RS232: The “Serial Port”

Part 10a of
“Electronics and Telecommunications”
A Fairfield University E-Course
Powered by LearnLinc

Module: Digital Systems (in two parts)

- Texts:
  - "Computers," Capron, Benjamin Cummings, 1996, ISBN 0-10053-0662-5
  - "Telecommunications," Blyth, McGraw-Hill, 1990, ISBN 0-02-61001041-2
  - "Understanding Telephone Electronics," Bigelow, Newnes, 1997, ISBN 0-7506-9944
- References:
  - Electronics Tutorial (Thanks to Alex Pounds)
  - Electronics Tutorial (Thanks to Mark Sokos)
- Part 9 – Computers
  - 5 on-line sessions plus one lab
- Part 10 – Digital Communications
  - 5 on-line sessions plus one lab
- Mastery Test part 5 follows this Module

Digital Systems: Topics

- Computer Architecture
  - Memory: ROM, RAM, Cache, Error Checking
  - CPU and Program Control
  - Secondary Storage: Floppy, Hard Drive, CD / DVD
  - I/O (Human: Video, Keyboard, & Pointer)
- Digital I/O: Serial, Parallel, IDE, USB. FireWire, SCSI

Part 9

- Serial I/O: RS232
- Modems
  - Telephone: Modulation and Data compression
  - Cable and DSL
- Telephony Digital Transmission
- Packet Transmission
- Fiber Optics: SONET

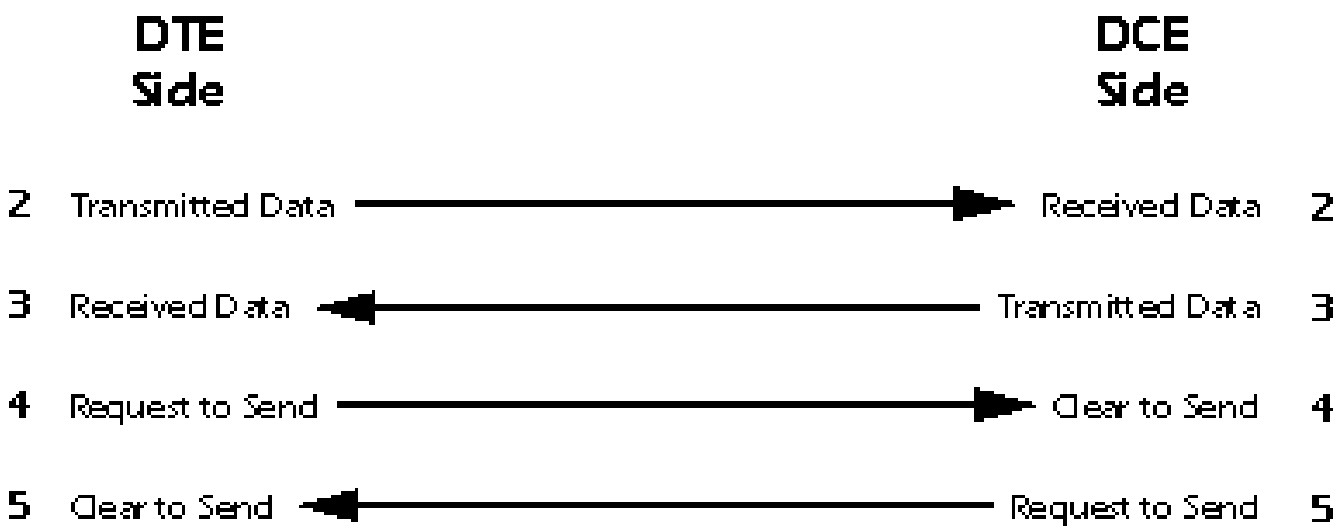
Part 10

Section 10 Schedule

Session 10a	**06/30**	**RS 232**	**Bigelow: 285-290; Blythe: 162-170**
Session 10b	07/02	Telephone Modems	Bigelow: 290-307; Blythe: 170-176
Session 10c No class 7/14, 7/16	07/07	Modems 2: DSL, Cable, Fax & 56K	Bigelow: 307-321; Notes
Session 10d	07/09	T-Carrier	Bigelow: 198-210
Session 10e	07/21	Packets & SONET	Bigelow: 308-309; Notes
Session 10f (Quiz 10 due 07/27) (Lab - 07/26, Sat.)	07/23	Review for Quiz 10	
Session 10g	07/28	Quiz 10 Results	
Session 10h No Class 8/4, 8/6	07/30	MT 5 Q&A	
Session 10i	08/13	MT 5 Q&A 2	If I'm back in time from Chicago
MT5 (Sat, Cheshire)	08/16	MT 5	
MT5 Results	08/18	MT 5 Results	

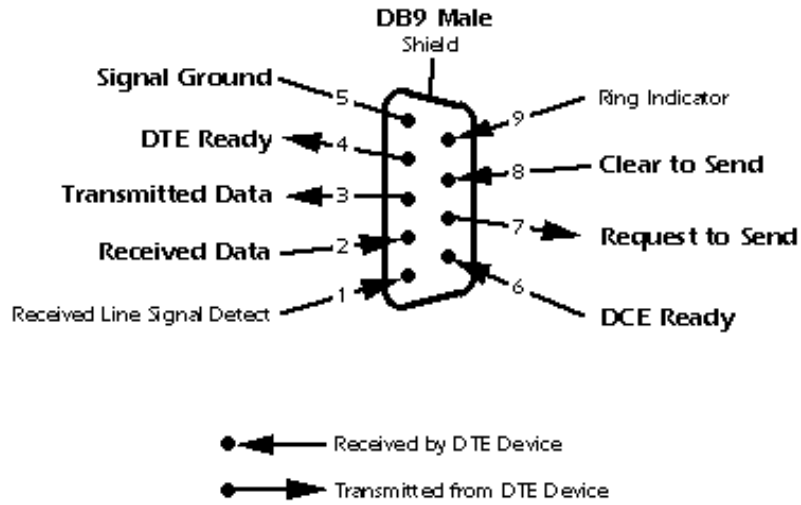
Data Sets and Data Terminals

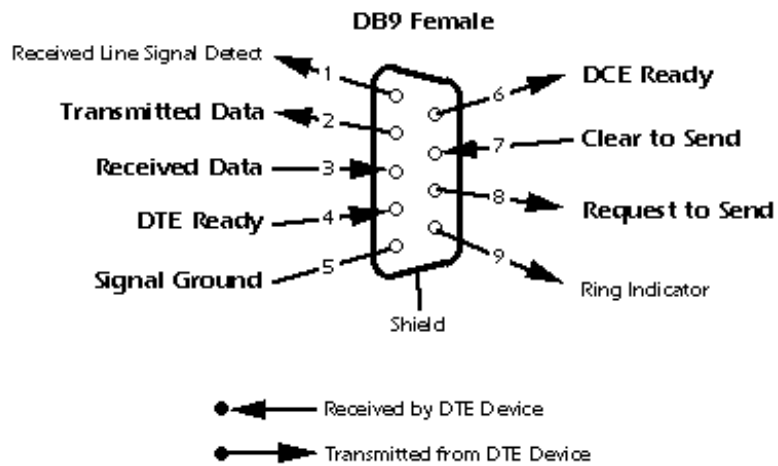
- DTE – Data Terminal Equipment
  - Computer (Your PC)
- DCS – Data Communications Equipment
  - Modem



DB 9 Connectors

- 9 pins: only the most used signals
  - CD (carrier detect)
  - RxD
  - TxD
  - DTE Ready
  - Ground
  - DCE Ready
  - RTS
  - CTS
  - RI





Transmitted Data (TxD)

- This signal is active when data is transmitted from the DTE device to the DCE device. When no data is transmitted, the signal is held in the mark condition (logic '1', negative voltage).

Received Data (RxD)

- This signal is active when the DTE device receives data from the DCE device. When no data is transmitted, the signal is held in the mark condition (logic '1', negative voltage).

Request to Send (RTS)

- This signal is asserted (logic '0', positive voltage) to prepare the DCE device for accepting transmitted data from the DTE device. Such preparation might include enabling the receive circuits, or setting up the channel direction in half-duplex applications. When the DCE is ready, it acknowledges by asserting Clear to Send.

Clear to Send (CTS)

- This signal is asserted (logic '0', positive voltage) by the DCE device to inform the DTE device that transmission may begin. RTS and CTS are commonly used as handshaking signals to moderate the flow of data into the DCE device.

DCE Ready (DSR)

- When originating from a modem, this signal is asserted (logic '0', positive voltage) when the following three conditions are all satisfied:
  - The modem is connected to an active telephone line that is "off-hook";
  - The modem is in data mode, not voice or dialing mode; and
  - The modem has completed dialing or call setup functions and is generating an answer tone.
- If the line goes "off-hook", a fault condition is detected, or a voice connection is established, the DCE Ready signal is deasserted (logic '1', negative voltage).

DTE Ready (DTR)

- This signal is asserted (logic '0', positive voltage) by the DTE device when it wishes to open a communications channel. If the DCE device is a modem, the assertion of DTE Ready prepares the modem to be connected to the telephone circuit, and, once connected, maintains the connection.
- When DTE Ready is deasserted (logic '1', negative voltage), the modem is switched to "on-hook" to terminate the connection.

Received Line Signal Detector (also called carrier detect **CD)**

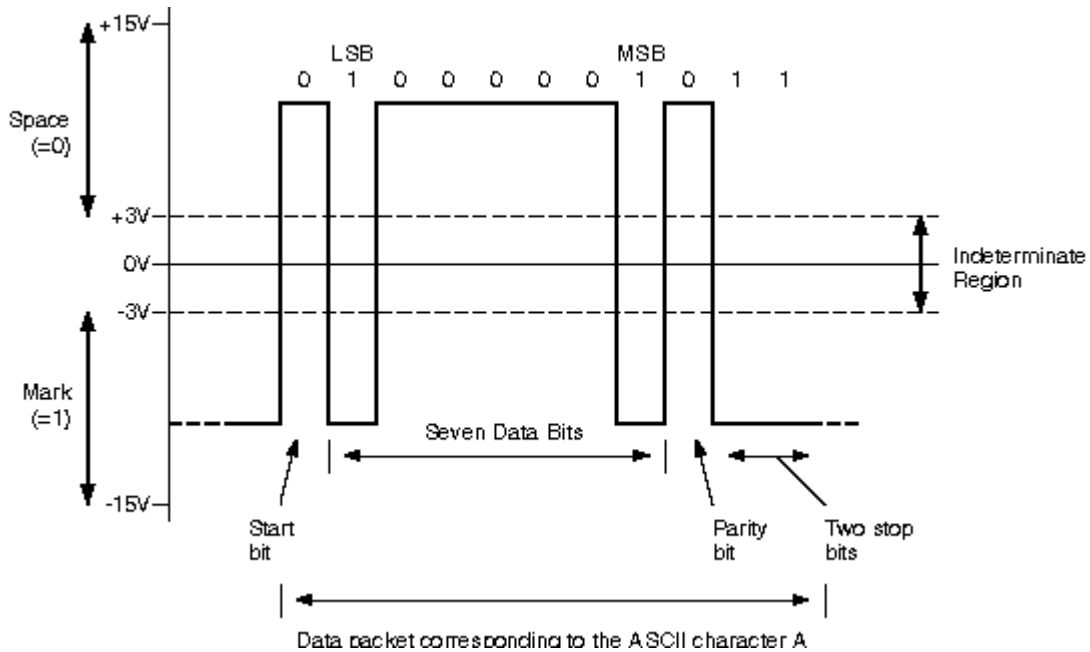
- This signal is relevant when the DCE device is a modem. It is asserted (logic '0', positive voltage) by the modem when the telephone line is "off-hook", a connection has been established, and an answer tone is being received from the remote modem.
- The signal is deasserted when no answer tone is being received, or when the answer tone is of inadequate quality to meet the local modem's requirements (perhaps due to a noisy channel).

Ring Indicator (RI)

- This signal is relevant when the DCE device is a modem, and is asserted (logic '0', positive voltage) when a ringing signal is being received from the telephone line. The assertion time of this signal will approximately equal the duration of the ring signal, and it will be deasserted between rings or when no ringing is present.

Asynchronous Data

- Data rate is approximate
- Data line often idle
- Start bit – 1 is sent to tell the other end that data is coming
- 8 bits plus “parity”
- At least two “stop bits” follow to let the far end get ready for the next “packet”



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