

WEEK -5 – Day3- Morning Session

- Check for different pin configurations during the connection of RS 232 and RS 485 protocols.

Practise –

Optical fibre crimping /RS 232 /RS 485 protocol connections

Introduction to RS-232:

The RS-232(X)(-Recommended Standard, X- stands for latest version like RS232c,RS232s) is a serial communication protocol, commonly used for transferring and receiving the serial data between two devices. It was designed for data exchange between DTE (Data Terminal Equipment) or PC and DCE (Data Communication Equipment) or MODEM. It supports data transfer rate from about 110bps to about 115200 bps (bits per sec). Here the logic 1 is represented by the -12V and logic 0 is represented the +12V

The most commonly used type of serial cable connectors is 9-pin connectors DB9 and 25-pin connector DB-25. Each of them may be a male or female type. The maximum length of the RS-232 cable is 500ft.



Fig1: RS232 Male and Female Connector

An RS232 pinout 9 pin cable features nine pins:

1. Data Carrier Detect (DCD) – this control signal is used when a modem informs a computer that it has detected a carrier that the computer can use for data transmission.
2. Received Data (RXD)– The data set receives the initial signal via the receive data line (Rx)D
3. Transmitted Data (TXD) – this line is used for data transmission between two sources. An example is data received from a modem transferred to a computer.
4. Data Terminal Ready (DTR) – this is the signal that shows that a computer is ready for transmission..
5. Signal Ground(GND) – A return for all the signals on a single interface, the signal ground (SG) offers a return path for serial communications. Without SG, serial data cannot be transmitted between devices.
6. Data Set Ready (DSR)– in contrast to the DTR signal, this signal notifies a computer or terminal that the modem is operational and capable of receiving data.
7. Request to Send (RTS) – This signal is sent after a connection between a data terminal and a modem has been established confirms recognition by the data terminal that communications can commence.
8. Clear to Send (CTS) – After a connection has been established between a data terminal and a distant modem, a clear to send (CS) signal ensures the data terminal recognizes that communications can be performed.
9. Ring Indicator – The ring indicator (RI) signal will be activated if a modem that operates as a data set detects low frequency. When this occurs, the data terminal is alerted, but the RI will not stop the flow of serial data between devices.

There are two typical RS232 cables used in the industrial applications:

- Crossed RS232 cable (or known as null modem cable)
- Straight RS232 cable

1) Straight Cable RS232 wiring

RS232 Straight Cable

Data Terminal
Equipment (DTE)

D-Sub Male 9 pins



Data Communication
Equipment (DCE)

D-sub Female 9 pins



		<u>Pin</u>	<u>Out</u>			<u>Pin</u>	<u>Out</u>	
Data Carrier Detect	DCD	1	→	1	DCD	Data Carrier Detect		
Transmit Data	RXD	2	←	2	TXD	Transmit Data		
Receive Data	TXD	3	→	3	RXD	Receive Data		
Data Terminal Ready	DTR	4	→	4	DTR	Data Terminal Ready		
Ground	GND	5	→	5	GND	Ground		
Data Set Ready	DSR	6	→	6	DSR	Data Set Ready		
Clear To Send	CTS	7	→	7	CTS	Clear To Send		
Request To Send	RTS	8	→	8	RTS	Request To Send		
Ring Indicator	RI	9	→	9	RI	Ring Indicator		

Fig2: RS232 Straight Cable Wiring

Cross Cable RS232 wiring

Cross cable wiring for RS232 usually happens between two DCE (data communication equipment) devices, or two DTE (Data Terminal Equipment) devices.

RS232 Cross Cable (Null Cable) Connection

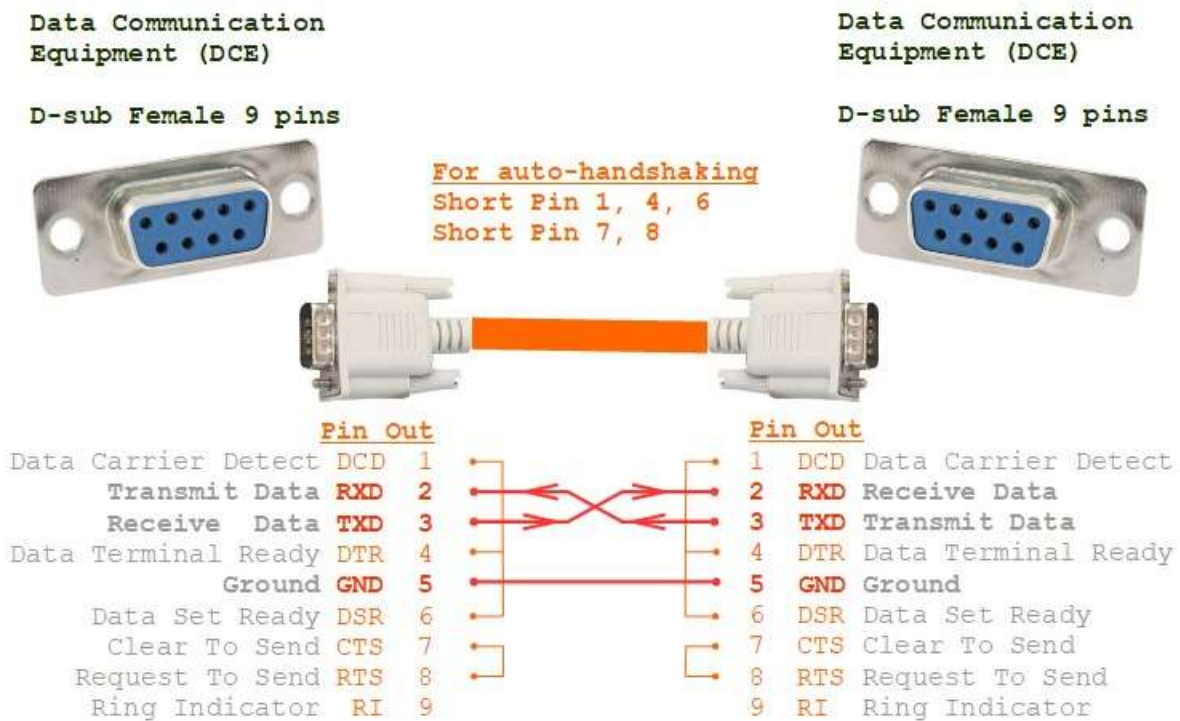


Fig3: RS232 Cross Cable Wiring

Introduction to RS-485:

The RS485 (EIA485) interface has become extremely robust and is the most popular communication protocol used in industry due to its multi-point topology. The RS485 interface achieves superior transmission over greater distances and better data rate performance than the RS232 protocol. Transmission speeds of 30-35 Mbps are supported for distances of up to 10 meters. Data rates of 100Kbps can be achieved over distances of up to 1200 meters.

There are two types of RS485:

- RS485 in *half-duplex* mode with 2 contacts
- RS485 in *full duplex* mode 4 contacts are employed.

Full-duplex mode is used when it is required to transmit and receive data at the same time. In half-duplex mode, only transmit or receive data can be done at any given time.

The voltage range on the lines varies from -7 V to +12 V. There is no specific type of connector used to implement the RS485 protocol but in most scenarios, a DB9 connector or terminal block are used.

Pinout connects to DB9 and DB25 connectors with 2 and 4 contacts.

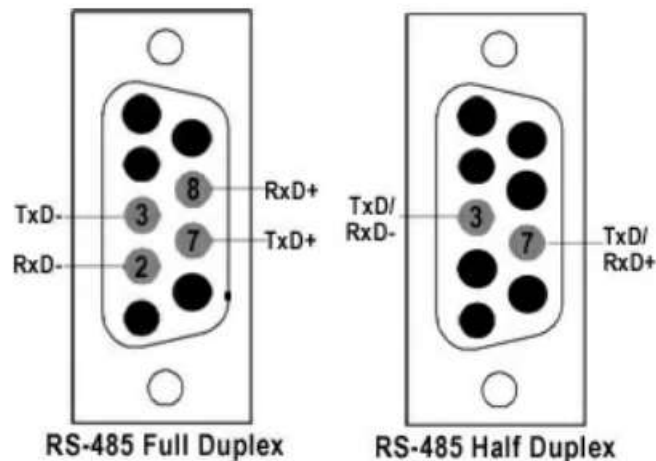


Fig3: RS485 wiring diagram for RS485 pinout DB9 connectors half and full duplex modes

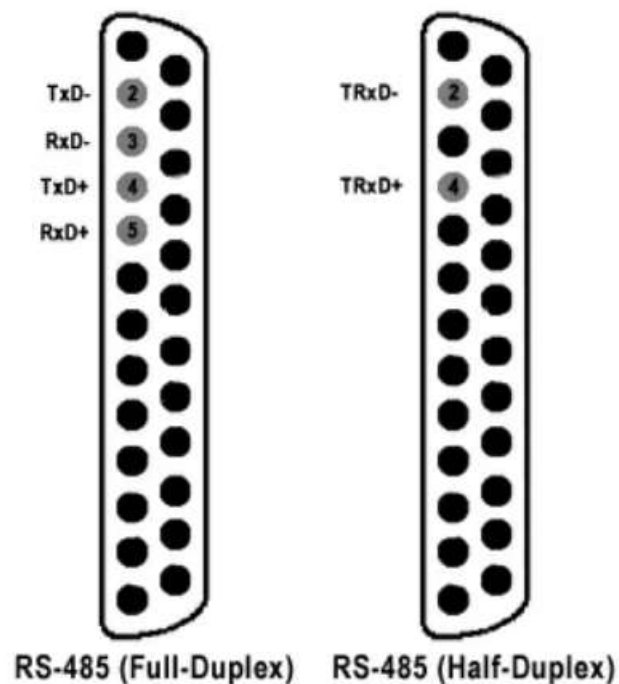


Fig 4: Pin diagram for 25 pin RS485 pinout both half duplex and full duplex mode

- CTS+ and CTS- and the RTS+ and RTS- signals are all employed as handshake control signals.
- TxD+ and TxD- perform data transmission.
- RxD+ and RxD- are the lines that are used to collect data.

Multi-drop configurations enable up to 32 devices to be connected with a single controlling master device

Optical fiber crimping /RS 232 /RS 485 protocol connections:

Some of the video links for the above practice sessions:

<https://www.youtube.com/watch?v=pUcZjqlvor8> –How to terminate a fibre link

<https://www.youtube.com/watch?v=7Q2ZyY8AvqY>- Make RS232 Cable at home

https://www.youtube.com/watch?v=PwapW_o5QYg – To Make DB9 Serial Male to Female RS232 Cable