Figure 12-251. *Positive and negative pulse in an idealized form.*

be assumed as instantaneous. *Figure 12-252* shows the non-ideal pulse and its characteristics. The time required for a pulse to go from a low state to a high state is called the rise time, and the time required for the pulse to return to zero is called the fall time. It is common practice to measure the rise and fall time between 10 percent amplitude and 90 percent amplitude. The reason for taking the measurements in these points is due to the non-linear shape of the pulse in the first 10 percent and final 90 percent of the rise and fall amplitudes. The pulse width is defined as the duration of the pulse. To be more specific, it is the time between the 50 percent amplitude point on both the pulse rise and fall.

Basic Logic Circuits

Boolean logic is a symbolic system used in representing the truth value of statements. It is employed in the binary system used by digital computers primarily because the only truth values (true and false) can be represented by the binary digits 1 and 0. A circuit in computer memory can be open or closed, depending on the value assigned to it. The fundamental operations of Boolean logic, often called Boolean operators, are "and," "or," and "not;" combinations of these make up 13 other Boolean operators. Six of these operators are discussed.
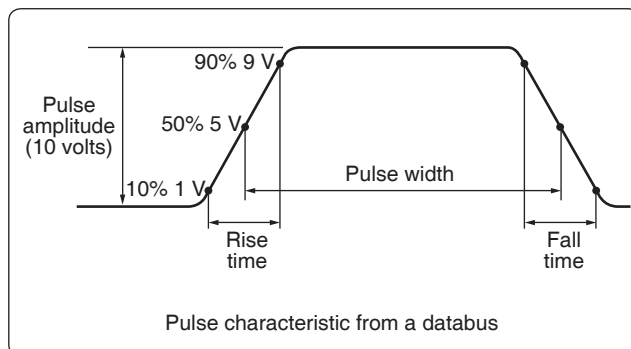

Figure 12-252. *Non-ideal pulse and its characteristics.*

The Inverter Logic

The inverter circuit performs a basic logic function called inversion. The purpose of the inverter is to convert one logic state into the opposite state. In terms of a binary digit, this would be like converting a 1 to a 0 or a 0 to a 1. When a high voltage is applied to the inverter input, low voltage is the output. When a low voltage is applied to the input, a high voltage is on the output. This operation can be put into what is known as a logic or truth table. The standard logic symbol is shown in *Figure 12-253*. *Figure 12-254* shows the possible logic states for this gate. This is the common symbol for an amplifier with a small circle on the output. This type of logic can also be considered a NOT gate.

The AND Gate

The AND gate is made up of two or more inputs and a single output. The logic symbol is shown in *Figure 12-255*. Inputs are on the left and the output is on the right in each of the
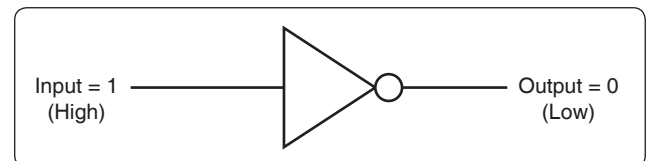

Figure 12-253. *Standard logic symbol.*

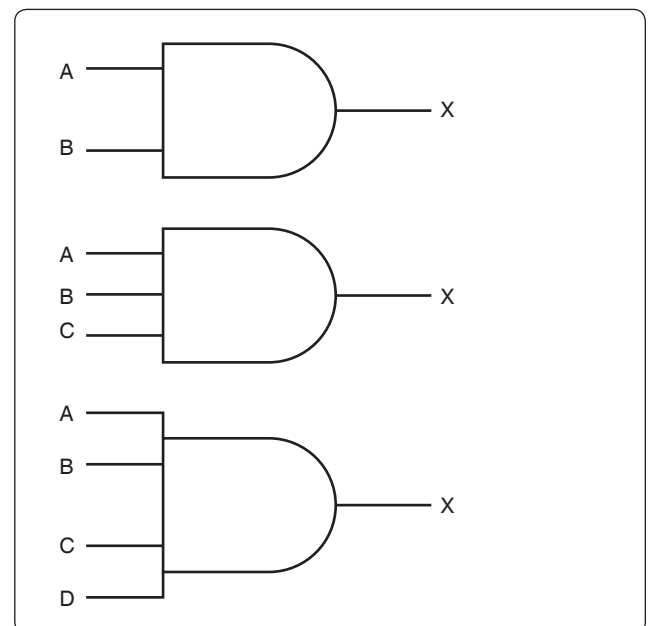| Input	Output
High	Low
Low	High

Figure 12-254. *Possible logic states.*

Figure 12-255. *AND gate logic symbol.*