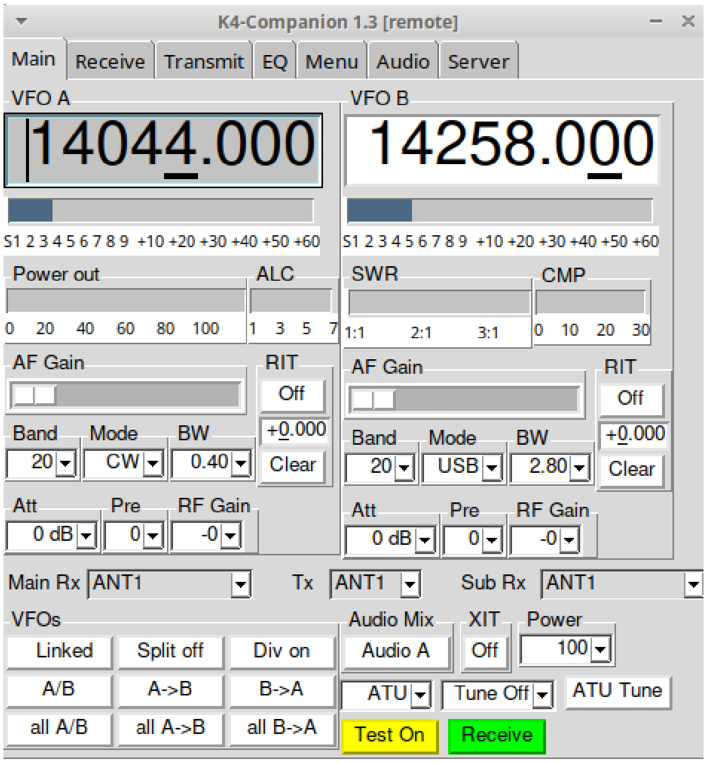
K4 Companion

An application for remote control of the Elecraft K4 series SDR transceiver


K4-Companion 1.3 [remote]

VFO A 14044.000

VFO B 14258.000

Band 20 Mode CW BW 0.40 RIT Off +0.000

Band 20 Mode USB BW 2.80 RIT Off +0.000

Att 0 dB Pre 0 RF Gain -0

Att 0 dB Pre 0 RF Gain -0

Main Rx ANT1 Tx ANT1 Sub Rx ANT1

Audio Mix Audio A XIT Off Power 100

ATU Tune Off

Developed by Dale Farnsworth, W7DA

Based on a simple utility originally devised by Charles Powell, NK8O

Revision date: June 17th 2025
The current version of K4 Companion is v1.3

Table of Contents

Introduction

K4 Companion is an application written in python3 that can remotely control an Elecraft K4 transceiver via TCP/IP. It currently controls the main K4 features and is very usable as is, but new features are being added all the time. K4 Companion is very configurable.

K4 Companion began life as a simple macro-sending program called K4Macro-Python, created by Charles Powell, NK8O. It has now grown far beyond a simple macro-sending program into a full-fledged remote control program for the K4.

Please send problem reports either: by sending an email, by entering an issue on github, or by making a pull request. Problem reports and suggestions are greatly appreciated.

Configuration information is maintained in a separate YAML file named, by default, k4companion.yaml. Custom configurations can be loaded with the –*config* option between the python executable and the desired configuration file.

Dale Farnsworth, W7DA
dale@farnsworth.org

License

Windows Installer & Binaries

Two options are available those who do not wish to create a full installation of Python3 or to examine the open source code. A Windows installer and Windows binary executable files are now available. The automated installer that places all items in the proper directory, creates a Start Menu entry, and it also will create a desktop shortcut if that option is selected. Double click the installer, then select the desired options. The user manual is also provided, found in %PROFILE%/k4companion/. **You may need to disable Windows security briefly to download the installer.** A way to start your K4 remotely is also needed. Please refer to the K4 User Manual or the various forums that address this function.

NOTE: The installer automatically places opus.dll, a mandatory dependency, in the %PROFILE%/k4companion directory. K4 Companion looks for opus.dll in the same directory (folder) as k4companion.exe and k4companion.yaml . The Windows installer does this automatically. K4 Companion has been compiled under Windows 11, and tested on both Windows 11 and Windows 10.

If preferred, manual installation is possible. There are three files that are needed to run under the Windows operating system. The three files, available on the github download page are:

- k4companion.exe
- k4companion.yaml
- opus.dll

The three k4companion files should be placed in a directory (folder) of your choice. These need to be placed in the same directory (folder). When starting the program, splash screen appears as the program opens (Windows version only).

The configuration file, k4companion.yaml, remains fully editable with your favorite text editor. You may break things if you don’t know what you are doing. Re-download the YAML file and start over if something breaks. If you have made significant sequential changes to the YAML file, it is a good idea to save the working copies with some kind of identifier.

A note regarding Windows Defender: The Defender reaction will range from none at all, to identifying K4 Companion as a virus. If identified as a virus, Defender will quarantine the executable and ask if you want to delete it. Instructions regarding bypassing Windows Defender are found at https://answers.microsoft.com/en-us/windows/forum/all/how-to-allow-an-ap-through-windows-defender/caab364c-9e65-448e-8635-98721be847ba

Use of K4 Companion outside your local network requires forwarding of port 9205 on the external router at the K4 server site. Port 9205 should point to the IP Address of the server K4. Unlike K4-to-K4 connections, K4 Companion functions via port 9205. The K4-to-K4 connection is via port 9204. Both ports can be forwarded to allow either type of connection. As an alternative to port forwarding, a virtual private network (VPN) or a SOCKS 5 proxy can be established.

Installation on Linux

One of the beauties of open source software is that it is typically cross-platform. Using Python3, the application is available on any platform that has Python3 available. It was developed on Linux, but it has now been successfully ported to both Mac OS, and Windows.

Here are the items one needs to take full advantage of K4 Companion and all its features:

1. You must have a way to turn your radio on remotely. This is detailed in the K4 user manual (pages 17 & 18) and requires the momentary closure and grounding of pin 8 to pin 5 on the DB15 ACC connector. Unfortunately the Wake On LAN feature is not available for the K4, at least not at this time. Other details are beyond the scope of this document. Nonetheless, there are many operators who simply leave the radio on at all times.
2. A computer capable of running a full installation of Python is needed. This has been tested with Xubuntu, Debian 12, Chromebook, various iterations of the Dell XPS series, and several Lenovo laptops, running a variety of Linux flavors.
3. Install portaudio (*sudo apt install portaudio19-dev* on Debian based distributions)
4. Install Python3. This is pre-installedd on most Linux distributions. Please refer to readily available documentation for installation on other operating systems.
5. Install ‘python-tk’ *(sudo apt install python3-tk* on Debian based distributions)
6. Install ‘pip3’, required for the remaining dependencies *(sudo apt install python3-pip)*
7. Install ‘pyyaml’ using pip
8. Install ‘opuslib’ for audio support using pip
9. Install ‘numpy’, and ‘pyaudio’ with using (Some of these may be pre-installed) portaudio is required for pyaudio to install correctly
10. Install ‘PySocks’ with pip. This allows SOCKS 5 proxy connections
11. **For access outside your local network, open port 9205 with port forwarding on your router,** a VPN, or SOCKS 5 proxy. K4 to K4 connections are accomplished via port 9204.

Notes: the typical installation of Python dependencies is with the command *pip install xxxxx* however security consciousness has caused the need for override with a number of operating systems. If your OS complains about installing the extras, use the command *pip install –break-system-packages xxxxx* It doesn’t really break anything. It installs the package in the individual user’s profile. I have done many such installs and it has never been a problem. Incidentally the *pip* command can be used to install ‘.whl’ Python files. Chirp, the well known open source HT programming software is provided this way, and using the .whl file is an easy way to keep up with changes and updates.

Although running on Mac OS has been challenging, if you are experimenting the “official” version Python 3 is 3.9, not 3.13. Installing Python 3.13.3 may cause some difficulties with two versions running side by side. Older (Intel) versions may not be qualified for full update to the most current OS version, and necessary dependencies are no longer available. See page 7 for further information.

When installing the pip dependencies you **must** specify *pip3* or you will get Python 2 files that won’t work. **Background colors** do not work under Mac OS. Buttons that have background colors unfortunately do not change on Mac OS. The most recent versions of K4 Companion have been tested on Mac OS and they work quite well on some systems, but not so much on others.

The YAML file can be edited to your liking, but it is easy to break things. If it stops working, simply download a fresh YAML file and start over. The latest version is available **here**:
https://github.com/DaleFarnsworth/K4-Companion/

Full Python Installation on Windows

Installation on Windows follows the same principles as Linux. It is quite similar, once Python3 is installed. **NOTE:** Windows binaries are available. See Page 3.

Here are the basic step:

1. As with Linux, you must have a way to turn your radio on remotely. This is detailed in the K4 user manual (pages 17 & 18) and requires the momentary closure and grounding of pin 8 to pin 5 on the DB15 ACC connector. Unfortunately the Wake On LAN feature is not available for the K4, at least not at this time. Again, there are many operators who simply leave the radio on at all times.
2. A computer capable of running a full installation of Python is needed. Windows 11 is the platform upon which testing has been done. With Windows 10, things may or may not work well.
3. Install Python3 https://www.python.org/downloads
4. Update pip *python -m pip install –upgrade pip*
5. Install numpy *pip install numpy*
6. Install opuslib *pip install opuslib*
7. Install pyaudio *pip install pyaudio*
8. Install socks support *pip install pysocks*
9. Install YAML support *pip install pyyaml*
10. From Contributions on the K4 Companion github site, download opus.dll and move it to the folder where K4 Companion is placed
11. **Forward port 9205 for access from outside your local network,** use a VPN, or configure a SOCKS 5 proxy.

Download k4companion and k4companion.yaml from the github site. Place them in a convenient folder. I suggest using PowerShell to use to open k4companion. It allows the use of the Ampersand, like Linux, to fork a process into the background and gives a little more flexibility. One caveat: if you close PowerShell or your cmd program on a running version of K4 Companion, it will exit the program. You will also need a copy of opus.dll in the same folder as the k4companion script. Opus.dll is on the github site.

The utility has been tested on Windows and works in the same way as it does under Linux. Known quirks include extensions are incorrectly assigned when files are downloaded. The main file may download with the '.txt' extension from the website and it should be either '.py', or left blank. Windows also wants to drop the '.yaml' extension. It is best in both instances to specify the extension when the downloads are saved, and to double-check the file names after downloading. If you have missed any of the dependencies, Python is very good at telling you what is needed.

The latest version is available **here**: https://github.com/DaleFarnsworth/K4-Companion/

MacOS Python Installation

Please read and follow all steps carefully. These instructions are verified on several MacOS machines running MacOS 15.5. It should work on other versions of MacOS as well. The usual disclaimers apply. Install at your own risk. Management, writers, producers, programmers, and all others associates are not responsible if you break your computer. Having said that, there is little to be broken and there are no reports of any problems.

1) Install Xcode from the App Store. After downloading, **open Xcode**. There is another Download and Install button. The only needed version is for MacOS, not iPad or other versions. It does not actually download the code again but it does install the code
2) Accept the license for Xcode. After completely installing Xcode, open a Terminal window (Applications → Utilities → Terminal). Run: *sudo xcode -license* and agree to the license terms. It has been found that MacOS does not always require this step
3) Download and install the latest version of Python 3 from *https://www.python.org/dowloads* As of this writing, the latest is version python 3.13.5 (as of 2025-06-14). Use the "macOS 64-bit universal2 installer"
4) Optional step to use the Bash terminal shell. If you prefer to use zsh, the default Terminal shell, see below. Change the default Terminal shell to Bash. Open a terminal shell (found in Applications → Utilities). Run: *chsh -s /bin/bash* This step is due to Bash being commonly used in many Linux/Unix applications. Again, zsh shell users see comments near the end of this document
5) Create an alias to the current version of Python. The default version of Python3 installed with Xcode is 3.9.6. Creating an alias points to the current version 3.13.5. In Terminal, run: *nano .bash_profile* Note the 'dot' at the beginning of the filename. Enter the following in *.bash_profile:* 'alias python=/usr/local/bin/python3'. On a second line, enter: 'alias pip=/Library/Frameworks/Python.framework/Versions/3.13/bin/pip3'. Note the actual commands do not use the single quotes ''. Issue the command *source .bash_profile* to activate the changes. It is recommended to completely close Terminal (from the menu bar) and re-open. This will re-read the configurations and system file locations. Zsh shell users see below for instructions.
6) Next, type: *pip install numpy*
7) Opus codec is next dependency. This is a download, build, install process. It is not at all complicated. Go to *https://opus-codec.org/downloads/* and download the file *opus-1.5.2.tar.gz* This will likely go to the Downloads folder on your Mac. In Terminal, type *tar zxvf opus-1.5.2.tar.gz* This will unpack the Opus library build files into a directory *opus-1.5.2* In Terminal, type the following commands: *cd opus-1.5.2,* then *./configure* (and note the 'dot' before the 'slash'). Next type *make* and finally *sudo make install* You will be asked for your password at this point, and the files will install into their proper places.
8) Next in Terminal, type *pip install opuslib*
9) Another build process comes next, but it is done a little differently. In Terminal, type: *git clone https://github.com/PortAudio/portaudio* This sounds daunting, but it will do its own thing and copy the files you need. Type the following four commands in Terminal as shown: *cd*

portaudio ; ./configure ; make ; sudo make install These commands can be executed sequentially, using the semicolon ';' as shown. If the process completes normally, you will be asked for your password to complete the installation.

10) There is one more file that must be placed in the system. While still in the portaudio directory, type: *cd include ; sudo cp pa_mac_core.h /usr/local/include/* This is a necessary file for the installation process, but it is not installed by default
11) Next, install PyAudio, PySocks, and PyYAML: *pip install pyaudio* , pysocks *pip install pysocks* , pyyaml *pip install pyyaml*
12) Install MacPorts https://guide.macports.org/chunked/installing.macports.html . Download the appropriate version and click on the package to install.
13) You must once again completely exit Terminal, then restart to access 'port'
14) Install *pkgconfig* with Terminal, using the command *sudo port install pkgconfig* Allow the install to add the needed dependencies
15) Install cmake: *sudo port install cmake* Allow all dependencies to be installed 'Y'
16) Install cairo: *sudo port install cairo* Allow all dependencies to be installed 'Y'
17) Install Python pkgconfig *pip install pkgconfig*
18) Install pyobjc *pip install pyobjc*

If all has gone well, download k4companion and k4companion.yaml from W7DA's repository on github at https://github.com/DaleFarnsworth/K4-Companion

Warning: if downloading from the web pages, the file *k4companion* will download as *k4companion.txt.* This file should be renamed as *k4companion* with the file extension deleted. To run the application directly, go to Terminal. Navigate to wherever you have placed the K4 Companion files. Type: *chmod 755 k4companion* It is not necessary to modify or change permissions on the YAML file. With this installation of K4 Companion, the program **must** be started from the command line. Again, navigate to the folder (directory) containing the two files, *k4companion* and *k4companion.yaml* To start the program, use the following command *./k4companion &* The ampersand '&' forks the program into the background. Then the terminal window can be closed. You should be ready to put the radio's information in the Server tab at this time. Since MacOS has extra security, the first time opening the program you must "Allow" K4 Companion. Because it couldn't connect immediately, it is necessary to press "Connect" after allowing the program. There is a way to create a desktop or other shortcut that can be called from Finder. This is described elsewhere in the K4 Companion User Manual.

When the script is run, it will advise of any missing dependencies or skipped steps.

Note for zsh shell users:

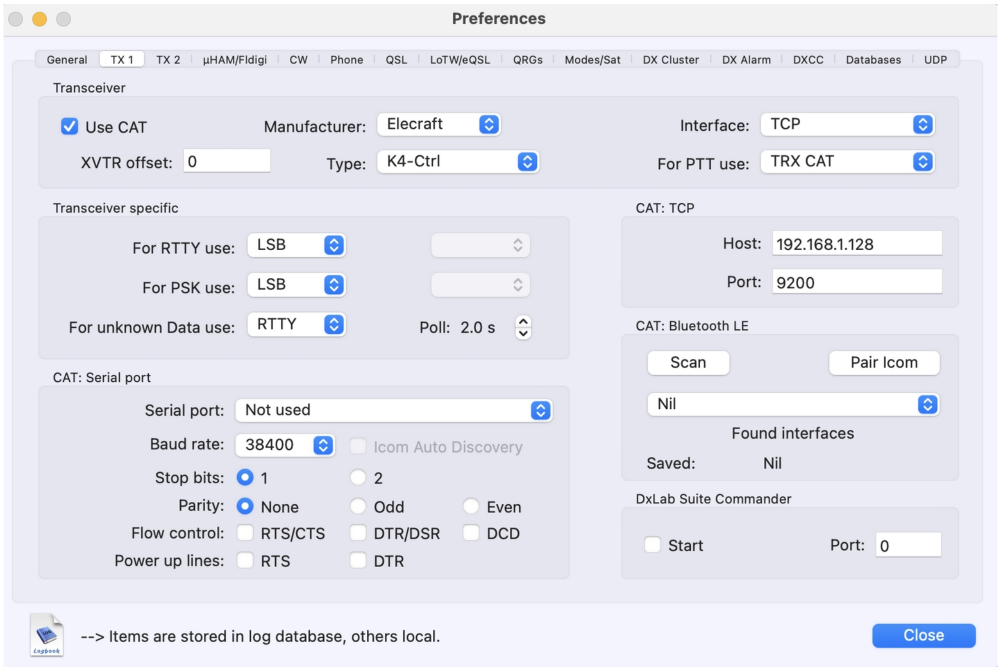
- To create an alias with zsh, open Terminal. You should be in your home directory (type *cd <enter>* if you have navigated elsewhere. Type: *nano .zsh* The alias will take the following forms: alias python="/usr/local/bin/python3" and pip="/Library/Frameworks/Python.framework/Versions/3.13/bin/pip3" With zsh the double quotes are needed. It is best to close Terminal and reopen so paths can be properly established each time changes are made and before MacPorts is installed

Note to MacOS users: RUMlogNG is a free (and excellent!) logging utility for MacOS, and the developer, Thomas – DL2RUM, has implemented a few features that are not yet in K4 Companion. Most notably, the panadapter and mini-pan. These programs run perfectly side-by-side. Connect

RUMlogNG via TCP/IP by using the radio’s address and port 9200 with the radio selection as Elecraft K4 – ctrl. RUMlogNG is available from the App Store.

RUMlogNG configuration page

Settings for running side-by-side with K4 Companion



Transceiver

☑ Use CAT

Manufacturer: Elecraft

Interface: TCP

XVTR offset: 0

Type: K4-Ctrl

For PTT use: TRX CAT

Transceiver specific

For RTTY use: LSB

For PSK use: LSB

For unknown Data use: RTTY

Poll: 2.0 s

CAT: TCP

Host: 192.168.1.128

Port: 9200

CAT: Bluetooth LE

Nil

Found interfaces

Saved: Nil

CAT: Serial port

Serial port: Not used

Baud rate: 38400

□ Icom Auto Discovery

Stop bits: ● 1 ○ 2

Parity: ● None ○ Odd ○ Even

Flow control: □ RTS/CTS □ DTR/DSR □ DCD

Power up lines: □ RTS □ DTR

DxLab Suite Commander

□ Start

Port: 0

--> Items are stored in log database, others local.

Image used with permission, Thomas Linder, DL2RUM

Work on a MacOS installer is ongoing.

Running K4 Companion

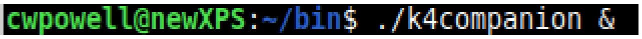
There are several ways to run K4 Companion, depending on the operating system. To execute the script directly, it requires the file to marked as executable. Under Linux and Mac OS, this can be done immediately after downloading the script. In a terminal window and using the command line, issue the command *chmod 755 k4companion .* It is not necessary to make any modifications or change permissions of the YAML file. The YAML file should be in the same directory or folder as the *k4companion* executable. Otherwise, the command line becomes complicated. No modifications of the Windows executable files is needed.

Methods for starting K4 Companion:

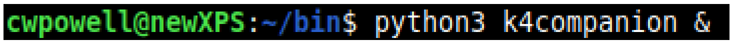
- Assuming the file has been made executable, from a Linux terminal window issue the command *./k4companion & <enter>* from the directory or folder where the script, as well as the configuration file are located. This will work with the “stock” configuration YAML. To use a custom configuration, use *./k4companion --config my_k4companionfile.yaml & <enter>*
- The alternative method, which requires no modifications nor marking files as executable is as follows: *python k4companion & <enter>*. The same approach can be used here for a custom YAML file
- To start the Windows binary navigate to the file in the chosen folder, then either click on k4companion.exe or highlight and press <e*nter*>
- If the Windows installer has been employed, K4 Companion can be run from the Start Menu or a Desktop icon if this option was selected at the time of installation
- In all cases, access from outside your local network requires forwarding of port 9205

Linux users: If you create a shortcut or desktop launcher K4 Companion, it must contain the **full path** to the executable in order to find the configuration file.

Windows users: Versions of PowerShell > 6.0 allow the use of the ampersand (*&)* to fork processes into the background. Windows requires calling *python k4companion & (enter)* and does not recognize ‘*python3’.* If the installer was employed, K4 Companion will be on the Start Menu. If selected there will also be a desktop shortcut. A taskbar shortcut is possible and the icon can be assigned to it as well.



```
cwpowell@newXPS:~/bin$ ./k4companion &
```

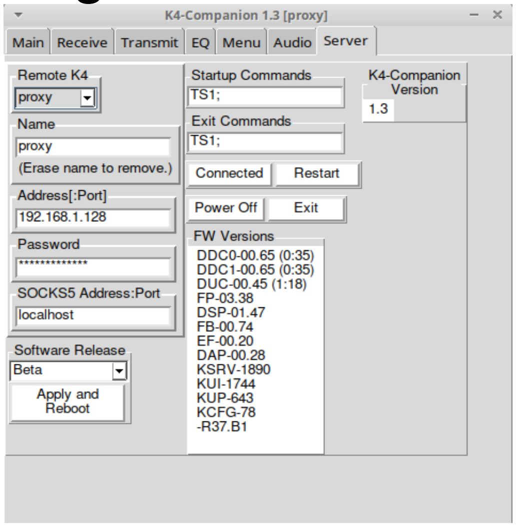


```
cwpowell@newXPS:~/bin$ python3 k4companion &
```

Mac users: A shortcut is possible using a shell script to start K4 Companion. Create a blank file on the desktop. Using Terminal, *cd Desktop ; touch k4companion ; chmod 755 k4companion* . Then use nano to edit: *nano k4launcher .* The file should contain:

```
#/bin/sh
~/path/to/k4companion
# where path/to/k4companion reflects your actual file path
exit 1
# EOF
```

Configuration: Server tab



Remote K4: proxy

Name: proxy

Address[:Port]: 192.168.1.128

Password: *************

SOCKS5 Address:Port: localhost

Software Release: Beta

Startup Commands: TS1;

Exit Commands: TS1;

K4-Companion Version: 1.3

FW Versions:

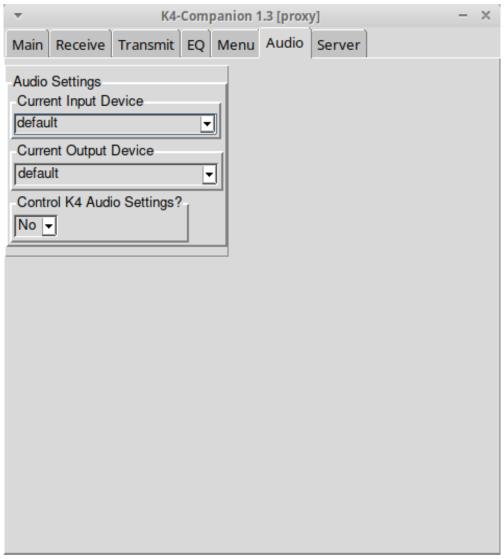
```
DDC0-00.65 (0:35)
DDC1-00.65 (0:35)
DUC-00.45 (1:18)
FP-03.38
DSP-01.47
FB-00.74
EF-00.20
DAP-00.28
KSRV-1890
KUI-1744
KUP-643
KCFG-78
-R37.B1
```

Server configuration is done through the ‘Server’ tab. Configuration parameters **must** be entered but K4 Companion will save these items and open after going back to the Main tab. K4 Companion now accommodates up to 25 servers. These can be run individually or several simultaneously. Items needed are:

- The address of the K4 to be controlled. This can either be the serial number of the radio in the form K4-Snxxxxx.local, or it can be the actual IP address of the K4. The default is **port 9205.** Specifying the connection port is not necessary unless it is redirected for an external connection
- Use of K4 Companion outside your local network requires forwarding of port 9205 on the external router at the K4 server site. Port 9205 should point to the IP Address of the server K4. Unlike K4-to-K4 connections, K4 Companion functions via port 9205. The K4-to-K4 connection is via port 9204. Both ports can be forwarded to allow either type of connection. As an alternative to port forwarding, a virtual private network (VPN) or a SOCKS 5 proxy can be established. The default SOCK 5 port is 1080 but this can be specified as xxx.xxx.xxx.xxx:1085, or point to whatever port is appropriate
- The password to access your K4. For all remote control this **must** be set on the radio. The default password will NOT work. In addition, the number of connections to your K4 must also be specified. This can be set to one, and up to four connections allowed. No connections will be permitted if the parameter is set to zero or left at default
- Once information is entered, K4 Companion will attempt to connect. If the information is entered correctly and the server is running, a connection will be established.
- **Hint:** enter password information first, then the server address.
- The server list can accommodate up to 10 servers. Deleting the information removes that slot from the list. There will be a blank slot at the end of the list for adding another server
- The Startup and Exit commands put the radio in Test Mode when K4 Companion opens and return it to Test Mode for safety when the program exits. These can be changed at your own risk!
- On the right hand side, the connection status is shown. ‘**Power Off**’ turns off the K4. ‘**Exit**’ will close K4 Companion without shutting down the radio. ‘**Restart**’ can be used if configuration is changed or if there is a brief loss of connectivity, i.e., the Internet connection drops briefly or network congestion causes a problem. ‘**Connected’** reflects the connection status.

Firmware upgrades or downgrades, and beta releases can be installed remotely. The column on the right shows what is actually installed and not available releases. Please check on the Elecraft site for information on the various releases and feature, or other information.

Audio Tab



Audio Settings

Current Input Device: default

Current Output Device: default

Control K4 Audio Settings?: No

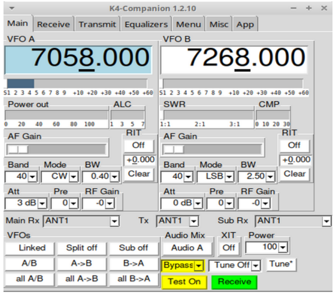
Audio connections are generally set to **default** in a typical Linux installation. Choices vary according to the Linux flavor and sound systems installed. In Windows there are a variety of settings, but generally these mention Speaker and Microphone. See **Notes on Operation** below.

Control K4 Audio Settings? If you are using K4 Companion to control the radio while sitting in the shack, this can be set to Yes. Otherwise for remote operations, set it to No. See **Notes on Operation** below. Once this tab is configured, the settings are saved automatically. No changes are needed unless something in your operational configuration changes. The equalizer settings **do** change on the radio, regardless of the settings selection in the App tab.

Operation and Controls

K4 Companion is logically organized with largely self-explanatory labels and functions. Each VFO can be linked, operated independently, swapped, placed into Split mode, Sub-receiver mode, or both simultaneously. A diversity receive selection is also available. Various other functions are controlled in the main tab, including preamps, attenuators, RF gain, ATU functions, audio controls, keyer speed, plus sidetone volume as well as power output, and the rig can be shut down from the K4 Companion.

The active transmit window is shown in pastel pink, so it is possible to see at a glance which VFO will transmit when the radio is keyed. This prevents confusion when using Split or Sub modes.

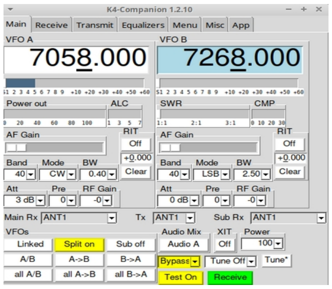

K4-Companion 1.2.10

VFO A 7058.000 — Band 40, Mode CW, BW 0.40, Att 3 dB, Pre 0, RF Gain -0, RIT Off +0.000

VFO B 7268.000 — Band 40, Mode LSB, BW 2.50, Att 0 dB, Pre 0, RF Gain -0, RIT Off +0.000

Main Rx ANT1, Tx ANT1, Sub Rx ANT1

Audio Mix: Audio A, XIT: Off, Power: 100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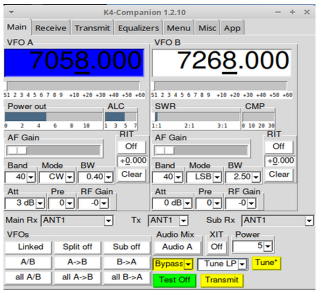
VFO B 7268.000 — Band 40, Mode LSB, BW 2.50, Att 0 dB, Pre 0, RF Gain -0, RIT Off +0.000

Main Rx ANT1, Tx ANT1, Sub Rx ANT1

Audio Mix: Audio A, XIT: Off, Power: 100

In the image on the left, VFO A is active for transmitting, and on the right, VFO B is ready for transmit. Note below that the K4 is actually transmitting at 5 watts, the ALC is normal at 5, and the SWR is slightly greater than 1:1. The details available at a glance are the frequency of each VFO, the S-meter reading for each VFO (if both are active), power out either 0-10 watts or 0-110 watts, SWR, and for phone operation, compression. When transmitting, the active transmit VFO show dark blue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VFO B 7268.000 — Band 40, Mode LSB, BW 2.50, Att 0 dB, Pre 0, RF Gain -0, RIT Off +0.000

Main Rx ANT1, Tx ANT1, Sub Rx ANT1

Audio Mix: Audio A, XIT: Off, Power: 5

The scroll rate for each VFO can be set independently from 1 Hz to 10 kHz. The rate is determined by clicking on a segment of the VFO, then scrolling with touchpad, mouse, or arrow keys.

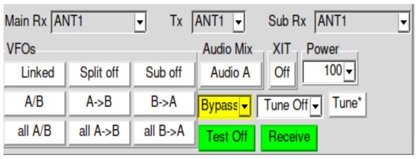
The VFO boxes also support **direct entry** Increment can be changed with the keyboard arrows ← → or mouse/touchpad. The active scroll rate increment is underlined. The Up ↕ Down arrows on the keyboard can be used if there is a single click in the VFO box. Scrolling always occurs at the underlined increment, and this can be changed as noted above.

Pull-down menus shown in the images above are available for each VFO to set the following parameters:

- Band selection, 160 through 6 meters
- Mode selection, including all available modes for the K4 (does not include digital sub-modes)
- Bandwidth selection from 50 Hz to 5 kHz (for AM reception)
- RF attenuation in 3 dB steps up to -21 dB
- Preamp selection − none, 1, 2, or 3 (depending on the band)
- RF gain, in -10 dB increments down to -60 dB. Note: Elecraft recommends use of Attenuation rather than RF gain. Attenuation reduces the signal to the ADC. This is different from the K3

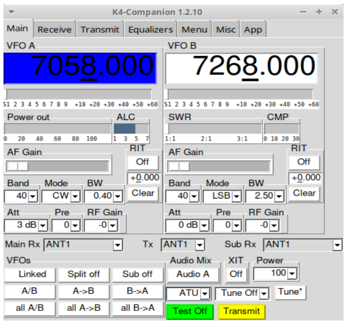
Each of these selections will “scroll” with the mouse or touchpad, in the same manner as the VFO controls.

The following controls are fairly self-explanatory, at least once you are familiar with K4 Companion.

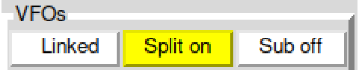

Main Rx ANT1 Tx ANT1 Sub Rx ANT1

When the application opens, it sets the K4 to Test Mode, as shown above. This button lights up yellow when engaged but turns green when off. Test Mode on startup prevents unintended transmission when setting up. **This can be disabled in the apps tab**, but it can be a useful feature. For safety, K4 Companion returns the radio to Test Mode on exit. Using Test Mode, it is also possible to check **ALC** and **compression** without actually transmitting.

Tx/Rx button at the lower right of the app has two features. If selected, the button warns that the K4 is in transmit mode, and at it turns yellow. Note that pressing this button does not actually put out any power. It is the equivalent of using a foot switch or pressing the PTT on the mic without actually speaking. One could use it to suppress QSK in CW mode but there is very little utility in that. QSK parameters are adjustable and the results are automatic. The button also turns yellow when sending CW as the transmitter is keyed.

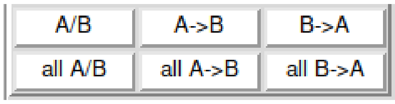


Audio output selection is labeled “Audio Mix”. Available selection are A, B, or A+B. If other selections are specified via macros, these will be reflected in the pull-down, but they are not directly selectable from K4 Companion. XIT is selectable with the next button in this row and controlled in the RIT digit box. The box and the button turn blue for XIT and green for RIT. Both RIT and XIT frequency delta can be selected directly or by scrolling with a mouse, touchpad, or keyboard arrows. Transmit power can be selected either with pull-down presets or by direct entry.



In the next row of buttons the options are:

- Linked VFOs or Unlinked. Elecraft calls this “Band Independence”
- Split on, Split off. This button lights up yellow as a secondary warning for the change of transmit VFO, and VFO B turns light blue to warn that it is now active for transmit
- Sub activates the K4 sub-receiver. This can be used either with Split mode to move the transmit VFO to B, or without. The main and sub-receivers have separate volume slider controls, located below the VFOs and meters.

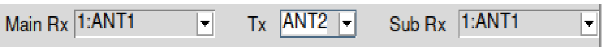


The middle row of the VFO section is self-explanatory.

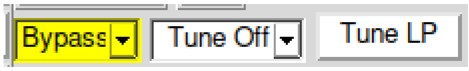
- Swap VFOs A/B (may be activated repeatedly maintain different modes, for example)
- VFO A to B
- VFO B to A

The finals row “All” swaps or copies all parameters, equivalent to a “double tap” of the buttons on the K4.

Antenna selection is now available, since version 1.2.7. These combinations mirror the selections available on the K4.


Main Rx 1:ANT1 Tx ANT2 Sub Rx 1:ANT1

ATU controls function via pull-down:



- Auto = ATU active, or Bypass
- Tune = normal ATU function = single tap on the K4
- TUNE = extended tune = double tap on the K4.

The “Tune” pull-down selects two states:

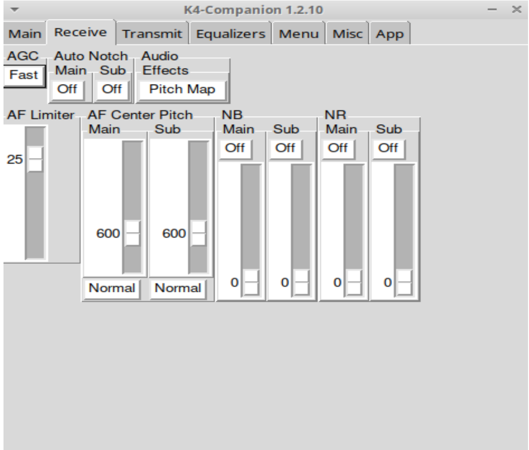
- Tune produces a carrier at the full (selected) power carrier
- Tune LP produces a low power carrier at 5 watts

The remaining button shows the “Tune” state that is active.

To EXIT K4 Companion, use the window ‘X’ at the top of the frame. Location will depend on your operating system. For Windows and Linux this is typically found at the upper right. On MacOS, it is usually on the left.

This completes the tour of the main tab of K4 Companion.

Receive Tab

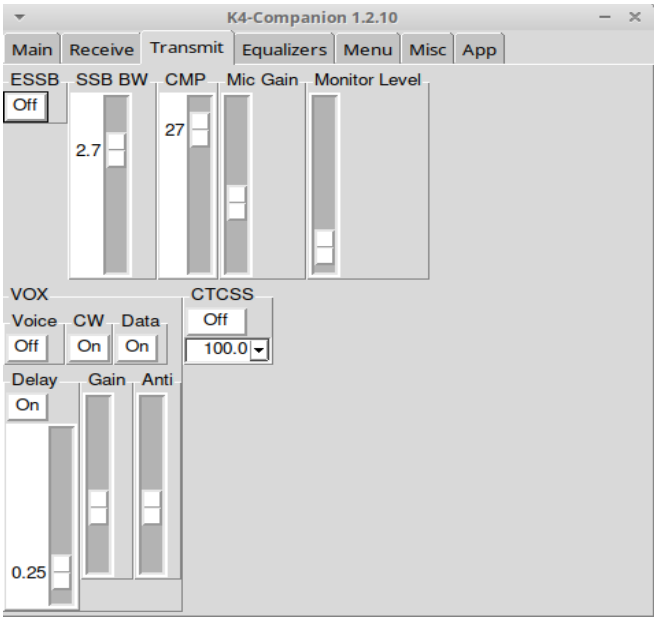


Controls for AGC, Audio Peaking filter, Auto Notch (SSB) and Audio Effects are in the top row. The function of each is explained in the K4 User Manual.   Options for Audio effects include

- Simulated Stereo – introduces a slight delay in L − R audio to reduce listening fatigue
- Pitch map − moves audio from left to right as the deviation from the center frequency decreases or increases
- Off − removes all tuning and listening effects

Note that the AF limiter only functions if the AGC is “Off”. This prevents extremely loud signals from blasting through at full-volume if the AGC is absent. AF Center Pitch functions by mode, and returns to the last user settings when changing modes. Noise Blanker, Noise Reduction, and RIT are explained in the K4 user manual.

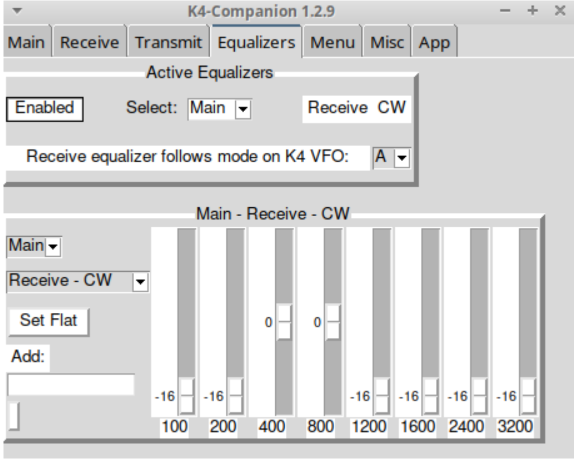
Transmit Tab



ESSB Off
SSB BW 2.7
CMP 27
VOX Voice Off
VOX CW On
VOX Data On
Delay On 0.25
CTCSS Off 100.0

- Transmit controls include ESSB (wide-band, high fidelity SSB). When selected, the SSB bandwidth varies between 3 kHz and 4.5 kHz
- SSB bandwidth for standard or CESSB (Controlled Envelope SSB) ranges from 2.4 to 2.8 kHz
- CMP, when set > 0, specifies the level of transmit audio compression when > 0, automatically enables CESSB
- Mic Gain − set to optimize SSB drive
- Monitor level − useful primarily if using K4 Companion for ancillary control of the radio while operating in the shack. No audio is returned when operating remotely. This control is independent of Sidetone level on the Main tab.
- VOX on/off with sliders to select parameters
- CTCSS – sets access PL^{TM} tones for FM repeater operation

Equalizers



Select: Main

Receive equalizer follows mode on K4 VFO: A

Main

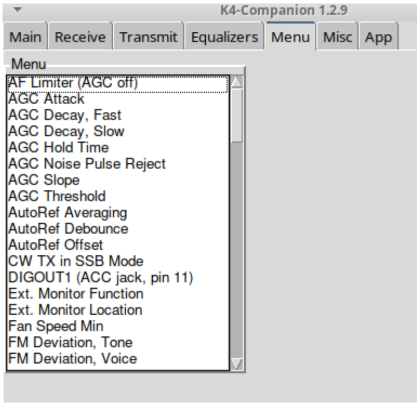
Receive - CW

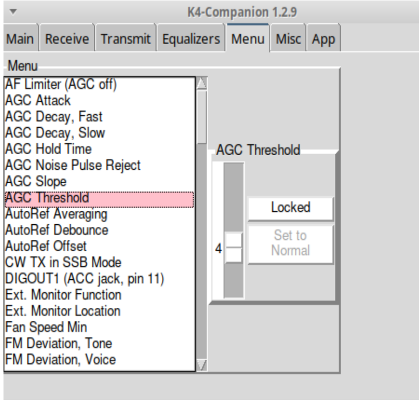
Transmit and Receive equalization can enabled or disabled, and be set by mode. These are personal preferences. When enabled **the settings on the K4 are altered.** The K4 settings do not revert to previous settings if the Equalizers on K4 Companion are disabled.

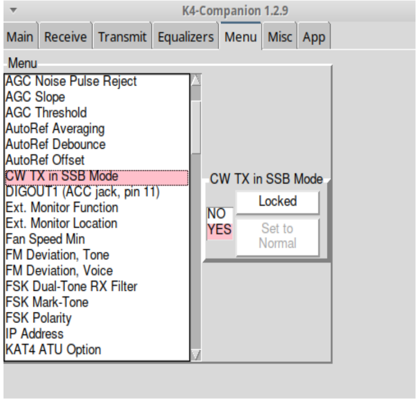
Please refer to K4 forums or the K4 User Manual for recommendations.

Menu Tab

The Menu tab reproduces **all** of the menu functions of the K4 menu functions. These functions are covered in the user manual. The configuration menu is a long, scroll-able list. When an item is selected, it appears in pink. Then a secondary widget opens that offers the menu choices. Some of these are simple YES/NO selections, others present a list, and some have a slider to select a value for the menu item.

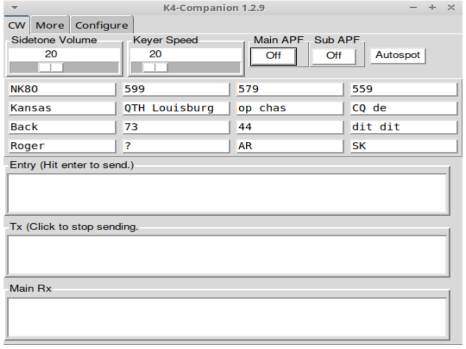






The images show a few of the selections possible through the menu system. Please be sure to read the K4 user manual carefully. Changing menu settings without due consideration can have unexpected results.

CW Window



Sidetone Volume: 20
Keyer Speed: 20
Main APF: Off
Sub APF: Off

NK80	599	579	559
Kansas	QTH Louisburg	op chas	CQ de
Back	73	44	dit dit
Roger	?	AR	SK

Entry (Hit enter to send.)

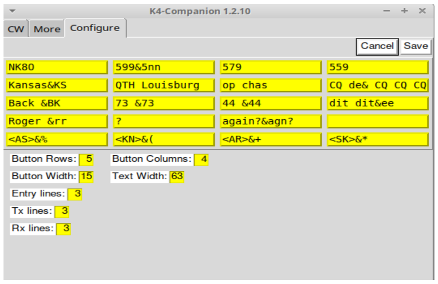
Tx (Click to stop sending.

Main Rx

K4 Companion has a CW functionality via keyboard.   There are a number user configurable macros that are easily set. These can be used sequentially in any combination. The typing buffer holds any text that is set until the user hits ‘enter’. The text will be sent and shown below in the Tx box. A cursor follows the text that is being sent. The sidetone will also reproduce each character audibly, unless the Sidetone level is set to zero. Tabs now divide some of the functions to prevent clutter of the interface. Audio peaking filter selection and Autospot are buttons in the CW tab. No spot tone is available remotely.

Several combination items require special characters to send correctly, but they have designations common to Elecraft. For example, ‘AR’ is sent with ‘+’ and ‘SK’ is sent with ‘*’. Other prosigns include ‘(‘ for **KN**, ‘=’ for **BT**, ‘%’ for **AS**, and finally ‘!’ for **VE**. To label these items, use the “&” as the divider to differentiate the label from what is actually sent. The label can be anything you like that tells you what is being sent. In the instance above, ‘My Call’ actually sends ‘NK8O’. ‘Kansas’ sends ‘KS’. The special characters ‘AR’ and ‘SK’ are show as below. Symbols that will not transmit on the K4 are excluded and a warning appears if any is entered in the text box.

Editing the buttons is accomplished with the ‘Configure’ tab. The ampersand (&) is used between the label and what is actually sent.   To finish editing, click ‘Save’. Changes can be made at any time. In the default configuration there are 20 macro buttons. The number of rows, columns, and other configuration can be edited to taste in the ‘Configure’ mode, but there is no harm in leaving the default configuration. One might use one row for CWT, another for hunting parks, and another for chasing DX. There is no distinction between upper case and lower case letters when sent. Brackets <> can be used in button descriptors but not to transmit . These characters are disable in on the transmit side of the buttons



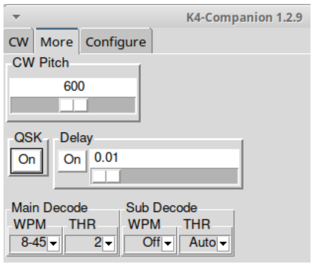
NK80	599&5nn	579	559
Kansas&KS	QTH Louisburg	op chas	CQ de& CQ CQ CQ
Back &BK	73 &73	44 &44	dit dit&ee
Roger &rr	?	again?&agn?	
<AS>&%	<KN>&(	<AR>&+	<SK>&*

Button Rows: 5
Button Columns: 4
Button Width: 15
Text Width: 63
Entry lines: 3
Tx lines: 3
Rx lines: 3

Some of the less obvious Elecraft CW designation are installed by default on the primary setup. These can be moved, changed, deleted, or edited to suit your preferences.

Finally, sending can be quickly canceled by a single click in the TX box. On editing if the user has a change of heart, the ‘Cancel’ button will undo any changes that were not saved.

Parameters such as CW offset/pitch are set in the “More” tab. QSK settings and CW decoder are also controlled here. The third line of the CW window does not appear unless decoding is enabled.



CW Pitch: 600
QSK: On
Delay: On 0.01
Main Decode: WPM 8-45, THR 2
Sub Decode: WPM Off, THR Auto

Debugging

No guarantee is made that this software will run on a particular machine or distributions. However, debugging information may be useful to the developer. Information for submissions is listed on github.com by opening an problem on the “Issues” tab of the K4 Companion site. To initiate debugging, use the ‘-d’ option: *./k4companion -d -d .* This will show a running list of actions by the script onscreen. To save the debugging information to a file, use *./k4companion -d >> mydebugfile 2>&1& .* The debug file can be named anything you like and the file will be created if it doesn’t exist already. To append an existing log file, use *./k4companion -d >> mydebugfile 2>&1&.* The file can then be posted or e-mailed to Dale, W7DA. Information from dmesg may be helpful as well: *sudo dmesg ,* although more likely if there is a system failure somewhere and not necessarily with K4 Companion.

Unfortunately the debugging option does not work with the compiled Windows EXE file. Report the problem in as much detail as possible to the developer, and copy any error messages that do appear.   The scripting has been thoroughly tested prior to compiling the Windows binary, so it is likely that the problems will be found in any case.

Notes on Operation

Audio functions on Linux can sometimes be challenging.   A working knowledge of ALSA, alsamixer, and alsactl is useful. Pavucontrol can assist with selecting the correct audio input and output. Be sure to check the Configuration tab in pavucontrol, and if audio is not working, try another combinations. These may include “Stereo Duplex,” “Play HiFi quality Music,” and “Pro Audio,” among others.

Audio tab Settings will generally this will be left at “default,” but there may be circumstances where other selections are needed. These may include “OSS” or various settings found in the sound system. Most of the audio issues appear to revolve around audio selection outside K4 Companion. In Windows, the App settings are likely to be “Microphone Array” for the “Current Input Device” and “Speakers/Headphones” for the “Current Output Device”.

A note about Windows: it is prone to occasional random audio failures, including disabling the audio for unknown reasons. You might have to dig into the subsystem a bit. I recommend using the Sound App, not the control panel. Use *mmsys.cpl* to access the Sound App. Control panel is often not very enlightening and the Sound App gives more information. As always, YMMV − your mileage may vary! This has not been a problem with recent builds.

An experiment proved that K4 Companion will run on WSL – Windows Subsystem for Linux, but it is not easy to set up, and there are quite a few stumbling blocks. Choppy audio is probably the greatest impediment, probably due to adding extra layers of complexity to the audio subsystems. It will like run under Parallels or other emulators, but possibly with the same audio delay issues. On the other hand, there are reports of the Windows version running under Parallels in MacOS with good success.

Enjoy!

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This manual was produced using FOSS, Free Open Source Software

Revision History

```
    Update changelog for v1.3

    windowsinstaller: Select the Desktop Shortcut option
       Previously, the desktop shortcut option was unchecked by default.
       Now, it will be checked by default.

    Fine tune Transmit meter lengths

    Modify tools/update_version to new version numbers

    Revise selection of multiple servers

    Rename App tab to Audio
       Also move the K4-Companion versin number to Server tab, column 3.

    Remove Misc tab and move contents to Server tab

    Rename Equalizer tab to EQ

    Fix saving and restoring location of CW window
       Previously, the CW window location was erroneously set when the CW
       window was reconfigured. Now, we only set its location when it is first
       opened.

    Improve specification of multiple K4 servers

    Print a better usage message on error

    Add label indiating K4's address can specify port

    Disallow port numbers greater than 65535

    Handle all K4 connect exceptions

    Add immediate mode CW Tx

    Stop sending CW when Escape key is pressed

    Handle Mac Enter key in CW text Entry

    Accommodate Mac mouse wheel scrolling

    Set focus on the click of toggle buttons

    Improve the setting of initial geometry

    Remove debug printing of group names/hierarchy
       This was useful early on, but less so now.

v1.2.10:
    Update changelog for v1.2.10

    Update K4 Companion Windows installer for v1.2.10
```

Update K4 Companion Windows exe for v1.2.10

Update K4 Companion User Manual to v1.2.10

Improve handling if no password is given

Restart by redrawing windows, not by execv
   We will reinitialize the windows, reather than restarting the program.

Add a modal option to popup windows
   Modal popups stop the mainline program execution until they are
   dismissed.

Fix parsing of window geometry
   It failed when the x offset of the window was negative.

Add VOX buttons for CW and Data
   We already had a VOX button for Voice.

Adjust the widths of the bar graphs and AF Gain
   Also, make them more consistent between Linux and Windows.

Add connect, poweroff, exit, and restart buttons
   Add these buttons to the App tab.

Improve the setting of the initial window geometry

Prevent the user from resizing windows
   There is no need. This will prevent the user from accidentally resizing
   the windows.

Make Tune* button display what it will do

Bugfix: Remove response TU0; from the ATU button

Limit the selection rate at which dropdown values
   High rates of value selections were particularly problematic on the
   bandwidth dropdowns. It takes about 1 second for the K4 to respond
   on a LAN, longer if we add the round-trip time of WAN latency.
    I found the problem was avoided if I deferred the selection for
   400 mS after a selection. I have set the deferral now to 1.5 seconds.
   It still seems responsive enough and should account for at least 1
   second of network latency.

Add support for multiple radios
   Added a new option "-r" or "--radio" that takes the name
   of a radio. This option is implemented by using a different
   settings file for each radio. The name of the settings file
   is .../<radioname>-settings.ini. For example, on Linux, the
   settings file for the radio K4one would be
   ~/.configs/k4companion/K4one-settings.ini.

Add Restart button to restart and reconnect

Adjust widget and frame spacing

```
Compact the Main tab vertically
   Reorganize the Main tab controls.
   Place the ATU buttons on a single dropdown button.
   Place the Tune buttons on single dropdown button.
   Introduce a Tune* button that repeats the most recent tune command.
   Move the Power Off button to the Misc tab.
   Remove the Exit button.

Revise VFO area layout to conserve vertical space

Move WPM from Keyer Speed slider to the  header
   Also remove numerical value from Sidetone Volume because it has no
   real-world significance.

Remove example_config_files/nk8o_k4companion.yaml
   It's identical to example_config_files/k4companion.yaml now,
   so it's not needed. We can add it back later if needed.

Clean up exit handling a bit

Unify k4companion.yaml and nk8o_k4companion.yaml
   The differences were minimal. Copy nk8o_companion.yaml to
   k4companion.yaml

Update nk8o_k4companion.yaml

Set Autospot button yellow while autospotting

Set APF background color to yellow when on

Fix ESSB toggle button

internal: In all evalcmd, round floats before int
   Round float values before converting to ints.

Add direct entry to the RF Gain dropdown button

Add direct entry to the BW dropdown button
   Also reverse order of BW entries.

Add increment/decrement of direct-entry dropdowns
   Increment with Arrow-Up, decrement with Arrow-Down.

   It initially only works with the Power dropdown button.

Make equalizer sliders narrower

Reserve red color for error conditions
   Change red buttons to yellow or blue.

Move RIT into VFO group

Change RIT slider to numeric text

Increase RIT/XIT resolution to 1 Hz

Change Main power setting to a dropdown button
```

```
    Clarify python version variable name

    Adjust layout of transmit tab
       Move two items to row 2 so the window isn't so wide.

    Replace CW button label separater char | with &
       At least for a while, we'll convert | to & in existing button values.

    Variable rename: options => optional

    Add additional widgets to the CW window

    Withdraw top_level instead of closing

    Factor out ButtonWidget from Button

    Factor out ToggleWidget from Togglebutton

    Factor out DropdownWidget from Dropdownbutton

    Add horizontal volume controls to VFO controls

    Enable mouse wheel on Slider widgets

    No longer bind vfo events on entire frame
       We had a problem where other widgets that bind the up/down arrows
       or mouse wheel. would change those widget AND the vfo.
       It was a nice idea, but is too confusing and problematic.

    Restore saved window positions on open
       Save the position of both the main windows and the CW window on
       close and restore them on the next open.

    Open CW window in CW mode, close it otherwise

    Ignore <Return> when editing CW buttons

    Allow all ctrl chars to work in the CW Entry field
       This allows copy/paste and navigation characters to function.

    Reset tx_sending_offset when CW window is opened.
       This fixes the bug in which CW was not sent after configuring the CW
       window.

v1.2.9:
    Update changelog for v1.2.9

    Update K4 Companion Windows installer to version 1.2.9

    Update K4 Companion Windows EXE to version 1.2.9

    Update K4 User Manual to version 1.2.9

    Only transmit CW in allowed modes
       Only send CW when the current transmit mode is CW or is SSB
       and CW transmitting is enabled in SSB mode.
    Fix Sidetone and Voice Monitor level sliders

    Validate CW characters before attempting to send them

    Add a Cancel option to the CW configuration screen

    Provide default values for CW prosigns

    Use RawConfigParser for .ini file settings
       This avoids the interpolation which caused problems when values contain
       the '%' character.

    Update tools/update_version for tentative versions

    Fix font for Equalizers Enabled button

    Break out Menu into a separate tab

    Add CW Text Decode configuration widgets

    Remove requirement for an extra --debug argument
       It was a mistake to require two --debug arguments to get
       normal debug output. Now we can get that by specifying only
       a single --debug argument..

    Add additional CW features
       CW is now in a top level window.
       The number of rows, columns, lines in the text windows are now configurable.
       Sending of CW can now be stopped by clicking on the Tx text field.

    Add label display to CW buttons

    Add CW transmit widgets

    Add CW text decode widgets

    Underline the VFO step character
       We also remove the step dropdown button, because it's not needed now.

       This means that to change frequency, you must use the mouse buttons and
       wheel and/or the keyboard Up/Down/Left/Right keys.

    Set font and center justify dropdown selectons
       Unfortunately, I don't know how to set the font for each specific
       ttk.Combobox, so I do it for all, based on the last such dropdown
       font value. I also set all selections to be centered. This is a
       compromise.

v1.2.8:
    Update changelog for v1.2.8

    Update Windows installer to version 1.2.8

    Updated User Manual to version 1.2.8 2025-05-03

    Update K4 Companion Windows EXE to 1.2.8
    Update K4 Companion User Manual to v1.2.8 2025-05-02

    Update Windows executable to 1.2.8 revised 2025-05-02

    Update To Do list

    Enable mouse control for VFOs
       A mouse click on a digit will set the VFO step and rotating
       the mouse wheel will change the frequency.

    Make Left & Right arrow keys change VFO steps
       If the VFO frequency spinner has focus, the left arrow key will
       increase the VFO step value and the right arrow key will decrease
       the VFO step value.

       Additionally, the PageUP and PageDown with change the frequency by
       10 times the current step value.

    Add additional settings for RF Gain

v1.2.7:
    Update changelog for v1.2.7

    Update Windows Installer to current version 1.2.7 2025-04-30

    Update Windows EXE to current version 1.2.7 2025-04-30

    Update User Manual to current version 1.2.7 2025-04-30

    Add antenna selection drop down menus
       One each for rx main, rx sub, and tx antennas.

    Fix Noise Blanker on/off and value sliders

    tools/update_version: Add support for dev branch

    Add startup_cmds and exit_cmds values to App tab
       Remove startup_cmds from the server settings and put it as a setting
       in the App tab.  Similarly, add exit_cmds that are K4 commands that
       are sent when k4companion exits normally.

    Windows installer updated to 1.2.6

    User Manual update to 1.2.6

    added Windows exe for version 1.2.6

v1.2.6:
    Update changelog for v1.2.6

    Handle a PC response in K3 legacy mode format
       Apparently sometimes the K4 returns a PC response in legacy mode format.
       I don't think this is supposed to happen because the first command we
       send to the K4 is "K41;", which requests that all responses be in K4
       mode format. So, this appears to be a minor K4 bug. We'll essentially
       ignore PC responses in the older format.
    update Windows installer to version 1.2.5

    add Windows executable version 1.2.5

    K4 Companion User Manual updated 2025-04-25

    nk8o_k4companion.yaml: Update to latest changes

v1.2.5:
    Update changelog for v1.2.5

    Redo the equalizers tab
       The equalizer interface was much more complicated than it needed
       to be. Now, you select a set of equalizers for all the modes.

       I apologize to those who have already configured equalizers.

    Simplify config evalcmds & evalresponses
       Now that we don't receive subscribed responses until all K4
       parameter values have been received, we no longer need to check
       for the parameter values to be None or short.

    Fix vox and qsk toggles and sliders
       Changes are extensive, because of the strange way in which the
       K4 combines vox and qsk delay on/off and values into a single
       command.

       We also defer subscribing to K4 responses until all k4 parameter
       values have been received once.

    Add .gitignore

    Add tools directory
       Some tools are useful now; some may be in the future.

    Update To Do List
       -Gracefully handle lack of audio input and/or output device.
       +Change all toggle button with more than 2 selections to dropdown buttons
       +
       +Turn off receive audio immediately when going into transmit mode, without
       +waiting for confirmation from the K4.

    update README.md information to reflect current changes

    K4 Companion version 1.2.4 Windows installer

    Close the splash screen, if there

    Handle case where no Audio devices are found
       Try to gracefully handle the case where no input or output audio
       device supporting an apropriate sample rate is found.

    Revert "version 1.2.4 Windows installer update"
       This reverts commit 58adf4927a80984a5736ac2b98201d68babd0a8f.

       k4companion-installer.exe was accidentally placed in the toplevel
       directory.

    Update To Do list
       Add: Gracefully handle lack of audio input and/or output device.

    version 1.2.4 installer including User Manual

    User Manual updated to current version 1.2.4 2025-04-21

    version 1.2.4 Windows installer update

    version 1.2.4, runs with opus.dll in the same folder/directory with EXE file

v1.2.4:
    Update changelog for v1.2.4

    Don't terminate the GUI on close until exit
       We were terminating the GUI while queued commands were still being
       processed, which sometimes resulted in tkinter exceptions.

    Fix Linked/Unlinked togglebutton
       Split mode and Panadapter modes should be independent of the
       VFO B Band Independence setting. Also, the K4 does not automatically
       send the Band Independence state in response to a RDY; command
       (as I believe it should), so we'll specifically request it at startup.

    update Windows installer to version 1.2.3

    add Windows executable version 1.2.3

    updated user manual to version 1.2.3

v1.2.3:
    Update changelog for v1.2.3

    Call subscribe_responses only when appropriate
       In several cases we called subscribe_responses(), when it was clear
       that we were subscribing to a single response. In those cases,
       we now call subscribe_response() instead.

       This change should result in no behavioral changes.

    Rename subscribe_cmds to subscribe_responses
       This better reflects its meaning.
       This change should not affect behavior.

    Subscribe to all responses before connecting to K4
       There was a race condition where sometimes the K4 sent a parameter
       value before the app was ready to receive it. This was noted when
       the VFO linked button had the incorrect initial value.

    upload Windows installer for 1.2.2

    manual edited to reflect current changes, known issues 2025-04-18

    Update Windows executable file to 1.2.2
```

```
v1.2.2:
    Update changelog for v1.2.2

    Try again to fix winfo error on closing
       commit b97d7eabc24355a21e29b2276afdcb24b580bb76 doesn't appear to
       fix the problem, so we'll try a more drastic workaround.

    Add TLS support and port 9204
       This code is only used on python version 3.13 or later.

    Fix wininfo error after closing
       The error rarely occurs because it results from a race condition.
       We sometimes (rarely) try to query information from tkinter after
       it has been closed. We'll try to avoid the error by checking if
       the server connection has been closed.

    remove stale installer

    /Windows/k4companion.exe updated to 1.2.1

    updated manual 2025-04-17 version 1.2.1

    updated /Windows/k4companion-installer.exe to version 1.2.1

v1.2.1:
    Update changelog for v1.2.1

    Windows installer 1.2.0 update
       Removed stale 1.1.40 Windows installer

    Update User Manual 2025-04-17

    update Window/k4companion.exe 1.2.0

    Update README.md 2025-04-17

    Update opus.dll to version 1.5.2

    Fix lost sub-receiver audio with 2 panadapters
       When dual panadapter mode is selected, the K4 sends an SB3; response.
       However the Programmer's Manual says the only valid responses are
       SB0; (sub-receiver off) and SB1; (sub-receiver on). We treated an
       SB3; response as meaning sub-receiver off. Now, we treat it as
       sub-receiver on.

    equalizers: Show active equalizer when disabled
       When the equalizers are disabled, we'll indicate the (pending) active
       equalizers in pink, after enabling, they are indicated in light green.

    update Documentation/K4 Companion User Manual.pdf to version 1.2.0

    updates to Documentation/K4 Companion User Manual.pdf

    add Windows/k4companion-1.2.0-installer.exe

    Add Windows/k4companion.exe 1.2.0
    Update changelog for v1.2.0

v1.2.0:
    Fix bugs in equalizer code
       There were a few. In particular, it would previously unconditionally
       set the K4's equalizer settings on startup. Now, we've added an
       Enable/Disable button. When disabled (default), no equalizer changes
       are sent to eht K4. When enabled, changes are still unconditionally
       sent at startup according to the equalizer settings in k4companion.

       This is a substantial rewrite of the equalizer code.

    Update To Do list

    Control app Mic Gain locally

    Add Windows/k4companion-1.1.40-installer.exe

    Update K4 Companion User's Manual.pdf to v1.1.40 (revised)

    Update Windows/k4companion.exe to 1.1.40 revised

    Update Windows/k4companion.exe to v1.1.40
       Apparently, this didn't work last time.

    Add version number to the displayed title

    Update K4 Companion User's Manual.pdf to v1.1.40

    Update Windows/k4companion.exe to v1.1.40

    Update changelog for v1.1.40

v1.1.40:
    Request that the K4 send opus-float encoded audio
       This is the default, but other software may change the format.
       If so, we reset it to the preferred format.

    Revert "Be more liberal in accepted audio encodings"
       This reverts commit 4c734154999d1606813edf87ae308609e61b61ca.

       Instead, we'll request that the K4 send us opus-encoded audio
       via the EM3; command

    Update changelog for v1.1.39

v1.1.39:
    Be more liberal in accepted audio encodings
       Accept encode_mode_opus as well as encode_mode_int16.

       Encode_mode_opus has been tested. Encode_mode_int16 has not.

    Update Documentation/K4 Companion User Manual.pdf

    Update k4companion.exe to v1.1.38

    Update changelog for v1.1.38
```

```
v1.1.38:
    Add version display to App tab

    Update To Do list
       Add mic gain control to local audio setting.

       Add version display in k4companion on the App tab.

    Update k4companion.exe to v1.1.37
       I tried to do this earlier, but failed.

    Restore WIndows/k4companion.exe
       I don't know how the deletion happened.

       Revert "Update Windows/k4companion.exe to v1.1.37"

       This reverts commit 1b3b6b02aabaeac66cf496e0088dfd72f0e2885b.

    Update Windows/k4companion.exe to v1.1.37

v1.1.37:
    Workaround for no pyaudio default audio device
       This is a problem reported by Margaret, K4ZMA, on Windows 11.

v1.1.36:
    Ensure we have a config dir on all platforms
       If the config dir doesn't exist, create it on darwin, win32,
       and Linux platforms.

    Update k4companion.exe to v1.1.35

    Remove ESSB startup bug from To Do list

v1.1.35:
    Fix ESSB togglebutton and SSB BW slider

    Update user manual to changes in v1.1.34

    Add a Windows .exe file in the Windows directory

    Update the Users Manual including Windows version

    Add Contributions/opus.dll and associated README
       This is a Windows dll file needed for running k4companion.

v1.1.34:
    Fix Exit button operation on lost connection
       There were two problems. First the directive, QUIT!, was missing the
       exclamation point.  The second was that after losing connectins, we
       correctly didn't send commands to the K4. Incorrectly, we also didn't
       act on internal directives like QUIT!.

       For good measure, instead of calling the quit() function, we instead
       call the root.destroy() if tkinter is running, and we call sys.exit()
       if tkinter is not running.
    Update the To Do list

    Improve Poll class implementation

    Make vfo scanning smoother
       We used to bunch up sending frequency changes every 50 mS.
       That worked well before we added audio support.  Now, we send
       them without delay for smoother audio reception.

v1.1.33:
    Handle lost connection to the K4 more gracefully
       Popup a an error message on socket send or receive error
       and mark the connection as closed.

    Create .ini file directory on Windows if needed

v1.1.32:
    Only popup not-connected warning once

    Fix bug in direct frequency entry
       The cursor would remain in the right side of the frequency spinbox
       and wouldn't permit the entry to be changed. Fixed.

    Fix diversity audio and sub off audio

    Remove Sub AGC control
       Contrary to the documentation, the K4 AGC control affects both main and
       sub receivers.

    Remove mic gain fom to do list, already done

v1.1.31:
    Show a popup for connected, but no response.
       This occurs when the password is wrong. Suggest that the user
       check the password in the App tab.

    Avoid exceptions on controls when not connected
       Some controls would generate an exception when changed while not
       connected to a radio. We now warn instead.

    Add widgets for VOX gain and anti-vox

    Update To Do List
       Add panadapter/waterfall

    Update the user manual with changes from v1.1.30

v1.1.30:
    Update to-do list

    Restart connection when password is changed

    Remove ":Port" from label for K4 address entry box
       Generally, there is no need to enter the port number, as the default
       port of 9205 is preferred. It will still be accepted though.

    Update nk8o_k4companion.yaml
    Call socket.send on socket.sendmsg failure

v1.1.29:
    Reconnect to server when address/port changes

    Fix exception for non-existent audio device(s)
       This exception occurred when the name of the audio device in the
       .ini file doesn't exist on the current machine.

    Add a to-do list

    Restore cat-only operation on port 9200
       Commit b6be0efd, which introduced handling audio receive packets
       in the server receive thread, broke cat-only operation. This
       commit fixes it.

    Introduce Server.cat_only variable - internal only
       Replace the various checks for port == 9200 or 9205 with checks
       for a Server.cat_only variable. No externally visible changes.

    Read up to 10 frames before deciding: no audio
       After opening the input device, read up to 10 frames of silence
       before deciding that there is no input.

    Update README

    Update README

    Add the User Manual to the Documentation directory
       Also move screenshot.png into an images sub-subdirectory.

v1.1.28:
    Fix pyaudio open code retry code
       In commit a0bcbb, I added two retries on opening the audio devices.
       Unfortunately, I even retried opening the input device when the
       previous opens succeeded. This commit should fix it.

    Add FW versions widget

    Add SOCKS5 proxy support

v1.1.27:
    Audio Mixer toggle button now displays all options
       It still only allows selecting some audio mixer combinations,
       but will correctly display other combinations if they are selected
       via the menu setting.

    Implement all audio mixer combinations

    Retry opening PyAudio a couple of times
       PyAudio sometimes fails to open. We'll retry it twice.
       If this doesn't work, we'll try to delay a second before retrying.

    Always send Audio MX commands to the K4
       Previously, they weren't send if "Control K4 Audio Settings" was
       set to No.
    Add QSK and VOX widgets

    Limit range of af-center-pitch slider when in CW
       In CW the range is 300-2000, otherwise it's 300-3000.

v1.1.26:
    Add k4 address and port to App settings

    Change to Opus-encoded transmit audio
       Thanks to Tom Blahovici, VA2FSQ, for a hint on setting the audio
       packet version number.

v1.1.25:
    Attempt to make server startup more reliable
       There were race conditions where responses were sometimes
       received from the K4 before we were prepared to receive them.
       I hope this commit addresses the problem.

    Update nk8o.k4companion.yaml

    Add RIT and XIT widgets

    Minor change to audio-effects toggle button

    Add Software Release Widgits

    Add "Normal" buttons for AF Center Pitch

v1.1.24:
    Reorganize widgets on receive and transmit tabs

    Add equalizer tab

    Standardize calls to server.subscribe_cmds
       Internal change only, no externally visible changes.

    Widen AF Center-Pitch settings

    Add SI parameters to the list
       Include SIDA, SIDD, SIDU, SIFP, SIRF, and SIRC. These are not fully
       documented in the Programmer's Reference Manual.

    Add CTCSS toggle and dropdown buttons

    Add noise reduction toggles and sliders

v1.1.23:
    Add noise blanker toggles and sliders

    Add auto-notch toggle buttons

    Add transmit voice monitor level slider

    Add mic gain slider

    Add center pitch sliders
    Add AGC toggle buttons

    Add audio effects toggle button

    Add CW pitch slider

    Add Receive tab with AF-Limiter and APF sliders

    nk8o_k4companion.yaml: Update to latest

    Rename the Settings tab to be App
       Since all the parameters we can configure can be considered settings,
       label the k4companion-specific settings "App".

    Add transmit tab with compression and ssb bw
       To the transmit tab, we add a compression slider, an
       ESSB on/off togglebutton, and an SSB bandwidth slider.

v1.1.22:
    Queue received audio in the receive thread
       Previously, the main thread would dequeue audio packets from the
       receive queue and then queue them on the audio queue to be picked up
       by the audio input thread. Now, the received thread places audio packets
       directly on the audio queue, reducing audio latency.

       I attempted to drop received audio packets if *any* were already queued.
       This resulted in too many dropped packets and audible artifacts.

    Remove duplicate set_only suffixes
       Internal change only, no visible impact.

    Change mic attenuation to a factor of 2000000
       It was 5000000

v1.1.21:
    Add initial audio transmit capability

    Fix TX Monitor Remote Menu initial setting

    Add timer functions - useful for debugging

    Clean up socket sendmsg errors

    Clean up error handling on socket connect failure

v1.1.20:
    Queue popup msgs, making them thread-safe
       Popup messages would not display properly when called from threads
       other than the main thread.

    Move except clause after queue.get_nowait()
       Code cleanup only. No change in behaviour

    Fix the sidetone slider
       The sidetone slider  now ignores "ML;" responses not representing CW
sidetone
```

```
    Update nk8o_k4companion.yaml
       With Charles' latest.

    Improve reliability of slider controls
       If a slider was moved rapidly, it was possible, though difficult,
       to get the slider value out of sync with the value sent to the K4.
       For example, the power slider might read 84 Watts, but the radio
       would actually be set to 79 Watts. This commit should fix that problem.

    bugfix: If audio input device is in settings
       This is part of the preparation for handling transmit audio

v1.1.19:
    bugfix: Fix Control K4 Audio setting

    Fix the Transmit/Receive togglebutton
       Before, it would work when clicked, but did not track the K4's state
       properly when the XMIT button on the K4 was pressed.

v1.1.18:
    Fix audio on system without 12000 Hz sample rate
       I obviously insufficiently tested commit e43a09ae
       "Resample to least multiple of K4 sample rate"

v1.1.17:
    Resample to least multiple of K4 sample rate
       Instead of resampling only to 48000 Hz, resample to the least integer
       multiple of the K4's sample rate. I.e, the first supported rate of:
       12000, 24000, 36000 or 48000 Hz. This will save CPU time on devices that
       support one of the lower output sampling rates.

    Integrate "directives" into the cmd structure
       Previously, buttons could have an option, "directive", indicating
       actions to be performed by the application. Now, directives are commands
       whose name ends in '!'. Examples:
         "directive: connect" becomes "cmd: CONNECT!;"
         "directive: quit" becomes "cmd: QUIT!;"
         "directive: show_previous_page" becomes "cmd: SHOW!PREVIOUS;"
         "directive: show_page XXX" becomes "cmd: SHOW!XXX;"

    Require debug_level >= 2 to print sent/received msgs
       Then uncommon debug messages won't become lost in a sea of common
       debug messages.

    No longer specifically request menu definitions
       Now that we get a dump of all K4 parameters at startup, we no longer
       need to later request the menu definitions.

    Add 5 Khz receive bandwidth option to config file

v1.1.16:
    Fix initial state of the Test Mode togglebutton
       We do this by delaying sending the RDY; command requesting the
       state of the transceiver until after we have sent our startup
       commands.
    Always control K4's audio on port 9200
       When receiving audio, we may not want to control the actual radio's
       audio, but when not receiving audio in the app, we always want to
       control the radio's audio.

    Fix debug msgs "sent: ..." on port 9200

    No longer request state for specific parameters
       Because we now get a complete dump of the K4 state, we no longer need
       to request the state of each parameter we're interested in.

v1.1.15:
    Finish startup audio settings
       Commit 409ffac was incomplete. This commit attempts to finish
       the job and also keeps the audio subsystem notified of changes to
       the diversity setting.

v1.1.14:
    Fix broken setting of audio_output_device
       Commit [b2c91fb4 Control PC audio mix and volumes] broke the ability
       to set the audio output device. This commit fixes it again.

v1.1.13:
    Fix connections on port 9200 (unauthenticated)
       Commit aaf589ad7a02322bdd9249cb549fb1942258147a broke connecting
       on port 9200. This commit fixes again.

    Fix startup issue with 'blank interface"
       Commit aaf589ad7a02322bdd9249cb549fb1942258147a didn't fix the problem
       it was intended to address. After sending the password to the K4, we
       need to wait a bit before sending the first command. This commit has us
       wait until the K4 has sent some data before we send the first command.

v1.1.12:
    Resample to 48000 Hz by repeating samples
       We have seen artifacts (clicks or ringing) when receiving CW with a
       couple of resamplers. Let's try a simple resampling by just repeating
       samples. The K4 provides 12000 Hz samples. Repeat them 4 times to yield
       a sample rate of 48000 Hz.

       We can only hope that (almost) all sound device support 48000 Hz.

v1.1.11:
    Delay initial dump of K4 parameters until ready
       We had a race condition where sometime the initial dump of K4 parameters
       was received before our widgets had subscribed to them. This caused the
       vfo widgets to sometimes not be initialized. We now delay telling the K4
       that we're ready for the dump until we're actually ready.

       I hope this fixes the issue we were seeing.

    Fix the audio mx togglebutton cmds

    Control PC audio mix and volumes
       Also add a new setting to optionally control the K4's audio settings
       as well.
    Update README.md to mention audio receive

v1.1.10:
    Optionally, save K4 password in settings

    Enable turning on diversity
       Diversity is particularly useful since we currently hear audio from
       both receivers all the time. Diversity keeps both receivers in sync.

    Fix the connect togglebutton
       It used to say 'connected' even on connection failure.
       Now it says 'connecting' until the K4 actually responds.

    Add an autospot button

    Don't print PING/PONG cmds unless debug >= 3

    Disable automatically, repeatedly, sent reports

v1.1.9:
    Handle pyaudio errors during playback

    Add saving/loading of settings file

    Avoid trying to send commands until server connect

    Add Setting tab including audio device settings

    Drop audio packets if we're behind processing them

    Use pydub to resample to 44100 Hz

    Move audio processing to a its own class

    Reduce audio delay by reducing audio write size

    Set frame rate to 48000 by duplicating samples

    Raise volume by multiplying pcm audio by 20

    Resample audio to 44100 Hz using resampy

    First working audio at 12kHz sample rate

v1.1.8:
    combobox: Allow settting colors for comboboxes
       Previously, the same color was applied to all comboboxes.
       Now the colors are applied to individual combobox instances.

    Decrease vfo spinner repeat rate

v1.1.7:
    Fix but in text widget

v1.1.6:
    Document some additional options in the yaml file
       Document is too strong of a word. A brief description is more accurate.
       Add the fact that widgets now support the leading option for additional
       vertical space before the widget and a label to surround the widget with
       a labeled frame.

    Move power-off and Exit buttons to column 2

    Improve password popup
       It's now a modal window, forced to remain on top.

v1.1.5:
    Add authenticated connection support on port 9205
       If the K4's port is specified as 9205, a password-protected connection
       is made on that port. This is a step toward supporting audio and PAN
       data on this connection.

v1.1.4:
    k4companion.yaml: Simplify yaml
       No externally visible changes in behavior.

    Remove groups that wrapped widgets for a label
       We instead put the label as an option of the widget.

    Add suport for labels & leading to all widgets
       This avoids the need to wrap the widget in a group just for a label
       and/or leading.

    Simplify font inheritance
       No outwardly visible changes except for a minor speedup.

    Permit a label to be added to widget items

    k4companion.yaml: Clean up the config file

    Improve validation of required item options

    Allow dash characters '-' in yaml file definitions

    Fix initial state of xvtr band selection settings

    Add a current screenshot to the README

v1.1.3:
    Rename program to K4-Companion
       This program has grown far beyond its initial ability to send macros to
       the K4. The name change better reflects its capabilities.

    Code cleanup

    k4macro.yaml: Move power slider
       This puts the audio sliders above the audio mixer selector.

v1.1.2:
    bugfix: Restore display of group labels
       Commit ceee3ba6a, which added tabs to pages, stopped displaying labels
       on groups. This commit restores them.

v1.1.1:
    menu: Defer loading menu definitions until needed
       We now don't request menu definitions from the K4 until the menu is to
       be first displayed.

v1.1.0:
    Add K4 menu support
       It may not be pretty but it appears functional

    Add tab support to pages
       Avoid requiring a notebook item being added to pages in oerder to get
       tabs.

    nk8o_k4macro.yaml: Add power_dropdown widget

    connect_button: Detect when k4 is connected

    nk8o_k4macro.yaml: Update from Charles, NK8O

    config: fix power_dropdown widget

    toggle_button: Allow some selections to have a cmd
       Previously, if one selection specified a cmd, all selections were
       requried to specify a cmd. Now only some of the selections may specify
       a cmd.

    Dropdown: Fix font setting

v1.0.43:
    Fix the range of the main and sub volume sliders
       The K4 maintains volume in a range of 0-60. In a misguided attempt to go
       from 0-100%, I scaled that to 0-100. Unfortunately, that does not map
       well. We now show the actual volume range of 0 to 60 for the volume
       sliders.

    bugfix: Avoid recursion on power slider
       The recursion was introduced when we permitted responses from the K4
       that match current values to be forwarded to subscribers. That change
       was necessary.

    Simplify K4 error code handling

v1.0.42:
    Validate item options in config file
       Check for required as well as optional options.

v1.0.41:
    Reformat K4 error messages

v1.0.40:
    Move power, ALC, SWR and CMP bar graphs up

    Show error messages for codes received from the K4
       We display them in a pop-up window.

    Permit connecting to the K4 via a button

    Rename cyclebutton to togglebutton
```

```
       Remove cyclebutton altogether as well as the updown option.

v1.0.39:
    Avoid subscribing to set-only commands
       Since they will never respond, there is no value is subscribing to
       responses for them.

v1.0.38:
    Fix incrementing/decrementing frequency
       It was failing when the existing frequency was not a multiple of the
       step size.

v1.0.37:
    k4macro.yaml: Fix SWR bar graph

    Remove atu_trainer_kx4ui.yaml, ctrl_panel_kx4ui.yaml
       They have some good info and may be resurrected later, but for now
       we're not keeping them up-to-date.

v1.0.36:
    Fix and recalibrate bar graphs

    Add ATU extended tune

v1.0.35:
    Rename all evaled options
       For example:
         responsevalue is now evalresponse
         cmdvalue is now evalcmd

    Many changes (Sorry)
       This change add bargraphs for power out, ALC, SWR and compression.
       Bargraph labels now use a fixed-width font by default.
       By default 1-point of leading is displayed before groups with labels.
       k4macro.yaml: It also rearranges several displayed widgets
       Miscellaneous bug fixes

    k4_macro.yaml: Add group marker comments
       Add #{ and #} markers at the beginning and end of each group.
       These help me find the end of a large group.

v1.0.34:
    Display active VFO and transmitting VFO
       Color the VFO frequency (currently pink) of the active VFO. While
       transmitting, color the VFO with the transmit freu=quency (currently
       red).

    Clean-up the display a bit

v1.0.33:
    radiobutton: fix bug referencing text

    nk8bo_k4macro.yaml: Add missing attenuator values

v1.0.32:
    k4macro.yaml: Add goodies from NK8O
    nk8o_k4macro.yaml: Include latest changes from NK8O

    Fix unexpected bandwidth and attenuator values

    Permit set_only and get_only cmds if multiple cmds
       For radio, dropdown, and cycle buttons, if a set_only or get_only
       command is specified, it it now permitted as long as it is not the only
       command or response.

    k4macro.yaml: Spelling change: Atten -> Attenuation

v1.0.31:
    Add nk8o_k4macro.yaml
       Example config file from Charles, NK8O.

    k4macro.yaml: Various updates

    config: Make togglebutton a synonym for cyclebutton

    cyclebutton: Set wraparound default to true

    Move cyclebutton 'justify' from selections
       Move 'justify'; option from selcections to cyclebutton

    Enable the width of the VFO to be specified

    Auto-set S-meter bar graph length
       Set the S-meter bar graph according to a percentage of the length of the
       text below the bar graph. The S-meter bar graph will match the text
       regardless of the point size of the text or the screen resolution.

    Add check for group without "contains:" in yaml

v1.0.30:
    Use dropdown buttons to replace cycle buttons

    Add dropdown buttons via a combobox

v1.0.29:
    Catch exceptions when calling eval
       If an exception occurs during an eval, print additional information.

    Change vfo INDY button text to UNLINKED

v1.0.28:
    Make VFO frequency display larger

    Calculate cycle selection width based on siblings
       Set cycle button selection widths on the maximum width of all siblings
       within the cycle buttons group.

    Use config preprocessor to organize YAML

    Simplify config file with a preprocessor
       Implement a simple preprocessor to simplify the organization of the YAML
       config file.
    Fix range of the sidetone slider
       The K4 Programmer's Manual says the range should be 0-100 in K4 mode,
       and only 0-60 in K3 mode. But it appears to be 0-60 in K4 made as well.

    Remove blinking from Tx Test on button
       Make it red instead.

    Change flashrate option to 'blink'

    Make all widgets black on white
       We can add color back in sparingly as needed.

    Reduce VFO step width to 6 characters
       Now that we don't offer a step width of 100 KHz, we no longer need a
       width of 7 characters to accomodate it. Six characters suffices.

    Remove auto-wrapping button text
       Auto-wrapping button text messed up multi-line button text, so this
       commit removes it.

    When debugging, avoid printing auto received msgs
       Certain messages are automatically received continuously from the K4.
       Currently that includes the S-Meter messages. Now, we'll only print
       those if the debug level is 3 or higher. This permits us to more easily
       monitor the other send/receive messages.

    Rename options that are eval()ed
       If they are passed to eval() rename the optios. This includes:
         cmd -> cmdvalue
         response -> responsevalue
         increment -> incrementvalue

    k4macro.yaml: Make some text changes
       Thanks to Charles, NK8O.

v1.0.27:
    Latest yaml changes using more cycle buttons

    Add support for Notebook (tabs)

    Add a bargraph, with S-Meter example

    Add a getvalue widget
       The getvalue widget is used to report a value that is automatically
       updated by the K4. For example, an S-Meter reading.

    Apparently, the K4 can return a null mode
       Some have reported receiving a response of MD; to a command MD; instead
       of MDn; as documented. It appears that the VT command can be sent with a
       null mode, rather than the documented required mode, so we'll just go with
it.

    Oops, fix partial cmd at the end of a read buffer
       Fix silly error in commit c77bfb8e4bfe6331c8ce8e71ab27afa3cf553462

v1.0.26:
    Handle a partial cmd at the end of a read buffer
```

```
      When a buffer is received that does not end in ';', a partial command is
      at the end of the buffer, and must be prepended to the following buffer that
      is received. The logic handling this was wrong. I hope it is correct now.

      Thanks to Dick, N4UN, for reporting the bug.

   Make a few more buttons into toggle buttons
      Thanks to Charles, NK8O.

   Make ATU bypass/auto buttons into a toggle button

   Add ability to cycle cyclebuttons up and down
      They cycle up if the button is clicked in its upper half and they
      cycle down if the button is clicked in its lower half.

   Change cyclebutton wrap to wraparound
      It now matches the (brief) documentation.

v1.0.25:
   Implement the cyclebutton widget
      This is a button that cycles between several button selections. Each
      selection can have its own command and text or image. As a special case,
      when there are two selection it is a toggle button that alternates
      between the two states.

   Change K4 error return to a warning unless debug
      Unless debugging is turned on, if the K4 returns an error response,
      we'll just print a warning message. If debugging, it will continue to
      produce an exception. We haven't seen any of these errors, I just want
      to be able to note them if/when they occur.

v1.0.24:
   Make vfo step combox box read-only
      This prevents the user from inputting invalid values.

   Fix checking for an error response from the K4
      We now will accep responses consisting of the command base.

   Fix sidetone slider

v1.0.23:
   Workaround a K4 bug dealing with 100 KHz vfo steps
      At least on the current version Production V36 and Beta V37.1,
      On startup, regardless of the VFO A step size, it reports a step
      size for VFO A of 100 KHz. The step size for VFO B is reported
      correctly.

      Also, if you try to select 100 KHz steps, it shows 100 Hz steps but
      reports via the API that it has 100 KHz steps.

      We disallow seting 100 KHz step size via the API and if we receive
      a step size of 100 KHz, we force it to be 100 Hz, matching what is
      on the K4 display.

   Request the K4 to send updates immediately
      Previously, updates were sent every 60 mS.
```

```
    Remove a harmless exception
       The condition triggering it is harmless and probably caused by a
       difficult-to-avoid race condition.

    Bugfix: Handling receiving vfo step size was broken

    Change sidetone level to a slider

    Only store response after base in k4_parameters
       Instead of storing the cmd/response base, we just store the portion of
       the command/respnse after the base characters. For example, for the
       response "MD1", where we used to store the entire response, we now just
       store "1".

    Add list of all command bases
       For future possible use.

    Check for error response from K4
       Raise an exception if the K4 responds that a bad command was sent.

    k4macro.yaml: Organize into two columns
       This removes the need to specify as many row and column placements.

    Change volume control to be a slider

    k4macro.yaml: Fix 5% volume value

    Cache get-only commands as well as normal cmds

    Make k4macro.yaml display more vertically compact

    Add back the yaml comments re the vfo settings

v1.0.22:
    Add latest mods to NK8O's k4macro.yaml file

    Bugfix: Set vfo step size properly on startup

v1.0.21:
    Change vfo step selector to a combobox
       The vfo selector defaults to combobox, a spinbox can be selected
       by adding 'step_spinbox: true' to the vfo yaml entry.

    New k4macro.yaml changes form NK8O

    Improve vfo direct frequency entry method

    Oops, the previous commit was too lenient, IMHO
       Raise an exception when trying to add a duplicate poll request.

    Make poll add/remove functions more tolerent

    Add button flashing capability to radio buttons

v1.0.20:
    Speed up displaying of multiple pages
    vfo fixes

    Handle commands with special "get format"

v1.0.19:
    Fix multiple page support
       Now the directives 'show_page' and 'show_previous_page' now work,
       although page display is not fast.

    Remove unused variables

    Synchronize VFO step size with K4

    Maintain state only for stateful commands
       Do not maintain the K4 parameter state for non-parameter commands.
       These are the commends that are set-only or get-only. Also, disallow
       set-only and get-only commands in radio buttons, because radio buttons
       need to match the K4 state.

v1.0.18:
    Unconditionally send commands
       We were being smart and assumed that all commands set K4 state.
       This is true for most commands, but not all. In particular, the SW
       commands modify the K4 state, but they don't directly represent state.
       Now, we'll send commands even if we recently sent the same command.
       In the future, we could distinguish between those commands that
       represent state and those that don't, but it likely isnt worth it.

v1.0.17:
    Update example_config_files/k4macro.yaml
       Incorporate the latest changes from NK8O.

    Always request parameter status when subscribing
       When subscribing to a K4 parameter, unconditionally request the
       parameter's current status.

    Rework polling mechanism
       Add capability of having poll callbacks with differing intervals.
       Right now we send vfo updates after 50 mS from the last change
       and poll receiving from the K4 every 1 mS.

    Remove server.base_cache
       It is an unnecessary kludge

v1.0.16:
    Internally maintain the K4's parameter status
       This simplifies the handling of radio buttons that send  multiple
       commands and responses, pemitting some radio button bug fixes.

v1.0.15:
    Implement a slider widget
       An example using it to set/get the K4 power output has been added to
       example_config_files/k4macro.yaml

    k4macro.yaml: incorporate changes from NK8O

    Fix debug msg on received bytes vs string
    Print debug messages to stderr

    Do not decode responses from non-K4 servers

    Add two config files created by KX4UI

    Clarify a message when the K4 has disconnected

v1.0.14:
    Gracefully handle server (k4) shutdown

v1.0.13:
    Rework radio button response handling
       Now gracefully handles radio buttons that do not include all possible
       values for the particular parameters controlled by the radio buttons.

    Rename k4macro.yaml.nk8o to k4macro.yaml
       Keep k4macro.yaml.nk8o as the only current example config file
       and rename it k4macro.yaml.

    Simplify specifying server startup commands
       This simplifies the implementation as well as the specification
       of startup commands.

    Remove no longer needed comments from config

    README: Add request for problem reports

v1.0.12:
    Add ability to send commands to K4 at startup

    Cleanup the code a bit

    Bugfix: Button cmd sending was broken, now fixed

v1.0.11:
v1.0.10:
    NK8O's latest yaml

    Permit multiple callbacks on same radio response

v1.0.9:
v1.0.8:
v1.0.7:
    Raise default button font size to 10
       This makes the smaller controls easier to see and to click.
       We leave the default label size at 8 as they don't need to be
       as prominent as the controls, IMHO.

    Close the program if a server is not found

v1.0.6:
v1.0.5:
    Fix bug to handle text that is an integer
       Text in the yaml file that happened to be an integer was being
       treated as an int rather than a string. Force it to be a string
       by using the str() function.

v1.0.4:
v1.0.3:
    Remove debug msgs for delay between servers

    Add email address to README

v1.0.2:
    Specify multiple cmds to servers via a list
       There was a problem when specifing multiple commands to multiple servers
       via a dict. Repeated commands to the same server would replace previous
       commands to that server in the dict. We now specify a list of dicts
       to alleviate that problem.

v1.0.1:
    Version 1.0.0
       First release to github
```