

Transistors, SCRs & TRIACs

By G8MNY

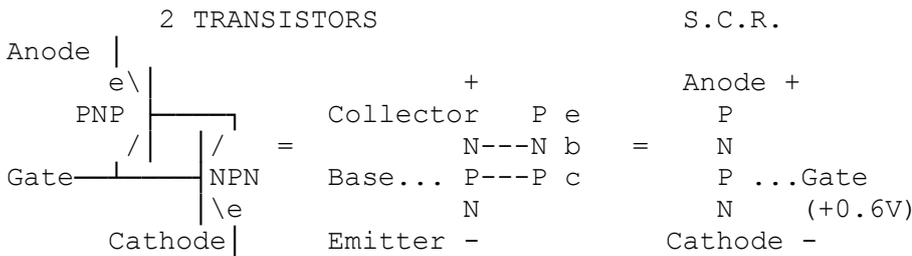
(Updated Feb 10)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

SCRs or THYRISTORS (trade name)

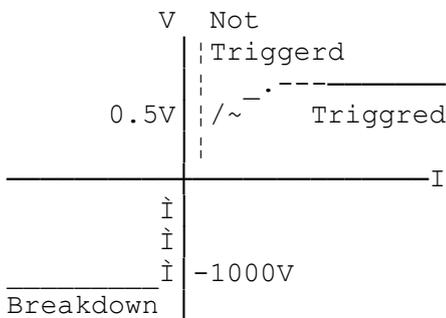
Silicon Controlled Rectifiers are equivalent to 2 transistors one PNP & one NPN with their collectors & bases connected to the other transistor's base & collector (swapped around).

If an on condition of +0.6V is now placed on the NPN's base, & there is a +ve supply/load on the PNP's emitter, current flows into the PNP's base turning it on, which in turn hold the NPN fully on.



Only the removal of the supply current, will turn off the SCR switch. With the SCR a -ve gate signal does nothing, not even turning off a turned on SCR, this is due to the gate connection only being on the edge of that layer & not affecting the currents flowing further in. There are turn off capable types made though.

False triggering is possible if the anode pulses +ve very quickly (dV/dT) due to stray capacitance to the gate.



Unlike transistors, SCR & TRIACS peak current handling is very large like diodes, with a 1 Amp rated device is able to withstand 40 Amp surge.

TRIACS

These are AC triggered switches, like SCR but have 2 additional junctions which are shorted together, it is a complex 3d device in practice.

T R I A C

- |                      |                              |
|----------------------|------------------------------|
| Anode'' (±) [case]   | It can be triggered to the   |
| PN                   | on state with either +/-0.6V |
| N                    | on the Gate with either +/-  |
| P-\....Gate (±0.6V)  | on the Anode'' although      |
| NP/                  | triggering sensitivity       |
| Cathode (±) [Anode'] | varies over the 4 states.    |

The Gate can only handle low power (e.g. 1/100,000 the anode switching power) so narrow pulse triggering is often used.

A diac (not the battery) is like a triac with internal 30V zeners anode to gate. So over 30V it goes short until the power is removed. With a suitable CR it provides simple AC phase shifted gate pulse trigger, used in mains light dimmers.

DIACS

These are triggering devices used with TRIACS gates & a capacitor to provide a short sharp high current trigger pulse. Basicly they are 2 like transistors in series with the same 30V breakdown voltage.



See my buls on "TRIAC Light Dimmer", "Auto SCR charger for Car Batts". "Simple SCR Regulated Charger" & "SCR Drill Speed Controller".

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