

Short Notes Chapter 14 (Lecture 38):

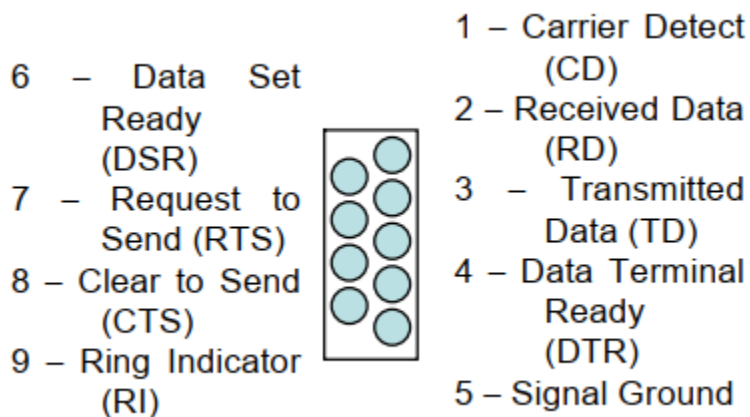
Serial port:

Serial port is a way of communication among two devices just like the parallel port.

Difference b/w parallel and serial ports:

The basic difference is that whole bytes are sent from one place to another in case of parallel port while the bits are sent one by one on the serial port in a specially formatted fashion.

The serial port connection is a 9pin DB-9 connector with pins assigned as shown below.



The data on the serial port is sent in a standard format called **RS232 communication**.

Start bit, data bit, parity bit and stop bit:

The data starts with a 1 bit called the start bit, then five to eight data bits, an optional parity bit, and one to two 0 bits called stop bits.

The number of data bits, parity bits, and the number of stop bits have to be configured at both ends. Also, the duration of a bit must be precisely known at both ends called the baud rate of the communication.

The **BIOS INT 14** provides serial port services.

Limitation in using BIOS:

A major limitation in using BIOS is that it does not allow interrupt driven data transfer, i.e. we are interrupted whenever a byte is ready to be read or a byte can be transferred since the previous transmission has completed. To achieve this, we have to resort to direct port access.

Important BIOS services regarding the serial port are discussed below:

INT 14 - SERIAL - INITIALIZE PORT

AH = 00h

AL = port parameters

DX = port number (00h-03h)

Return:

AH = line status

AL = modem status

Modem status is not used in direct serial communication.

The port parameters in AL consist of the baud rate, parity scheme, number of stop bits, and number of data bits.

INT 14 - SERIAL - WRITE CHARACTER TO PORT

AH = 01h

AL = character to write

DX = port number (00h-03h)

Return:

AH bit 7 = error flag

AH bits 6-0 = port status

INT 14 - SERIAL - READ CHARACTER FROM PORT

AH = 02h

DX = port number (00h-03h)

Return:

AH = line status

AL = received character if AH bit 7 clear

INT 14 - SERIAL - GET PORT STATUS

AH = 03h

DX = port number (00h-03h)

Return:

AH = line status

AL = modem status

Serial port access:

Serial port is also accessible via I/O ports.

COM1 is accessible via ports 3F8-3FF while **COM2** is accessible via 2F8-2FF.

The first register at **3F8** (or 2F8 for the other port) is the transmitter holding register if written to and the receiver buffer register if read from.

3F9 whose bit 0 must be set to enable received data available interrupt and bit 1 must be set to enable transmitter holding register empty interrupt.

Bit-0 of **3FA** is set if an interrupt is pending and its bits 1-3 identify the cause of the interrupt.

The three-bit causes are as follows:

110 (16550, 82510) timeout interrupt pending

101 (82510) timer interrupt

100 (82510) transmit machine

011 receiver line status interrupt. priority=highest

010 received data available register interrupt. priority=second

001 transmitter holding register empty interrupt. priority=third

000 modem status interrupt. priority=fourth

The register at **3FB** is line control register while the one at **3FD** is line status register.

The register at **3FC** is the modem control register. Bit-3 of this register must be set to enable interrupt generation by the serial port.