Author: Mark Palmer, Microchip Technology Inc.

INTRODUCTION

Usually a sensor requires its output signal to be amplified before being converted to a digital representation. Many times an operational amplifier (opamp) is used to implement a signal gain circuit. The programmability of this type of circuit allows the following issues to be solved:

- Optimization of the sensor output voltage range

- Calibration of the amplifier circuit's gain

- Adapting gain to input signal variations
  - sensor characteristics change over temperature/voltage
  - multiple input sources into a single gain circuit

- Field calibration updates

- Increased reliability vs mechanical potentiometer

- BOM consolidation – one op amp and one digital potentiometer supporting the various sensor options

This Application Note will discuss implementations of programmable gain circuits using an op amp and a digital potentiometer. This discussion will include implementation details for the digital potentiometer's resistor network. It is important to understand these details to understand the effects on the application.

AN1316.pdf (441 KB)