HARMONIC EMISSIONS

Harmonic emissions measurements were performed by a certified testing facility:

M. Flom Associates Inc.
3356 N. San Marcos Pl., #107
Chandler, AZ 85224-1571
Tel. 480 926 3100
Fax. 480 926 3598

This testing was for the radiation from the Microtrack Processor with communication and power cables attached. Photos of the M. Flon Associates are in the Test Setup file. Additional testing was performed at Southwest Microwave, Inc. for spurious and harmonic emissions directly from the transmitter and also from the radiating cable. Fig 1 shows a measurement with the spectrum analyzer connected to the TNC port of Microtrack transmitter. A 5th order elliptic filter connected to the transmitter final amplifier attenuates all harmonics above 30 MHz. The second harmonic is 20 db below the fundamental and all other harmonic and spurious 50 db lower.

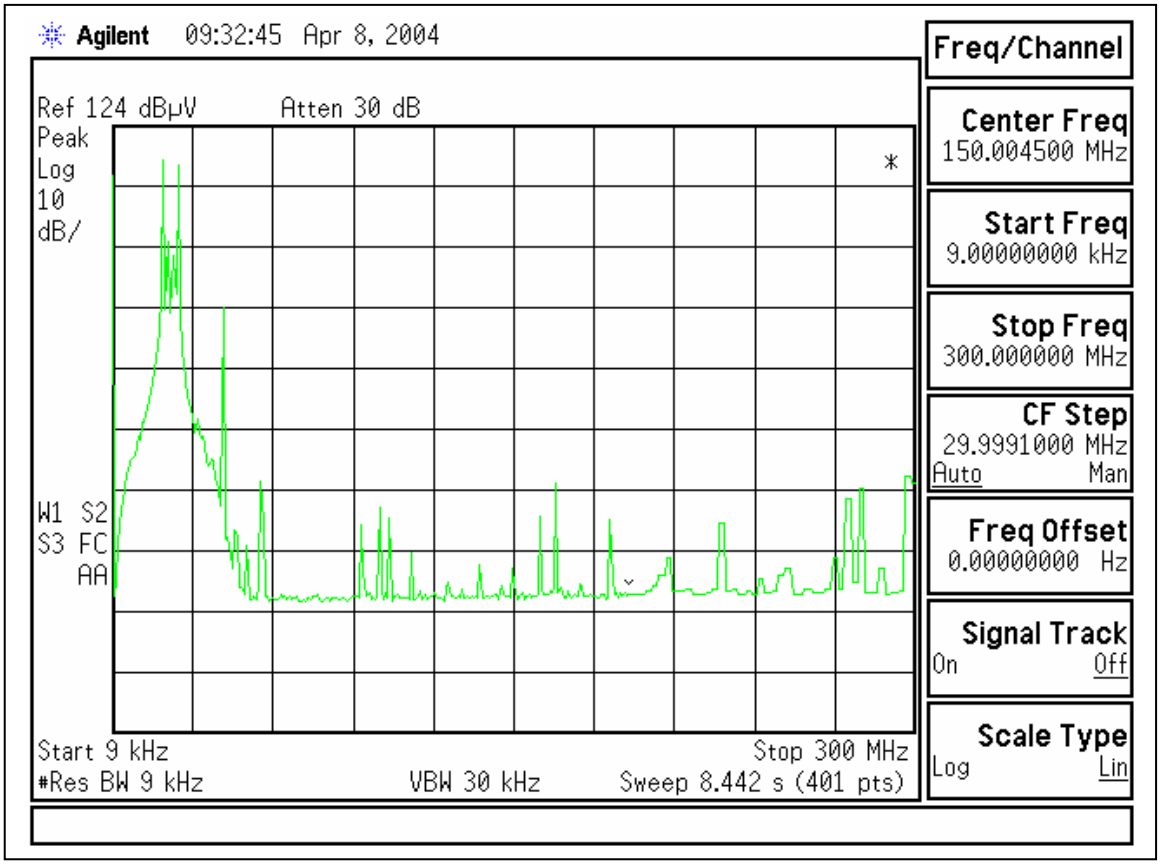

Fig 1

Fig 2 is the same as Fig 1 with frequency sweep extended to 1GHz.

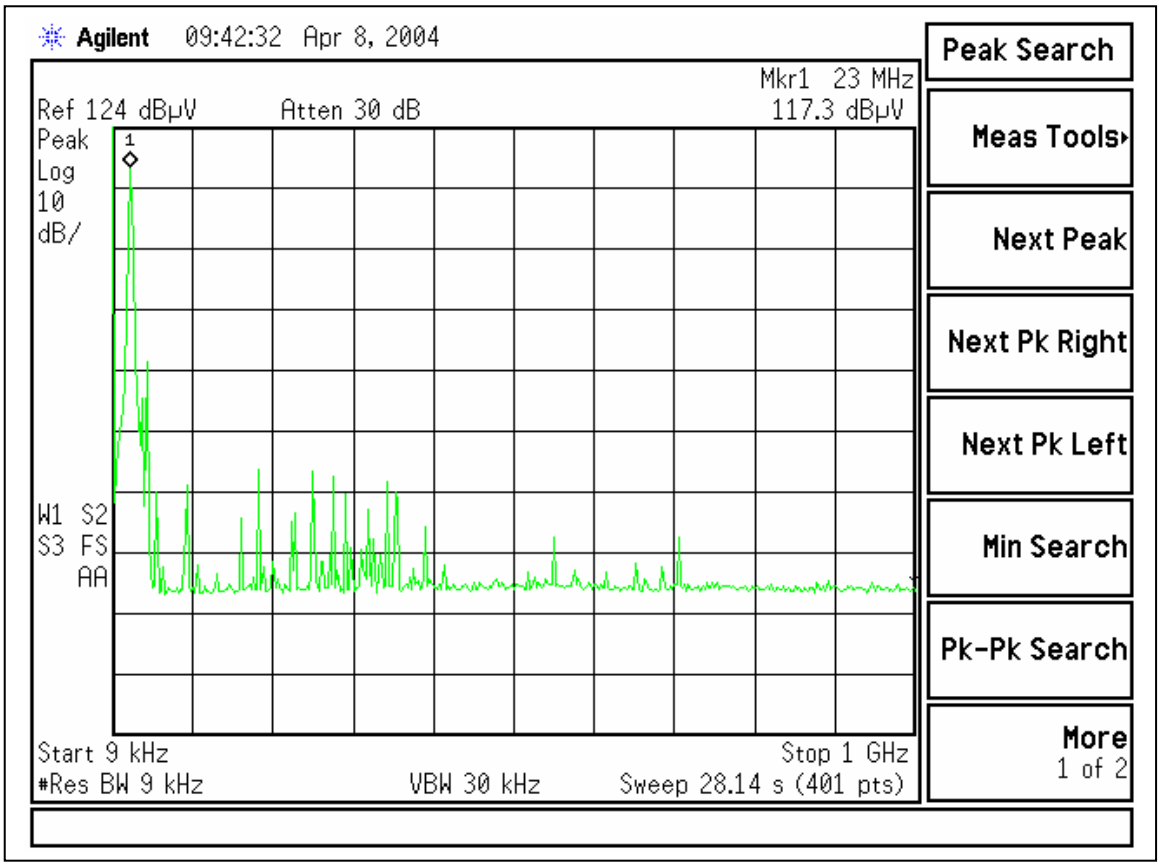

Fig 2

The low levels of the harmonic and spurious signals from the transmitter output port is not expected to cause any measurable radiation 3 meters from the leaky cable. The coupling value from the transmitter to a point 3meters from the cable at the fundamental was measured at –63 db. The second harmonic as radiated from the leaky cable is expected to be:

From Fig 1	-20 db
Coupling loss	-63 db
Loss 3 meters to 30 meters	-40 db
Total	123 db below the transmitter power

Additional measurements were made at the Southwest Microwave, Inc. Maricopa test site. The loop antenna used for the fundamental radiation from the buried cable is not calibrated above 30 MHz. An Electro-Metrics Model EM-6917 log periodic antenna, calibrated from 30 MHz –1000 MHz was used for the harmonic measurements. The antenna was placed 3 meters perpendicular to the cable and at 30 meters from the leaky

cable input where the maximum fundamental was observed. Fig 3 is a typical screen. No harmonics are observed. The large signals are the local television and FM radio stations. The red and blue markers indicate where the harmonics from the Microtrack Processor would appear if they were visible above the noise level.

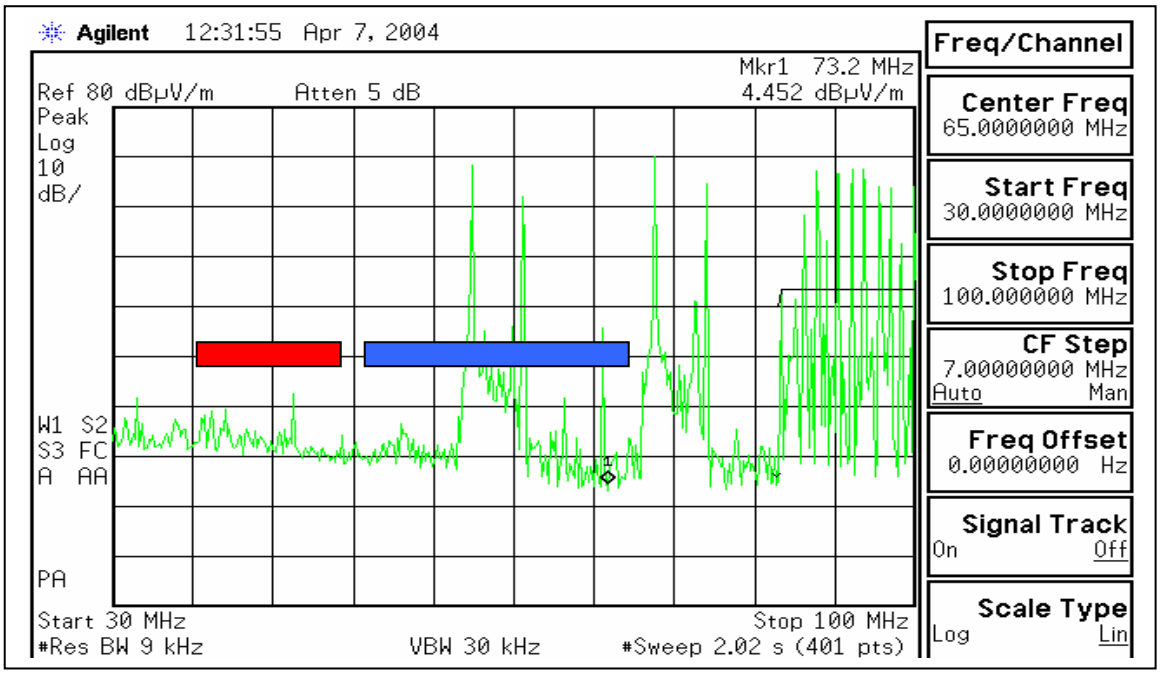

Fig 3

Extending the spectrum analyzer sweep to 1 GHz also shows only local television and FM radio signals. The antenna is not calibrated below 30 MHz.

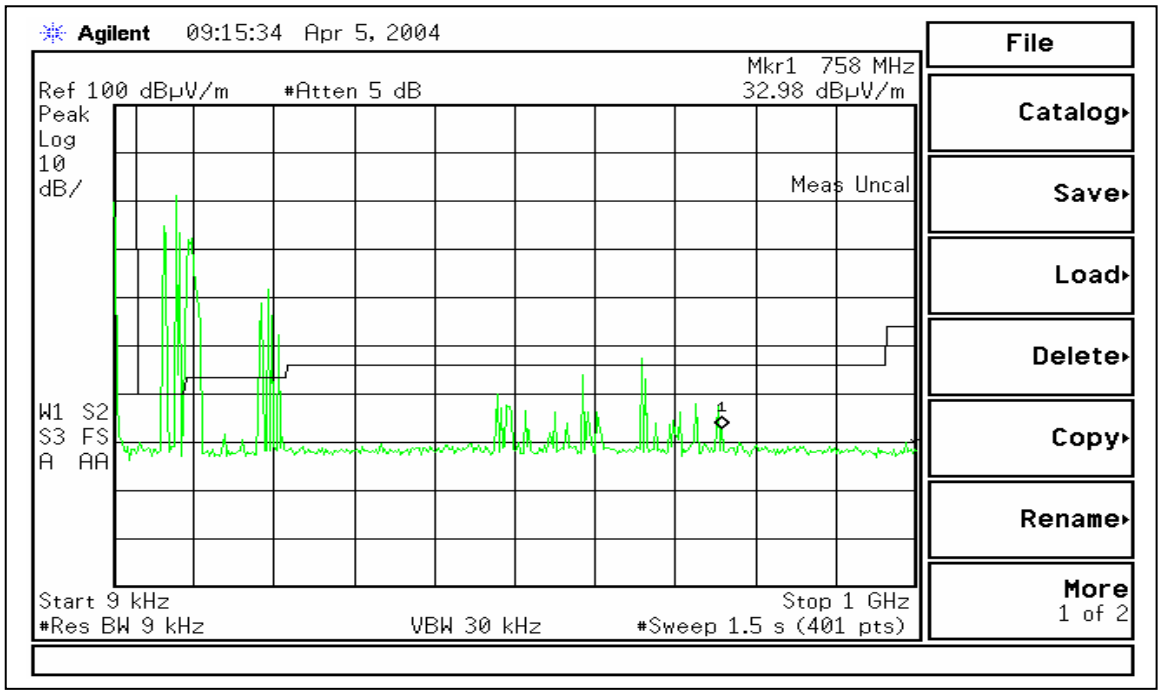

Fig 4