RS232 Quick Guide

TIA/EIA-232-F Standard

RS232 conveys data over a simple unterminated, multiconductor cable at rates up to 20kB. The RS232 standard specifies the electrical characteristics and connector for an all encompassing point-to-point modem interface. Although the original specification was intended for modems, subsequent renderings shed unneeded signals to expand its scope and use as a general purpose serial interface at data rates up to 1MB.

Specification		RS232
Mode of Operation		Single-Ended
Number of Drivers and Receivers Allowed on One Line		1 Driver, 1 Receiver
Maximum Cable Length		50 Feet*
Maximum Data Rate		20kB/s
Maximum Voltage Applied to Driver Output		±25V
Driver Output Signal	Minimum Loaded	±5V
	Maximum Unloaded	±15V
Termination		3kΩ to 7kΩ
Output Slew Rate		30V/µs (Max)
Receiver Input Voltage Range		±25V Max
Receiver Input Sensitivity		±3V
Receiver Input Resistance		3kΩ to 7kΩ

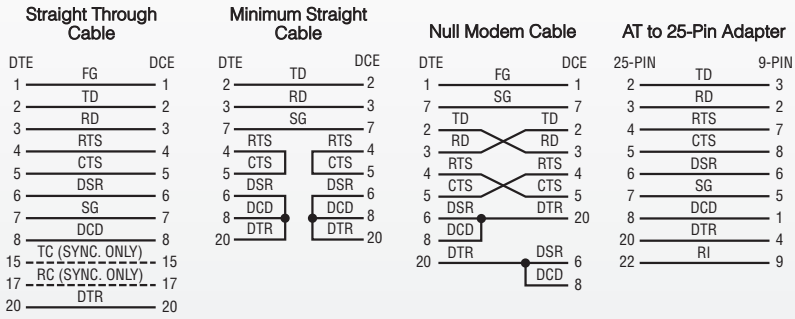
* For 2500pF cable capacitance, as per IEA 232D for data rates less than 20k baud. For data rates greater than 20k baud, C_{LOAD} = 1000pF.

Signal Pinout

DB25	DB9	Name	ABBR.	DTE ⇔ DCE
1		Frame Ground	FG	
2	3	Transmit Data	TD	⇒
3	2	Receive Data	RD	⇐
4	7	Request to Send	RTS	⇒
5	8	Clear to Send	CTS	⇐
6	6	Data Set Ready	DSR	⇐
7	5	Signal Ground	SG	
8	1	Data Carrier Detect	DCD	⇐
9		(Reserved)		
10		(Reserved)		
11		Unassigned		
12		Sec. Carrier Detect	(S) CD	⇐
13		Sec. Clear to Send	(S) CTS	⇐
14		Sec. Transmit Data	(S) TD	⇒
15		Transmitter Clock	TC	⇐
16		Sec. Receive Data	(S) RD	⇐
17		Receiver Clock	RC	⇐
18		Local Loopback		⇒
19		Sec. Request to Send	(S) RTS	⇒
20	4	Data Terminal Ready	DTR	⇒
21		Remote Loopback		⇒
		Signal Quality Detect	SQ	⇐
22	9	Ring Indicator	RI	⇐
23		Data Rate Select		
24		Transmitter Clock	(E) TC	⇒
25		Test Mode		⇐

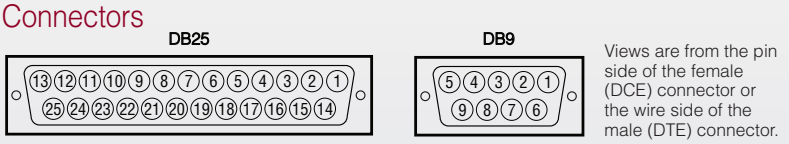
- The DTE ⇔ DCE column indicates data direction.
- Pin numbers in bold indicate commonly used signals.
- Data rate select (Pin 23) can be from DTE or DCE.

Cable and Adapters



A minimum null modem cable is the same as a minimum straight cable except that RD and TD (Pins 2 and 3) are cross-connected as in the null modem cable.

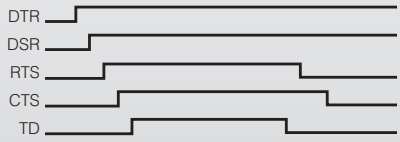
Connectors



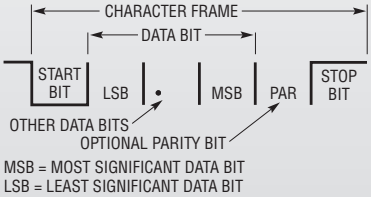
Views are from the pin side of the female (DCE) connector or the wire side of the male (DTE) connector.

Relative Signal Timing

Normal timing sequences during establishment of communications are shown below. On half-duplex circuits, RTS is dropped as soon as the data is sent. This is to signal a turnaround of the circuit.



Character Frame



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