Width and Delay

Quantum Composers pulse generators can provide an array of output pulse trains with precise timing and unparalleled flexibility. Each channel can provide independent width and delay control within some restrictions. This technical document explains the restrictions on width and delay and how those settings affect the channel output.

The period setting (called T_o) will generate an internal pulse at the desired period from the system to the individual channels. The channels then use this pulse to start calculating the set delay and width.

The width and delay are limited by the intended output period T_o. The delay time plus the width time must be less than the intended output period by approximately 75 ns in order to generate a pulse output at the set period. If the delay and width settings exceed the unit's T_o period, the channel will still generate an output pulse just not with the intended period.

As an example, let's say that the output period of the pulse generator is set to 10 us. This can be represented as a pulse output with a rate between rising edges of 10 us. *Figure 1* shows an example of the output on Channel A with a delay and width setting total that exceeds the 10 us internal rate. The delay setting is 9 us and the width is set to 4 us for a total of 13 us. When the 2nd T_o pulse reaches the channel, the channel is in the middle of generating the 4 us output. When this situation happens, the channel ignores the 2nd T_o pulse and finishes the output operation.
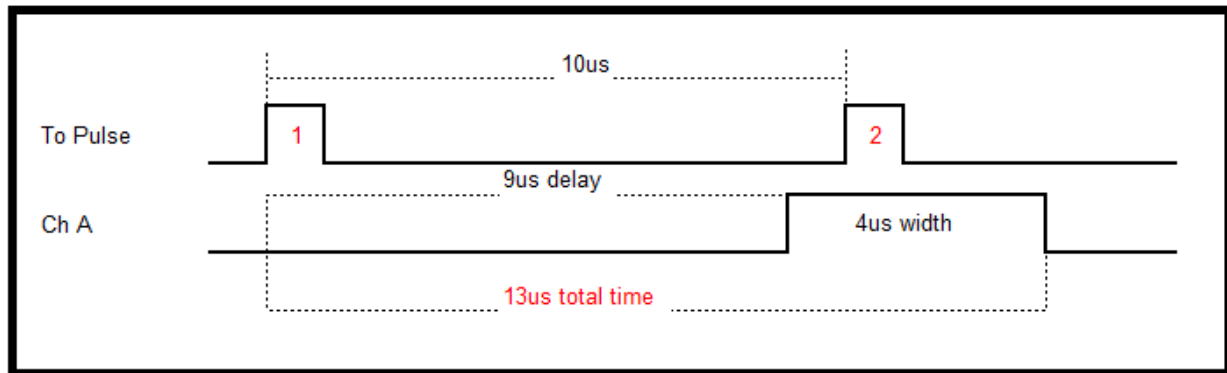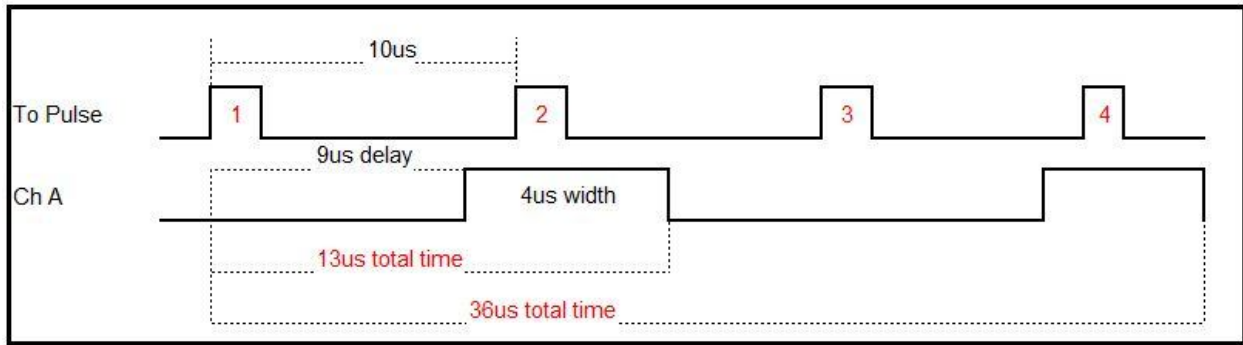

Figure 1

Figure 2

Figure 2 shows how this behavior affects the output over a longer period of time.

Since the output was busy when the second T_o pulse arrived at the channel, the T_o pulse is ignored and the channel won't start the next output generation (delay and width) until the 3rd T_o pulse. This causes the output to generate an output pulse every 20 us, from rising edge to rising edge, instead of the intended 10 us.

This restriction is one way multiple rates can be generated out of two different channels. By setting the delay on one channel to match the T_o period, that channel will be in synch with any non-delayed channel but running at ½ the period as show in *Figure 3*.
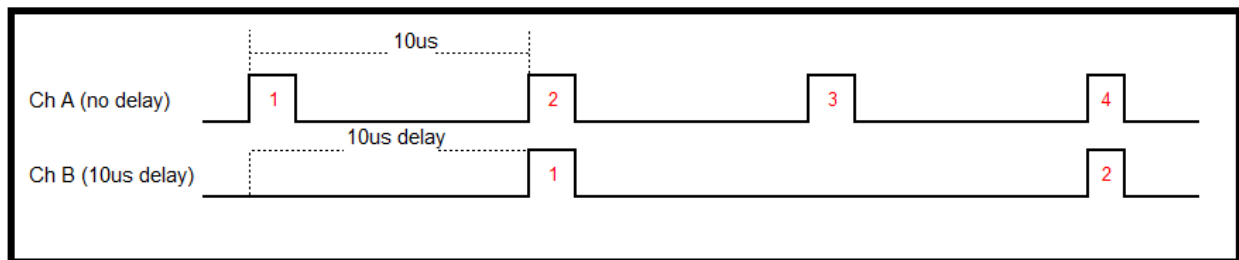

Figure 3

The important point to remember when attempting to operate the unit with a specific period is to always allow approximately 75 ns of "dead time" at the end of the pulse event. Leaving that little bit of time at the end of the pulse will ensure that the pulses will be generated with the intended period.

If there are any questions about how any of our units operate or if there are special requirements for your project please contact us at support@quantumcomposers.com and view our website at www.Quantumcomposers.com for our latest product offerings.