

## Re: 4017 Counter skips under load

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- *From:* Joerg <[notthisjoergsch@xxxxxxxxxxxxxxxxxxxxxxxx](mailto:notthisjoergsch@xxxxxxxxxxxxxxxxxxxxxxxx)>
  - *Date:* Tue, 03 Jul 2007 15:10:07 -0700
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jcargile2001@xxxxxxxx wrote:

On Jul 3, 1:24 pm, Joerg <[notthisjoerg...@xxxxxxxxxxxxxxxxxxxxxxxx](mailto:notthisjoerg...@xxxxxxxxxxxxxxxxxxxxxxxx)>  
wrote:

jcargile2...@xxxxxxxx wrote:

On Jul 2, 3:24 pm, "David L. Jones" <[altz...@xxxxxxxx](mailto:altz...@xxxxxxxx)>  
wrote:

On Jul 3, 7:11 am, jcargile2...@xxxxxxxx  
wrote:

I have a fairly simple circuit that consists of a 4017 decade counter and nine relay/LED combinations. The relays are very small and the circuit operates just fine with no load, or when I connect an LED to the relay output. But when I try to operate the circuit under load (it is being used to fire nichrome ignitors), then the counter simply skips the loaded relay and moves right to the next output. So if I send the counter a series of

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5 clock pulses, and put a load on the relay attached to output 3, then the count goes 1,2,4,5,6. The final count ends up being one off, so it's almost like the output in question doesn't exist. What I don't understand is why this is happening, since the relay is what bears the load, not the 4017. Shouldn't the output requirement on the counter be the same regardless of what the relay is switching?

Yes, it should be, but only if you have used proper circuit physical circuit layout techniques to ensure that there is no ground or power bounce. Think "star grounding" and power decoupling. Very common trap for young players.

Dave.

I installed the final power setup (on the tests I just had the board jumpered onto the power supply) and now it will fire the ignitors. The problem is that the counter is now behaving irrationally. It will skip several counts when receiving a clock pulse and will jump around with the slightest change in ground (even connecting a single lead from the multimeter to any point on ground advances the count). I've tried several different caps (.01–10 uF) connected directly to the

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power leads of the 4017 with no luck. All of the info I can find on decoupling keeps talking about selecting the capacitor based on frequency. But I'm only sending a single pulse of about 25 ns every 10–20 seconds. Does this mean I can use a larger cap? I'm seriously freaking out at this point cause I only have 24 hours to get this working. Thanks for the help!

How on earth do you get a 25nsec pulse out of a CD4017? That's like clocking a moped at 100mph.

Anyhow, since things seem to become desperate over there I can only suggest to build it up again on an experimental board that has a ground plane. And no, you do not have to select decoupling caps based on frequency. A 0.1uF plus a nice 10uF electrolytic should do, more if your power supply is wimpy.

Can you post schematic plus photo?

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Regards, Joerg

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Sorry, I mistyped. The clock pulse coming into the 4017 from the PC parallel port is 25 ms in length. The counter then activates the next relay in sequence and the output stays active for 10–20 seconds before moving on to the next firing cue. I'll post a printout of the circuit design when I get home in a couple hours. I'm using a pretty good sized power supply, and I've tried other power sources as well with the same results. Should I be doing some sort of decoupling where the power enters the board as well? I noticed that the parallel port interface card that I'm using has some sort of diode/cap combination where the power enters the board. Would this help even things out further?

Ok, I might not be there at that time but others will be. As Rich said, mind the relays. I would not drive them directly from the chip, it does not like inductive loads and their spikes. At the least place some kind of buffer in between. The CD40106 for example.

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If the power supply is clean you don't need much filtering onto the board if the leads are not longer than a few inches. But the CD4017 should be grounded and there should be a 0.1uF from its VDD pins straight to the ground plane.

If you post, maybe also include a photo. That can help a lot. For schematics a scanned hand sketch is fine.

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Regards, Joerg

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