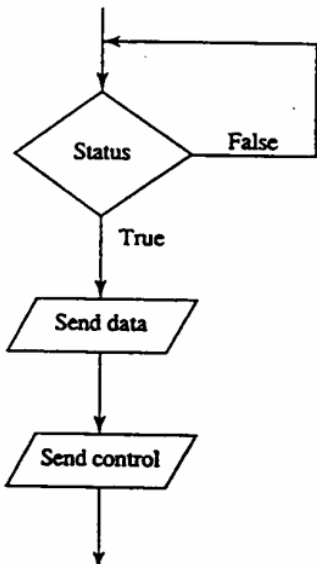
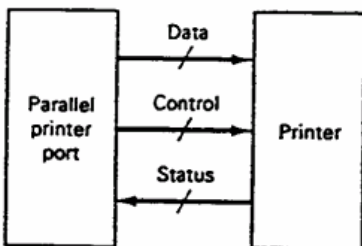
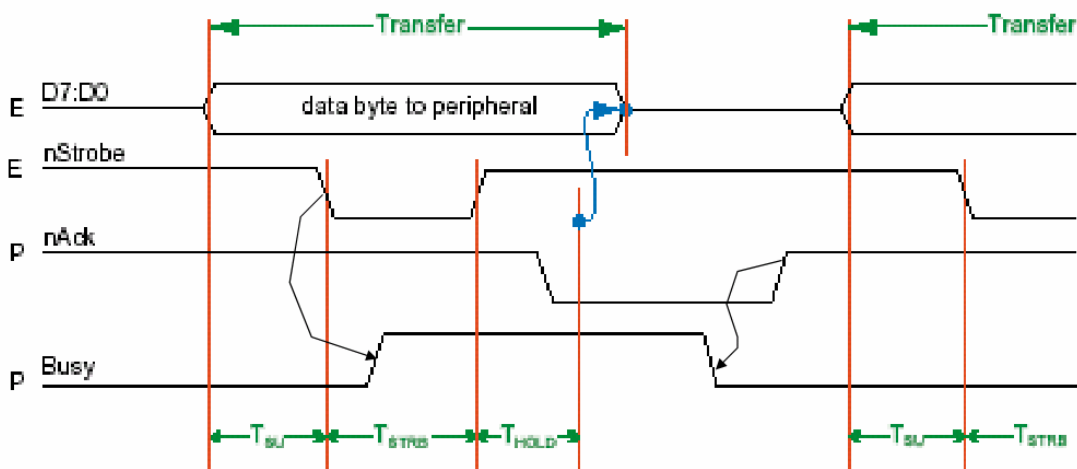


Seminary

Design an 8 bit parallel printer interface connected to an ATmega64 microcontroller (to its ports). The transfer protocol should use 2 handshaking signals: STB output (informing the printer that data is available on the data lines) and BUSY OR ACK (input) informing the microcontroller that the printer is either busy or is ready to receive new data.

- Explain the design.
- Draw the schematic of the interface.
- Draw the flow-chart of the procedure that sends a string of characters to the printer. Write the corresponding procedure in pseudo-code.
- Homework: write the complete program in assembly language (initialization phase + printing sequence)

Note: the MC can check the status of the printer in 2 ways: by polling (in a loop) or by using interrupts. Make the above design for both approaches.



Control signal:

STROBE when PC presents a character

Status signals:

ACK is used by printer to acknowledge receipt of data and can accept a new character.

BUSY high if printer is not ready to accept a new character

Handshaking protocol:

- The computer checks the BUSY signal from the printer, if not BUSY then
- When the PC presents a character to the data pins of the printer, it activates the STROBE pin, telling it that there is a byte sitting at the printer's data pins. Prior to asserting STROBE pin, the data must be at the printer's data pins for at least 0.5 μ s. (data setup time)
- The STROBE must stay for 0.5 μ s
- The printer asserts BUSY pin indicating the computer to wait
- When the printer picks up the data, it sends back the ACK signal, keeps ACK low for 5 μ s.
- As the ACK signal is going high, the printer makes the BUSY pin low to indicate that it is ready to accept the next byte
- The CPU can use ACK or BUSY signals from the printer to initiate the process of sending another byte