



# How to make KPC-3 Adjustments

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## 1 KPC-3 Plus Adjustments

### 1.1 Introduction

While we don’t normally think of making adjustments to the TNC, the Kantronics TNCs do offer specific tuning options that can help with your ability send and receive digital messages. Obviously, the type of radio to which your TNC is connected is important. The good news is that Kantronics KPC-3 Plus User’s Manual does a nice job outlining the steps to configure both the receive and transmit sides of your TNC.

This HOW-TO summarizes these steps with ideas on how to implement them.

### 1.2 Reference

Before proceeding, find, download, and review the **Kantronics KPC-3 Plus User guide**. While most of this information is based on material from this edition (printed 2015-05-28), more recent editions contain similar information.

### 1.3 Adjusting the Receive Volume of Your Transceiver

The transmitters’ receiver feeds directly into the TNC which, in turn, detects and presents the data being received. Like a user, if the volume is too low, you may not hear anything. If it is too high, it could be distorted. The KPC3 has two methods for getting the volume right; both methods are covered here.

### 1.3.1 Using the Radio's fixed level receive audio (data) port

Some radios offer a data port that essentially presents a fixed level (unsquelched) of receive audio from the radio as well as access to the transmitter input. Regardless of what you do with the radio's volume control, the fixed level audio is just that... fixed.

If you have a data port and a **custom cable**, do the following:

1. Connect the TNC to the radio data port.
2. Turn ON your computer (with your transceiver OFF).
3. Start your terminal program
4. Turn ON your KPC-3 Plus.
5. If not already done, set the KPC-3 Plus's baud (ABAUD) and CALLSIGN.
6. Turn ON your transceiver.
7. The receive LED may remain on all of the time.
8. Set the TNC's Carrier Detect parameter to SOFTWARE.
  - a. Requires to be in TERMINAL mode, not NEWUSER mode.
  - b. TNC Commands:     cmd: INT TERMINAL  
                          cmd: CD SOFTWARE
9. Now, the receive LED will not light until valid packets are heard (see the CD command in the commands section for more details on this command).

### 1.3.2 Using the Radio's speaker and mic

Not all radios provide a fixed level audio port. If this is the case with your radio, then you need a **custom cable** to connect the TNC to the radio's mic and speaker output (some radios include a speaker output as part of the mic pin-out; check your radio manual for details).

To adjust the receive volume of your transceiver to the proper level (or to confirm that it is already set at the proper level), do the following:

1. Connect the TNC to the radio's mic and speaker output.
2. Turn ON your computer (with your transceiver OFF).
3. Start your terminal program.
4. Turn ON your KPC-3 Plus.
5. If not already done, set the KPC-3 Plus's baud (ABAUD) and CALLSIGN.
6. Turn ON your transceiver and open the squelch control (turn it fully counterclockwise).
7. Slowly turn the transceiver's receive volume up until the RCV LED (receive indicator) on the KPC-3 Plus lights (turns ON).
8. Increase the transceiver's receive volume control slightly above the point at which the RCV LED lit up (turned ON).
9. Slowly turn the transceiver's squelch control clockwise until the RCV LED goes OUT (turns OFF).

Now the receive volume control on your transceiver is properly adjusted for sending signals to your KPC-3 Plus.

If you do not see the receive LED light, check the cabling between the radio and the KPC-3 Plus. Also, until KPC3 has been initialized from the computer, the KPC-3 Plus will not show ANY indication of receiving.

## 1.4 Kantronics KPC3 Transmit level adjustment

With the receive side all set, it's time to focus on the transmit side. This is just as important to ensure you have sufficient (but not too much) audio drive into the radio. If the transmit audio level is too low, the receiving station may not be able to decode your signal. If it is too high, you risk producing distortion and harmonics on the band.

### 1.4.1 TNC commands

There are a few KPC-3 TNC commands that will help with the transmit level adjustment:

**XMITLVL** n                      Default 100

#### **CALibrate**

The voltage range set by the XMITLVL command is from 1 mV to 4 V p-p. From a count of 0 to 255, the voltage is increased from 1 mV to (approximately) 130 mV, or 0.50 mV per step. From a count of 256 and above, the voltage is increased linearly but in larger steps (approximately 14 mV per step) until 4V (max) is reached at a count of 502.

The 1200-baud data drive level (transmit audio voltage) from the KPC-3 Plus to your radio is adjusted digitally using your keyboard and the transmit level (XMITLVL) or the calibrate (CAL) command.

You should adjust the drive level to provide about 3 to 3.5 kHz of deviation with your radio. If you don't have access to a deviation meter, adjust drive so your packet transmissions generate about the same audio sound as packets heard from other stations.

If you don't have access to a deviation meter, then the following method works to set the transmitter drive level using a smart phone app. While I have used an iPhone and the referenced app below, it should apply to android phones as well.

### 1.4.2 What you will need

1. Free **iPhone Decibel X** (<https://apps.apple.com/us/app/decibel-x-db-sound-level-meter/id448155923>)
2. or Free **Android Decibel X** (<https://play.google.com/store/apps/details?id=com.skypaw.decibel>).
3. HT capable of receiving on the packet bands you wish to set.
4. Dummy load for your radio. While not required, it is always good not to splatter your calibration tones all over the airwaves.
5. KPC-3 Plus manual for reference.

### 1.4.3 Procedure

1. Connect your packet transceiver to the dummy load.
2. On your HT, tuned to the packet frequency of interest. Turn off all tones.
3. Open Decibel X and position it near the HT. Put it in "sound meter" mode.
4. At the packet station, from Ipserial, connected to the TNC and do a Hard Reset (RESTORE DEFAULT).
5. After setting the baud rate and entering your call sign, put the TNC in CAL mode (see the KPC-3 Manual, Calibration/Equalization section).
6. Keep the background noise as low as possible.

7. At Iserial, press “S” (2200 Hz space) to cause the TNC to generate a tone.  
**NOTE:** The “Space” frequency is the one that you want to make sure doesn't get clipped. The pre-emphasis of the space is much more than the mark (1200 Hz), so the space will get clipped first.
8. While watching the Decibel X, at Iserial, enter “+” (plus key) to start to raise the signal level.
9. You can either find the graph that shows your progress or watch the decimal number below the meter to detect the change in the signal level.
10. Once you see the level stop going up, enter “-” (minus key) to back it off.
11. At Iserial, press “X” to exit.
12. Write down the setting. This is the setting this TNC will work with this radio.
13. If you usually connect this TNC to different radios, repeat this process for that radio/TNC pair.
14. If you ever need to do a Hard Reset on this TNC when connected to this radio, then use the XMITLVL command to restore this value.

#### 1.4.4 Observed results

Using this method, my Alinco DR125 2-meter radio ended up with a XMITLVL of about 280. My Kenwood TM-V71 was close to the default XMITLVL of 100.



DO NOT INCLUDE

Source: Santa Clara County RACES

XMITLVL settings for various transmitters and deviation levels around target of 3.25 kHz

Make	Model	XMITLVL	Deviation	Method	Callsign	Updated
Yaesu	FRM-350	160	3.75 kHz	Deviation Meter	N6MEF	06/27/18
Kenwood	TH-F6A	43	3.50 kHz	Deviation Meter	N6MEF	06/27/18
Kenwood	TM-D710	41	3.50 kHz	Deviation Meter	N6MEF	06/27/18
Yaesu	FT-8800	123	3.75 kHz	Deviation Meter	N6MEF	06/27/18
Alinco	DR-235 MkIII	262	3.60 kHz	Deviation Meter	N6MEF	06/27/18
Kenwood	TM-231	19	3.57 kHz	Deviation Meter	N6MEF	06/27/18
Kenwood	TS-2000	43	3.50 kHz	Deviation Meter	N6MEF	06/27/18