

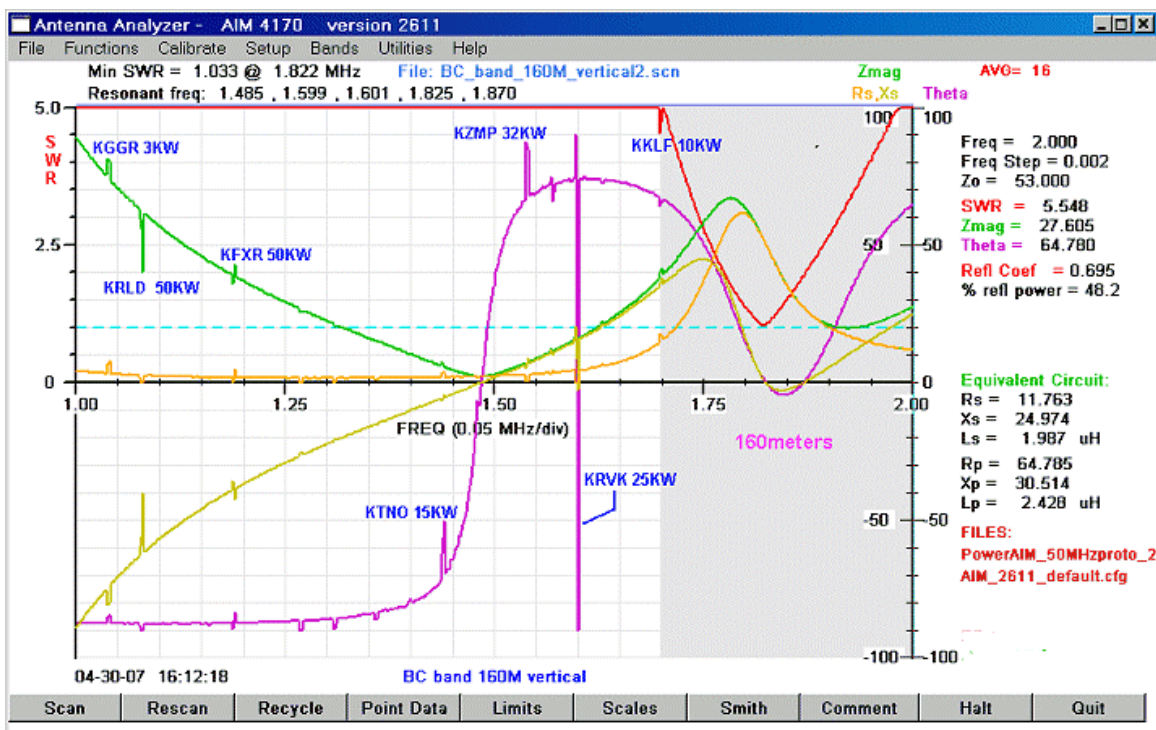
Power AIM Preliminary Evaluation

By W5BIG April 30, 2007

updated: Nov 29, 2007

An antenna analyzer based on the same principles as the AIM4170 is under development. The prototype is working now and some test were run on April 30, 2007 at the site of Array Solutions east of Dallas. Jay, WX0B, has several antennas including a quarter wave 160 meter vertical. This antenna picks up considerable RF energy from broadcast radio stations in the Dallas area and it cannot be measured with the regular AIM4170 unless a high pass filter is included in the transmission line.

This new analyzer is designed to operate in the presence of large RF signals, up to 25 volts peak amplitude. We found during a series of experiments, that the effect of BC interference was limited to about 20KHz around the station's center frequency. Outside that narrow frequency range, the antenna parameters can be measured accurately. The maximum power injected into the antenna under test is less than 1mW so there is very little interference with nearby receivers.



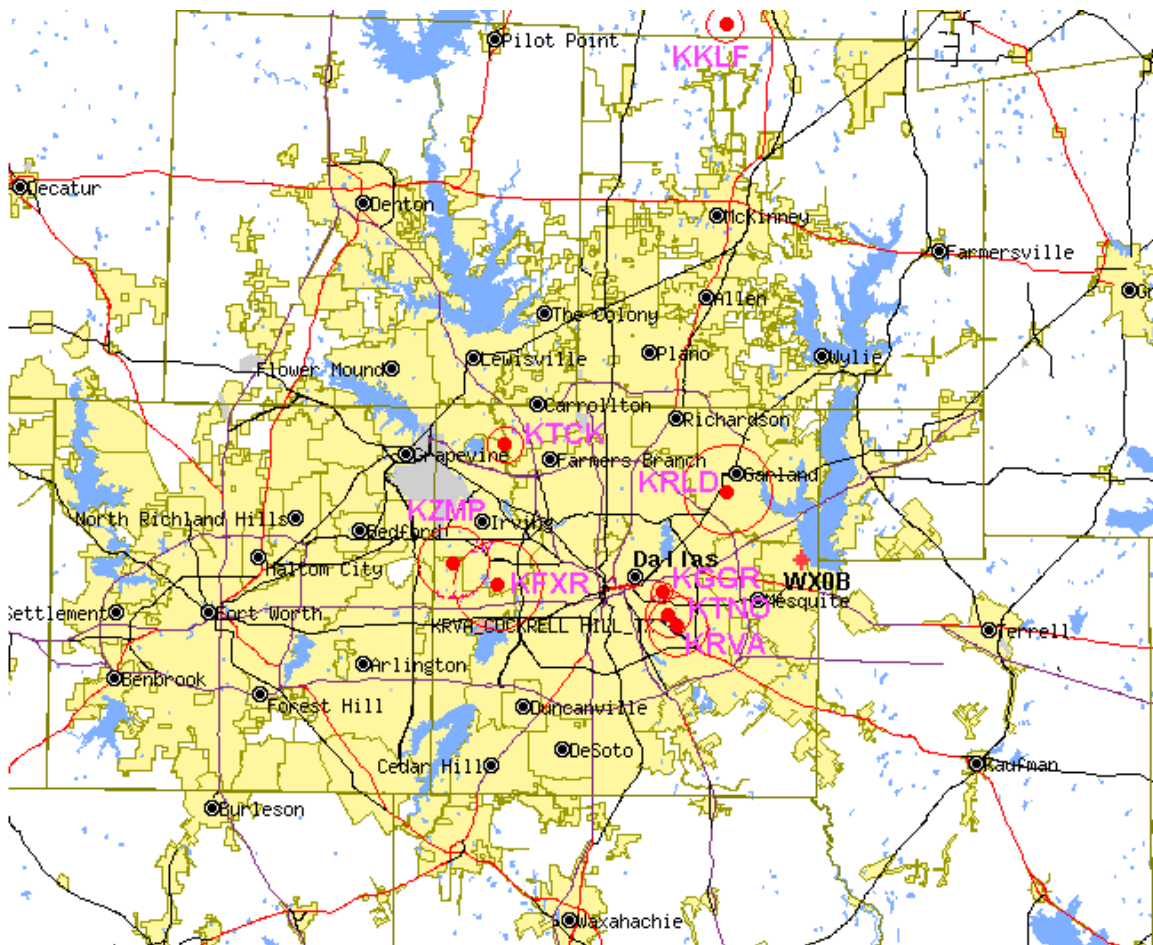
This picture shows a scan of the 160 meter vertical from 1.00 to 2.00 MHz. Each horizontal division is 50 KHz. The 160 meter band is highlighted in the gray area. This area includes frequencies above and below the actual ham band. Glitches in the waveforms are due to local BC stations. The call letters of several stations along with their power levels are annotated on the scan. The total effect of each station depends on its frequency as well as its power since the 160 meter antenna doesn't pick up as much radiation at 1080 KHz as it does at 1600 KHz. Hence, the glitch due to KRLD isn't very large even though KRLD runs 50KW and is only about 10 miles away.

The most prominent glitch is due to KRVA at 1600 KHz running 25 KW. The cumulative RF voltage due to all the stations measured at the end of the transmission line of the 160M vertical was about 2V peak.

Local Broadcast Radio Stations and Coordinates:

- 1700 KKLK 10KW (33.4231N, 96.6628W)
- 1600 KRVA 25KW (32.7397N, 96.7114W)
- 1540 KZMP 32KW (32.8125N, 97.0083W)
- 1440 KTNO 15KW (32.7506N, 96.7228W)
- 1310 KTCK 9KW (32.9344N, 96.9403W)
- 1190 KFXR 50KW (32.8992N, 96.4131W)
- 1080 KRLD 50KW (32.8903N, 96.6456W)
- 1040 KGGR 3KW (32.7786N, 96.7308W)

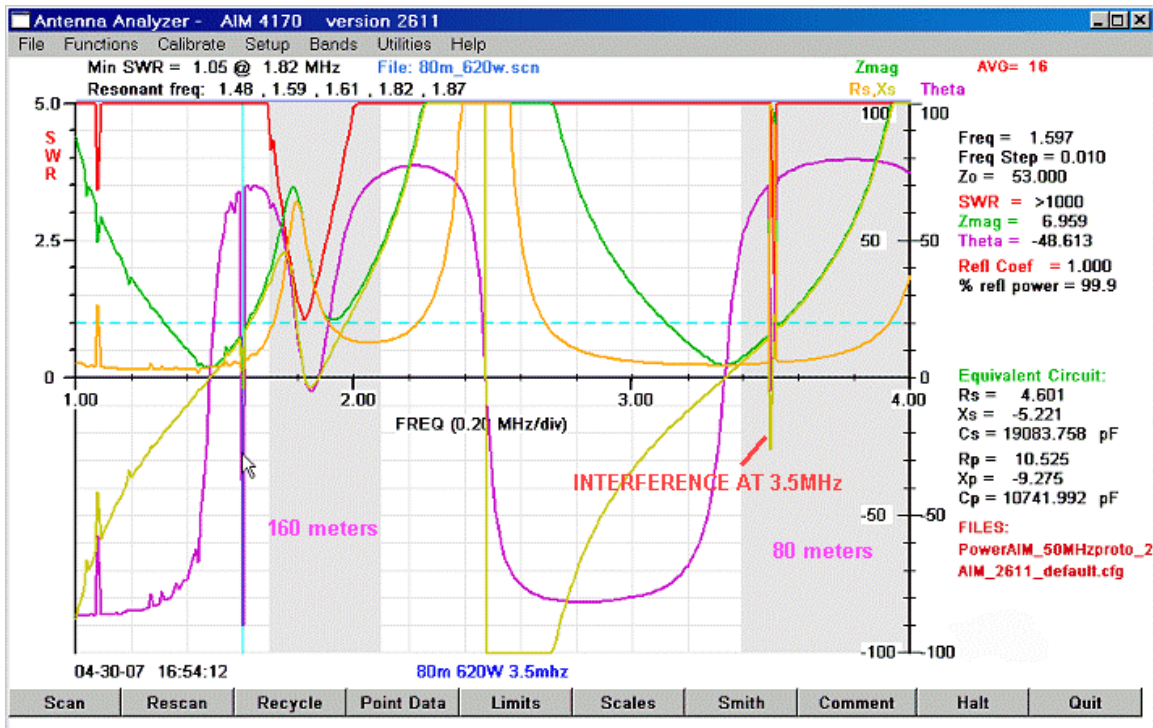
The locations of these BC stations are shown on the map below:



The **Array Solutions** site is on the right side of the map, near Lake Ray Hubbard. It's labeled **WX0B**. Each station is surrounded by a circle with a radius proportional to the square root of its power level.

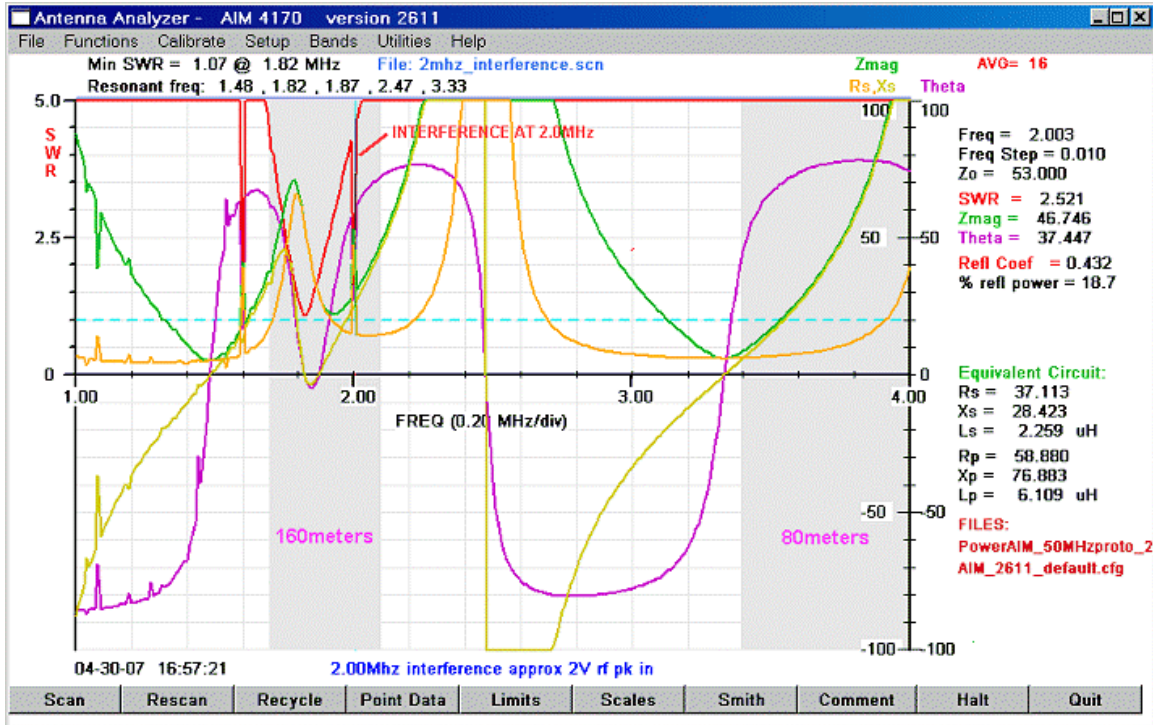


This picture shows the performance of the antenna focusing on the 160 meter band. The curves are smooth. The SWR is 1.04 at 1.82 MHz and the impedance is very close to 50 ohms, which is expected. Over the 160 meter band, the BC stations do not disturb the measurements.



For this scan, Jay turned on his 80 meter transmitter and set it for 620 watts into an antenna that was only a few yards from the 160 meter vertical. The stray RF level was about 10V peak. There is a large glitch at 3.5MHz but outside this zone, there is negligible disturbance.

On the left side of the scan we can still see the interference from the BC stations.



This scan covers the same frequency range as the previous scan. This time the interference is at 2 MHz with the transmitter driving the same nearby 80 meter antenna. The stray RF level is about 2 volts peak. The transmitter power level was reduced to avoid overheating when driving a high SWR load. The measurement of the vertical antenna is only affected in a region about 20KHz wide around 2 MHz.

Comments are welcome. Please email: Bob@w5big.com