

When you read this location, you get a byte, but only the high-order bit (bit 7) is valid. If you are programming in machine language, this is the sign bit, so you can perform a Branch Plus or Branch Minus immediately after reading this byte. BASIC is too slow to keep up with the audio tones used for data recording on tape, but you don't need to write the program: there is a built-in routine named READ for reading data from a cassette.

READ is described in Appendix B.

Complete electrical specifications of these inputs and outputs are given in Chapter 7.

For electrical specifications of the annunciator outputs, refer to Chapter 7.

The hand control connector signals

Several inputs and outputs are available on a 9-pin D-type miniature connector on the back of the Apple IIe: three one-bit inputs, or switches, and four analog inputs. These signals are also available on the 16-pin IC connector on the main circuit board, along with four one-bit outputs and a data strobe. You can access all of these signals from your programs.

Ordinarily, you connect a pair of hand controls to the 9-pin connector. The rotary controls use two analog inputs, and the push-buttons use two one-bit inputs. However, you can also use these inputs and outputs for many other jobs. For example, two analog inputs can be used with a two-axis joystick. Table 7-19 shows the connector pin numbers.

Annunciator outputs

The four one-bit outputs are called *annunciators*. Each annunciator can be used to turn a lamp, a relay, or some similar electronic device on and off.

Each annunciator is controlled by a soft switch, and each switch uses a pair of memory locations. These memory locations are shown in Table 2-10. Any reference to the first location of a pair turns the corresponding annunciator off; a reference to the second location turns the annunciator on. There is no way to read the state of an annunciator.