

FREQUENTLY ASKED QUESTIONS

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Content Questions

Why should a “one-shot” not be used often?

“One-shots” are *asynchronous* devices, and use of them will result in circuits requiring very specific time delays. If they are used a lot, your circuit design will end up being not very robust against small changes in conditions or minor modifications to the design, and will be vulnerable to glitches and logic races. In general it’s better design practice to use clocked, synchronous signals to drive all logic transitions.

Are one-shots used at all in commercial devices or only in DIY circuits?

I imagine they’re used in some commercial devices. Although they are notorious as not-very-robust circuit design, they work OK for some applications.

Are counters only used for measuring time?

No— although counting up time intervals is a useful application, you can use counters for counting anything! For example, today’s ripple counter could count the number of times somebody pressed a button (if the button sent a pulse into the first D flip-flop’s clock input), or the number of times a particle goes through a counter, or the number of anything that makes a logic signal that goes into the first clock input.

Does the telescope use comparators to make sure the particle is large enough?

A cosmic ray telescope like the one I described today would typically use comparators to determine if the signal from each scintillator exceeds some threshold (typically pulse size is proportional to light collected, which is in turn proportional to energy loss of the particle). This would reject noise on the input (which could be from random photon emission, or low-energy radioactive background, or electronic pickup, or whatever) so that only real particles with large energy loss are detected.

Do you *have* to use a sample and hold for an ADC?

No, you don't have to use a sample-and-hold. It depends on the specific timing and nature of the signal, and what information you are interested in. If you are interested in the integral of a signal (say, total charge), sample and hold is often a good thing to do, as you can integrate charge on a capacitor and leave it there until you know whether you want to digitize it. But if you want to digitize a rapidly varying signal, simple sample and hold might not be the best plan.