

## **AN-24: Simple Resolution Enhancement for the PCM-ADIO Advanced Analog I/O**

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**The situation will arise in which more resolution is required from an analog to digital converter for a specific application. While all converters are fixed resolution, most can only use a single voltage input range at a time. A novel technique can be applied to input signals using the PCM-ADIO from WinSystems to extend the effective resolution as the input voltage changes.**

The PCM-ADIO PC/104 based advanced analog I/O from WinSystems has many features that make it one of the most flexible high resolution data acquisition cards available in this form factor. Any single input channel can be programmed independently of any other channel to any combination of voltage range, polarity, conversion rate, buffer size, and either single ended or differential input modes. This totally unique versatility allows users to connect many different sources to a PCM-ADIO with little or no external circuitry.

This flexibility provides users a novel way to enhance the effective converter resolution of wide voltage range input signals that change relatively slowly. It is actually much closer to auto-ranging in a digital multi meter, and serves the same purpose. As the input voltage on a given channel changes, the range can be increased or decreased through software control to maximize the available resolution. Start with the channel of interest on the PCM-ADIO programmed to +/- 10 volt bipolar range, or whatever bipolar range might be appropriate for the maximum input voltage. The first conversion result will dictate which voltage mode to switch to before making the second, effectively higher resolution conversion. If the first conversion returns a voltage that corresponds to 4.5 volts, then the mode should be changed to the 5 volt unipolar range. If the input corresponds to negative 1.1 volts, the highest resolution for the second conversion can be achieved by using the 1.25 volt unipolar mode with the software polarity bit set to invert the input.

Make sure to choose a range for the second conversion that will maintain a reasonable number of counts from full scale for the selected range to simulate voltage hysteresis and prevent oscillation. If the current conversion data moves to full scale, return to the +/- 10 volt bipolar range to determine what input range to use for subsequent conversions. This technique ensures you can capture the highest resolution data in the fewest number of conversions.

More information is available at [www.winsystems.com](http://www.winsystems.com), or, contact the WinSystems Application Engineering department at (817) 274-7553