

Chapter 11: Input/Output Organisation

Lesson 14: Serial Port

Objective

- Be familiar with serial I/O port functioning
- Learn that a serial port accepts or sends the 1-bit in successive time slots and connects to the bus through very few lines
- Learn about the registers when using a serial port

Serial port

Serial port

- Accepts or sends 1-bit in one time slice on a line
- Extremely convenient for remote connections to the devices as it has very few lines
- USART port for synchronous and asynchronous reception and transmission using UART mode serial communication

Example

- RS232C port

Example of the USART Serial port signals

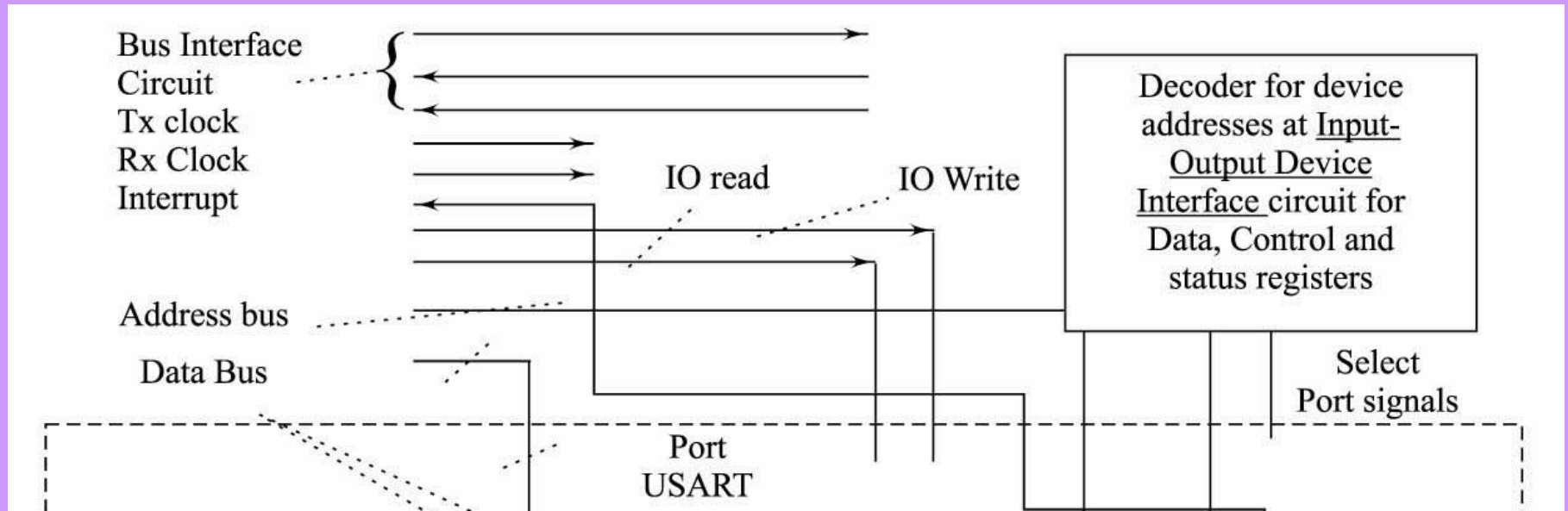
USART (Universal Synchronous Asynchronous Receiver and Transmitter) port

1. Data bus D0-D7
2. Interrupt
3. I/O Read
4. IO Write.
5. C/D (= 1 means control or status bits transfer and = 0 means data transfer)

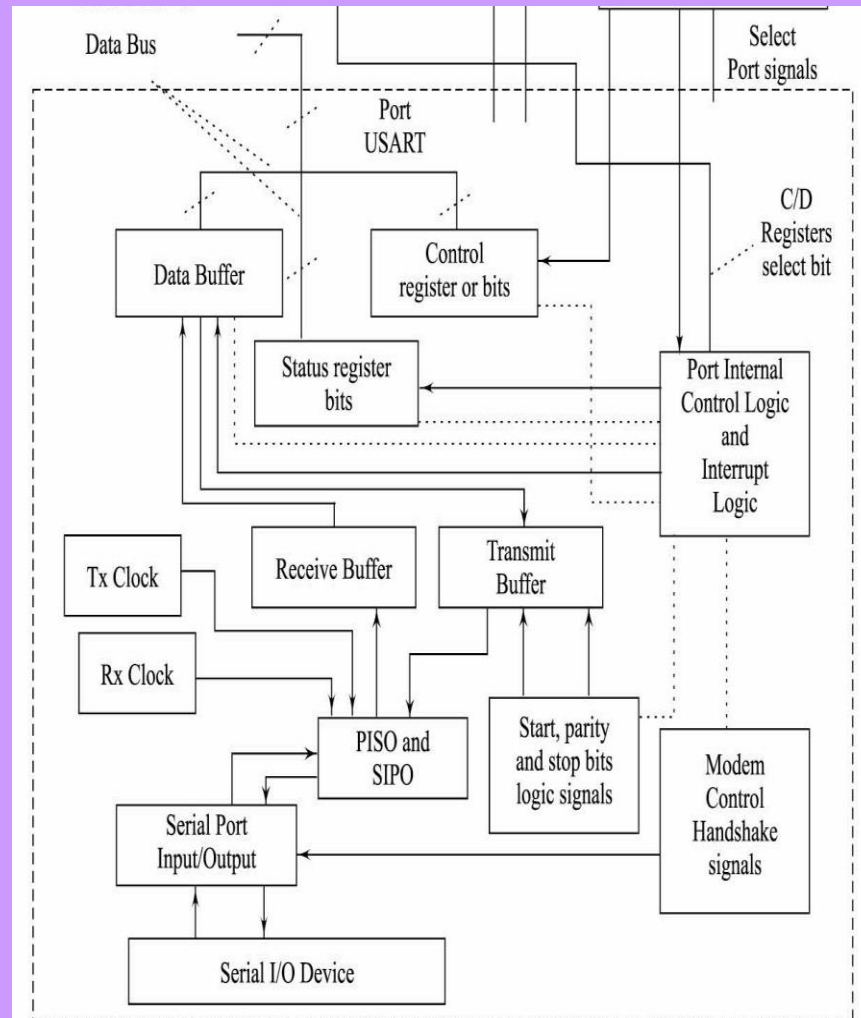
USART (Universal Synchronous Asynchronous Receiver and Transmitter) port

6. Transmitter and receiver clock inputs for the PISO and SIPO, respectively
7. CS (Port chip Select)
8. Reset (after this input, the port control registers need to be programmed again)

Serial port (USART) connecting to the bus on the one hand and to the I/O device on other hand



Serial port USART connecting to the bus



SIPO

- Converts serial data to parallel data at the rate controlled by a shift clock

PISO

- Converts parallel data to serial data at the rate controlled by a shift clock. The time slice during which the bit should be accepted or transmitted depends on receiver clock or transmitter clock, respectively

Example of the Serial port registers

Serial port control and status registers

- (i) Control register (s)
- (ii) Status register(s)

Example of the Serial port output register for synchronous or asynchronous data transfer

(iii) Output register(s) or buffer, (for sending the output through the port) using a PISO (parallel-in to serial-out) shift register and circuit for placing the start bit, parity bit, and stop bit, before sending the data buffer data

Example of the Serial port input register for synchronous or asynchronous data transfer

- (iv) Input register(s) or buffer (for receiving the input from the device through the port) using a SIPO (serial-in to parallel-out) or a circuit for detecting the start bit, parity bit, and stop bit, before receiving into the data buffer

Example of the Serial port clock inputs in synchronous mode communication

(v) Transmitter and receiver clock inputs for the PISO and SIPO, respectively

Summary

We learnt

- Serial I/O port functioning that a serial port accepts or sends the 1-bit in successive time slots and connects to the bus through very few lines
- Registers when using a serial port
- PISO and SIPO registers for synchronous communication

End of Lesson 14 on **Serial Port**