(DE3 -3) Digital Transistor Inverter

Aim of experiment

This experiment will examine the operation of the Transistor inverter and compare the expected outputs to the truth tables for this device.

Apparatus

Prototyping Board– DC Power Supply 5V or 9V Battery – Light Emitting Diode (LEDs) – Transistors - Resistances – Connection Wires.

Theory of experiment

The use of transistors for the construction of logic gates depends upon their utility as fast switches. When the base-emitter diode is turned on enough to be driven into saturation, the collector voltage with respect to the emitter may be near zero and can be used to construct gates for the TTL logic family.

A simple 2-input logic NOT gate can be constructed using a RTL Resistor-transistor switches as shown in figure 1 with the input connected directly to the transistor base. The transistor must be saturated "ON" for an inverse output "OFF" at Q.

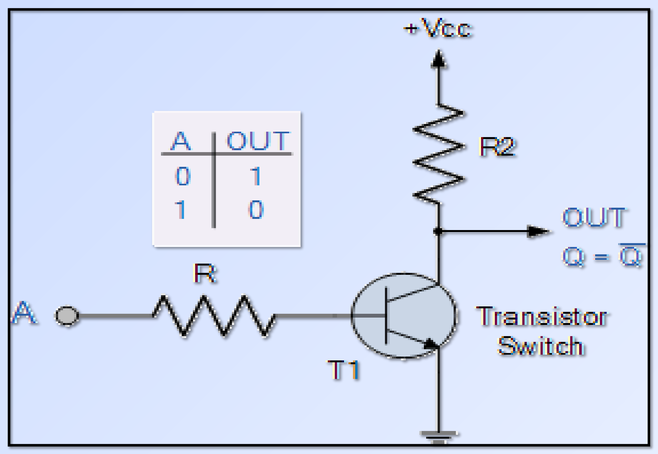


Figure 1. Transistor inverter

The NOT circuit or inverter performs the basic logic function of complementation. It may be identified by the presence of a bubble on the input or the output of the traditional logic symbol or a triangle on the IEEE/IEC logic symbol as seen in figure 2. The inverter has one input and one output and the output is the complement of the input. Figure 2 contains the truth table for the NOT function.

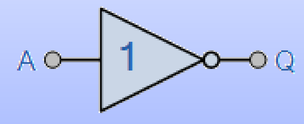
Symbol	Truth Table	
	**A**	**Q**
	0	1
	1	0
Boolean Expression Q = not A or A	Read as inverse of A gives Q	

Figure 2. logic symbols and truth table for the NOT function

Procedures

1. Connect the circuit as shown in figure 1 in the Prototyping board.
2. Connect the V_{cc} point in figure to 5 V.
3. Connect point A to input switches in Prototyping board, and connect OUT to output LED.
4. Change switch 1 on and off and show the output of LEDS.
5. Record the results in the following table.

Results

Switch 1	LED output
0	
1	
0	
1	

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