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 = Clk
- 5 = Clk
- VCC = 4
- 3 = GND
- 2 = Data
- 1 = Data

Female Socket
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

The PS/2 Keyboard and Mouse Interface – p.
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)

<table>
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<th>Command</th>
<th>Description</th>
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<tbody>
<tr>
<td>ED</td>
<td>LED control</td>
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<tr>
<td>EE</td>
<td>Echo</td>
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<tr>
<td>F0</td>
<td>Set scan code set</td>
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<tr>
<td>F3</td>
<td>Set key repeat rate</td>
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</table>

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

- **Echo**
  - Keyboard will respond with EE

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

- **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 (Y Overflow, X Sign)</th>
<th>LSB (Buttons)</th>
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<tbody>
<tr>
<td>Y</td>
<td>X</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.