

**NBEMS  
Software...  
2014 Winner  
of the ARRL  
Technical  
Excellence  
Award!**

# **The Wellington Radio Club Guide for... The Basic Testing, Calibration, Troubleshooting and a Few Installation Options for PBC Basic NBEMS**

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**Simple step-by-step instructions with lots of illustrations!**

**Version 2 – 9/1/14**

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This guide is to assist the few people who may have BASIC NBEMS installations that are not working up to expectations. The MT-63 digital mode chosen for BASIC NBEMS is well suited to both acoustical coupling as well as interface use.

However, after working on several hundred installations, we have found the few problems encountered arose from:

- Errors in the installation or configuration procedures,
- The aging of the computer’s electronic components, and
- Big differences in the hardware, firmware, software, and/or accessories like mics or speakers

The fact that relatively few people have problems with Basic NBEMS is a tribute to David W1HKJ and his colleagues who have created such a great, user friendly and flexible suite of programs that comprise the NARROW BAND EMERGENCY MESSAGING SYSTEM.

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For further assistance setting audio levels, troubleshooting, or testing, contact these WRC Elmers by email:

- AC4FC – Chris [chris\\_hite@bellsouth.net](mailto:chris_hite@bellsouth.net)
- AF4RL – Rich [rich@lucibella.com](mailto:rich@lucibella.com) (Mac literate)
- K4MGW – Marc [k4mgw@comcast.net](mailto:k4mgw@comcast.net)
- K4WAG – David [david@theftcontrol.com](mailto:david@theftcontrol.com)
- K4ZXR – Joel [e30racer116@gmail.com](mailto:e30racer116@gmail.com)
- KC4WAM - BILL [kc4wam@gmail.com](mailto:kc4wam@gmail.com)
- KS4NB – Larry [larry33414@aol.com](mailto:larry33414@aol.com)

**Or**

Seek assistance just before or during these on-the-air training nets:

**THE WRC’s PBC NBEMS NET (Wellington)**

**TUESDAYS 7:30pm 147.285+ PL 103.5 <<<>>> ELMERS are usually available at 7PM**

**THE BRARA NBEMS NET (Boca Raton)**

**MONDAYS 8:00pm 145.290 PL110.9**

**THE KNIGHTS OF THE ROUND TABLE SIMPLEX NET (Broward)**

**1<sup>st</sup> & 3<sup>rd</sup> SATURDAY 10am 146.550**

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**This Guide was developed by the above Elmers and edited by Larry KS4NB.**

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# Sound Card Calibration – A 10 Minute Procedure

FLDIGI and FLMSG work well in both older and newer computers, and with operating systems going back to Windows 98. However, in rare instances, particularly with older computers, although the configuration maybe be perfect and the sound levels adjusted properly, the decoding and encoding of tones appears scrambled. The solution in almost all cases is a simple, 10 minute procedure to test and calibrate the computer's sound card.

1) Identify the sound card/device in your computer. One way is to open Device Manager that lists your sound devices.

2) Download a free program, *CheckSR.exe* to help with the test & calibrate procedure. CheckSR will establish the difference between your sound card transmit and receive accuracy. It is measured in parts per million (PPM) based on a given sample rate.

Download from [www.mixw.net/files/CheckSR.exe](http://www.mixw.net/files/CheckSR.exe).

3) Open CheckSR. Choose the input and output sound devices found through Device Manager. Select the *Sample rate* which is usually 44100. Click on Start and let it run for at least 5 minutes.

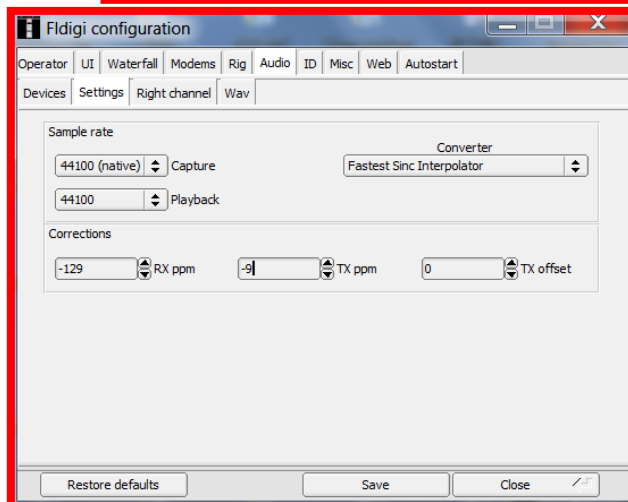
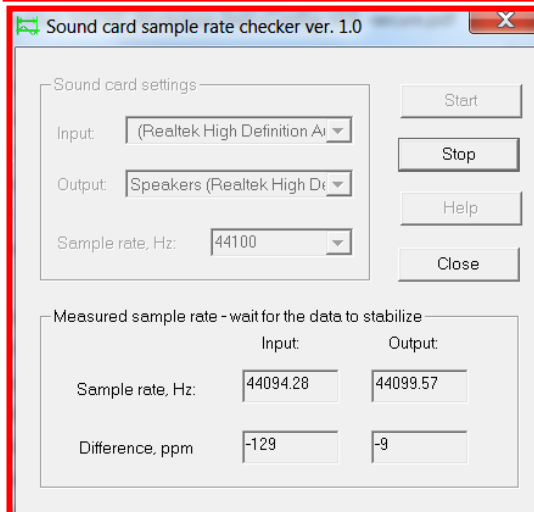
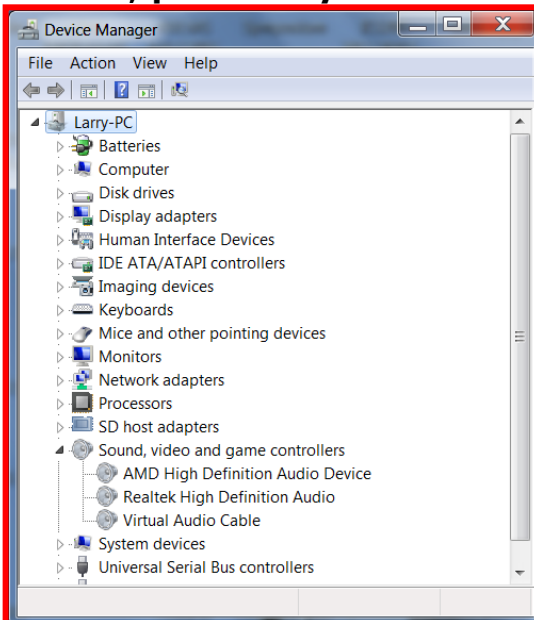
4) Click Stop and record the numbers. Usually, the input and output differences are small, like the data to the right.

However, don't be surprised if the difference values are in the thousands! Just plug them in as described below!

5) Open FLDIGI and click on *CONFIGURE*. Then *Sound Card*, *Audio* and lastly *Settings*. The *Sample rates* should both be 44100. Enter the difference ppm values recorded from CheckSR. RX is the Input ppm and TX is the Output ppm.

6) YOU MUST SAVE AND THEN CLOSE.

This will clear almost all the stubborn sound card offset error cases. Those errors should have been the eliminated by adjusting for the discrepancy between your TX and RX sample rates.

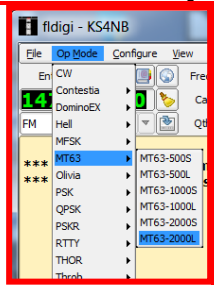


Thanks to Dave K3AAX of Melbourne and Tony W4VHA of West Palm Beach for their inputs!

# BASIC CHECKS AND SETTINGS YOU CAN DO WITH AN ACOUSTICAL COUPLING SETUP

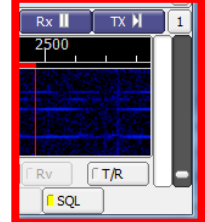
*If your computer doesn't have a built-in microphone, make sure to use an external mic.*

**A) Open FLDIGI.** "FLDIGI+YOUR CALLSIGN" are at the top left of the screen.

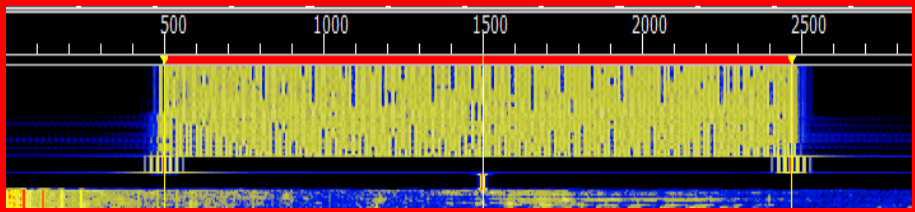


**B) SELECT THE DIGITAL MODE:** Click on *OP Mode*. On the drop-down menu, select MT63, then MT63-2000L. *MT-63-2KL* will appear in the screen's bottom most left corner.

**C) SQUELCH (SQL) CONTROLS** are in the bottom right corner. The squelch should be on and the small SQL box should be  or . If not colored, click on the box.



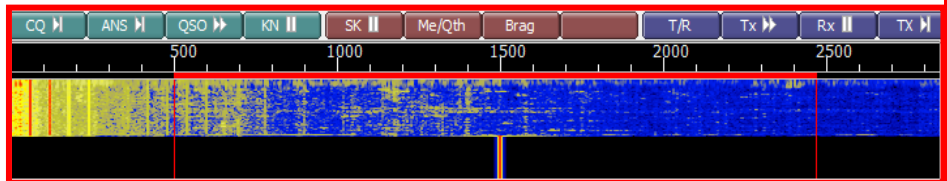
**D) SQUELCH SLIDER CONTROL:** It is the black column to the extreme right. Its small white knob should be about 1/8" above the bottom. If the SQL box has a , drag the knob up slowly to get a  **NO RANDOM CHARACTERS SHOULD BE GENERATED IN THE TOP HALF OF THE SCREEN.** If you still get gibberish, drag the slider knob further upwards and recheck **(B)**.



**E) Waterfalls** display what the sound card/device receives or transmits. It shows the width occupied by a signal... in this case a MT63-2KL signal. Its color is indicated by color with blue being weak, yellow moderate and red strong.

Black indicates no signal. If the screen is totally black, there is no signal input. Test the microphone and check the FLDIGI sound card configuration.

**F) TESTING THE MICROPHONE, THE "CAPTURE DEVICE":** When the microphone is working, it will pick up room noise that normally appears as light blue as shown below. Speak into the microphone. A yellowish waterfall should appear.



**G) TESTING THE SPEAKER, THE "PLAYBACK DEVICE":** Left click on the speaker icon and set the speaker volume at about midpoint. Next click on the "TUNE" button found at the upper right most corner of the screen. A tone will come from the left speaker and a red vertical line will appear at 1500Hz on the waterfall as shown above. Click the button again to turn off the tone.



**H) TESTING OFF-THE AIR... SIMULATING A RADIO TRANSMISSION:** The objective is to test your preliminary settings, the encoding and decoding setup of the computer, and its sound devices using the actual MT63-2KL digital mode.

**METHOD A:** With just an audio/voice recorder, (tape, dictation or many cellphones), hold the recorder mic an inch or so from the computer speaker, start recording, and then click the "CQ" button. The transmission will appear on the bottom half on the FLDIGI screen and will transfer to the top section as it is transmitted. Stop the recording only when the tones cease.

Now rewind the recording. Hold the recorder speaker an inch or so from the computer mic and have it playback the recording. The tones coming from the recorder should be decoded and appear in the top screen exactly as they were transmitted.

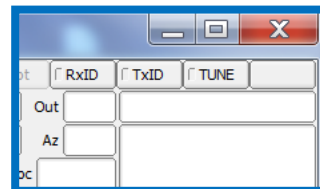
**METHOD B:** Use two computers. Generate the MT-63 tones on one computer and decode them on the other, and then vice versa.

**IF THE ABOVE CHECKS AND TESTS WERE SATISFACTORY...CONGRATULATIONS! YOU'RE READY TO RECEIVE & TRANSMIT COMPLEX DOCUMENTS. JOIN A NET TO PRACTICE! CONTACT AN ELMER IF YOU NEED HELP TESTING, SETTING YOUR AUDIO LEVELS OR TROUBLESHOOTING. THEY ARE AVAILABLE ON THE AIR BEFORE MOST NETS OR BY EMAIL.**

## OPTIONAL SETTINGS

**COMPUTER SPEAKER OPTIONS:** To operate with the simple acoustical coupling method and to implement an option below, you MUST know where the computer speakers are located. Contrary to common sense, some speakers are even located underneath the computer!

**LOCATING YOUR LEFT COMPUTER SPEAKER:** The FLDigi default configuration activates the left computer speaker. On the FLDIGI main screen, click on the uppermost right button: TUNE. It should turn **RED** and a tone should come through the speaker that is currently selected. To turn off the test tone, click on the TUNE button once again.



The optional settings are made from the "FLdigi configuration" windows as shown.

### **OPTION 1: RIGHT SIDE SPEAKER SELECTION**

Some operators may prefer to enable the right speaker for convenience when transmitting. That is when the radio mic is held near the computer speaker.

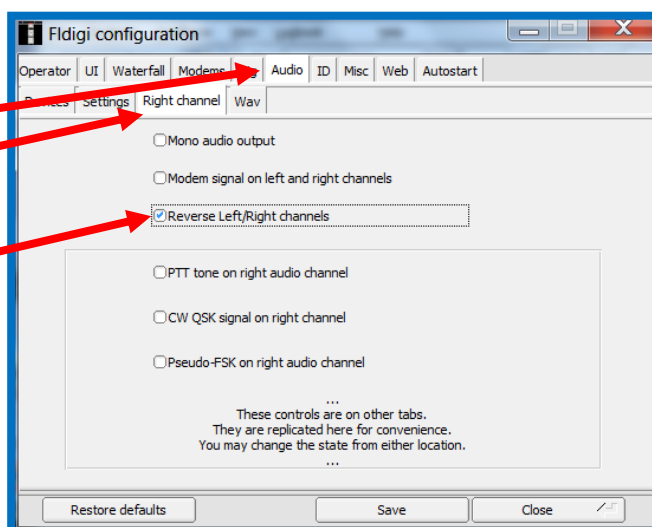
Click **AUDIO**,

Click *Right channel* tab

Check the Reverse Left/Right channels box.

Save

**Test this feature:** Click the **TUNE** for the tone. It will come from the speaker that is currently selected. Now check or uncheck the *Reverse* box. The tone will switch back and forth between speakers.



### **OPTION 2: USING BOTH COMPUTER SPEAKERS**

**Multi-NBEMS operators:** When they will use the same computer at the same or different times, it may be useful to enable BOTH computer speakers.

**The WHISPER coupler or earbuds:** Their performance maybe enhanced by choosing to use BOTH speakers.

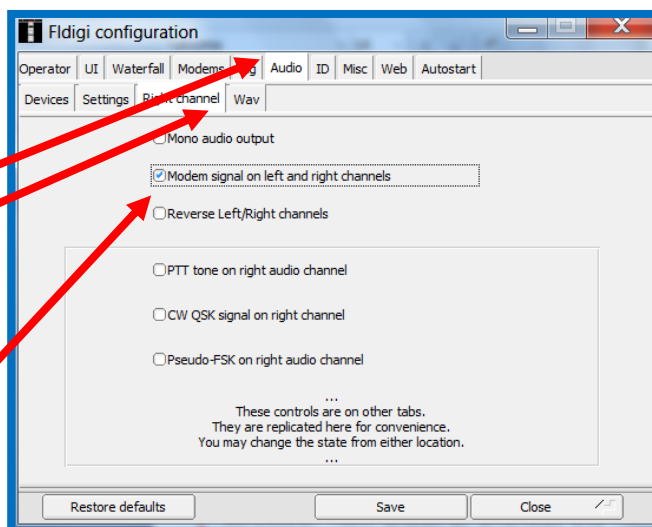
Click **AUDIO**,

Right channel tab

Check the *Modem signal on Left and Right channels* box.

Save

**Test this feature:** Click the **TUNE** to get the test tone. It will come from both speakers. To check Whisper unit or earbud performance, plug-in them in. Check or uncheck the *Modem signal* box. Choose the setting producing the loudest tone.



## OPTIONAL SETTINGS-(Continued)

### CAUTION:

The modes discussed below are not as reliable as MT-63-2KL. They do not have redundancy and are much less robust than MT-63.

**LARGE DOCUMENT/FAST MODES:** There may be times when a document is absolutely necessary to send but its file is too large to transmit before the repeater, or a transceiver, times out using the MT63-2KL mode. The PSKxxxR robust modes use both forward error correction and interleaving to achieve improvements over standard PSK. However, they should only be used as a last resort with minimum noise and strong signals. The chart below shows modes that would not exceed 2500 Hz with a center of 1500Hz. The PSK1000R offers about 4½ times the speed of MT-63-2KL and has been used successfully on FM with strong signals following the procedures described below.

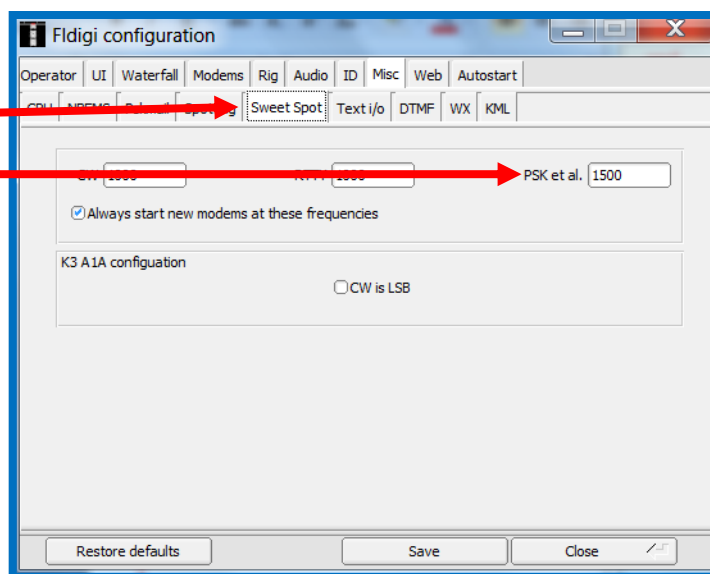
Mode	Baud	WPM	Duty Cycle	BW(Hz)	Modulation
PSK63RC20	63	1100	80.00%	1725	20-PSKR
PSK125RC10	125	1100	80.00%	1700	10-PSKR
PSK250RC5	250	1100	80.00%	1650	5-PSKR
PSK250RC6	250	1320	80.00%	2000	6-PSKR
PSK500RC2	500	880	80.00%	1400	2-PSKR
PSK500RC3	500	1320	80.00%	1900	3-PSKR
PSK800RC2	800	1280	80.00%	1400	2-PSKR
<b>PSK1000R</b>	<b>1000</b>	<b>880</b>	<b>80.00%</b>	<b>1800</b>	<b>1-PSKR</b>

Click **MISC**, Sweet Spot tab

Set the *Psk et al* to 1500 Hertz

Save

(This keeps the center frequency on 1500 Hz just as on MT63-2kl.)



### OPERATING PROCEDURE:

- 1) Advise the receiving station to make the configuration change above and follow the steps below.
- 2) Turn off the AFC button, on the bottom right of the FLDIGI screen.
- 3) Select the PSKxxxR mode on the bottom of the FLMSG screen.
- 4) Confirm that the receiving station is in the same exact mode you are in.
- 5) After successful transmission, when you change back to MT-63, turn on the AFC feature.