

USART Interfacing RS-232

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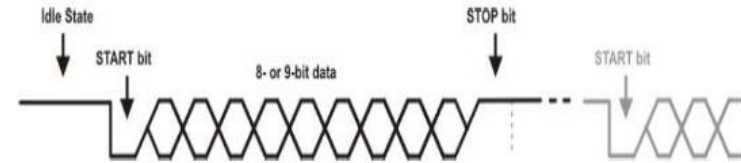
Introduction to USART and RS-232

USART stands for Universal Synchronous/Asynchronous Receiver/Transmitter.

RS-232 is a standard for serial communication transmission of data.

This presentation will explore the interfacing of USART with RS-232.

Universal Synchronous Asynchronous Receiver Transmitter (USART)



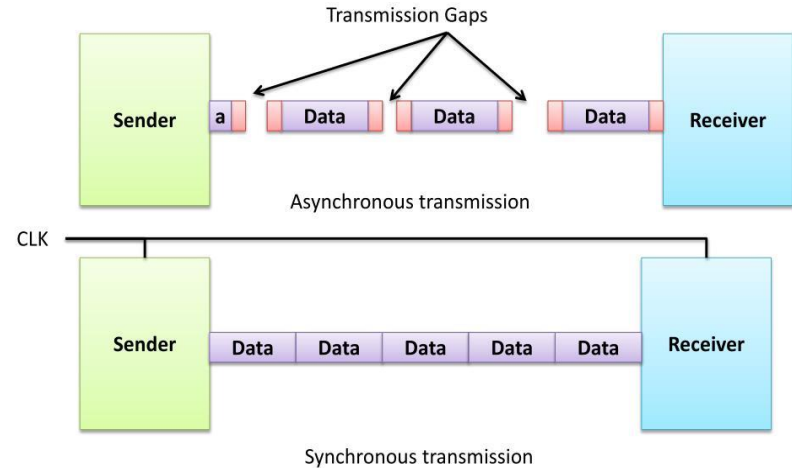
Basics of Serial Communication

Serial communication involves sending data one bit at a time over a single channel. channel.

It is simpler and less expensive compared to parallel communication methods.

Common applications include data transfer between computers and peripherals.

Type of Serial Communication

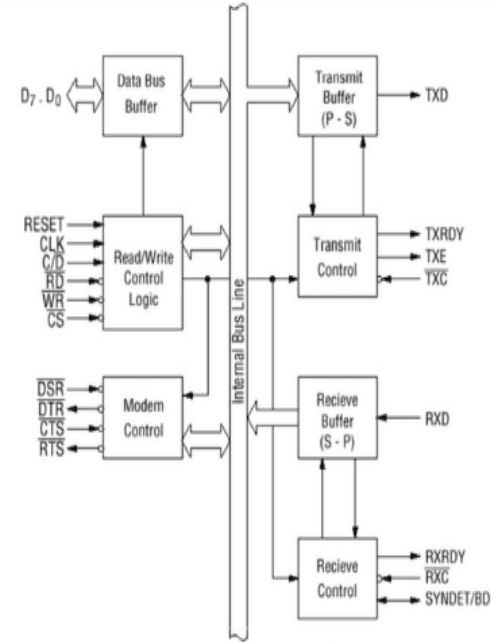


Understanding USART

USART can operate in both synchronous and asynchronous modes.

It enables communication between microcontrollers and other devices.

Configurable parameters include baud rate, data bits, parity, and stop bits.



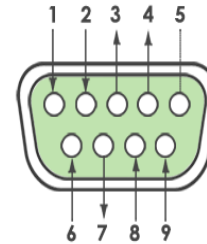
Overview of RS-232 Standard

RS-232 specifies electrical characteristics and timing for serial communication.

It typically uses a 9-pin or 25-pin connector for physical connections.

Voltage levels in RS-232 are defined, with logical '1' and '0' represented by specific voltage ranges.

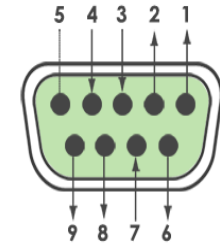
DB9 Male



Pin	Signal Direction	Signal Name	Signal Function
1	←	CD	Carrier Detect
2	←	RxD	Receive Data
3	→	TxD	Transmit Data
4	→	DTR	Data Terminal Ready
5	—	GND	Ground
6	←	DSR	Data Set Ready
7	→	RTS	Request To Send
8	←	CTS	Clear To Send
9	←	RI	Ring Indicator

→ Transmitted from DTE Device
← Received by DTE Device

DB9 Female



Pin	Signal Direction	Signal Name	Signal Function
1	→	CD	Carrier Detect
2	→	TxD	Transmit Data
3	←	RxD	Receive Data
4	←	DTR	Data Terminal Ready
5	—	GND	Ground
6	→	DSR	Data Set Ready
7	←	CTS	Clear To Send
8	→	RTS	Request To Send
9	→	RI	Ring Indicator

→ Transmitted from DCE Device
← Received by DCE Device

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Pin Configuration for RS-232

The DB9 connector is commonly used in RS-232 applications.

Key pins include TxD (transmit data), RxD (receive data), and GND (ground).

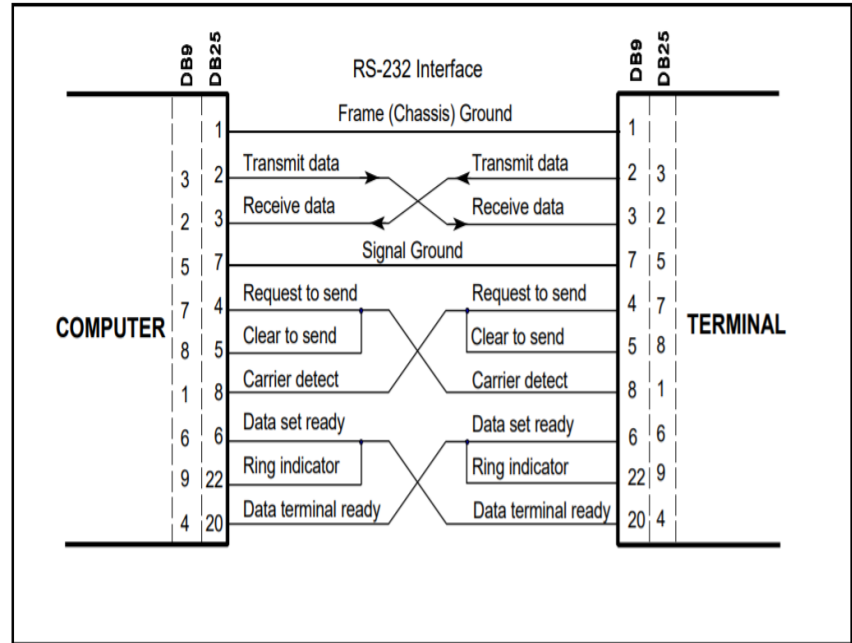
Understanding pin functions is essential for proper device connections.

Configuring USART for RS-232

Set the baud rate on the USART to match the RS-232 device requirements.

Configure data bits, parity, and stop bits according to the communication protocol.

Ensure the USART is set to operate in asynchronous mode for RS-232 communication.

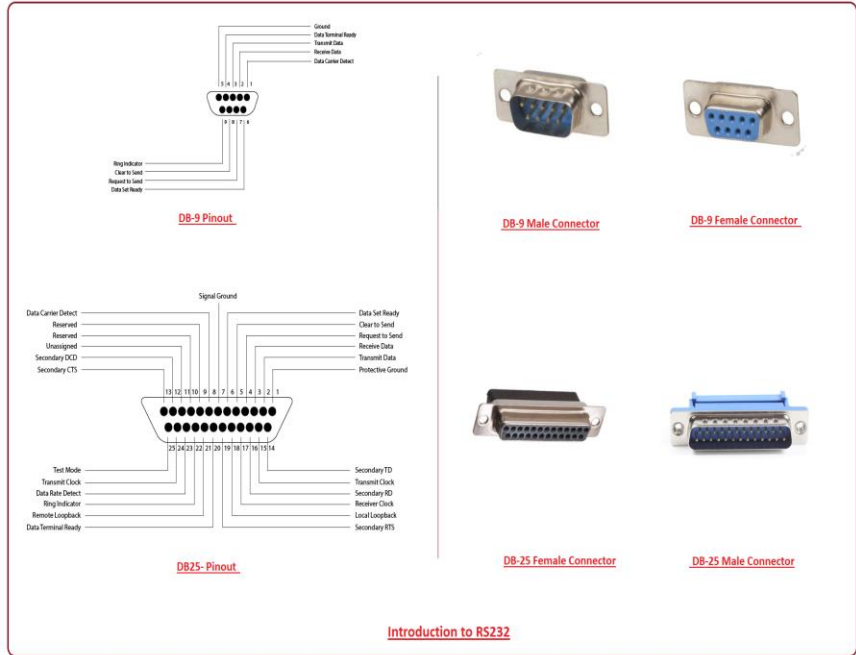


Wiring Diagram for USART to RS-232

A typical wiring diagram shows connections between the microcontroller and RS-232 device.

TxD from the microcontroller connects to Rx/D on the RS-232 device and vice versa.

Ground connections must be established to ensure a common reference point.

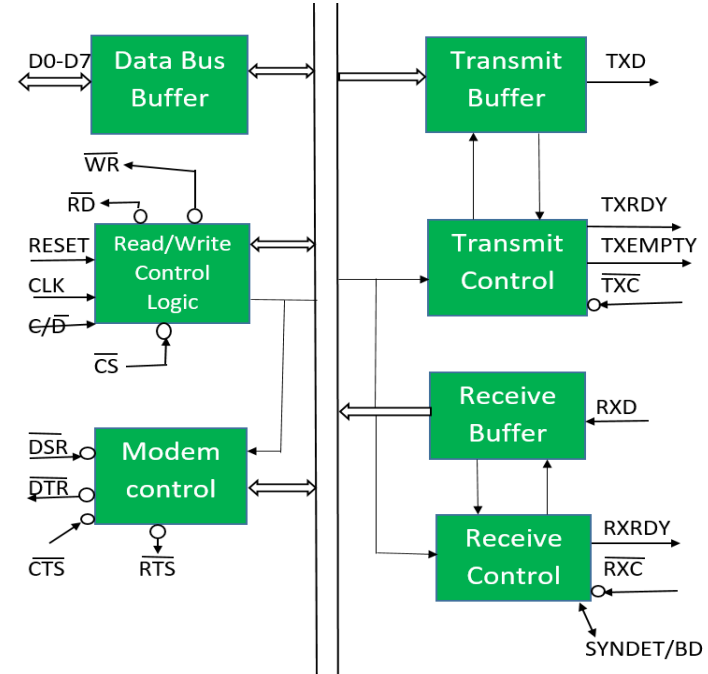


Common Challenges in USART Interfacing

Signal level incompatibilities between microcontrollers and RS-232 devices can arise.

Noise and interference can affect data integrity over long distances.

Proper termination and shielding can help mitigate these issues.



Troubleshooting USART and RS-232 Interfaces

Check baud rate settings to ensure both devices are configured identically.

Use an oscilloscope to examine signal integrity and voltage levels.

Verify cable connections and continuity to rule out physical connection issues.



Conclusion and Applications

USART interfacing with RS-232 is widely used in various applications, such as modems and printers.

Mastering this interface is crucial for effective communication in embedded systems.

Understanding these concepts enables engineers to design robust serial communication.

