Re: The mechanism behind bouncing...

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- *From*: "Jon Slaughter" <Jon_Slaughter@xxxxxxxxxxx>
- *Date*: Sat, 03 Feb 2007 08:13:46 GMT

"KILOWATT" <kilowatt"nospam"@softhome.net> wrote in message
news:45c3aa6d$0$31564$c3e8da3@xxxxxxxxxxxxxxxxxxxx

> Hi... thanks for your attention.
>
> I just wish to know the precise reason why for example, a digital counter
> may count many pulses on it's clock input when the clock is feed via a non
> noise−free source like a mechanical switch. It is because when the
> contacts
> makes/breaks, arcing (i've read somewhere that there can be a possibility
> of
> arcing even at low voltage) occurs, or if it's because of the very rough
> surface (microscopically−speaking) of the switch contacts, were the metal
> molecules grinds (and possibly flexes) together, during switch activation?
> TIA for your reply.

The atoms of the two materials are not configured in such a way that there is complete contact. If they were then the materials would be fused. Since there are not fused and they slide there is friction involved and this friction causes the contacts to move farther a part and then closer together. So the average distance between the constants is changing significantly campared to when is not moving and they are making good contact. So now the electric field is changing because of the distances changing between the contacts. As the contacts move farther away the field becomes weaker but now we have a capacitive effect. This effect creates a force between the contacts that attract them. One now has a kinematic force pulling the contacts away(so it can slide), one of friction that wants to stop the slide, and one of capacitance that is attractive(I'm sure there are more too).

Anyways, So there are all these forces that are interacting and the end result is this oscillation of the contacts moving toward and away from each other. One always gets "arcing" but thats kinda relative turn. (In some sense all electronic flow is "arcing".) Generally this term is used when there is significant macroscopic arcing and this requires much higher voltages than the microscopic arcing that always happens. (Its just a matter of degree). This oscillation that happen is called bouncing and the net effect is to increase and decrease the resistance but with a trend towards increasing it(which happens very sharply when the contacts finally break away).

When a switch bounces it does turn on and off instantaneously a few times then finally settles on off. Nothing is every instanenous in the real world. The net resistance is dependent on many factors and one of them is the distance between the contacts. Theres a point where the distance becomes so great that microscopic forces do not have any significant effect. The bound that you see on an oscilloscope occurs right at this point where D becomes more significant and the other forces do not. This point has to do with how much of the two contacts are actually in contact although it happens over the whole surface since some points on the contacts are more in contact than other points. In this case we have an average that approximates the whole surfeces very well unless the contacts are very distorted.

I guess ultimately the effect I'm talking about is sorta middle ground between the atomic and the macroscopic. Whats really important here is what happens when the two contacts are about to completely leave each other and not what happens before(although it could be significant it is just a smaller version of the main one). Once you understand this then its not hard to see that it happens many times before but just on a smaller and smaller scale. (One could say that bouncing is always happening so its just a matter of degree).

Anyways, I'm kinda rambling there but maybe it will shed a little light on your problem.

Jon

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