

CONNECTORS

PC-Support Information Pages for various Connectors and Cables

Connector pin assignment for: Keyboard (DIN Connector), PS2 Keyboard, serial mouse, PS2 mouse, PS2 - 9pin D-Sub adapter (mouse). Connector pin assignments for the following graphic outputs: Monochrome, CGA, EGA, VGA, 9pin to 15pin Adapter (CGA/EGA). Power Connectors for: AT Mainboard Connector, ATX Mainboard Connector, Standard Drive Connector, 3-Pin Mini Drive Connector, 4-Pin Mini Drive Connector. Pin assignments for: MIDI Inputs and Outputs, USB Plug, Network Cables 10MBit/100MBit.

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Date	Version	Revision	Name	Department	Phone	Description of Changes
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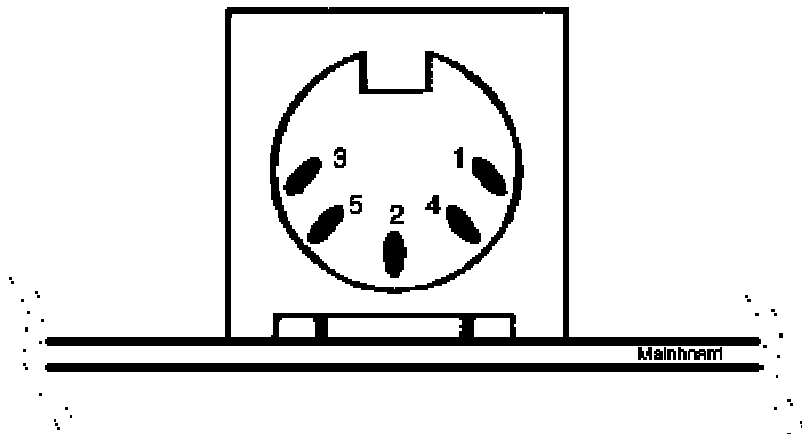
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1. Keyboard (DIN Connector)

keyboard connector on the mainboard



Simplified drawing, view upon:

Socket



Plug



Pin	Function
1	Keyboard Clock
2	Keyboard Data
3	N.C.
4	GND
5	+5 Vcc

2. PS/2 Keyboard

Simplified drawing, view upon:

Socket	Plug
6 o 5	5 o 6
4 3	3 4
2 1	1 2

Please note, that the counting of these connector pins may be different in some cases!

Pin	Function
1	Keyboard Data
2	N.C.
3	GND
4	+5 Vcc
5	Keyboard Clock
6	N.C.

3. Mouse

The theme "mouse at the PC" is very complicated. First you have to observe that there are many different types of mice available. There is the serial mouse (with 9pin or 25pin D-Sub connector, which by now is hard to find anymore), there is the PS/2 mouse and combined mice, which can be differentiated by the expression "PS/2 - Serial Mouse" and the fact that an adapter is supplied (Mini-DIN to 9pin D-Sub). Finally there are USB mice and combined USB/PS2 mice which again have a supplied adapter USB to PS2. The transmission protocols of the serial, PS/2 and USB mice and the electrical features of these interfaces are very different! For combined mice the interface and protocol is internally switched to the appropriate version after detecting the interface. Older mice may have a little switch for this! But pay attention, there are mice which have a switch to select between the "Microsoft" and "Mouse Systems" serial protocol. It is important to use the supplied mouse driver of the manufacturer to achieve the correct functionality. If you are lucky the operating system will automatically detect the mouse correctly and use a suitable standard driver.

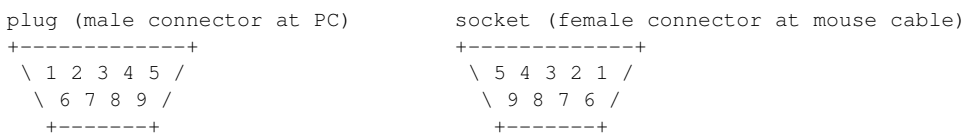
Make sure that you know what kind of mouse you have or need. Mismatches can even damage your mouse or PC. In any case use the adapter and driver which was supplied by the manufacturer.

In spite of the complexity of the issue some pin assignments of important mouse types will be given here. Here is also a good description of how mice work.

3.1. Serial Mouse with 9 pin D-Sub Female Connector

The 9pin D-SUB mouse connector has the female socket on the mouse cable. At the PC you have to use the normal male connector of the serial RS232 interface. For mice with a 25pin connector the 9pin to 25pin adaptor of the RS232 interface can be used. Since this version is not sold any more the pin assignment is not mentioned here.

Simplified drawing, view upon:



Pin	Function
2	Mouse Data
3	Clock
5	GND
7	VCC +5V

3.2. PS/2 Mouse

Simplified drawing, view upon:



Please note, that the counting of these connector pins may be different in some cases!

Pin	Function
1	Mouse Data
2	N.C.
3	GND
4	+5V
5	Clock
6	N.C.

3.3. PS/2 to 9pin D-Sub Mouse Adapter

Please observe that obviously every mouse manufacturer uses an own pin assignment and therefore supplies an own adapter. Usually the assignment is different than what would be expected for the serial RS232 interface, as e.g. the RX input for the mouse data, like it is usual for a normal serial mouse. Just some random signal pins may be used. The evaluation of the signals is done by the driver. Therefore the assignment is not standardized, but depends on the manufacturer. With other words, it only works if the mouse, the adapter and the driver are matching. In spite of this some widely used assignments are given here. Because of the already explained reasons it is even not possible to give signal names to the pins.

Adapter which should be working for A4tech mice:

PS2 Plug	D-Sub 9pin
1	1
3	3 + 9
4	5 + 2
5	6

The counting of the pins is like shown above!

Adapter which should be working for Logitech mice:

PS2 Plug	D-Sub 9pin
1	4
2	2
3	5 + 6
4	8
5	7
6	3

The counting of the pins is like shown above!

4. Graphic Adapters

4.1. Monochrome Adapter 9pin D-Sub

Pin	Signal
1	GND
2	GND
3	N.C.
4	N.C.
5	N.C.
6	+INTENSITY
7	+VIDEO
8	+HORIZ SYNC
9	-VERT SYNC

4.2. CGA (Color Graphics Adapter) Connector 9pin D-Sub

Pin	Signal
1	GND
2	GND
3	RED
4	GREEN
5	BLUE
6	INTENSITY
7	not used
8	HORIZ SYNC
9	VERT SYNC

4.3. EGA (ENHANCED GRAPHICS ADAPTER) Video Connector (9pin D-Sub)

Pin	Signal
1	GND
2	SECONDARY RED
3	RED
4	GREEN
5	BLUE
6	SECONDARY GREEN/INTENSITY
7	SECONDARY BLUE/MONO VIDEO
8	HORIZ RETRACE
9	VERT RETRACE

4.4. VGA (Virtual Graphic Array) Connector

Stecker: 15-Pin High Density D-Sub female connector (socket). The cable has a male connector (plug).

Pin	Signal
1	Red Video ¹
2	Green Video ¹
3	Blue Video ¹
4	Monitor ID Bit2 (not used)
5	GND
6	Red Return (GND)
7	Green Return (GND)
8	Blue Return (GND)
9	Key (no pin in the plug!)
10	Sync Return (GND)
11	Monitor ID Bit0(not used)
12	Monitor ID Bit1 ²
13	Horizontal Sync
14	Vertical Sync
15	N.C.

¹ Analog monochrome monitors only use the green video input. Red and blue are not used.

² Monochrome monitors set pin 12 to ground (GND). Color monitors leave pin 12 unconnected. The graphic adapter uses this signal to detect the type of monitor which is connected.

4.5. 9pin D-Sub to 15pin D-Sub Adapter

Older systems (monitors and graphic adapters) had 9pin D-Sub inputs and outputs. With this adapter they can be adapted to the newer high density 15pin D-Sub connector.

9pin D-Sub Signal	Pin	15pin D-Sub Signal	Pin
Red	1	Red	1
Green	2	Green	2
Blue	3	Blue	3
Horz. Sync	4	Horz. Sync	13
Vert. Sync	5	Vert. Sync	14
Red GND	6	Return Red	6
Green GND	7	Return Green	7
Blue GND	8	Return Blue	8
Sync GND	9	Digital Ground	10
		Ground	5

Analog video signals have the following voltage levels:

Dark = 0V

Full color intensity = +0.7V

5. Power Connectors

Often the question turned up if there is an adapter to supply older mainboards with an ATX power supply, or if there is an adapter to supply new mainboards with old AT power supplies. **Both is either very problematic or simply not possible!**

Old board with a new ATX power supply

In theory this would be possible, because the ATX power supply has all voltages, which are needed by the old AT mainboard. However, problematic is that the ATX power supplies only start up if the PWR-ON signal is set by the mainboard. This signal is not generated by an old mainboard. I.e. at this point you would need an additional circuit to generate it, which makes it impossible for most people. A second problem could occur by the fact that a big part of the power which an ATX power supply generates is on the 3.3V output. Therefore the 5V supply for these power supplies is designed much weaker. An old system does not need the 3.3V supply but uses a lot on the 5V supply. In some cases this can lead to problems.

New board with an old AT power supply

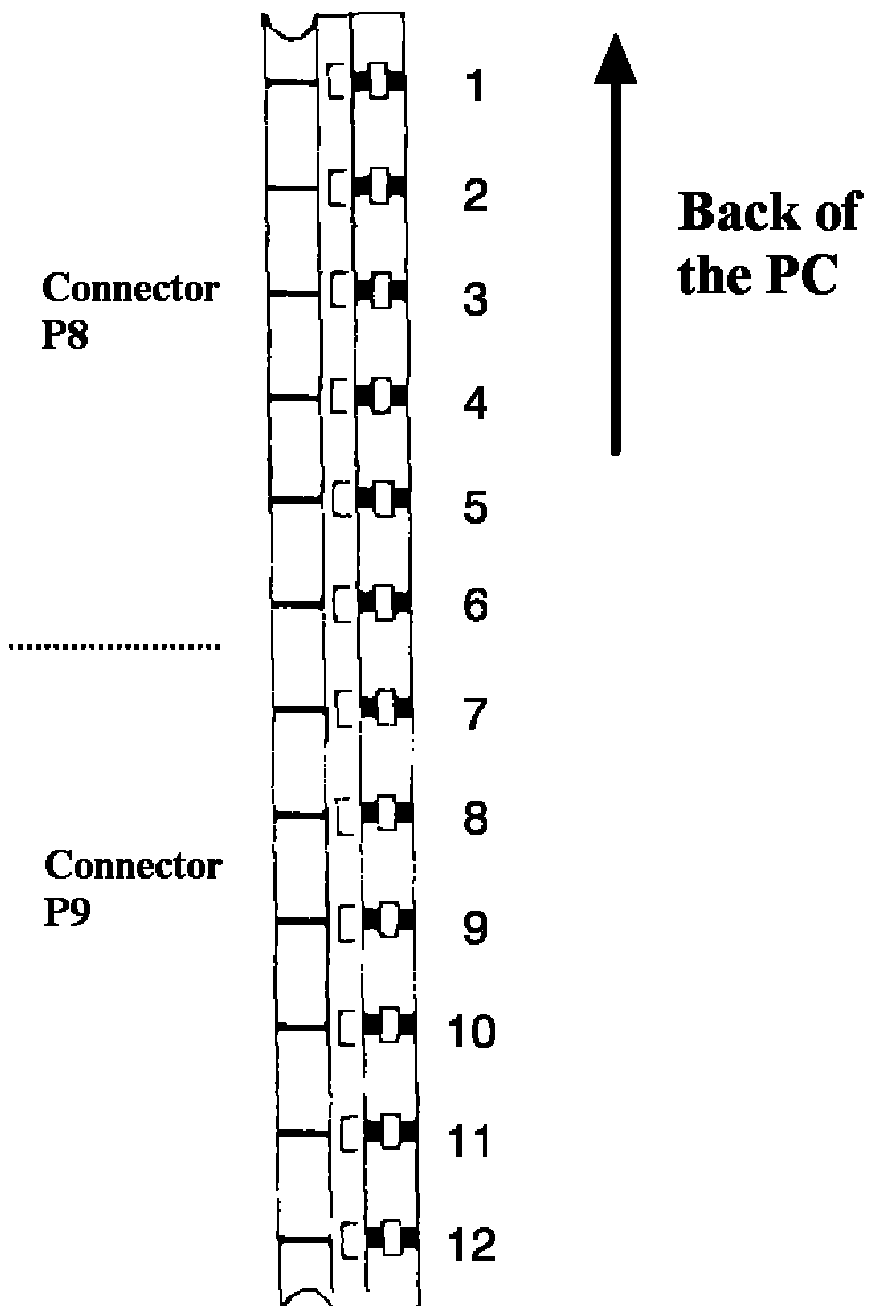
This combination is not possible. The new board needs a 3.3V supply which an old AT power supply is not able to supply. An adapter would have to include a voltage converter from 5V to 3.3V.

Conclusion

Somebody with enough knowledge of electronics could find a solution. This would mean a lot of effort and some danger for the mainboard. **A commercial solution is not available, for none of the cases!**

5.1. AT Mainboard Connector

AT - Mainboard Power Connectors



Mainboard PIN	Power Cable PIN	Power Cable Color	AT Mainboard Assignment
1	P8 - 1	Orange	PWR Good
2	P8 - 2	Red	+5V
3	P8 - 3	Yellow	+12V
4	P8 - 4	Blue	-12V
5	P8 - 5	Black	gnd
6	P8 - 6	Black	gnd
7	P9 - 1	Black	gnd
8	P9 - 2	Black	gnd
9	P9 - 3	White	-5V
10	P9 - 4	Red	+5V
11	P9 - 5	Red	+5V
12	P9 - 6	Red	+5V

Type of power connectors: P8 und P9, 6-pin Molex

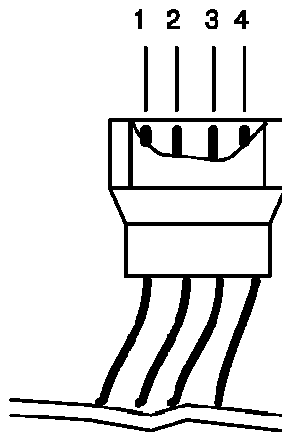
5.2. ATX Mainboard Connector

Pin	Assignment
1*	3.3V
2	3.3V
3	GND
4	+5V
5	GND
6	+5V
7	GND
8	PW-OK
9	5VSB
10	+12V
11	3.3V
12	-12V
13*	GND
14*	PS-ON
15	GND
16	GND
17	GND
18	-5V
19	+5V
20	+5V

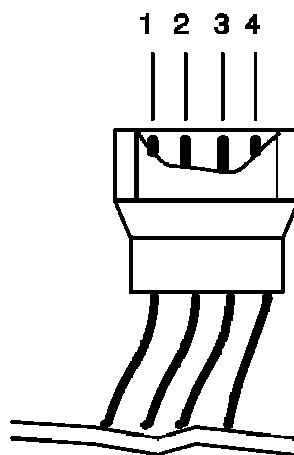
* The power supply ON/OFF functions are contacted through the mainboard power plug to the power supply. These are pins 1, 13 and 14 for: 3.3V, GND and the PS-ON signal. To switch the powersupply on, e.g. if you want to test it or use it for non-PC purposes, you have to connect a shortage between PS-ON (pin 14) and GND (e.g. pin 13). The colors of the power wires are the same as for the AT mainboard. Red = +5V, White = -5V, Yellow = +12V, Blue = -12V, Black = GND

5.3. Standard Drive Connector

View upon the connector from the power supply



View upon the connector from the power supply

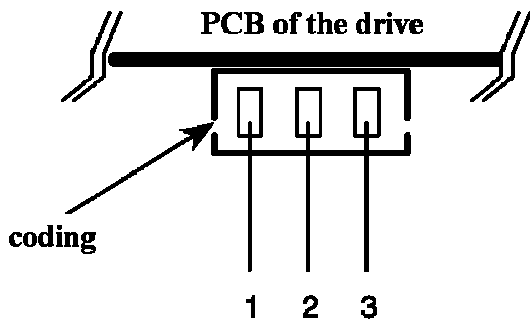


Connector - PIN	Power Cable - Color	Function
1	Red	+5V
2	Black	GND
3	Black	GND
4	Yellow	+12V

Connector: 4-pin Molex, standard connector for all normal hard disks, floppy disks, CD-ROMs, Tape Drives, etc.

5.4. 3-Pin Mini Connector

3-pin DC power connector for hard disks or other drives

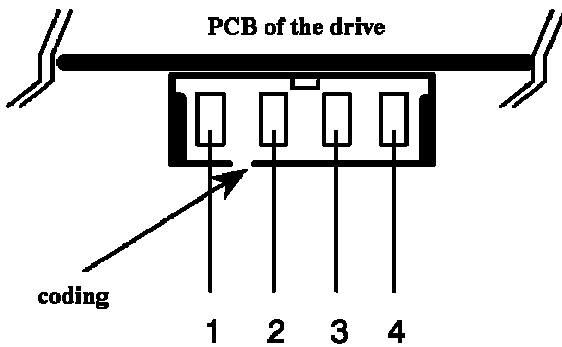


View upon the connector at the hard disk

PIN	Cable Color	Function
1	Red	+5V
2	Yellow	+12V
3	Black	GND

5.5. 4-Pin Mini Connector

4-pin DC power connector for floppy disk drives, etc.



view upon the power connector of the drive

PIN	Cable Color	Function
1	Red	+5V
2	Black	GND
3	Black	GND
4	Yellow	+12V

6. MIDI Inputs and Outputs (5pin)

MIDI Input Pin	Signal	MIDI Output Pin	Signal
1	N/C	1	N/C
2	N/C	2	GND
3	N/C	3	N/C
4	Current Src	4	Current Sink
5	Current Sink	5	Current Src

7. USB Plug

Pin	Signal
A1	Vcc
A2	Port0 data-
A3	Port0 data+
A4	Gnd
B1	Vcc
B2	Port1 data-
B3	Port1 data+
B4	Gnd

8. Network Cables 10MBit/100MBit

Crossover cable for the direct connection from network card to network card without hub, e.g. for a peer to peer network of 2 PCs.

Signal	RJ45 Pin		Signal	RJ45 Pin
TD+	1	<---->	3	RD+
TD-	2	<---->	6	RD-
RD+	3	<---->	1	TD+
RD-	6	<---->	2	TD-

You have to observe, that the wires of the wire pairs TD+ / TD- and RD+ / RD- are twisted with each other. jeweils verdreht sind. It is recommended to use a proper CAT. 5 cable.

For a 100MBit full duplex connection without hub you can use the following cable. Here also the wires of the wire pairs have to be twisted, or a CAT 5 cable has to be used.

Signal	RJ45 Pin		Signal	RJ45 Pin
TX_D1+	1	<---->	RX_D2+	3
TX_D1-	2	<---->	RX_D2-	6
RX_D2+	3	<---->	TX_D1+	1
BI_D3+	4	<---->	BI_D4+	7
BI_D3-	5	<---->	BI_D4-	8
RX_D2-	6	<---->	TX_D1-	2
BI_D4+	7	<---->	BI_D3+	4
BI_D4-	8	<---->	BI_D3-	5