



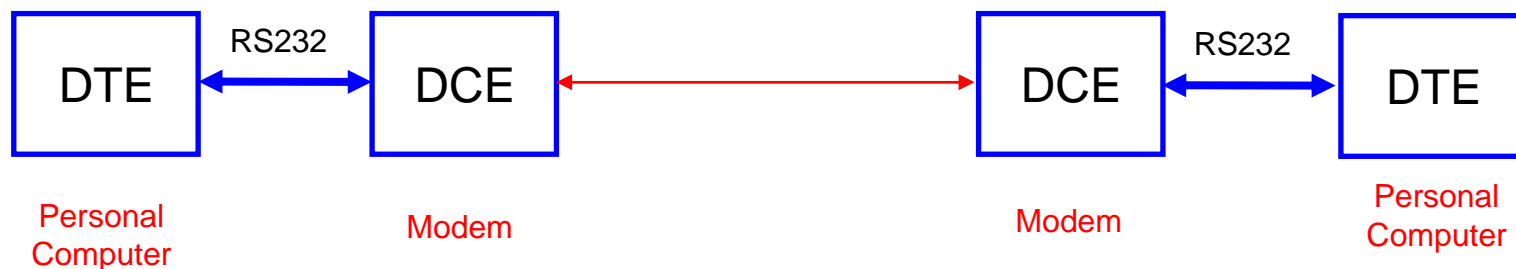
Lo standard RS-232

Massimiliano Pieraccini



**Porta
seriale
bidirezionale
asincrona**

Lo standard RS-232 nasce per collegare
calcolatore (**DTE: Data Terminal Equipment**)
modem (**DCE: Data Communication Equipment**)

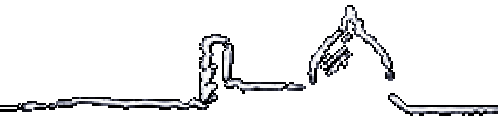


Velocità massima: 20 kbit/s

Lunghezza massima: 15-20m

Oggi la RS-232 si usa per:

- Display
- Stampante
- Lettori di codici a barre
- Registratori cassa



Perché non si trasmette secondo lo standard della famiglia logica (ad esempio: TTL)?

Forte componente in continua

Bassi margini di rumore

Fronti rapidi (riflessioni, crosstalk, EMI..)

Segnale bipolare

TX

- 0 (space) \rightarrow +5V +15V

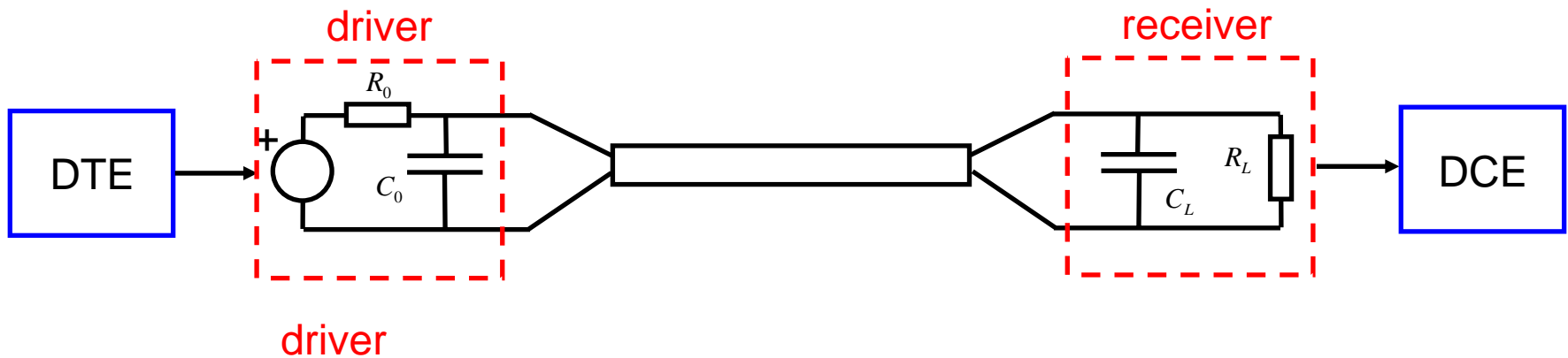
- 1 (mark) \rightarrow -5V -15V

RX

- 0 (space) \rightarrow +3V +25V

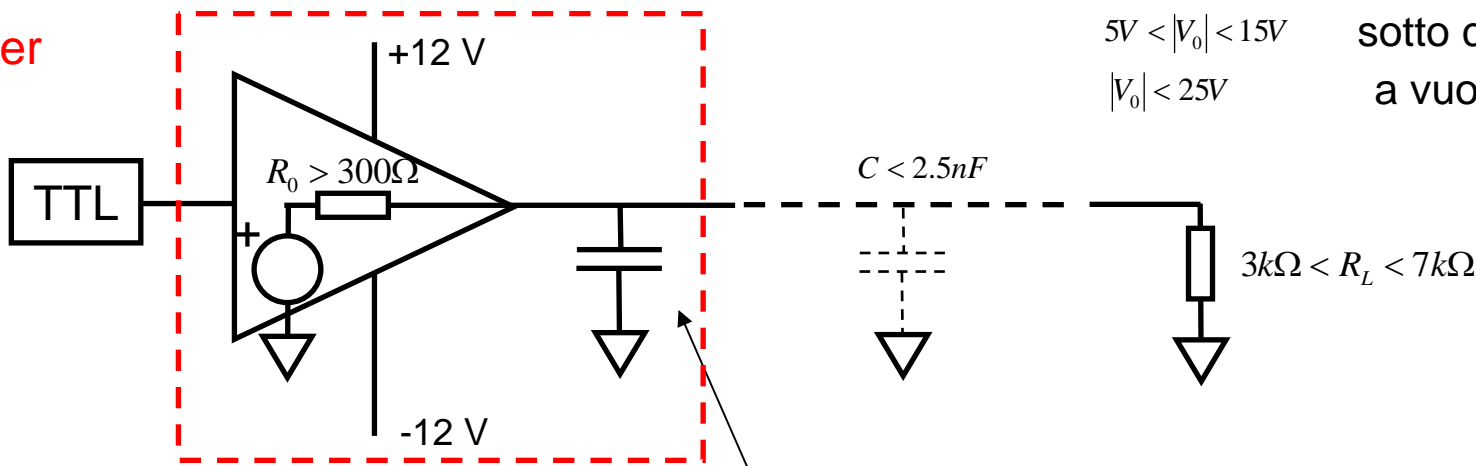
- 1 (mark) \rightarrow -3V +25V

$$\text{Slew Rate} < \frac{30\text{V}}{\mu\text{s}}$$



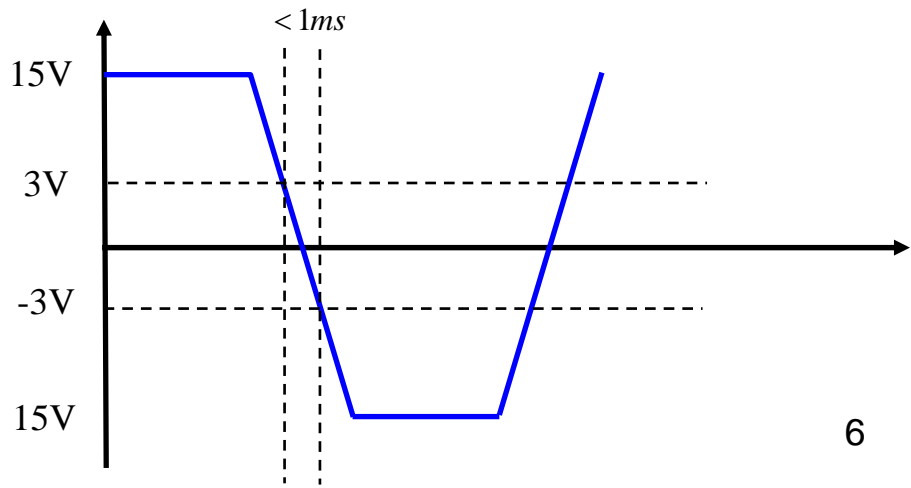
Specifiche elettriche

driver

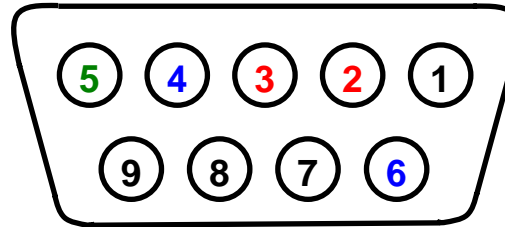


Deve fornire correnti da/verso sia
Vcc sia GND, fino a 0.5A

La capacità dimensionata in modo che $Slew\ Rate < \frac{30V}{\mu s}$



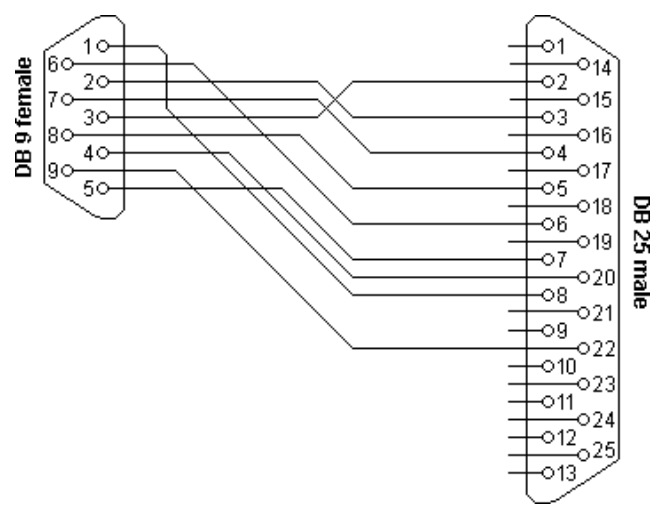
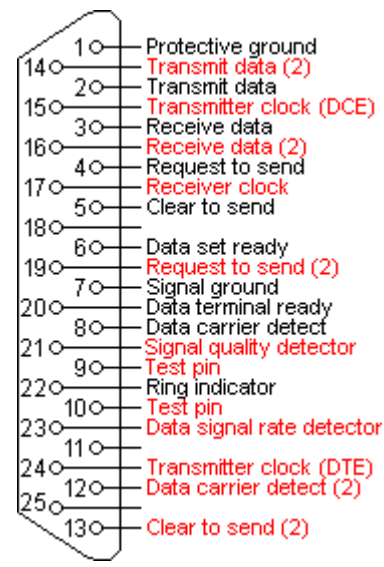
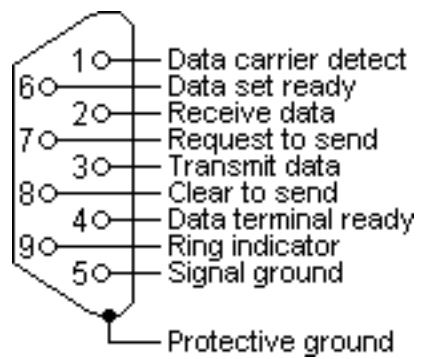
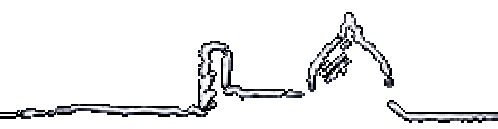
Connettore maschio

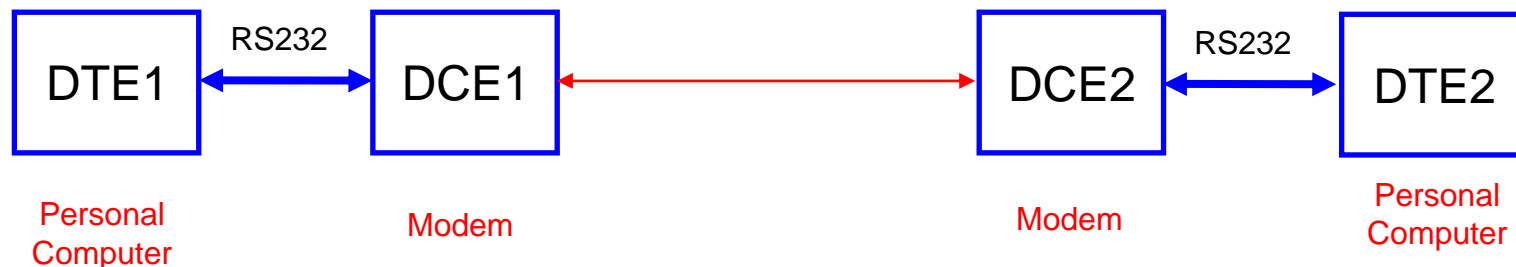


DB9C Connector

- 1) CD Carrier Detect
- 2) RD Receiver Data line
- 3) TD Transmit Data line
- 4) DTR Data Terminal Ready
- 5) GND
- 6) DSR Data Set Ready
- 7) RTS Request to Send
- 8) CTS Clear To Send
- 9) RI Ring Indicator

Nota: La RS-232 presuppone una terra comune tra DTE e DCE





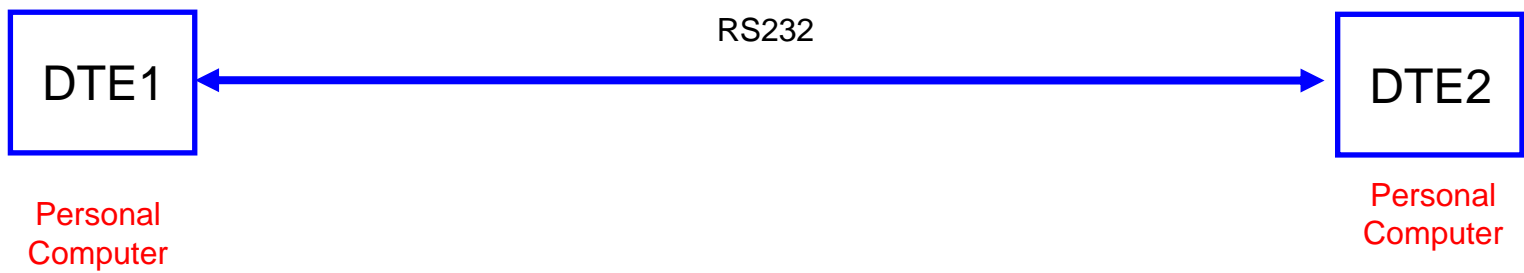
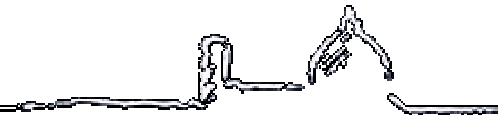
- 1) CD Carrier Detect
- 2) RD Receiver Data line
- 3) TD Transmit Data line
- 4) DTR Data Terminal Ready
- 5) GND
- 6) DSR Data Set Ready
- 7) RTS Request to Send
- 8) CTS Clear To Send
- 9) RI Ring Indicator

All'accensione del DTE, **DTR** diviene on
All'accensione dei DCE, **DSR** diviene on

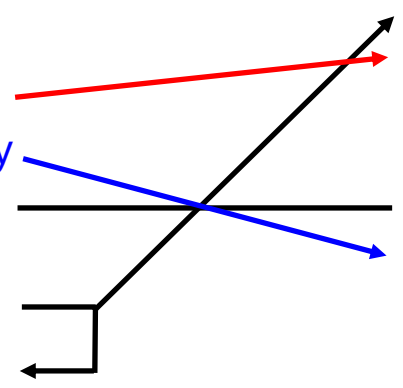
Trasmissione da 1 a 2

- 1) DTE1 controlla il DSR, se è on richiede la connessione ponendo **RTS** on
- 2) Il DCE1 fa il numero e invia la portante
- 3) DCE2 sente la portante e attiva **CD**
- 4) DCE2 manda una portante a DCE1 e attiva **CTS**
- 5) DCE1 sente la portante e attiva **CD** e **CTS**
- 6) DTE nella linea **TD** invia i dati

Connessione diretta (null-modem)

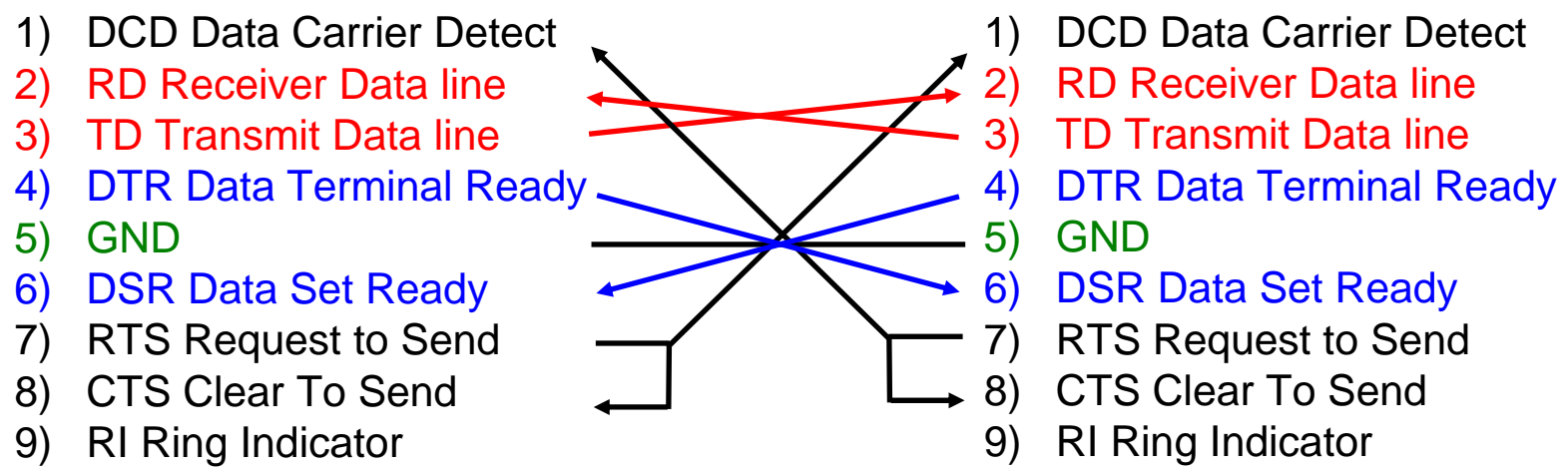
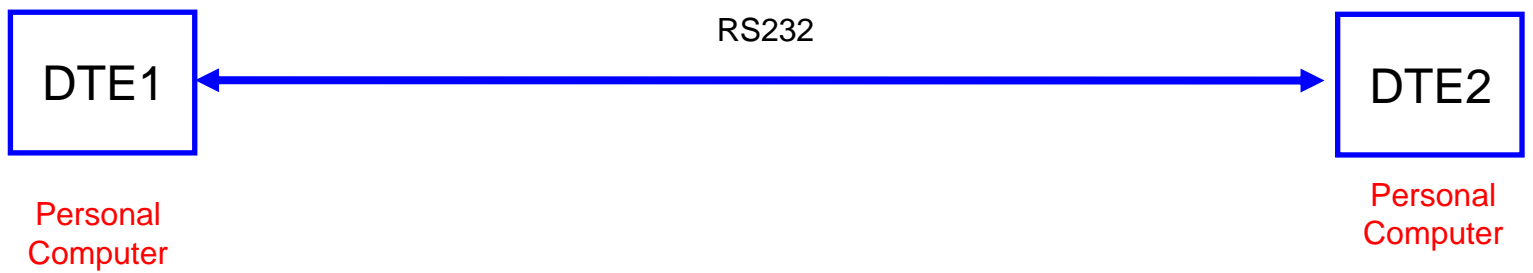
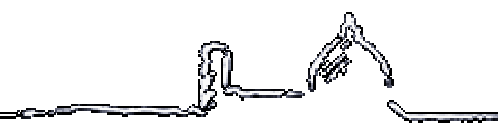


- 1) DCD Data Carrier Detect
- 2) RD Receiver Data line
- 3) TD Transmit Data line
- 4) DTR Data Terminal Ready
- 5) GND
- 6) DSR Data Set Ready
- 7) RTS Request to Send
- 8) CTS Clear To Send
- 9) RI Ring Indicator

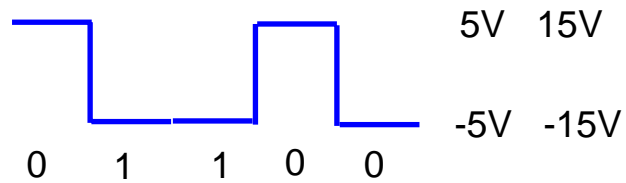


- 1) DCD Data Carrier Detect
- 2) RD Receiver Data line
- 3) TD Transmit Data line
- 4) DTR Data Terminal Ready
- 5) GND
- 6) DSR Data Set Ready
- 7) RTS Request to Send
- 8) CTS Clear To Send
- 9) RI Ring Indicator

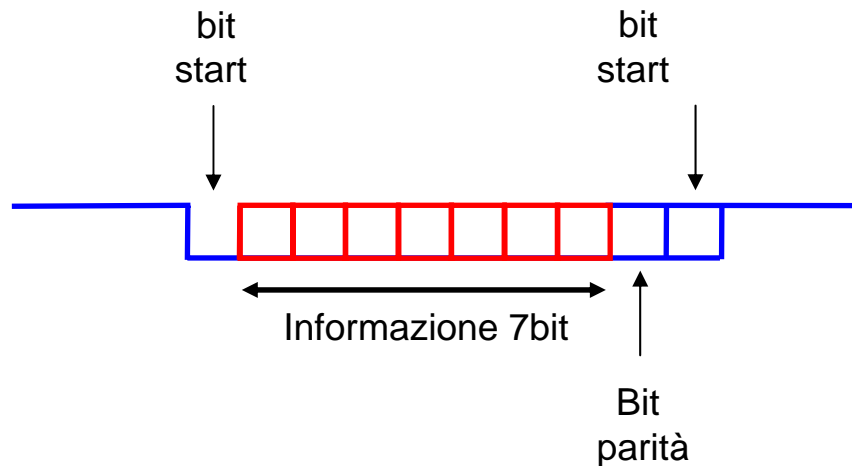
Connessione diretta (null-modem)

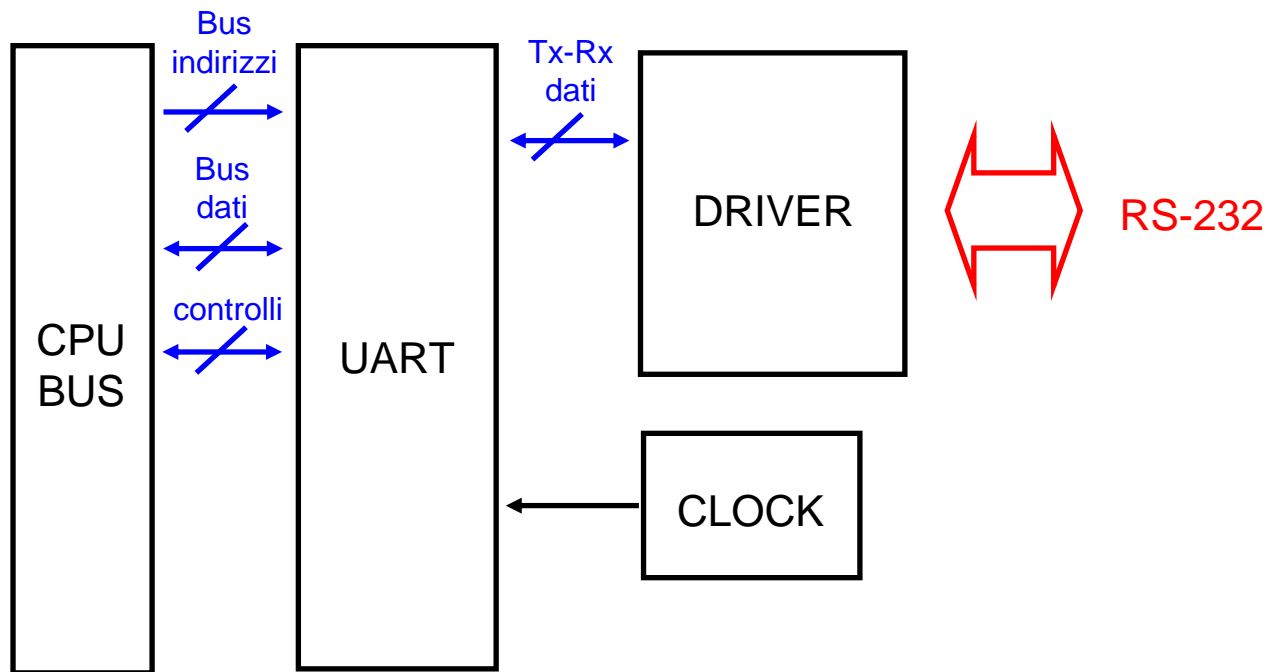


NRZ bipolare



- 1) Bit di start
- 2) Dati serializzati a gruppi di 5,6,7,8 bit
- 3) Bit di parità
- 4) Bit di stop

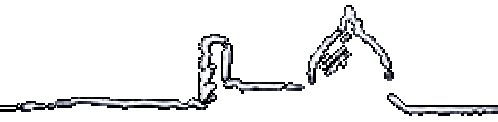




UART (Universal Asynchronous Receiver Transmitter)

La UART converte un byte ricevuto in parallelo dalla CPU in una sequenza di bit con start-parità-stop

La UART può lavorare fino a 1 Mbit/s



- Linea differenziale
- Fino a 32 TX e 32 RX collegati alla stessa linea (**Bus**)
- Lunghezza del cavo fino a 1Km
- Velocità fino a 10 Mbit/s