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## Changing the standard I/O links

See "The Standard I/O Links" in Chapter 3.

There are two pairs of locations in the Apple IIe that are used for controlling character input and output. They are called the *I/O links*. In an Apple IIe running without a disk operating system, the I/O links normally contain the starting addresses of the standard input and output routines—KEYIN and COUT1 if the 80-column firmware is not active, BASICIN and BASICOUT if the 80-column is active. If a disk operating system is running, one or both of the links will hold the addresses of the operating system input and output routines.

COUT1 and BASICOUT are described in Chapter 3.

The link at locations \$36 and \$37 (decimal 54 and 55) is called CSW, for *character output switch*. Individually, location \$36 is called CSWL (CSW Low) and location \$37 is called CSWH (CSW High). CSW holds the starting address of the subroutine the Apple IIe is currently using for single-character output. This address is normally \$FDF0, the address of routine COUT1, or \$C307, the address of BASICOUT.

When you issue a PR#n from BASIC or an n Control-P from the Monitor, the Apple IIe changes this link address to the first address in the ROM memory space allocated to slot number n. That address has the form \$Cn00. Subsequent calls for character output are thus transferred to the program on the peripheral card. That program can use the instruction sequences given above to find its slot number and use the I/O and RAM locations allocated to it. When it is finished, the program can execute an RTS (return from subroutine) instruction to return control to the calling program, or jump to the output routine COUT1 at location \$FDF0 to display the output character (which must be in the accumulator) on the screen, then let COUT1 return to the calling program.

KEYIN and BASICIN are described in Chapter 3.

A similar link at locations \$38 and \$39 (decimal 56 and 57) is called KSW, for *keyboard input switch*. Individually, location \$38 is called KSWL (KSW low) and location \$39 is called KSWH (KSW high). KSW holds the starting address of the routine currently being used for single-character input. This address is normally \$FD1B, the starting address of KEYIN, or \$C305, the address of BASICIN.