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A low cost multi-channel data logger for fair weather atmospheric electricity measurements

To setup an automated atmospheric electricity observatory, a data logger was constructed by multiplexing four low power, 8 channel, serial 10 bit MAX 198 ACDs. One requirement in atmospheric electricity measurements is the ability to measure large number of parameters simultaneously. The logger has 32 unipolar channels or 16 differential channels (two unipolar channels can construct 1 differential channel). The atmospheric electric transducers generate very small voltages or current signals.

The logger was constructed with 10 bit digitizing accuracy to detect small signal change due to local reasons and disturbances. The range of the logger is -2.4 V to +2.4 V, which corresponds to a code width of 0.0048 V. The constructed logger has a conversion rate of 12-clock cycles/ conversion for each channel with maximum clock speed of 1500 kHz to facilitate the measurement of sudden changes in atmospheric electrical parameters.

Since logger was constructed to obtain from power from the parallel port, no external power supply is required. Logger can be driven with any software program, which provides access to the parallel port. A 32 bit DLL is written to drive the logger in Matlab 5.0. Data acquisition software provides the facility to take the measurements on point wise. The software can be on figured to obtain measurements during specific periods of the day.

The logger was successfully used to measure the atmospheric vertical electric field, air-earth current and the wind speed simultaneously.