Introduction

The first step in troubleshooting your ESTeem radio system is analyzing the received radio signal. Fully analyzing the received radio signal requires analysis of two characteristics, the receive signal strength (how much signal is being received) and the quality of the demodulated data (how well the ESTeem can understand the signal it has received). This bulletin describes the operation and use of the receive signal troubleshooting tools available as an option in the ESTeem Model 192 products for completing this analysis.

Note: The ESTeem Model 192 products must have the receive signal strength option installed at the factory for these tools to operate correctly.

Two tools are available within the ESTeem Model 192 for analyzing the receive signal. The first tool is the ESTeem Receive Signal Strength Meter (RSSM). This tool will display the level of the received signal strength from any remote transmitter. The second tool available is the ESTeem Data Quality Meter (DQM). The DQ Meter prints the received signal strength and quality of demodulated data for each radio packet received from a remote ESTeem. Using both the Receive Signal Strength Meter and the Data Quality Meter together provide the tool necessary for accurate receive signal analysis.

Receive Signal Strength Meter

The ESTeem RSSM is used to verify that enough signal is reaching the ESTeem Modem for proper communication. The RSSM is not as precise as a spectrum analyzer for measuring the signal strength, but can be used for an approximation. When activated, the ESTeem Model 192 will send the digital value of the received signal strength in microvolts (μV) out of the RS-232 port. This value will update at once per second rate and will output one of the following values:

0, 3, 6, 10, 20, 35, 50, 75, 100, 200, 400 or 800

The ESTeem RSSM will display the lowest microvolt value if the signal strength is between one of two above values. For example, if the ESTeem is receiving 45μV of signal from a remote transmitter, the ESTeem will print out 35. A value of 35 on the RSSM represents signal strengths from 35μV through 50μV.

The Receive Signal Strength Meter is turned on by the following software command:

RXS ON<Enter>

The ESTeem will begin printing ASCII strings to whichever communications port is currently in the command mode. For example, if switch 8 on the RS-232 port setup switches is in the ON position, the ESTeem’s command port defaults to the IR port.

Measuring the Received Signal Strength

Note: The ESTeem Model 192 must be set at High Sensitivity (Squelch=0) for accurate receive signal strength measurements.

The receive signal strength is measured by remotely turning on an ESTeem transmitter and then measuring the amount of signal received in the local ESTeem (Figure 1).
The following steps are to measure the receive signal strength from a remote ESTeem:

1. Open the ESTeem Utility Program in your computer and select Terminal Emulation (Figure 2).
2. Press F1 (Set Frequency) and select Display Current Operating Frequency and Squelch (Figure 3). Verify that the squelch level is set at HIGH. Press escape (ESC) until back at the Terminal Emulation Window.

   Note: The Receive Signal Strength Meter is calibrated at High Sensitivity. If the ESTeem is set to any other value, the measured results will be inaccurate.

3. Remote program the ESTeem from where you are measuring the received signal strength by typing PROGRAM XXX<Enter> (XXX is the destination ESTeem address). At the remote programming prompt (RPG), turn on the remote transmitter by typing RADIO ON<Enter>.
4. Press Control-C (Hold down control key and press C at same time) to enter the command mode of the ESTeem. This will disconnect the ESTeem from remote programming and you should be at a CMD: prompt.
5. Type the command RXS ON<Enter>.
6. The ESTeem will begin to print out received signal strength values. Record the received signal strength values from 0-800. The remote ESTeem transmitter will cycle on for 10 seconds and then turn off for 3 seconds. The higher value printed will be the receive signal strength from the remote ESTeem modem.
7. Turn off the Received Signal Strength Meter by typing RXS OFF<Enter>.
8. Remote program the transmitting ESTeem (PROGRAM XXX) and type RADIO OFF<Enter> at the RPG: prompt.

   Note: The command for Remote Programming (PROGRAM) can be abbreviated to PROG.
9. Type Control-C to break the remote programming connection.

Data Quality Meter

The ESTeem Data Quality Meter was designed for factory laboratory analysis of the quality of the demodulated data. The values produced are of no practical use in the field outside of identifying poor data quality due to reflections or signal multipathing. The following procedures will allow you to measure the data quality if asked to do so by EST Customer Support.

The ESTeem Data Quality Meter analyzes all received radio packets for the quality of demodulation through the receiver. The Data Quality Meter can be used in conjunction with the RSSM to help isolate problems in received signal paths by comparing the quality of the received signal directly with the amplitude (received signal strength).

The Data Quality Meter is turned on by the following software command:

   DQ ON<Enter>

The ESTeem will print an ASCII string to whichever communications port is currently in the command mode. For example, if switch 8 on the RS-232 port setup switches is
in the ON position, the ESTeem’s command port defaults to the IR port. The ASCII string will look like the following:

[XXX]rssV,dqV

- XXX is the source ESTeem address of the incoming packet.
- rssV is the A/D converter value for the received signal strength (0-255).
- dqV is the Data Quality Value (0-248).

**Interpreting the Data Quality Values**

If two packets of data are received with a data quality value (dqV) less than 50, you have a problem with the quality of the demodulated data. The following section describes, in detail, the other components of the data quality print out.

**Address** - The source address printed in the Data Quality Meter is the address of the ESTeem that originated the received packet, but the received signal strength and data quality value is *not necessarily* from this address. If repeaters are used, the value for received signal strength and data quality is from the repeater.

**Received Signal Strength** - The value printed in the Data Quality Meter is the raw value from the A/D converter. The ESTeem uses this A/D value to determine and print out received signal strength values in microvolts in the RSSM. You can use these A/D values to compare received signal strengths from one station to the next over time, but they are not actual received signal strength measurements.

To measure the actual received signal strength proceed to *Measuring Received Signal Strength* in the report.

**Data Quality** – The data quality value ranges from the best signal quality of 248 to the worst signal quality at a 0 value. There will be a unique data quality value (0-248) for each transmission but the values should stay fairly consistent over time. Small changes to this value will be normal.