

Re: Checking a BC548B NPN Transistor?

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On Sun, 17 Jun 2007 10:10:04 -0500, John Fields
<jjfields@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx> wrote:

Well, I don't know about you, but when I use an analog multimeter I usually have a pretty good idea of what I'm looking for if I'm using it to measure voltages, and even more so if I'm using it to measure current. I relegate 'pot luck' to those situations where I'm trying to determine the polarity of an unmarked diode or the type (PNP or NPN) and pinout of an unknown transistor.

I don't take pot luck either when measuring voltages but sometimes accidents do happen. I figure it out before I start probing – as most experienced techs do.

I agree that the polarity switch would appear to find most use when testing semiconductors. However, even without such a switch I don't find it a problem. For example, I test a loose transistor on the bench by simply having a lead in each hand and probing between pins in order to first determine the base lead. If I get conduction to two other pins when the black lead is on the third I know it is NPN and the black lead is on the base. And similarly for a PNP with the red lead on the base. I don't make permanent connections for this simple test since it is not necessary and a polarity switch would not be any advantage. Only when testing to determine which of the other two pins is emitter and collector do I make permanent connections. For this test I connect the meter leads to the two pins other than the base pin (pot luck principle). To check for NPN I connect a damp finger (or short cct) between the black lead (+ve) and the base pin and if it conducts I know the black lead is on the collector and the red lead must be on the emitter. If it doesn't conduct I know the leads are reversed and I swap them. In the case of a PNP the damp finger (or short) goes between the red lead (-ve) and the base. If it conducts the red lead is on the collector and if it doesn't I swap the leads. If I don't see any conduction at all I carry out further testing to

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determine what device I have or whether it is faulty or has low gain (some power devices may not give an indication with a damp finger). The situation where the leads are permanently connected to the device is the only real advantage I can see for having a polarity switch on the meter. But this function alone (to avoid swapping leads) would not be sufficient reason to include it in my opinion.

Being able to reverse the polarity with the switch (after the event) is no more of an advantage than lifting one lead off when the pointer swings the wrong way.

Except that simply lifting a lead won't do it. Since you need to swap leads, the lead on chassis ground will have to be removed and replaced by the lead formerly used as the probe and Vice Versa.

I suppose I was trying to say that inexperienced users who have a meter with a polarity switch may forget to check the position of the switch before using the meter. You will no doubt agree that because the switch can be left in either position between uses, that unless the switch is checked, the lead polarity can be as indicated by lead colour (red +ve) or the reverse (black +ve) on dc and resistance ranges. The probability of failing to check is ever present and where not done can produce hard slam situations. I maintain that this is less likely to occur where the polarity of the leads is fixed and immutable and all users of such meters know this fact. Where the switch polarity is such as to cause a reversed reading or a "hard slam" then the time taken to use the polarity switch is excessive and won't protect the meter pointer. I agree that using the switch for this function is not why it has been included, but does everyone understand this?

Again, simply lifting the red lead won't do anything except disconnect the red lead from the circuit. If you expect the meter to read upscale you'll need to actually swap the leads. That is, connect the lead that was formerly the probe, to ground, and Vice Versa, as mentioned earlier.

Experienced users would be unlikely to make an error and in most cases they would probably be probing with a lead in each hand. If an unexpected polarity were encountered it doesn't take any longer to swap leads than it does to move the polarity switch on the meter. It

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will only be where both leads are permanently connected – and never in the case of undetermined dc voltage polarity – that the polarity switch will be of use. In fact when measuring DC voltages the polarity switch would be as useless as the moving coil reversal button on my AVO. The only real use for the polarity switch is when testing semiconductors, and I maintain that its benefit even there is a moot point.

As far as looking for the polarity reversal switch goes, it seems to me that instead of me "making a big deal" out of this, you're grasping at straws in order to try to prove that the polarity reversal switch is largely fluff.

Well that is your opinion. As I said before, because the polarity switch can be left in either position the lead polarity can change from use to use unless the switch is checked beforehand – an additional function which is vital to avoid any mishaps. To my mind it is far simpler and less confusing to have a fixed polarity rather than having to check which polarity my leads are whenever I want to use the meter to measure dc voltage... Horses for courses...

The momentary polarity reversal switch sounds kind of inconvenient (and dangerous) to me in that to use it you've either got to press it when you get a downscale reading, which means you've got to go looking for it and press it while keeping the probe on the point of interest and getting the reading, or press it first and then go looking for the point of interest. Either way requires doing three things at once, which can be kind of confusing.

Indeed and, because of that, claimed that it had no polarity reversal switch. Kind of like a carpenter "forgetting" that his favorite claw hammer can also be used to remove nails, eh?

You are being a bit hard I think. If the function on the AVO is of dubious value (as I have said it is) and is never used, then it is

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easy to overlook that it is even there. Your criticism might be valid if the button were frequently used but the analogy of the carpenter's hammer is totally facetious. The claw function would be in use frequently and would be impossible to forget, unlike the reversal button on the AVO.

Also, because of the Wiki article making the claim that on all analog multimeters (when the OHMS ranges are being used) the voltage on the minus input will be more positive than the voltage on the PLUS input and your buying into it without even checking it out is the reason this thread is still going on and you're desperately trying to defend your untenable position.

As I said before, I erred in not including a qualifier in my statement so yes, by not including one I did make the error of meaning "ALL" meters. Perhaps I am just guilty of being ignorant of the fact that of all the manufacturers of non-electronic analog multimeters, the only ones to include a polarity switch are from the USA. I am also guilty of being ignorant of these meters because they are not commonly found in the rest of world. The total number of users of meters with a polarity switch in the USA would be only a relatively small percentage of the total number of users of analog meters outside of the USA, so I claim that my statement referred to the majority of such analog meters found today.

And just before anyone else mentions they know of analog meters which don't have a polarity switch but which put out +ve on the red lead when on resistance ranges, I'll wager that in such cases the meter will be an electronic unit a-la Philips 2503 or a modern Gossen Metrawatt Metraport 3A

http://www.gossenmetrawatt.com/resources/tt/mport3a/ba_gb.pdf
Note that the NPN and PNP designations on the transistor symbols diagram on p.21 are reversed (the symbols are correct). This meter is fully electronic and on resistance ranges the red lead is +ve and the black lead is -ve. Their non-electronic meters such as the MetraHit 1A/2A http://www.gossenmetrawatt.com/resources/tt/hit1a_2a/ba_gb.pdf use a 1.5V battery for low resistance ranges and semiconductor testing similar to AVO, Triplett and Simpson analog meters. Note on p.18 the instruction that the common connection lead (which is black btw) is +ve, as it always has been on the majority (ALL?) non-electronic analog meters manufactured outside the USA.

Looking at the analog products from both Triplett and Simpson, they still produce analog meters with the polarity switch, but I have not

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been able to locate any non-electronic meters of similar types from other makers outside the US which include a similar function. It seems to have been a function on US brand meters only eg, Triplett and Simpson.

Good ol' Yankee ingenuity!

Yes, but in the eyes of manufacturers and users of such equipment outside the USA, obviously ingenuity which is of dubious value, and therefore not considered a necessary item.

****RH**** On the AVO, No. The switch simply reverses the moving coil meter connections. I have never had cause to use it, nor do I regard it as necessary or desirable.

Yes, it's probably best not to mess with it since it's only switching 37.5µA.

I agree. I can vaguely remember my instructor telling me much the same back in the 50's. He said "using this button can get you into more hot water than it is worth – don't use it".

John, (and any other users of Triplett or Simpson meters with a polarity switch), I had no knowledge of any meters with such a function before posting and I acknowledge that you are accustomed to the functions of your meters and think they are great. I apologise for getting your back up but I also expect a little latitude for my unintentional ignorance of these meter brands. US users on the other hand also have to accept that the vast majority of users outside the USA where these brand meters are not common, will have a different viewpoint. The fact remains that for non-electronic analog meters the rule "when on OHMS, black is +ve" is true. And there must be many thousands of cheap analog meters without polarity switches being used even in the USA today.

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