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Improved Fan Control

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Abstract

Cooling large computer enclosures is an increasingly difficult task, usually requiring multiple fans and/or multiple rotors per fan. A technique is disclosed that reduces stress on a power distribution system for multiple fans by delaying individual fan control signals at the final distribution point near the fans.

Description

This disclosure relates to the field of electrical equipment cooling.

Cooling large computer enclosures is an increasingly difficult task, usually requiring multiple fans and/or multiple rotors per fan. These fans are usually controlled from a single controller source with a single-speed signal. This is typically a PWM (pulse width modulated) signal, the speed indication encoded into the pulse width. This will then be driven to multiple fans in parallel. As a result, the power draw per fan is synchronized, which in turn maximally stresses the power distribution system.

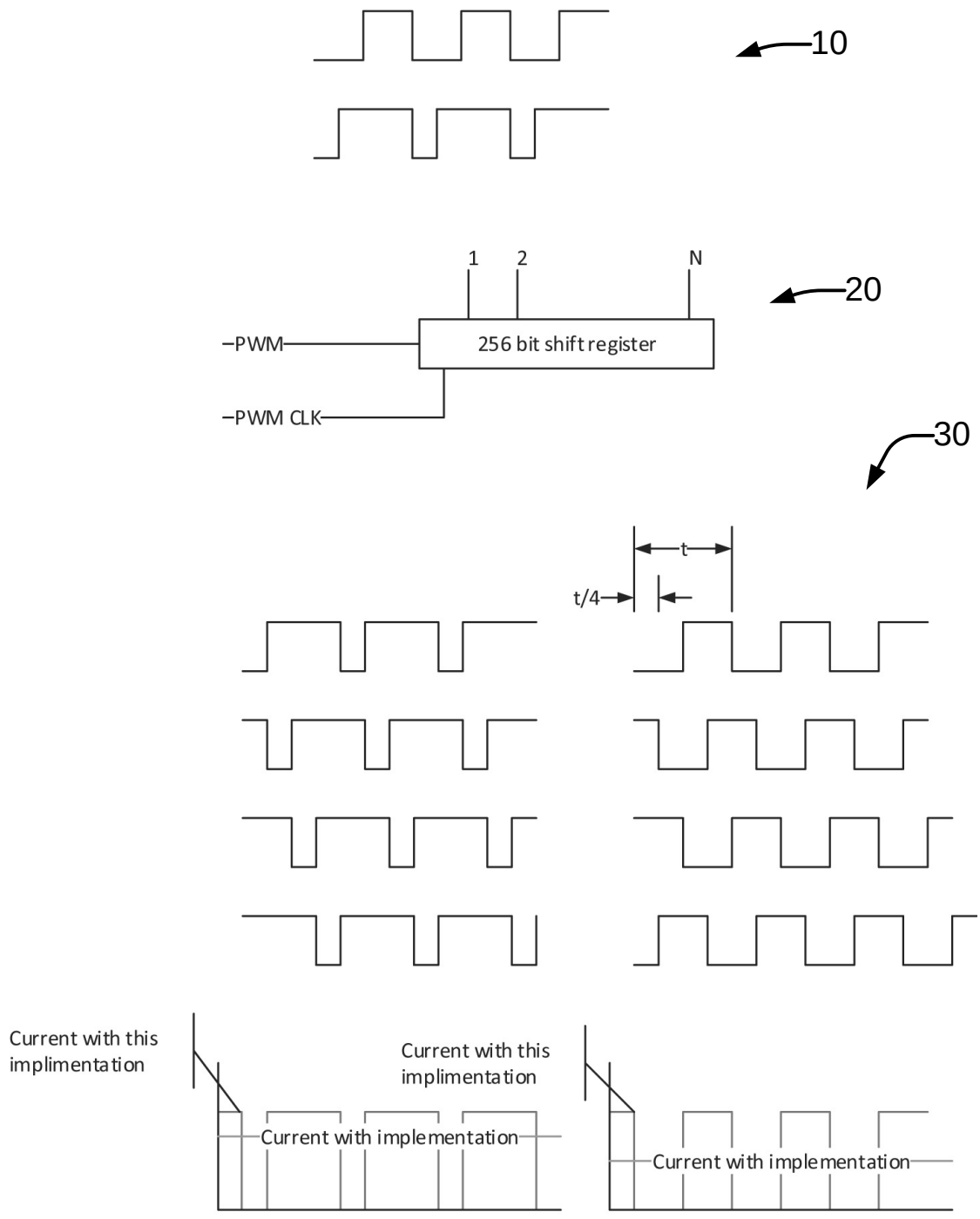
According to the present disclosure, and as understood with reference to the Figure, individual fan control signals for each fan are delayed at the final distribution point near the fans in order to reduce the signal count to the fans. The delay is accomplished with a shift register, with the number of registers equal to the granularity of the control signal.

In examples, the fan control signal is a square wave, as illustrated at 10 for two different duty cycles. In these examples, the granularity is 1/256th the PWM period. In some examples, the clock drive to the delay register is equal to the clock used to generate the PWM signal (although this may not be so in other examples).

The fan drive is selected by connecting the drive signal to the fan to the appropriate shift register output as shown at 20.

The resultant improvement to the power current signal is shown at 30. The improvement given the granularity and pulse width may not always be this dramatic. However, in all cases the step and frequency content of the current change will be reduced.

The disclosed technique advantageously reduces fan-generated transient noise on the power distribution system; reduces fan-generated transient di/dt to the power distribution system; and simplifies or reduces the cost of the power distribution system.



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