The PS/2 Keyboard and Mouse Interface

CSEE W4840

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The IBM PC/XT and /AT Keyboards
IBM PC Enhanced (101-key) Keyboard

Original keyboard connector: DIN-5
The PS/2 Mini-DIN 6 Connector

6 5 = Clk
VCC = 4 3 = GND
2 1 = Data
Female Socket
Synchronous Serial Interface

Like RS-232, but with a clock.
Odd parity, one start, one stop.
Keyboard-to-host shown: keyboard initiates everything.
Codes (Keyboard to Host)

- **00/FF** Error or buffer overflow
- **F0** Key-up
- **FA** Acknowledge
- **EE** Echo response
- **FE** Resend
- **E0** Extended code coming
Host brings Clock low, then Data low to indicate transfer to keyboard, then releases Clock (rises).

Keyboard starts generating clock signals. Host supplies serial data, changing after each falling edge. After stop bit, host releases Data. Keyboard pulls Data low for one more clock signal to indicate it received the byte.
**Commands (Host to Keyboard)**

**ED** LED control
- Caps lock
- Num lock
- Scroll lock

**EE** Echo
Keyboard will respond with EE

**F0** Set scan code set
Keyboard will respond with FA and wait for another byte 01–03. 00 leaves scan code unchanged.

**F3** Set key repeat rate
Keyboard responds with FA and waits for second byte, indicating repeat rate.
Commands (Host to Keyboard)

F4 Enable keyboard
   Responds with FA, clears buffer, enables scanning.

F5 Disable keyboard
   Responds with FA, disables keyboard.

FE Resend
   Retransmit the last byte.

FF Reset Keyboard
Three bytes sent every time mouse moves or button clicked:

<table>
<thead>
<tr>
<th>MSB</th>
<th>LSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>X</td>
</tr>
<tr>
<td>Overflow</td>
<td>Sign</td>
</tr>
<tr>
<td>X movement</td>
<td></td>
</tr>
<tr>
<td>Y movement</td>
<td></td>
</tr>
</tbody>
</table>

Movement values are since last transmission: 9-bit two’s-complement (signed) numbers.

Many more variants, modes, and other junk.