SETTING $10TNC GAIN CONTROLS IN WINDOWS & RASPBERRY PI

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Overview:

In order to properly send and receive digital signals, the received signal levels reaching the software on your computer must be in the proper range for that software to decode, and the transmitted signal levels reaching the transmitter must be in the proper range for suitable modulation of your transmitter.

Receiver software may have a "DCD" (Data Carrier Detect) threshold adjustment, below which it does not recognize even that the receiver is receiving a signal. If so, that will have to be adjusted as well (I typically put them just as sensitive as possible without having gobbledygook characters out of background noise appearing). Some receiver detection software does NOT have such an adjustment and depends on the overall signal level of a valid signal being set in the appropriate range (e.g., Direwolf for raspberry pi).

FM transmitters for amateur usage may have a specially shaped frequency response designed to emphasize higher frequencies, as well as a limiter designed to prevent overmodulation. (Remember that an FM transmitter swings a smaller frequency deviation for a low amplitude signal, and a larger frequency shift for a larger input audio signal.) If the signal to be transmitted is of excessive amplitude, the pre-emphasis (shaped frequency response) and limiting circuits may end up transmitting a signal that is more difficult to decode.

Your transceiver may have both microphone gain on its microphone input, in addition to the TX GAIN adjustment of the $10TNC – these will interact. Best to leave your microphone gain at the typical level used with voice transmissions, and alter the TX GAIN of the $10TNC to match.

Your transceiver may have a demodulator output that can be sent to the $10TNC, which is independent of the regular audio volume control; or it may not. If the audio signal that you're sending to the $10TNC is affected by your regular audio volume control, best to adjust it for a relatively normal audio output, and then utilize a speaker that can be turned off when desired (so that you don't have to listen to the digital signals forever). Then adjust the RX gain of the $10TNC for optimal data detection.

It is often easier to adjust the received volume if you're able to visually observe a waterfall (Fast Fourier Transform) display. Our current direwolf software on raspberry pi doesn't have a waterfall display, so it may be easier to get an initial receiver setting either while running FLDIGI on the raspberry or while using a Windows computer running software that shows a waterfall display (e.g., soundmodem.exe or FLDIGI)

Specific Information For Different Software:

Software /	Windows	Windows BPQ	Raspberry Pi	Raspberry Pi

Computer Platform:	FLDIGI		Direwolf	FLDIGI
Adjusting RX	1. Have your receiver physical volume set to an appropriate audible volume. Mark the knob/radio so that you can reliably return to this setting. 2. Check that the C-Media USB sound card is selected. 3. Check that the mixer mic gain controls are at or near maximum sensitivity 4. Observe the FFT Waterfall – when you adjust the receiver squelch control to hear continuous hiss, you should definitely see the signal on the waterfall. If not, check wiring connections. 5. Adjust $10TNC RX controls for optimal signal detection.	1. Have your receiver physical volume set to an appropriate audible volume. Mark the knob/radio so that you can reliably return to this setting. 2. Remember that BPQ for Windows requires a KISS input, such as from UZ7HO soundmodem.exe software. Confirm that you have selected the same TCP port on both soundmodem.exe and in your BPQ32.EXE configuration file. 3. Check that the C-media USB sound card is selected as the audio source in soundmodem.exe. 4. Confirm that the windows mixer controls are set at or near maximum mic sensivitivity. 5. Adjust the DCD Threshold on soundmodem near the bottom (left)	1. Have your receiver physical volume set to an appropriate audible volume. Mark the knob/radio so that you can reliably return to this setting. 2. Using alsamixer, select your C-media device, and set the mixer mic gain controls at or near maximum. 3. Use the following command to permanently store your gain settings: sudo alsactl store 4. To get your RX gain somewhere near the right range, it may be easier first to set it using the FLDIGI software such that the FFT display is dark when no signal is being received, shows a spectrum when a packet signal is being received (even tho FLDIGI cannot decode	1. Have your receiver physical volume set to an appropriate audible volume. Mark the knob/radio so that you can reliably return to this setting. 2. Using alsamixer, select your C-media device, and set the mixer mic gain controls at or near maximum. 3. Use the following command to permanently store your gain settings: sudo alsactl store 4. In the configuation of FLDIGI, verify that your C-media USB audio souce is selected. 5. 4. Observe the FFT Waterfall – when you adjust the receiver squelch control to hear continuous hiss, you should definitely see the signal on the

		most sensitive position. 6. Adjust the RX gain control on the $10TNC optimally, so that it is in the middle of the range throughout which received packet signals are properly decoded (neither too sensitive nor inadequately sensitive.)	packet) and shows a “white out” when the squelch is disabled and loud HISS is being received. If you are lucky and reach decode-able signals immediately in the next step, you may be able to skip the intermediate FLDIGI adjustment suggested here. 5. If your Raspberry Pi is set to automatically start Direwolf, halt that program by finding its task number and kiling it: pgrep direwolf (observe the job number) kill <job #> Then bring up a terminal window and on the command line execute the direwolf program: direwolf This will start Direwolf within a text terminal	waterfall. If not, check wiring connections. 6. Adjust $10TNC RX controls for optimal signal detection while listening to a valid digital signal of the type selected in the Op Mode of FLDIGI.

			window. Whenever a signal is detected, it will read out the header, and give volume level information. You want normal-sounding packet signals to come it at a volume level near 50. Adjust the RX level control on the $10 TNC to achieve this. 6. Be certain that your direwolf.conf file and bpq32.cfg file are both set for the same TCP port for communication between the two programs.	
Adjusting TX	1. If your transceiver has a mic gain control, have it adjusted for normal voice into your normal microphone. 2. Ensure that your Windows mixer output levels for the C media USB device are at or near maximum. 3. FLDIGI provides a transmitter tune selection; using	1. If your transceiver has a mic gain control, have it adjusted for normal voice into your normal microphone. 2. Ensure that your Windows mixer output levels for the C media USB device are at or near maximum. 3. UZ7HO soundmodem.exe provides a Calibration	1. If your transceiver has a mic gain control, have it adjusted for normal voice into your normal microphone. 2. Using alsamixer, select the C-media USB sound device. Verify that the headphone output signal levels are at or near maximum. 3. Store your setting	1. If your transceiver has a mic gain control, have it adjusted for normal voice into your normal microphone. 2. Using alsamixer, select the C-media USB sound device. Verify that the headphone output signal levels are at or near maximum. 3. Store your setting permanently using

	this, and listening to your own signal on a second transceiver, adjust your TX gain so that your transmitted audio volume level is just sightly below the maximum that can be achieved. This will ensure that you are not overmodulating.	selection in its menu. Using this, and listening to your own signal on a second transceiver, adjust your TX gain so that your transmitted audio volume level is just slightly below the maximum that can be achieved. This will ensure that you are not overmodulating.	permanently using the following command: sudo alsactl store 4. Verify that your linbpq is set to the same TCP port as your direwolf. 5. Cause your linbpq to transmit several times. This can be done by setting some beacon to transmit every 1 or 2 minutes, or by issuing a command to Connect to a station that is unlikely to respond. While listening to your own signal on a second transceiver, adjust the $10TNC TX gain control for just-below-maximum transmitted audio level. This will avoid overmodulation.	the following command: sudo alsactl store 4. Within FLDIG, select the Op Mode you wish to utilize. 5. Using the FLIDIG “TUNE” button, and while listening to your signal on a second transceiver, adjust the $10TNC TX gain for just-below-maximum audible signal leel.