

RS-232 Cables and Connections

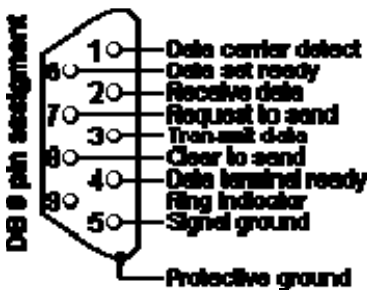
Mark E. Donaldson

RS-232 Connector Pin Assignment

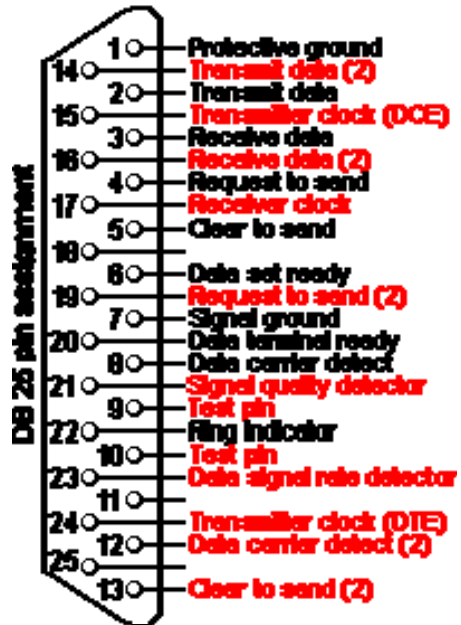
The RS-232 connector was originally developed to use 25 pins. In this pin-out, provisions were made for a secondary communication channel. In practice, only one communication channel with accompanying handshaking is present. For that reason the smaller 9 pin version is more commonly used today. The diagrams show the signals common to both connector types in black. The signals only present on the larger connector are shown in red. Note, that the protective ground is assigned to a pin at the large connector where the connector outside is used for that purpose with the DB9 version.

The pin assignment is also shown for the DEC modified modular jack. Although this interface is differential (the receive and transmit have their own floating ground level) it is possible to connect RS-232 compatible devices with this interface.

RS-232 DB 9 Pin Assignment



RS-232 DB 25 Pin Assignment



DEC MMJ pin assignment



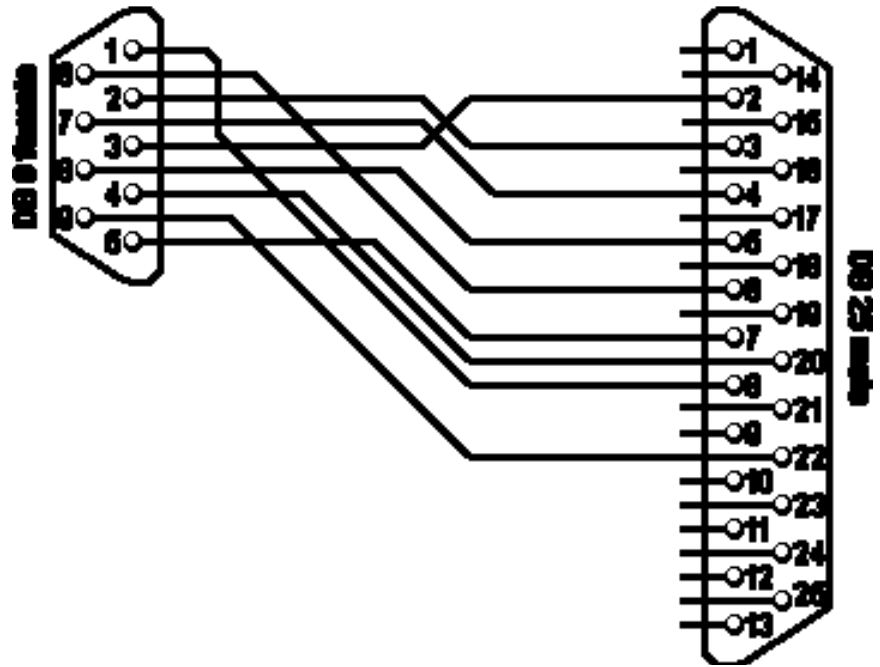
DB9 to DB25 Converter

The original pin layout for RS-232 was developed for a 25 pins sub D connector. Since the IBM-AT, 9 pins connectors are commonly used. In mixed applications, a 9 to 25 pins converter can be used to connect connectors of different sizes.

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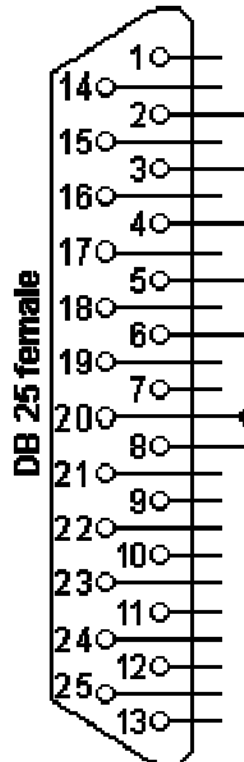
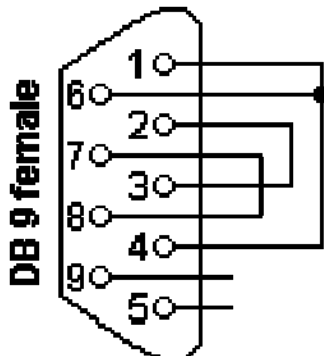
RS-232 DB9 to DB25 Converter



RS-232 Loopback Test Plug

The following connectors can be used to test a serial port on your computer. The data and handshake lines have been linked. In this way all data will be sent back immediately. The PC controls its own handshaking. The first one can be used to check the function of the serial port with standard terminal software. The second version can be used to test the full functionality of the serial port with Norton Diagnostics or CheckIt.

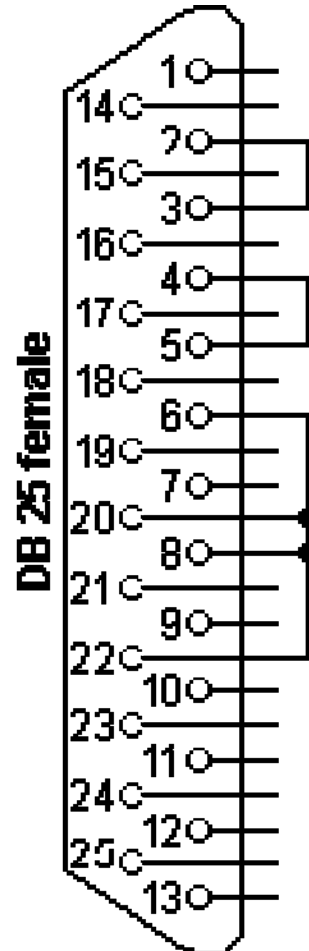
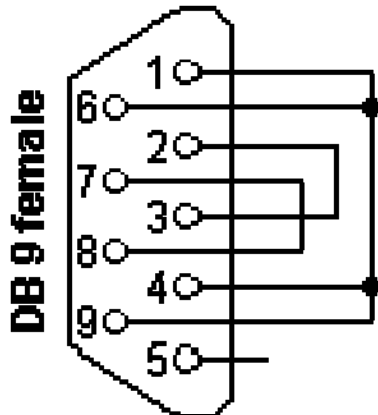
RS-232 Loopback Test Plug for Terminal Emulation Software



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RS-232 Loopback Test Plug For Norton Diagnostics And Checkit



RS-232 Null Modem Cables

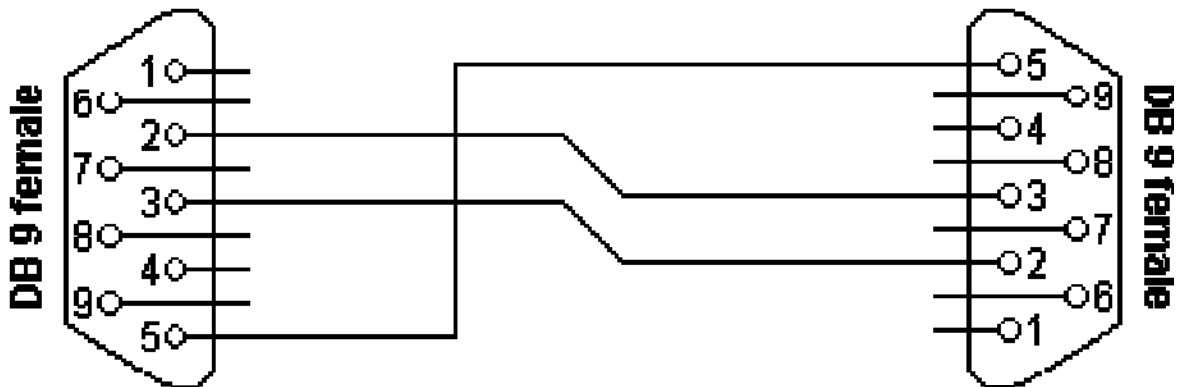
The easiest way to connect two PC's is using a null modem cable. The only problem is the large variety of null-modem cables available. For simple connections, a three line cable connecting the signal ground and receive and transmit lines is sufficient. Depending of the software used, some sort of handshaking may however be necessary. Use the selection table to find the right cable for each purpose. For a Windows 95/98 Direct Cable Connection, the null modem cable with loop back handshaking is a good choice.

Null modem cables with handshaking can be defined in numerous ways, with loopback handshaking to each PC, or complete handshaking between the two systems. The most common cable types are shown here.

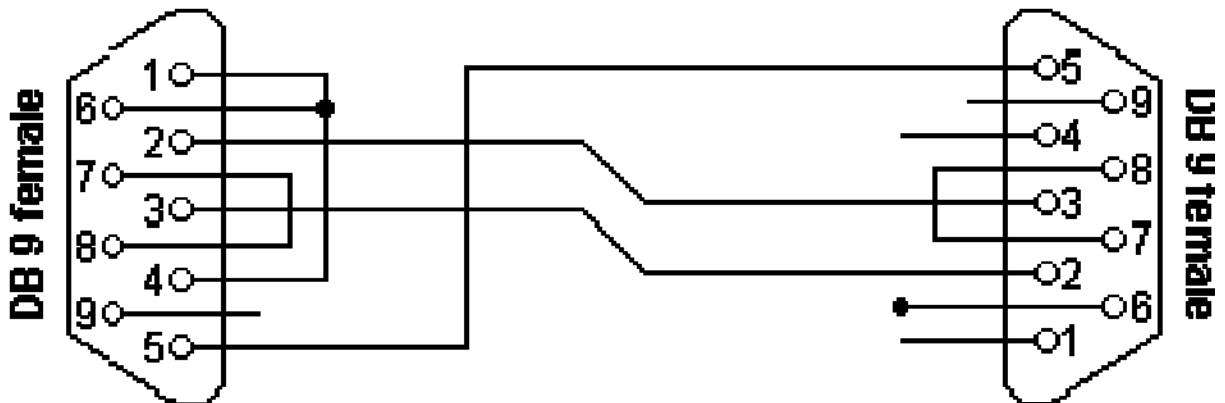
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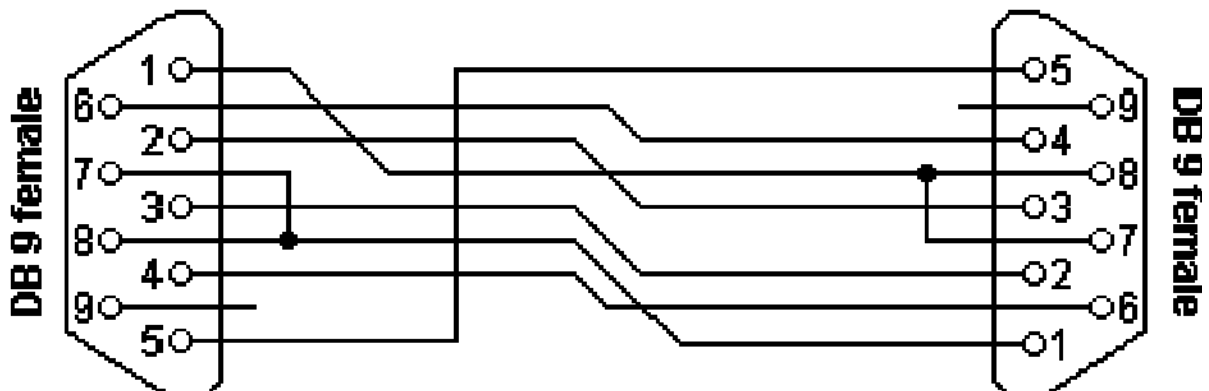
Simple Null Modem Without Handshaking



Null Modem With Loop Back Handshaking



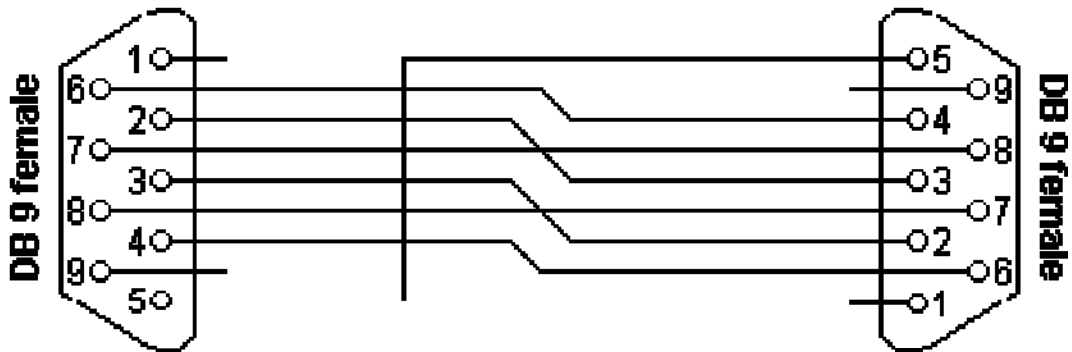
Null Modem With Partial Handshaking



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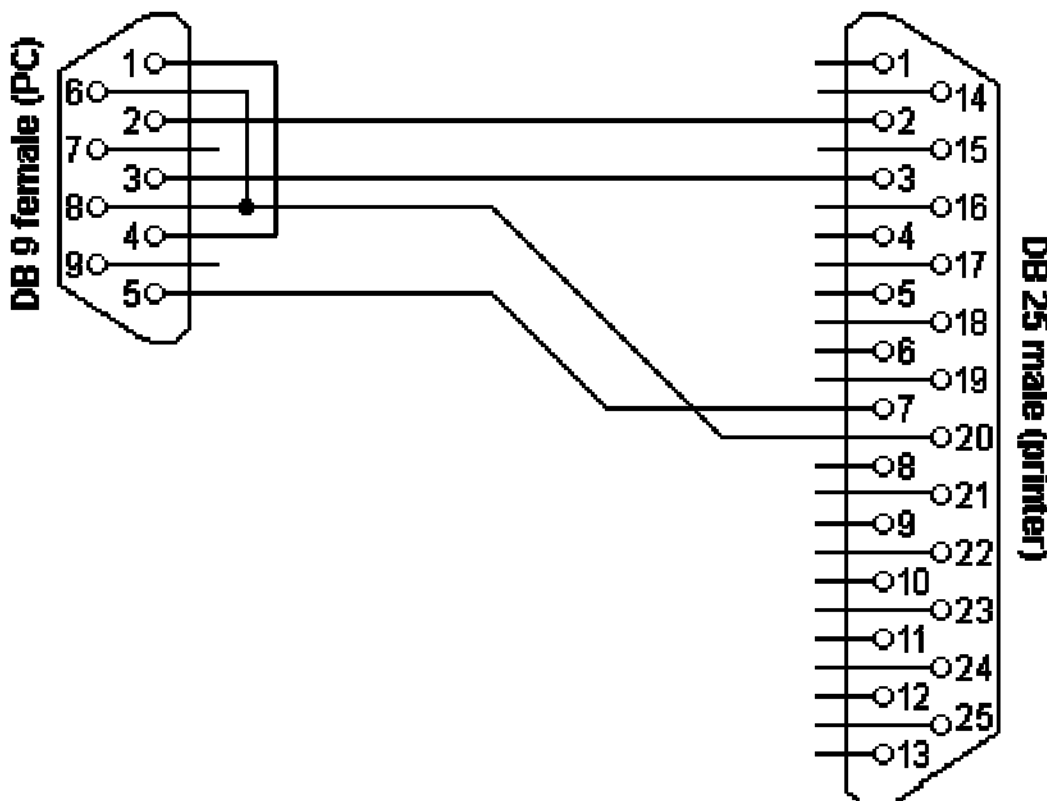
Null Modem With Full Handshaking



RS-232 printer cable

When a serial printer is connected to a PC, the handshaking is not symmetrical any more. In that case a cable is used where some handshaking lines at the PC side are looped back. On the printer side only the data lines and one handshaking line are used.

RS-232 Printer Cable



RS-232 Monitor Cable

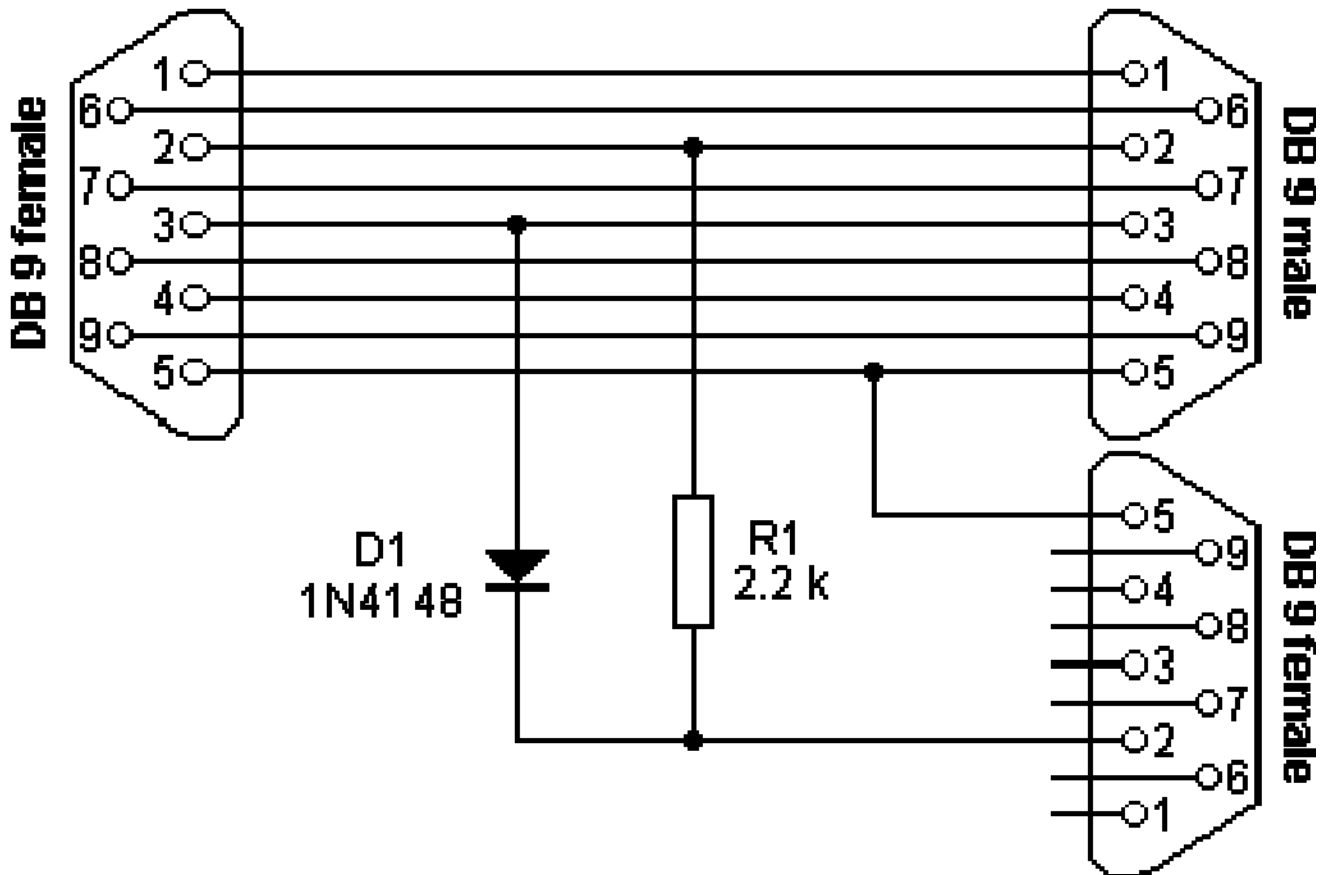
It is not difficult to monitor the serial communication between two devices with a PC. To do this you need the monitor cable which is displayed in the next picture. Two sockets are connected straight through. The PC is connected to the third one.

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This monitor cable taps communication from both sides. This means that if the two devices happen to talk simultaneously, the monitored information will be garbage. In most circumstances communication software works half duplex, in which case this problem does not exist.

RS-232 Monitor Cable



DEC MMJ Serial Cables

Digital Equipment Corporation (now owned by Compaq) has been a leader in mainframe world for several years. For connection of their systems, they developed a connector system based on modular jacks. The main difference is the key which is not in the middle, but at one side. This makes it impossible to connect this type of cable to telephony or LAN networks erroneously.

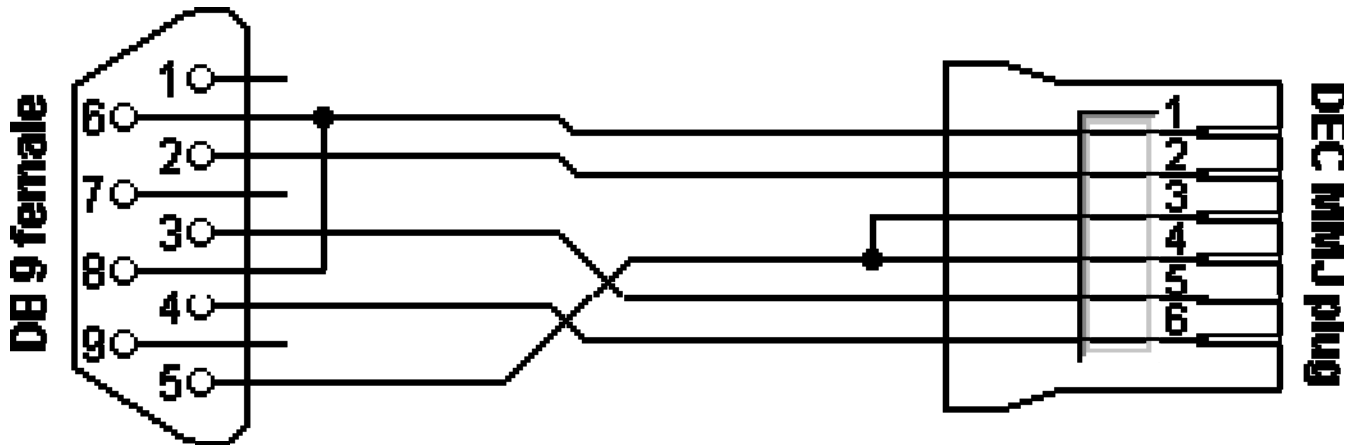
The six available leads were used for the main signals in serial communication. In fact, the MMJ signals are not RS-232 signals. The transmit and receive signals do not have a common ground, but they are mainly differential. By combining both minus leads and connecting them to the RS-232 signal ground at the other side, signals can in practice be exchanged with a normal RS-232 device.

Besides the transmit and receive lines, DTR and DSR signals are present for handshaking purposes. The following pictures show the various cables used for different situations.

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PC Serial Port to DEC Printer (H8571-J)



The cable shown here can be used to connect a DEC printer with serial MMJ connector to a normal PC. Note, that this cable has not completely the same wiring as the H8571-J adaptor. The difference is the connection between pin 6 and 8 at the PC side. This connects the printer DTR line to the PC CTS input. Some programs need this connection to prevent paper-out or printer off line messages.