

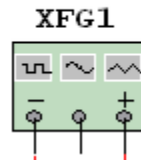
# Lab Project 2

## 2Bit Binary Up Counter Simulation

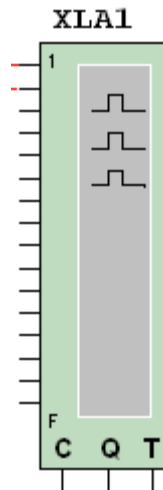
### Notes and Setup Procedure

To simulate a 2Bit Binary Counter in Multisim requires two important pieces of test equipment: Function Generator and a Logic Analyzer

Function Generator



Logic Analyzer



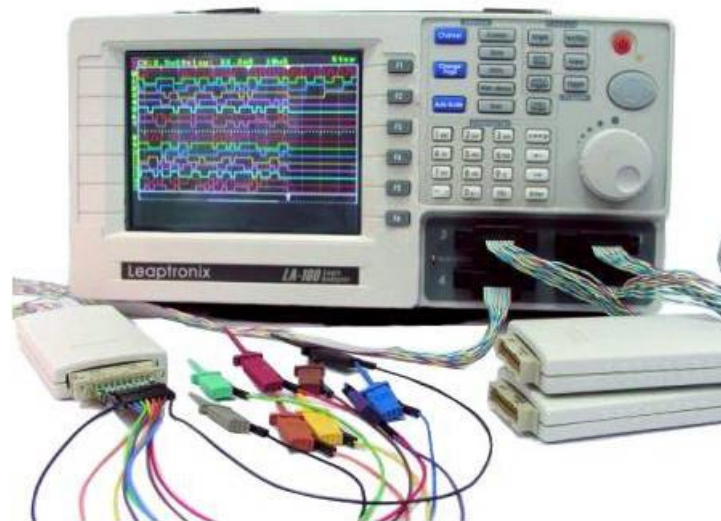
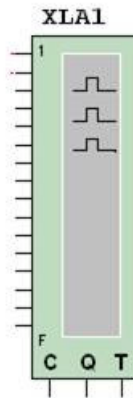
# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Notes

A Logic Analyzer is used for fast data acquisition of logic states and advanced timing analysis to help design large digital systems and carry out troubleshooting.

Logic Analyzer

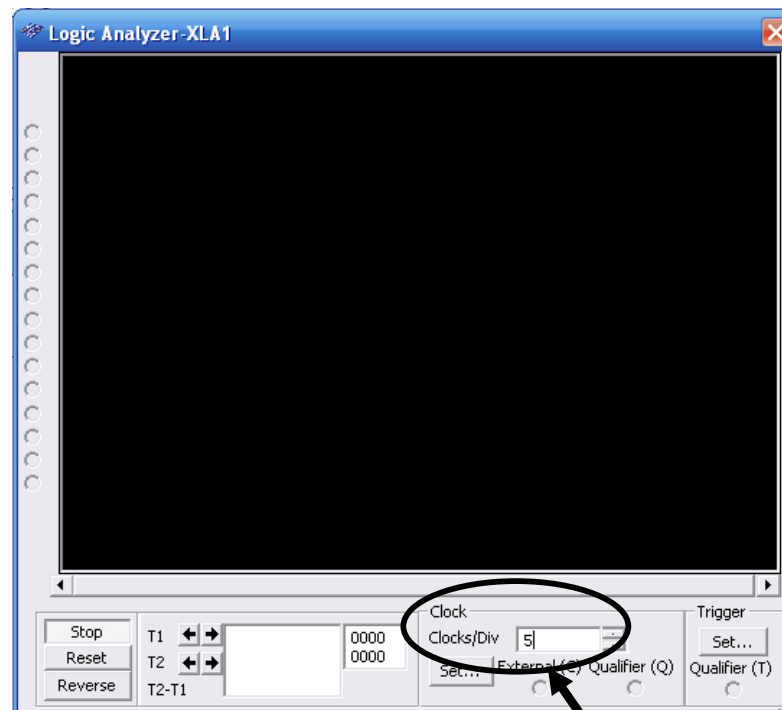


# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Notes and Setup Procedure

Double click the Logic Analyzer Icon with the mouse and adjust the test instrument as shown in the Figure below.



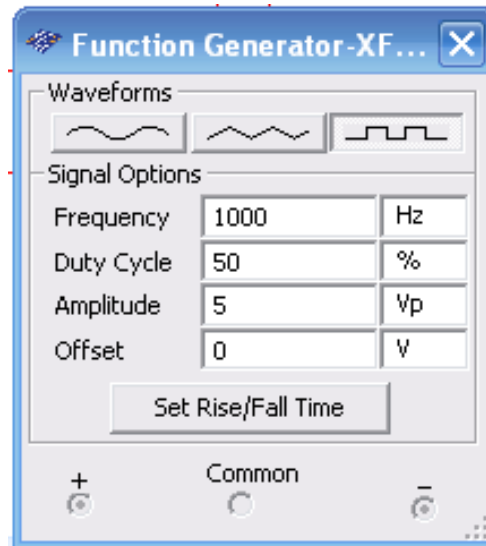
Adjust Clocks/Div  
to 5

# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Notes and Setup Procedure

Double click the Function Generator Icon with the mouse and adjust the test instrument as shown in the Figure below.





# Lab Project 2

## 2Bit Binary Up Counter Simulation Notes and Setup Procedure

### **Lab Procedure**

- Build the 2Bit Up Binary Counter on page 157 of the Laboratory Manual using Multisim.
- Run a simulation event on the digital circuit.
- The Logic Analyzer shall display a series of square-wave pulses on the screen.
- Complete the Truth Table Showing FF (Flip-Flop) Binary States and the equivalent Decimal Count Value (slide 6).
- Build the 2Bit Up Counter on page 157 of the Laboratory Manual on the breadboard and validate the Counting Operation using the Truth Table

# Lab Project 2

## 2Bit Binary Up Counter Simulation

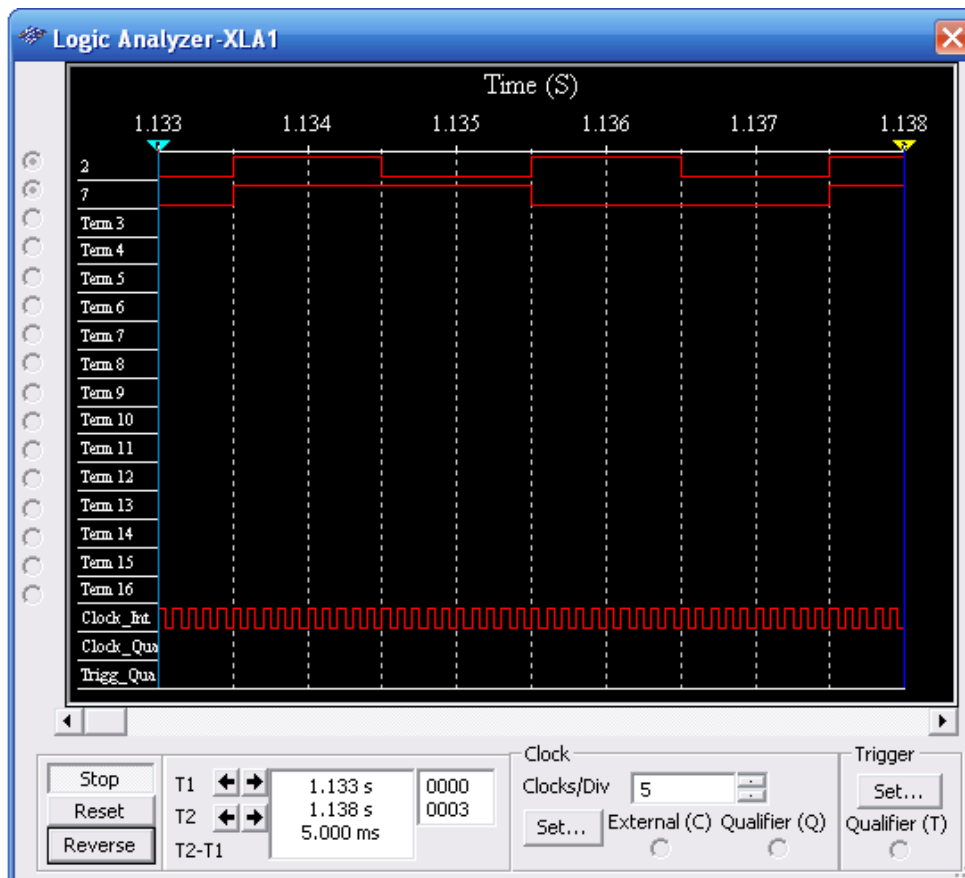
### Notes and Setup Procedure

Flip-Flop Output		
2Q	1Q	Decimal Count Value
0	0	
0	1	
1	0	
1	1	

2Bit Binary Up Counter  
Truth Table

# Lab Project 1

## 2Bit Binary Counter Simulation Notes

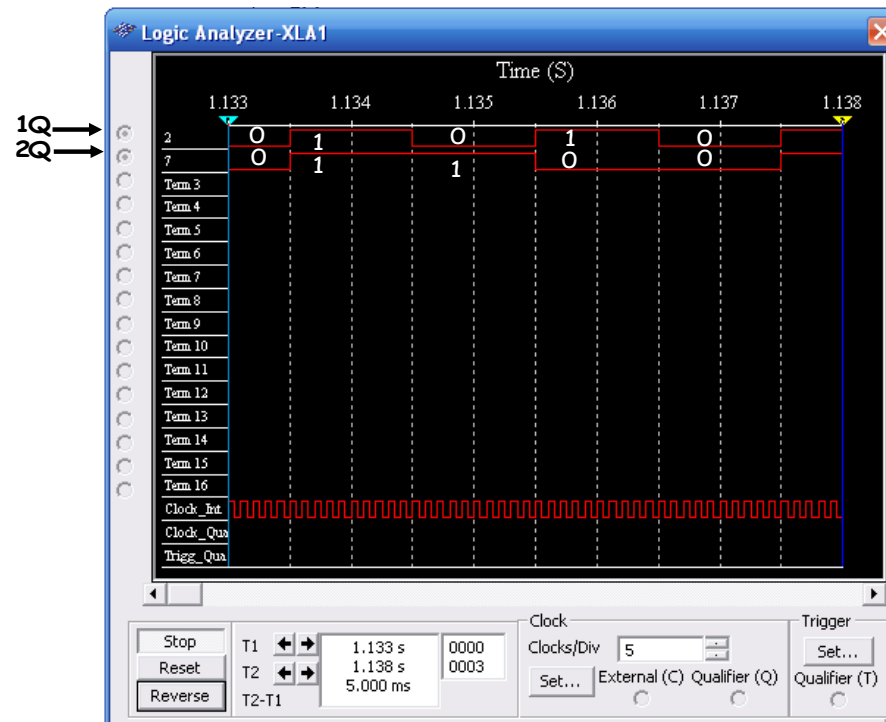


# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Notes

Convert the square-wave pulses into Binary "1s" and "0s" data.





# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Tech Questions

---

### **SMART ENERGY DESIGN ANALYSIS**

- What components comprise of the **IHD** (In Home Display)?
- What subcircuit of the 2Bit Binary Up Counter provides the Human Machine Interface (**HMI**) for User Input?
- What subcircuit provides the **Cycling** for the 2Bit Binary Up Counter?



# Lab Project 2

## 2Bit Binary Up Counter Simulation

### Tech Questions

---

### **Lab Report Requirements**

Discuss the **SMART Energy** Design Analysis Tech Questions in the Lab Report and place the information under the **Practical Applications** Section of the document.