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RS-232: DTEs, DCEs and Pin Signal Sequences

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NOTE: Throughout this discussion acronyms will be used in place of full names. Since all knowledgeable data communications personnel use these acronyms, you should practice using them.

DTE and DCE

According to the RS-232 standard, all devices involved in data communications can be classified into two groups:

DTE - Data Terminal Equipment: those devices that originate the data or are its final destination. Examples would be computers, printers, tape drives, etc.

DCE - Data Communications Equipment: those devices whose function it is to communicate the data between the DTEs. Examples would be modems, data multiplexers, and digital service units.

The RS-232 cabling between a DTE and a DCE is straight through. That is, pin 1 from the male DTE connector goes to pin 1 on the female DCE connector, pin 2 goes to pin 2, and so on. If a pin is an output for a DTE, then it is an input for a DCE (and vice versa).

RS-232 PIN GROUPS (three main groups)

1. CONTROL pins carry signals that indicate and control the state of the DTE/DCE interface.
2. DATA pins carry data signals.
3. CLOCK pins carry the clock signals necessary for synchronous data communications.

Because Half Duplex has to control line direction, it requires more RS-232 pins. The following is the sequence of RS-232 signals which are usually used for Half Duplex.

HALF DUPLEX SIGNAL SEQUENCE

Sequence	Pin	Full Signal Name	Output From	Input To
(1)	20	Data Terminal Ready (DTR)	DTEs	DCEs
(2)	6	Data Set Ready (DSR)	DCEs	DTEs
(3)	4	Request to Send (RTS)	Tx DTE	Tx DCE
(4)	8	Rx'd Line Sig Detect (DCD)	Rx DCE	Rx DTE
(5)	5	Clear to Send (CTS)	Tx DCE	Tx DTE
(6)	2	Tx Data (TD)	Tx DTE	Tx DCE
(7)	3	Receive Data (RD)	Rx DCE	Rx DTE
Constant	7	Signal Ground (SG)	n/a	n/a

Fortunately, most Apple products use Full Duplex and so require fewer pins. The following is the sequence of RS-232 signals which are often used for Full Duplex.

FULL DUPLEX SIGNAL SEQUENCE

Sequence	Pin	Full Signal Name	Output From	Input To
(1)	20	Data Terminal Ready	DTEs	DCEs
(2)	6	Data Set Ready	DCEs	DTEs
(3)	2	Tx Data	Tx DTE	Tx DCE
(3)	3	Receive Data	Rx DCE	Rx DTE
Constant	7	Signal Ground	n/a	n/a

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