# Amateur Radio Using **Digital Modes** Lab 1: Setting up the Radio.

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- What you will need: Laptop running up to date build of Windows, Linux or Mac OSX.
- CHIRP-next software installed for programing the radio. (Otherwise, can be programmed manually).
- Radio and USB Programming cable from the Amazon Idea List.





LZYCO USB External Stereo Audio Sound Adapter with 3.5mm Speaker/Headphone and Microphone Jacks. Plug and Play No drivers Needed.(Black)

Baofeng Programming Cable for BAOFENG UV-5R/5RA/5R Plus/5RE, UV3R Plus, BF-888S



Setup and functional test of the Baofeng UV-5R radio.

Illustration 1: Required Workshop Hardware

## Introduction

Before you begin, ensure the Baofeng UV-5R has been fully charged. Note the manual says it takes 4 hours with the standard charger to bring a Baofeng battery back to full charge. We will install crossplatform software called CHIRP-next for initial programming of the radio and then some manual tweaking. We will use the USB programming cable connected between your laptop and the radio.

### Exercise

#### Software programming of Radio

<u>STEPS</u>		NOTES
1.	Ensure the Baofeng UV5-R is fully charged, and the antenna is installed on radio.	
2.	Download and install CHIRP-next software for your platform. Installation for major Linux distributions referenced from that page as well.	LINUX USERS. Since CHIRP-next needs access to USB-to-Serial device, ensure users who run CHIRP are added to the dialout group.         sudo adduser \$USER dialout         Where \$USER is a local user. You will need to logout and log back in for the group membership to be recognized.         OSX USERS: CHIRP-next on OSX has dependencies that need to be installed first, as noted on the website.
3.	Plug the USB Programming Cable into your laptop. The cable should register as a USB-Serial controller pl2303. <u>Linux</u> : port should register as /dev/ttyUSB0. <u>Windows</u> : Notification pop-up should include COM port.	40138.639609       usb 1-9: New USB device found, idVendor-007b, idProduct-2303         40138.166761       usb 1-9: New USB device strings: Mfr-1, Product-2, SerialNumber-0         40138.166761       usb 1-9: Product: USB-Serial Controller         40138.166761       usb 1-9: Rew USB device found, idVendor-007b, idProduct-2303         40138.166761       usb 1-9: Product: USB-Serial Controller         40138.166761       usb 1-9: Rew USB device found, idVendor-007b, idProduct-2303         40138.166761       usb 1-9: Rew USB device found, idVendor-007b, idProduct-2, SerialNumber-0         40139.76771       usbcore: registered new interface driver usbserial generic         40139.76772       usbcore: registered new interface driver pl2303         40139.76773       usbcore: registered onverter new attached to ttyusb0         1019.7673       usbcore: pl2303         40139.76773       usbcore: pl2303         40139.76773       usbcore: pl2303         40139.76773       usbcore: pl2303         40139.76774       usbcore: pl2303         40139.76774
4.	Plug the K2 connector end of the USB programming cable into the Baofeng UV5-R. Note orientation as depicted in illustration at right. Connection is tight so be sure connector is fully seated into the socket. DO NOT TURN ON THE RADIO YET.	Filtestration 4: Note orientation of K2 connector

<ol> <li>Run CHIRP-next and select <u>Download from Radio</u>.</li> <li>We are making a backup image of your radio. Backup images are unique to each radio. You can only upload an image to your radio that has been originally sourced from a download of your radio.</li> </ol>	File Edit View Radio Help File Edit View Radio Help Download From Radio Alt+D Upload To Radio Alt+U Import from data source Alt+U Import from stock config Channel defaults Stop Escape Illustration 5: CHIRP Menu
<ul> <li>6. In the Radio window, set the following: <ul> <li>COM port used by the USB programming cable.</li> <li>Make and model of Radio.</li> <li>Click OK</li> <li>Acknowledge Experimental Driver warning by clicking <u>Yes</u></li> </ul> </li> </ul>	Port       COM3         Vendor       Baofeng         Model       UV-5R         Cancel       OK         Illustration 6: Setting Radio and Connection in CHIRP-next
7. Follow the instructions in the pop-up window then click OK. The cloning process will begin creating an image in memory.	Baofeng UV-5R Instructions 1. Turn radio off. 2. Connect cable to mic/Spir connector. 3. Make sure connector is firmly connected. 4. Turn radio on (volume may need to be set at 100%). 5. Ensure that the radio is turned to channel with no activity. 6. Click OK to download image from device. Don't show instructions for any radio again CK Illustration 7: Backing up your Radio.
8. Once complete a tabbed window will appear.	B B Fit Edit Viru Robi Hep     Raving VV-R (Lottich) X
9. <u>Select</u> all the rows that have frequencies listed and <u>delete</u> rows.	Memory Integration         Image: https://image: htttps://image: https://image: https://image: https://image:
10. Click <u>File</u> then <u>Save As</u> to create a backup image.	I         D0000         Pand         Pand         Pand           I         8.0000         Storder         Storder         Norder         Norder           I         8.0000         Storder         Norder         Norder         Norder         Norder           II         8.0000         Storder         Norder         Norder         Norder         Norder           II         8.0000         Norder         Norder         Norder         Norder         Norder           II         8.0000         Norder         Norder         Norder         Norder         Norder         Norder           II         8.0000         Norder         Norder         Norder         Norder         Norder         Norder
For example: Baofeng_UV5-R_original.img	Illustration 8: Download from Radio result
11. Familiarize yourself with the interface being sure to review the Settings tab.	

<ol> <li>Next, we want to import the frequencies we will be using during the workshop. <u>Download</u> the HOPE workshop csv file. HOPE-workshop.csv</li> <li>Within CHIRP select <u>File</u>, then <u>Import</u>, then open the file you just downloaded.</li> <li>A window will pop-up showing the frequencies that will be imported. Click <u>OK</u>. NOTE: By default, frequencies imported will overwrite existing memory locations</li> </ol>	Import         To         From         Name         Frequency         Comment           Import         0         0         HOPE-ZM         147,545000         147,545000           Import         1         1         HOPE-ZM         147,545000         147,545000           Import         2         2         HOPE-XP         447,875000         143,545000           Import         4         4         SIMPLEX         146,520000         144,990000           Import         6         6         CHAN2         144,990000         143,5610000           Import         7         7         CHANS         143,510000         143,3500000           Import         10         10         CHANS         433,300000         11         11         PACKET         145,010000         12         12         APRS         144,390000         14         1         -10         -100         Auto         Rever         OK         Cancel           Illustration         9:         Import         HOPE APR         Import         HOPE APR         Artect         Artect
<ul> <li>15. Go to the Settings tab and make changes within the following sub menus: <ul> <li>Basic Settings</li> <li>Display Mode (A) - <u>NAME</u></li> <li>Display Mode (B) - <u>NAME</u></li> <li>Advanced Settings</li> <li>VOX Sensitivity - 3</li> </ul> </li> <li>Other Settings <ul> <li>VHF Lower Limit (MHz) - 144</li> <li>VHF Upper Limit (MHz) - 148</li> <li>UHF Lower Limit (MHz) - 420</li> <li>UHF Upper Limit (MHz) - 450</li> </ul> </li> <li>Work mode Settings <ul> <li>Display - A</li> <li>VFO/MR - Mode Channel</li> <li>VFO A Power - Low</li> <li>VFO B Power - Low</li> </ul> </li> </ul>	CHIRP         File       Cell View Radio Help         Baofeng UV-SR: Baofeng LV-SR: original-ht3ing %         Memories       Basis Settings         Advanced Settings       Carrier Squetch Level: 3         Other Settings       Battery Saver: 1:3         Other Settings       Battery Saver: 1:3         Difference       File         Maximum       File         Display Mode (B):       Name         RXLED Color:       Purple         Roger Beep:       Enabled         O(completed Getting radio settings (idle)         Illustration 10: CHIRP Settings Tab
16. Save the new image using <u>File</u> and <u>Save As</u> to create a new image file. For example: HOPE_workshop.img	
17. With our new image created and saved, select <u>Upload to Radio</u> from the Radio menu. Validate the port setting then click <u>OK</u> .	Radio         Port       COM3         Vendor       Baofeng         Model       UV-5R         Cancel       OK         Illustration 11: Verify connection in CHIRP

18. Follow the instructions in the pop-up window that follows. Acknowledge Experimental Driver warning by clicking <u>Yes</u> . Your radio is now configured for the frequencies used in the workshop. Next let's test the radio.	Baofeng UV-5R Instructions 1. Turn radio off. 2. Connect cable to mic/spkr connector. 3. Make sure connector is firmly connected. 4. Turn radio on (volume may need to be set #100%). 5. Ensure that the radio is tuned to channel with no activity. 6. Click OK to upload image to device. Don't show instructions for any radio again OK Illustration 12: Instructions for Baofeng Radio	
19. With the frequency set for <u>SIMPLX</u> , make a transmission to another student whose radio is also on and set for <u>SIMPLX</u> . Note: Students will use their FCC issued callsign throughout the workshop. Those students unlicensed will operate under the special event issued callsign under the supervision of an FCC licensed control operator.	For example, here is a radio report exchange betweer to stations. "This is W2AAA. Can someone give me a radio check?" Someone may respond with the following: W2AAA this is W2BBB, I hear you loud and clear. Then you acknowledge the report "QSL. Your loud and clear as well. Thank you for the report. W2BBB this is W2AAA clear"	

#### Manual Programming

While CHIRP-next takes care of the most tedious aspects of setting up and programming your radio, there are some configurations that are best verified manually.

This is especially important since we will be working with a number of radios transmitting in close quarters and want to reduce potential interference.

- Set Squelch (SQL) sensitivity to ignore noise.
- Set Transmit power (TXP) to low so we do not overload receive on radios using adjacent frequencies.
- Turn off all courtesy tone features.
- Set Voice Operation Transmission (VOX) sensitivity so the radio transmits when it hears audio from the USB sound device via the audio cable (we will install audio cable later.)

We can configure these settings manually by performing the following:

1.	Press the MENU button then press the UP or DOWN buttons to cycle through the MENU items.			
2.	<ul> <li>For each MENU item in the table at right, change the setting depicted.</li> <li>Cycle to the MENU item using the UP and DOWN buttons.</li> <li>Press MENU button again to enter configuration.</li> <li>Pres UP or DOWN buttons to cycle through SETTING options.</li> <li>Press MENU button again to confirm setting.</li> <li>Press EXIT to leave programming.</li> </ul>	Menu	Function	Setting
		0	SQL (Squelch Level)	3
		2	TXP (Transmit Power)	LOW
		4	VOX (Voice operated transmission)	3
		34-37	Tail tone settings	OFF
		39	ROGER (tone sent end of transmission)	OFF
3.	<ul> <li>With the additional settings made, go ahead and make another backup image of the radio.</li> <li>Download from Radio.</li> <li>File, Save As, HOPE_workshop.img</li> </ul>			