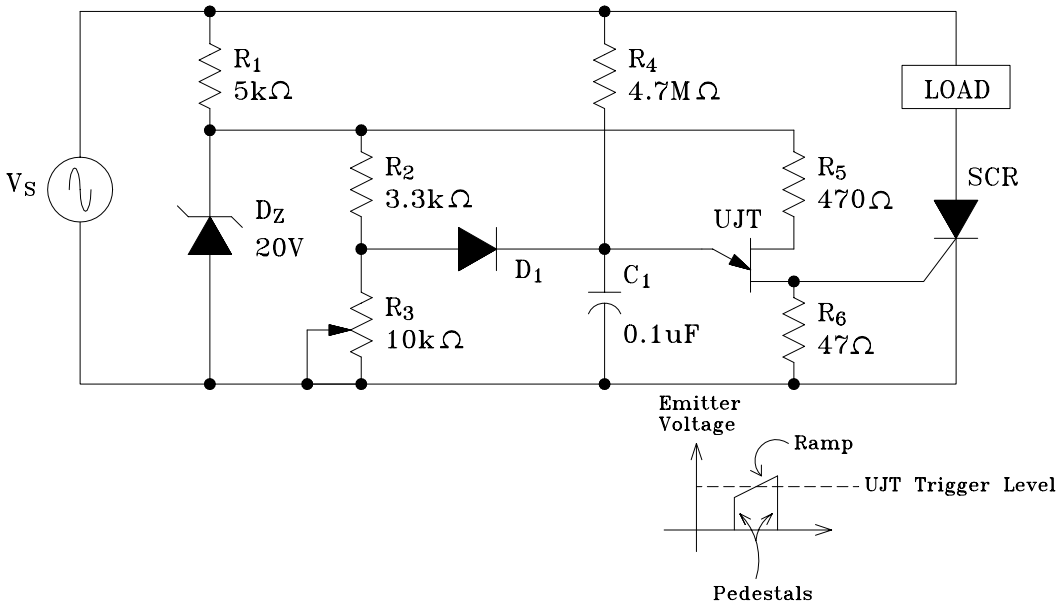
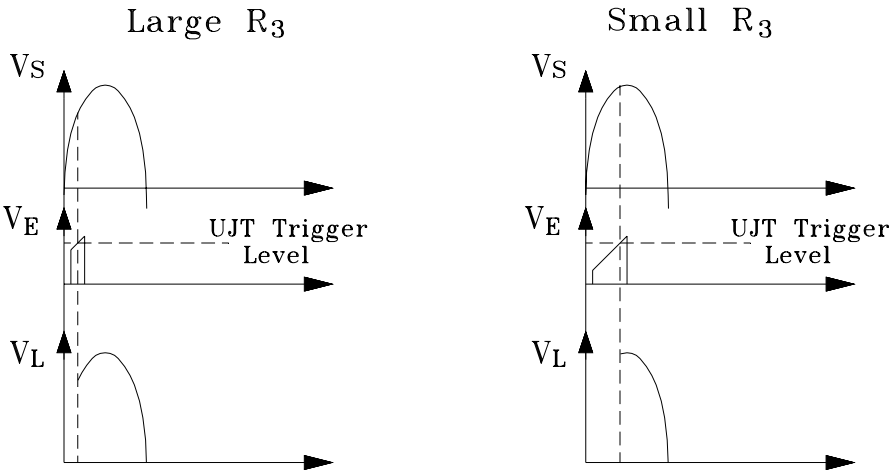
3.3 Ramp-Pedestal UJT-SCR Control Circuit:

The circuit, shown below, uses a UJT to trigger a SCR. The UJT is used to more accurately trigger the SCR.



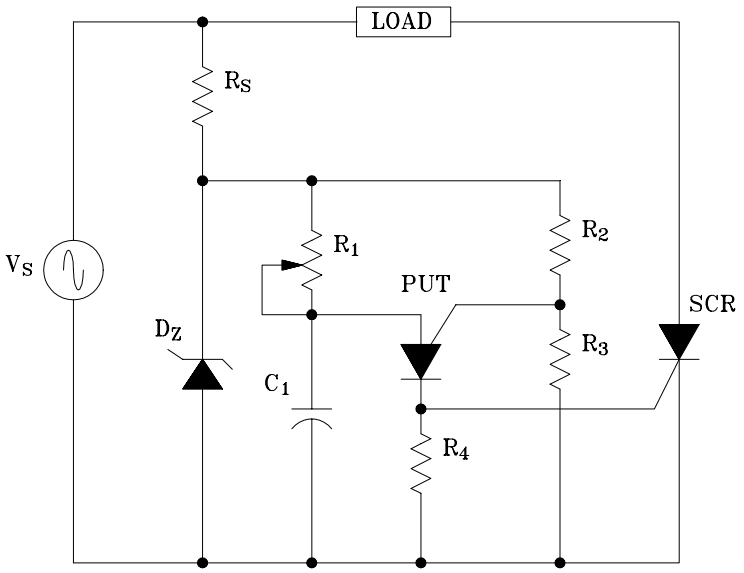
When the source voltage exceeds 20V, the zener diode (D_Z) will begin to conduct, applying a DC voltage across the base connections of the UJT. At the same time, diode D_1 will be forward biased, and the capacitor will quickly charge through R_1 and R_2. This represents the left-hand pedestal portion of the of the emitter voltage. Once the capacitor charges to the voltage across R_3, D_1 will become reverse biased and the capacitor will continue to slowly charge through R_4. This represents the ramp portion of the emitter voltage. The capacitor continues to charge until the UJT fires. At this point the capacitor will quickly discharge through R_6, and this represents the right-hand pedestal of the emitter voltage. The capacitor discharge is sufficient to trigger the SCR.

The point at which the UJT fires can be adjusted by varying the pot R_3. With a large setting on R_3, the capacitor must charge to a larger value before D_2 becomes reverse biased. This causes the UJT to fire faster, resulting in more of the source voltage appearing across the SCR. This can be seen graphically as:



3.5 SCR Triggering Using A PUT:

A typical circuit using a PUT to trigger a SCR is as follows;



The SCR only operates on the positive half portion of the source voltage, so this is all we will deal with. When the source voltage reaches a sufficient voltage, the zener diode will begin conducting and place its voltage across R_1/C_1 and R_2/R_3. The capacitor begins to charge and the PUT trigger voltage will be set to;

$$V_T = \eta V_Z + 0.5V$$

$$\therefore V_T = \frac{R_3}{R_2 + R_3}(V_Z) + 0.5V$$

The trigger voltage is equal to the capacitor voltage, since the capacitor is connected between the PUT anode and ground. When the capacitor charges to the trigger voltage, the PUT turns on, discharging the capacitor through R_4, turning on the SCR. The time required to charge the capacitor could be varied by adjusting the potentiometer R_1.