MICROCONTROLLER

UNIT–III

Lecture–4

RS232 Standards

- An interfacing standard RS232 was set by the Electronics Industries Association (EIA) in 1960

- The standard was set long before the advent of the TTL logic family, its input and output voltage levels are not TTL compatible

- In RS232, a 1 is represented by $-3 \sim -25$ V, while a 0 bit is $+3 \sim +25$ V, making -3 to $+3$ undefined

Contd.

RS232 DB-25 Pins

Pin	Description	Pin	Description
1	Protective ground	14	Secondary transmitted data
2	Transmitted data (TxD)	15	Transmitted signal element timing
3	Received data (RxD)	16	Secondary receive data
4	Request to send (-RTS)	17	Receive signal element timing
5	Clear to send (-CTS)	18	Unassigned
6	Data set ready (-DSR)	19	Secondary receive data
7	Signal ground (GND)	20	Data terminal ready (-DTR)
8	Data carrier detect (-DCD)	21	Signal quality detector
9/10	Reserved for data testing	22	Ring indicator (RI)
11	Unassigned	23	Data signal rate select
12	Secondary data carrier detect	24	Transmit signal element timing
13	Secondary clear to send	25	Unassigned

RS232 Connector DB-25
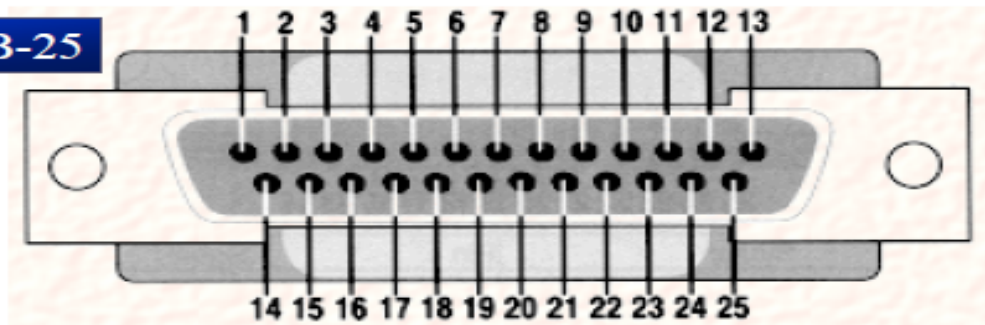
Contd.

RS232 Connector DB-9
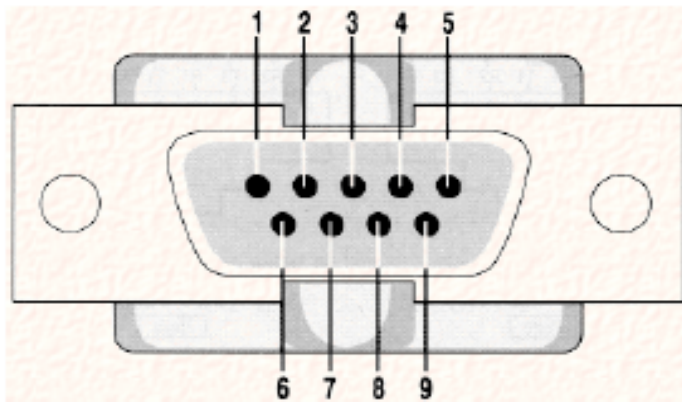
RS232 DB-9 Pins

Pin	Description
1	Data carrier detect (-DCD)
2	Received data (RxD)
3	Transmitted data (TxD)
4	Data terminal ready (DTR)
5	Signal ground (GND)
6	Data set ready (-DSR)
7	Request to send (-RTS)
8	Clear to send (-CTS)
9	Ring indicator (RI)

Data Communication Classification

- Current terminology classifies data communication equipment as
- DTE (data terminal equipment) refers to terminal and computers that send and receive data
- DCE (data communication equipment) refers to communication equipment, such as modems
- The simplest connection between a PC and microcontroller requires a minimum of three pins, TxD, RxD, and ground

MAX232

- ❑ We need a line driver (voltage converter) to convert the R232's signals to TTL voltage levels that will be acceptable to 8051's TxD and RxD pins
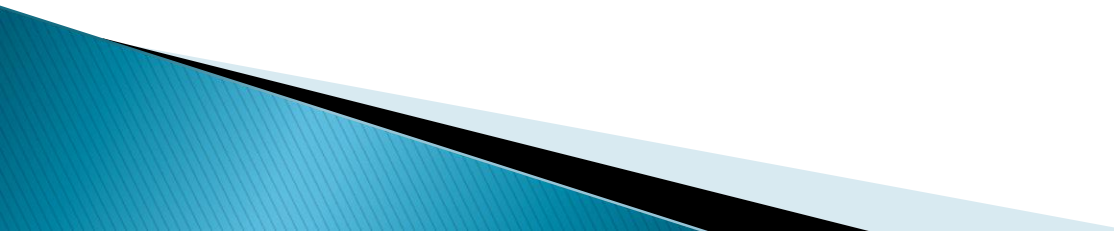

MAX232 requires four capacitors

MAX232 has two sets of line drivers
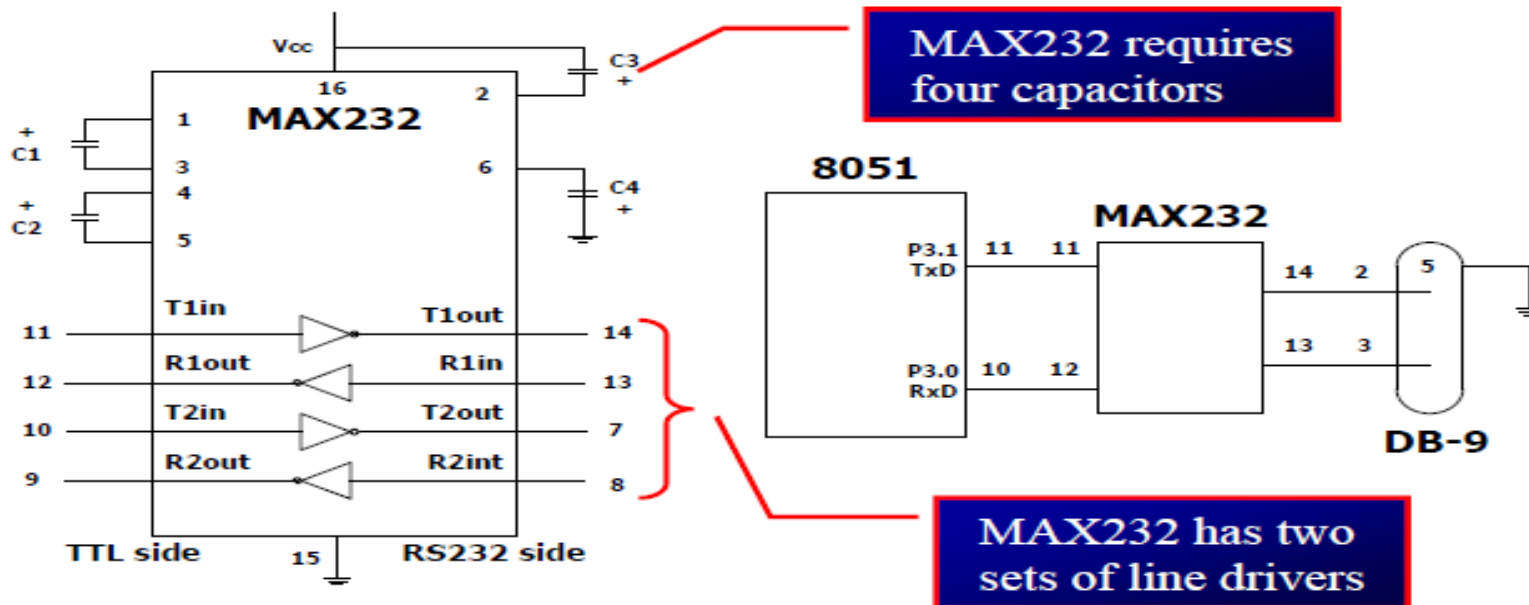
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❑ To save board space, some designers use MAX233 chip from Maxim
  ➢ MAX233 performs the same job as MAX232 but eliminates the need for capacitors
  ➢ Notice that MAX233 and MAX232 are not pin compatible
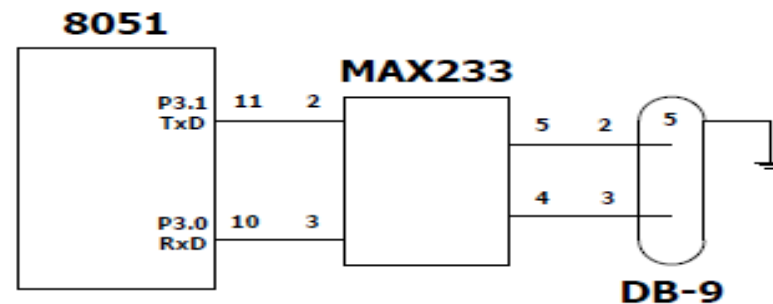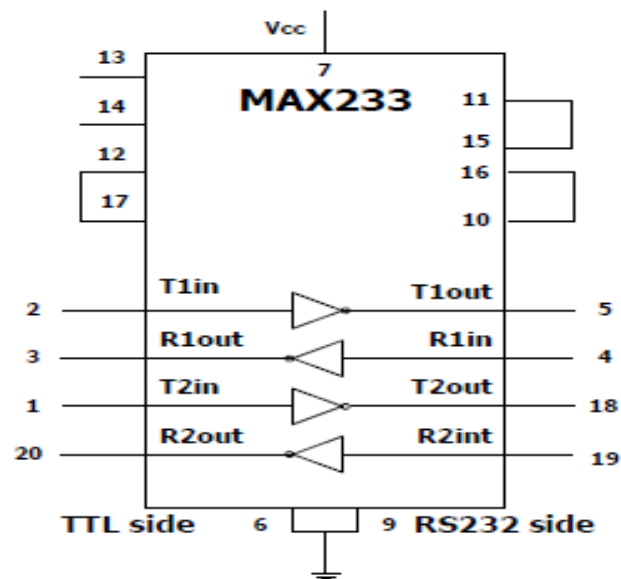
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▸ To allow data transfer between the PC and an 8051 system without any error, we must make sure that the baud rate of 8051 system matches the baud rate of the PC's COM port. Hyper–terminal function supports baud rates much higher than listed below

▸ SBUF is an 8–bit register used solely for serial communication

Contd.

- SCON is an 8-bit register used to program the start bit, stop bit, and data bits of data framing, among other things

- Since not all pins are used in PC cables, IBM introduced the DB-9 version of the serial I/O standard