

How mouse system works

Typical PC mouse controlling system has the following parts:

sensors -> mouse controller -> communication link -> data interface -> driver
-> software

Sensors are the movement detectors (typically optomechanical) which sense the mouse movement and button switches which sense the button states. Mouse controller reads the state of those sensors and takes account of current mouse position. When this information changes, the mouse controller sends a packet of data to the computer data interface controller.

The mouse driver in the computer received that data packet and decodes the information from it and does actions based on the information. Typically, mouse driver has the information of the current mouse state (position and button states) and tells them to the application or operating when it asks them. Typically, the mouse driver calls mouse cursor moving routines when mouse is moved and sends messages to the software when buttons are pressed.

Serial mouse



A serial mouse is a computer mouse that connects to the computer through a serial port. Today, the serial mouse has been replaced by the PS/2 and USB mouse.

Serial Mouse Data Formats

The data packets are sent at 1200 baud with 1 stop bit and no parity. Each packet consists of 3 bytes. It is sent to the computer every time the mouse changes state (ie. the mouse is moved, or the buttons are pressed/released).

	D6	D5	D4	D3	D2	D1	D0
1st byte	1	LB	RB	Y7	Y6	X7	X6
2nd byte	0	X5	X4	X3	X2	X1	X0
3rd byte	0	Y5	Y4	Y3	Y2	Y1	Y0

LB is the state of the left button, 1 = pressed, 0 = released.

RB is the state of the right button, 1 = pressed, 0 = released

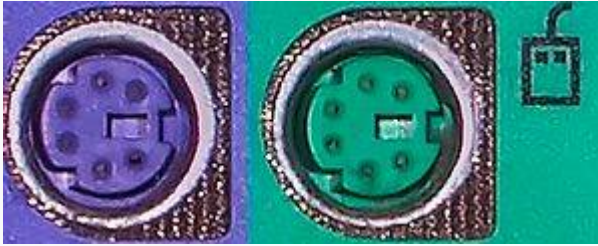
X0-7 is movement of the mouse in the X direction since the last packet. Positive movement is toward the right.

Y0-7 is movement of the mouse in the Y direction since the last packet. Positive movement is back, toward the user.

PS/2 Mouse

The PS/2 port is a 6-pin mini-DIN connector used for connecting keyboards and mice to a PC compatible computer system. Its name comes from the IBM Personal System/2 series of personal computers, with which it was introduced in 1987. The PS/2 mouse connector generally replaced the older DE-9 RS-232 "serial mouse" connector, while the PS/2 keyboard connector replaced the larger 5-pin/180° DIN connector used in the IBM PC/AT design. The PS/2 keyboard port is electrically and logically identical to the IBM AT keyboard port, differing only in the type of electrical connector used. The PS/2 platform introduced a second port with the same design as the keyboard port for use to connect a mouse; thus the PS/2-style keyboard and mouse interfaces are electrically similar and employ the same communication protocol. However, unlike the otherwise similar Apple Desktop Bus connector used by Apple, a given system's keyboard and mouse port may not be interchangeable since the two devices use different sets of commands and the device drivers generally are hard-coded to communicate with each device at the address of the port that is conventionally assigned to that device. (That is, keyboard drivers are written to use the first port, and mouse drivers are written to use the second port.[1])

PS/2 port



The color-coded PS/2 connection ports (purple for keyboard and green for mouse)

Type [Keyboard](#) and [computer mouse](#) data connector

Production history

Designer [IBM](#)

Designed 1987; 33 years ago

Superseded [DIN connector](#), [DE-9 connector](#) and [Mini-DIN-9 InPort](#)

Superseded by [USB](#)

General specifications

Hot pluggable No

External Yes

Cable 4 wires plus shield

Pins 6

Connector [Mini-DIN-6](#)

Electrical

Signal 5 V [DC](#)

Max. voltage 5.0±0.5 V

Max. current 275 mA

Data

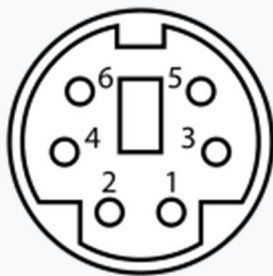
Data signal Serial data at 10.0–16.7 kHz with 1 start bit, 8 data bits ([LSB](#) first), 1 parity bit (odd), 1 stop bit, [1 ack bit (if host-to-device)]

Bitrate 7–12 [kbit/s](#)

Max. devices 1 or 2^{ia}

Protocol [Serial](#)

Pin out



Female connector from the front

Pin 1 +DATA Data

Pin 2		Not connected ^[b]
Pin 3	GND	Ground
Pin 4	Vcc	+5 V DC at 275 mA
Pin 5	+CLK	Clock
Pin 6		Not connected ^[c]

1. [^] Keyboard and mouse ports may be combined into a single port which can be used to connect both by splitter cable.
2. [^] Sometimes, keyboard Data for splitter cable.
3. [^] Sometimes, keyboard Clock for splitter cable.

PS/2 Mouse Data Formats

	D7	D6	D5	D4	D3	D2	D1	D0
1st	YV	XV	YS	XS	1	0	R	L
2nd	X7	X6	X5	X4	X3	X2	X1	X0
3rd	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0

L	Left Button State (1 = pressed down)
R	Right Button State (1 = pressed down)
X0-X7	Movement in the X direction
Y0-Y7	Movement in the Y direction
XS	Direction of movement in the X axis (1 = UP)
YS	Direction of movement in the Y axis (1 = LEFT)
XV,YV	Overflow in the movement data bits (1 = overflow has occurred)

USB

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USB cable and port



Short for universal serial bus, USB (pronounced yoo-es-bee) is a plug and play interface that allows a computer to communicate with peripheral and other devices. USB-connected devices cover a broad range; anything from keyboards and mice, to music players and flash drives. For more information on these devices, see our [USB devices](#) section.

Variable in Structure	Byte Sequence	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Button	Byte0	Not used	Not used	Not used	Not used	Not used	Middle button	Right button	Left button
X	Byte1	X axis movement information as a signed integer							
Y	Byte2	Y axis movement information as a signed integer							

Atmega 32u4 Based Generic USB Mouse