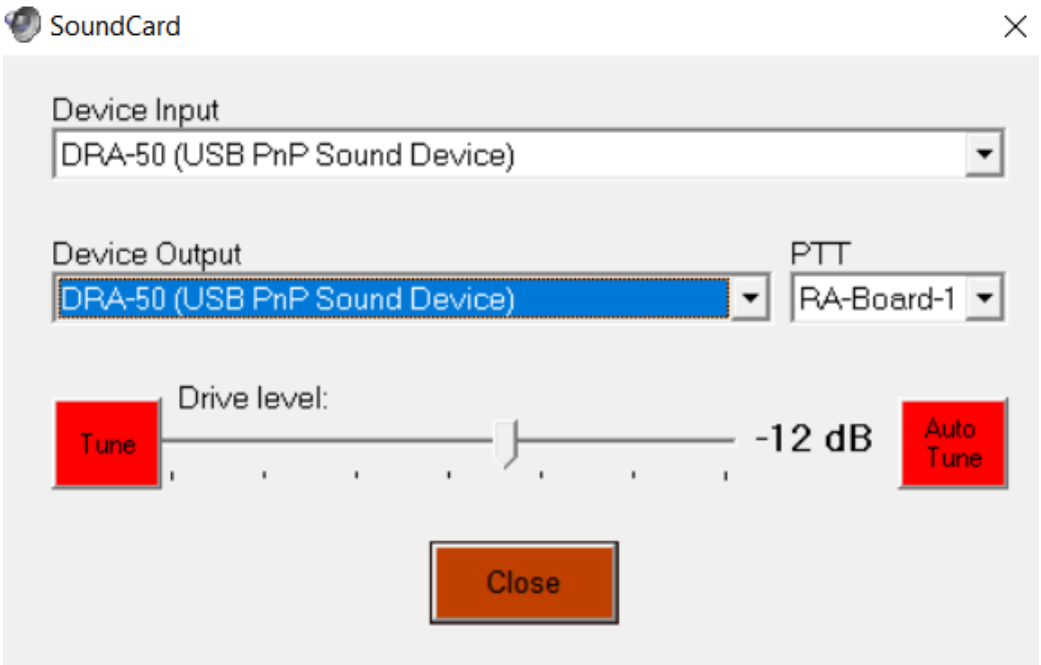


* VARA FM WIDE needs a FM rig set for 9600 Packet operation, with a special soundcard interface (6 kHz BW) connected to rear panel: RA-Board, Signalink “Black” transforms, Modified Signalink (red audio transforms removed), homebrew interface (a simple direct cable)…

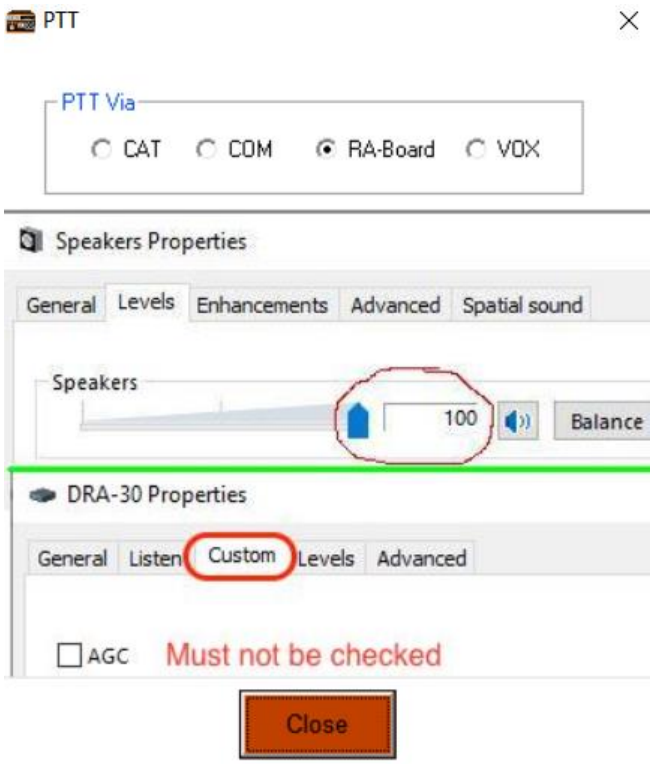
* In other case, you must select VARA FM NARROW

Close

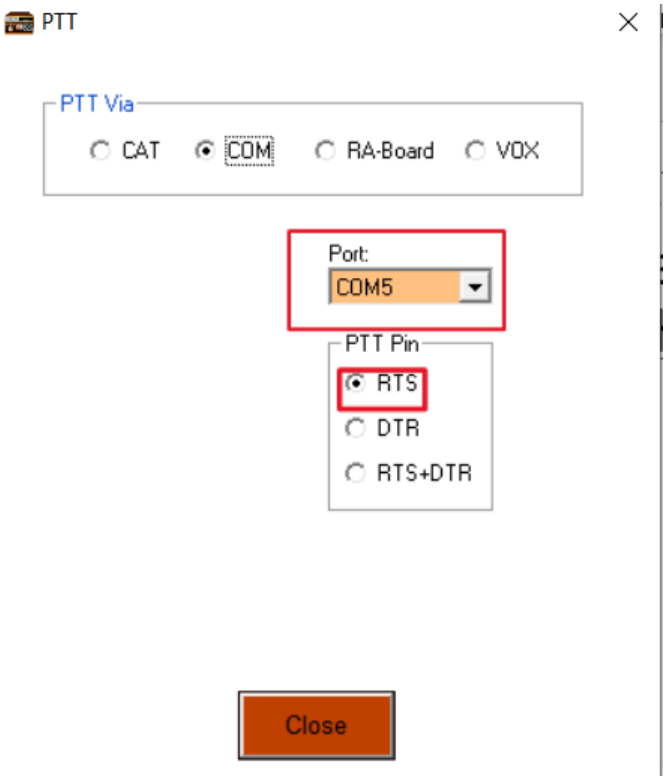
Next go to “Settings” again and select “SoundCard..”, you will want to see “Device Input” and “Device Output” showing (USB PnP Sound Device)



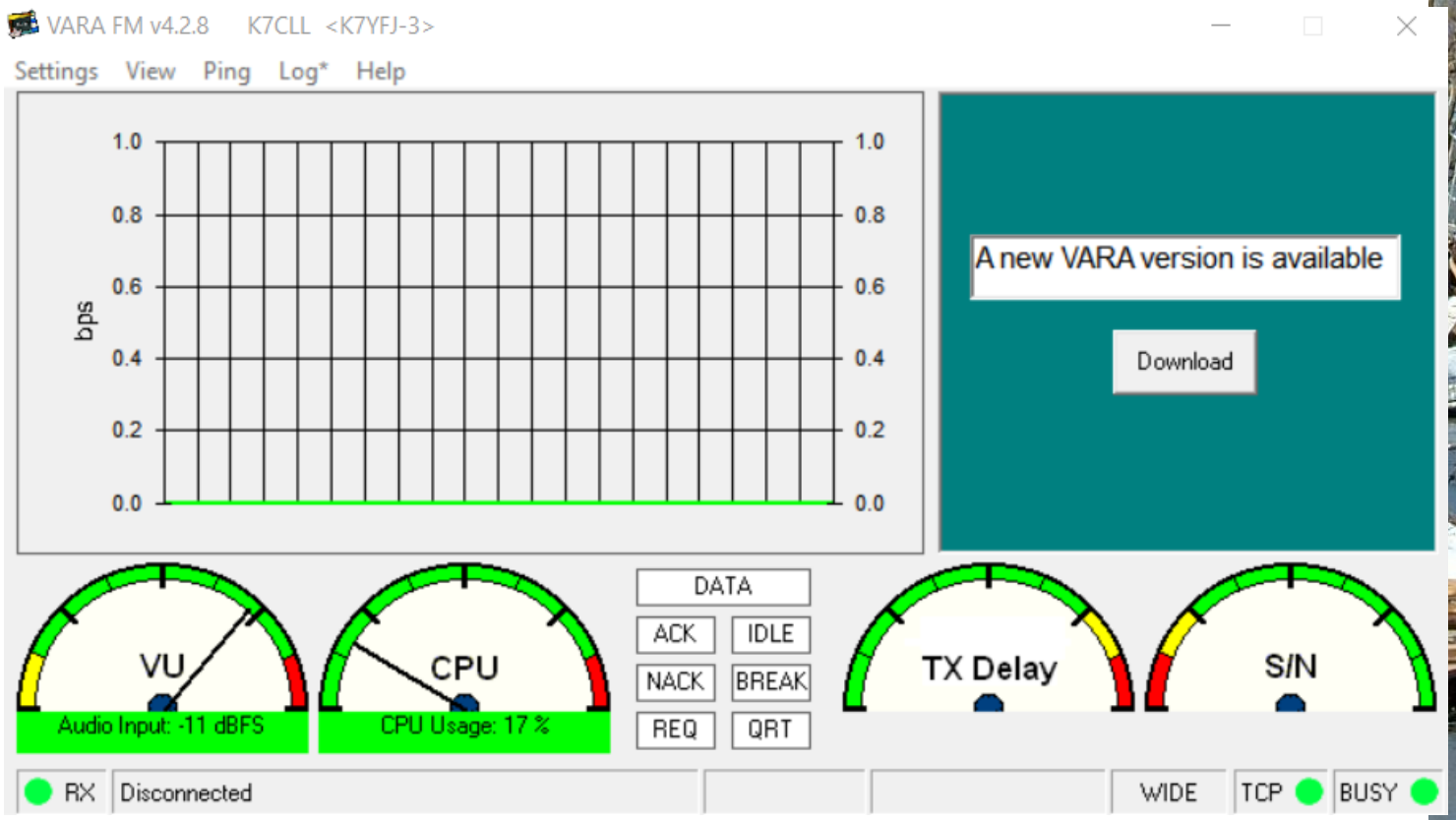
Next go to “Settings”, select “PTT…”, with a DRA-50, select RA-Board, with a Digirig…select “COM” for com port, select the correct COM Port



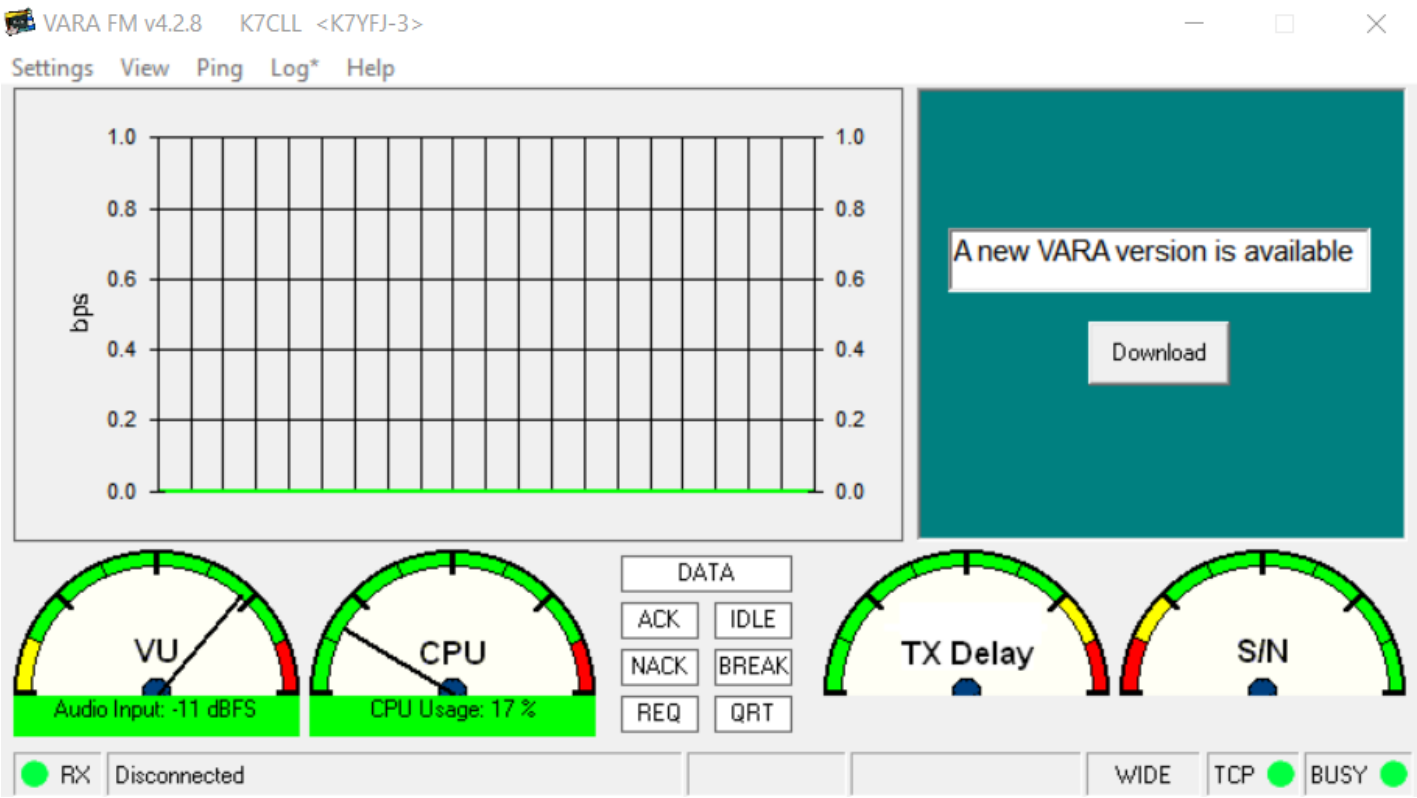
Select the DigiRig mobile COM port and select RTS, then Close



The VARA FM program needs two audio level adjustments, audio input level (manual) and audio drive level (automatic)

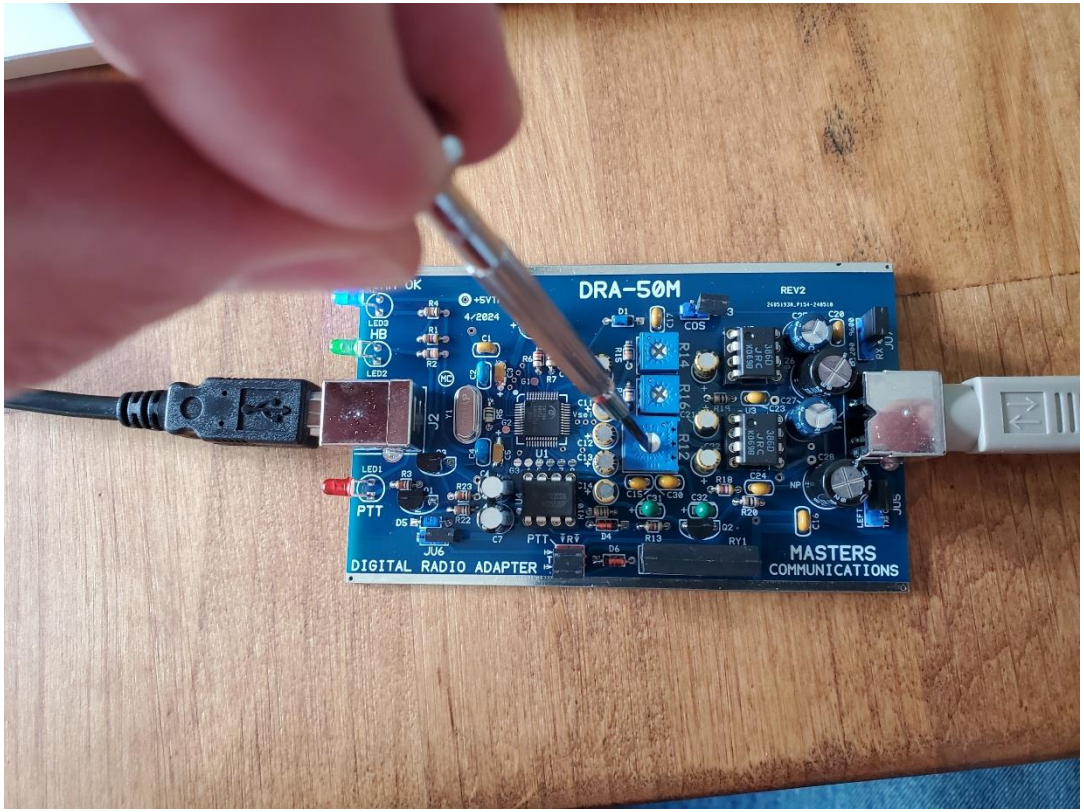


Manual audio input level is adjusted first, lower left screen shows “VU”, “Audio Input” meter, we want to adjust the meter to about “-11 dBFS”

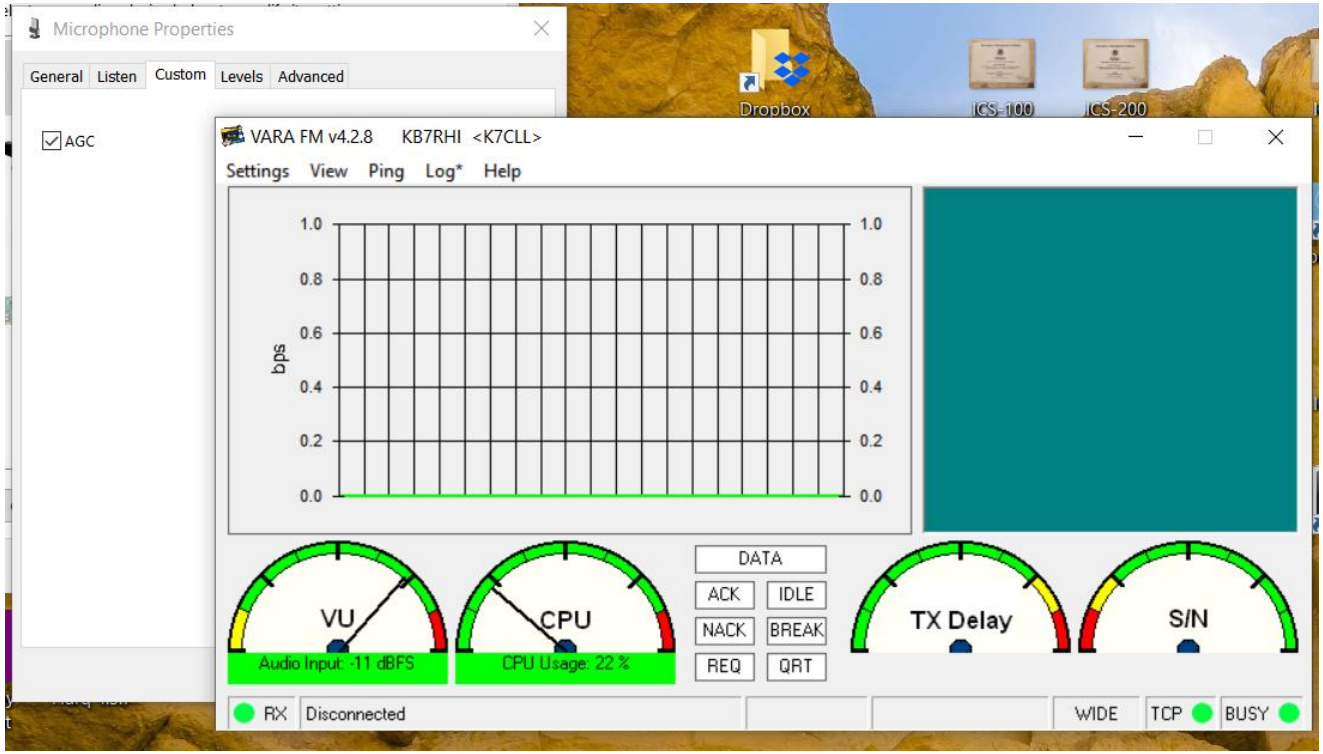


To adjust the audio input, remove the DRA-50 board from the case by removing the four face plate screws, then push on the back end enough to then pull the board out

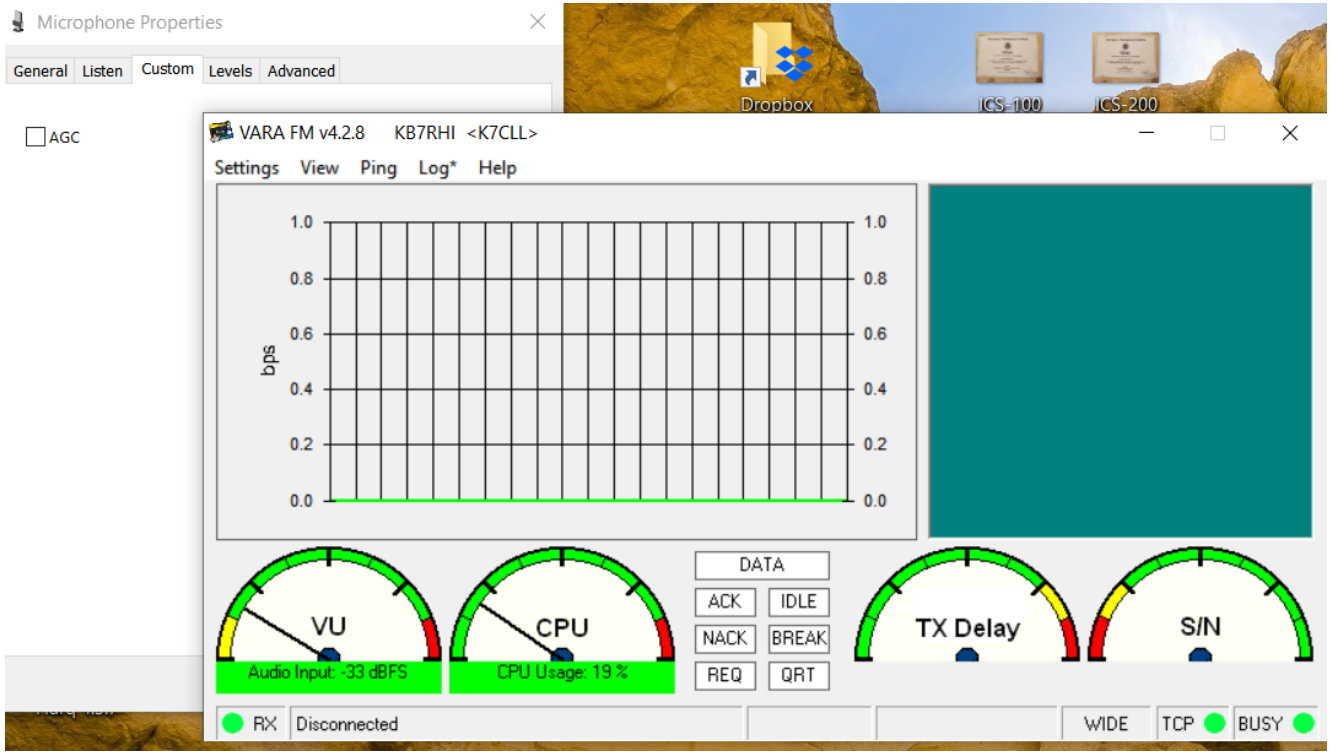
Have your DRA-50 hooked back up to a radio that is on and laptop, gently turn the larger blue trim pot with a flat headed screwdriver till the VU meter shows about -11 dBFS



AGC was on by default when I started up my laptop…I had opened up the DRA-50 and adjusted VU level to -11 without knowing AGC was checked



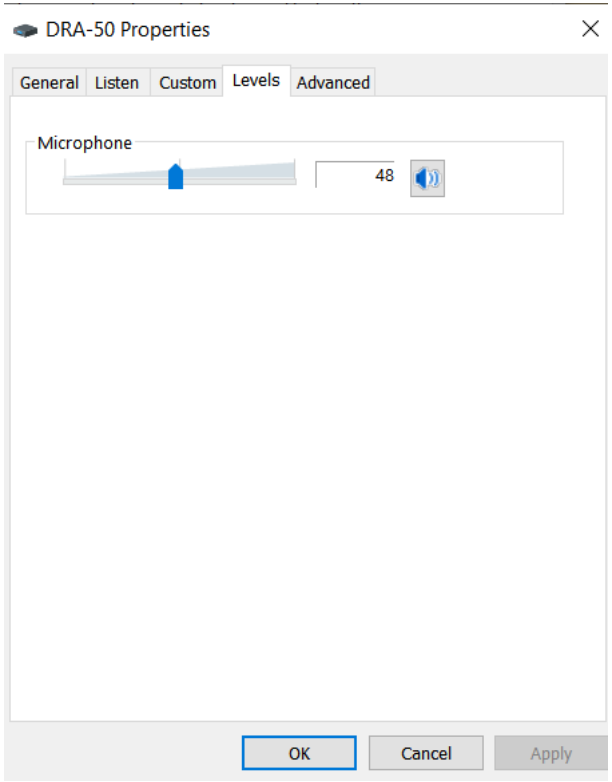
Unchecked my AGC box and the VU levels fell down to -33...note to self...double check all your sound card settings first before opening up the DRA-50 to readjust



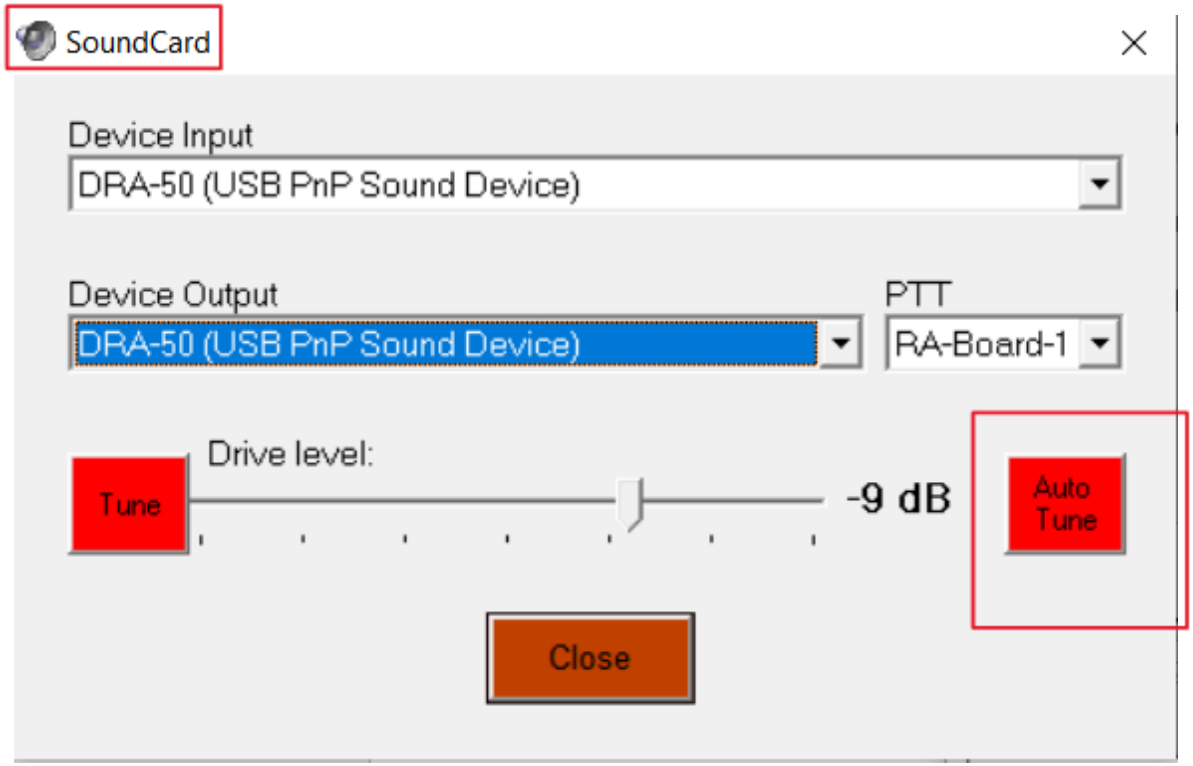
DRA-50 minor audio input level adjustment after first doing a DRA-50 trim pot adjustment

- After you have taken the DRA-50 board out and done a **VU meter adjustment to -11**, at a later time you find the VU meter is a little higher or lower than what you want
- You probably do not need to open up the DRA-50
- Just go back to the laptop soundcard Recording levels tab and left click your mouse on the slider to adjust the level back to -11, **that is why on the first adjustment you set at 50%, to give you some wiggle room**

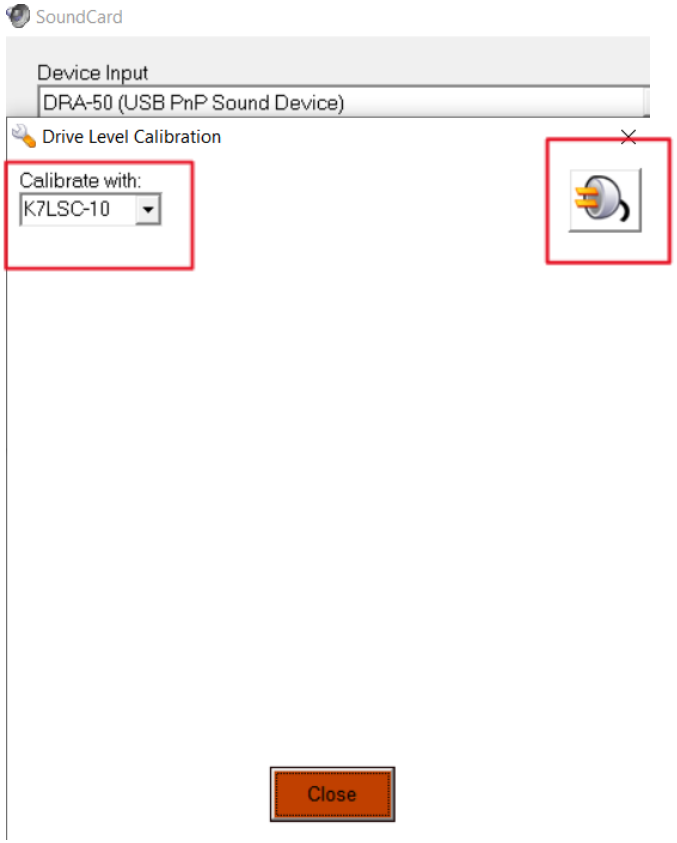
A DIGIRIG does not have an audio input trim pot to adjust, adjustment is done with the laptop Recording levels tab to get VU meter to about -11



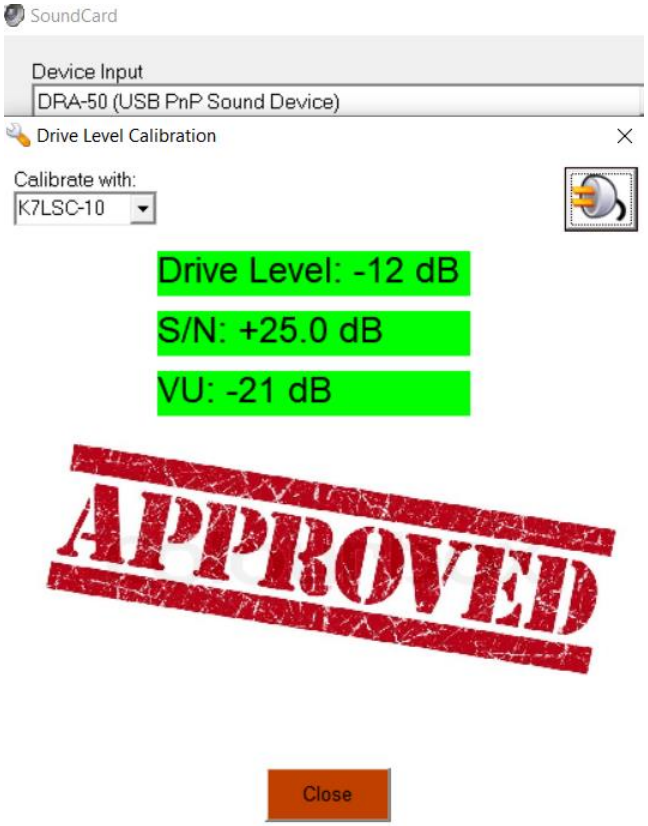
Automatic drive level adjustment, go back to VARA program “Settings”, then select “SoundCard”, then push on the red Auto Tune button



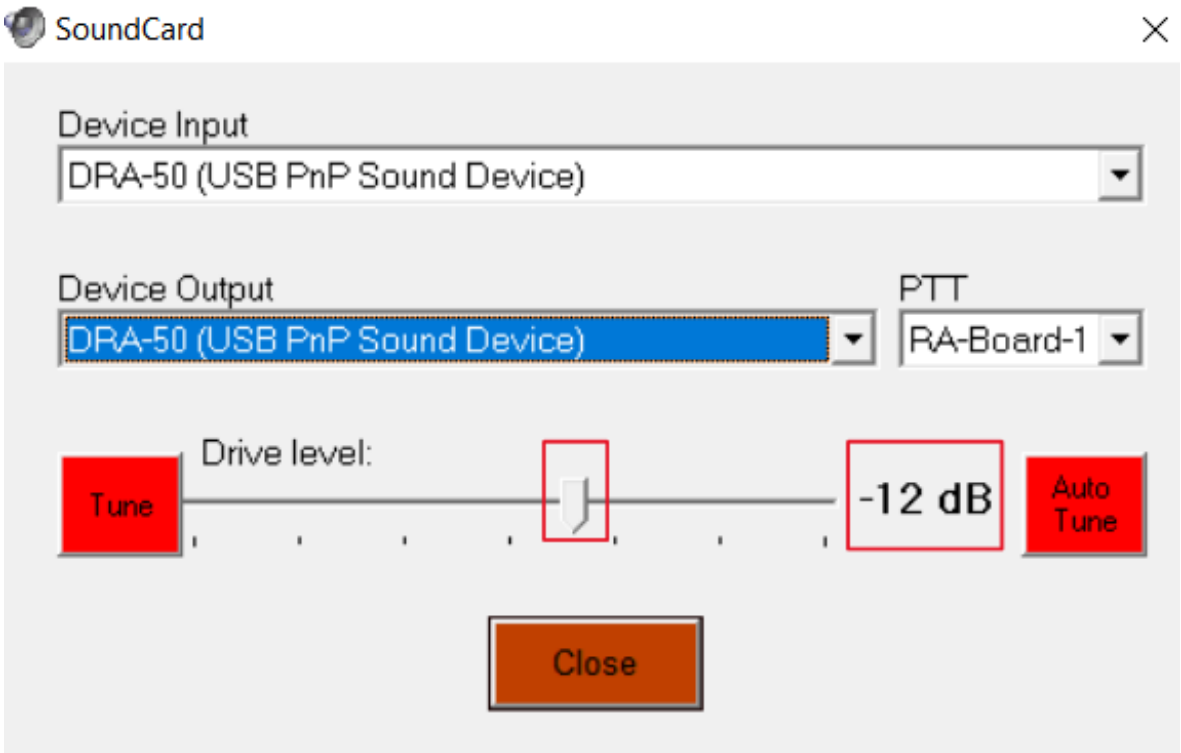
Under “Calibrate with:”, enter the station call sign or gateway call sign, then click on the power plug on the right side of the screen, your station will now send 10 tones to the other station



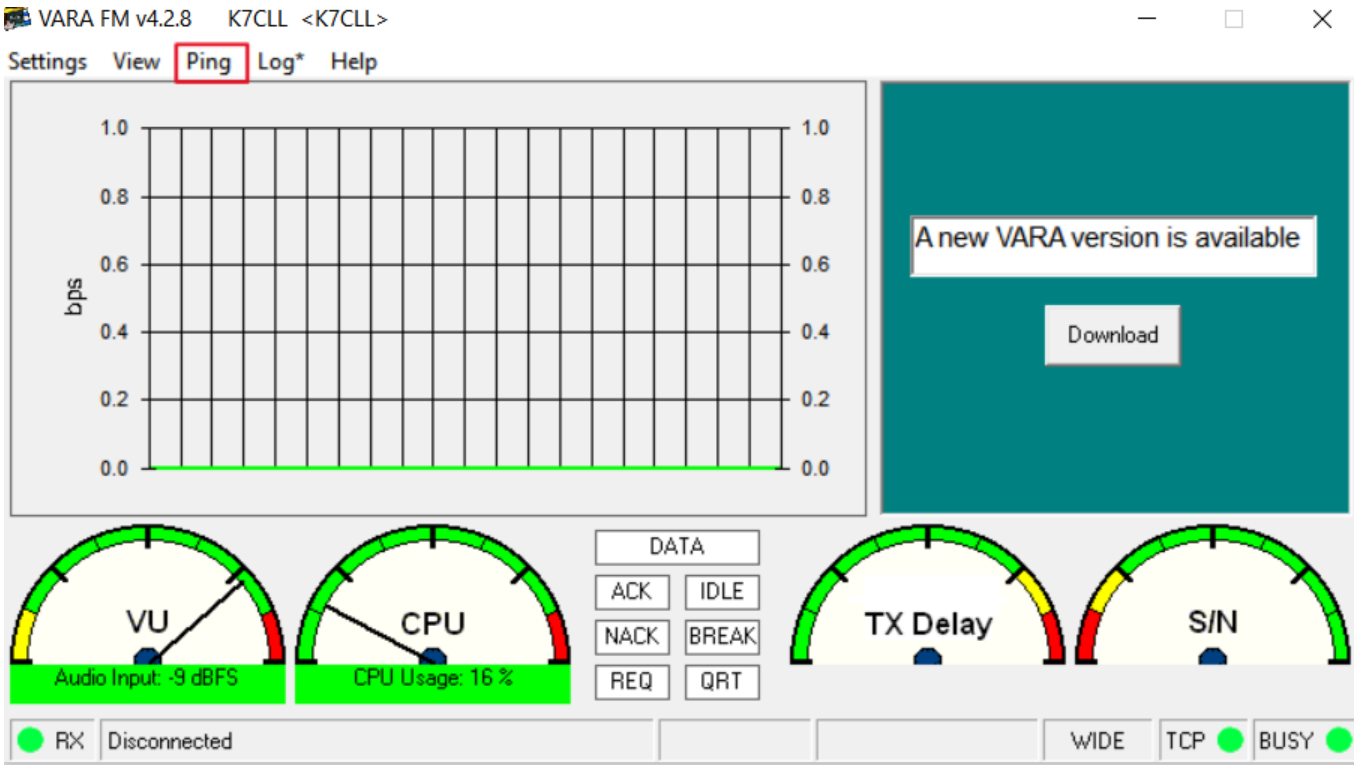
Your station just sent 10 tones, each a little stronger, the receiving station will reply back noting the best tone, your program will then automatically adjust your drive level (Very nice) or give further instructions



The SoundCard drive level here is -12dB, (You can left click your mouse on the drive level slider to manually adjust the drive level)

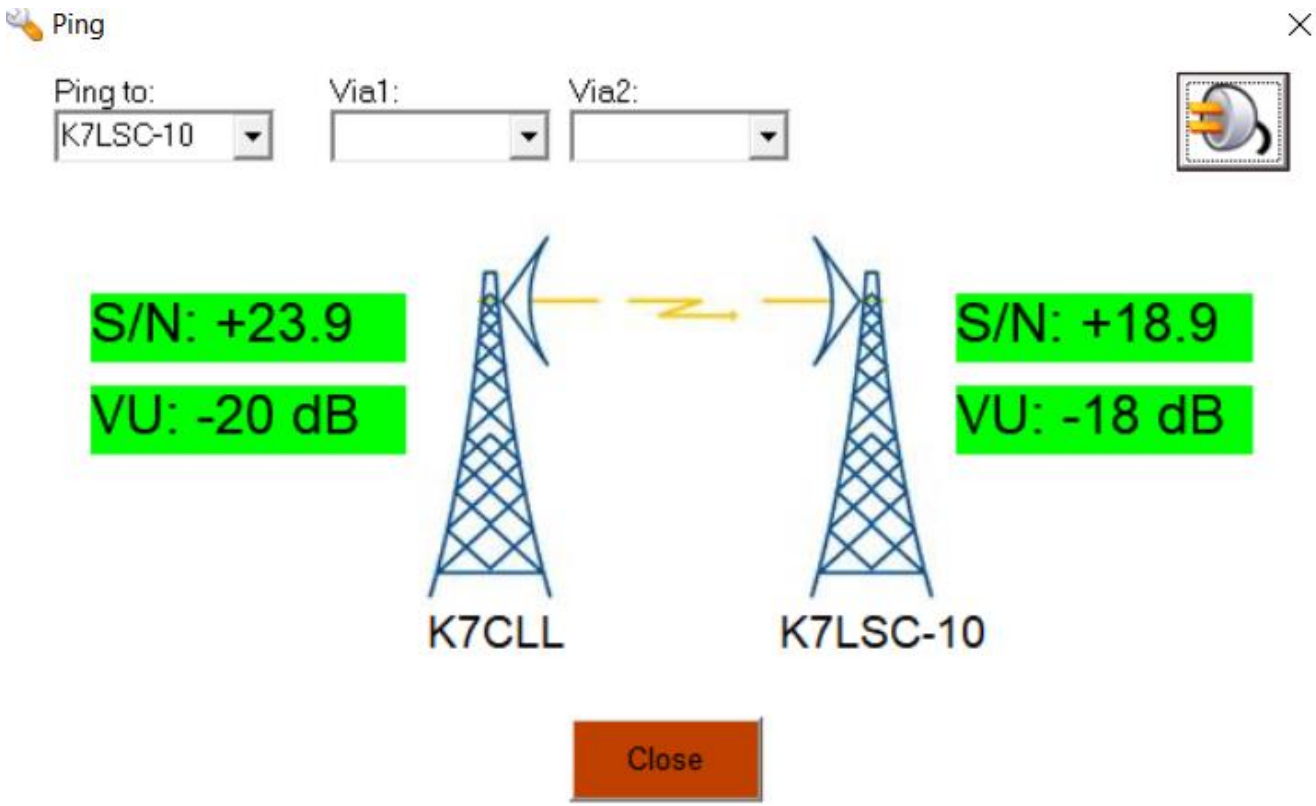


You can do a pathway quality check to another station using the “Ping” feature, with the VARA FM program open, go to “Ping”



You can Ping a station to see (S/N) and (VU) levels with your radio path, select the station/gateway call sign and any DIGIs, then click on the power plug

I Pinged the Legacy Salmon Creek RMS (K7LSC-10) from my house, it will not say "Approved", just shows you the numbers for each station, numbers in green are good



USB Hub issues with RF interference?

- Watch out for RF interference if you are using a USB Hub
- Using two different USB Hubs, one would lock up my station **every time** while using a mag mount on a cookie sheet nearby and 5 watts
- The other USB Hub would **intermittently** lock up my station
- Problems noted where the radio would lock up on transmit
- The Winlink program would freeze up while trying to do a session

What if there is no VARA FM stations in my county yet, how do I calibrate the first station?

1) Plan to get **two** VARA FM stations with a VARA FM license
2) Do the initial setup on your laptop soundcard Playback and Recording levels, then do the **audio input** level adjustment to VU -11
3) Drive level setup…With STATION A, do an auto tune to STATION B…STATION B will hear the **best tone** and report that back to STATION A, and the VARA FM program will automatically adjust the drive level

Setting up your first county VARA FM station

4) **Listen carefully** to the **tones being sent**, if they sound over driven, know that the **auto tune** function **can be fooled** into trying to select the **best** of 10 badly distorted tones, in that case, **manually adjust** the drive level and try again

5) Repeat the steps with STATION B…STATION B will now do an auto tune with STATION A, the best tone will be reported back to STATION B, listen carefully to the tones being sent again

The VARA FM program does several functions independent of your Winlink Express program

- When doing a **Ping** or **Auto Tune** between VARA FM stations, **only** the VARA FM program needs to be open
- If your station is just a **DIGI station**, no Winlink Express program needs to be open
- The **DIGI call sign** can be different from an opened Winlink VARA FM session, you just need the DIGI call sign **registration key** to entered in the VARA program setup page

A note of caution if using VARA FM to send large messages that may include file attachments

- If using a handheld radio and VARA FM to send file attachments…be careful not to try sending too large of a file…handhelds do not have active cooling and some modes like VARA FM will heat up your radio more than you might realize
- Scott Currie NS7C has reported people with Baofeng handheld radios have burned up their radio while trying to send a large file with VARA FM, there is no temperature protection shut down
- It is best to use a radio with active cooling (Fan) with larger file attachments
- Mobile radios without active cooling need to be careful…use low power

Cascadia Subduction Zone Estimated Impacts

This link shows the estimated impacts that a Cascadia Earthquake would have in the PNW

https://www.oregon.gov/oem/Documents/Cascadia_Rising_Exercise_Scenario.pdf