

EMK310 Practical 2

SERIAL COMMUNICATION BETWEEN PIC, PC & EEPROM

1. Introduction

The objectives of this practical are to familiarise the student with communication between

- the PIC and a PC, and
- an external EEPROM and the PIC.

2. Problem statement

You must design and realise a system that uses a PIC18F13K50 to implement a USB to serial bridge to facilitate communication between a PC and the EUSART of the PIC18F45K20. Communication must also be established between the PIC18F45K20 and an external EEPROM using I²C. The I²C link must be hardcoded.

3. System description

3.1 Overall system description

Figure 1 shows a block diagram of the system that has to be designed. Hyper Terminal (Windows based software) or a similar application will be used to communicate between the serial port of the PC and the PIC18F45K20 via the USBRS232 bridge that will be implemented on the PIC18F13K50 interface. The PIC18F45K20 will also communicate with an external EEPROM. A serial EEPROM such as the Atmel AT24C01A will be used.

3.2 Detail system description

The PC will access the external memory device (EEPROM) via the two PICs. The user must be able to either retrieve data that is stored on the EEPROM for display on the PC or store data in the EEPROM by entering data using serial communication application such as Hyperterminal. A cell phone address book will be simulated. The system will use the following commands:

1. **"Names"** – when the command "Names" (case insensitive) is sent to the PIC, it should respond with the names of the group members. Each name and number must start at the left of the screen on a new line. This data has to be stored on the PIC itself for retrieval via Hyper Terminal.
2. **"New"** – when the command "New" (case insensitive) is sent to the PIC, it should respond with the message "Enter name of new contact." This message has to be stored on the PIC itself for retrieval via Hyper Terminal. The next entry (maximum size of 15 ASCII characters) that follows the "ENTER NAME OF NEW CONTACT" message must be written to and stored by the EEPROM. All characters, including characters used to issue commands, will be treated as data when the contact's name is entered. Next the PIC must display the message "ENTER CONTACT NUMBER". This message has to be stored on the PIC itself for retrieval via Hyper Terminal. The number has to be stored on the EEPROM at the address following the name entry. Only numerals may be accepted in this mode (maximum size of 10 ASCII characters). Upon entry of the number, the PIC must display the message "NEW ENTRY SAVED". This message too has to be stored on the PIC itself. (Question: How many names and numbers can you store on the EEPROM?)

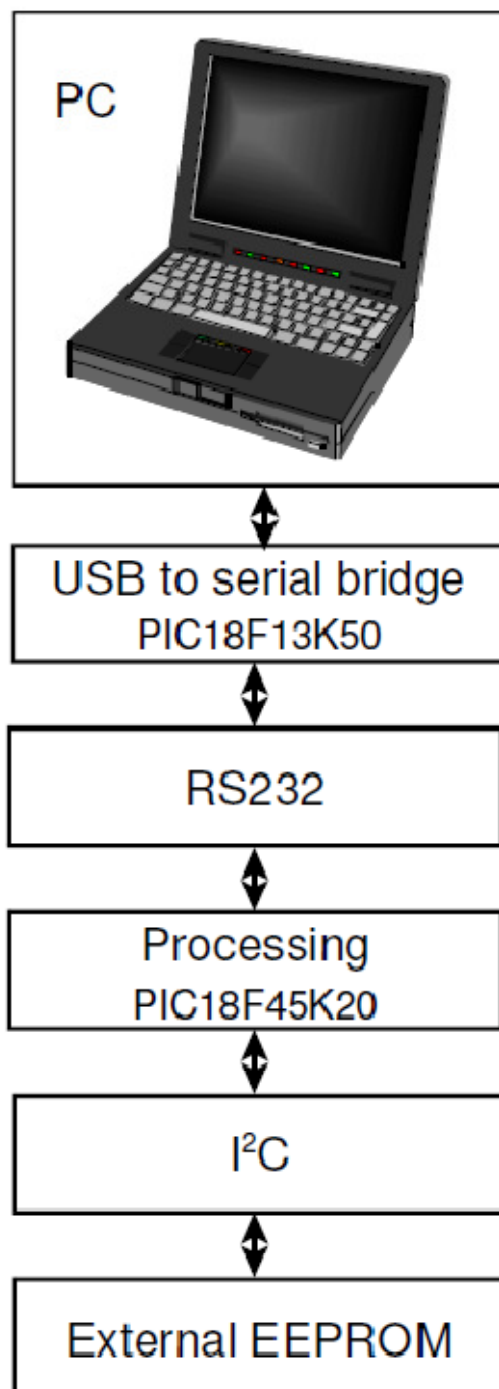


Figure 1. System to realise serial communication between PC and external memory device.

3. **"[any letter]"** – when any single letter is sent to the PIC, the entries stored in the EEPROM starting with [any letter] must be retrieved via the PIC and displayed in Hyper Terminal.
4. **"Delete"** – when the command "Delete" is sent to the PIC, it should empty the EEPROM and send "EEPROM DELETED" over the RS232 interface.

3.3 Communication protocol

Communication between PC and PIC

Type: RS323 asynchronous serial (3-wire cable)

Rate: 19 200 Baud

Format: ASCII

Bits: 8-bit; one start bit; one stop bit; no parity

Communication between PIC and EEPROM

Type: I²C (refer to datasheet).

NB: The I²C protocol has to be hardcoded, i.e. you may not make use of the onboard I²C functionality of the PIC.