Updated October 26, 2015
Digital Modes on RemoteHamRadio.com
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This is an overview of how to operate digital modes on the RemoteHamRadio.com (RHR) service. "Digital Modes" means primarily RTTY, but the information also applies to PSK, JT65, etc...

First, let me say that setting up digital modes can be challenging, even before adding the complication of remote operating. If you are not experienced in setting up and operating digital modes, I recommend you get some experience with a "local" station where you can see the radio and see what is happening. Then you will be able to add remote operating with less confusion and frustration.

RHR has two access methods: "WebDX", and "K3/0-Mini."

WebDX:

WebDX is a web-based console appearing in the Google Chrome web browser. The advantage is you can operate from any computer with the Chrome web browser and an internet connection. No extra equipment is needed. There is a video tutorial at RHR: "Tutorial 2 – How to operate using the browser based technology WebDX."
http://www.remotehamradio.com/tutorials/

WebDX works well for CW/ SSB operating, and is "adequate" for basic digital mode operating. To operate digital modes in WebDX, you use your digital mode software to generate tones to be sent to the radio in SSB mode (LSB or USB). For RTTY, this would be called AFSK (instead of FSK). Operating in SSB mode has a few "quirks" to be aware of, but is perfectly adequate. Setup information will follow below after an overview of the other access method, "K3/0-Mini."

K3/0-Mini:

The K3/0-Mini access method uses an Elecraft K3/0 or K3/0-Mini as a control head, and a RemoteRig RRC-1258 modem with an internet connection, to provide a "real radio" experience with a tuning knob, buttons, etc... You can learn about the K3/0-Mini at the Elecraft website:
http://www.elecraft.com/K3-Remote/k3_remote.htm
There is a video tutorial at RHR: "Tutorial 1 – Getting familiar with the K3/0/10/100-Mini"
http://www.remotehamradio.com/tutorials/

The K3/0-Mini works very well for CW/SSB, and very well for digital modes operating. You operate the K3/0-Mini almost identical to having a real K3. Setup is similar to having a real K3, and we will discuss it much further below, after we select our digital mode software, and after going through setting up for the WebDX access method.

Digital mode software:

To operate digital modes, you need digital mode software to decode the tones on receive, and to generate the tones for transmit. Some popular digital mode programs are:

MMTTY: MMTTY is popular, but is only for RTTY. See "Getting Started on RTTY" with MMTTY at:
http://www.aa5au.com/rtty/

Fldigi: Fldigi supports RTTY and many other digital modes. See the "Beginners' Guide to Fldigi" at:
http://www.w1hkj.com/beginners.html

Ham Radio Deluxe: Ham Radio Deluxe provides many logging and station control functions, and has a digital modes program called DM780. DM780 supports RTTY and several other digital modes. See:
http://www.ham-radio-deluxe.com/features.html#DM780
As an example of using DM780, see: "Operating PSK with Ham Radio Deluxe" at:
www.nharc.org/links/OperatingPSK.pdf

For any of the digital modes programs, the software and your computer will need audio in, audio out, and a way to switch

between receive and transmit.

Audio comes from RHR and goes into your digital modes program. Audio comes out of your digital modes program and goes to RHR for transmit. Switching between receive and transmit is usually done by one of:

   VOX - voice-operated switching, or

   PTT - a Push-to-talk switch, or

   Computer control - usually called CAT or "rig commands".

VOX is not available in WebDX, and generally not available in the K3/0-Mini unless it has been specially enabled in the RemoteRig boxes.

PTT is available in both WebDX and K3/0-Mini. PTT is difficult in WebDX because you have to switch between programs for each transmit, and you will want to move on to Computer control.

Computer control can be setup in WebDX or K3/0-Mini. Once setup and working, computer control is easy for the operator to use, so they can concentrate on the DX, contest, or other operating issues. Computer control for WebDX is setup with an add-on called the "RHR Helper App for Chrome." Computer control for the K3/0-Mini uses a cable connected to the RemoteRig RRC-1258 box, but is configured very similar to connecting directly to a K3 radio.

Setting up for the WebDX access method:

WebDX: Audio in:

Audio arrives from the remote radio to your Chrome web browser and appears on your default Playback Device (sound card). This audio needs to be routed into the input device of your digital modes program. Most sound cards do not support this routing, and you will need either an analog or digital work-around. The analog work-around is to put a stereo splitter or Y-cable on the computer's headphone output. One-half continues to your speakers or headphones. The second-half goes back into an audio input on a second sound card, such as a cheap USB sound card. Your digital modes program selects the second sound card as its input source. The digital work-around is to install special software like "Virtual Audio Cable" and do the splitting and routing "digitally" within the computer.

WebDX: Audio out:

Your digital modes program generates tones on the default Playback Device, and will be picked up as your "microphone" by the Chrome Web Browser when you allow it to use your microphone. The WebDX webpage has a "Troubleshoot Audio" button which lets you test that audio is being received on the "microphone" input and is at a proper level, before going on-the-air. Sometimes on your computer you will need to select, enable or disable certain Recording devices or Playback devices to get Chrome to pickup the generated audio. You will use the soundcard's and the digital modes program's volume controls to keep the tone volume slightly lower than when you test with your voice and a real microphone.

WebDX: Switching between receive and transmit:

VOX is not available in WebDX.

PTT can be done by using the mouse to press a button on the WebDX webpage (or use the CTRL key while on the WebDX webpage). Since you will be running a digital modes program and the Chrome web browser, you will have to switch focus between these two programs quite often - for each transmission - to use the PTT button on the WebDX page. You will quickly get tired of all this rapid switching and want to move on to computer control.

Computer control is more complicated to setup, but once working makes operating easy.

First, you install the RHR Helper App for Chrome which provides a virtual serial port so that your digital modes program can send CAT or radio commands (such as TX, RX) to the remote radio. This lets you stay in your digital modes program, instead of continually switching back and forth to activate PTT on the WebDX page. Instructions for the RHR Helper App for Chrome are at:

http://www.remotehamradio.com/rhr-helper-setup/

Second, you setup your digital modes program to send the proper radio commands to switch between receive and transmit. In the MMTTY program, this is done in using the menu "Option/Setup MMTTY/TX/Radio command." The MMTTY settings are shown here:
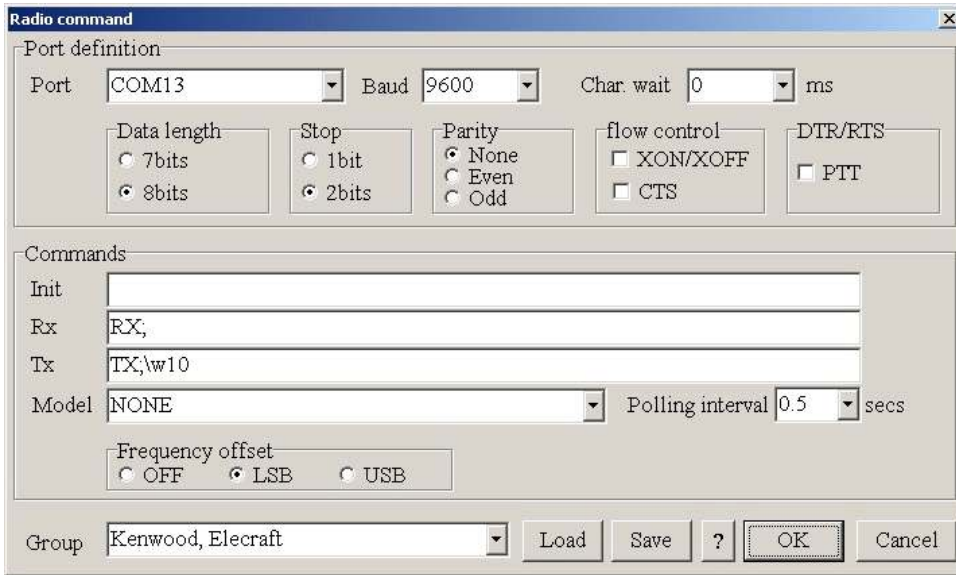
In the Fldigi program this is done in the tab for "Configure/Rig/Hamlib" or the tab for "Configure/Rig/RigCAT." The Fldigi settings are shown here:

You only need to minimally setup for Transmit (TX), and Return to Receive (RX), for the radio type of an Elecraft K3, which uses the Kenwood command set. Other control functions and radio commands may also be controlled through the RHR Helper App for Chrome such as controlling and logging the radio's frequency.

WebDX: Some "quirks" of digital modes on WebDX:

LSB or USB:
In the WebDX access method, the K3's DATA mode is not available, you have to operate in LSB or USB mode. The

RTTY program MMTTY uses LSB. The multi-mode program Fldigi uses USB. Read the documentation and help files for your program.

What's my frequency?
Your tones will be offset from the "carrier frequency" or "dial frequency" shown on the WebDX page. This matters if you want to use DX spots, and to stay in the proper band segment. DX stations on RTTY are spotted at their lowest tone frequency, called the "mark" frequency. If a DX station is spotted on RTTY on 14080 kHz, for the MMTTY program operating in LSB with a 1445 Hz offset you would tune your WebDX radio to an LSB "dial frequency" of 14081.45 For Fldigi operating in USB mode it would be the opposite.

Do not overdrive the radio:
The use of audio tones being sent to a "microphone" input means you need to be careful with the sent signal levels. If you send the tones too loudly, they will overdrive the radio and distort the signal. Always turn off the Compression (CMP to 0). Keep the PWR settings slightly lower than you would for voice operating. When transmitting, the Power Meter on the WebDX page should read about one-half or less of the maximum CW power.

Using the Bandwidth (BW) control for narrow filtering:
If you keep your operating tones near the middle of the audio passband (around 1445 Hz), you can use the Bandwidth (BW) control on the WebDX page (in the "More" settings) to reduce nearby interference without having to also move frequency to keep the tones centered in the audio passband.

Summary for the WebDX access method:

Complicated to setup the first time, and a few "quirks due to using a sideband mode (LSB or USB), but WebDX is adequate and useable for digital mode contacts.

Setting up for the K3/0-Mini access method:

To use the "K3/0-Mini" access method with RHR you will need four additional parts available from Elecraft:
  K3/0-MINI-F   Mini Control Head
  RRIGCON   RemoteRig RRC-1258MKII Control Unit Only
  RRMINICBL   Cable set for K3/0-Mini to Control RemoteRig 1258MKI
  PWR12V1A-US   Power Supply for K3/0-Mini
  Total price about $1,060. The RemoteRig RRC-1258 needs some setup and changes to its default configuration to be used with the stations on RHR. Get help from RHR or a current K3/0-Mini user.

You'll still need a computer, in order to run your digital modes program, and to run the Chrome web browser. The web browser console is used to select a RHR site and configure the RRC, but then everything operates from the K3/0-Mini contol head as if using a real K3. Some differences I have noted are:
1. You cannot change the MENU and CONFIG settings from your K3/0-Mini, they are set and fixed at the remote K3 radio by the station owner. If you think a setting on a raido is wrong or needs to be changed contact RHR support.
2. You have no Monitor (MON) feedback from the remote radio. You will have no monitor feedback on SSB. In CW and RTTY the tones are being generated locally, in the RRC-1258 or your computer, and not coming back from the remote radio.

Remember, to operate digital modes you need audio in, audio out and a way to switch between receive and transmit.

K3/0-Mini: Audio in/audio out:

The most "trouble-free" access to Audio out is at the SP and AUX/MIC connectors on the side of the RemoteRig RRC-1258, before it is routed to/from the K3/0-Mini. In most cases, you will want to use a splitter or y-cable so you can send one side to your K3/0-Mini or your speaker or headphones, and the other side to your computer input (MIC or LineIN) for your digital modes program.

Access to Audio in and Audio out is also available at the K3/0-Mini, though people report more problems getting this to work properly. On the K3/0-Mini you have SPKRS and MIC connectors on the side of the K3/0-Mini. There are also

large PHONES and MIC connectors on the front of the K3/0-Mini that are basically in parallel with the side-panel connectors. A K3/0-Mini does not have LINE IN and LINE OUT connections at the back of the radio like a K3 radio.

When driving the MIC input with tones from the computer you will likely need an attenuator or voltage divider to keep from overdriving the MIC input. You may need to configure to get the tones on both Left and Right channels (Tip and Ring of Mic plug). You can make your own cables, or use a commercial interface like a SignaLink USB. Review the K3 Manual about basic operation in "Data Modes" and spend the time to get the audio settings in your digital modes program and on the K3-0/Mini set properly. Write down your settings for future reference. Settings may change slightly between RHR sites, or if you adjust the AF VOLUME or MIC GAIN controls. When transmitting, Elecraft recommends the Mic gain be set for four bars of ALC, with the fifth bar occasionally flickering.

Another access to Audio out is to plug in a USB cable from your K3/0-Mini to your computer and it will create a "USB audio CODEC" that can be used as a playback device to receive audio from the remote radio. This cable/connection is not otherwise used by RemoteHamRadio.com or the RemoteRig RRC setup. The audio level still varies with the AF volume
control and the MIC level. This USB audio CODEC is only MONO, and not stereo like the SP connector on the RemoteRig RRC-1258. Stereo is useful when using a remote radio that has a sub-receiver so you can listen to the main receiver on Left and the sub-receiver on Right. It does not appear possible to use the USB audio CODEC to send tones to the remote radio. This may work with the RemoteHams.com setup, but not with the RemoteRig RRC-1258 on RHR.

Some DATA MODES of the K3 do not use audio input, i.e., they are "direct keyed" modes: FSK D, PSK D. In some cases you may end up "upside down" where the keying polarity is opposite due to additional inversions of the signal due to interfaces, software settings, etc. All the RHR sites are set the same (e.g. FSK POL = 0) so that once you have your software working, it will work on all sites. This may require you to configure your software to an "inverted" setting from its default. This is perfectly normal and depends on the interface methods being used. In the other audio modes, such as DATA A or AFSK A, audio may not get to the remote radio unless the remote radio has proper settings in the MAIN Menu for MIC SEL rP.L and MIC+LIN ON. These settings have been figured out for RHR sites, although they may be lost when a radio is replaced or other changes occur.

K3/0-Mini: Switching between receive and transmit:

VOX is generally not available in the K3/0-Mini.

PTT is available from the front panel XMIT button, the MIC connector, a footswitch plugged into the PTT jack on the back of the K3/0-Mini, or if you have a SignaLink USB interface, it generates a PTT signal that can be plugged into the PTT jack on the back of the K3/0-Mini. You will probably already be using one method for your SSB transmitting.

Computer control is a better way for digital modes, and does NOT need the RHR Helper App for Chrome like WebDX. Instead, you can connect a serial cable from your computer to the RemoteRig RRC-1258, connecting to the mini-USB port, or to the COM1 port. You then configure your digital modes software or your logging program to generate a PTT signal on the serial port, or to send CAT or Radio commands to the "radio" on that port. For information, see page 199 of the RemoteRig RRC1258-MkII Users manual (available at Remoterig.com) entitled "Logging or computer control, RTTY etc." The manual also describes how to use the USB port to operate RTTY in the FSK mode, instead of the AFSK mode using tones.

K3/0-Mini: Some "quirks" of digital modes on K3/0-Mini:

You can switch the radio to digital modes, e.g. DATA, and FSK, AFSK, or PSK. This eliminates a lot of the confusion about LSB/USB and the proper "dial frequency." DX spots will work correctly, and no additional offset calculations should be needed. Sometimes when you activate a different RHR station and its radio, you will need to change the DATA MD and PITCH for the radio. E.g., if the previous user was operating PSK and you want to operate FSK, you will need to use the DATA MD button to scroll through and select the mode. The audio levels will change as you adjust AF volume, since you are sharing ("splitting") the audio stream, and the audio stream volume from the remote radio is controlled by the AF volume knob. You do not have the fixed level Line In and Line Out connections.

Summary for the WebDX access method:

Requires more equipment, and complicated to get setup, but the K3/0-Mini is fully capable on all digital modes nearly as if you had a real K3 radio in front of you.

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