



How To Guide

EZ Start Setup for RTTY With N1MM+ for FLEX-6000

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September 26, 2016

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Background

This document assumes the reader wishes to use MMTTY and 2Tone as dual decoders inside of N1MM Logger+ to operate a RTTY contest. RTTY may be keyed using two general methods: FSK and AFSK. With FSK, software that is sending RTTY will key a single line on and off to toggle between the two RTTY tones while PTT is enabled. The radio itself generates the FSK carrier and moves its frequency. With AFSK, the carrier is generated as an audio tone in software and then sent to the radio as audio where it is upconverted and transmitted. There is no difference on the receiving side and so the use of FSK or AFSK is generally an operator preference. At the time of the writing, only AFSK is currently supported on the FLEX-6000 so this setup guide will use AFSK.

This document does not directly cover the case where SO2R operation would be used with a FLEX-6700. There is a separate document, [*SO2R Mode with N1MM for the FLEX-6700 How to Guide*](#), that covers this setup.

Requirements

The following hardware is required for using RTTY:

- FLEX-6000 Signature Series Transceiver
- Computer capable of running N1MM Logger+ and any decoding programs as well as DAX and CAT from FlexRadio Systems

The following software is required for using RTTY:

- SmartSDR v1.6+ or greater
- N1MM+ v1.0.1058+ or greater
- MMTTY
- 2Tone

Interfacing your FLEX-6000 Signature Series radio to N1MM Logger+ requires setup in 6 applications:

- MMTTY
- 2Tone
- SmartSDR-Win (or Maestro)
- DAX
- SmartSDR Cat
- N1MM Logger+

Setups for these applications are detailed below:

Installing and configuring software

Each section below details the installation and configuration of each software package required to work RTTY with no external interfaces or cables. The section on 2Tone may be skipped if

you prefer to run a single decoder, but having two will often provide better data for making decisions and prevent repeats during a contest.

MMTTY

MMTTY is a RTTY decoder and encoder program that can be used stand-alone or in conjunction with N1MM Logger+. The instructions for installing MMTTY for use with N1MM Logger+ can be found by visiting <http://n1mm.hamdocs.com/tiki-index.php?page=Digital+-+MMTTY+for+RTTY+support>, but there is an abbreviated installation below.

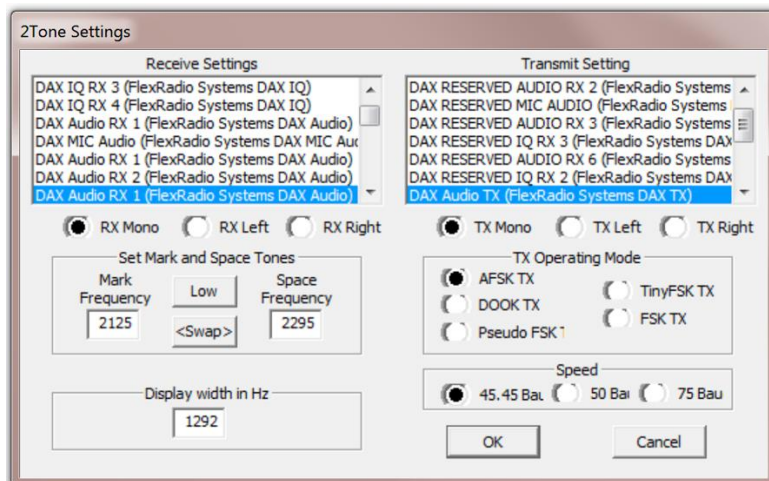
Download the current release of MMTTY here: <http://hamsoft.ca/pages/mmtty.php>. *Note: the top of the Hamsoft page has advertisements including download links for other software. Read the page before clicking.*

Install MMTTY by starting the program and following the installation instructions. The default directory, C:\Ham\MMTTY is fine for installation. You may change this directory if desired, but do not install into C:\Program Files or other system directories. When prompted, enter your callsign.

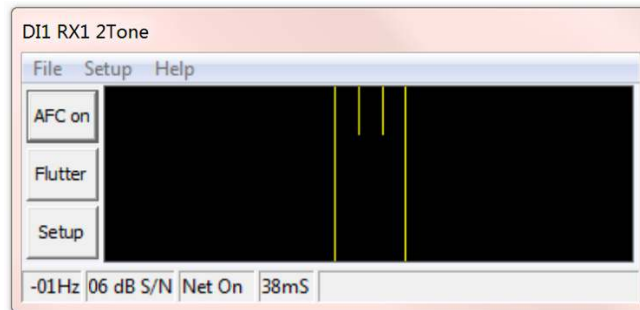
2Tone

2Tone can be downloaded from the RTTY contesting site using this link: <http://www.rttycontesting.com/downloads/2tone/>

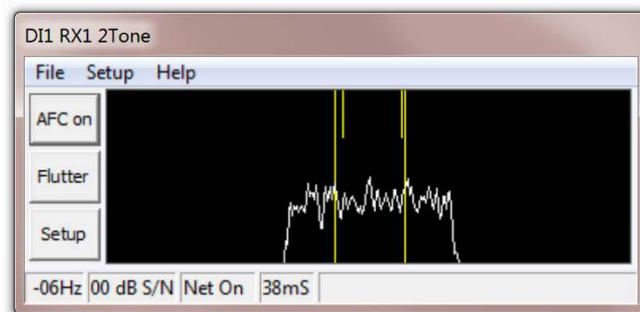
2Tone will download as a ZIP file onto your computer. Open and expand the zip file to a directory such as C:\Ham\2Tone <version number>. Double-click 2Tone to start the decoder. In the interface to 2Tone, click Settings in the menu and find the DAX Audio RX 1 and DAX Audio TX channels as shown.



Ensure the other settings are correct as well and click OK. Your 2Tone window should look something like this now:

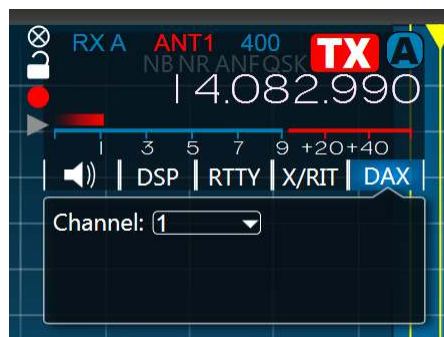


If you already have DAX channel 1 assigned to slice A, it might look like this (audio present):

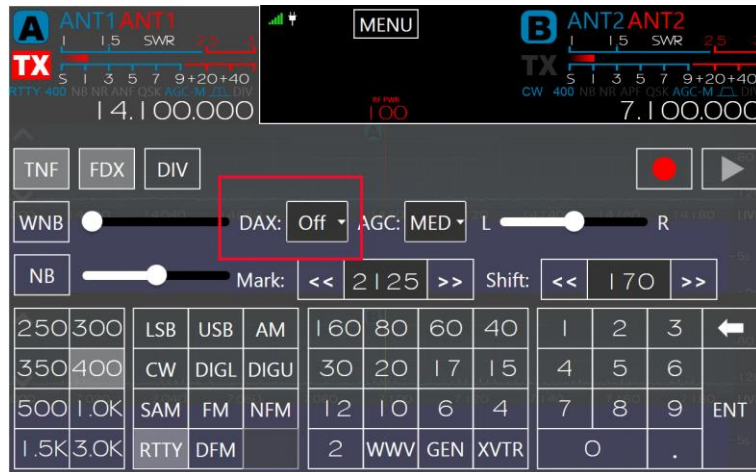


SmartSDR (or Maestro)

Before configuring N1MM Logger+, go ahead and launch SmartSDR or connect Maestro to your radio. Open a panadapter and slice on 20m or another band and switch your mode to RTTY. If there are signals present, go ahead and tune to one. On the slice, ensure that DAX Channel 1 is selected under DAX. In SmartSDR, the selection is made on the slice flag as shown:



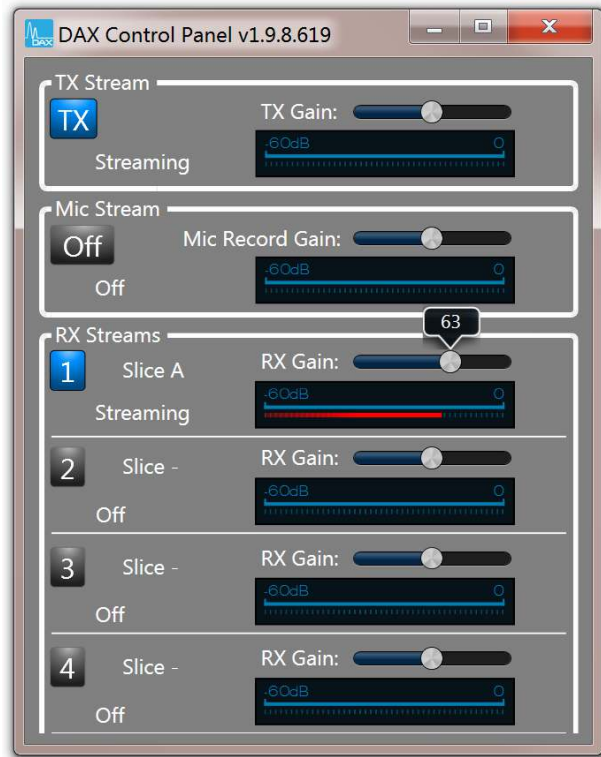
If Maestro is being used instead of SmartSDR, either press the VFO A knob for one second or tap the VFO A frequency indicator to bring up the Slice A control menu. The DAX channel can be selected near the center of the screen as shown below (tap on the box and change to DAX Channel 1):



DAX

On the same computer, you will be using for N1MM Logger+ open DAX. If this computer does not have DAX installed, install SmartSDR on this computer first. When DAX is open, select both the DAX RX channel 1 receive and DAX TX channels. Both buttons should turn blue after selecting. If they are not, you will need to resolve this before proceeding. Hovering over the channel will provide text that will help you debug. Generally, if the button is red it is an indication that something in Windows has grabbed a sound card it shouldn't be and this can be fixed in the sound setup control panel that is accessed in the system tray.

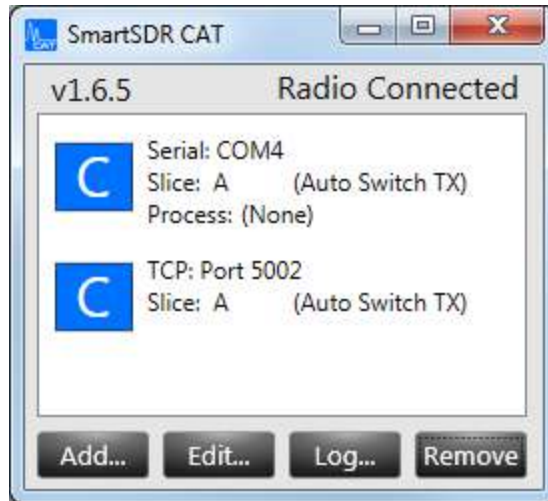
DAX should now look like this:



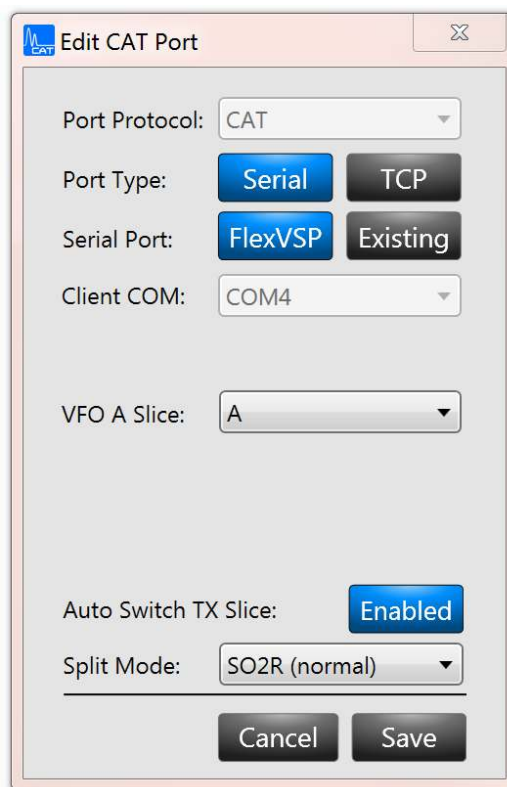
Adjust the RX Gain setting of channel 1 so that the red RX signal indicator is roughly $\frac{3}{4}$ -scale. The text under Slice A should say “Streaming.” If it does not, this problem must first be investigated and solved. Hovering over the channel indicator can provide diagnostic information if streaming is not occurring.

SmartSDR CAT

Open the SmartSDR CAT Control Panel by double-clicking on the icon on the desktop (or clicking on the icon in the Task Bar if it is already running).



Ensure that you have the default CAT port ("C" icon) on Slice A and make a note of the COM port number. If it is not setup, you may add a port like this now by clicking Add... at the bottom of the panel. It should be setup like this:



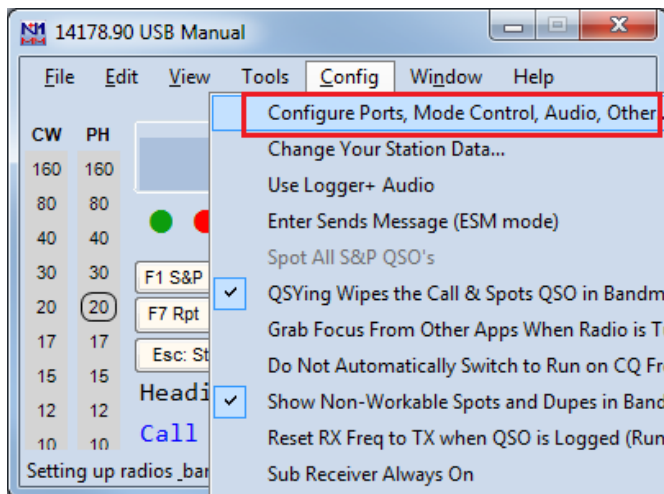
You may setup other ports for support using SO2R by following the previously referenced SO2R document at the start of this setup guide.

N1MM Logger+

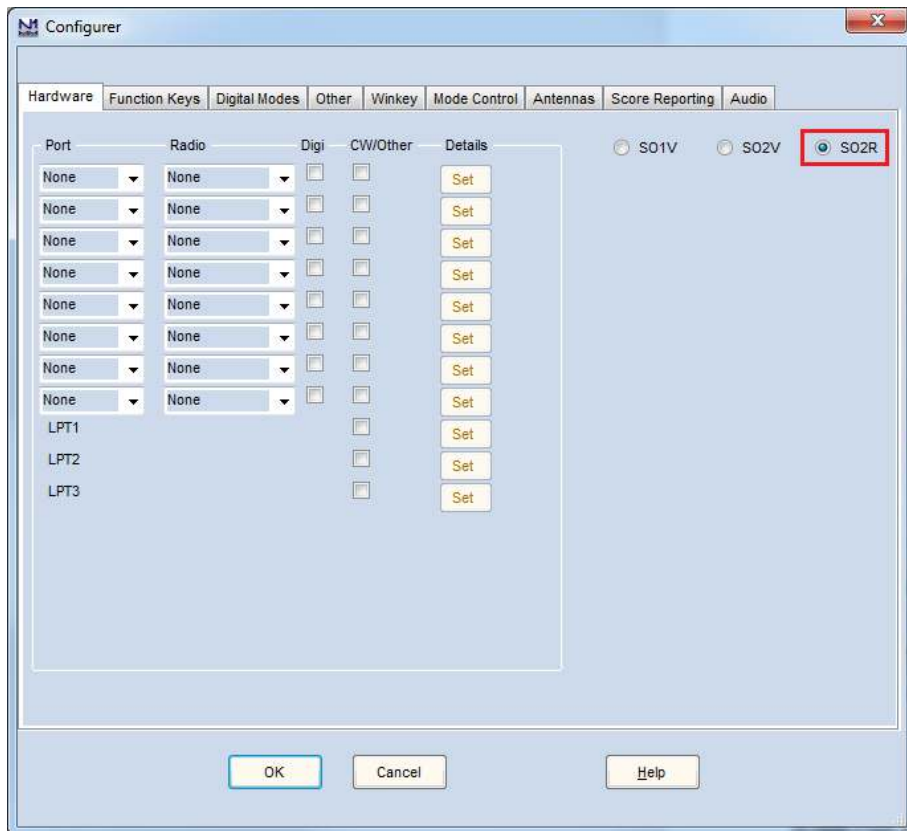
N1MM Logger+ must first be installed using a Full Install and any updates. For details on how to install N1MM Logger+, visit <http://n1mm.hamdocs.com/tiki-index.php?page=Full+Install>

If this is the first time to use N1MM, upon launching the program a form will be presented for entry of details such as your Call sign, QTH, ARRL section, etc. Fill this out and continue to get to the main display.

Warning: It is a best practice to close and restart N1MM upon completing any changes to the Port configuration. Unexpected behavior (keying anomalies, etc) may result from not following this practice. This is especially true if switching to/from external Winkeyer ports from our Winkeyer Emulation ports as communication seems to continue to send signals to both ports until the application is restarted.



Click the Config -> Configure Ports, Mode Control, Audio, Other... menu option.

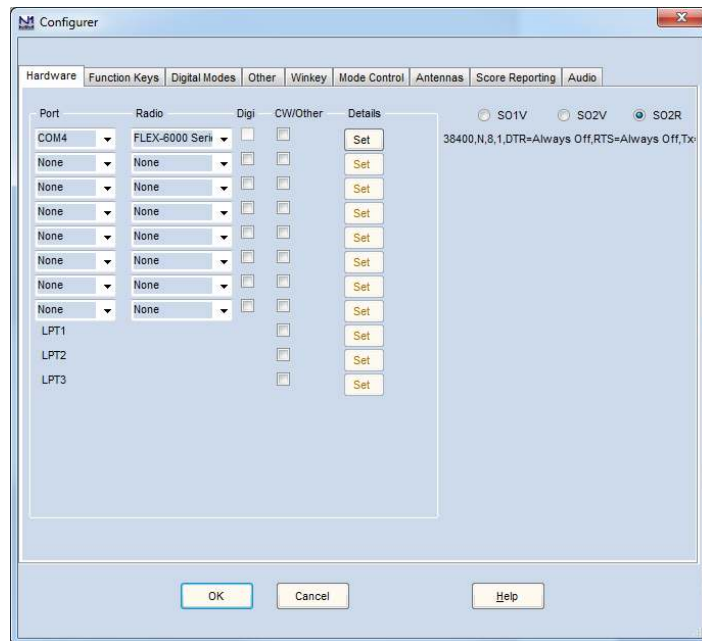
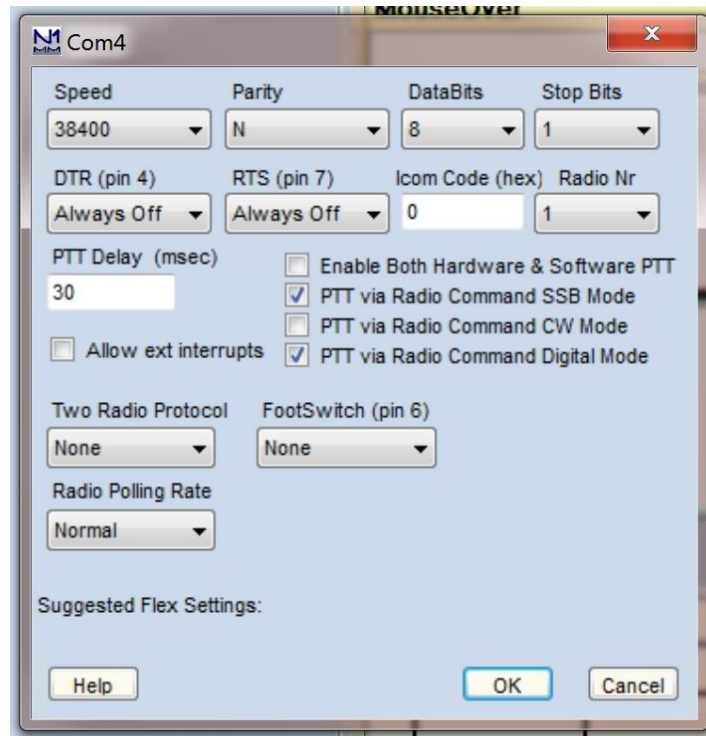


Starting on the Hardware Tab, select the SO2R box on the far right.

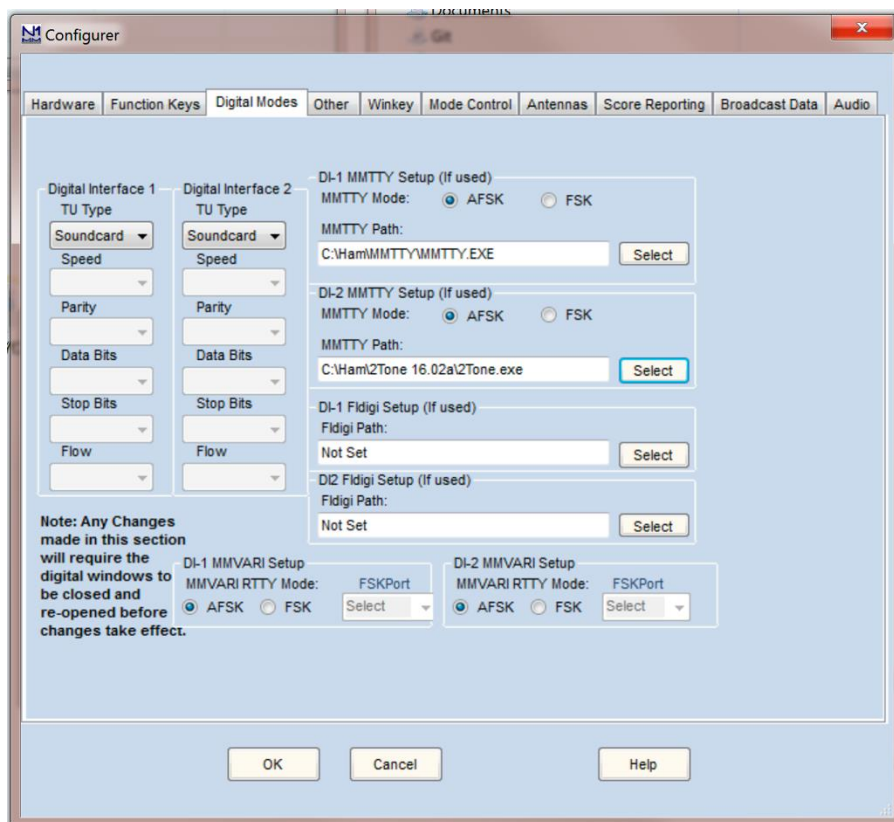
On the top row of port definitions, select the main CAT COM port (COM4 in our example). Under Radio, choose FLEX-6000 Series.

Click the Set button under Details on the first row.

Setup the form as shown and click the OK button.

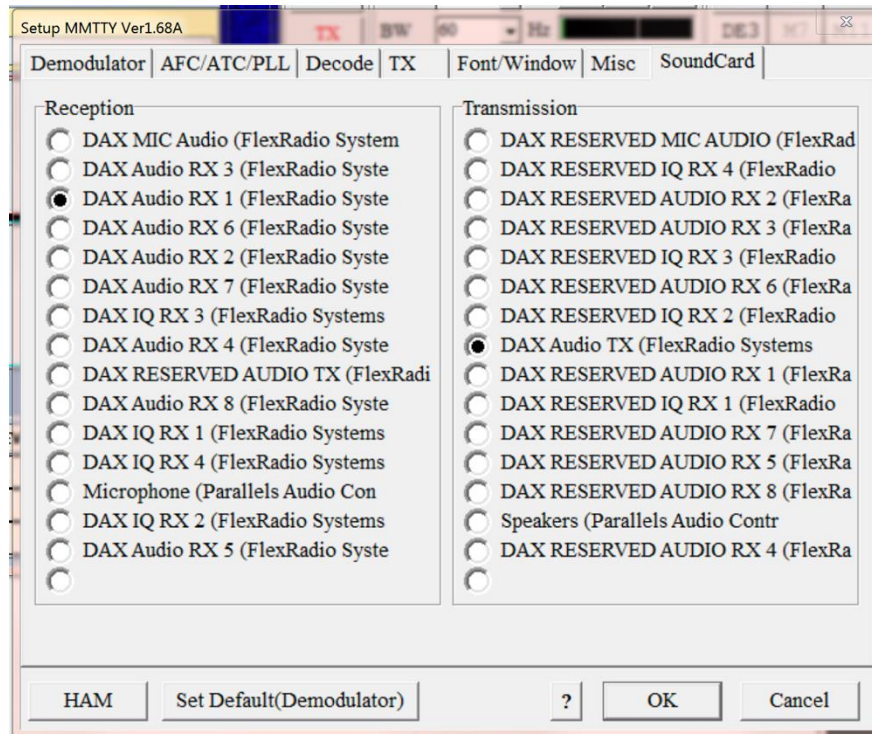


Now click on the Digital Modes tab. Under the Digital Interface 1 and Digital Interface 2 columns, select Soundcard for the TU Type for both. For the DI-1 MMTTY Setup (if used) box, select AFSK and locate the directory and executable for MMTTY where you installed it. Do the same for 2Tone, locating the directory and executable for 2Tone. The windows should now look like this:

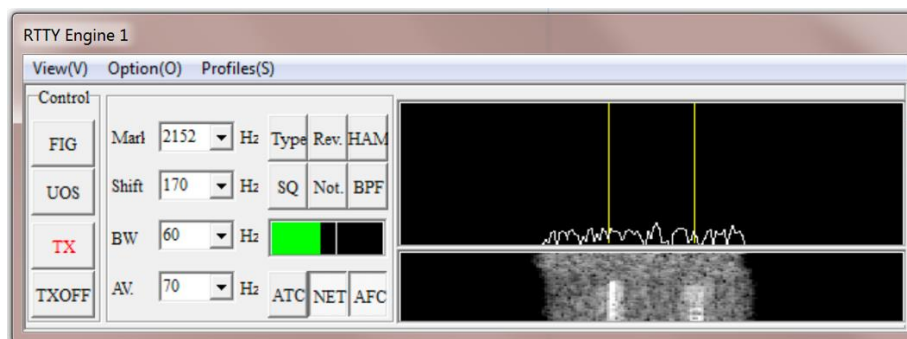


Click OK.

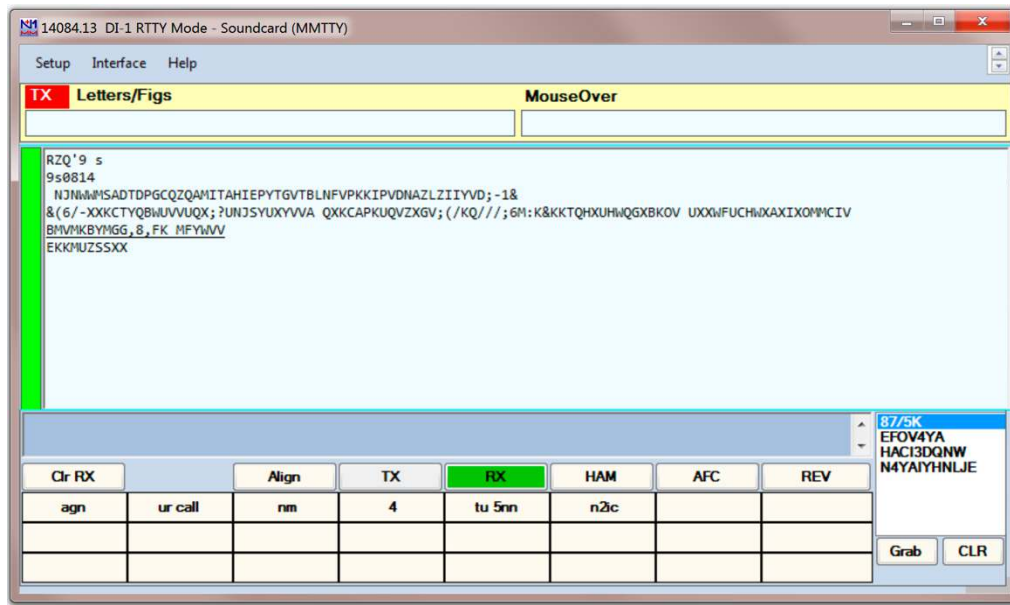
Now in the N1MM Logger+ main window, select Window->Digital Interface. The RTTY Engine 1 window from MMTTY should be visible. Select Option(O) from the menus and then Setup(O) and select the sound cards as shown below:



Click OK. You should now be able to see audio in the RTTY Engine window like this:

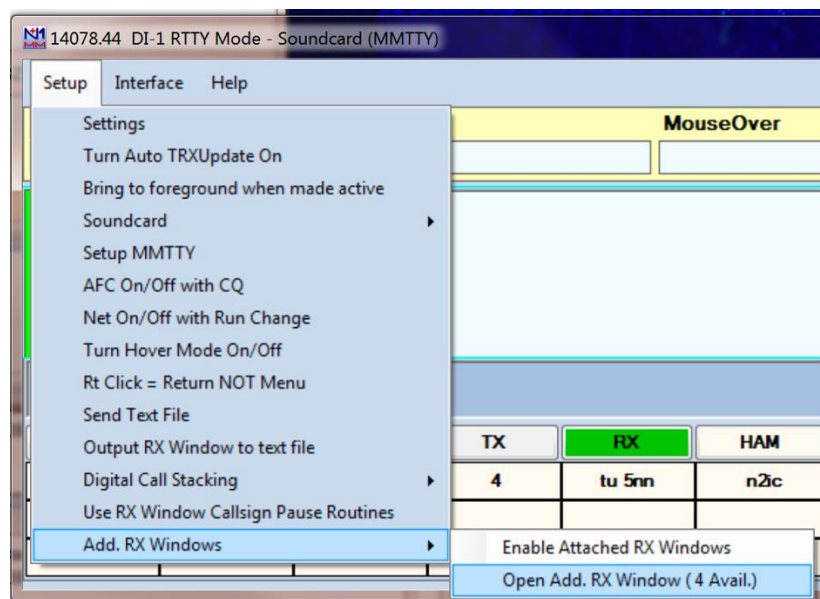


Your DI-1 Window should now be decoding anything it hears and you should see a window that looks something like this:



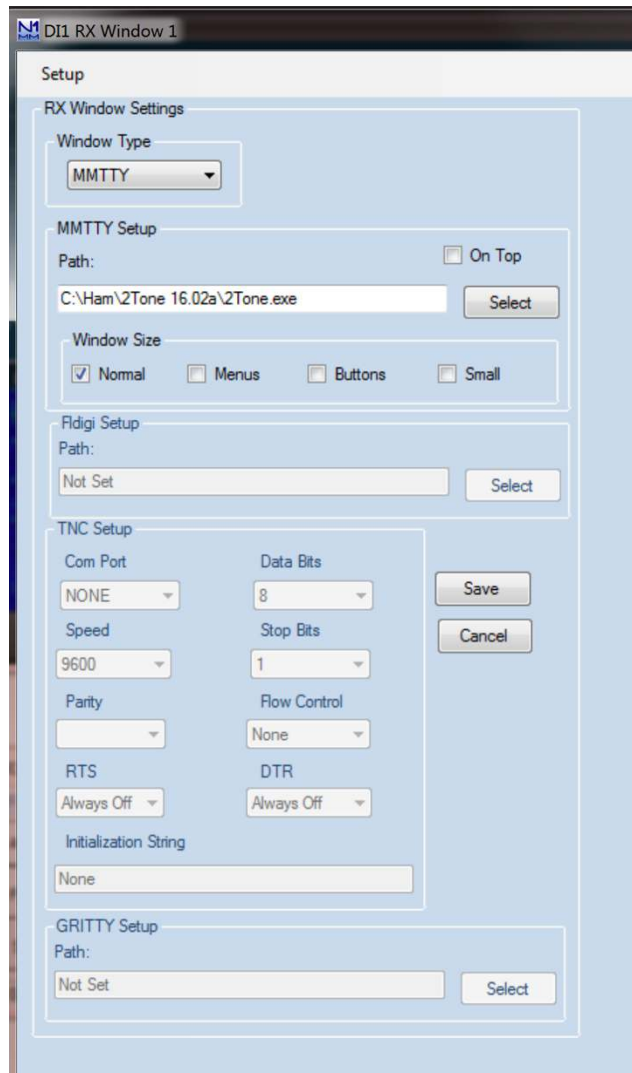
This window now shows decoding occurring from MMTTY. Next, we want to add 2Tone to this window so that there are two decoders at once for the DAX channel. This will give you confidence that in the decodes that you see. For example, if MMTTY says "CQ N2LEX N2LES K" you might not know who was calling. But if you simultaneously have a decode from 2Tone that says "CQ JHDSHS N2LEX K" you would be much more assured that N2LEX is the correct callsign.

To add 2Tone, ensure 2Tone is started (double click on the icon in your C:\Ham\2Tone <version>\ folder). Now in your DI-1 Window, select Setup->Add. RX Windows->Open Add. RX Window (4 Avail.).

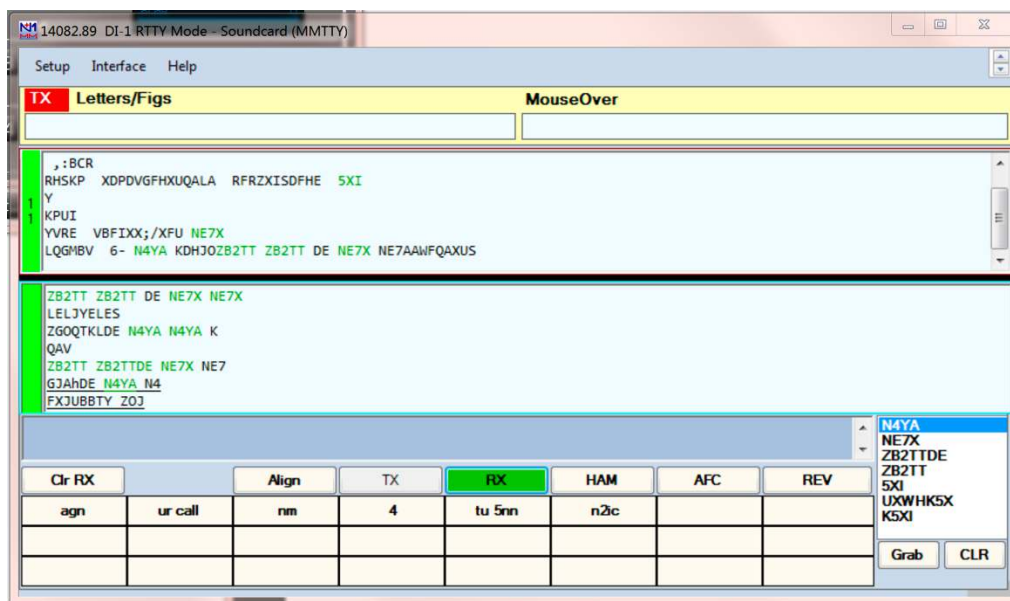


When the setup window opens, select MMTTY for the Window Type and set the path to point to

the 2Tone installation on your hard drive. The window should look like this:



Now in the DI-1 Window, select Setup->Add. RX Windows->Enable Attached RX Windows. Your DI-1 Window should now have both decoders at the same time and should look like this:



You should now be able to decode with both programs. N1MM Logger+ documentation has mode details on how to use the decoder windows, select callsigns from the windows, etc. For more details on using this interface, read the N1MM Logger+ Documentation at this address: <http://n1mm.hamdocs.com/tiki-index.php?page=Digital+Setup>

Using RTTY Skimmer

RTTY Skimmer uses wideband IQ data from a radio to locate stations that are transmitting RTTY signals and then it decodes these signals and makes them available as Telnet spots. How is this useful? If you are running a modest station and would like to run assisted in a contest – that is you would like to use spotting networks or a local decoding program like a skimmer – you can either use Internet spots or you can use spots generated locally. If you use Internet spots from a DX cluster, you may or may not hear the stations that are spotted and you have no idea how you might receive those stations. If, however, you use a local skimmer you can know what sort of SNR you will have on each RTTY signal and, therefore, you have an idea about how likely you are to work any individual station.

Fortunately, the FLEX-6000 has built in IQ channels that can be used at the same time that the radio is being used for a contest. This allows your FLEX-6000 to not only be your operating radio, it can also be your spotting radio. There are certain limitations – for example, your operating and spotting antennas are limited to the number your radio supports at a single time. For example, with a FLEX-6300 and FLEX-6500, you can only use one receive antenna at a time and so your spotting antenna must be the same antenna. On a FLEX-6700, you could use two different antennas for receive if desired, but again these must be the same antenna(s) used for spotting.

Since the purpose of the spots is to help find who you can work reliably, using the same antenna that you will use for your receiver is a huge benefit. You know when you see a spot, it came from the same radio you are operating on. If, however, you are using the same antenna for transmit and receive, when you go to transmit skimmer will no longer have data since the

antenna has been temporarily redirected to the transmitter instead of the receiver. As a practical matter this is of little importance since most of the stations you would spot are continuously transmitting, calling CQ up to twice per minute. It only takes once in a periodic time period to get a spot that can be used anytime in the near future.

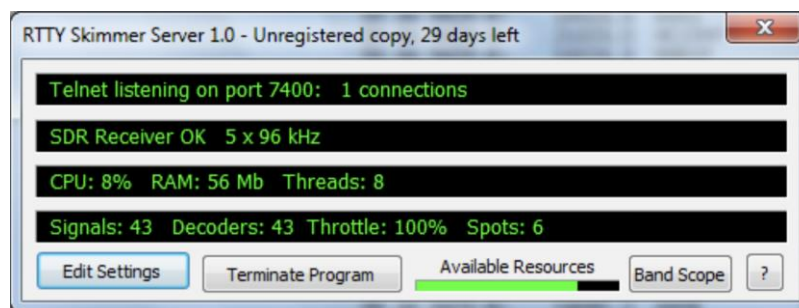
Select a computer for running the RTTY Skimmer software that has sufficient horsepower to skim the bands of interest. Alex details this in the manual and it is an important consideration.

Setting up RTTY Skimmer

To setup RTTY Skimmer, do the following:

1. Download and install RTTY Skimmer from Alex, VE3NEA, which can be found here: <http://www.dxatlas.com/RTTYSkimServ/>. Do not run the RTTY Skimmer yet (although it is not fatal if you do).
2. Install SDR-Bridge from W2RF. SDR-Bridge does not need to be running when RTTY Skimmer is running, but it does install a driver and FlexRadio DLLs in the RTTY Skimmer directory so it must be installed. Download, install and run (once) SDR-Bridge which can be found here: <http://www.grv.com/sdrbridge.html>. SDR-Bridge will move several software components to the RTTY Skimmer directory. Once it has been run, close SDR-Bridge.
3. Run RTTY Skimmer and follow the directions on setting it up. Some additional information below may help you do this. The RTTY Skimmer User's Manual can be found here: <http://www.dxatlas.com/RttySkimServ/Files/RttySkimServ.pdf>. Follow along with the manual while we setup the Skimmer server.

RTTY Skimmer will use the FlexLib and VITA-49 DLLs in the directory to connect directly to your FLEX-6000 and pull IQ data through the DAXIQ interface. Note that it pulls the data directly from the radio and does not require the DAXIQ control panel be used. When started, RTTY Skimmer will place an icon in the system tray. To setup the server, right click on the icon and say "Show Window."



Selecting Edit Settings will pause RTTY Skimmer and will bring up a window where you can edit the settings.

1. The top of the file has user information which will be displayed in Telnet when the server is connected to N1MM Logger+ or another telnet client. Fill this information in for your station.
2. Under [SDR] the radio type will show "01 QuickSilver QS1R". As tempting as it is to change this value, it should be left alone!
3. The default rate value (1) is 96kHz which has been tested and works well. The other rates should also work, but have not been tested by FlexRadio at the time of this writing. It's best to start with 1 and then change the value later to run a different bandwidth if desired.
4. Make note of the port number in the [Telnet] section. You may change this if desired, but remember the number as it will be required in later steps
5. There are other levels that can be used in decoding. The Normal level (1) works well, but other levels can be used to suit your preference.
6. If you will be using RTTY Skimmer in a contest, the best decodes can be achieved by explaining to Skimmer what typical contest exchanges look like. Ensure that you have setup the contest correctly in the Contest=DX line (or not if you are using it for general use). The instructions in the RTTY Skimmer manual explain how to do this.
7. Finally, the SegmentSel96= line will set the bands that are of interest for skimming. You can have up to 2 bands skimmed for a FLEX-6300 or up to 4 bands for a FLEX-6500 or FLEX-6700. This means that you can only have four "1"s in this line and they correspond to the bands to skim. Looking at the CenterFreqs96 line above, enter a 0 for any band you do not want to skim and a 1 for any band you want to skim. So, for example, if you wanted to Skim 10, 15, 20 and 40 on a FLEX-6500, you would have the line:

SegmentSel96=0010101010

Note that for each "1" Skimmer will use a DAXIQ channel starting with #4 and working down to #1.

8. Next, uncomment the line listing the segments of interest at the bottom of the file by removing a semicolon from the start of the line that fits (contesting or not). You may also change the segments as desired.
9. Save and exit and Skimmer should start running, although it will not yet have data.
10. Next, we will assign DAXIQ channels. Currently, every DAXIQ channel must be mapped to a visible panadapter. This means that today, in Maestro only two bands can be skimmed at a time. In SmartSDR, you can skim four bands, but they must all be visible panadapters. Open each panadapter you want to skim with and select a DAX channel, starting with 4 and going down to how ever many skimmer bands you have selected and assign the channels to the panadapters.

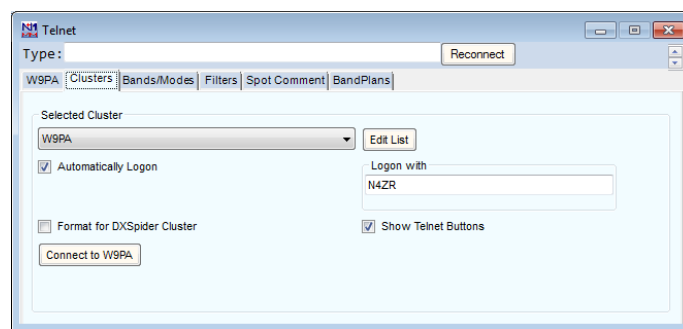
RTTY Skimmer should now show that it has data and that decoders are working and creating spots. You may also press the Band Scope button to see the band and see where skimmer receivers are working. Only a single band scope is shown and it may be pointed to any skimmed band with the control in the upper left of the display.

Configuring N1MM Logger+ for Telnet Spots

Next, N1MM Logger+ must be configured to receive the spots. In the description below, we discuss connecting N1MM Logger+ directly to the RTTY Skimmer via telnet. You may also want to combine Internet spots to get information from both places. If this is desired, you may place VE7CC's CC Cluster software "in the middle." The procedure for doing this is not detailed here. There is an argument to be made for not using the Internet spots (you won't know if you can work them) and one to be made for using them (if you want to CQ, knowing where stations are all over the world will help you avoid CQing in a spot someone else is using somewhere else in the world, even though you cannot hear them).

The directions for configuring N1MM+'s telnet window can be found here:

<http://n1mm.hamdocs.com/tiki-index.php?page=Telnet+Window>.



To configure N1MM Logger+:

1. Open up the Telnet window and go to the Clusters tab.
2. Select Edit List
3. Scroll to the bottom of the list and enter the IP address for your local RTTY Skimmer system and the port you chose before (7300 is the default)
4. Close the edit window and select your cluster by name with the drop down box and hit the Connect to button on the Telnet window of N1MM+.

If desired, you may adjust any filtering parameters and band/mode parameters, but in general you'll probably want most of what comes from your local server (RTTY Skimmer) since you already setup the bands where it will skim. Minimize the telnet window (do not close it)

Spots will now start appearing on your bandmap (Window -> bandmap) as well as in the available mults and Qs window (Window -> Available Mults & Qs). Using the Bandmap in N1MM Logger+ is covered here: <http://n1mm.hamdocs.com/tiki-index.php?page=Bandmap+Window>

Using the available Mults and Qs is covered here: <http://n1mm.hamdocs.com/tiki-index.php?page=Available+Mults+and+Qs+Window>

The available mults & Qs window can be sorted to show mults only, everything you need to work, and can be sorted in any number of ways. For example, you can sort by decreasing SNR (signal to noise ratio) which is provided by RTTY Skimmer. This allows you to work the loudest stations first if desired. By excluding regular contacts and just showing mults, you can be sure

to work the mults first. You can also sort by beam heading to efficiently work everyone in, say, the Caribbean while your antenna is pointed in that direction.

Remember that using a skimmer changes your entry classification in most contests to an assisted classification. With today's modern log-checking software, it is very easy to determine whether a skimmer is in use because of the rapid band hopping and focus on multipliers. In short, if you operate this way, you should always claim assistance in your log.

FOR MORE INFORMATION

For more information visit www.flexradio.com or submit a support ticket via our HelpDesk (<https://helpdesk.flexradio.com/hc/en-us>)