The Passive Sign Convention

Ohm's Law states that V= I R. ***This is not a complete definition of Ohm's Law since***

- voltage is ACROSS and has a POLARITY; and
- current is THROUGH and has a DIRECTION.

We must establish a directional relationship between voltage polarity and current direction. That relationship is known as the PASSIVE SIGN CONVENTION (PSC).

See Figure 1a. The PSC for the resistor stipulates that the reference direction for I1 is that I1 flows from the positive to negative voltage polarity designators for V1. If you select a current direction, you have also selected the voltage polarity, or vice versa.
THEY ARE NOT INDEPENDENT.

C. Arranging Parts and Pin Numbers

Every pin (external connection) on every part in every *Schematics* libraries is numbered. When arranging parts in *Schematics*, it is vital to understand the relationship between the passive sign convention in Figure 1, current directions in PSpice and the part's pin numbers. When a part is placed, it is automatically oriented either vertically or horizontally. As shown in Figure 11, vertically placed parts have pin 1 at the top and pin 2 at the bottom, while horizontally oriented parts have pin 1 on the left and pin 2 on the right.

Currents measured by PSpice flow into pin 1 and out of pin 2.

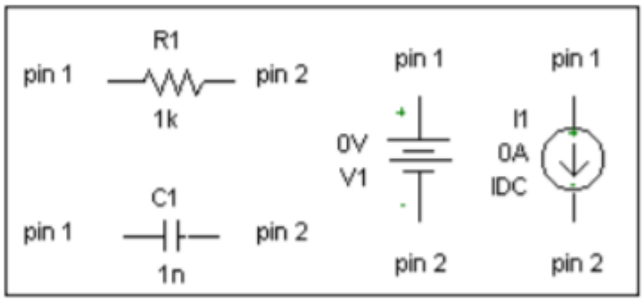

FIGURE 10

C. The Passive Sign Convention and PSpice

All currents and voltages in PSpice and *Schematics* obey the passive sign convention shown in Figure 1. The voltage across the element is defined positive at node *m* with respect to node *n*. Obviously, the ordering of the nodes is quite important. In fact, we'll return to this concept of node *m* versus node *n* several times. If V_{mn} as calculated by PSpice is positive, then PSpice will return a positive number. If the current value returned by PSpice is positive, then current flows in at node *m* and out of node *n*. For example, if we ask PSpice its calculations for V_{mn} and *I* and it said, -4.5 and 2.2E-3, we know that node *n* is 4.5 V positive with respect to node *m* and a current of 2.2 mA flows from *m* to *n*. In other words, the element is a source.

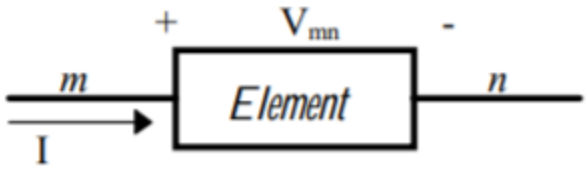

FIGURE 1