LNM-1 Line Noise Meter and Scope Interface
Application Notes

These brief notes are not intended as a full set of operating instructions for connecting and using this instrument with an oscilloscope, spectrum analyzer, or data logger. Specialized training is required for that. The notes only describe unique features of this device.

1. Plug the instrument into a standard wall receptacle. Connect to 120 Volts AC only! A 240 Volt version is available by special order.

2. For full accuracy when the Line Noise Meter is connected to a scope or other instrument, that instrument should be battery powered and not connected to the AC line, although no harm will occur if this is not done.

3. The LINE NOISE output is a unity gain representation of the line noise from 1.7 kHz to 2 MHz for display on an oscilloscope or spectrum analyzer. The maximum output amplitude is +/- 13.5 Volts.

4. The H-N / N-G switch allows viewing the signal present on Hot to Neutral (normal mode) or Neutral to Ground.

5. The meter reading on PEAK setting is peak, not peak-to-peak.

6. PEAK reading calibration is optimized for noise spikes and pulses. It will read 10% to 15% high on sine wave signals. PEAK is the most appropriate setting for most work.

7. True RMS readings are performed on the full noise waveform within the passband of the instrument. This will usually differ from the calculated value of a scope measurement function, which is applied only to the displayed waveform.

8. When the level displayed on the meter approaches 1,000 mV, the range will automatically switch to display Volts. (1.00 V = 1,000 mV)

9. The 60 Hz output from the TRIG REF connector is a reconstructed waveform used to: (1) provide a stable trigger reference, and (2) observe the position in the 60 Hz cycle where noise impulses actually occur (+/- 100 uS). It is not a true representation of the line voltage waveform.

10. The proper probe settings in your scope configuration for connection to LINE NOISE and TRIG REF are X1 (not X10).

11. The LINE NOISE output is independent of the measurement functions of the LNM-1. This means that the signal at the LINE NOISE port is not affected by the RMS / PEAK switch setting, although it does respond to the L-N / N-G switch setting.

12. The signal from the DC OUT connector is a DC representation of the voltage displayed on the digital panel meter, but it is a fast responding signal that is time constrained only by the passband limitation of the instrument. It will allow the display of switching transients that are much too fast to show up on a digital meter. The output varies from approximately 3 mV to 900 mV DC, and the proper scope probe setting is X10. Minimum input impedance of the scope or other datalogger is 1 M ohm.

13. The metal case of the Line Noise Meter is connected to AC line ground for safety reasons but the BNC output connectors are isolated from AC line ground.

14. It is not possible to perform a direct comparison of the LNM-1 with one of the common high-pass devices sold by a well known filter manufacturer for looking at line noise by connecting them both to different channels of a conventional oscilloscope. The common high-pass device has very poor AC line isolation and will essentially reference the scope's inputs to either the neutral or hot side of the AC line. The result will be a completely erroneous scope display, and erroneous readings from the LNM-1. On the other hand, two LNM-1 units can be connected to two channels of a scope and work perfectly well because the units are well isolated from the AC line. This could be used to look at noise on both legs of a typical residential electrical service. A scope with three or more channels could use three LNM-1 units to look at all three phases of a 3-phase service simultaneously.