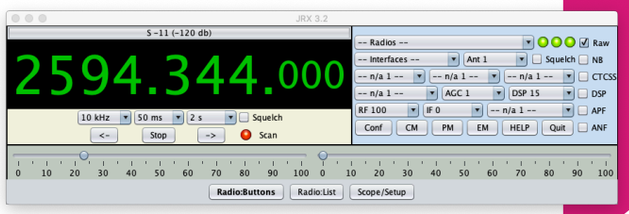
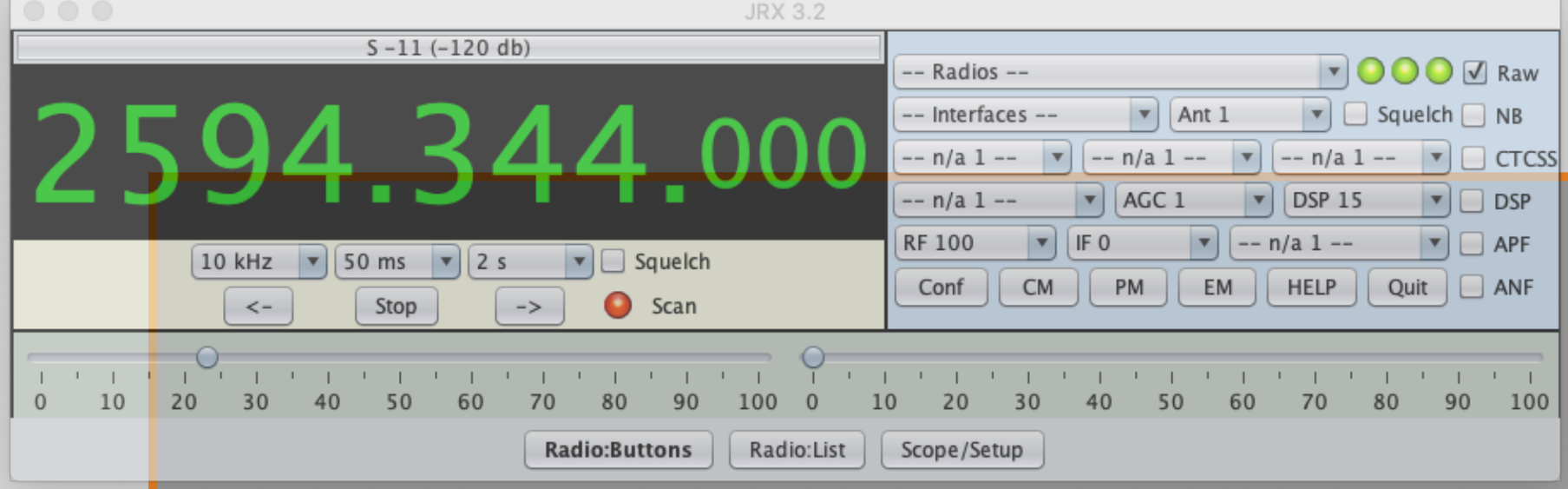
Version 5.1.0



JRX_TX

The Basics

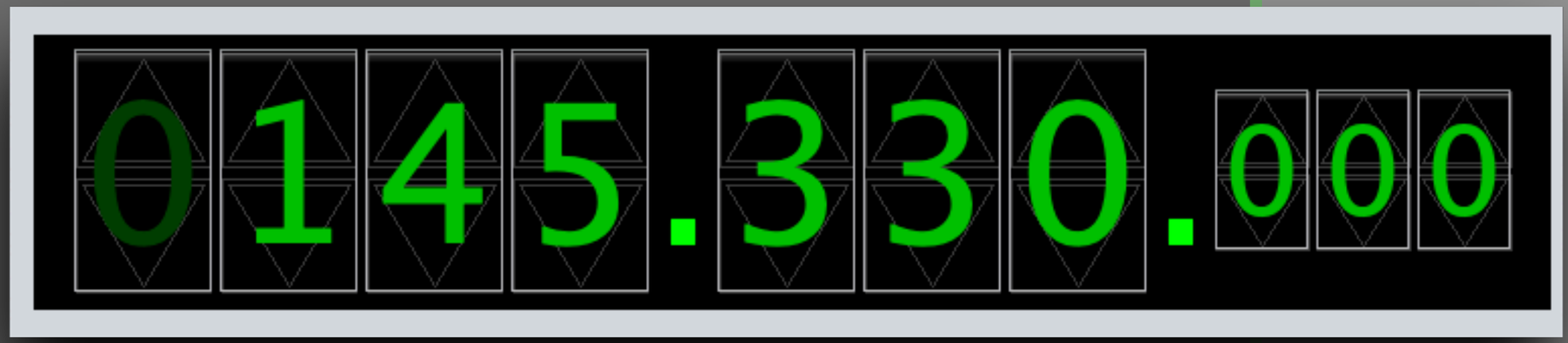


Transition from JRX to JRX_TX

Introduction

If you know how to use JRX, you will find everything you loved and some more capability in JRX_TX. The goal was to add transmit controls, preserve the operations of JRX, and make the entire application accessible for blind operators. The incentive was the fine pioneering of Paul Lutus with JRX and the need for an accessible tool for blind amateurs to use the newer touch screen based radios. Hamlib has been faithful to support those new rigs so here is a way to operate them with voice assist. The development was done on the MacOS platform so everything has been tested with VoiceOver. Most of the testing was on the IC-7100 which is a touch screen rig. Enjoy.

Using the VFO Display



01 Setting the receive frequency

Using the keyboard may be easier ... for sighted users.

The left and right arrow keys will move you across the digits. The up and down arrows will increase and decrease the values. The display looks like a radio VFO readout. It serves as both a display and a control. As you make changes they are immediately sent to the radio. If the radio is not capable of operation on that frequency, the app is silent about that. Some radios set different modes as you set the frequency.

So what do the double decimal point do? Well, they separate the display into three groups. The group on the right is Hertz or cycles per second. A value of 100 is 100 Hertz. The group in the middle is Kilohertz or thousands of cycles per second. So a value of 100 in this group is really 100 KiloHertz or 100 Khz or 100,000 Hertz or 100,000 cycles per second. The group on the left is Megahertz. So 100 in this group is 100 Megahertz or 100 Mhz or 100,000 Khz or 100,000,000 Hz . You can see that the decimal points take the place of commas. The figure on the preceding page shows digits of 0145.330.000 which means the frequency is 145.33 Megahertz or 145,330,000 cycles per second.

The exciting part of this is the ability to scan the band by holding down the up arrow key on a digit. When looking for any activity, using the 1 Khz digit is a good choice. To fine tune a single sideband voice, use the ones Hertz digit. The mouse works too, just like it did in JRX. Click the top half of a digit to increment and bottom half to decrement. For slewing the digit, use the mouse wheel.

Using the keyboard is a breeze ... for blind users.

The arrow keys will move you across the digits and increment and decrement the digits. VoiceOver keys are not needed to navigate within the VFO Display Control. When you use the up or down arrows, the current digit is changed and the value is announced. When you use the left or right arrows, the frequency and VFO in use are announced. Use the VoiceOver keys to leave the VFO display and visit the other control groups. The interface make use of tab groups. When you first hear that you are on a tab group, the left and right arrow keys can be used to move through the tabs. The VoiceOver keys do not change tabs. Using the plain old left and right arrow will move to the next tab and voiceOver will announce it.

The VFO Display Control is made of ten “decade digits” which are aware of when you increment up past nine. The next higher decade digit will increment and the current digit will wrap around to zero. It works just like the odometer on a car. You can wind up in forward, or on some cars, you remove miles by going in reverse. The digits are green and the leading zeroes are dimmed. This makes for a nice sexy display which looks like a real transceiver. The app was developed on a Mac and tested extensively with VoiceOver. Since the code is Java, it will work on Windows and Linux. The speech has not been tested yet on those platforms. It is our intention to make this work with speech on all the supported platforms, if possible.

02 VFO Operations

For blind operators:

There are shortCut keys to perform the operations:

OPTION A will select VFO A with a confirming dialog.

OPTION B will select VFO B with a confirming dialog.

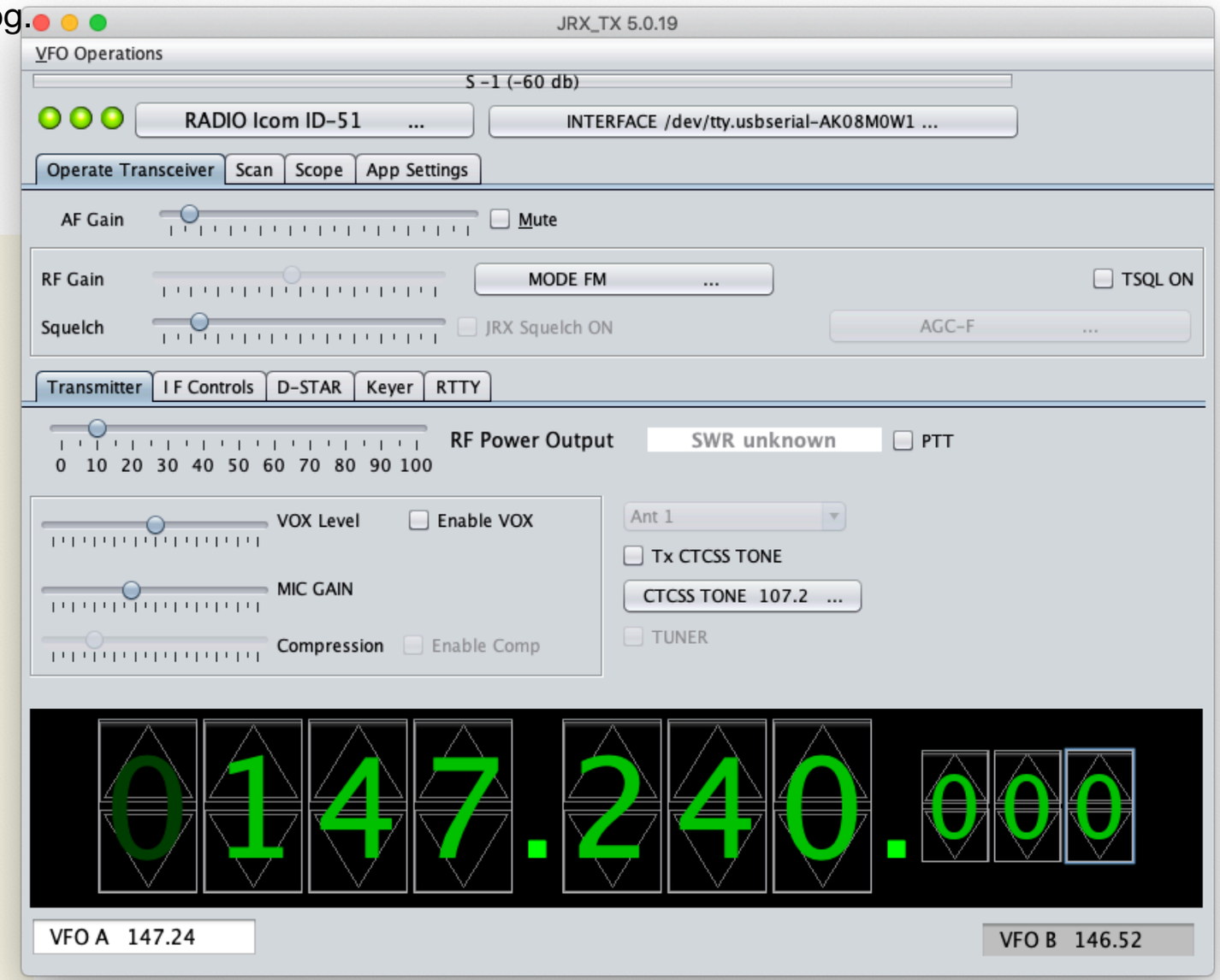
OPTION C will copy VFO A over top of VFO B.

OPTION S will swap VFO A and VFO B frequencies.

For sighted operators:

The VFO operations are located on the menu bar. VoiceOver is not working properly with menu items so there are shortCut keys which you can use.

Just below the VFO Display Control (Green on black numbers) are two text fields, one of which has a white background. That is the selected VFO at present. The VFO frequencies have truncated trailing zeroes for easier reading.



03 Introducing the ‘memory button’

Storing your own memory channels on the computer, not the radio.

Wouldn’t it be nice to have a way to store channels that was independent of the complicated radio memories. It seems that there are as many memory storage schemes as there are radios. So here is a stab at a common storage mechanism using a novel approach: a button.

Each memory button represents an available storage for a VFO frequency, mode, and other parameters including an internal state used for scan operations indicated by its foreground font color:

* BLACK - programmed memory
* GREEN - currently part of a scan group
* BLUE - currently part of a scan group but skipped
* RED - currently part of a scan group and selected
* GRAY - unprogrammed memory

A 'memory BUTTON' is programmed using the current transceiver control settings including the VFO frequency and mode and lots of other settings like CTCSS tone and IF bandwidth and the like.

Memory buttons, when left-clicked, immediately set the transceiver controls to the values persisted by the button, and those controls send the settings to the radio.

To program a memory button, pick a gray button and click and hold for about a second. All the current applicable settings are stored to that location and the color turns BLACK.

Groups of three or more memory buttons, delimited by unprogrammed buttons, are recognized as channels to be scanned.

A group of two memory buttons is recognized as frequency scan limits where the range endpoints are the button frequencies

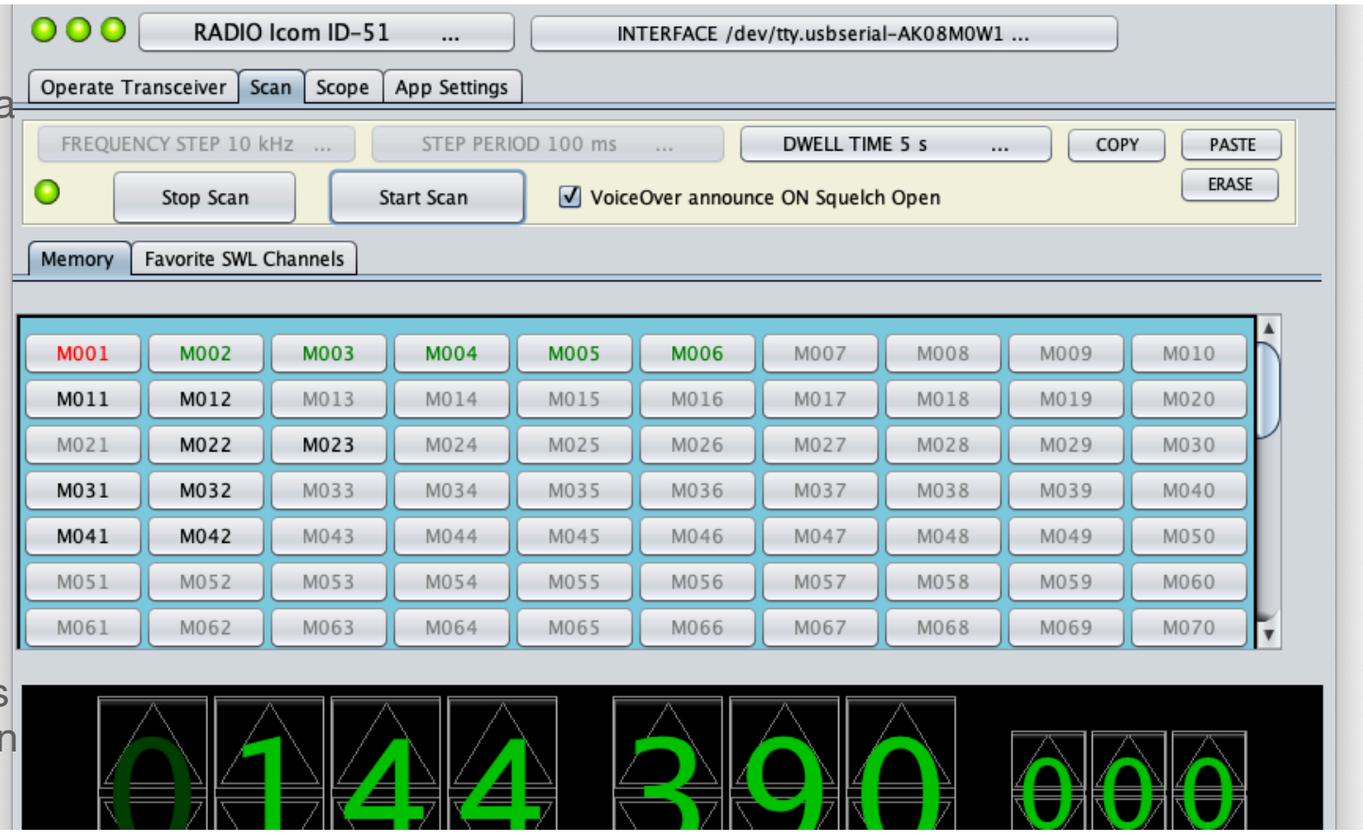
04 The SCAN TAB: Memory Channel Buttons

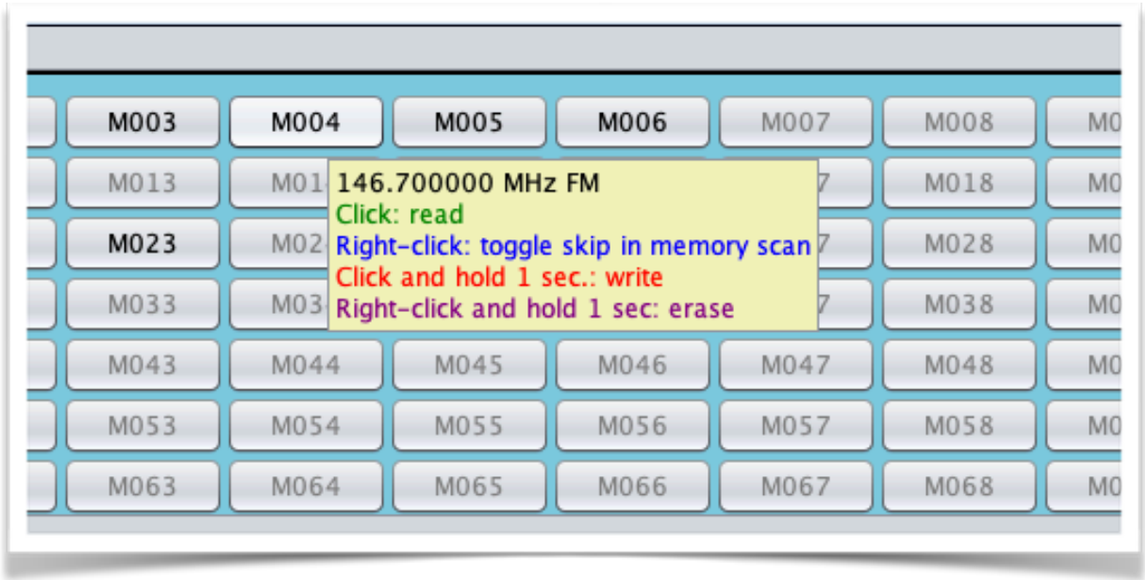
The scan tab was ported from JRX so the operation is about the same. There are two tabs from which to choose channels. The one shown is the programmable memory channels. Each button represents a programmable channel. There are 200 in a table with 10 buttons to a row and the numbering starts with M001. A scroll bar reveals the hidden part of the table.

A memory button stores all the pertinent information set in the "Operate Transceiver" tab. So the frequency, the mode, the CTCSS tone, and other parameters are saved. When you click on a button, the radio and the VFO Display Control are set to the stored frequency and mode, etc.

Buttons that are empty storage locations are grayed out. When you click and hold on a button, the current frequency and mode and all the rest are saved in that memory location. The color of the button turns to BLACK indicating the button is now programmed. If you just left click momentarily, the button is "read", meaning that the setting is loaded to the radio and the VFO Display Control. When you hover over a memory button, the information stored is shown in the toolTip.

Each button represents a memory storing a channel that can be recalled and also scanned.





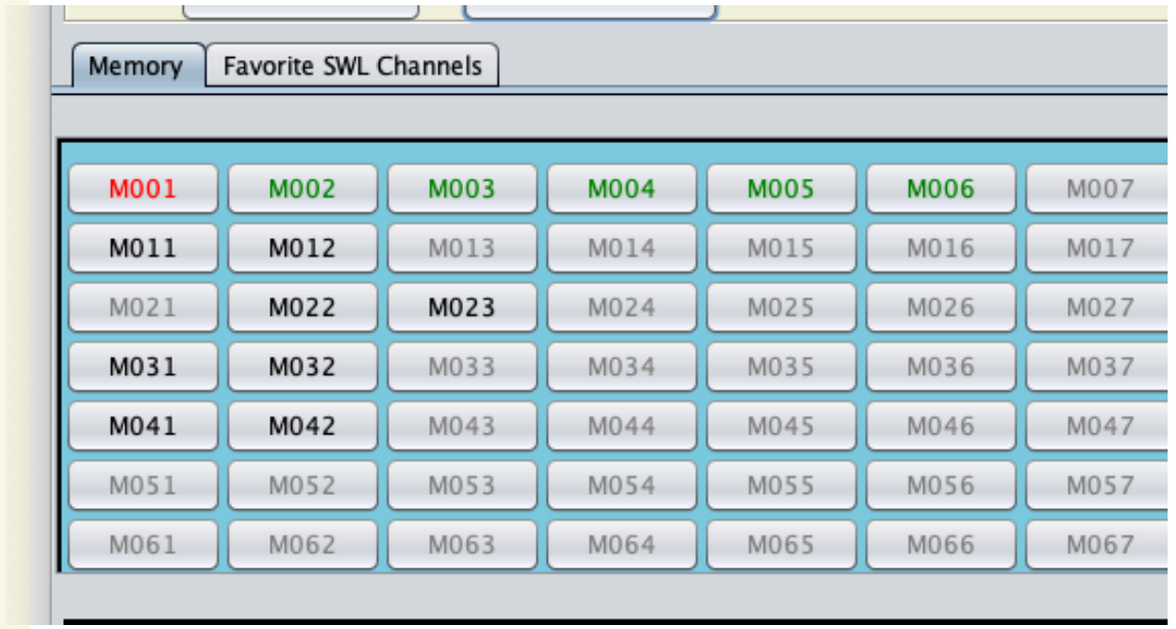
On the left you see the toolTip as the mouse hovers over a button. The first item in BLACK is the frequency and the mode, 146.7 Mhz and FM mode. The next lines are instructions for use. A left click reads the button to the application and sets the radio. A right-click toggles the skip which is useful during channel scan when one channel has a lot of noise that is irritating. The button turns BLUE when its SKIP is on. The next instruction is to left-click and hold to store the current frequency and mode to memory. The last instruction is right-click and hold to erase the memory location.

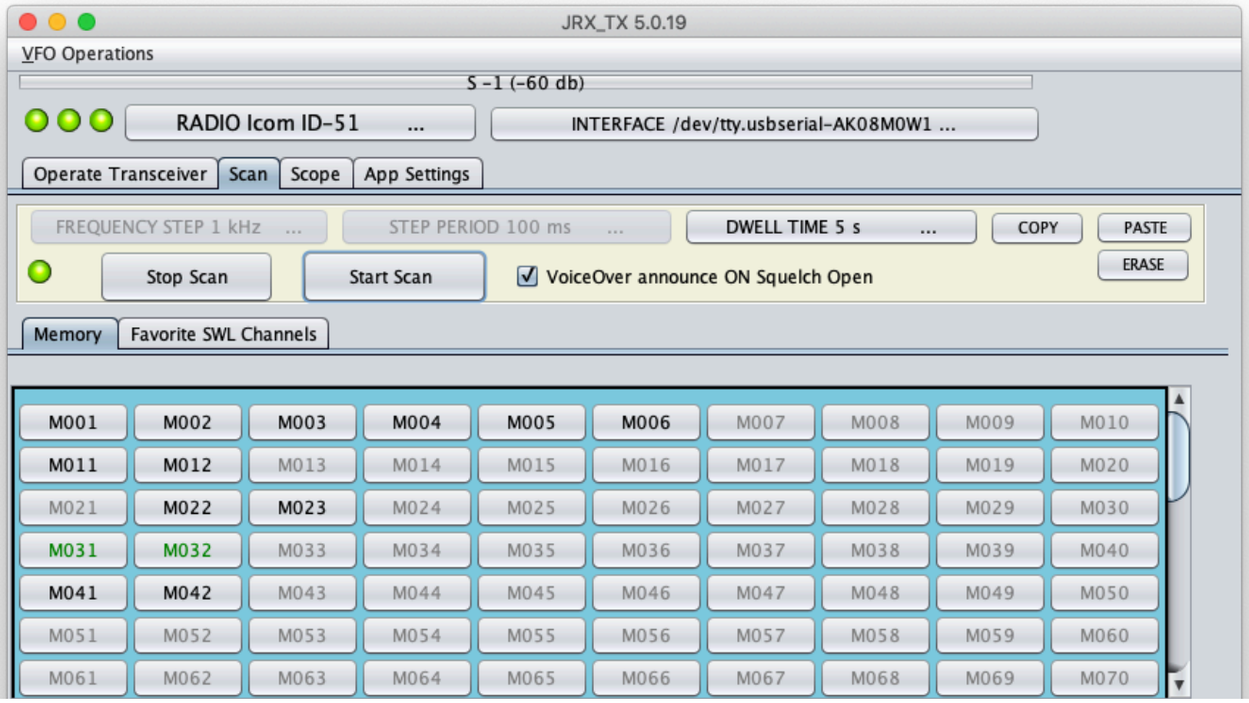
05 The SCAN TAB: Scanning through a range of channels

How to group channels for scan

On the right, the screen shot shows the first few rows of memory buttons. Notice that the first six buttons are grouped together and all programmed. Then there is an empty button. That empty button marks the end of a scan group. If you click on the lowest button and then the highest button and then click “Start Scan”, the channels are scanned in order of the buttons and the colors of the scanned buttons change as they are scanned. The current scan button is RED and the rest of the buttons in the range are green.

To stop the scan, click “Stop Scan” button. Notice that the “Step Period” sets how long before the next button is read. The “Dwell Time” sets how long the scanner delays when it finds the squelch





To scan a frequency range, program two buttons like M031 and M032 where there are only two buttons in the group and on each end there are empty memory buttons. Now, when you click “Start Scan”, the frequencies between the two buttons will be scanned stepping the “SCAN STEP” frequency jump that is chosen. The three parameters at the top of the area are ListButtons that open a dialog when clicked. They work like ComboBoxes that are compatible with voiceOver.

06 Scanning channels with VoiceOver

About memory buttons:

Each memory button stores a channel. A channel consists of a frequency, a mode (like FM mode), an IF filter width, an AGC setting, a CTCSS access tone, the preamp setting, the attenuator setting, and the noise blanker setting. The good news is that all these things are saved automatically when you click and hold the button for more than one second. All these values are read from the transceiver controls. So all the settings you need to access this channel are stored based on the current radio settings.

Good thing is you don't have to think about this at all. Set it and forget it. When you left click a memory button, these settings are all restored, your radio is set to these settings and you are listening just as you were the day you stored those settings. VoiceOver gives you an ear-full that goes something like this:

"M001, Color Black, frequency 144.39 megahertz, mode is FM. Left click to set V F O frequency, Right click to toggle skip in memory scan, click and hold on second to save and overwrite the current VFO and Mode, Right click and hold one second to erase…. plus other VoiceOver standard table navigation commands. That is way too much information too fast. So here it is in slow motion. You can see, only a portion of the information actually stored is read back to you, but it is the most important part. M001 is the button title which means that it is button #1. There are 200 buttons. Color Black indicates the state of the memory channel. Black means the memory is programmed, Green means we are scanning and that the memory is part of the scan group. Red means that this channel is the one we are listening to right now. Gray means that this channel is empty - it is available to be programmed. You need to leave a GRAY button at each end of a scan group. That is how the boundary of a group is determined. The frequency is 144.39 megahertz and the receive mode is FM. The remainder of the message is a reminder of how to use the buttons. So this is a good time to use the control key to cut off all the blabber. Once you hear black and the frequency, you know pretty much everything.

So when you click on any button, the radio is instantly set to that channel. That is extremely handy. If you want to scan through a group of buttons, click the first one in the group, then click the last one in the group, then click the "START SCAN UP" button.

07 VoiceOver and Scanning a frequency range

It takes a group of two.

In order to scan a frequency range, you need to program just two adjacent buttons separated from all the other buttons by two empty (GRAY) buttons. The first button is the beginning of the scan range and the second button is the end of the range. The mode used will be the mode of the first button scanned. The SCAN STEP is used to jump equal steps between the beginning and end frequency. Usually you will pick a number that matches channel spacing for that band. For example, the 2 meter ham band uses 15 Khz spacing for channels, but the most popular channels are on 30 Khz intervals. If you are snooping around, then look every 1 Khz so you don't miss anything. Noice the "VoiceOver ON Squelch Open" box. When this box is checked, a dialog window is opened every time the squelch is broken. VoiceOver announces the button number what frequency is being used. When you click the OK button, the scan continues.

There are no names for channels, only button numbers. That sounds like an oversight until you get familiar with the repeaters in your area. People will say I'll meet you on the 67 machine, or let's go to 55 simplex. These will mean much more than names and that' s the way it is. They may know you by your call sign, but often forget your name. We are geeks beloved by God.

Now on to more fun things, the SWL Favorite Channels. I don't often think of listening to the local airport control tower, but it sure is fun once in a while. Or how about the local taxi company, especially if you are waiting for their cab. We have the tool for you.

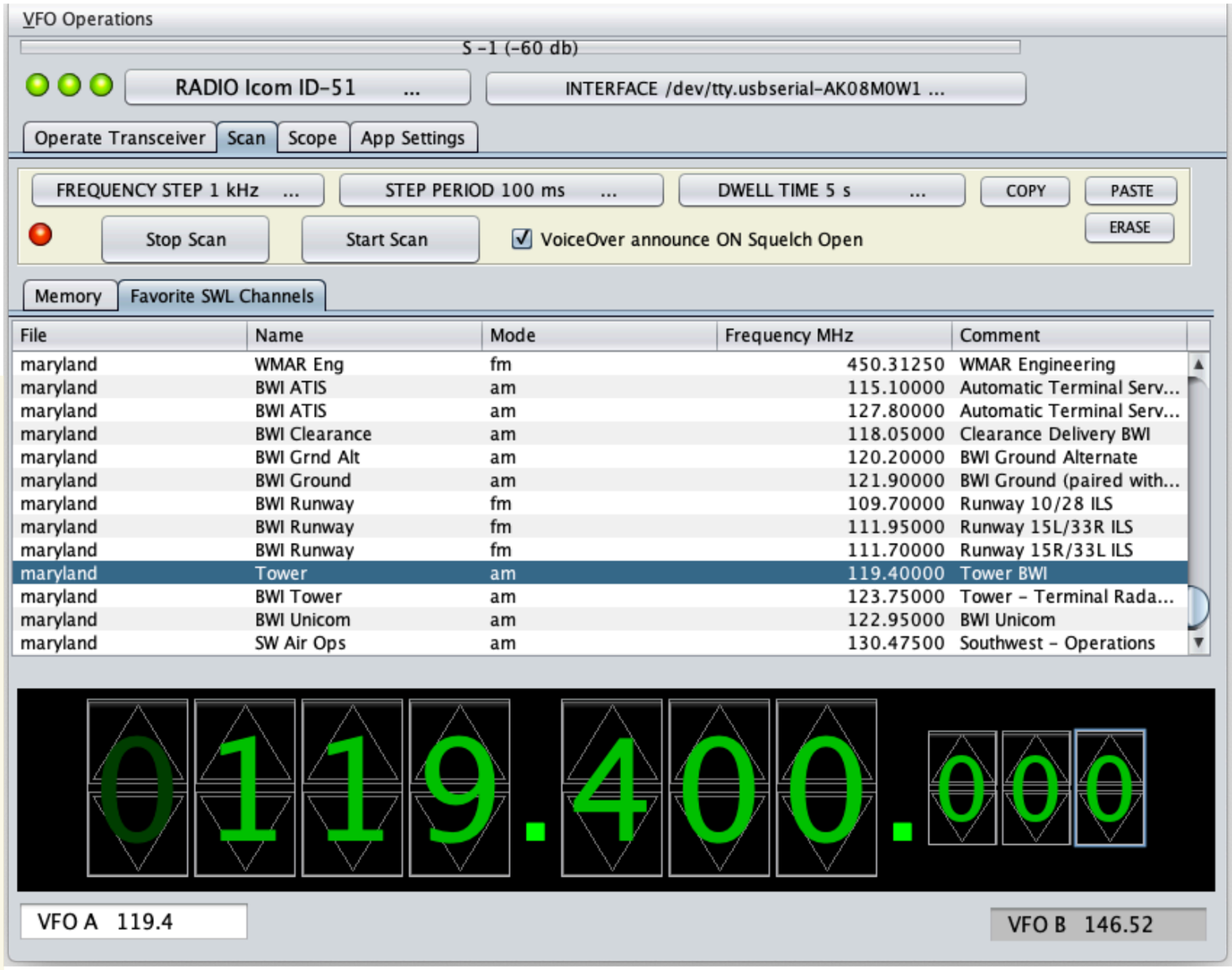
08 Using the Favorite SWL Channels tab

You can listen to lots of things.

This feature that came with JRX. It is a list of channels with mode and frequency. Click on a line and the radio is set to the frequency. Select multiple lines and click on Start Scan Up. You are scanning

The list comes from a csv file which can be edited easily in a spreadsheet application. The file is located in a hidden directory called .TRX/frequencies/ in your home directory. It contains about 1000 channels.

You can create your own file and add it to the directory. On the right, I added a file called maryland.csv and the file is added to the bottom of the default list in the table shown.



What is a CSV file? If you look at a CSV file in a text editor, you will see that data entries are separated by commas and usually some white space. At the end of each line is an end-of-line delimiter which is not visible and usually consists of a carriage return and line feed which are generated when you type RETURN. So each line in the file corresponds to a line in the channels list. The first line is important. It is the header that is shown at the top of the Channels chart. Copy that line from the original csv file. Then fill in the chart with your favorite channels. Where there are blank entries, just add a comma and a space. Any spreadsheet app

09 Using the SWL Channel chart with VoiceOver

The scan controls work the same.

This is the beauty of Paul's design. If you select a contiguous group of channels, then they are scanned one by one. The presentation is really a list where each line is a channel. The information in a line is divided into fields, and they look like columns. At the top of each column are labels. The labels are: File, Name - a nice short moniker for the channel, Mode - like FM or AM, Frequency Mhz, and Comment - which gives you nitty-gritty info on the channel. Since you can make your own chart, be nice to all the rest of us by grouping similar channels together.

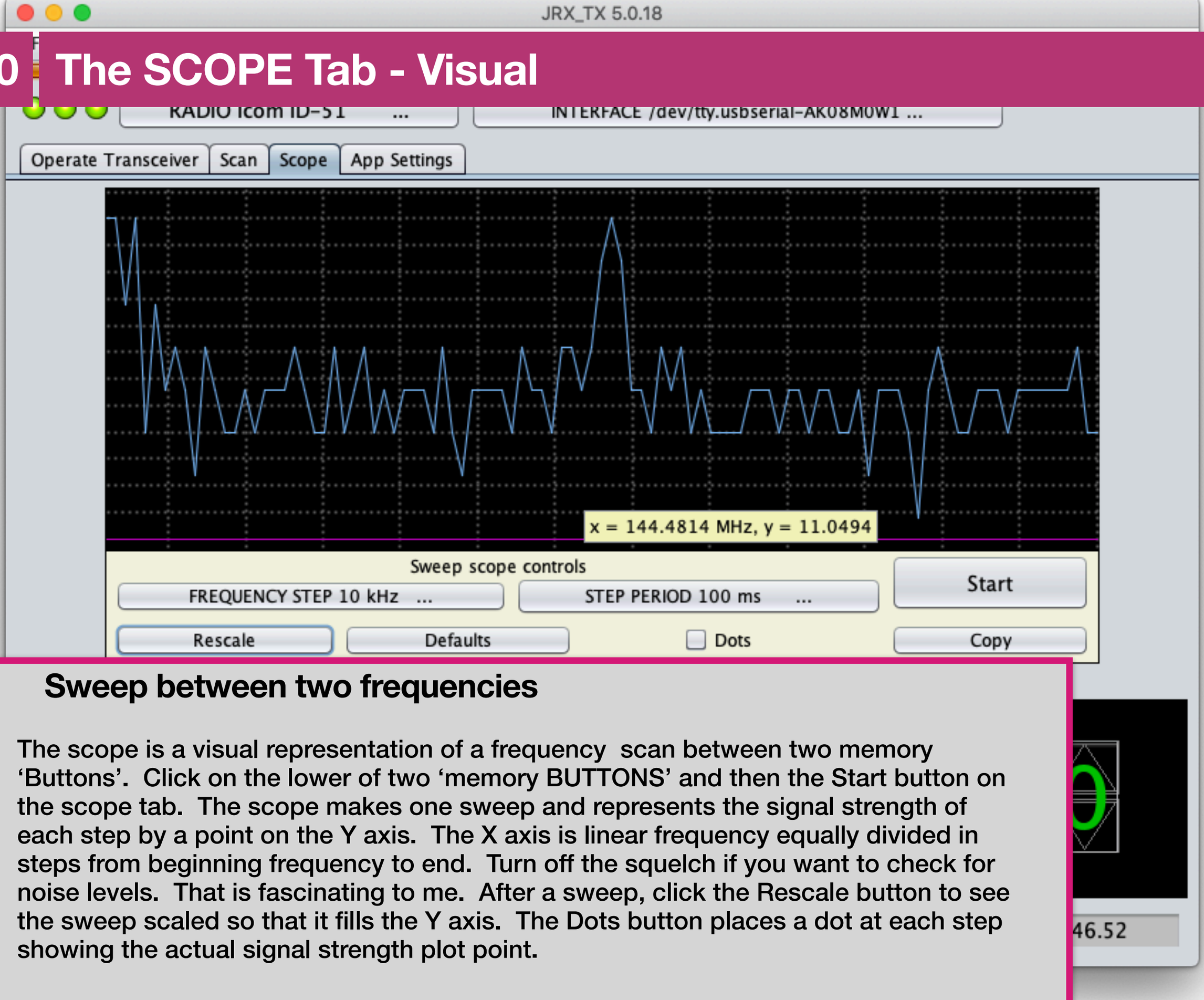
If you select two adjacent lines, the frequencies between the two channels will be scanned using the current value of the SCAN STEP (which is the ListButton on the left). So what you are really navigating is a table where each line is a channel entry. VoiceOver does an OK job on tables. This table has a vertical scroll bar. There are, by default, about 1000 entries in the table. You may want to scroll down to the bottom where I have added on some real cool ones just for Maryland.

Lou, this is where we need to collaborate on a fix. I don't know if voiceOver will actually work with this or not. The TAB key navigation works great. The plain old arrow keys even work better. But voiceOver is not working correctly. It is not tracking with the plain arrow key navigation. For example, it is easy to go down rows using the down arrow, but voiceOver just says "5 items selected"… The scroll bar works for sighted users, but I don't know how to access it with voiceOver.

When you use the voiceOver cursor, you have to go very very slowly, or voiceOver puts you all the way back at the beginning…. about a 1000 lines back. Good grief. I hope there is a good way to present this info to a blind user, because this way does not seem to work.

OK, if you get into the table with voiceOver and start using the down arrow, good things happen. As you arrow down, each line is selected, the radio is updated with the frequency and you are manually scanning through the channels. If you hold down the down arrow, you fly through the channels. So how about we make the table respond to up and down arrows by writing the description of a row or something to trick voiceOver into announcing the text on a row? BUT, don't touch a left or right arrow because they switch TABS and you have to start all over again. We can disable them after you enter the table maybe. This is

10 The SCOPE Tab - Visual



Sweep between two frequencies

The scope is a visual representation of a frequency scan between two memory ‘Buttons’. Click on the lower of two ‘memory BUTTONS’ and then the Start button on the scope tab. The scope makes one sweep and represents the signal strength of each step by a point on the Y axis. The X axis is linear frequency equally divided in steps from beginning frequency to end. Turn off the squelch if you want to check for noise levels. That is fascinating to me. After a sweep, click the Rescale button to see the sweep scaled so that it fills the Y axis. The Dots button places a dot at each step showing the actual signal strength plot point.

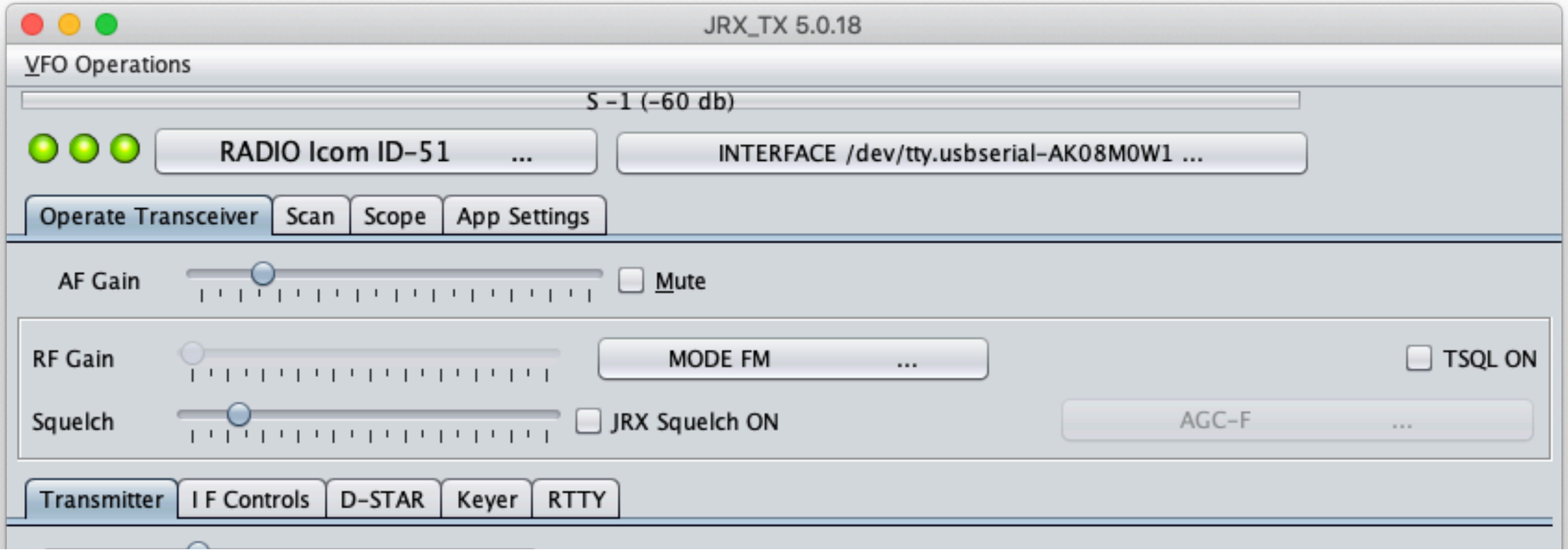
11 The Scope Tab - Audible

All the controls are accessible and so is the waveform.

The scope sweep actually measures the signal strength at each frequency step between two endpoint frequencies. Each measurement is converted to a tone that represents the signal strength reading. A lower tone represents a weak signal and a higher tone represents a strong signal. Each tone duration represents another measurement. This works extremely well because the signal strength is logarithmic and musical octaves are logarithmic. One octave doubles the frequency. Also, a 3db increase in signal level also represents a doubling in strength.

So if you want to measure the noise floor on an empty band, set the squelch to zero and scan the band. I see that my HT is a little more sensitive on the high end of the two meter band or there is just more noise there. Anyway, the sweep plot goes generally up and the tone generated goes generally up with a nice woodwind kind of atmosphere.

12 A word about voiceOver and tabbed panes



VoiceOver recognizes the tabbed pane as a logical group. Each tab is also a group. Sometimes voiceOver calls a tab a radio button… and sometimes voiceOver calls a tab a tab. When you first enter a tabbed pane, you can use the plain old arrow buttons to scroll through the panes. The voiceOver keys DO NOT scroll through the tabs.

This application has a tabbed pane within another tabbed pane. You can look at this like a tabbed folder within a tabbed folder. It makes the number of key strokes to get to any control a lot shorter.

VoiceOver and java Menu Items

At present, voiceOver does not recognize menu items on the menu bar. Because of this, there are short cut keys assigned to all the menu items. They are:

option A	Set VFO A as selected radio VFO.
option B	Set VFO B as selected radio VFO.
option C	Copy VFO A over VFO B.
option S	Swap VFO A with VFO B.
option P	Selections simplex.
option U	Select duplex plus
option D	Select duplex minus
option T	Select split operation

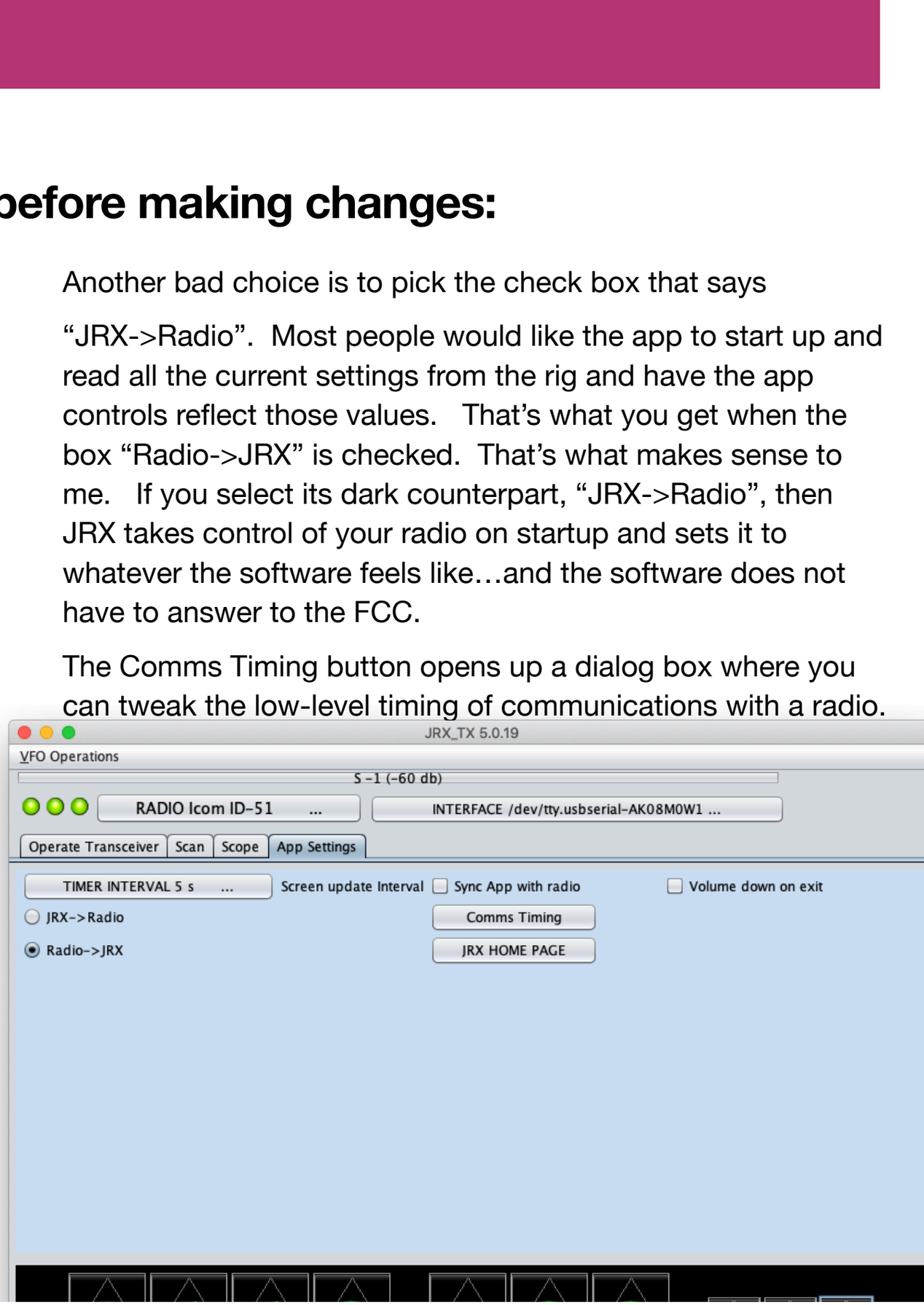
13 App Settings TAB

Be careful on this tab. At least read this before making changes:

The controls on this page can make operation of the transceiver difficult or give you unexpected results. First is my concern about even enabling the checkBox that is labeled “Sync App with radio”. The app philosophy has been to design for blind access. The interface DOES NOT keep track of changes made to the rig using the rig’s front panel. One reason is that the information to do that is not adequate over the rig comms from Hamlib. Another reason is that for a blind operator, the rig’s touch screen menus are not accessible. That is the motive for developing this app. I expect that a blind user will twiddle the VFO knob on a desktop rig and may use the HT buttons to change channels. So in that instance, you may want to enable that “Sync App with radio”. But you buy some nasty side effects. When you try to adjust a slider like volume, the updates from the radio pretty much cancel out your manipulation of the slider control. I would recommend that when you are using the app, just leave the rig front panel alone, except for using the PTT on the mic. It looks really cool to have the software update when you change the radio dial, but sighted operators will have the same nasty problem trying to adjust the sliders. So my advice is, do not enable that little check box labeled “Sync App with radio” if you want to stay afloat.

Another bad choice is to pick the check box that says “JRX->Radio”. Most people would like the app to start up and read all the current settings from the rig and have the app controls reflect those values. That’s what you get when the box “Radio->JRX” is checked. That’s what makes sense to me. If you select its dark counterpart, “JRX->Radio”, then JRX takes control of your radio on startup and sets it to whatever the software feels like…and the software does not have to answer to the FCC.

The Comms Timing button opens up a dialog box where you can tweak the low-level timing of communications with a radio.



APPENDIX

Files - JRX_TX creates a hidden directory in user/home/.JRX_TX which contains

1. Memory Buttons are saved to file: **.JRX_TX/memoryButtons.ini** where the first line describes the data header and can serve as a structure ID for updates to the structure. *MemoryCollection* class reads and writes the file.
2. The components that begin with “sv_” like sv_ctcssListButton have a selection value that is saved to the file: **.JRX_TX/ JRX_TX.ini** . The reading and writing is done by *ConfigManager* class.
3. The SWL Channel list is read from the directory: **.JRX_TX/frequencies** which contains at least the one file **default.csv** and any other **csv** file that you create. These are all concatenated into one long list that is viewed as a table by the class *ChannelChart*.

Command Line - how to run jrx_tx.jar from the MacOS terminal

The application takes command line arguments which are:

-r com port (COM1, /dev/ttyUSB0, etc.)

-m radio code number (same number as with Hamlib rigctl)

-M "radio name" (IC-756, etc., quoted)

-d (debug) 0,1,2

-t (run event timer) 0 = no, 1 = yes

-i initialize radio settings to defaults, no arg, (doesn’t lose memory or other settings)

-h this help and exit

Note: This app requires : Hamlib 4.0 or later. At the terminal prompt: rigctl -V gives the Hamlib version installed.

So to run the app on my iMac for an ID-51 on /dev/tty.usbserial_AK08M0W1 with debug msgs to stdout and run event timer :

java -jar JX_TX.jar -m 3084 -r /dev/tty.usbserial_AK08M0W1 -d 2 -t 1

Or, just double click on the jar file in Finder.