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Making a Stop-less Digitally Programmable Potentiometer (DPP™)

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APPLICATION NOTE

ABSTRACT: This design note contains a reference design to take the stops out of the digitally programmable potentiometer (DPP) in an application circuit.

Digitally programmable potentiometers with an increment/decrement interface have three control functions, $\overline{INC}$, U/$\overline{D}$, and $\overline{CS}$. The wiper moves on the falling edge of $\overline{INC}$ in the direction established by the level−sensitive U/$\overline{D}$ function. $\overline{CS}$ is used for addressing, enable, and store functions. Once the wiper reaches the last tap of the pot, it will stop at that point. A number of applications require the wiper to automatically reverse direction and move in the new direction.

The circuit in Figure 1 is a stop−less digitally programmable potentiometer. The pulses that drive the $\overline{INC}$ pin of the DPP are counted by a 7 bit binary counter (U1). The output of the counter is compared by a magnitude comparator (U2) with a fixed number. Using a 32 tap pot as an example, the magnitude comparator is programmed (by connecting high and lows on its input pins) to the fixed number 31. The output of the magnitude comparator drives a JK flip flop connected in the toggle mode. When the number of input pulses to the DPP equals the number 31, U2's output toggles the output of a JK flip flop to the opposite state. The output of the JK drives the U/$\overline{D}$ input of the DPP thus causing the change in direction of the movement of the wiper. The same circuit can be used for 16, 32, 64, and 100 tap potentiometers by changing the number programmed at the input of the magnitude comparator.

If the clock is continuous and 5 V is applied to the potentiometer, the signal at the wiper will be a staircased triangular waveform. The stop−less potentiometer can operate from less than 5 Hz to more than 5 MHz.

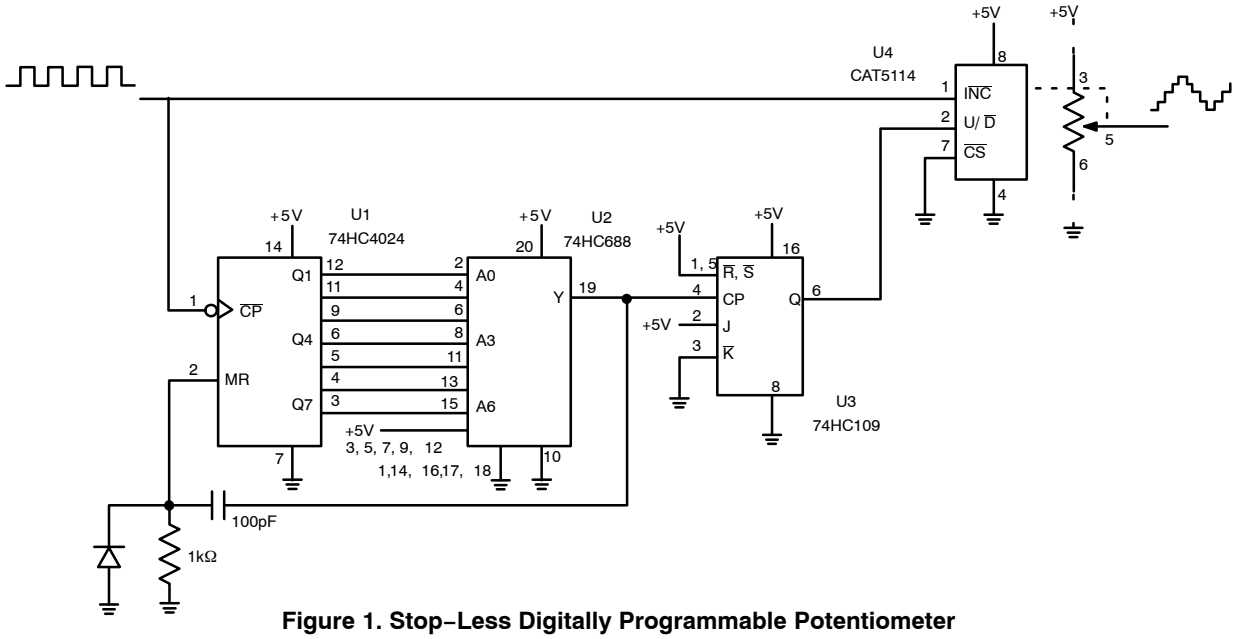

Figure 1. Stop−Less Digitally Programmable Potentiometer

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