

Using Transistors In Cockpit Building

www.737ng.co.uk

ian@737ng.co.uk

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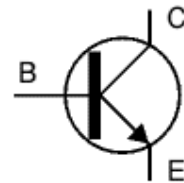
Using transistors in the construction of your circuits makes them more reliable and maintenance free. Transistors don't jam or go sticky like switches do. They are cheap, ranging from a couple of cents each upto whatever you want to pay. I use two types in my circuits, the BC237 (Left) and the BFY51 (Right).



The BC237 is a low power component that is great for switching one (or several) LED on and off. The BFY51 is a medium power transistor that I use for switching relays or arrays of LED's. A quick scan of the data sheet will tell you what kind of capacity the transistor can handle.

There are two basic types of transistor. NPN & PNP. This relates to the construction of the conductive materials that make up the physical properties of the transistor. But for now all we are interested in are NPN which is the most common type.

On the right is the circuit symbol for an NPN transistor. Transistors have three leads the Collector, the Base and the Emitter (C,B & E).



NPN

Refer to the data sheet of your transistor to confirm which is which.

Now a transistor can be used as either an amplifier or a switch. I'm not interested in 'pumping up the volume' so what I'm doing is using transistors to turn something on and off based on criteria I decide on.

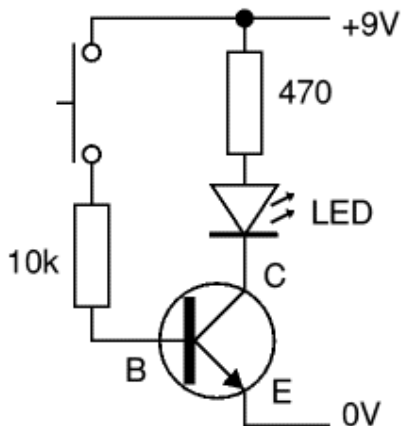


Basically what I'm doing is replacing mechanical switches with electronic one's to simplify and make circuits smaller.

Additionally, multi-switching tasks can be carried out from one source or a switching task can be performed only if two or more conditions are met.

So how does it work. Ok, look at the symbol of the transistor. Notice the arrow? Well that's the way the juice flows in an NPN transistor (a PNP has reverse polarity). I always use a regulated 5vdc supply from an ATX power supply, so these transistors can handle that with no problem at all.

Using DC and an NPN transistor, the current flows from the Collector to the Emitter when the Base is powered up. With no voltage applied to the Base, the switch is off. When voltage is applied to the Base, the switch is on and current can flow from the Collector to the Emitter, turning on your device.



A simple switching circuit

Here's a simple circuit to illustrate that. Notice that between the push switch and the Base there is a resistor. This protects the transistor from damage. Connect a transistor without a resistor and you'll destroy it as soon as it's powered up. The value of the resistor is a matter of what you want to switch, but as a rule of thumb, I have been using 10k when switching just one LED, 1K when I am switching several and as low as 510ohm when driving relays or DC lamps.

Tip: if your LED seems dim when switched on, reduce the value of the resistor from 10K to say 5K or even 1K to drive the transistor a little harder.

So, in a nutshell, you can use a transistor to switch on one LED or as a means of turning on a heavy load from a small power source.



For more information on using transistors, take a look at John HEWES excellent Electronics Club
<http://www.kpsec.freeuk.com/components/tran.htm>
or look here for an 'In words of one syllable' explanation
<http://www.satcure-focus.com/tutor/page4.htm>

Rapid Part No's

BC237 = 47-5526

<http://www.rapidonline.com/Electronic-Components/Discrete-Semiconductors/Transistors/Low-power-NPN-transistors/66245/kw/bc237>

BFY51 = 81-0122

<http://www.rapidonline.com/Electronic-Components/Discrete-Semiconductors/Transistors/Medium-power-NPN-transistors/66248/kw/bfy51>