

Re: Latching Relay

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I am putting together a project which is designed around low power DC (battery driven), and that ultimately results in a high (+5v) or low (0v/ground) – a simple change of state to pin out of IC. I have good control over this output, and can provide assertion high or low, or indeed momentary.

I intend to then couple this output through a darlington transistor pair to provide the necessary current for a relay to then switch mains power and operate a mains powered device (eg. a light bulb).

The problem I have is:

As the project is battery driven, I MUST be as frugal as possible with current drain. I cannot afford any power drain from the battery when the relay is in operation and the mains powered device is on.

What I have considered:

Latching relay – I think these work by providing a brief trigger to energise the coil, the n/o contact is somehow strapped to the load side, which then latches the relay on after trigger. Reset would require a break in the coil leg to ground/0v. Have I understood this correctly? Will there be no further drain from battery after initial trigger?

This initially appear the answer, but as my output is from 1 IC pin only (high, low or blip), I am left wondering how to design my cct to trigger and re-set the relay?

Magnetic latching relay – this looks like a strong possibility. I could set my output to momentary, then each time pin assertion, the relay is triggered and toggled on or off. I believe because these relay on magnets, that they do not use or require current to maintain state?

I don't understand the above working designs / options of these relays enough to be confident within my design, could someone help me with my understanding and perhaps make comment to my original project requirement (ie. battery control, switch on/off of mains power, no battery draw when coil/switch is energised).

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A typical datasheet is here:

<http://rocky.digikey.com/WebLib/Omron%20Web%20Data/G6J-Y%20Series.pdf>

This is a single coil version, see pdf page 7 for pinout on G6JU latching version which indicates coil current into pin 1 and out pin 8 is "S" for Set, and current into pin 8 and out pin 1 is "R" for Reset, the diagrams show the configuration of pins 2-7 in the Reset state, presumably, since this is the default factory setting at shipment. According to the datasheet, the coil requires an approximately 20mA pulse of duration 10ms maximum to guarantee state change at 5V. The most uncomplicated way to drive this particular relay with your circuit arrangement is to use a series capacitor like so:

View in a fixed-width font such as Courier.

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. CMOS BUFFER
. G6JU
. |\ + +-----+
. in >---| >---||-----|1 |
. | / 470U ||
. ||
. 5v Set ||
. ||
. 0v Reset .---|8 |
. | +-----+
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This circuit is limited to about 1/2 second recovery to recognize, and/or respond to, new state change commands. For a circuit with no recovery time, you would have to go timed pulses – one-shots– using something like the 74HC123 dual, RC selected for say 15ms, with one triggered off the 0->5V transition and the other triggered off the 5V->0 transition from your original circuit.

View in a fixed-width font such as Courier.

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. +-----+ CMOS BUFFERS
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.---|>B Q|--|>-----
.||||/|
.|| 15ms || G6JU
.|+-----+|+-----+
.in >-----+ .--|>|--|1 |
.||||
.5v Set | 74HC123 .--+ clamp ||
.|||| diodes ||
.0v Reset |||||
.| gnd '---|>|--|8 |
.|+-----+|+-----+
.|| 15ms ||
.||||\|
.'---o>A Q|--|>-----'
.||||/
.+-----+
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