



ENT269

Embedded System and Interfacing

Laboratory 1: Input and Output Interfacing

Name:

Matrix No.:

Laboratory Group:

Date:

Lab Demonstration

Task 1

Demo	Verification
	Time :
	Sign :

Task 2

Demo	Verification
	Time :
	Sign :

OBJECTIVES

1. To get familiar with PIC Microcontroller
2. To get familiar with C18 programming language
3. To interface and program input and output using light emitting diode, transistor and push button/switch

EQUIPMENT/COMPONENTS

1. PIC Microcontroller (SK40C) – 1 Unit
2. Light Emitting Diode – 8 Units
3. Push-Button/Switch – 1 Units
4. Transistor 2N2222 – 2 Units
5. Resistor 330 Ω – 8 Units
6. Resistor 10k Ω /5k Ω – 2 Unit

INTRODUCTION

Interfacing is one of the important concepts in microcontroller PIC18F4580 because the microcontroller is a CPU that can perform some operation on a data and gives the output. However, to perform the operation we need an input device to enter the data and in turn output device displays the results of the operation. Here we are using push button or switch and light emitting diode (LED) display as input and output devices along with the microcontroller.

LEDs are a particular type of diode that converts electrical energy into light. LEDs are most commonly used in many applications for indicating the output. They find huge range of applications as indicators during test to check the validity of results at different stages. They are very cheap and easily available in a variety of shape, color and size.

Meanwhile, all switches fall into one of two distinct categories: momentary or maintained:

1. Maintained switches – like the light switches on your wall – stay in one state until actuated into a new one, and then remain in that state until acted upon once again. These switches might also be called toggle or ON/OFF switches.
2. Momentary switches only remain active as long as they're actuated. If they're not being actuated, they remain in their "off" state.

Transistors make our electronics world go 'round. They're critical as a control source in just about every modern circuit. Sometimes you see them, but more-often-than-not they're hidden deep within the die of an integrated circuit. This chapter introduce the basics of the most common transistor around: the bi-polar junction transistor (BJT). In small, discrete quantities, transistors can be used to create simple electronic switches, digital logic, and signal amplifying circuits. In quantities of thousands, millions, and even billions, transistors are interconnected and embedded

into tiny chips to create computer memories, microprocessors, and other complex ICs. One of the most fundamental applications of a transistor is using it to control the flow of power to another part of the circuit – using it as an electric switch. Driving it in either cutoff or saturation mode, the transistor can create the binary ON/OFF effect of a switch.

The MPLAB C18 compiler is a free-standing, optimizing ANSI C compiler for the PIC18 will be used in the laboratory for programming. The compiler deviates from the ANSI standard X3.159-1989 only where the standard conflicts with efficient PICmicro MCU support. The compiler is a 32-bit Windows console application and is fully compatible with Microchip's MPLAB IDE, allowing source-level debugging with the MPLAB ICE in-circuit emulator, the MP LAB ICD 2 in-circuit debugger or the MPLAB SIM simulator. From MPLAB C18, depending on the device selected and features enabled, there are up to five ports available. Some pins of the I/O ports are multiplexed with an alternate function from the peripheral features on the device. In general, when a peripheral is enabled, that pin may not be used as a general purpose I/O pin. Each port has three registers for its operation. These registers are:

- TRIS register (Data Direction register)
- PORT register (reads the levels on the pins of the device)
- LAT register (Output Latch register)

The Output Latch register (LAT) is useful for read-modify-write operations on the value that the I/O pins are driving. Before the input and output can be used, register TRIS should be configured. This register is used for setting up the ports as input or output:

- If **TRIS_x = 0** ; **PORT_x = output**
- If **TRIS_x = 1** ; **PORT_x = input**

Initially all port are configure as input (TRIS_x = FFH)

ACTIVITY/TASK

PREPARE a structured program in C language to the tasks given below:

TASK 1:

IF a push-button (active low) is pressed the output of PORTB is **TASK 1.1**, *ELSE* **TASK 1.2**

- **Task 1.1:** Blink 8-leds in PORTB with two (2) seconds *delay.
- **Task 1.2:** Shifting left four (4) times by two (2) seconds *delays and shows the output in PORTB. Initial value for PORTB is 99H.

*Use *delays.h* Function Library

TASK 2:

Figure 1 shows the 2-inputs OR gate using transistor. Develop the truth table, modify and construct the circuit (add a LED) and write a C program.

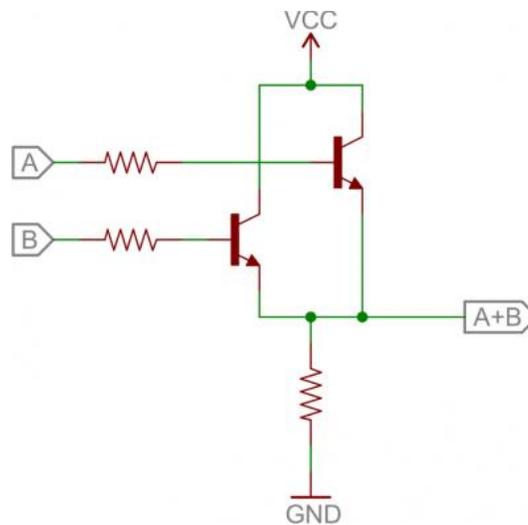


Figure 1: 2-Inputs OR Gate

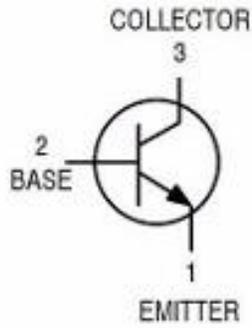
DISCUSSION:

CONCLUSION:

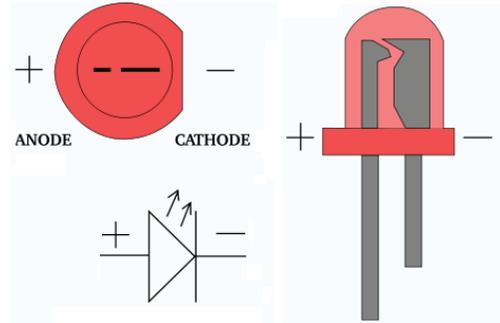
APPENDIX

NPN Transistor

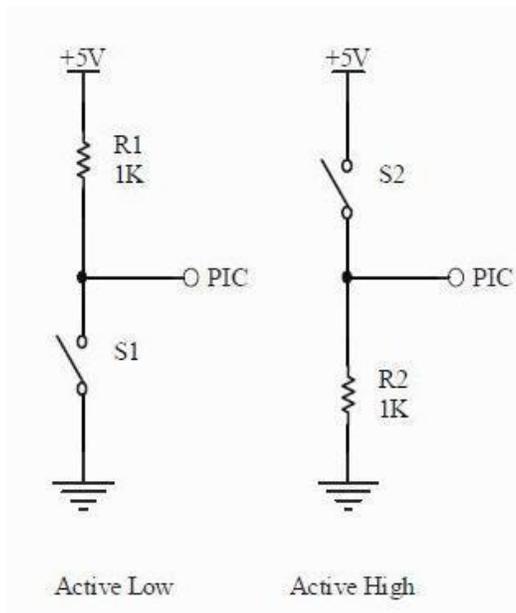
2N2222



Light Emitting Diode (LED)



Push Button/Switch



PIC18F4580 Pin Configuration

