

(DE3 -10) NOR Gate

Aim of experiment

Examination of the operation of the NOR logic gate 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) – Digital ICs: 7402 NOR Gate – Connection Wires.

Theory of experiment

All logic gates have two or more inputs and one output. These logic gates accept digital logic levels on their inputs and will provide a digital logic level output which is dependent on the type of logic gate and the inputs applied to the gate. For the TTL logic family, any gate input that is not connected will be treated as if logic 1 is present on that input. The number of different possible combinations of inputs is 2^n where n is the number of inputs. Therefore, four unique combinations of inputs are possible for a two input gate.

The complement of the OR function is the NOR function and the logic symbol has the inversion present on the output. *Figure 1* contains the logic diagram and the truth table for the NOR function and the Boolean Equation.

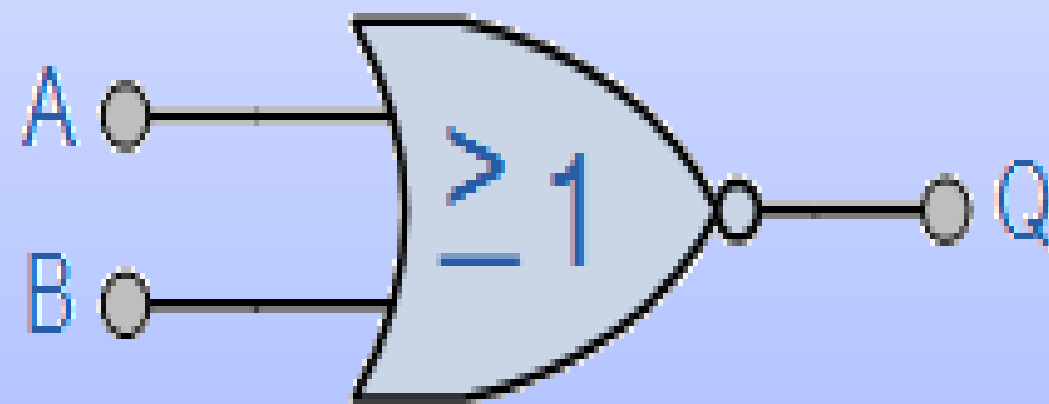
Symbol	Truth Table		
	B	A	Q
	0	0	1
	0	1	0
	1	0	0
	1	1	0
2-input NOR Gate			
Boolean Expression $Q = A+B$		Read as A OR B gives NOT Q	

Figure 1. Logic symbols and truth table for the NOR function

The NOR gate can generate by connect OR gate and NOT gate series as shown in *figure 2*.

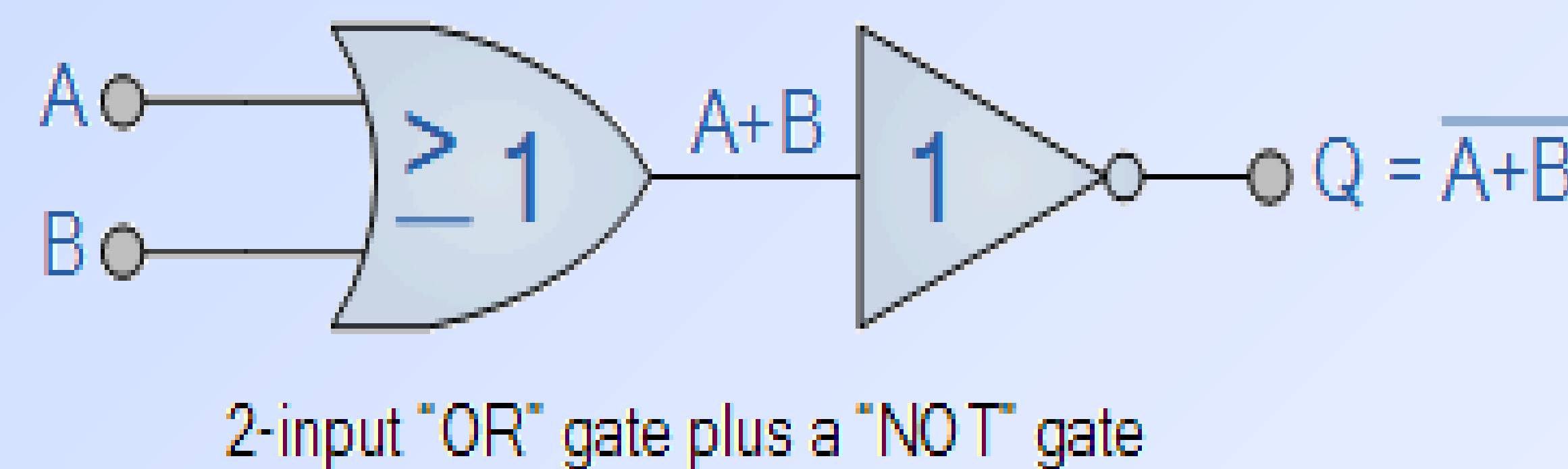
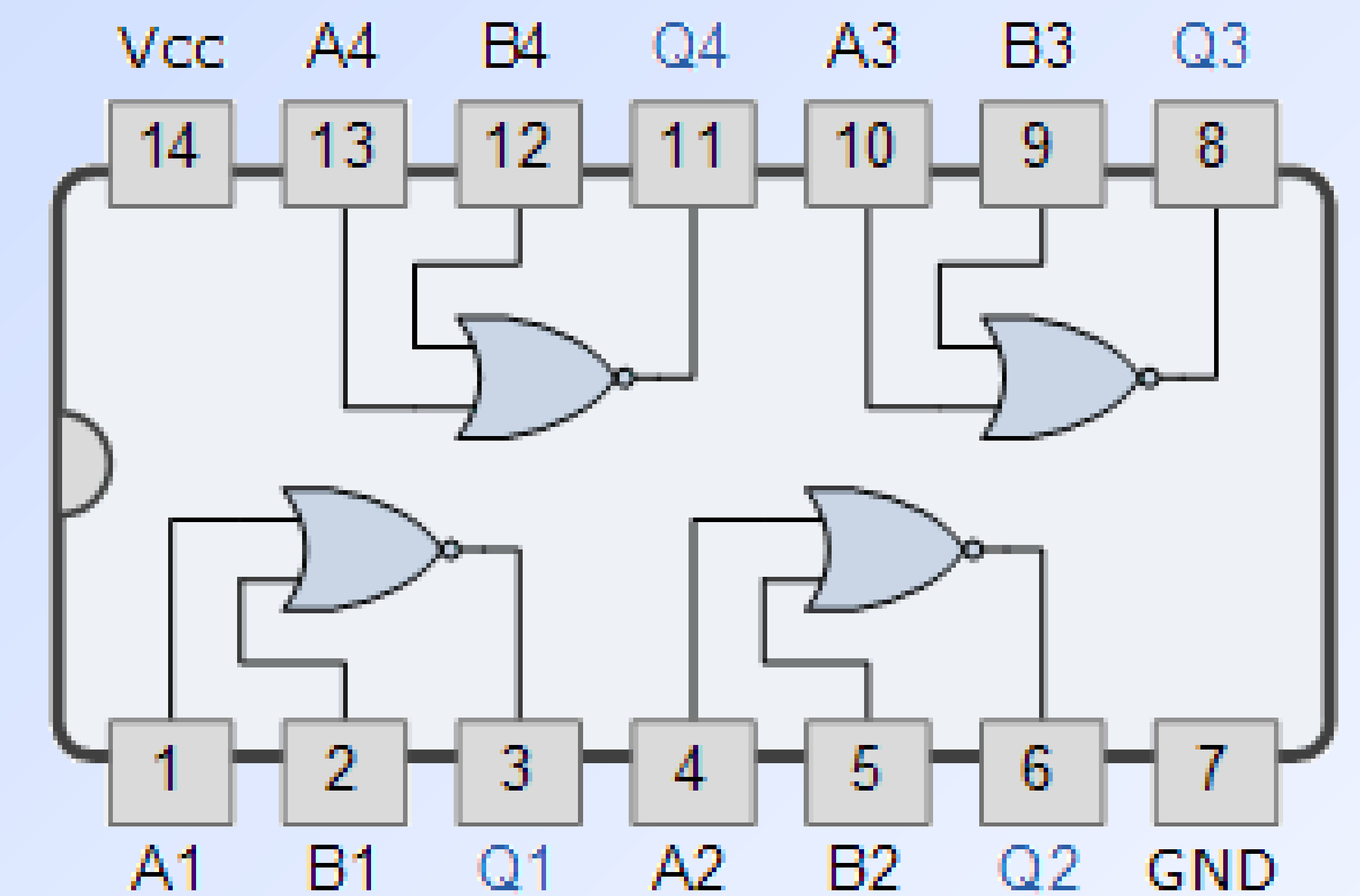


Figure 2. Equivalent circuit to NOR gate

Procedures

1. Put the 7402 NOR Gate shown in the Prototyping board.
2. Connect the pin 14 to 5 V and pin 7 to ground.
3. Connect pin 2 and 3 to input switches in Prototyping board, and connect pin 1 to output LED.
4. Change switches 1 and 2 on and off and show the output of LEDS.
5. Record the results in the following table.



Results

Switch 1	Switch 2	LED output
0	0	
1	0	
0	1	
1	1	