RS232 Modem Eliminator Cables

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NOTE: The following discussion describes the pin crossover process necessary to produce a cable type modem eliminator. There are also electronic devices called modem eliminators. These devices do not necessarily perform the same function as a modem eliminator cable.

NOTE: For reasons specific to their applications, some interfaces use other pins than those we discuss here. You should be aware that there are a lot of different pin configurations out there.

Modem eliminator cables are designed to rectify the problems that occur when two RS232 DTEs are connected directly, without intervening DCEs.DTETb

RS232 was originally designed for DTE to DCE communications.

DTE to DCE cable connections are pin to pin (pin 1 of the DTE is connected straight through to pin 1 on the DCE, 2 to 2, etc.).

However, most devices (except modems) installed locally (e.g., personal computers and printers in the same room) are DTEs, and DTEs won't communicate when connected by a straight through cable.

Here is one reason why: Data Terminal Ready (pin 20) (which tells the DCE that the DTE is online) is an output from the DTE and an input to the DCE. If two DTEs were connected with a straight through cable, the DTR output from the first DTE would go straight to the DTR output of the second DTE. Besides not working, this could also cause problems in the interface electronics.

Similarly, Data Set Ready (pin 6) is an output from the DCE and an input for the DTE. If two DTEs are trying to communicate with a straight through cable, the DSR input from the first DTE would go to the DSR input of the second DTE. Connected like this, neither DTE would output a signal onto the pin, so neither would know if its connected device was online.

Other pins cause similar problems in straight-through DTE connections.

So you can see that the RS232 interfaces of two DTEs are not compatible if connected with a straight-through cable and no intervening DCEs.

A modem eliminator cable simply jumpers signals from the pins of one DTE connector to compatible pins on the other, so that each DTE interface thinks

it's talking to a DCE interface. Let's look at a typical signal exchange below.

1. DTE #1 raises DTR on pin 20. The modem eliminator jumpers DTR from pin 20 of DTE #1's connector (a DTE output) to DSR on pin 6 of DTE #2's connector (a DTE input).

We'll assume that DTE #2 was already on, so DTR on pin 20 of its connector was already active and DTE #2 is expecting a DSR from its DCE. DTE #2 sees the DTR from DTE #1 as the expected DSR.

The modem eliminator also jumpers DTR from pin 20 of DTE #2 to pin 6 of DTE #1 so that DTE #1 believes that its DCE is on-line too.

2. The modem eliminator routes TD (Transmit Data) from pin 2 (a DTE output) of each DTE to the opposite connector's RD (Receive Data) on pin 3 (a DTE input).

3. When a DTE wants to transmit, it simply shifts data out onto TD (pin 2) of its connector.

The modem eliminator cable routes the data to the RD on pin 3 of the destination DTE. Of course, in basic full duplex both DTEs may do this at the same time without the need for any other control signals.

HALF DUPLEX

In Half Duplex communications, Request to Send (pin 4), Clear to Send (pin 5), and Data Carrier Detect (properly called Received Line Signal Detect, pin 8) are required to control the direction of transmission. Some modem eliminators have these pins jumpered as well to accomodate local connection of "Half Duplex" DTE devices.

NOTE: When troubleshooting an RS-232 problem, it is always a good idea to check the connectors on the DTE and DCE to find out which signal pins are used. Then read the documentation to determine how they are being used. If it turns out that pins are connected but not used by the device, then those pins should be disconnected.

Apple RS232 Modem Eliminator Cable Pinout

PC DB9	Printer DB25
1	4
2	2
3	3
4	5&6
5	7
6&8	20
7	8
9	NC

PC DB25	Printer DB25
1	1
2	3
3	2
4	5
5	4
6	8&20
7	7
8&20	6

PC DB 25	Printer DB9 (LW Pro)
1	5
2	2
3	3
4	8
5	7
6	1&4
7	5
8&20	6

PC DB9	Printer DB9
1&4	6
2	3
3	2
5	5
6	1&4
7	8
8	7

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