INSTRUCTIONS FOR USING THE RSSI TOOL FOR DURAFON 1X AND DURAFON PRO

This tool is only available in DuraFon 1X, PRO, and DuraWalkie handsets serial # 114000001 or higher.

1. **"RSSI"** stands for receive signal strength indicator. Usually for a phone (DuraFon as well) this is in the form of several bars. The problem is this is simply not adequate for performing a real site survey. Industry standard for measuring signals are in negative dBm. You do not need an admin handset for this test. All handsets can do this.

2. **Handset to Base signal testing:**
   a. Press MENU * # # *, then press "1" for "BER". Next choose the correct base ID. The 1X primary base ID is 10 and additional bases 20, 30, or 40. For PRO, the primary base ID is 00 and 01-07 if you have additional bases. While in BER mode press "star" which will bring up the –dBm and frequency deviation screen.

3. **Handset to handset signal testing (separate test if 2-way intercom or broadcast is used):**
   a. Note: 2-way intercom and broadcast operation normally (unless you have a PRO repeater base) do not use the base station. This means range testing for these modes needs to be done as well unless these modes of operation are not used.

   b. First note which 2-digit handset ID you have. Next press MENU * # # *, then press "2" for "HS BER". Then while the handset is displaying "HS BER READY", grab another handset and 2-way call it. It will automatically answer – putting it in test mode. Now press the star key to pull up the RSSI screen. Both handsets will see RSSI readings.

Note: Frequency deviation should not exceed 3000Hz or 3kHz. Any more may mean there is a hardware problem.

RSSI and –dBm:
The highest reading is around -47dBm and won't typically read any stronger even if very close. It is typical to maintain a signal of -55dBm or better for about the first 100 feet from the base station antenna.

The weakest signal that can be received is -110dBm. If you go beyond this, you will lose the link between the handset and base. Note this is not the signal you want to set as your minimum signal for coverage! If you do lose the link between handset and base, exit the menu, and go back to the original steps. 20 to 30dB of signal margin is required to maintain a reliable link and to compensate for varying conditions. This means the signal should be -80dBm or better (better meaning less negative). A -65dBm signal is stronger than a -80dBm signal because it is less negative. If you have any trouble with this, see the Wiki link below on "dBm".

Signal >-80dBm = no dropped calls, no noticeable degradation in voice quality.
Signal -81dBm to -90dBm = low risk of dropped calls but a slight reduction in voice quality.
Signal -91dBm to -100dBm = real risk of random dropped calls and noticeable voice quality reduction.
Signal <-101dBm = terrible voice quality and dropped calls.
Signal <-110dBm = no link at all.

This assumes little to no interference in the 902-928MHz band. If you have severe interference, you will see poor performance even though RSSI is strong. It is the signal to noise radio (margin) that matters. If you think there is a possibility of interference, you may want to purchase a 900MHz USB spectrum analyzer to find the source. A product such as the MetaGeek Wi-Spy 900X is a relatively low cost option.

DOING THE SIGNAL TEST: Use a building blueprint or map and denote the base station location and signal strength readings at various locations.

TESTING WITH THE STUBBY ANTENNA VERSUS LONG HANDSET ANTENNA:
Do your testing with the antenna that will be actually used. There is a 2 dB difference between the long and short antenna but a 5 to 8 dB difference when in actual use. This is because the long antenna extends beyond the person's head so signal attenuation is not as bad (you are testing while having the phone in front of you vs. next to your ear that is real world use).

Do not have any other handsets or bases in use during site survey testing.

If changes are made such as moving a base station antenna, do them one at a time and redo the entire site survey over again. Do not do multiple changes at the same time as this will not allow you to know which of changes helped (or made worse).

Good sources for additional learning: http://en.wikipedia.org/wiki/DBm http://en.wikipedia.org/wiki/Rssi
http://en.wikipedia.org/wiki/Wireless_site_survey http://www.wireless-nets.com/resources/tutorials/conduct_wireless_site_survey.html

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