**Design Ideas interface to microcontrollers**

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The Design Idea in [Circuit and software provide accurate recalibration for baseline PIC microcontroller’s internal oscillator](http://www.edn.com) uses three I/O lines to recover the internal calibration value by recalibrating against a reference clock, the 4-MHz crystal.

The method in [Microcontroller moving-dot display interface uses three I/O lines](http://www.edn.com) needs three output lines—data, clock, and latch—and requires some firmware and hardware. The moving-dot display has some benefits over the bargraph display: It better indicates a location of detected object in sonar and radar applications; it needs only one LED’s current-limiting resistor instead of several; and it provides the same current for all LEDs, thus providing even brightness.

Using the scheme in [Microcontroller displays multiple chart or oscilloscope timing ticks](http://www.edn.com) you can add time ticks, representing seconds or minutes, to a chart graphic by using a simple and inexpensive crystal based microcontroller to generate a sequence of tags on a dedicated chart channel.

The circuit in [Fast-settling synchronous-PWM-DAC filter has almost no ripple](http://www.edn.com) avoids most of the problems of lowpass filtering of the output of a high-resolution DAC by combining a differential integrator in a DAC-output span with common voltage references.

Some op amps, such as the AD8041 from Analog Devices (www.analog.com) and the EL5100 from Intersil (www.intersil.com), provide a disable pin. In addition to using this pin for multiplexing, you can also use the disable function to configure the op amp as a phase detector or a frequency mixer as [Switched-gain op amp serves as phase detector or mixer](http://www.edn.com) shows.