

This chapter describes the input and output (I/O) devices built into the Apple IIe in terms of their functions and the way they are used by programs. The built-in I/O devices are

- the keyboard
- the video-display generator
- the speaker
- the cassette input and output
- the game input and output

For descriptions of the built-in I/O hardware, refer to Chapter 7.

At the lowest level, programs use the built-in I/O devices by reading and writing to dedicated memory locations. This chapter lists these locations for each I/O device. It also gives the locations of the internal soft switches that select the different display modes of the Apple IIe.

Built-in I/O firmware routines are described in Chapter 3.

- ❖ *Built-in I/O routines:* This method of input and output—loading and storing directly to specific locations in memory—is not the only method you can use. For many of your programs, it may be more convenient to call the built-in I/O routines stored in the Apple IIe's firmware.

The keyboard

The primary built-in input device for the Apple IIe is the keyboard. The original and enhanced IIe keyboards have 63 keys, while the extended keyboard IIe keyboard has 81 keys. Both keyboard types have automatic repeat, which means that if you press any key longer than you would during normal typing, the character code for that key will be sent continuously until you release the key. Both keyboard types also allow you to hold down any number of keys and still press another key; this is known as *N-key rollover*.

The keyboard layout shown in Figure 2-1 is for the original and enhanced IIe keyboards. The keyboard layout shown in Figure 2-2 is for the extended keyboard IIe keyboard.

Apple IIe's manufactured for sale outside the United States have a slightly different standard keyboard arrangement and include provisions for switching between different character sets. These differences are described in Appendix I.