Transistors SCRs and Triacs

The SCR is 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 (+.6v) is now placed on the 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 turn off the SCR, this is due to the gate connection only being on the edge of the that layer. There are turn off caperble types made. False triggering is possible if the anode pulses +ve very quickly (dV/dT).
Unlike transistors, SCR & TRIACS peak current handling is very large, with a 1A rated devices able to withstand 40A surges.

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  2 transistors        SCR                TRIAC

            +       Anode +              Anode'' (+/-) [case]
Collector   P e       P                   PN
        N---N b       N                   N
Base... P---P c       P ...Gate (+0.6v)   P-\....Gate (+/-0.6v)
        N             N                   PN/
Emitter  -          Cathode -           Cathode  (-/+) [Anode']
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A Triac is an AC triggered switch, like a Silicon Controlled Rectifier (SCR or Thyristors) but have 2 additional junctions which are shorted together, it is a complex 3d device in practice. It can be triggered to the on state with either +/-0.6V on the Gate with either +/-on the Anode" although sensitivity varies over the 4 states. The Gate can only handle low power so narrow pulse triggering is often used. A diac (not the battery) with a CR provides simple dimmer AC phasing shift pulse gate triggering.

It was originally posted to the Packet radio System by John G8MNY in JAN 2001