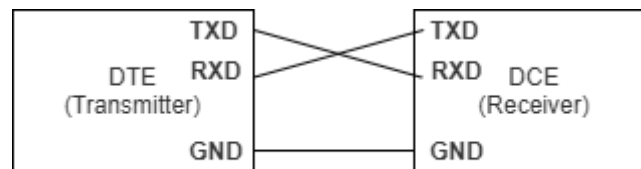




Mode 2 – Bi-directional data bus mode. In this mode only port A works, and port B can work either in mode 0 or mode 1. 6 bits port C are used as handshake signals. It also has interrupt handling capacity.

RS232

RS232 is an Interface and the protocol between DTE(data terminal equipment) and DCE(data communication equipment) using serial binary data exchange. Here C is used for the current version. *Universal Asynchronous Data Receiver & Transmitter (UART)*, attached in a motherboard, used in connection with RS232 for transmitting data to any serial device like modem or printer from its DTE interface.



RS232 PROTOCOL

Electrical Specifications :

1. Voltages:

There can be two states in the signal level of RS232C pins.

- **Mark state** – It is the high bit which is represented by binary 1 and have negative voltages. Its voltage limits for transmitting signal ranges from -5 to -15V. Its voltage limits for receiving signals ranges from -3 to -25V.
- **Space state** – It is the low bit which is represented by binary 0 and have positive voltages. Its voltage limits for transmitting signal ranges from +5 to +15V. Its voltage limits for receiving signals ranges from +3 to +25V.

2. Cables and Wires :

The maximum cable length for RS232C is equals to 15.24 meters or equal to the capacitance of 2500pF. Limits for the impedance of wires ranges from 3 ohms to 7 ohms.

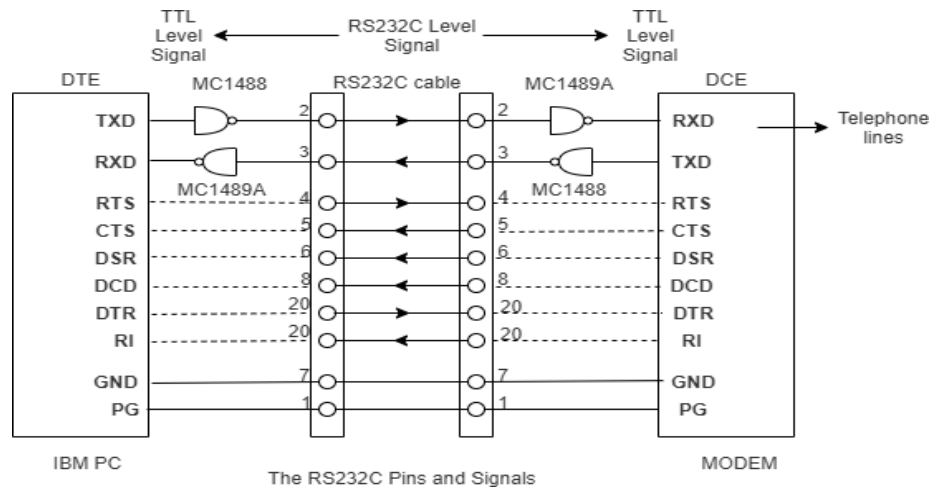
3 Data and Slew rates :

Rate of data transmission through RS232C is up to 20Kbps. The rate of change in signal levels ie. slew rate is up to 30V/microsecond.

4. Current :

Maximum current rating is 3Amps at the maximum operating voltage of 250V AC.

Pins and Working :



RS232C requires 25 pins connector for connecting DTE and DCE. Here is the list of pins and signals of RS232C and the connection between DTE and DCE using drivers and receivers.

1. *TXD & RXD* –

Transmit Data and Receive Data on the DTE are the serial data lines. These lines have opposite functions on a DCE. TXD sends outgoing data to DCE. RXD receives incoming data from DTE.

2. *RTS & CTS* –

Transmitter activates the Request to Send when it requires to transmit data over the line. The line itself gets deactivated when the communication stops. Receiver activates the Clear To Send to tell the transmitter whether it is ready or not to receive the data. It remains active during the transmission.

3. *DTR & DSR* –

Through the Data Terminal Ready line, DTE informs the DCE that it is in online mode and the process of communication can occur. The main task of Data Set Ready signal is to inform that DCE is ready for communication.

4. *DCD* –

DCE activates the Data Carrier Detect in order to show that it has been connected to DTE.

5. RI –

When an incoming call on the telephone line is detected by DCE, then the Ring Indicator gets activated.

Handshaking:

Before the actual data transfer, signals are transmitted from DTE to DCE in order to make connections by a process known as handshaking. Following is the sequence of signal handshaking:

- Initially, the computer activates RTS signal to modem when a data is transferred from computer to modem.
- Modem in turn activates the DCD and then the CTS gets activated.
- Computer then sends data on TXD. After the data transmission is completed, the computer deactivates the RTS which causes the modem to deactivate CTS.

Applications :

However, most of functions performed by RS232C has been taken by the USB, but they are still successful in performing following applications.

1. It is used in establishing communication between the computer and embedded systems.
2. Due to its lower costs, It plays a vital role in CNC machines and servo controllers
3. Some microcontroller boards and PLC machines use RS232C.
4. RS232C ports are used to communicate in headless systems in the absence of any network connection.
5. Many Computerized Numerical Control Systems are contains RS232C port.

Limitations :

1. It cannot be used for chip to chip or chip to sensor device communication
2. It degrades the performance of the system in the presence of noise and requires shorter cables due to having common grounds between DTE and DCE
3. The cost of system increases as RS232C interface needs separate transceiver chips.
4. Its performance degrades to short distances only when transfer speed is high.