A Basic Transistor DC Beta Function Tester Design Description

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Some of us collectors accumulated many **transistors**. They can easily be removed from defunct electronics equipment. Although many devices look like transistors, they may instead be other types of semiconductors. Power rectifiers, power transistors and power **MOSFET** devices are both available in identical Versawatt plastic packages.

To make matters a bit more complicated, even transistor looking devices may possible be **FETs, UJTs, VariCap diodes** or other more exotic types. But assuming that by miracle all is left are transistors, even those can be two different types. At the beginning more transistors were made as a **P-N-P**, nowadays, much more of them are made as **N-P-N** device. Both the **NPN** and the **PNP** transistors are multi-layer semiconductor devices. The name of the transistor types is the first letter of their layers. The **PNP** device is made by an **N-Layer** between two **P-layers**. The same way is with the **NPN** types.

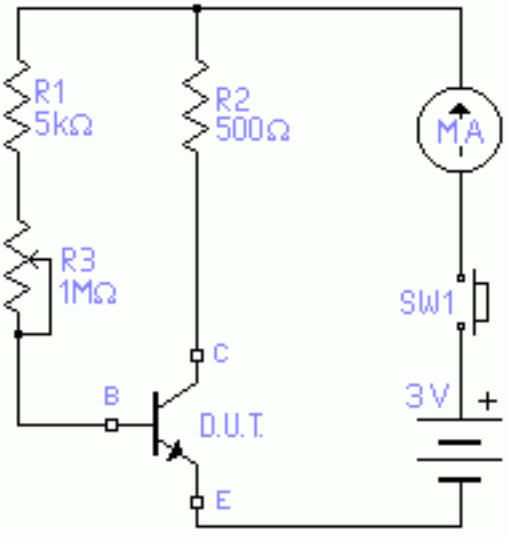

Figure 1. Simple Basic Functional Transistor Beta Tester

Present day, ordinary transistors - just like their earlier relatives the **diodes** - are almost always made by junctions. Very early devices were made with point contacts. Semiconductor junctions are slightly different composition boundary layers in close proximity to one another. The difference between these layers is exceedingly minuscule. A few impurity - donor or acceptor - atoms added to nearly pure silicon, germanium or other semiconductor material is all that required.

A very simple transistor **tester** as shown on **Figure 1**. requires only three resistors, a battery, a transistor socket, a current meter and a push button switch. For the current meter an external VOM can be used. The way the schematic is drawn, it will test and identify the more popular NPN type transistors. This tester can also be used to test the PNP transistors if the battery polarity is reversed. Adding another switch to the circuit, both type transistors can be tested.

When a Device Under Test (D.U.T.) is placed into a socket the meter should not move as the circuit is open. Press the SW1 switch and observe the scale on the current meter. In a good transistor, when SW1 is depressed, the current meter will deflect, indicating current flow. Slowly rotate the R3 potentiometer. The current meter will deflect more. The higher is this current the higher is the gain of the device under

test. The transistor amplification number commonly referred to as Beta can be measured. This Beta is a DC (Direct Current) type of current amplification factor. That is one of the easiest, and more useful transistor parameter to measure.

If the device placed into the socket is a PNP type, no current will flow. The current meter should not register any current. If it does, than the transistor is a NPN type, or it is shorted out. If it shows only a very small amount, and then the transistor is leaky - it has too much leakage (reverse) current. In early, low number, point contact germanium transistors, (two or three digits following the 2N number like 2N34) a small leakage current is OK. The meter can be calibrated in gain units. This tester is a good relative gain indicator. It allows selecting the transistor with a higher gain.

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