AN-006 – Interfacing PC Keyboards to the DOS Stamp

Topic

This application note describes how to interface a PC keyboard to the DOS Stamp. PC keyboards come in XT, AT, and PS/2 styles. This note covers only AT and PS/2 styles.

In this application note the following items are used:

1 DOS Stamp embedded computer (Bagotronix Inc.)
1 PC keyboard (AT-style)
1 5-pin DIN socket
1 DOS Stamp JP1 cable
1 DOS Stamp JP2 cable
5 VDC regulated power supply

Theory of Operation

The PC keyboard uses a bi-directional clocked serial data stream. The keyboard sends scan codes to the computer, and the computer sends commands to the keyboard.

Scan codes are not the actual characters on the key tops. Each key generates a scan code upon pressing, and another upon releasing. On a PC, the keyboard controller and BIOS interpret these scan codes for you. When you interface to a keyboard directly, your program must do this work.

The keyboard is connected to the DOS Stamp as follows:

DOS Stamp	PC Keyboard (AT-style)
JP1.17 (PIO31)	Pin 2 (DATA)
JP1.21 (PIO0)	Pin 1 (CLOCK)
JP1.33 (+5V)	Pin 5 (+5V)
JP1.34 (GND)	Pin 4 (GND)

PS/2-style keyboards have the same signals, but use a different connector.

The DOS Stamp uses a "bit-banging" serial interface to the keyboard. This interface is made up of two general-purpose I/O pins. The CLOCK pin is always configured as an output on the DOS Stamp side. The DATA pin is switched between being an input (with pull-up) or an output on the DOS Stamp side, depending on whether the DOS Stamp is receiving scan codes from the keyboard, or issuing commands to the keyboard.

The Software

There are two example programs for the PC keyboard interface. The first, PCKBRD1.EXE, shows the scan codes that the keyboard produces. The second, PCKBRD3.EXE, shows the keyboard's scan codes being converted to ASCII codes for display, and the Caps Lock, Num Lock, and Scroll Lock keys being controlled by commands from the PC.

Program Listing

See the DSPCKBRD.ZIP file for program listings.