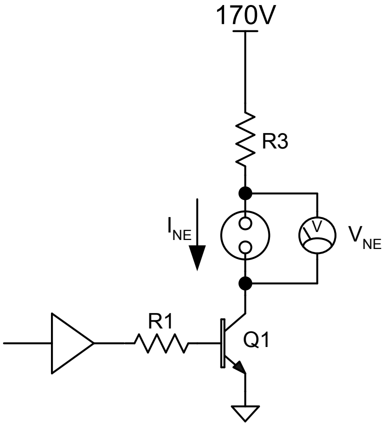

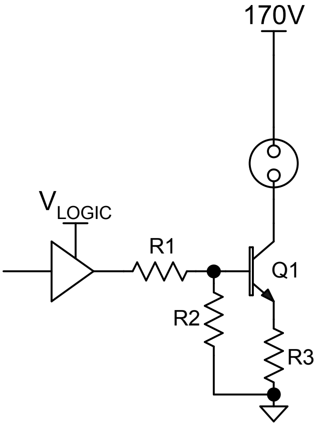

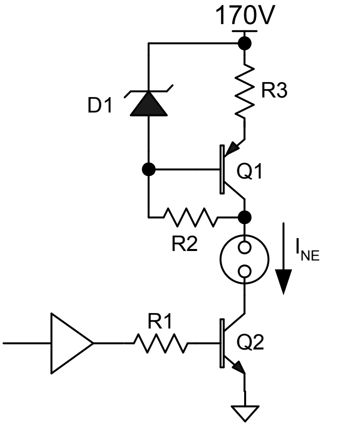

Simple saturated drive: R3 dissipates nearly all of the waste heat because Q1 is usually operated in saturation to keep its voltage drop low. One current limiting resistor is shared by all digits for multi segment displays. Current and therefore brightness varies with changes in the 170 rail. I_{R1} needs to be much greater than (I_{R3} / 100) to satisfy Q1 h_{FE}. This configuration works with both bipolar and MOSFET transistors.

$$I_{NE} = \frac{170 - V_{NE}}{R3}$$

Low side constant current linear drive: Q1 dissipates nearly all of the waste heat because the voltage on R3 is usually low compared to the voltage across Q1. Multi segment displays requires a current sink for each segment. This will not work with MOSFETs because of wide variations in gate threshold voltage part to part. I_{R1}-I_{R2} needs to be about (I_{R3} / 100) to satisfy Q1 h_{FE}.

$$I_{NE} = \frac{\left(\frac{V_{LOGIC} \times R2}{R1 + R2}\right) - 0.65V}{R3}$$

High side constant current linear drive: Q1 dissipates nearly all of the waste heat because the voltage on R3 is usually low compared to the voltage across Q1. Multi segment displays can share Q1 and the segment drives can be either NPN or MOSFET switches. I_{R2} needs to be about (I_{R3} / 100) to satisfy Q1 h_{FE}. I_{R1} can be lower than the first example because Q2 does not need to be saturated since small V_{CE} variations will not affect the current… this has the benefit of making Q2 switch off faster for multiplexed drives.

$$I_{NE} = \frac{V_{D1} - 0.65V}{R3}$$