ELECTRICAL ENGINEERING DEPARTMENT

BME310: BIO-ELECTRONICS I

FALL 2019

CIRCUIT ANALYSIS USING MULTISIM TUTORIAL

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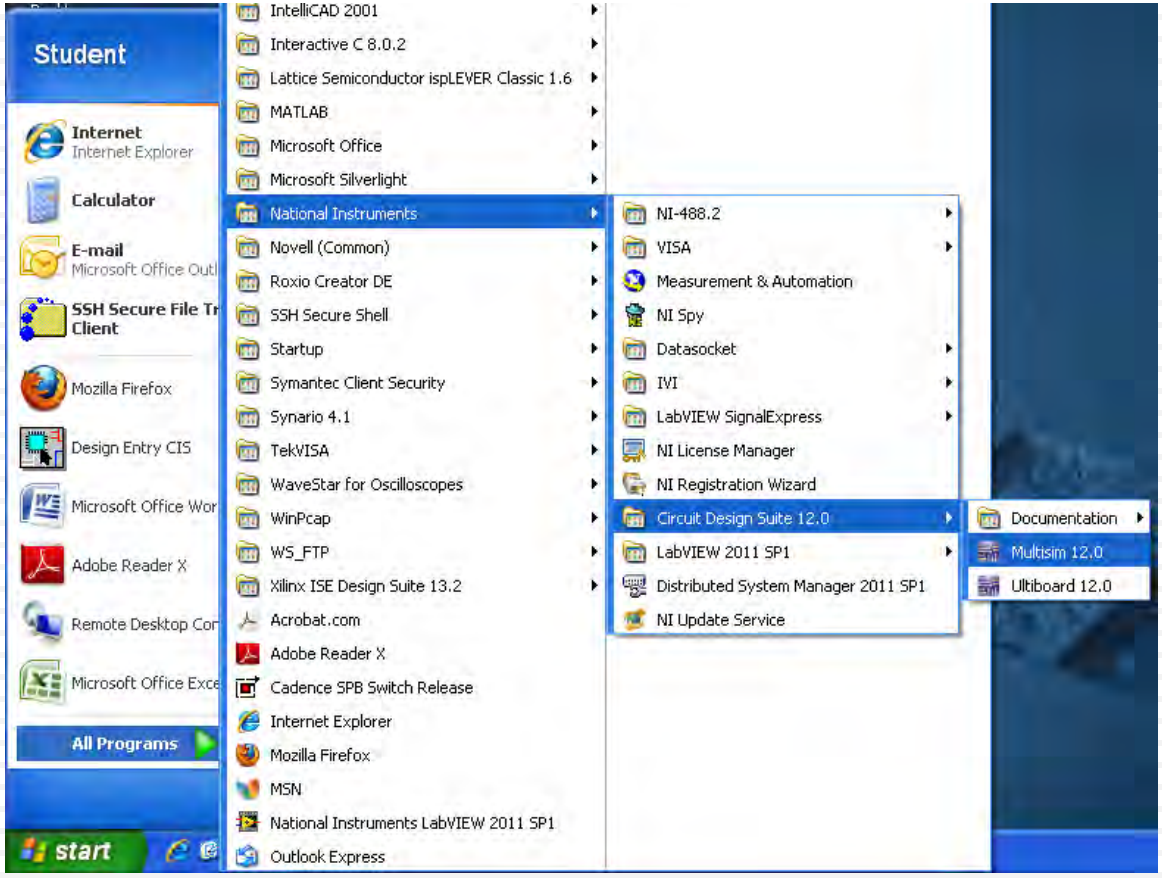
What is Multisim?

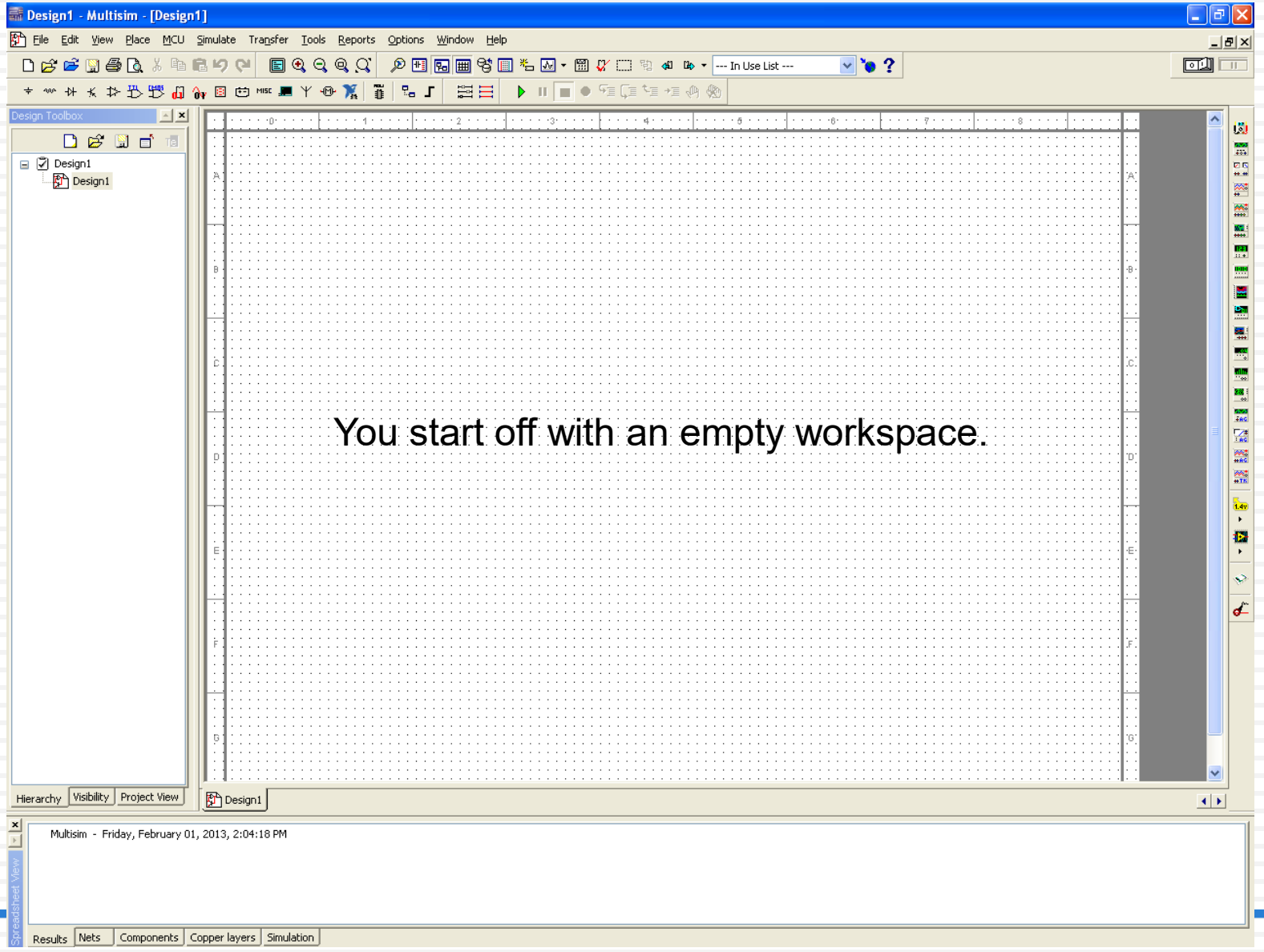
- A virtual circuit simulator for both analog and digital design
- Allows you to test circuits without having to physically build them

Starting the Program

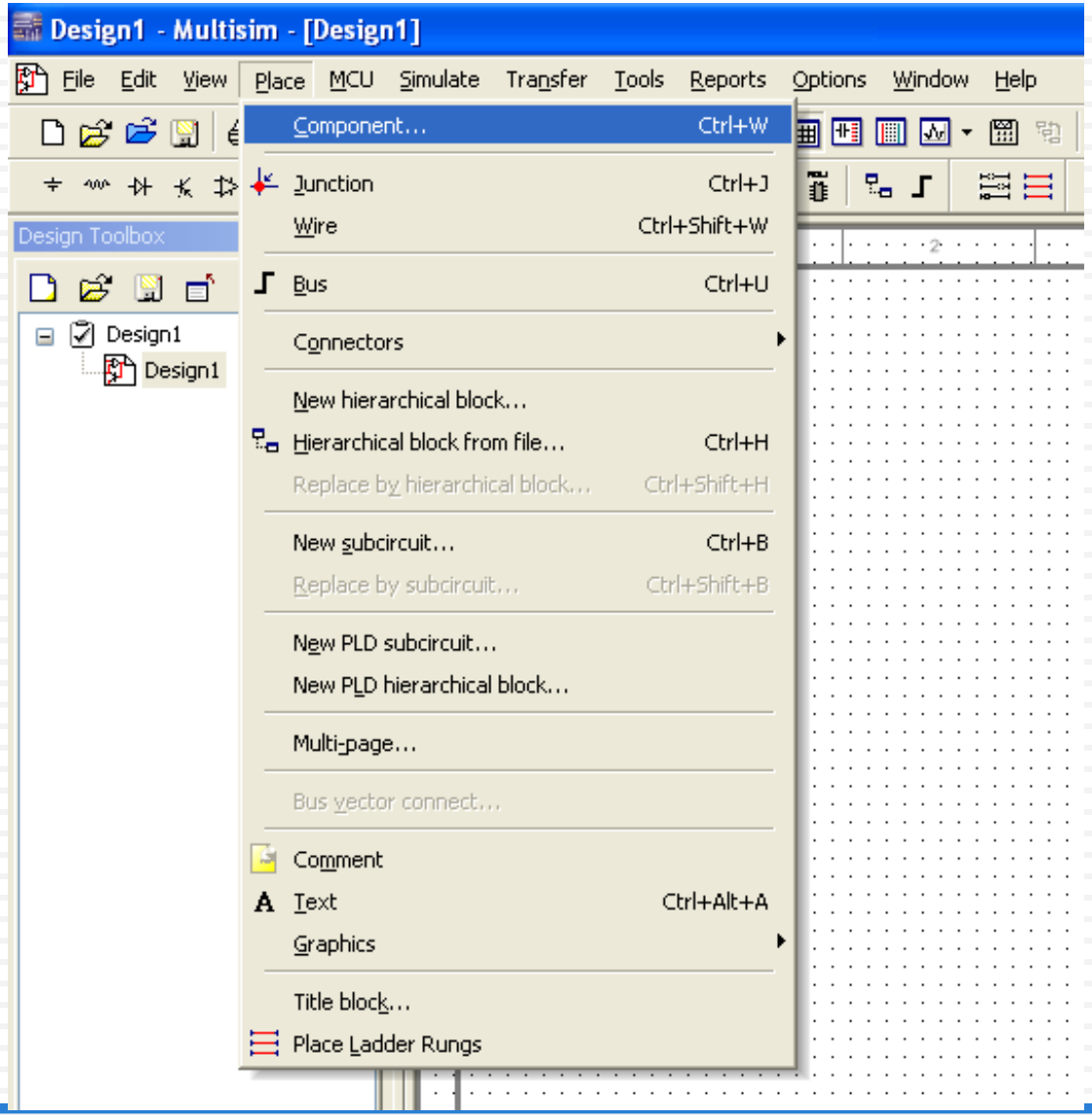
- Start Menu → All Programs → National Instruments → Circuit Design Suite → Multisim



Program Interface

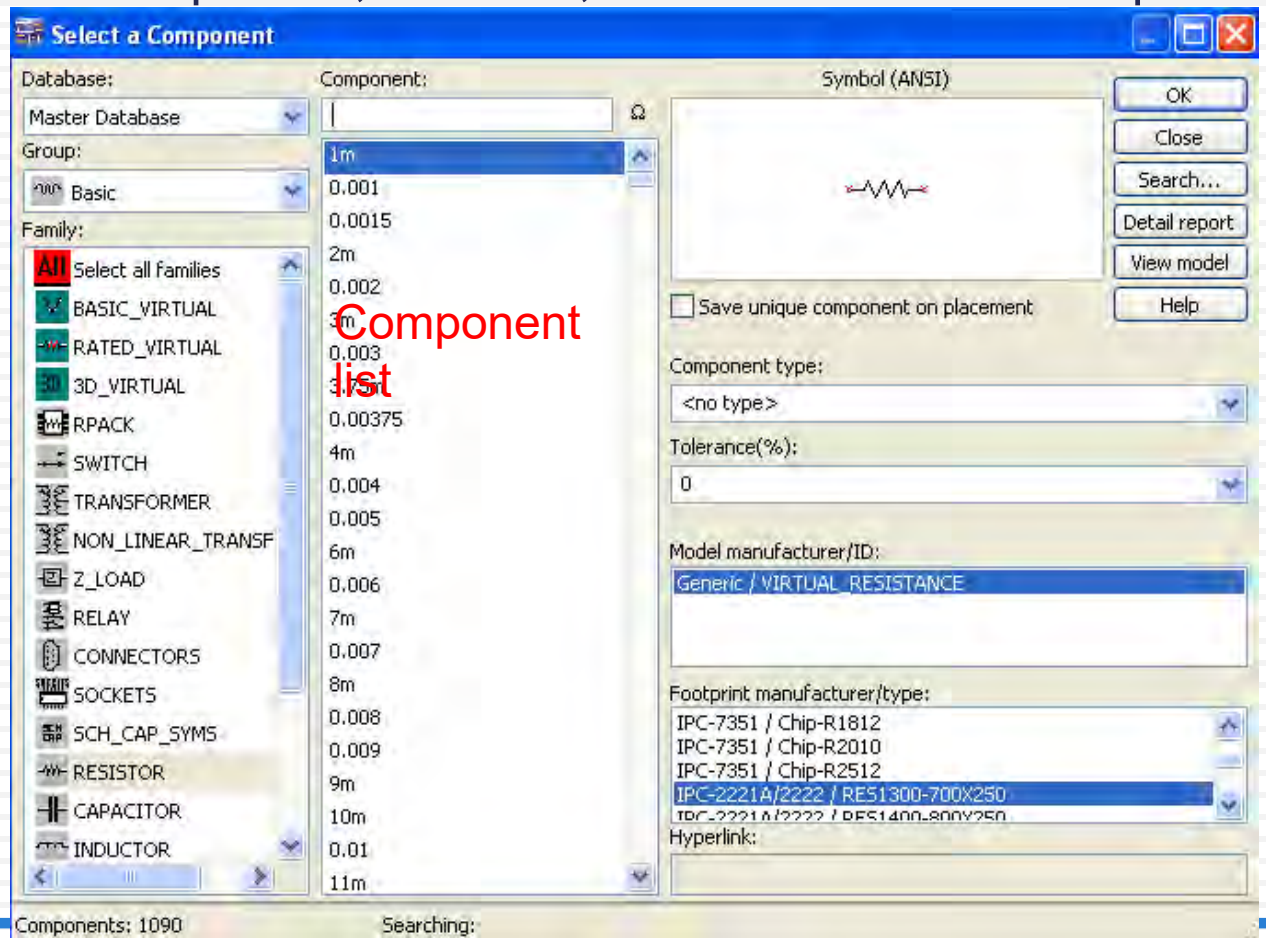


Placing Components

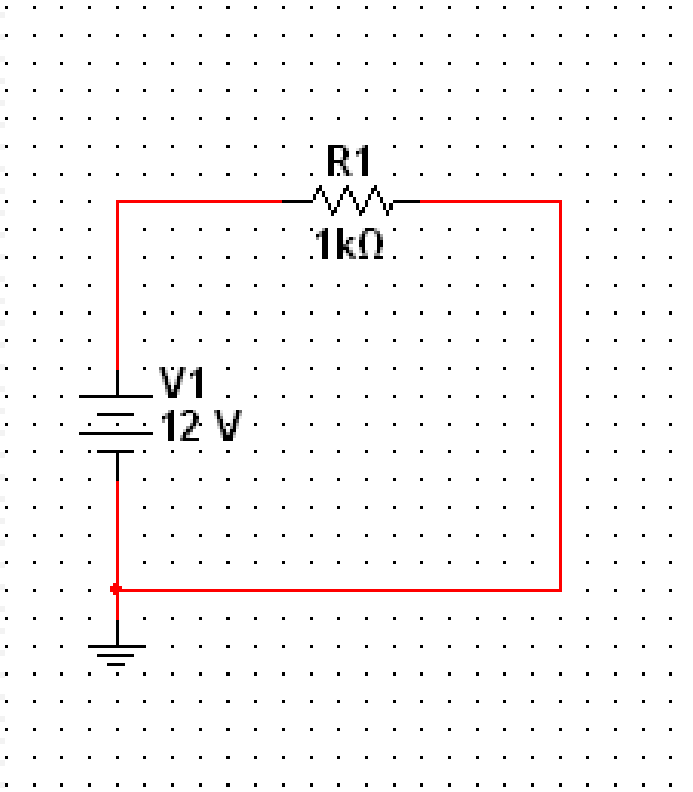


Placing Components onto the Workspace

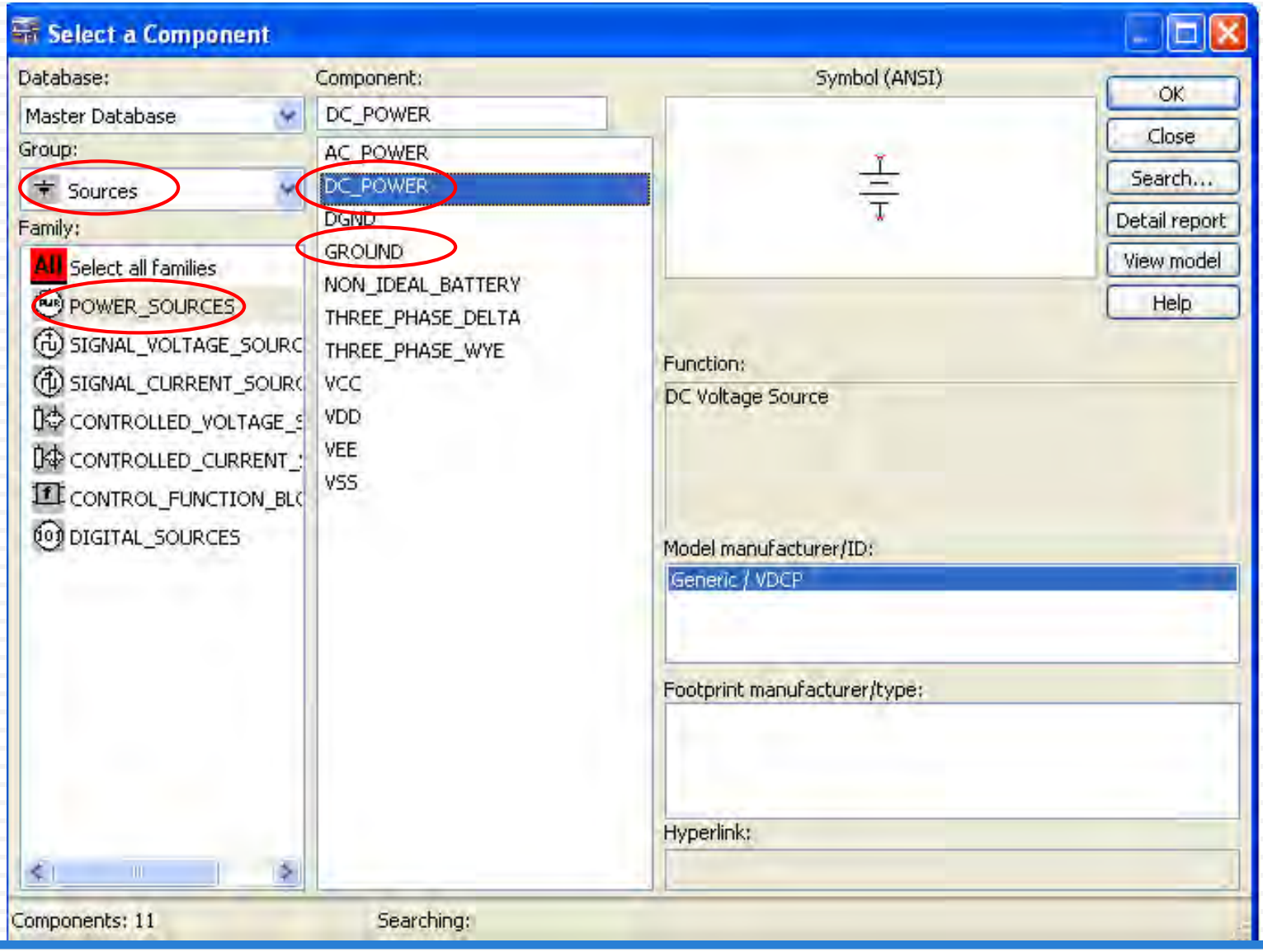
- Filter the components you want to see by using the Group dropdown, selecting a Family, and searching for the Component name
- Select your component, click OK, and click on the workspace to place it



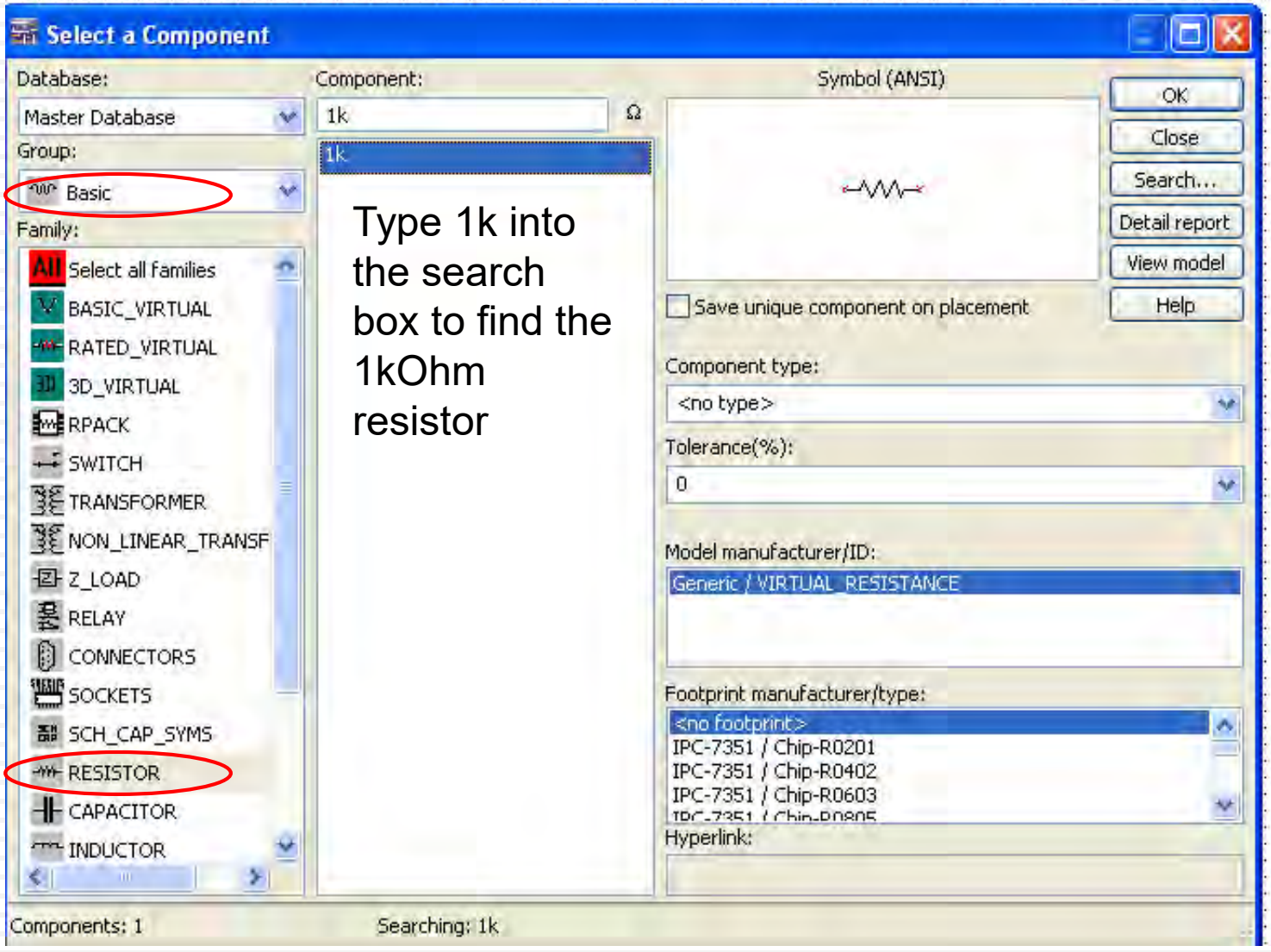
Let's Build This Circuit



Finding the Voltage Source and Ground

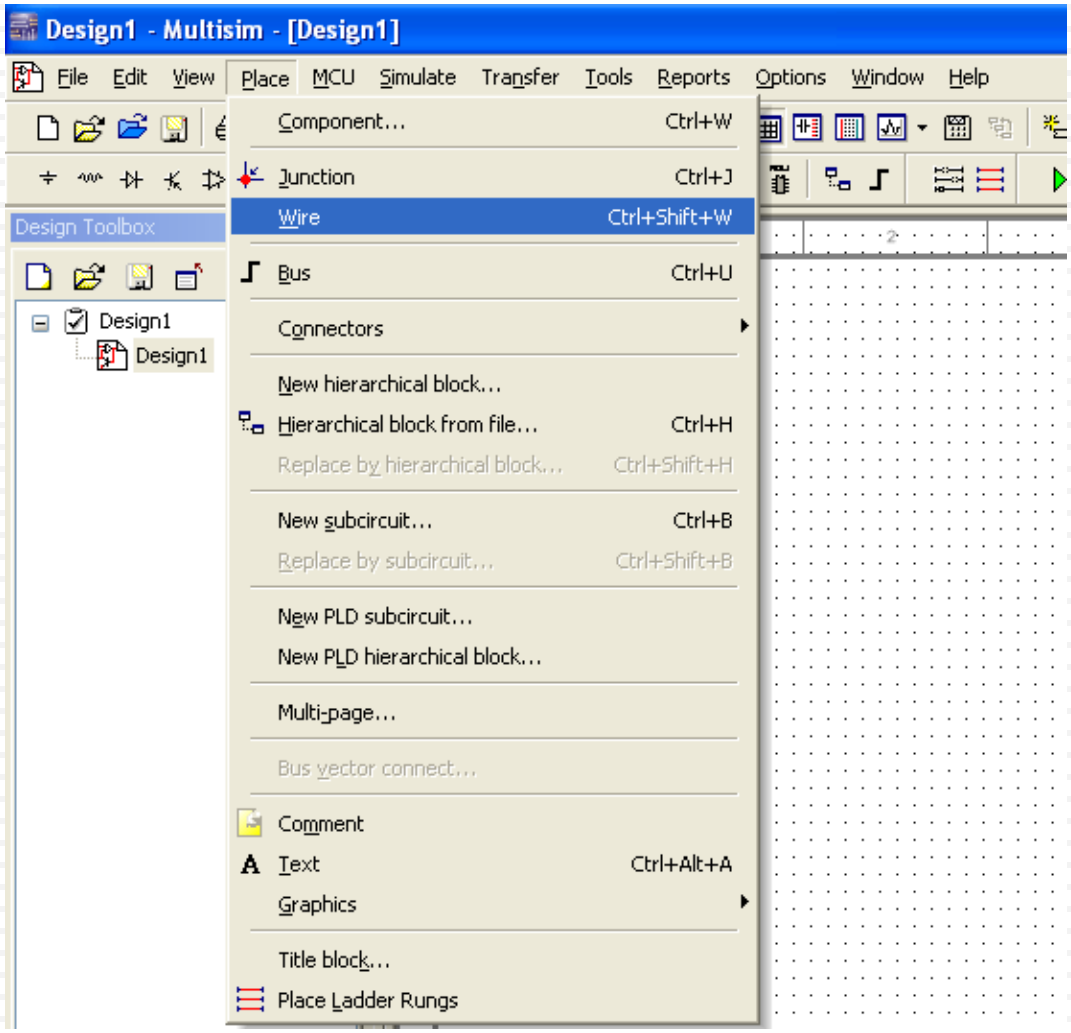


Finding the Resistor



Placing Wires

- A circuit is not complete if the components are not connected
- Click Place → Wire
- Click on the workspace to designate the start point and click again to place the stop point

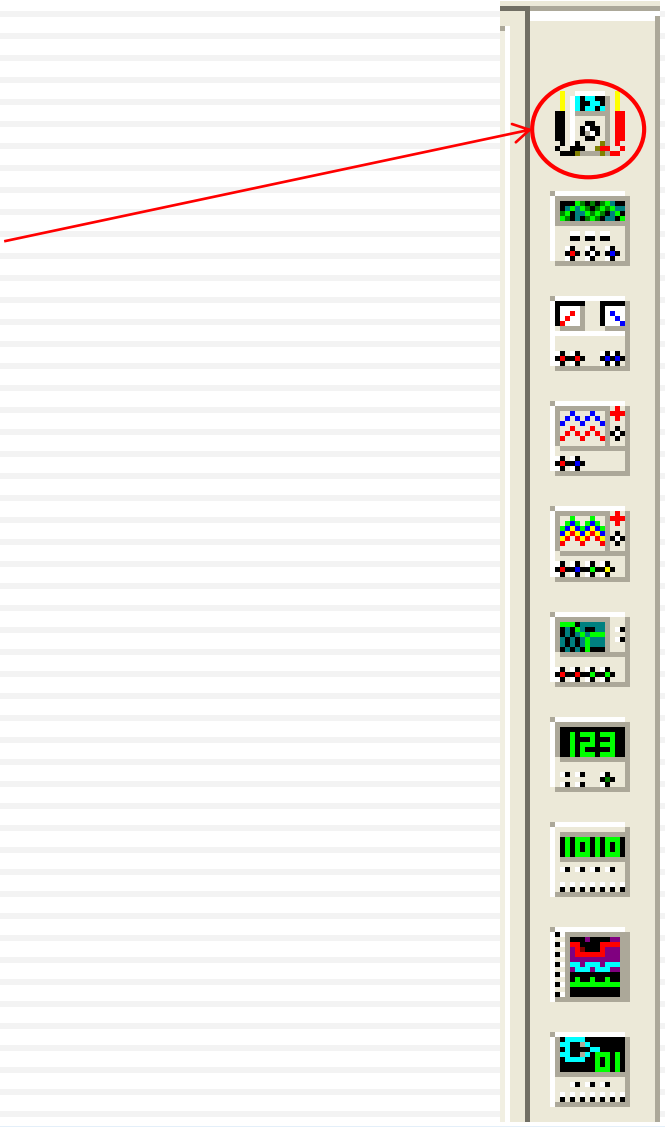


Taking Measurements

- We need to tell the software where we want to measure and what to measure with
- Let's use the multimeter to measure the voltage across the resistor and the current through it

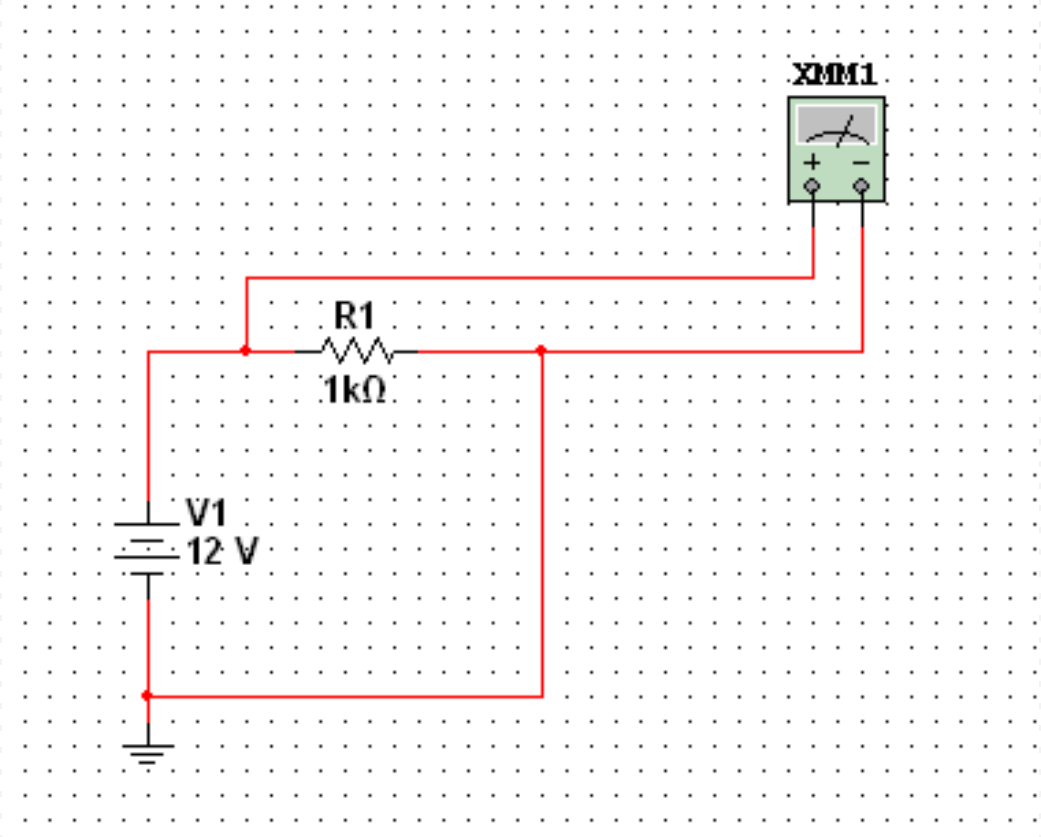
Measuring with the Multimeter

- On the right hand side, click the Multimeter (1st icon)
- Place onto the workspace



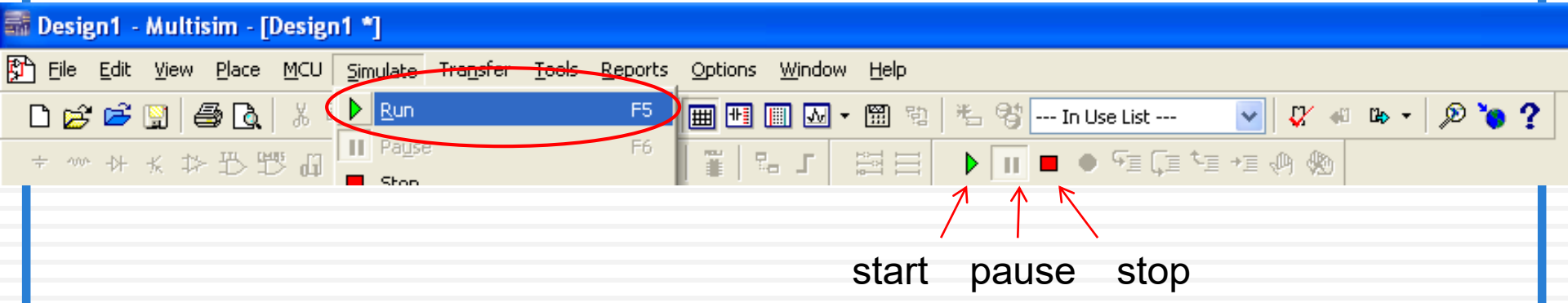
Measuring the voltage across R1

Use wires the connect the positive and negative terminals of the multimeter to the circuit.



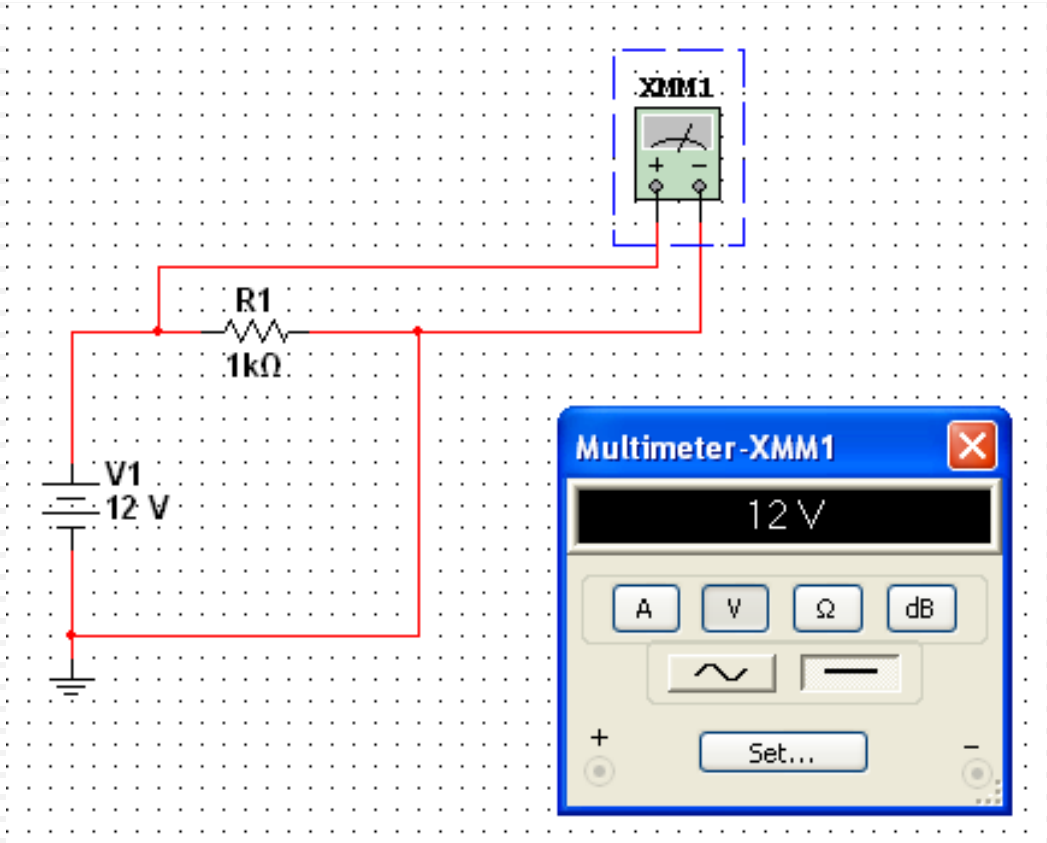
Simulating

- To simulate the circuit, go to Simulate → Run, Hit F5, or click the Play button



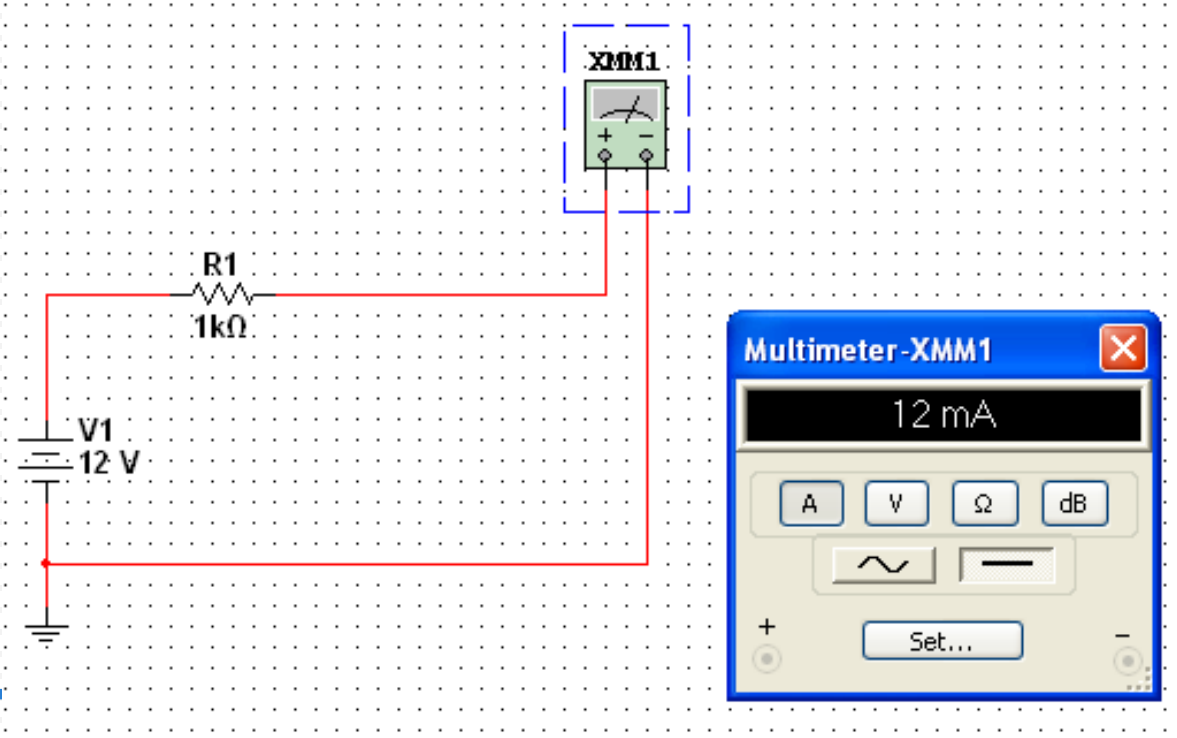
Reading the Voltage

- Double-click the multimeter icon on your workspace and click the V button
- It says 12V which is what we expect



Reading the Current

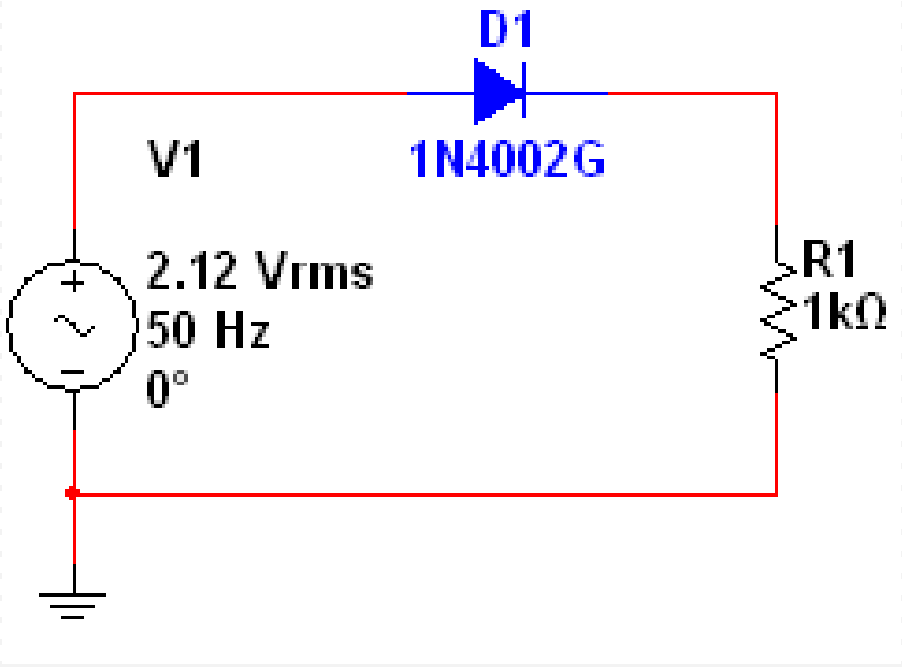
- To measure the current at a location within a circuit, we must place the measuring device in series with the circuit at that location
- Close the multimeter window and Stop the simulation
- Connect the multimeter as shown and Start the simulation
- Double-click the multimeter and click the A button
- It says 12mA which is what we expect (12V/1kOhm=12mA)



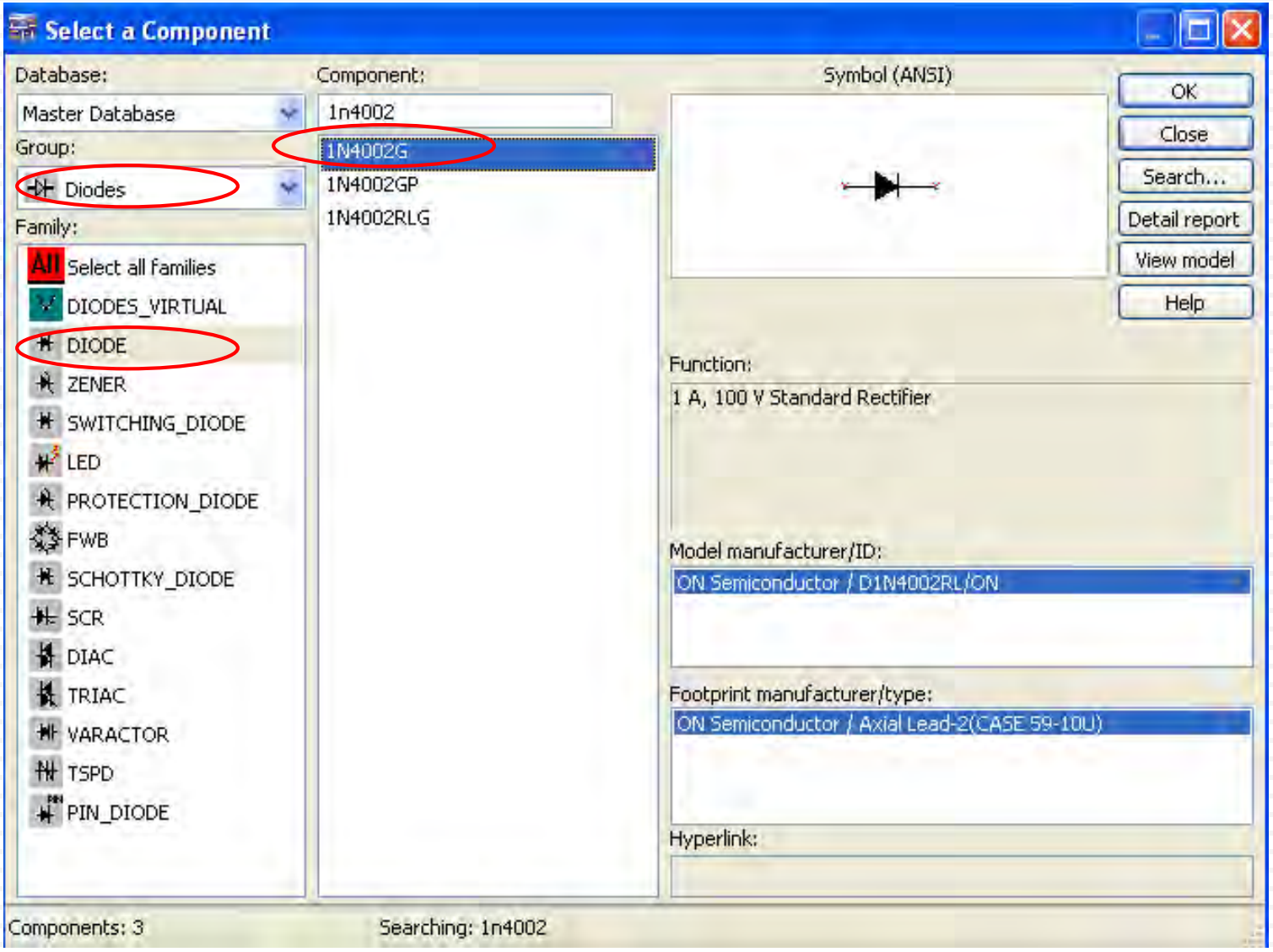
Diodes and AC Circuits

- Diodes are essentially electrical switches
- The switch is CLOSED when the voltage across the diode exceeds some threshold (~0.6V)
- Otherwise, it is OPEN (OFF)

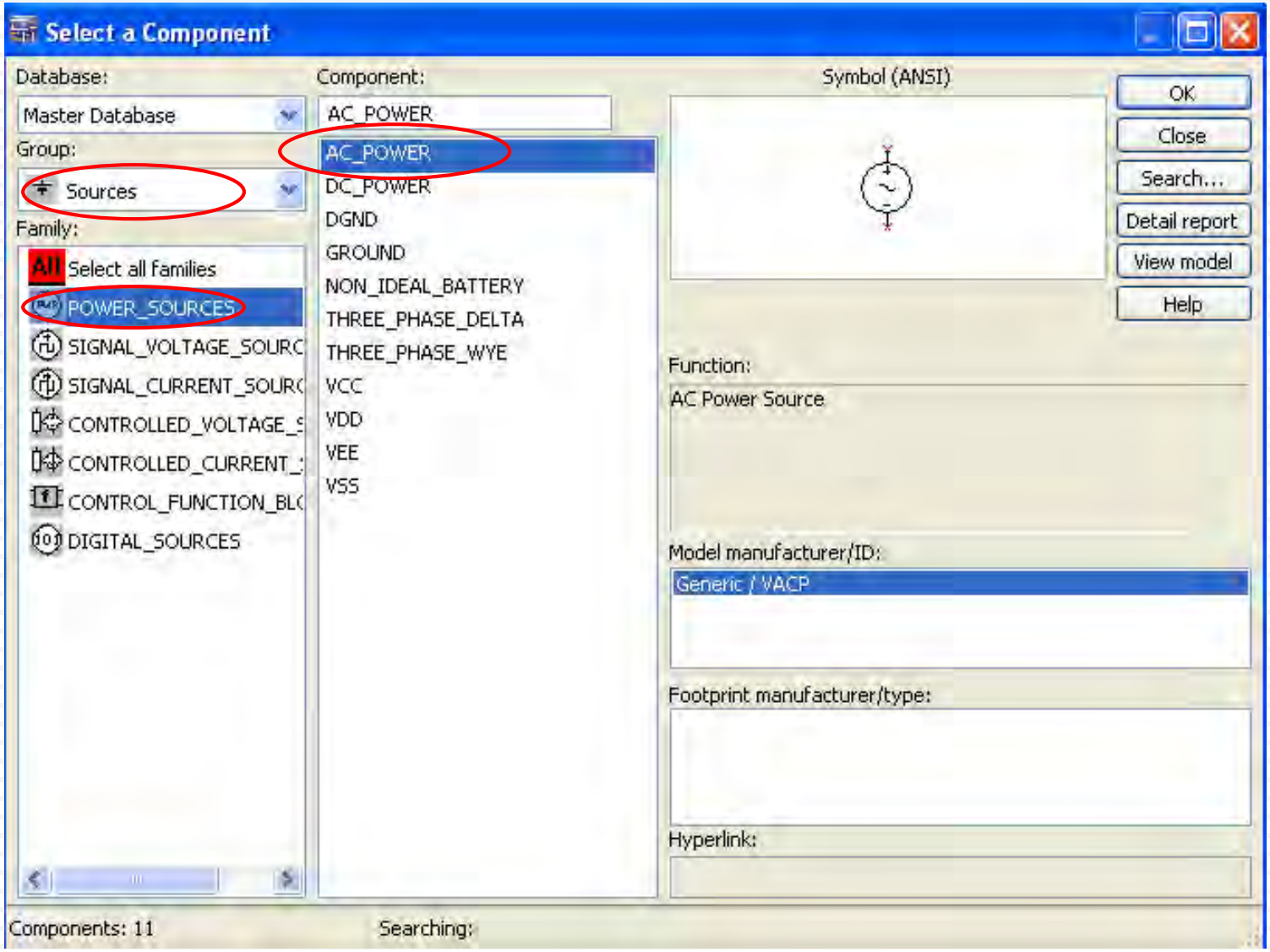
Let's Build This Circuit (2)



Finding the Diode



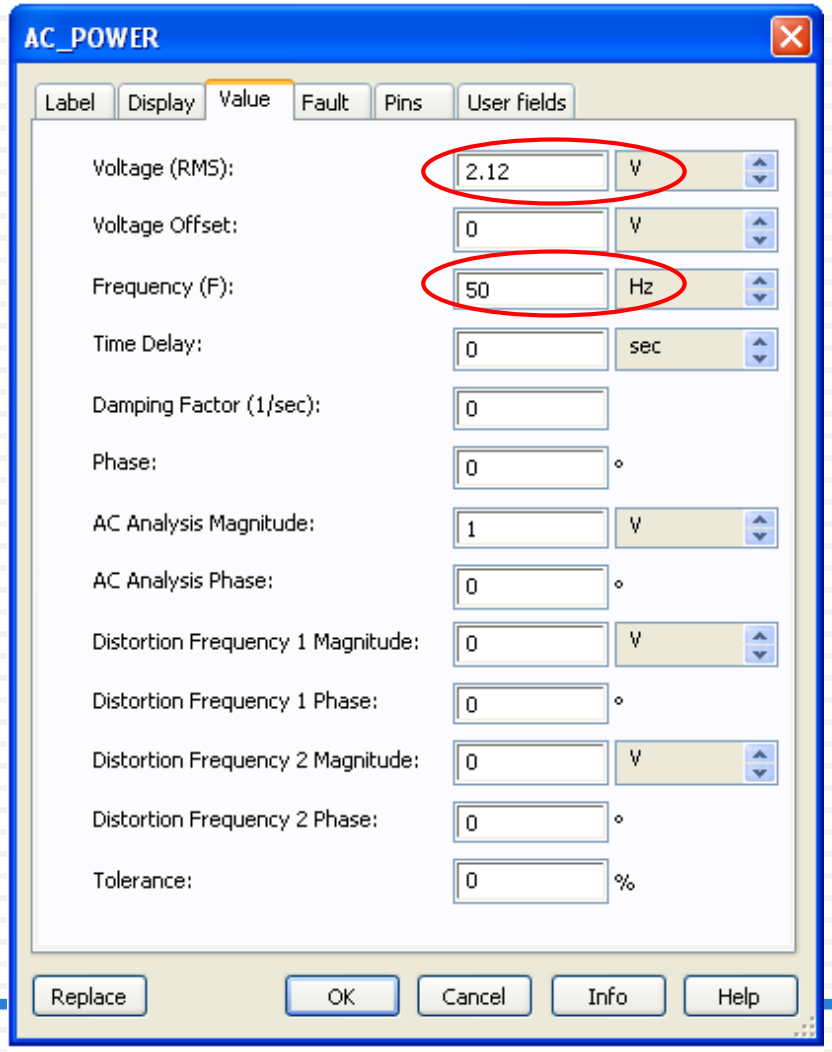
Finding the AC Source



Changing the AC Source Values

Double-click the AC source and change the fields to match the ones below.

2.12 Vrms is 3 Vpeak

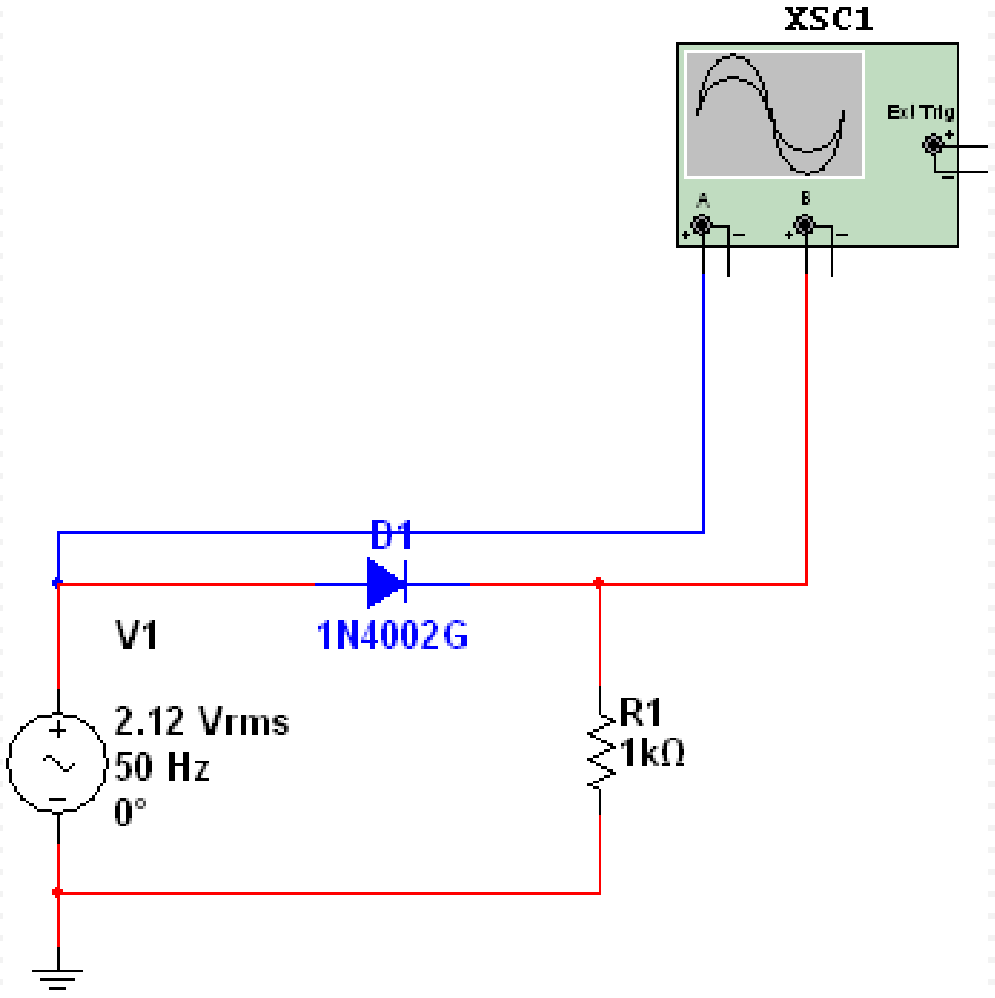


Measuring the Voltage Across R1

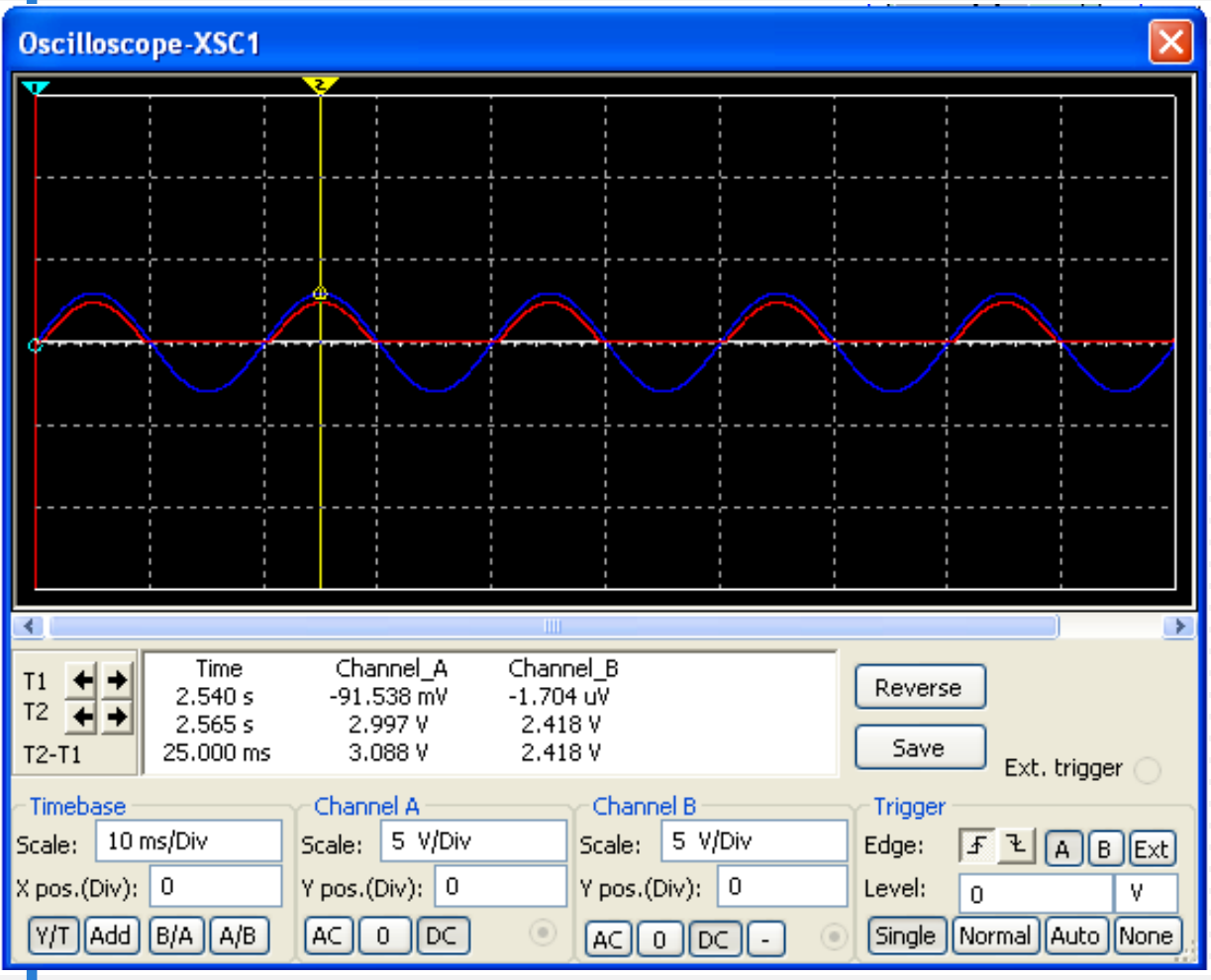
- Because we are using an AC source, we need to use an oscilloscope to the see the AC voltage
- From the right-hand column, select the Oscilloscope (4th icon down) and place it onto the workspace

Connect as follows…

- Change the color of the wire in Terminal A by right-clicking it and selecting Color Segment
- This configuration will measure the input voltage (Terminal A) and the voltage after the diode and across R1 (Terminal B)
- The negative terminals are left open because the ground reference is the same for both measurements
- However, if they were not the same, they must be connected appropriately



Simulation



- Start the simulation and double-click the oscilloscope
- Hit Single on the bottom right
- Drag the triangle markers across the traces to read their values

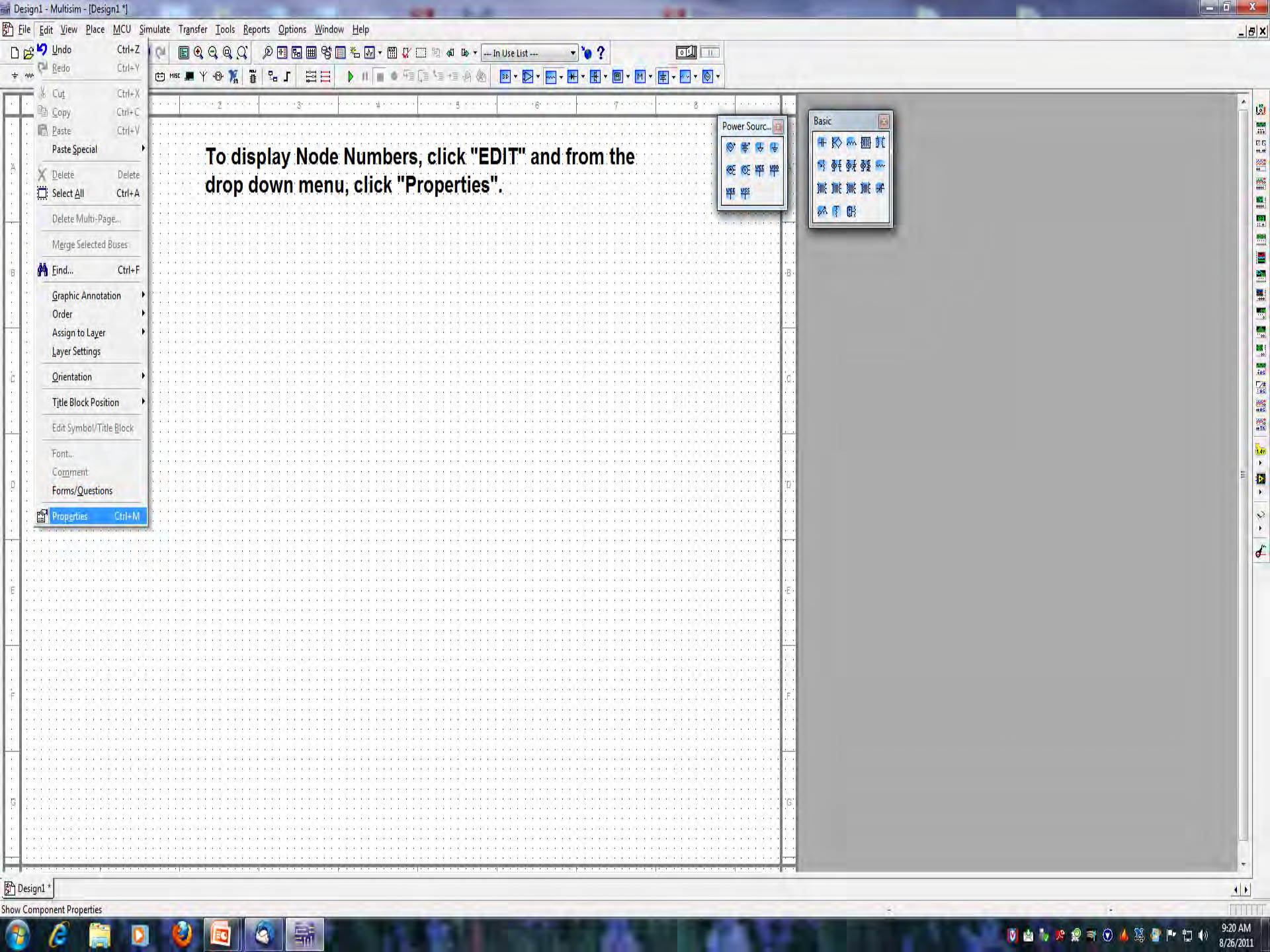
Analysis

- The peak voltage for Channel A is 3V which is expected
- The peak voltage for Channel B is 3V-0.6V=2.4V which is correct
- But the red trace has no negative portion!!!
- This is because the diode is ON only when the voltage across it is 0.6V, therefore, no current will pass through when the AC source dips below 0.6V

Oscilloscopes

- Try measuring the circuit with the other oscilloscope components (e.g. Agilent Oscilloscope or Tektronix Oscilloscope)
- They look like the actual scopes seen on your lab benches
- Play around with the knobs to get familiar with their functions

Multisim Hints

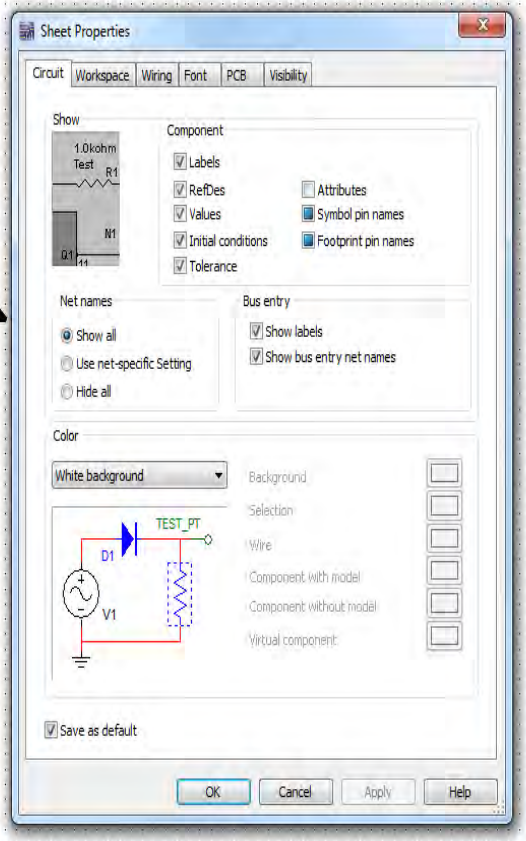

Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Paste Special
Delete Delete
Select All Ctrl+A
Delete Multi-Page...
Merge Selected Buses
Find... Ctrl+F
Graphic Annotation
Order
Assign to Layer
Layer Settings
Orientation
Title Block Position
Edit Symbol/Title Block
Font...
Comment
Forms/Questions
Properties Ctrl+M
--- In Use List ---
To display Node Numbers, click "EDIT" and from the drop down menu, click "Properties".
Power Sourc...
Basic
Design1 *
Show Component Properties
9:20 AM
8/26/2011

Design1 - Multisim - [Design1 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

The resulting "Sheet Properties Menu" allows preferences to be changed to accomodate individual needs.

For example, to display "Node Numbers", click "Show All".



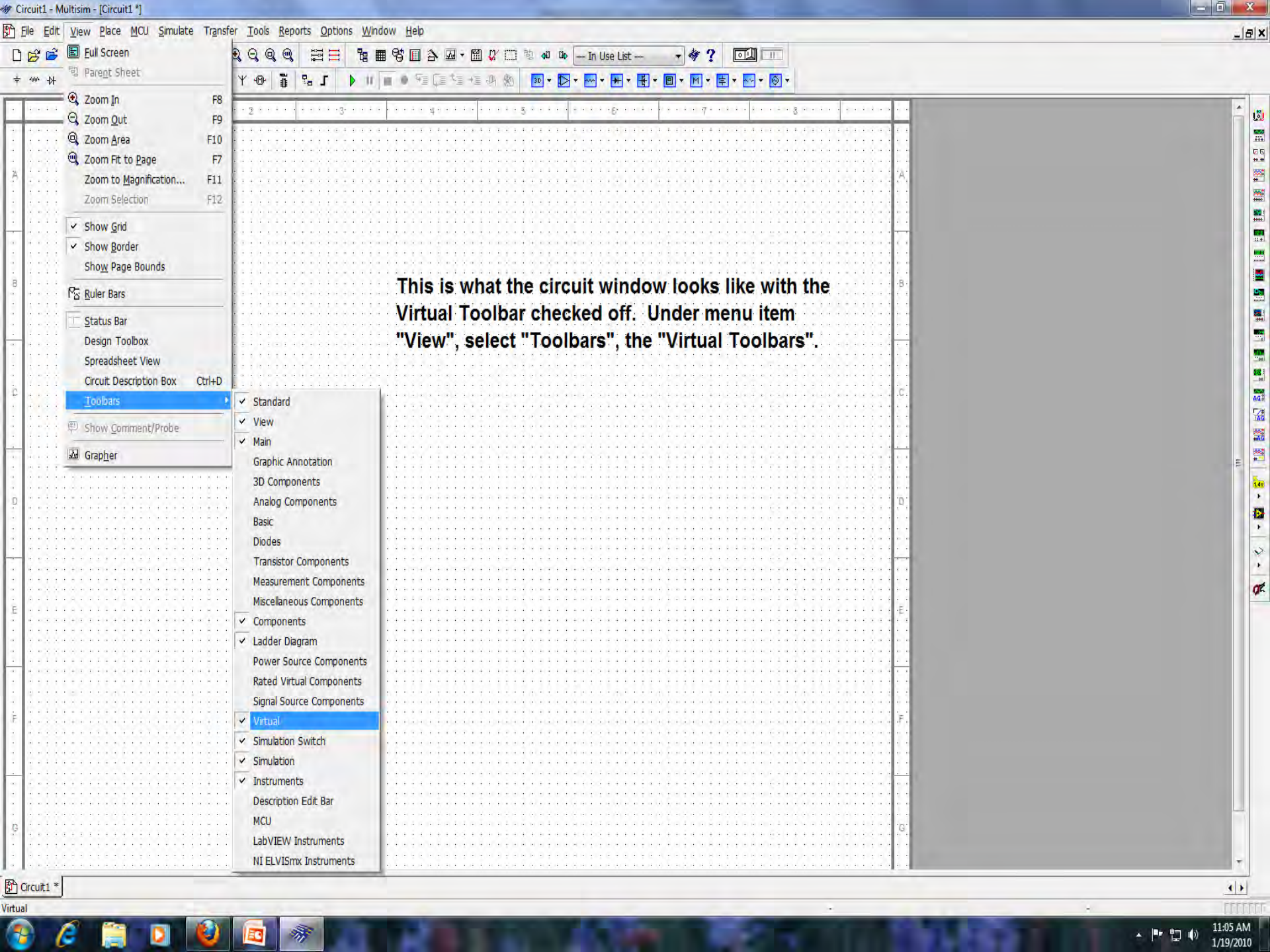
Power Sourc...

Basic

Design1 *

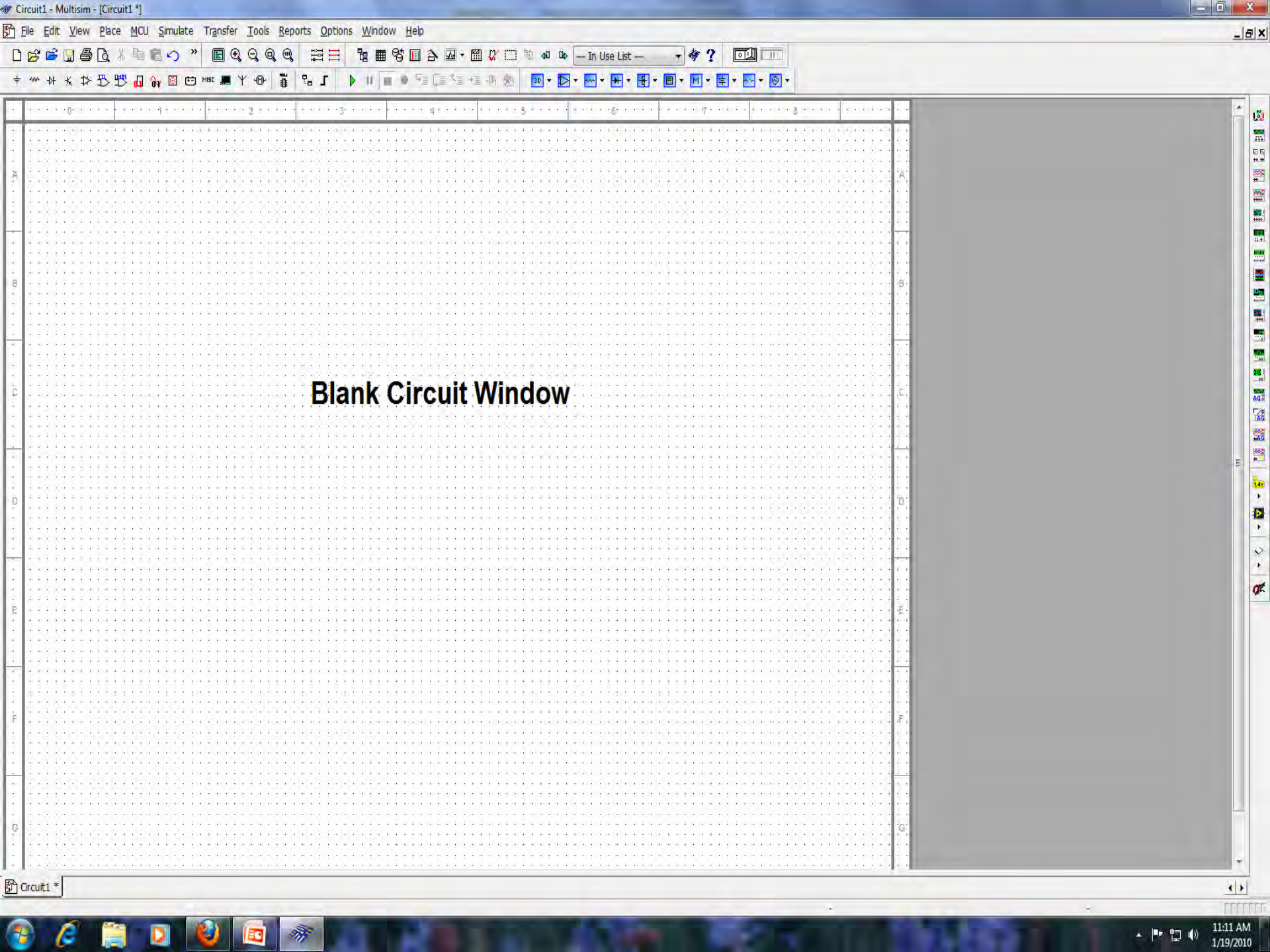
9:32 AM
8/26/201

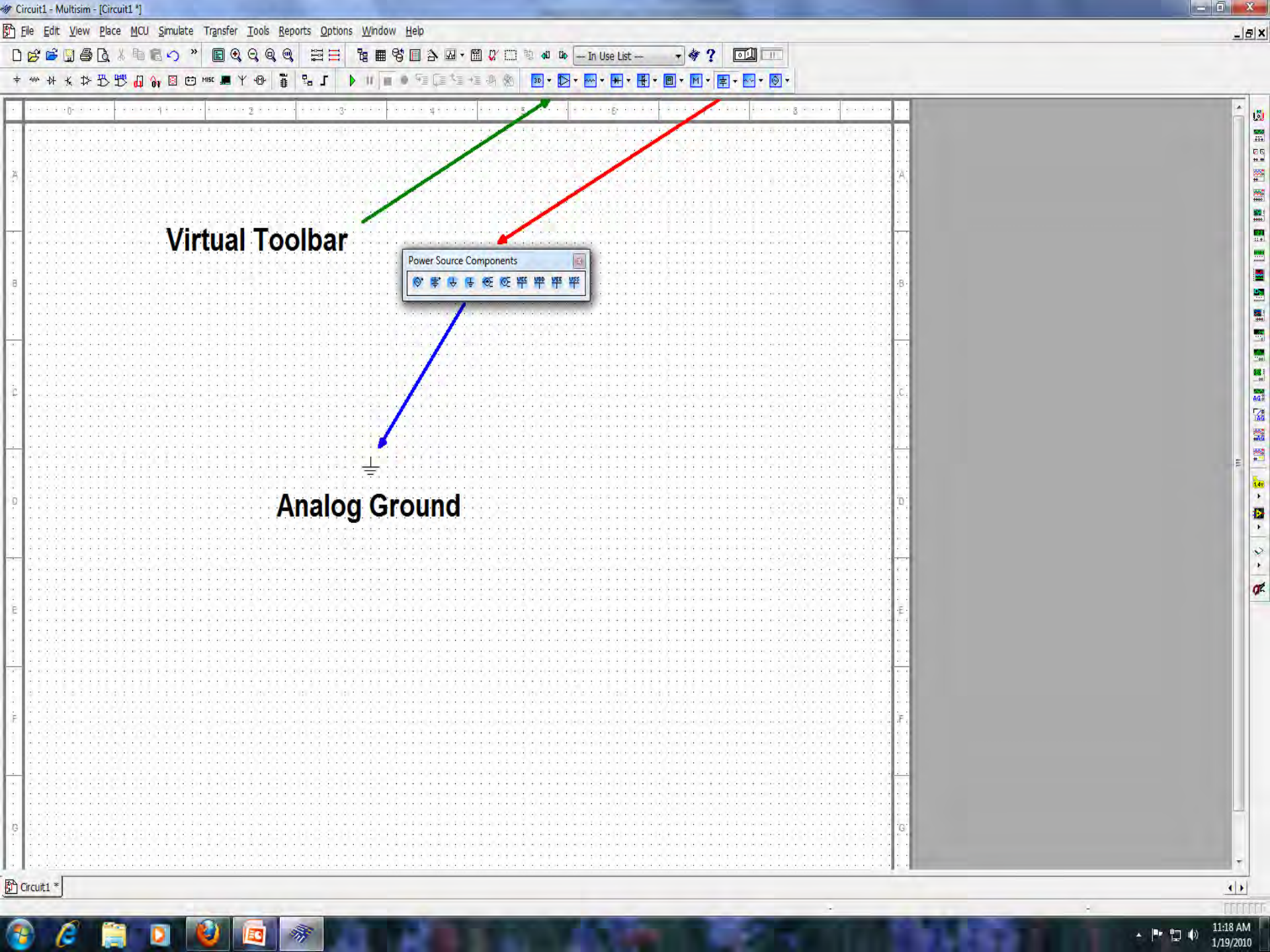
- **Click → Sheet Prop.**
- **|_____ Circuit**
- **|____Net Names → Check off**
- **" Show All "**
- Again here, there are other menu tabs which controls operations on the workspace that you may activate as the need arises.
- **Click → View**
- **|_____ Toolbars → Virtual**
- **Components**
- **Standard**
- **View**
- **Main**
- **Simulation switch**
- **Simulation**
- **Instruments**
- This is a basic set of the most used toolbars. Note activating all the **Toolbars** will take space away from the "**Circuit Window**".


Circuit1 - Multisim - [Circuit1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Full Screen
Parent Sheet
Zoom In F8
Zoom Out F9
Zoom Area F10
Zoom Fit to Page F7
Zoom to Magnification... F11
Zoom Selection F12
Show Grid
Show Border
Show Page Bounds
Ruler Bars
Status Bar
Design Toolbox
Spreadsheet View
Circuit Description Box Ctrl+D
Toolbars
Show Comment/Probe
Grapher
Standard
View
Main
Graphic Annotation
3D Components
Analog Components
Basic
Diodes
Transistor Components
Measurement Components
Miscellaneous Components
Components
Ladder Diagram
Power Source Components
Rated Virtual Components
Signal Source Components
Virtual
Simulation Switch
Simulation
Instruments
Description Edit Bar
MCU
LabVIEW Instruments
NI ELVISmx Instruments
This is what the circuit window looks like with the Virtual Toolbar checked off. Under menu item "View", select "Toolbars", the "Virtual Toolbars".
Circuit1 *
Virtual
11:05 AM
1/19/2010

Working with the "Circuit Window

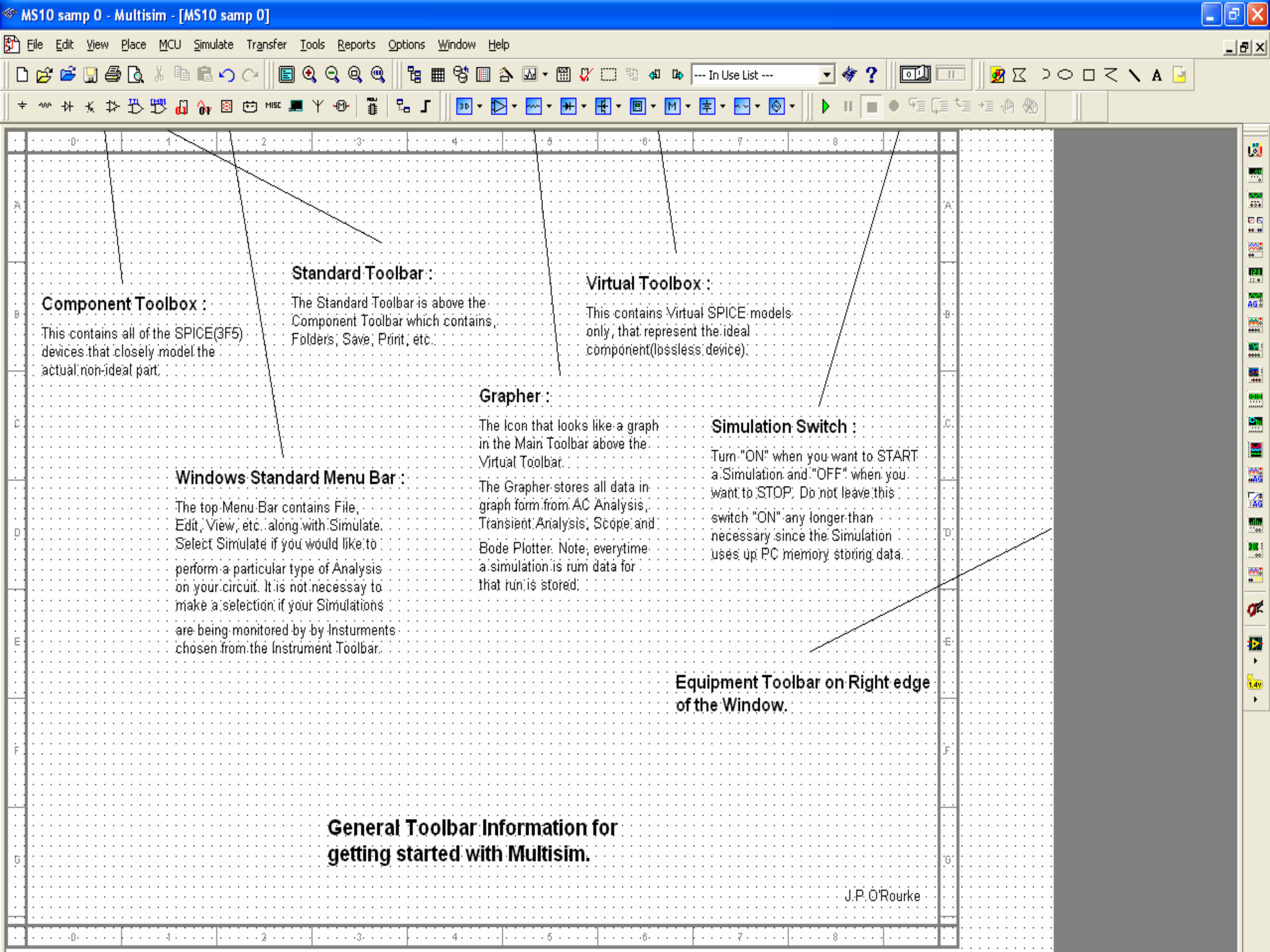
- If the "**Toolbars**" stack vertically above the **Circuit Window**, they may be spread out horizontally. To do this, move the mouse pointer to the right hand edge of the window to be moved and drag it to a new location, efficiently using all the available horizontal space. This will maximize the **Circuit Window** size for the "**Toolbars** " that were chosen.
- Closing the "**Spreadsheet Window**" below the circuit will also aid in maximizing the "**Circuit Window**".
- The default window is generally called "**Circuit 1** " unless something was already saved using that name. If "**Circuit 1**" has been used then "**Circuit 2**" etc will be the default window. This might be a good time to rename this window under "Save As" so it doesn't get accidentally saved as "**Circuit 1**".

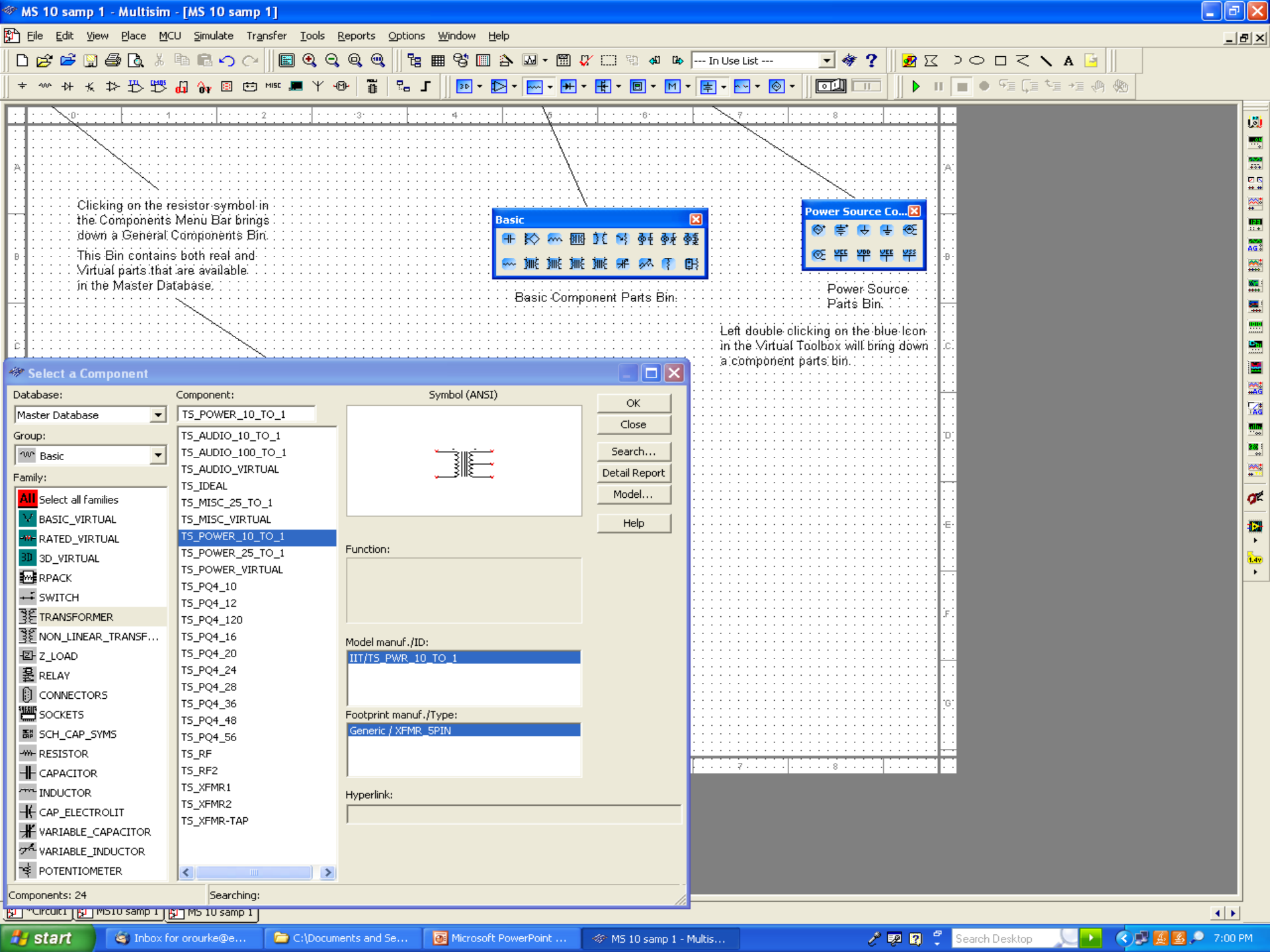

Circuit1 - Multisim - [Circuit1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
-- In Use List --
Blank Circuit Window
Circuit1 *
11:11 AM
1/19/2010

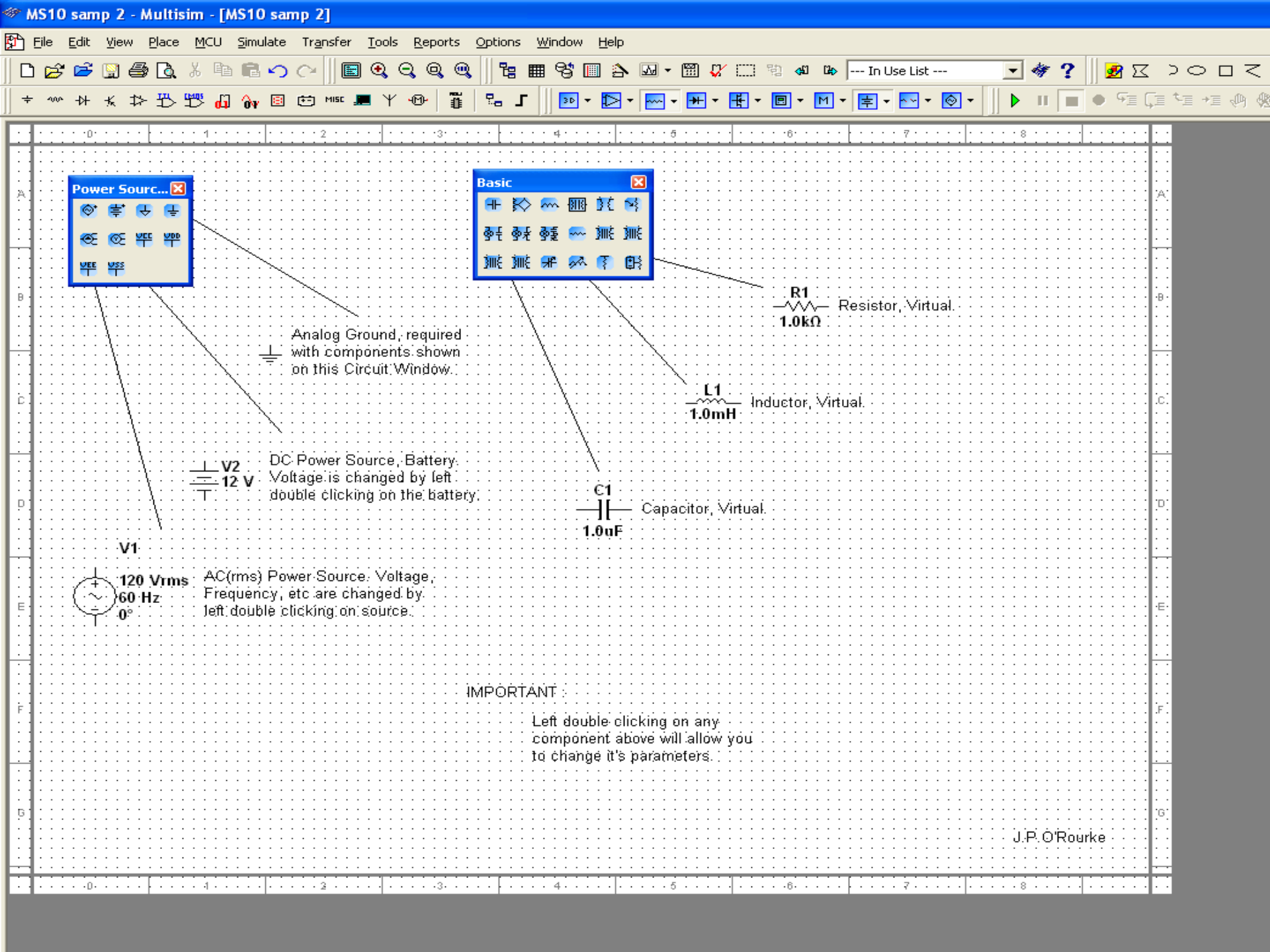

Circuit1 - Multisim - [Circuit1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
-- In Use List --
Virtual Toolbar
Power Source Components
Analog Ground
Circuit1 *
11:18 AM
1/19/2010

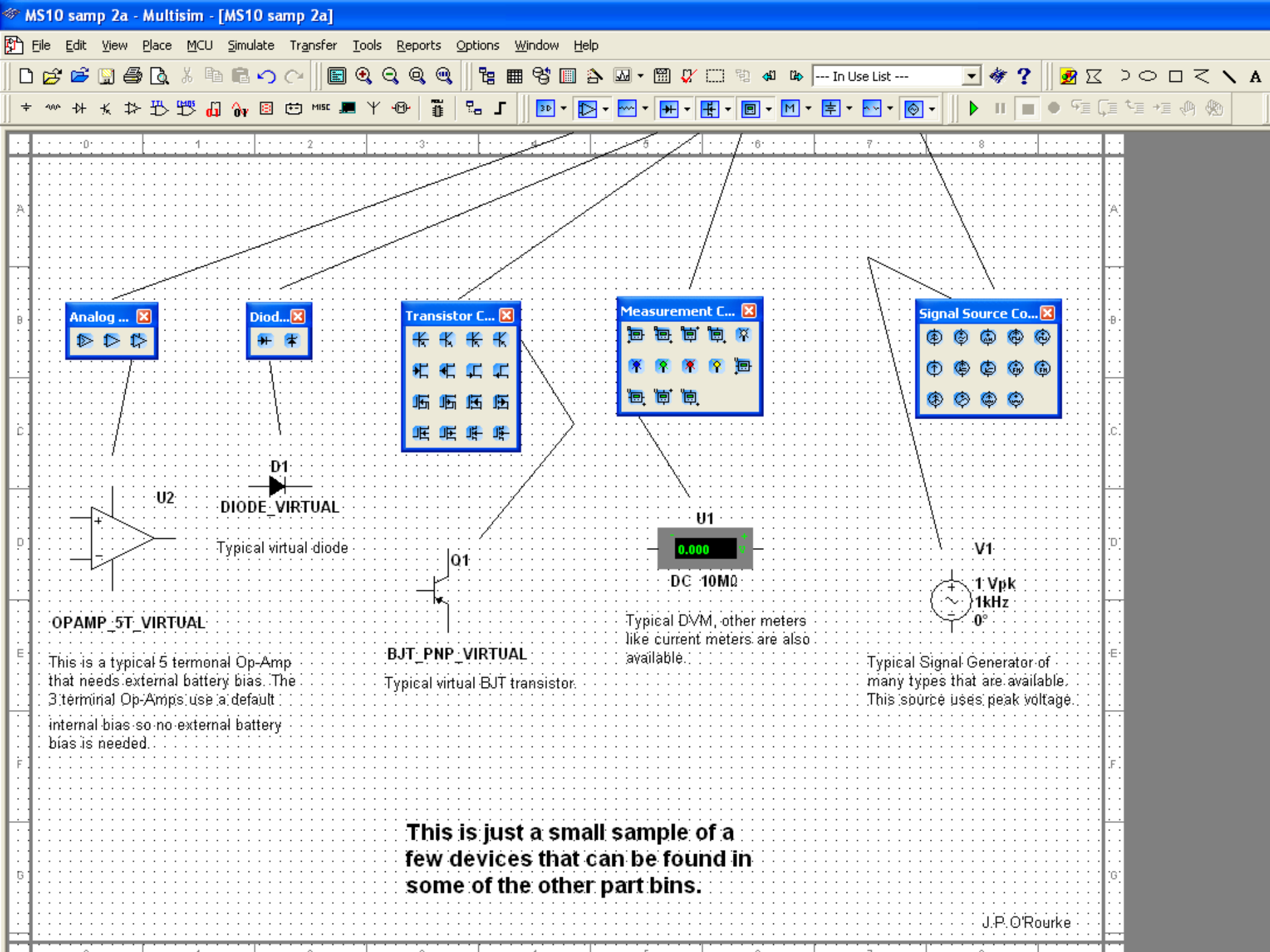
Some Helpful Suggestions

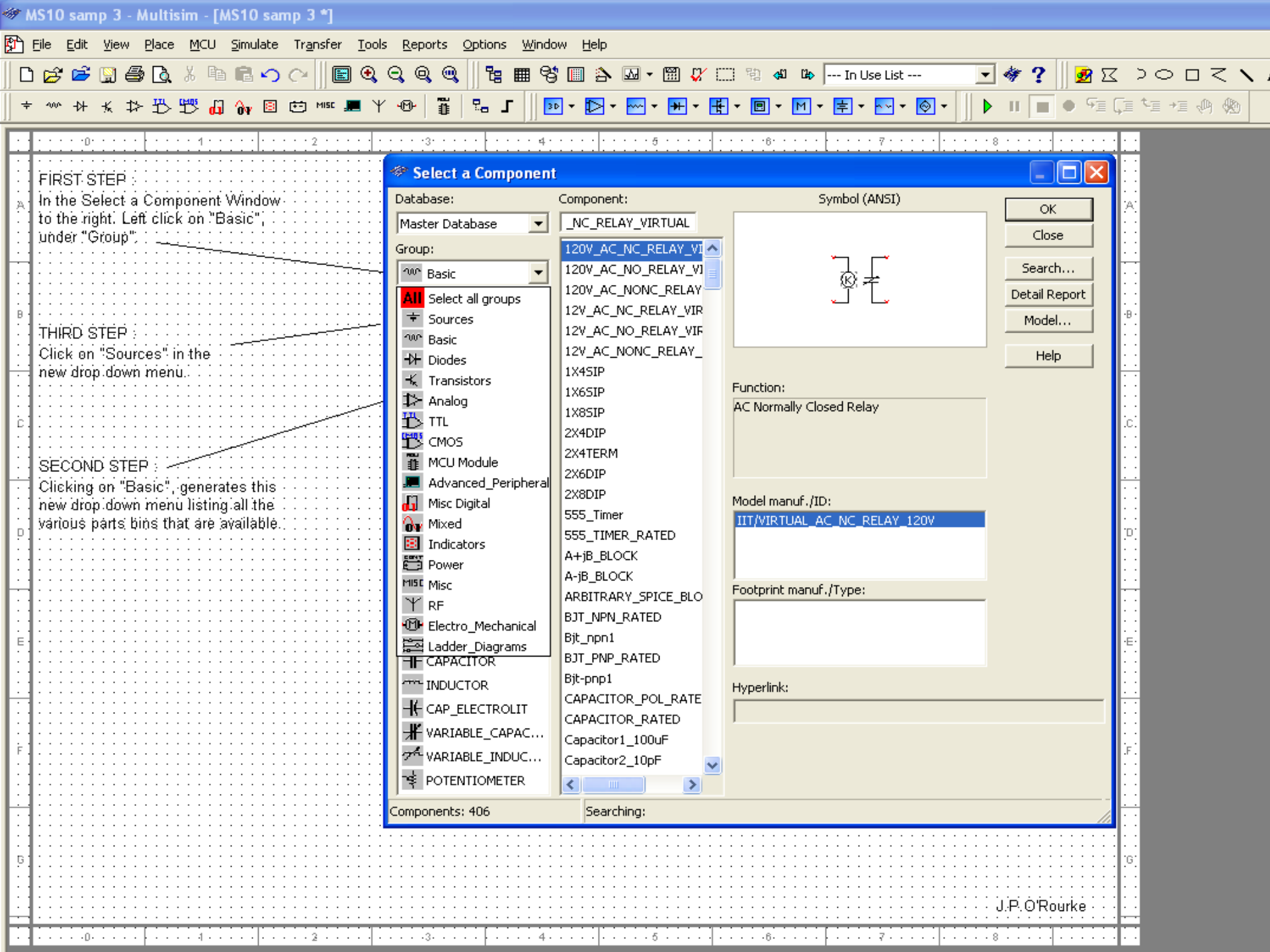
- If you need to select many items from a toolbox, having the window close automatically every time a component is selected can be annoying. This situation can be remedied by left clicking on the battery symbol itself. This will launch a toolbox on the **Circuit Window** that will stay there until you close it by left clicking on the little “x” in the upper right hand corner of the toolbox. This method of selecting components is generally preferred and will be used throughout this tutorial.
- In **Multisim** the circuit design components are chosen from the **Components** and **Virtual Toolboxes,** shown in figure 1. In most general designs and simulations, where no PC board layout is required, it is suggested that passive components be chosen from the **Virtual Toolbox** and the active components from the **Components Toolbox**. The choosing of **Virtual** passive components(resistors, capacitors and inductors) is suggested as a time saving feature since the component value is much easier to change by using this method.
- This basically concludes the preliminary setup and use of the **Circuit Window**.

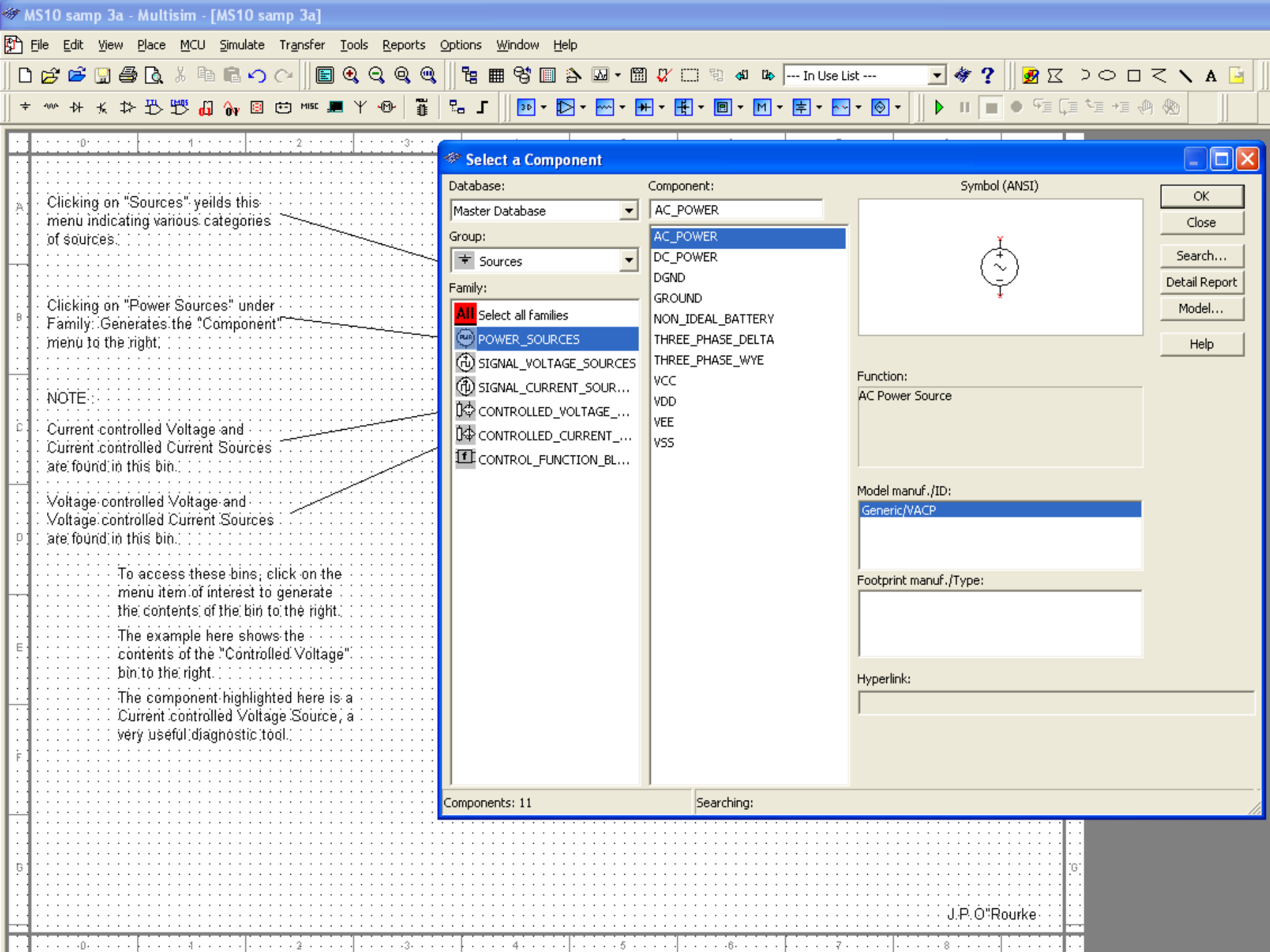

MS10 samp 0 - Multisim - [MS10 samp 0]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Component Toolbox :
This contains all of the SPICE(3F5) devices that closely model the actual non-ideal part.
Standard Toolbar :
The Standard Toolbar is above the Component Toolbar which contains, Folders, Save, Print, etc.
Virtual Toolbox :
This contains Virtual SPICE models only, that represent the ideal component(lossless device).
Grapher :
The Icon that looks like a graph in the Main Toolbar above the Virtual Toolbar.
The Grapher stores all data in graph form from AC Analysis, Transient Analysis, Scope and Bode Plotter. Note, everytime a simulation is rum data for that run is stored.
Simulation Switch :
Turn "ON" when you want to START a Simulation and "OFF" when you want to STOP. Do not leave this switch "ON" any longer than necessary since the Simulation uses up PC memory storing data.
Windows Standard Menu Bar :
The top Menu Bar contains File, Edit, View, etc. along with Simulate. Select Simulate if you would like to perform a particular type of Analysis on your circuit. It is not necessay to make a selection if your Simulations are being monitored by by Insturments chosen from the Instrument Toolbar.
Equipment Toolbar on Right edge of the Window.
General Toolbar Information for getting started with Multisim.
J.P.O'Rourke

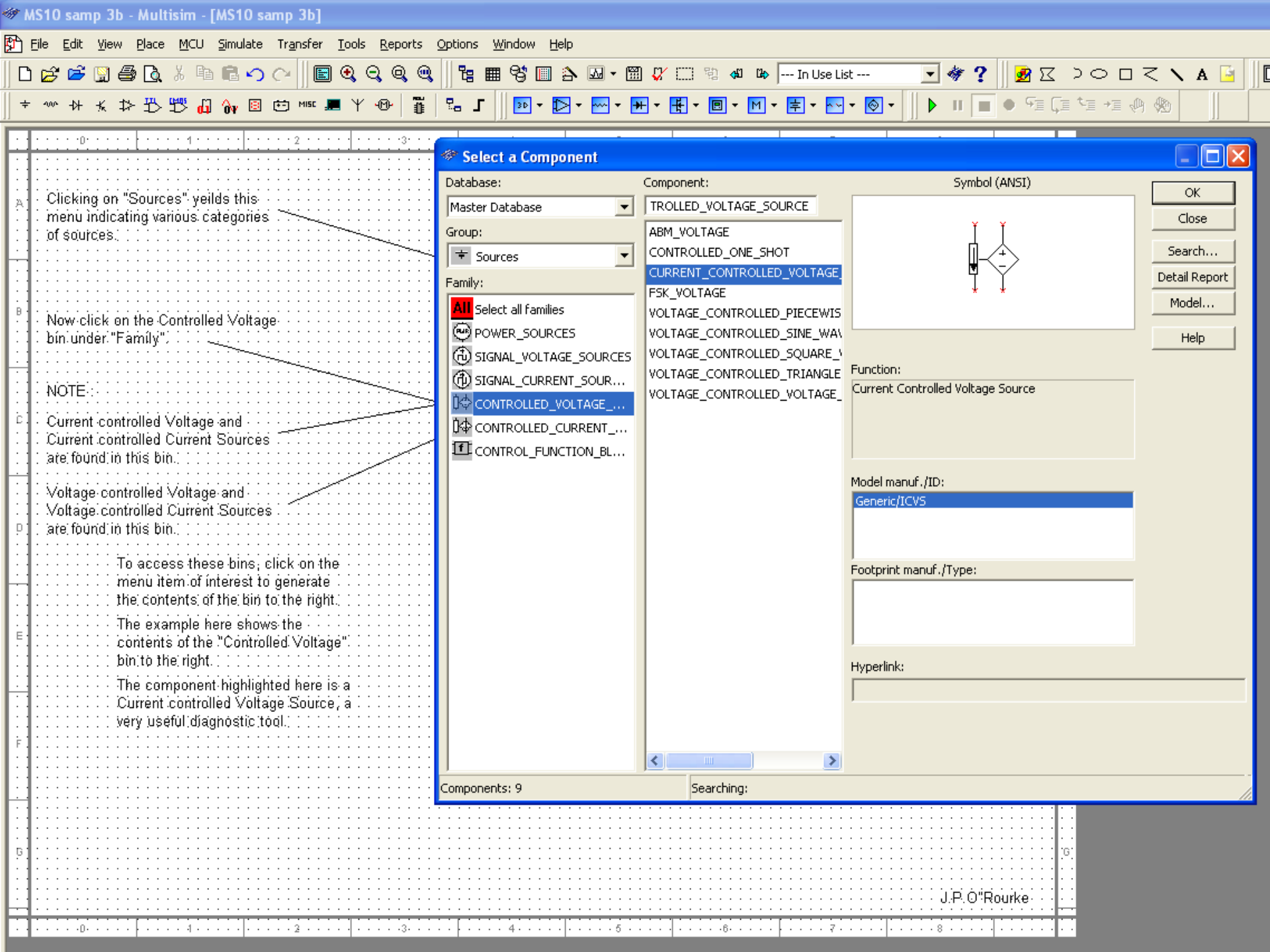

MS 10 samp 1 - Multisim - [MS 10 samp 1]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Clicking on the resistor symbol in the Components Menu Bar brings down a General Components Bin.
This Bin contains both real and Virtual parts that are available in the Master Database.
Basic
Basic Component Parts Bin.
Power Source Co...
Power Source Parts Bin.
Left double clicking on the blue icon in the Virtual Toolbox will bring down a component parts bin.
Select a Component
Database:
Master Database
Component:
TS_POWER_10_TO_1
Symbol (ANSI)
OK
Close
Search...
Detail Report
Model...
Help
Group:
Basic
Family:
Select all families
BASIC_VIRTUAL
RATED_VIRTUAL
3D_VIRTUAL
RPACK
SWITCH
TRANSFORMER
NON_LINEAR_TRANSF...
Z_LOAD
RELAY
CONNECTORS
SOCKETS
SCH_CAP_SYMS
RESISTOR
CAPACITOR
INDUCTOR
CAP_ELECTROLIT
VARIABLE_CAPACITOR
VARIABLE_INDUCTOR
POTENTIOMETER
TS_AUDIO_10_TO_1
TS_AUDIO_100_TO_1
TS_AUDIO_VIRTUAL
TS_IDEAL
TS_MISC_25_TO_1
TS_MISC_VIRTUAL
TS_POWER_10_TO_1
TS_POWER_25_TO_1
TS_POWER_VIRTUAL
TS_PQ4_10
TS_PQ4_12
TS_PQ4_120
TS_PQ4_16
TS_PQ4_20
TS_PQ4_24
TS_PQ4_28
TS_PQ4_36
TS_PQ4_48
TS_PQ4_56
TS_RF
TS_RF2
TS_XFMR1
TS_XFMR2
TS_XFMR-TAP
Function:
Model manuf./ID:
IIT/TS_PWR_10_TO_1
Footprint manuf./Type:
Generic / XFMR_5PIN
Hyperlink:
Components: 24
Searching:
start
Inbox for orourke@e...
C:\Documents and Se...
Microsoft PowerPoint ...
MS 10 samp 1 - Multis...
Search Desktop
7:00 PM


MS10 samp 2 - Multisim - [MS10 samp 2]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Power Sourc...
Basic
R1
1.0kΩ
Resistor, Virtual.
Analog Ground, required with components shown on this Circuit Window.
L1
1.0mH
Inductor, Virtual.
V2
12 V
DC Power Source, Battery. Voltage is changed by left double clicking on the battery.
C1
1.0uF
Capacitor, Virtual.
V1
120 Vrms
60 Hz
0°
AC(rms) Power Source. Voltage, Frequency, etc are changed by left double clicking on source.
IMPORTANT :
Left double clicking on any component above will allow you to change it's parameters.
J.P. O'Rourke


MS10 samp 2a - Multisim - [MS10 samp 2a]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Analog ...
Diod...
Transistor C...
Measurement C...
Signal Source Co...
U2
OPAMP_5T_VIRTUAL
This is a typical 5 termenal Op-Amp that needs external battery bias. The 3 terminal Op-Amps use a default internal bias so no external battery bias is needed.
D1
DIODE_VIRTUAL
Typical virtual diode
Q1
BJT_PNP_VIRTUAL
Typical virtual BJT transistor
U1
0.000
DC 10MΩ
Typical DVM, other meters like current meters are also available.
V1
1 Vpk
1kHz
0°
Typical Signal Generator of many types that are available. This source uses peak voltage.
This is just a small sample of a few devices that can be found in some of the other part bins.
J.P. O'Rourke


MS10 samp 3 - Multisim - [MS10 samp 3 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
FIRST STEP :
In the Select a Component Window to the right. Left click on "Basic", under "Group".
THIRD STEP :
Click on "Sources" in the new drop down menu.
SECOND STEP :
Clicking on "Basic", generates this new drop down menu listing all the various parts bins that are available.
Select a Component
Database:
Master Database
Component:
_NC_RELAY_VIRTUAL
Symbol (ANSI)
OK
Close
Search...
Detail Report
Model...
Help
Group:
Basic
All Select all groups
Sources
Basic
Diodes
Transistors
Analog
TTL
CMOS
MCU Module
Advanced_Peripheral
Misc Digital
Mixed
Indicators
Power
Misc
RF
Electro_Mechanical
Ladder_Diagrams
CAPACITOR
INDUCTOR
CAP_ELECTROLIT
VARIABLE_CAPAC...
VARIABLE_INDUC...
POTENTIOMETER
120V_AC_NC_RELAY_VI
120V_AC_NO_RELAY_VI
120V_AC_NONC_RELAY
12V_AC_NC_RELAY_VIR
12V_AC_NO_RELAY_VIR
12V_AC_NONC_RELAY_
1X4SIP
1X6SIP
1X8SIP
2X4DIP
2X4TERM
2X6DIP
2X8DIP
555_Timer
555_TIMER_RATED
A+jB_BLOCK
A-jB_BLOCK
ARBITRARY_SPICE_BLO
BJT_NPN_RATED
Bjt_npn1
BJT_PNP_RATED
Bjt-pnp1
CAPACITOR_POL_RATE
CAPACITOR_RATED
Capacitor1_100uF
Capacitor2_10pF
Function:
AC Normally Closed Relay
Model manuf./ID:
IIT/VIRTUAL_AC_NC_RELAY_120V
Footprint manuf./Type:
Hyperlink:
Components: 406
Searching:
J.P. O'Rourke

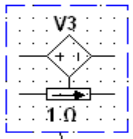

MS10 samp 3a - Multisim - [MS10 samp 3a]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Clicking on "Sources" yeilds this menu indicating various categories of sources.
Clicking on "Power Sources" under Family. Generates the "Component" menu to the right.
NOTE:
Current controlled Voltage and Current controlled Current Sources are found in this bin.
Voltage controlled Voltage and Voltage controlled Current Sources are found in this bin.
To access these bins, click on the menu item of interest to generate the contents of the bin to the right.
The example here shows the contents of the "Controlled Voltage" bin to the right.
The component highlighted here is a Current controlled Voltage Source, a very useful diagnostic tool.
Select a Component
Database:
Master Database
Group:
Sources
Family:
Select all families
POWER_SOURCES
SIGNAL_VOLTAGE_SOURCES
SIGNAL_CURRENT_SOUR...
CONTROLLED_VOLTAGE_...
CONTROLLED_CURRENT_...
CONTROL_FUNCTION_BL...
Component:
AC_POWER
AC_POWER
DC_POWER
DGND
GROUND
NON_IDEAL_BATTERY
THREE_PHASE_DELTA
THREE_PHASE_WYE
VCC
VDD
VEE
VSS
Symbol (ANSI)
OK
Close
Search...
Detail Report
Model...
Help
Function:
AC Power Source
Model manuf./ID:
Generic/VACP
Footprint manuf./Type:
Hyperlink:
Components: 11
Searching:
J.P.O'Rourke


MS10 samp 3b - Multisim - [MS10 samp 3b]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Clicking on "Sources" yeilds this menu indicating various categories of sources.
Now click on the Controlled Voltage bin under "Family".
NOTE:
Current controlled Voltage and Current controlled Current Sources are found in this bin.
Voltage controlled Voltage and Voltage controlled Current Sources are found in this bin.
To access these bins, click on the menu item of interest to generate the contents of the bin to the right.
The example here shows the contents of the "Controlled Voltage" bin to the right.
The component highlighted here is a Current controlled Voltage Source, a very useful diagnostic tool.
Select a Component
Database:
Master Database
Group:
Sources
Family:
All Select all families
POWER_SOURCES
SIGNAL_VOLTAGE_SOURCES
SIGNAL_CURRENT_SOUR...
CONTROLLED_VOLTAGE_...
CONTROLLED_CURRENT_...
CONTROL_FUNCTION_BL...
Component:
TROLLED_VOLTAGE_SOURCE
ABM_VOLTAGE
CONTROLLED_ONE_SHOT
CURRENT_CONTROLLED_VOLTAGE_
FSK_VOLTAGE
VOLTAGE_CONTROLLED_PIECEWIS
VOLTAGE_CONTROLLED_SINE_WAV
VOLTAGE_CONTROLLED_SQUARE_
VOLTAGE_CONTROLLED_TRIANGLE
VOLTAGE_CONTROLLED_VOLTAGE_
Symbol (ANSI)
OK
Close
Search...
Detail Report
Model...
Help
Function:
Current Controlled Voltage Source
Model manuf./ID:
Generic/ICVS
Footprint manuf./Type:
Hyperlink:
Components: 9
Searching:
J.P. O'Rourke

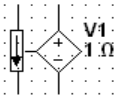
MS10 samp 5 - Multisim - [MS10 samp 5 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

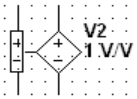
Here I have clicked on one of each of the dependant sources previously mentioned.



Double clicking on the Dependant Source generates this box

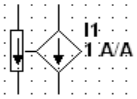


Current dependant Voltage Source. This can be used to monitor current anywhere in a circuit. The voltage out can be sent to a oscilloscope so the current waveform can be viewed.

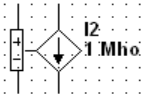


Voltage dependant Voltage Source. This can be used to monitor the voltage across components that are floating above ground. The voltage output then can be sent to a grounded oscilloscope.

This can also be used in a Spice model of an Op-Amp.



Current dependant Current Source. Typically used in a Bi-Polar Transistor Spice model.



Voltage dependant Current Source. Typically used in a FET Transistor Spice model.

The above Dependant Sources can also be called Converters since they convert an input signal to an output signal.

Clicking on "INFO" generates useful information on the device

CURRENT_CONTROLLED_VOLTAGE_SOURCE

Label | Display | Value | Fault | Pins | User Fields

Transresistance (H): 1 Ω

Replace | OK | Cancel | Info | Help

Component Reference

Hide | Locate | Back | Forward | Print | Options

Contents | Index | Search | Favorites

Topics:

Remove | Display

Current topic: Current-Controlled Voltage Source

Add

Current-Controlled Voltage Source

The output voltage of this source depends on the current through the input terminals. The two are related by a parameter called transresistance (H), which is the ratio of the output voltage to the input current. It can have any value from mW to kW.

$$H = \frac{V_{OUT}}{I_{IN}}$$

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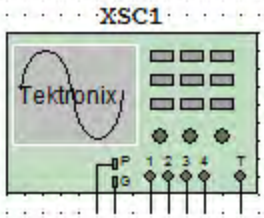
MS10 samp 7 | *Circuit1 | MS10 samp 8 | Circuit1 | MS10 samp 5 *

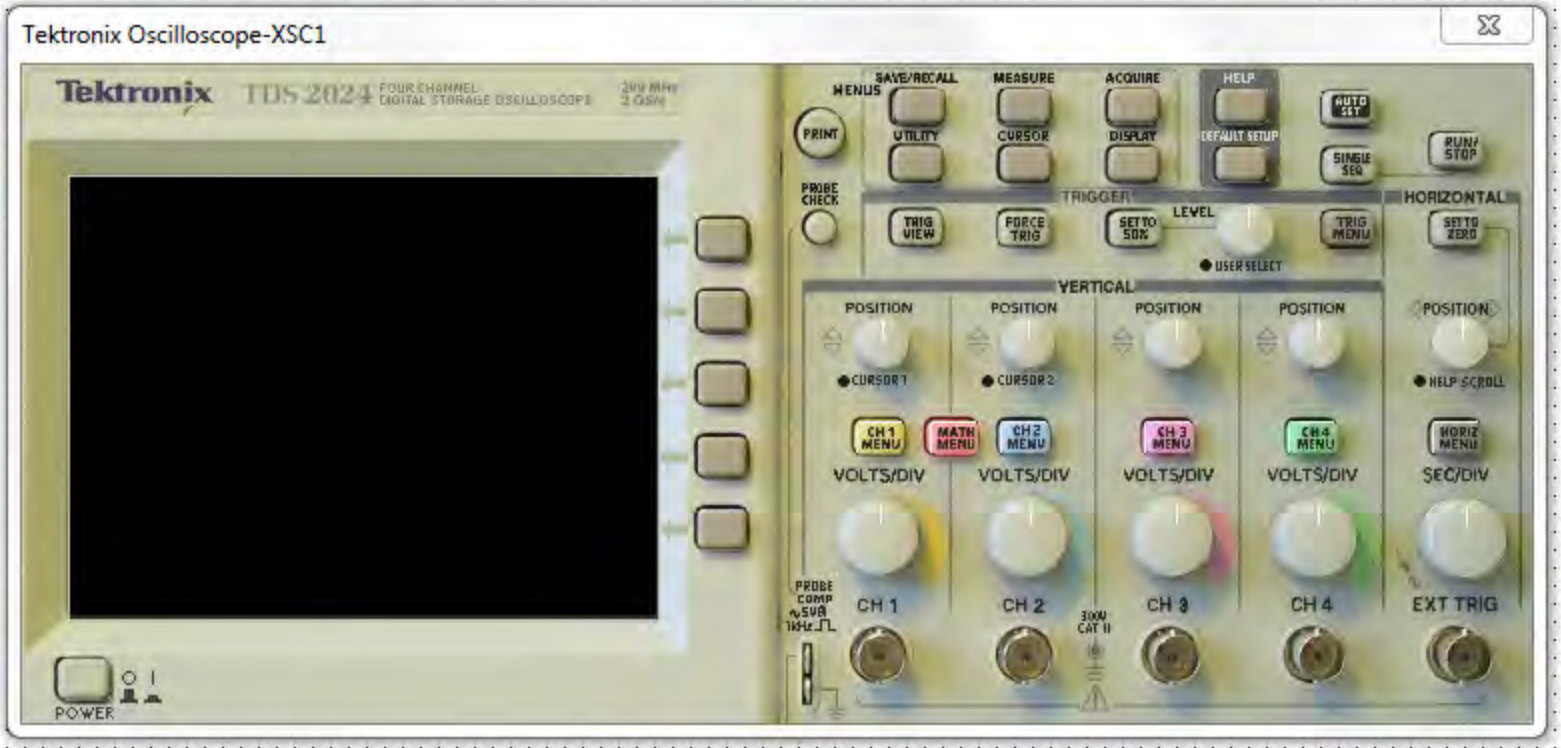
Tran: 0.080 s

start | PP MS10 samp 1 | MS10 samp 5 - Multi... | Component Reference | Inbox for orourke@... | Document1 - Micros... | Search Desktop | 9:08 PM

Design1 - Multisim - [Design1 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help





Multisim Simulation Analysis

Introduction

- The purpose of the previous set of slides is to give you a general idea where some items are in the menus along with some general information about the selected component.
- The next step in the process would be to actually layout an actual circuit and make some typical circuit measurements.

- The following sample circuit will be used to show various measurement techniques using Mulitsim's Virtual Instrumentation package. Note the circuit techniques, instrumentation and methods of measurement done here in software will be similar to what's actually done in the laboratory.

MSckt1 - Multisim - [MSckt1]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

The first part that should be selected in any design is a ground since no simulation can take place without a ground reference somewhere in the Circuit Window.

Note the 3rd and 4th symbols from the left are Digital and Analog grounds respectively.

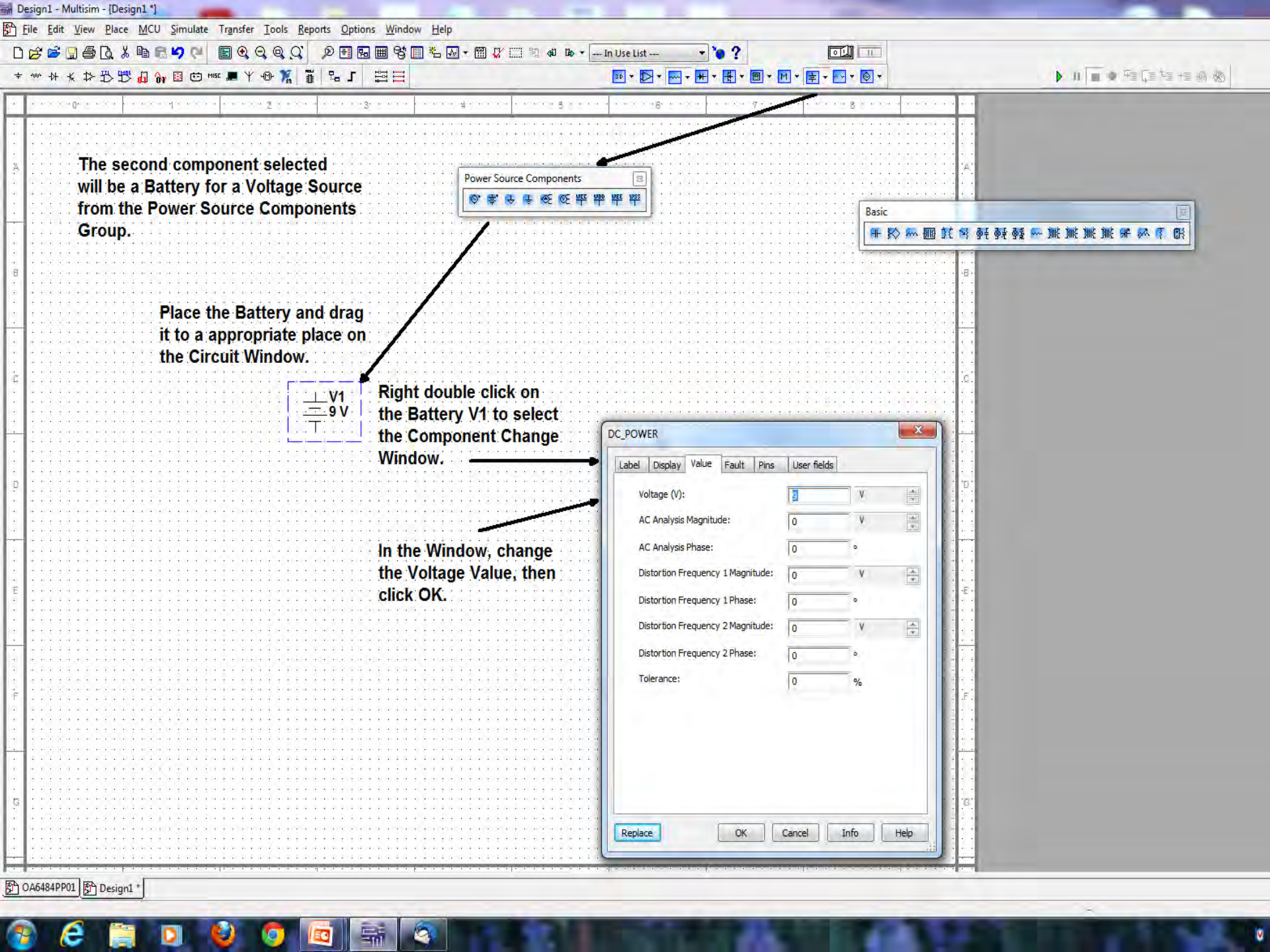
The Circuit we will be constructing here will be an Analog circuit.

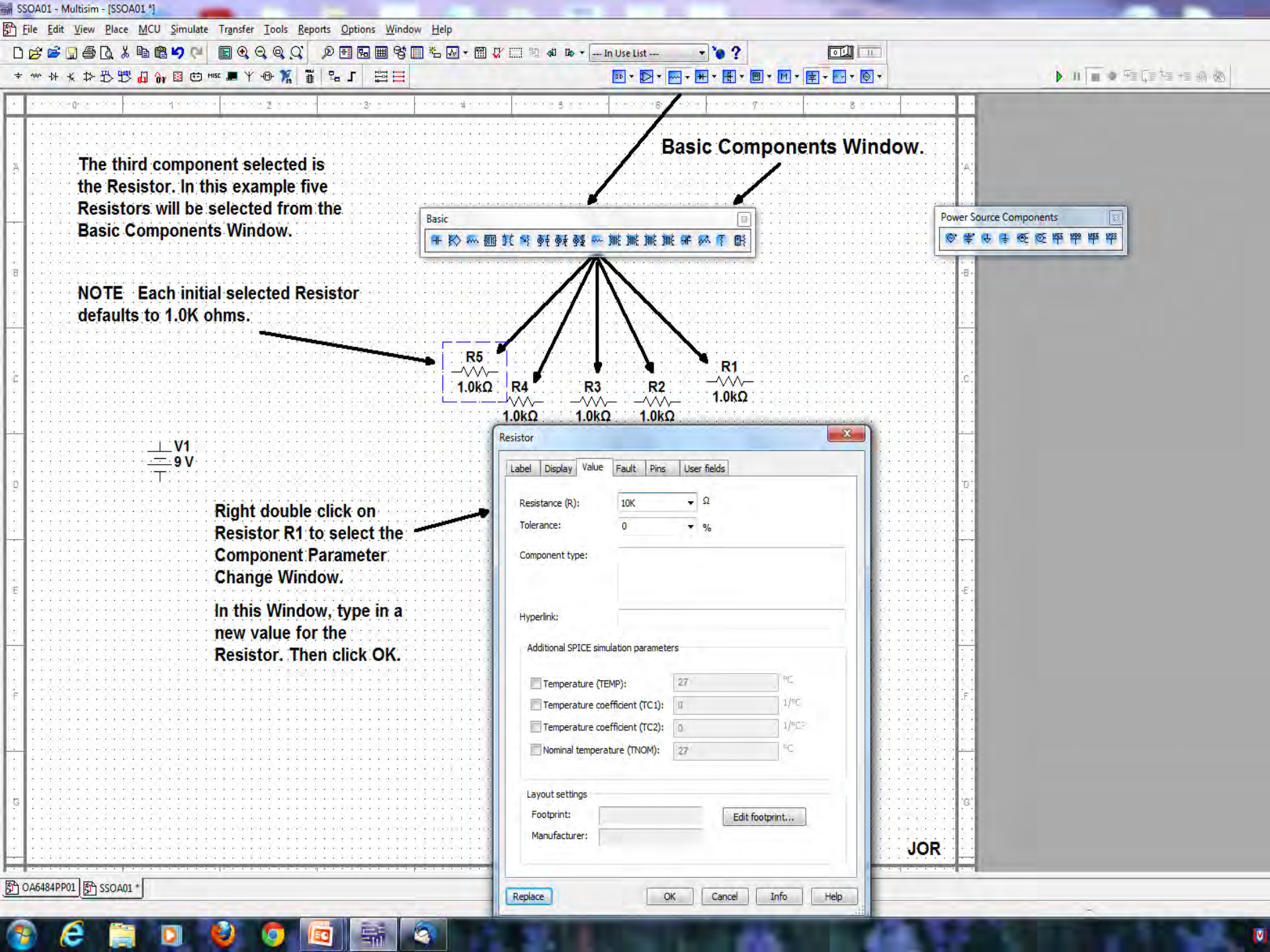
Click on the Battery symbol above to generate the Power Source Components Window to the left.

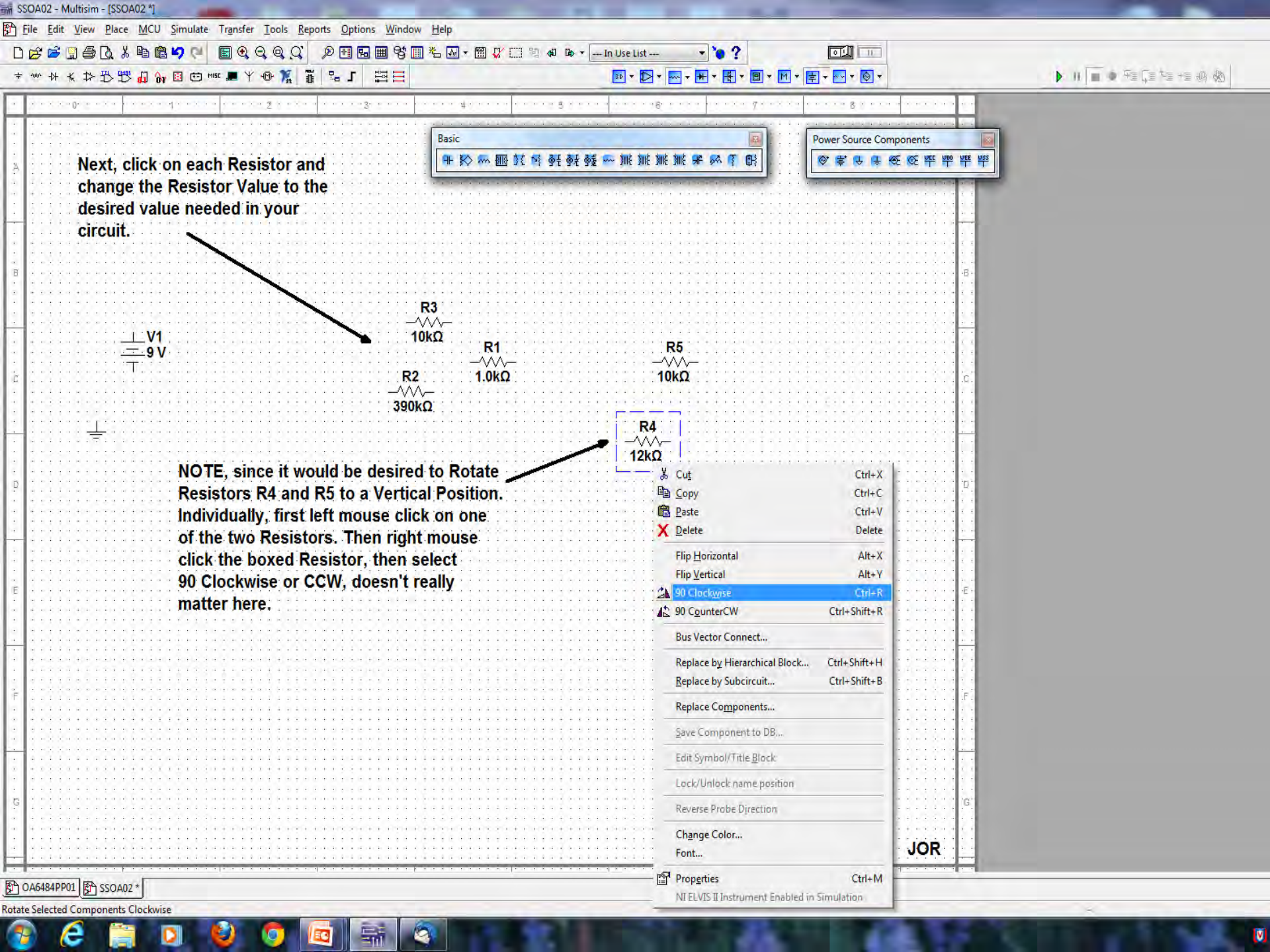
Click on the analog ground symbol, fourth from the left and drag it to some convienent place in the Circuit Window.

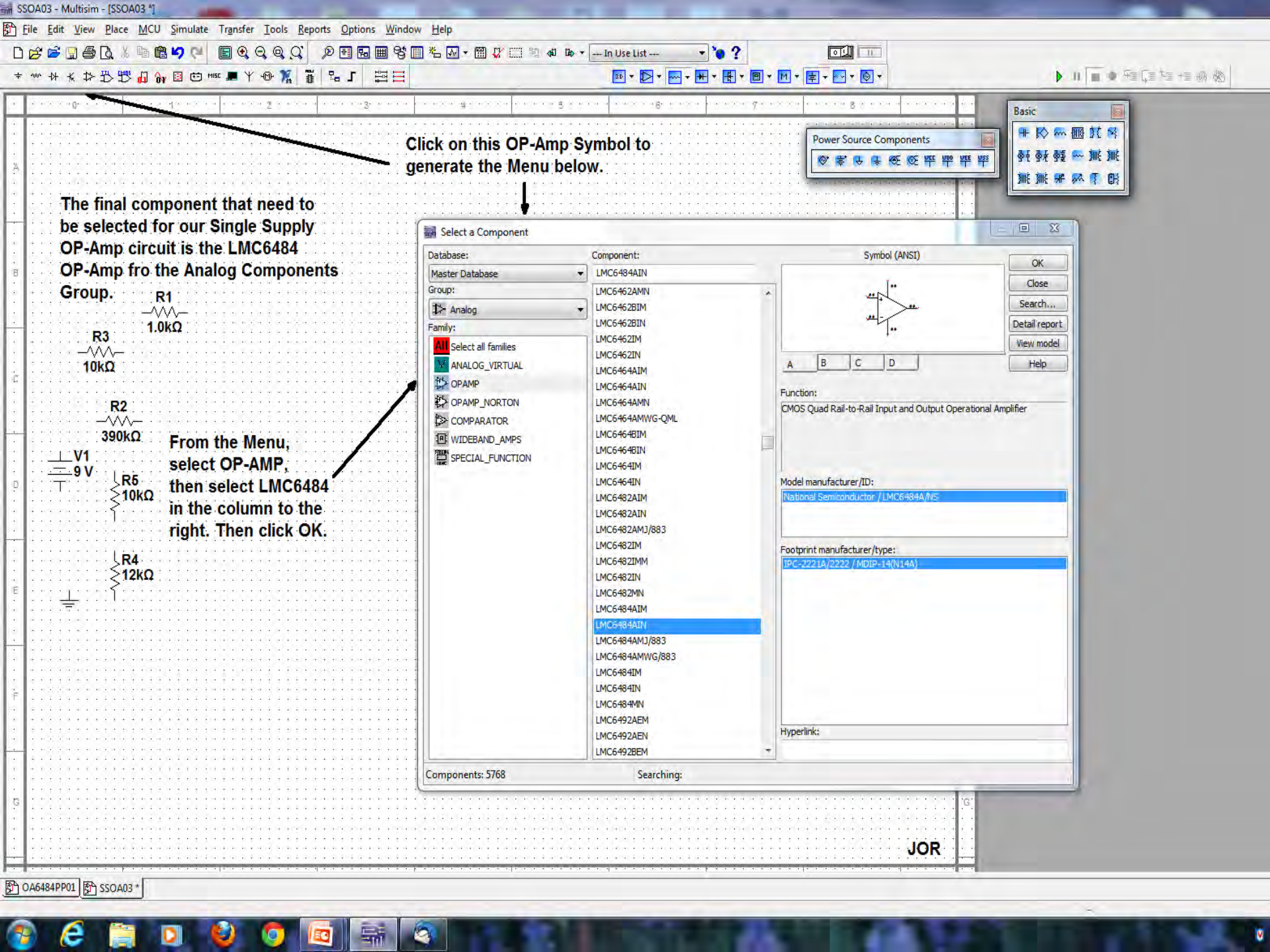
MSckt1

7:07 PM
2/1/2011


Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
The second component selected will be a Battery for a Voltage Source from the Power Source Components Group.
Power Source Components
Basic
Place the Battery and drag it to a appropriate place on the Circuit Window.
V1
9 V
Right double click on the Battery V1 to select the Component Change Window.
In the Window, change the Voltage Value, then click OK.
DC_POWER
Label Display Value Fault Pins User fields
Voltage (V): 9 V
AC Analysis Magnitude: 0 V
AC Analysis Phase: 0 °
Distortion Frequency 1 Magnitude: 0 V
Distortion Frequency 1 Phase: 0 °
Distortion Frequency 2 Magnitude: 0 V
Distortion Frequency 2 Phase: 0 °
Tolerance: 0 %
Replace OK Cancel Info Help
OA6484PP01
Design1 *


SSOA01 - Multisim - [SSOA01 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Basic Components Window.
The third component selected is the Resistor. In this example five Resistors will be selected from the Basic Components Window.
NOTE Each initial selected Resistor defaults to 1.0K ohms.
Basic
Power Source Components
R5 1.0kΩ
R4 1.0kΩ
R3 1.0kΩ
R2 1.0kΩ
R1 1.0kΩ
V1 9 V
Right double click on Resistor R1 to select the Component Parameter Change Window.
In this Window, type in a new value for the Resistor. Then click OK.
Resistor
Label Display Value Fault Pins User fields
Resistance (R): 10K Ω
Tolerance: 0 %
Component type:
Hyperlink:
Additional SPICE simulation parameters
Temperature (TEMP): 27 °C
Temperature coefficient (TC1): 0 1/°C
Temperature coefficient (TC2): 0 1/°C²
Nominal temperature (TNOM): 27 °C
Layout settings
Footprint:
Manufacturer:
Edit footprint...
Replace OK Cancel Info Help
JOR
OA6484PP01 SSOA01 *

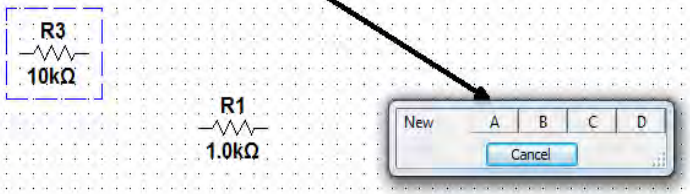

SSOA02 - Multisim - [SSOA02 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Basic
Power Source Components
Next, click on each Resistor and change the Resistor Value to the desired value needed in your circuit.
R3
10kΩ
R1
1.0kΩ
R5
10kΩ
V1
9 V
R2
390kΩ
R4
12kΩ
NOTE, since it would be desired to Rotate Resistors R4 and R5 to a Vertical Position. Individually, first left mouse click on one of the two Resistors. Then right mouse click the boxed Resistor, then select 90 Clockwise or CCW, doesn't really matter here.
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Flip Horizontal Alt+X
Flip Vertical Alt+Y
90 Clockwise Ctrl+R
90 CounterCW Ctrl+Shift+R
Bus Vector Connect...
Replace by Hierarchical Block... Ctrl+Shift+H
Replace by Subcircuit... Ctrl+Shift+B
Replace Components...
Save Component to DB...
Edit Symbol/Title Block
Lock/Unlock name position
Reverse Probe Direction
Change Color...
Font...
Properties Ctrl+M
NI ELVIS II Instrument Enabled in Simulation
JOR
OA6484PP01
SSOA02 *
Rotate Selected Components Clockwise

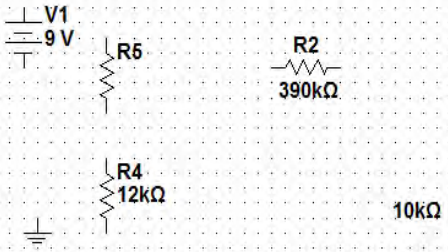

SSOA03 - Multisim - [SSOA03 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Click on this OP-Amp Symbol to generate the Menu below.
The final component that need to be selected for our Single Supply OP-Amp circuit is the LMC6484 OP-Amp fro the Analog Components Group.
From the Menu, select OP-AMP, then select LMC6484 in the column to the right. Then click OK.
R1 1.0kΩ
R3 10kΩ
R2 390kΩ
V1 9 V
R5 10kΩ
R4 12kΩ
Power Source Components
Basic
Select a Component
Database:
Master Database
Component:
LMC6484AIN
Symbol (ANSI)
Group:
Analog
Family:
All Select all families
ANALOG_VIRTUAL
OPAMP
OPAMP_NORTON
COMPARATOR
WIDEBAND_AMPS
SPECIAL_FUNCTION
LMC6462AMN
LMC6462BIM
LMC6462BIN
LMC6462IM
LMC6462IN
LMC6464AIM
LMC6464AIN
LMC6464AMN
LMC6464AMWG-QML
LMC6464BIM
LMC6464BIN
LMC6464IM
LMC6464IN
LMC6482AIM
LMC6482AIN
LMC6482AMJ/883
LMC6482IM
LMC6482IMM
LMC6482IN
LMC6482MN
LMC6484AIM
LMC6484AIN
LMC6484AMJ/883
LMC6484AMWG/883
LMC6484IM
LMC6484IN
LMC6484MN
LMC6492AEM
LMC6492AEN
LMC6492BEM
OK
Close
Search...
Detail report
View model
Help
A B C D
Function:
CMOS Quad Rail-to-Rail Input and Output Operational Amplifier
Model manufacturer/ID:
National Semiconductor / LMC6484A/NS
Footprint manufacturer/type:
IPC-2221A/2222 / MDIP-14(N14A)
Hyperlink:
Components: 5768
Searching:
JOR
OA6484PP01
SSOA03 *

SSOA04 - Multisim - [SSOA04 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Since this Single Supply OP-Amp, LMC6484 is a Quad OP-Amp, we only need to use a single device in this package. This is done by chosing device "A" from the second Menu that is generated after clicking OK.





Power Source Components

Basic

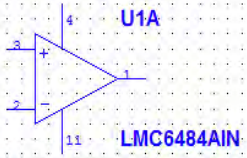
JOR

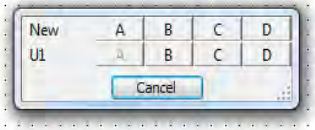
OA6484PP01 SSOA04 *

SSOA04 - Multisim - [SSOA04 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Selecting Device "A", selects a single OP-Amp from the package but also generates another Menu in case you need to select Device "B", etc. Since here we only need one OP-Amp, just click "Cancel". The original Menu will then appear, then click "Close".





R3
10kΩ

R1
1.0kΩ

V1
9 V

R5

R2
390kΩ

R4
12kΩ

10kΩ

JOR

Power Source Components

Basic

OA6484PP01 SSOA04 *

SSOA04 - Multisim - [SSOA04 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Selecting Device "A", selects a single OP-Amp from the package but also generates another Menu in case you need to select Device "B", etc. Since here we only need one OP-Amp, just click "Cancel". The original Menu will then appear, then click "Close".

R3
10kΩ

R1
1.0kΩ

V1
9 V

R5

R2
390kΩ

R4
12kΩ

10kΩ

Power Source Components

Basic

Select a Component

Database: Master Database

Group: Analog

Family:
- All Select all families
- ANALOG_VIRTUAL
- OPAMP
- OPAMP_NORTON
- COMPARATOR
- WIDEBAND_AMPS
- SPECIAL_FUNCTION

Component: LMC6484AIN

LMC6084IM
LMC6084IN
LMC6442AIM
LMC6442IM
LMC6442IN
LMC6462AIM
LMC6462AIN
LMC6462AMN
LMC6462BIM
LMC6462BIN
LMC6462IM
LMC6462IN
LMC6464AIM
LMC6464AIN
LMC6464AMN
LMC6464AMWG-QML
LMC6464BIM
LMC6464BIN
LMC6464IM
LMC6464IN
LMC6482AIM
LMC6482AIN
LMC6482AMJ/883
LMC6482IM
LMC6482IMM
LMC6482IN
LMC6482MN
LMC6484AIM
LMC6484AIN
LMC6484AMJ/883

Symbol (ANSI)

A B C D

OK
Close
Search...
Detail report
View model
Help

Function:
CMOS Quad Rail-to-Rail Input and Output Operational Amplifier

Model manufacturer/ID:
National Semiconductor / LMC6484A/NS

Footprint manufacturer/type:
IPC-2221A/2222 / MDIP-14(N14A)

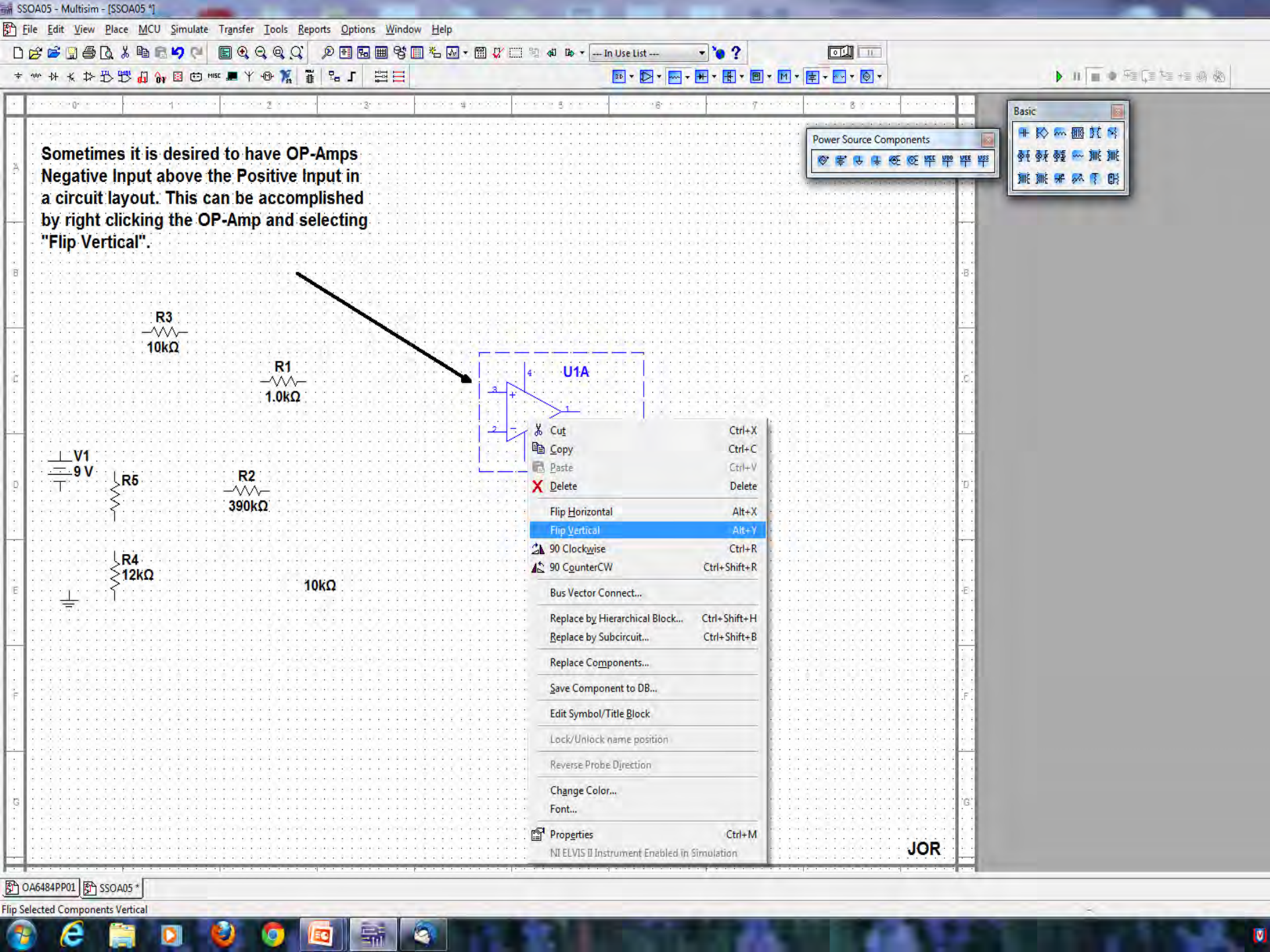
Hyperlink:

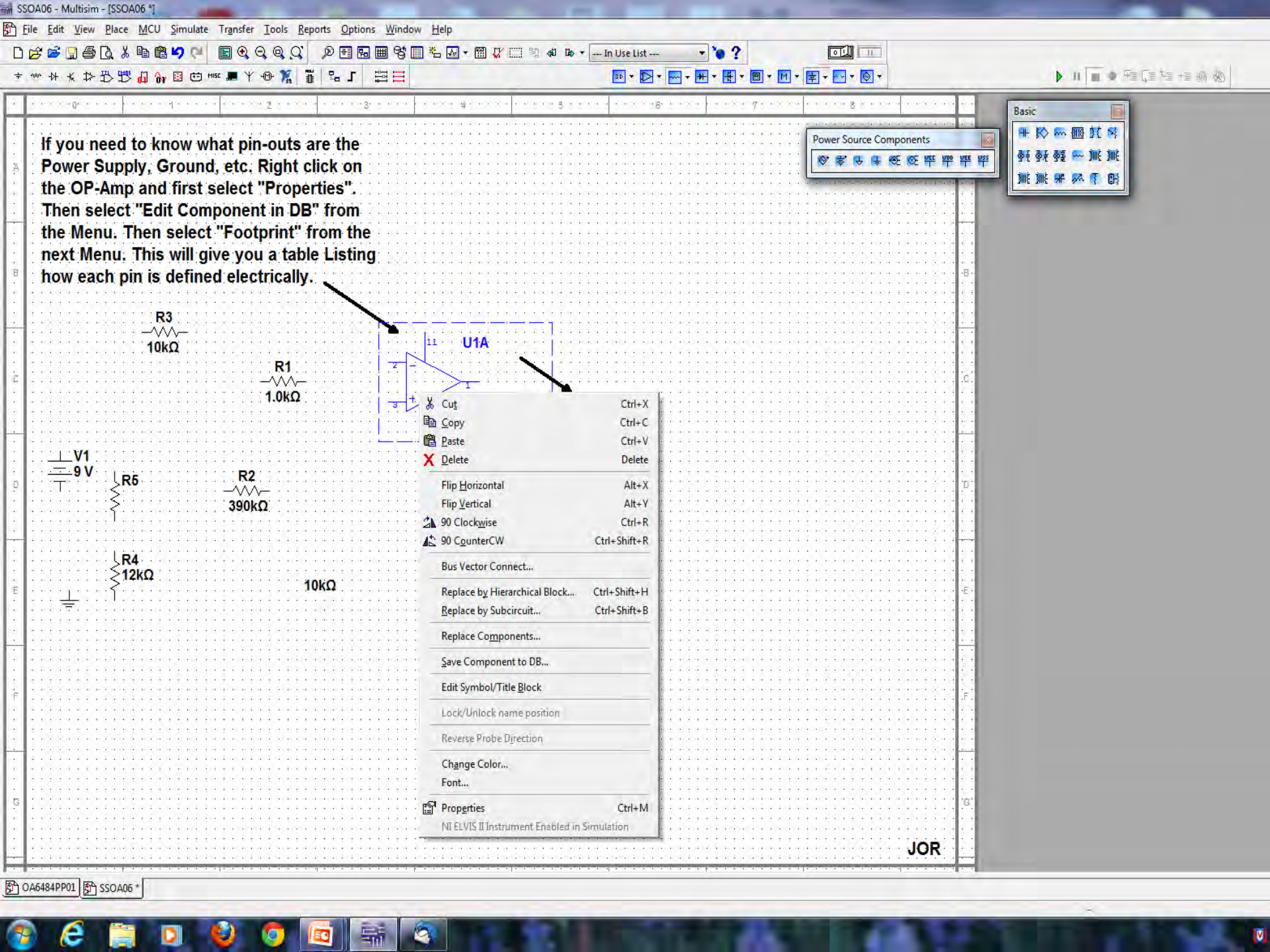
Components: 5768

Searching:

JOR

OA6484PP01 SSOA04 *


SSOA05 - Multisim - [SSOA05 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Sometimes it is desired to have OP-Amps Negative Input above the Positive Input in a circuit layout. This can be accomplished by right clicking the OP-Amp and selecting "Flip Vertical".
R3
10kΩ
R1
1.0kΩ
U1A
V1
9 V
R5
R2
390kΩ
R4
12kΩ
10kΩ
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Flip Horizontal Alt+X
Flip Vertical Alt+Y
90 Clockwise Ctrl+R
90 CounterCW Ctrl+Shift+R
Bus Vector Connect...
Replace by Hierarchical Block... Ctrl+Shift+H
Replace by Subcircuit... Ctrl+Shift+B
Replace Components...
Save Component to DB...
Edit Symbol/Title Block
Lock/Unlock name position
Reverse Probe Direction
Change Color...
Font...
Properties Ctrl+M
NI ELVIS II Instrument Enabled in Simulation
JOR
Power Source Components
Basic
OA6484PP01
SSOA05 *
Flip Selected Components Vertical


SSOA06 - Multisim - [SSOA06 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In Use List ---
Power Source Components
Basic
If you need to know what pin-outs are the Power Supply, Ground, etc. Right click on the OP-Amp and first select "Properties". Then select "Edit Component in DB" from the Menu. Then select "Footprint" from the next Menu. This will give you a table Listing how each pin is defined electrically.
R3
10kΩ
R1
1.0kΩ
U1A
V1
9 V
R5
R2
390kΩ
R4
12kΩ
10kΩ
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Flip Horizontal Alt+X
Flip Vertical Alt+Y
90 Clockwise Ctrl+R
90 CounterCW Ctrl+Shift+R
Bus Vector Connect...
Replace by Hierarchical Block... Ctrl+Shift+H
Replace by Subcircuit... Ctrl+Shift+B
Replace Components...
Save Component to DB...
Edit Symbol/Title Block
Lock/Unlock name position
Reverse Probe Direction
Change Color...
Font...
Properties Ctrl+M
NI ELVIS II Instrument Enabled in Simulation
JOR
OA6484PP01
SSOA06 *

SSOA06 - Multisim - [SSOA06 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

If you need to know what pin-outs are the Power Supply, Ground, etc. Right click on the OP-Amp and first select "Properties". Then select "Edit Component in DB" from the Menu. Then select "Footprint" from the next Menu. This will give you a table Listing how each pin is defined electrically.

R3
10kΩ

R1
1.0kΩ

U1A
LMC6484AIN

V1
9 V

R5

R2
390kΩ

R4
12kΩ

10kΩ

Power Source Components

Basic

OPAMP

Label | Display | Value | Fault | Pins | User fields

Value: LMC6484AIN
Footprint: MDIP-14(N14A)
Manufacturer: IPC-2221A/2222
Function: CMOS Quad Rail-to-Rail Input and Output Operational Amplifier
Hyperlink:

Edit component in DB
Save component to DB
Edit footprint
Edit model

Footprints for multi-section components can only be edited from the database. See Help for more information.

Replace | OK | Cancel | Info | Help

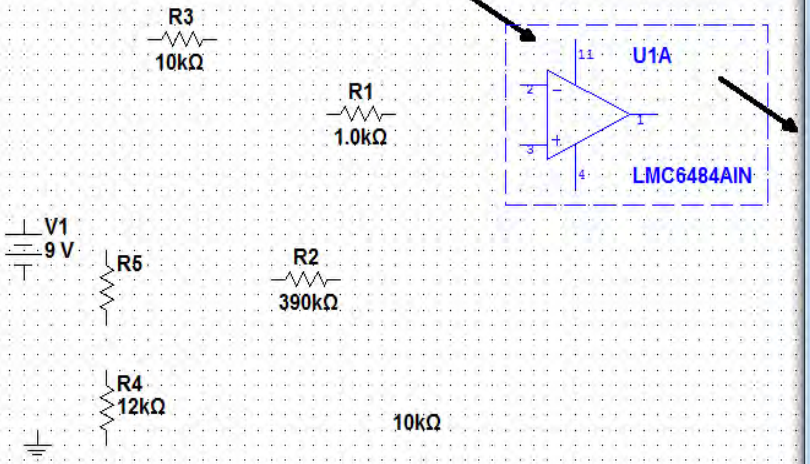
JOR

OA6484PP01 | SSOA06 *

SSOA06 - Multisim - [SSOA06 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

If you need to know what pin-outs are the Power Supply, Ground, etc. Right click on the OP-Amp and first select "Properties". Then select "Edit Component in DB" from the Menu. Then select "Footprint" from the next Menu. This will give you a table Listing how each pin is defined electrically.



Component Properties

General | Symbol | Model | Pin parameters | Footprint | Electronic param. | User fields

Footprint manufacturer/type:

IPC-2221A/2222\MDIP-14(N14A)

Add From database
Delete
Change
Map pins

Symbol pin to footprint pin mapping table:

Symbol pins	Footprint pins	Pin swap gr
1IN+	3	A
1IN-	2	B
VS-	11	
VS+	4	
1OUT	1	C
2IN+	5	A
2IN-	6	B
VS-	11	
VS+	4	
2OUT	7	C
3IN+	10	A
3IN-	9	B
VS-	11	
VS+	4	
3OUT	8	C
4IN+	12	A
4IN-	13	B
VS-	11	
VS+	4	
4OUT	14	C

Verify symbol-to-footprint mapping against the datasheet when adding or changing footprint.

OK Cancel Help

Basic

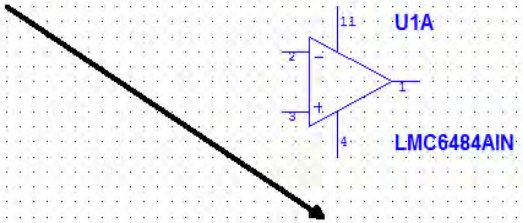
OA6484PP01 SSOA06 *

SSOA07 - Multisim - [SSOA07 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

The Procedure for Wiring all the Components together is accomplished using the mouse.

Using the Battey as an example, Left click on the Top Terminal of the Battery. Move the mouse around over the Top Terminal until a Black Dot appears with Cross-hairs on it.



JOR

Power Source Components

Basic

OA6484PP01 SSOA07 *

SSOA08 - Multisim - [SSOA08 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

--- In Use List ---

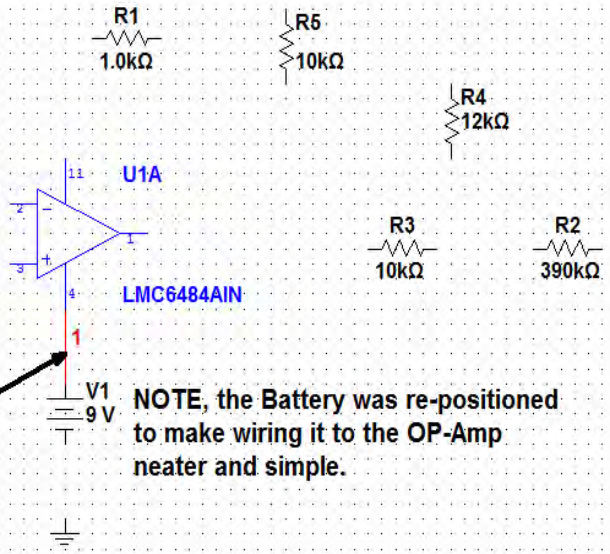
Power Source Components

Basic

The Procedure for Wiring all the Components together is accomplished using the mouse.

Using the Battey as an example, Left click on the Top Terminal of the Battery. Move the mouse around over the Top Terminal until a Black Dot appears with Cross-hairs on it.

When the Black Dot appears, Hold Down the Left Mouse Button and move the Mouse Pointer(Dot) to the OP-Amps Power Supply Pin # 4. When positioned correctly over the end of Pin # 4 a little Red Dot will appear indicating it's ready to connect. Click the Left Mouse button the make the Connection. This completes the wire connection.



NOTE, the Battery was re-positioned to make wiring it to the OP-Amp neater and simple.

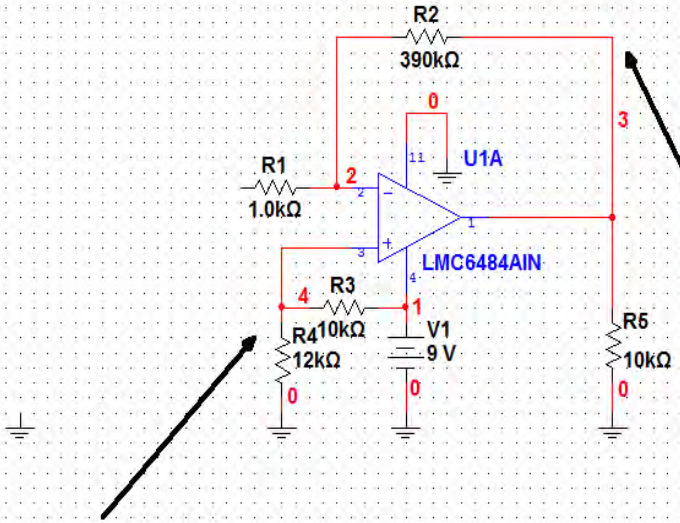
JOR

OA6484PP01 SSOA08 *

SSOA09 - Multisim - [SSOA09 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

The Wiring of all the Components is completed in the Diagram below.



The Components have been re-positioned to make the Wiring neater. Extra Grounds were also used to make to minimize the Wiring.

In general the software picks the shortest wiring connection between two component Terminals. If this is not desirable the you may manually route your wires by Left clicking the Mouse when ever you need to change direction on your way to making the second connection. The Left Mouse click nails down that wire at that point when the wiring direction is changed.

JOR

Power Source Components

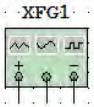
Basic

OA6484PP01 SSOA09 *

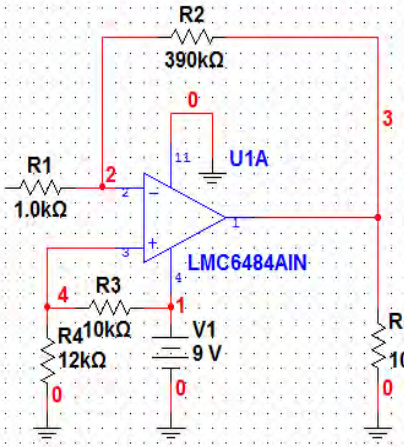
SSOA12 - Multisim - [SSOA12]

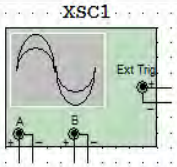
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Finally to test our circuit and verify it's operation we will need to add some Instrumentation. NOTE, most of Multisim's Instrumentation is located on the Toolbar on the far right hand side of the Circuit Window.



The "Function Generator" is located 2nd down from the top in the "Equipment Toolbar". To select it, Left click on it and move the Mouse Pointer to the desired location on the screen. Then Left click to place it there. NOTE both these clicks are momentary clicks, don't hold the Mouse Button down when trying to position the Instrument on the Circuit Window.





The two Channel Oscilloscope is Located 4th down from the top in the "Equipment Toolbar". To select it, Left click on it and move the Mouse Pointer to the desired location on the screen. Then Left click to place it there.

Power Source Components

Basic

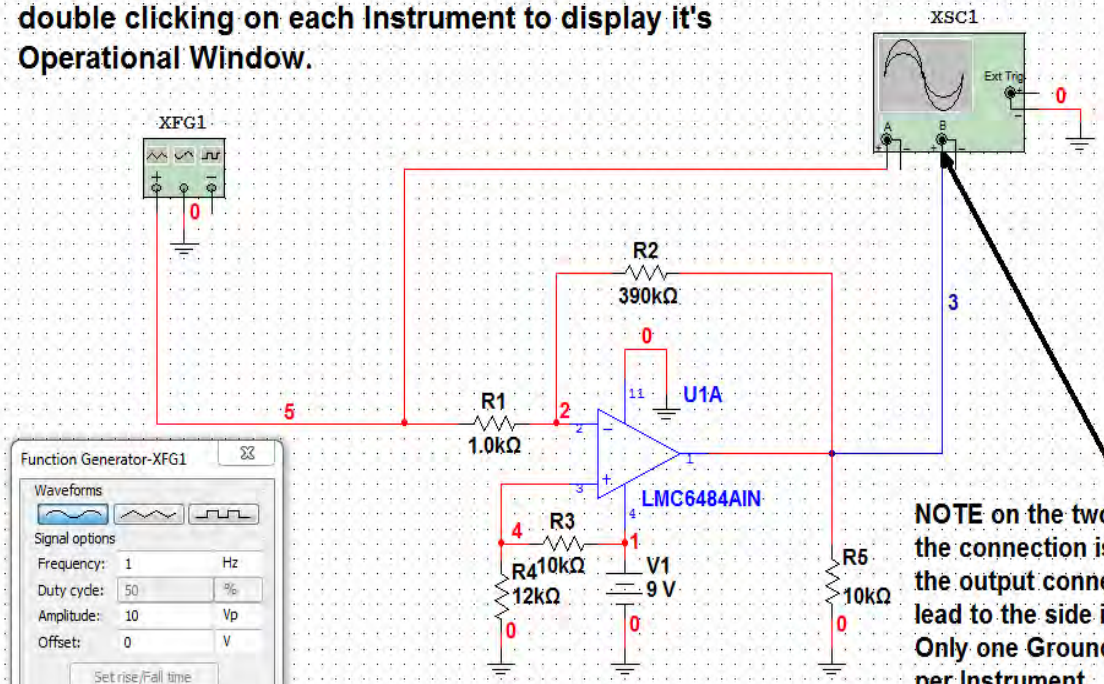
JOR

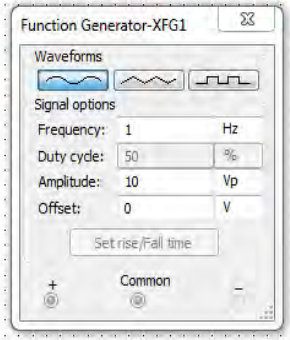
OA6484PP01 SSOA12

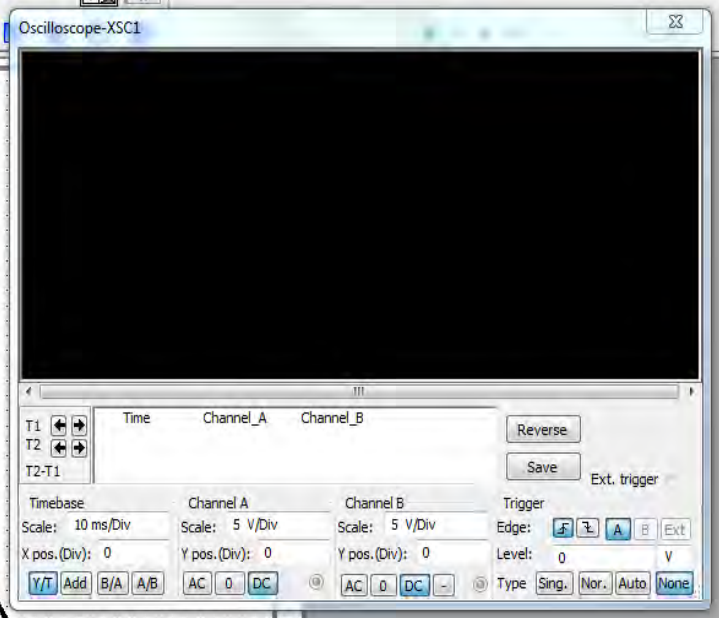
SSOA13 - Multisim - [SSOA13]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Wiring up the Instruments to the Circuit and then double clicking on each Instrument to display it's Operational Window.





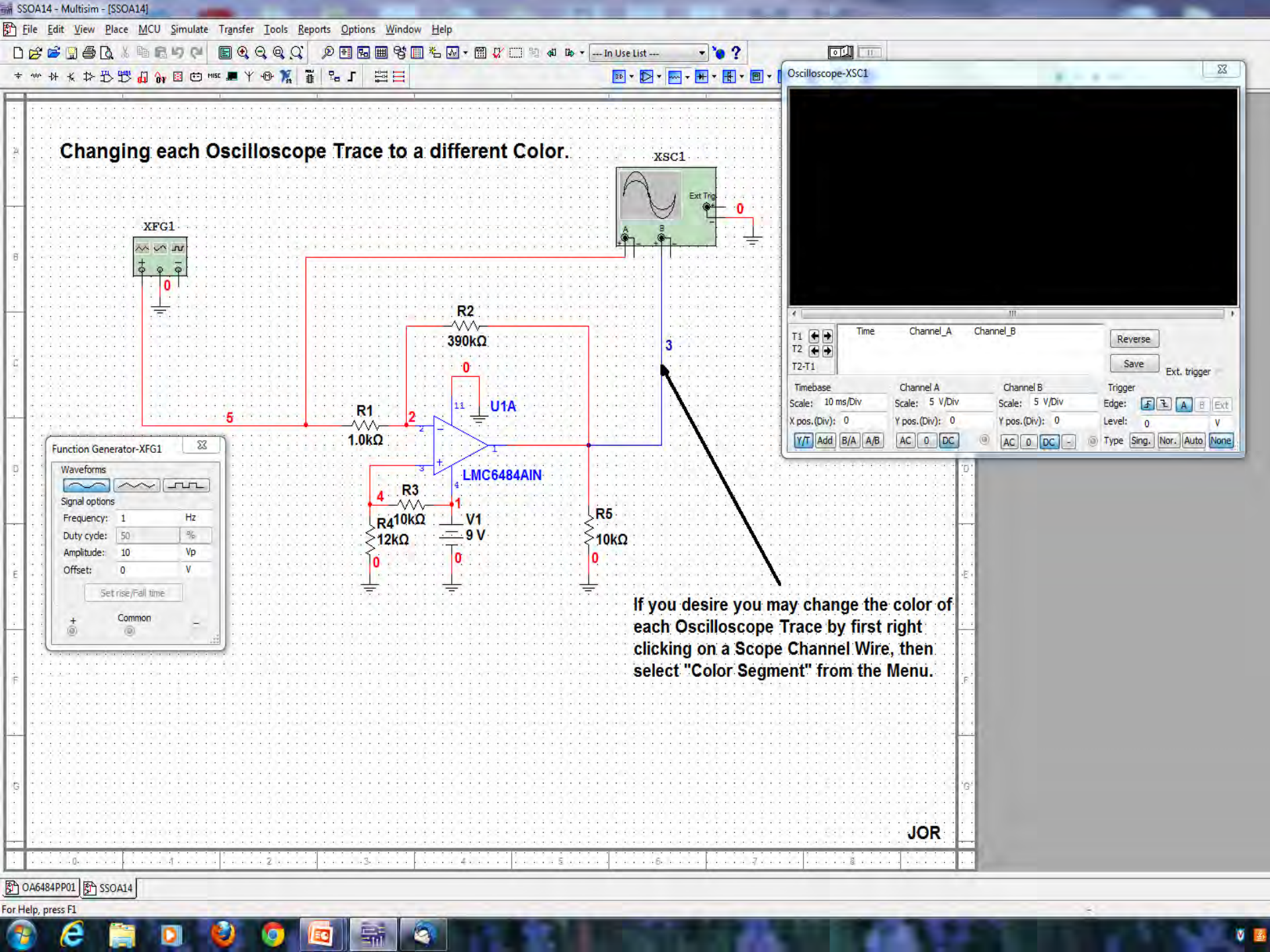


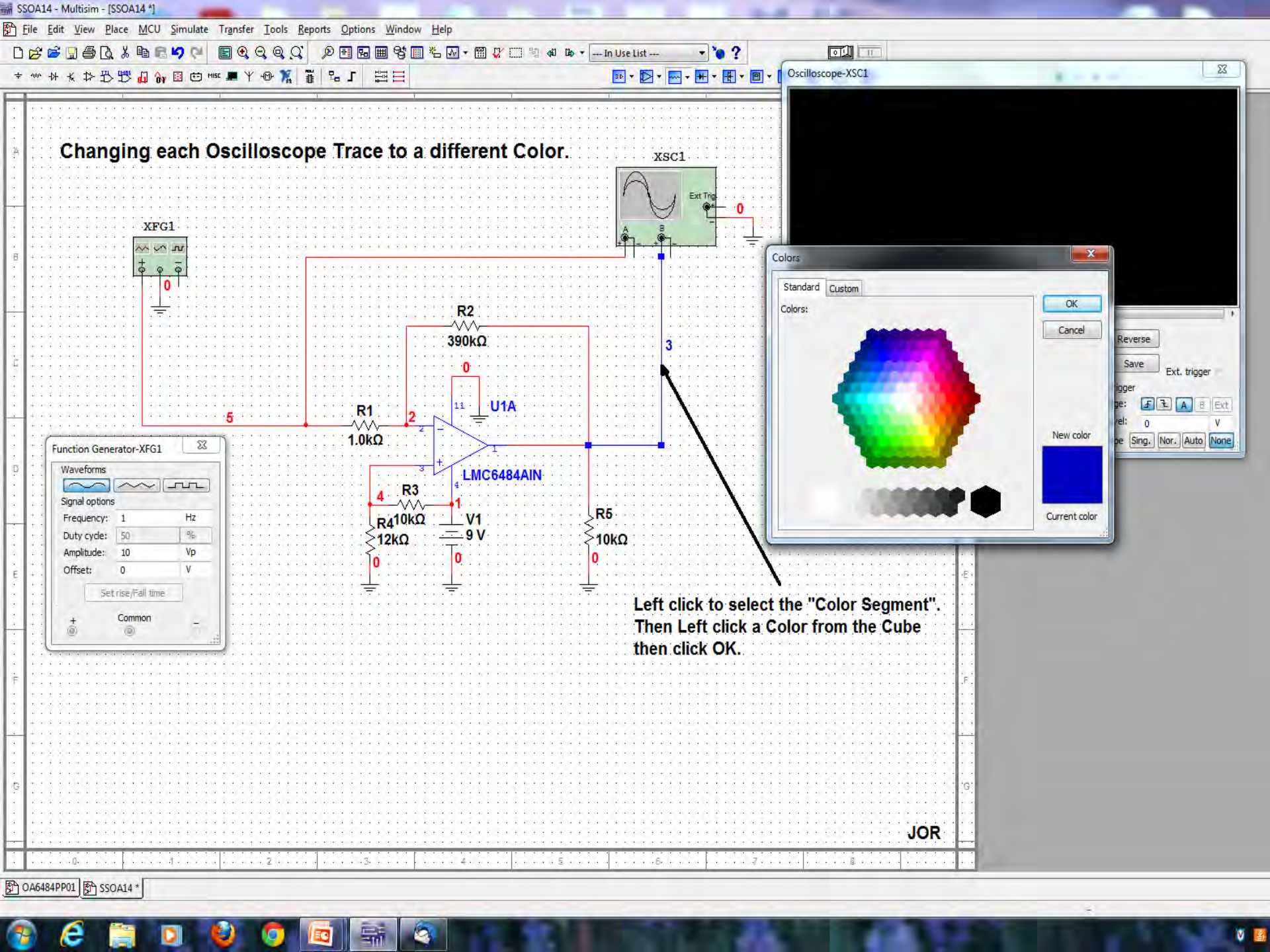
NOTE on the two Channel Oscilloscope the connection is made to the center of the output connector. The right angled lead to the side is a Ground Connection. Only one Ground Connection is required per Instrument.

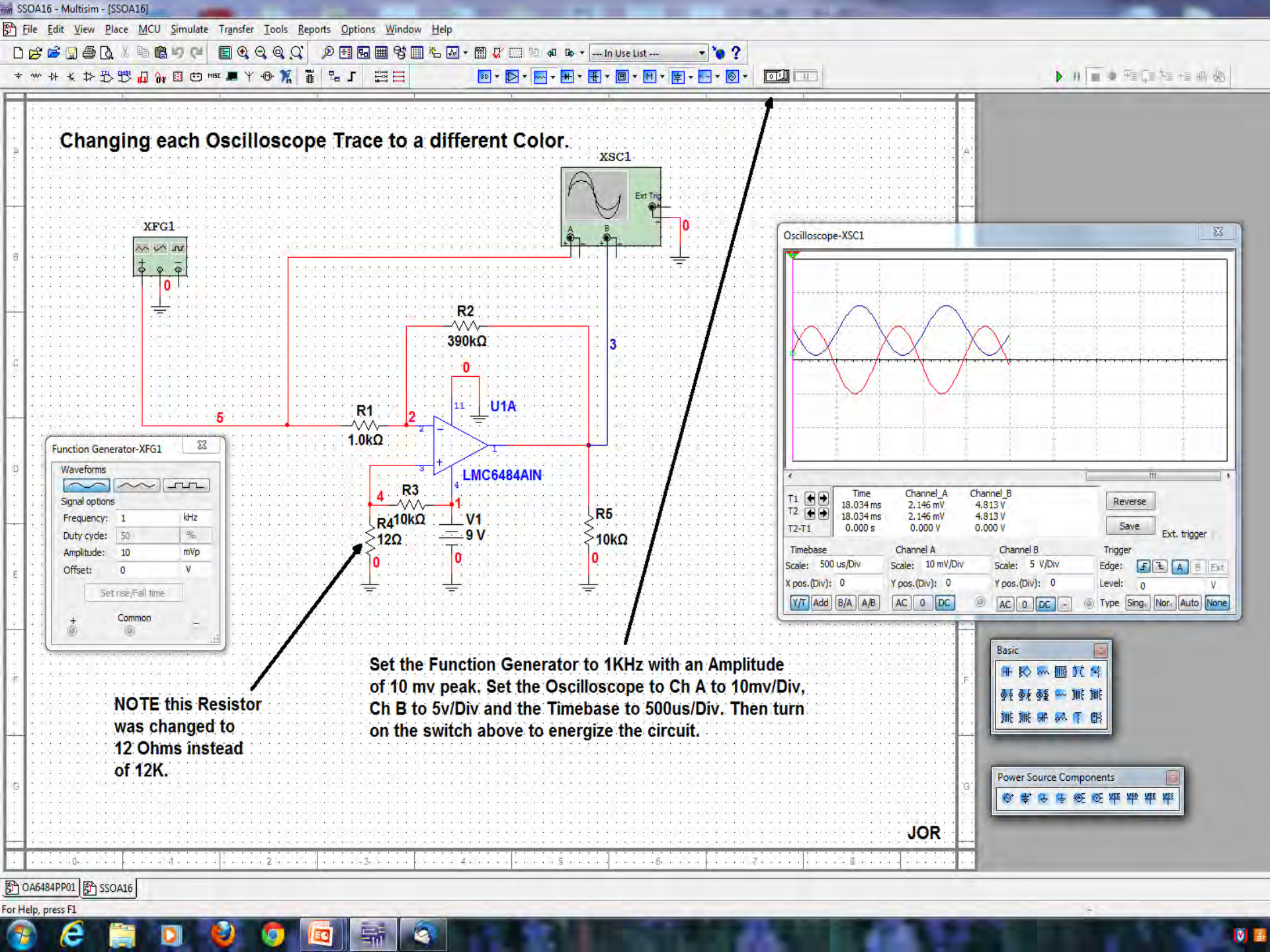
JOR

OA6484PP01 SSOA13

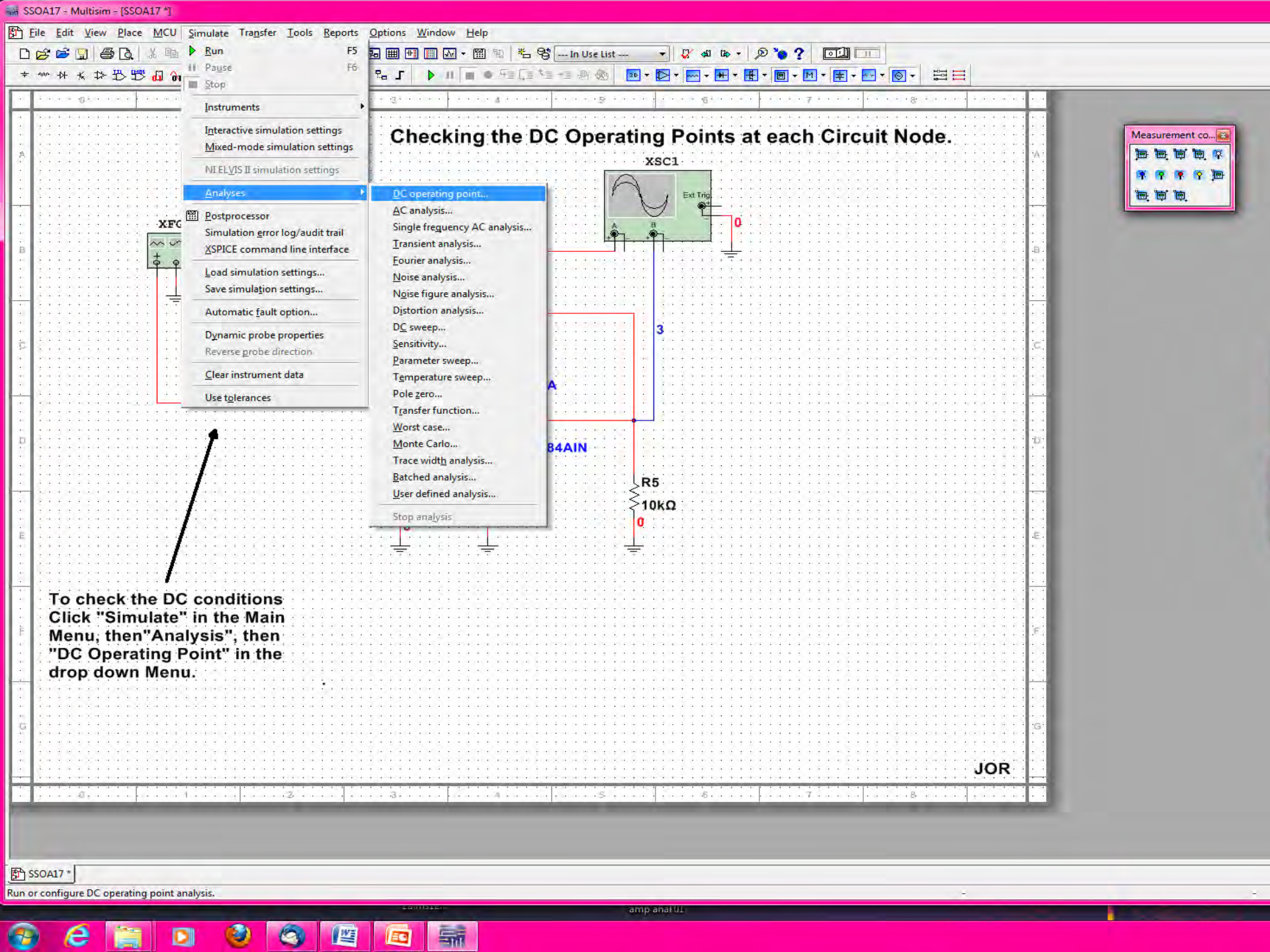
For Help, press F1

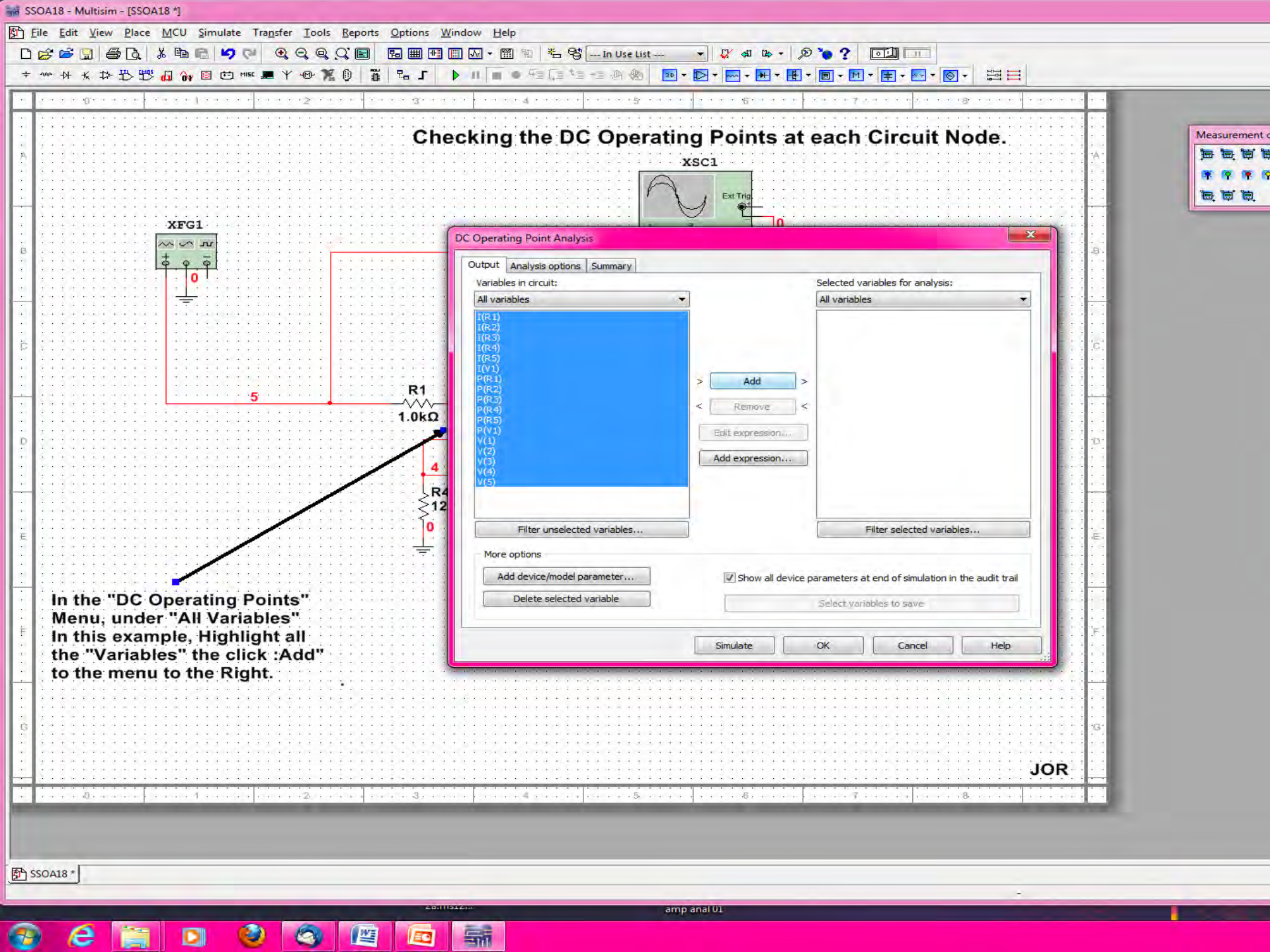

SSOA14 - Multisim - [SSOA14]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Changing each Oscilloscope Trace to a different Color.
XSC1
Ext Trig
A
B
XFG1
0
R2
390kΩ
R1
1.0kΩ
U1A
LMC6484AIN
R3
10kΩ
R4
12kΩ
V1
9 V
R5
10kΩ
Function Generator-XFG1
Waveforms
Signal options
Frequency: 1 Hz
Duty cycle: 50 %
Amplitude: 10 Vp
Offset: 0 V
Set rise/Fall time
Common
Oscilloscope-XSC1
Time
Channel_A
Channel_B
Reverse
Save
Ext. trigger
Timebase
Scale: 10 ms/Div
X pos.(Div): 0
Channel A
Scale: 5 V/Div
Y pos.(Div): 0
Channel B
Scale: 5 V/Div
Y pos.(Div): 0
Trigger
Edge:
Level: 0 V
Type Sing. Nor. Auto None
If you desire you may change the color of each Oscilloscope Trace by first right clicking on a Scope Channel Wire, then select "Color Segment" from the Menu.
JOR
OA6484PP01
SSOA14
For Help, press F1


SSOA14 - Multisim - [SSOA14 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Changing each Oscilloscope Trace to a different Color.
XSC1
Ext Trig
A
B
XFG1
R2
390kΩ
R1
1.0kΩ
U1A
LMC6484AIN
R3
10kΩ
R4
12kΩ
V1
9 V
R5
10kΩ
Function Generator-XFG1
Waveforms
Signal options
Frequency: 1 Hz
Duty cycle: 50 %
Amplitude: 10 Vp
Offset: 0 V
Set rise/Fall time
Common
Oscilloscope-XSC1
Reverse
Save
Ext. trigger
Sing.
Nor.
Auto
None
Colors
Standard
Custom
Colors:
OK
Cancel
New color
Current color
Left click to select the "Color Segment".
Then Left click a Color from the Cube
then click OK.
JOR
OA6484PP01
SSOA14 *


SSOA16 - Multisim - [SSOA16]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Changing each Oscilloscope Trace to a different Color.
XSC1
Ext Trg
A
B
XFG1
R2
390kΩ
R1
1.0kΩ
U1A
LMC6484AIN
R3
10kΩ
R4
12Ω
V1
9 V
R5
10kΩ
Function Generator-XFG1
Waveforms
Signal options
Frequency: 1 kHz
Duty cycle: 50 %
Amplitude: 10 mVp
Offset: 0 V
Set rise/Fall time
Common
Oscilloscope-XSC1
Time Channel_A Channel_B
T1 18.034 ms 2.146 mV 4.813 V
T2 18.034 ms 2.146 mV 4.813 V
T2-T1 0.000 s 0.000 V 0.000 V
Reverse
Save
Ext. trigger
Timebase
Scale: 500 us/Div
X pos.(Div): 0
Channel A
Scale: 10 mV/Div
Y pos.(Div): 0
Channel B
Scale: 5 V/Div
Y pos.(Div): 0
Trigger
Edge:
Level: 0 V
Type Sing. Nor. Auto None
NOTE this Resistor was changed to 12 Ohms instead of 12K.
Set the Function Generator to 1KHz with an Amplitude of 10 mv peak. Set the Oscilloscope to Ch A to 10mv/Div, Ch B to 5v/Div and the Timebase to 500us/Div. Then turn on the switch above to energize the circuit.
JOR
Basic
Power Source Components
OA6484PP01
SSOA16
For Help, press F1

- The procedure to check the Nodal DC Operating Conditions of the OP-Amp Circuit.

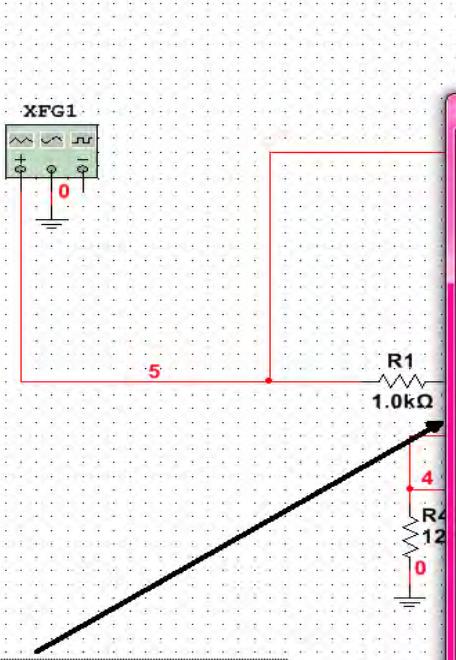

SSOA17 - Multisim - [SSOA17 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Run F5
Pause F6
Stop
Instruments
Interactive simulation settings
Mixed-mode simulation settings
NI ELVIS II simulation settings
Analyses
Postprocessor
Simulation error log/audit trail
XSPICE command line interface
Load simulation settings...
Save simulation settings...
Automatic fault option...
Dynamic probe properties
Reverse probe direction
Clear instrument data
Use tolerances
DC operating point...
AC analysis...
Single frequency AC analysis...
Transient analysis...
Fourier analysis...
Noise analysis...
Noise figure analysis...
Distortion analysis...
DC sweep...
Sensitivity...
Parameter sweep...
Temperature sweep...
Pole zero...
Transfer function...
Worst case...
Monte Carlo...
Trace width analysis...
Batched analysis...
User defined analysis...
Stop analysis
Checking the DC Operating Points at each Circuit Node.
XSC1
Ext Trig
A
B
0
3
R5
10kΩ
0
84AIN
To check the DC conditions Click "Simulate" in the Main Menu, then"Analysis", then "DC Operating Point" in the drop down Menu.
JOR
Measurement co...
SSOA17 *
Run or configure DC operating point analysis.


SSOA18 - Multisim - [SSOA18 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Checking the DC Operating Points at each Circuit Node.
XSC1
Ext Trig
XFG1
0
5
R1
1.0kΩ
4
R4
12
0
DC Operating Point Analysis
Output
Analysis options
Summary
Variables in circuit:
All variables
I(R1)
I(R2)
I(R3)
I(R4)
I(R5)
I(V1)
P(R1)
P(R2)
P(R3)
P(R4)
P(R5)
P(V1)
V(1)
V(2)
V(3)
V(4)
V(5)
Add
Remove
Edit expression...
Add expression...
Selected variables for analysis:
All variables
Filter unselected variables...
Filter selected variables...
More options
Add device/model parameter...
Delete selected variable
Show all device parameters at end of simulation in the audit trail
Select variables to save
Simulate
OK
Cancel
Help
In the "DC Operating Points" Menu, under "All Variables" In this example, Highlight all the "Variables" the click :Add" to the menu to the Right.
JOR
Measurement
SSOA18 *
amp anal 01

SSOA18 - Multisim - [SSOA18 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the DC Operating Points at each Circuit Node.



DC Operating Point Analysis

Output | Analysis options | Summary

Variables in circuit: All variables

Selected variables for analysis: All variables

I(R1)
I(R2)
I(R3)
I(R4)
I(R5)
I(V1)
P(R1)
P(R2)
P(R3)
P(R4)
P(R5)
P(V1)
V(1)
V(2)
V(3)
V(4)
V(5)

Add | Remove | Edit expression... | Add expression...

Filter unselected variables... | Filter selected variables...

More options

Add device/model parameter... | Delete selected variable

Show all device parameters at end of simulation in the audit trail

Select variables to save

Simulate | OK | Cancel | Help

In the "DC Operating Points" Menu, under "All Variables" In this example, Highlight all the "Variables" the click :Add" to the menu to the Right.

Now click "Simulate".

JOR

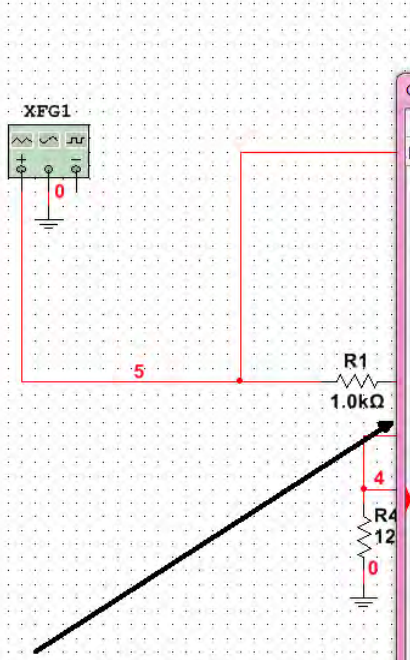
SSOA18 *

amp anal 01

SSOA18 - Multisim - [SSOA18 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the DC Operating Points at each Circuit Node.



Grapher View

File Edit View Graph Trace Cursor Legend Tools Help

DC Operating Point | DC Operating Point

SSOA18
DC Operating Point

	DC Operating Point	
1	I(R1)	-11.28263 u
2	P(R1)	127.29784 n
3	I(R2)	-11.28263 u
4	P(R2)	49.64608 u
5	I(R3)	-898.92129 u
6	P(R3)	8.08059 m
7	I(R4)	898.92130 u
8	P(R4)	9.69671 u
9	I(R5)	441.15066 u
10	P(R5)	1.94614 m
11	P(V1)	-17.11219 m
12	V(3)	4.41151
13	V(4)	10.78706 m
14	V(1)	9.00000
15	V(2)	11.28263 m
16	V(5)	0.00000
17	I(V1)	-1.90135 m

Selected Diagram:DC Operating Point

This table lists the "Current", "Voltage" and "Power" at various Nodes in the circuit.

JOR

Measurement co...

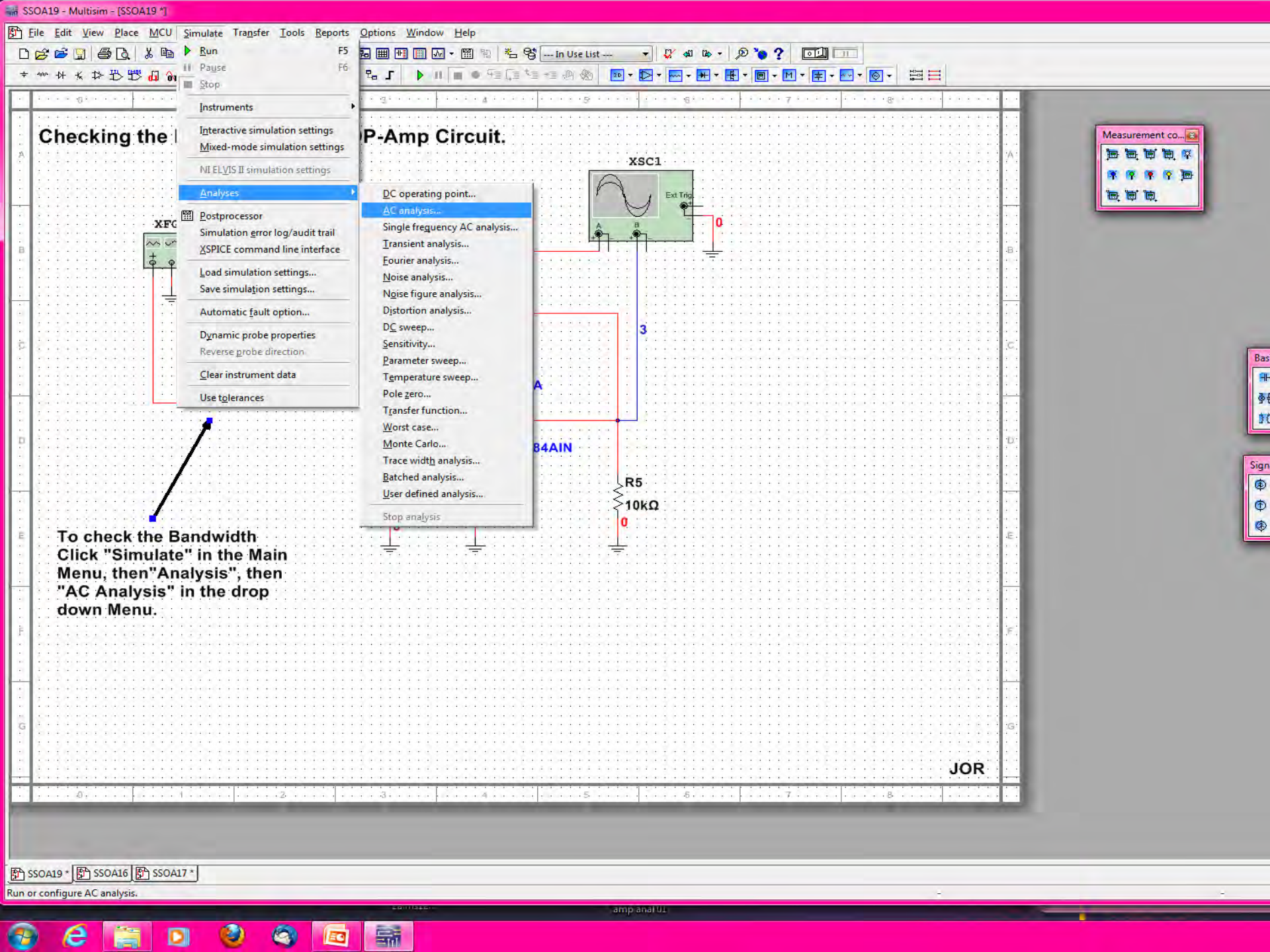
Basic

Signal source co...

SSOA18 *

For Help, press F1

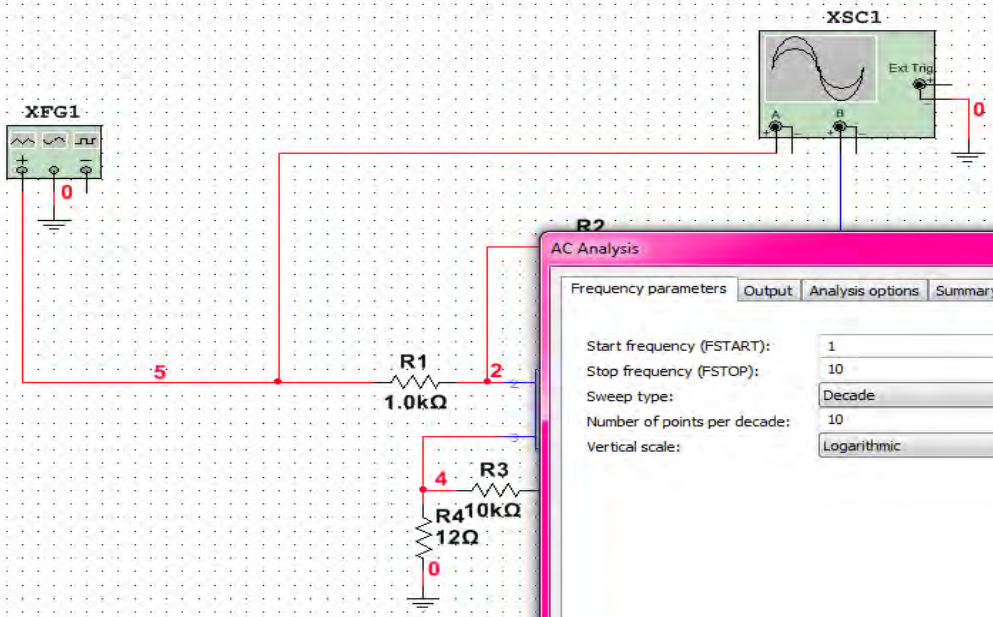
- The Procedure to find the OP-Amps Bandwidth.

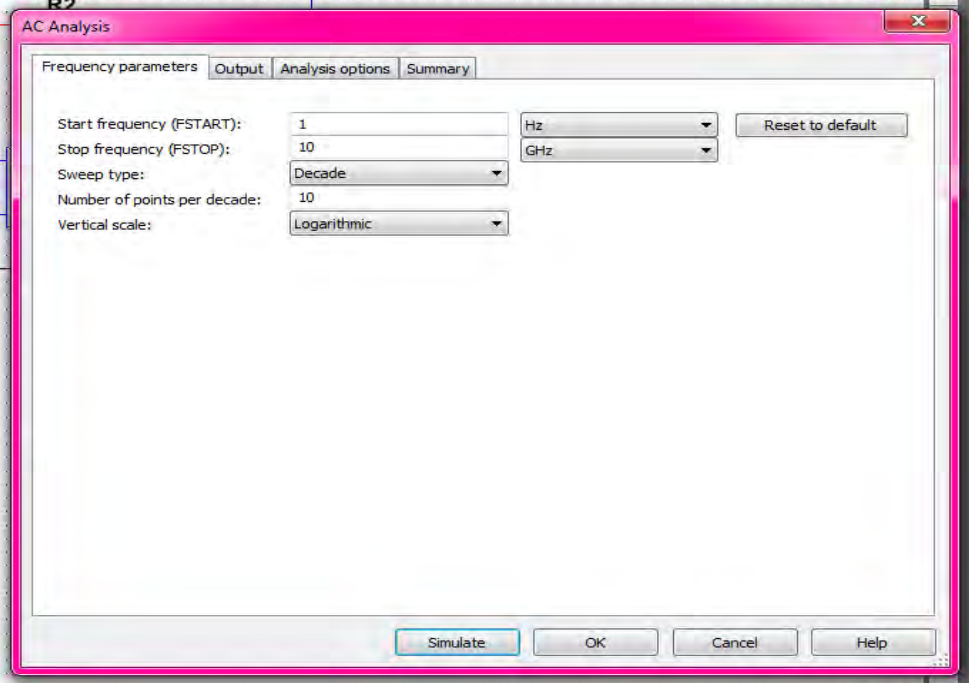

SSOA19 - Multisim - [SSOA19 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Run F5
Pause F6
Stop
Instruments
Interactive simulation settings
Mixed-mode simulation settings
NI ELVIS II simulation settings
Analyses
Postprocessor
Simulation error log/audit trail
XSPICE command line interface
Load simulation settings...
Save simulation settings...
Automatic fault option...
Dynamic probe properties
Reverse probe direction
Clear instrument data
Use tolerances
DC operating point...
AC analysis...
Single frequency AC analysis...
Transient analysis...
Fourier analysis...
Noise analysis...
Noise figure analysis...
Distortion analysis...
DC sweep...
Sensitivity...
Parameter sweep...
Temperature sweep...
Pole zero...
Transfer function...
Worst case...
Monte Carlo...
Trace width analysis...
Batched analysis...
User defined analysis...
Stop analysis
Checking the
P-Amp Circuit.
XSC1
Ext Trig
A
B
0
3
R5
10kΩ
84AIN
To check the Bandwidth Click "Simulate" in the Main Menu, then"Analysis", then "AC Analysis" in the drop down Menu.
JOR
Measurement co...
SSOA19 *
SSOA16
SSOA17 *
Run or configure AC analysis.

SSOA20 - Multisim - [SSOA20 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Circuit.





After clicking "AC Analysis" The Bandwidth Menu appears. Here default specifications are noted but may be changed to your desired specifications. Finally click the Output Menu Tab and chose the Output Node Voltage which is Node 3 in this circuit, or V(3).

JOR

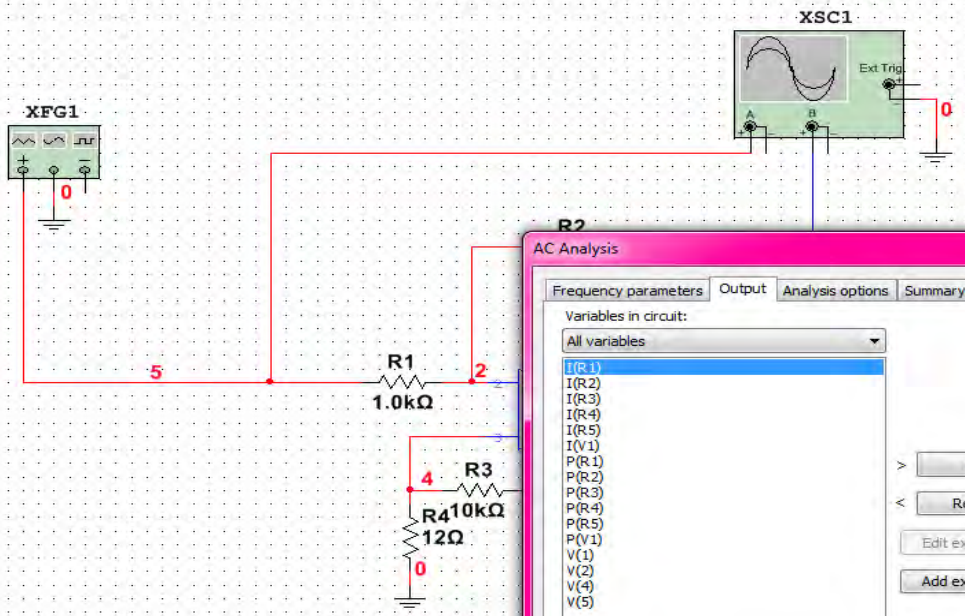
SSOA20 * SSOA16 SSOA17 *

amp anal 01

SSOA20 - Multisim - [SSOA20 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Circuit.



AC Analysis

Frequency parameters | Output | Analysis options | Summary

Variables in circuit:

All variables

I(R1)
I(R2)
I(R3)
I(R4)
I(R5)
I(V1)
P(R1)
P(R2)
P(R3)
P(R4)
P(R5)
P(V1)
V(1)
V(2)
V(4)
V(5)

Filter unselected variables...

Add
Remove
Edit expression...
Add expression...

Selected variables for analysis:

All variables

V(3)

Filter selected variables...

More options

Add device/model parameter...
Delete selected variable

Show all device parameters at end of simulation in the audit trail

Select variables to save

Simulate | OK | Cancel | Help

After clicking "AC Analysis" The Bandwidth Menu appears. Here default specifications are noted but may be changed to your desired specifications. Finally click the Output Menu Tab and chose the Output Node Voltage which is Node 3 in this circuit, or V(3).

JOR

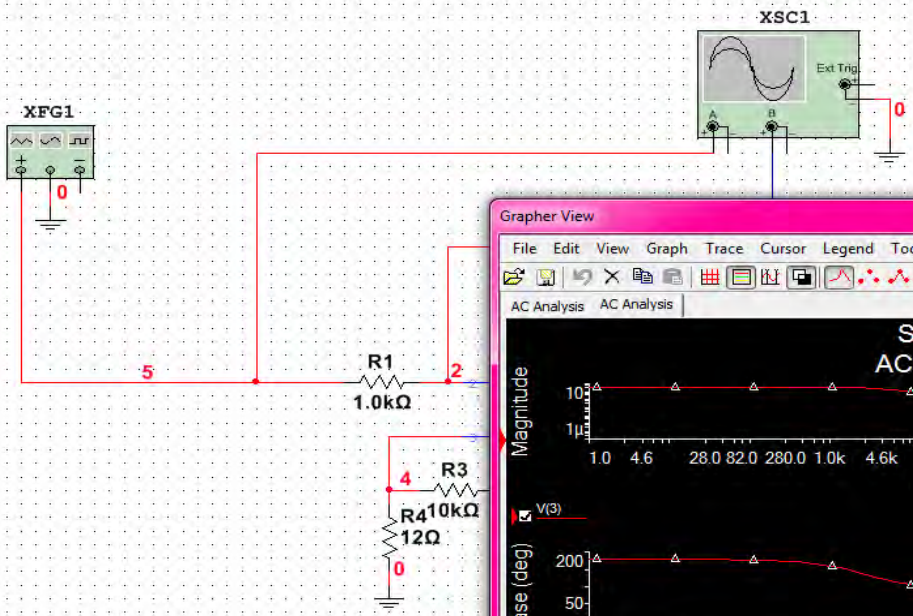
SSOA20 * | SSOA16 | SSOA17 *

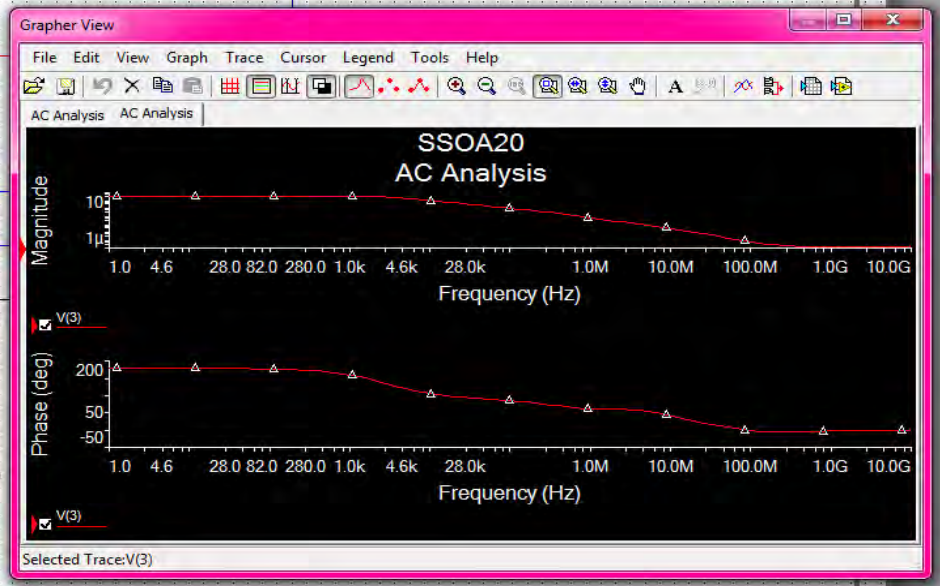
amp anal 01

SSOA20 - Multisim - [SSOA20 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Circuit.





This is the default "Frequency" and "Phase Response" of the OP-Amp.

JOR

Measurement co...

SSOA20 * SSOA16 SSOA17 *

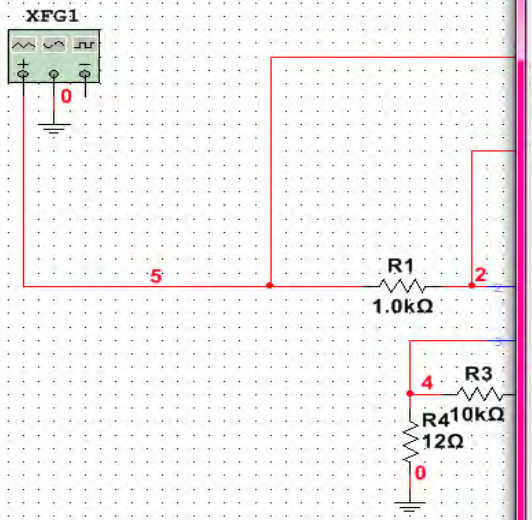
For Help, press F1

amp anal 01

SSOA20 - Multisim - [SSOA20 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Ci

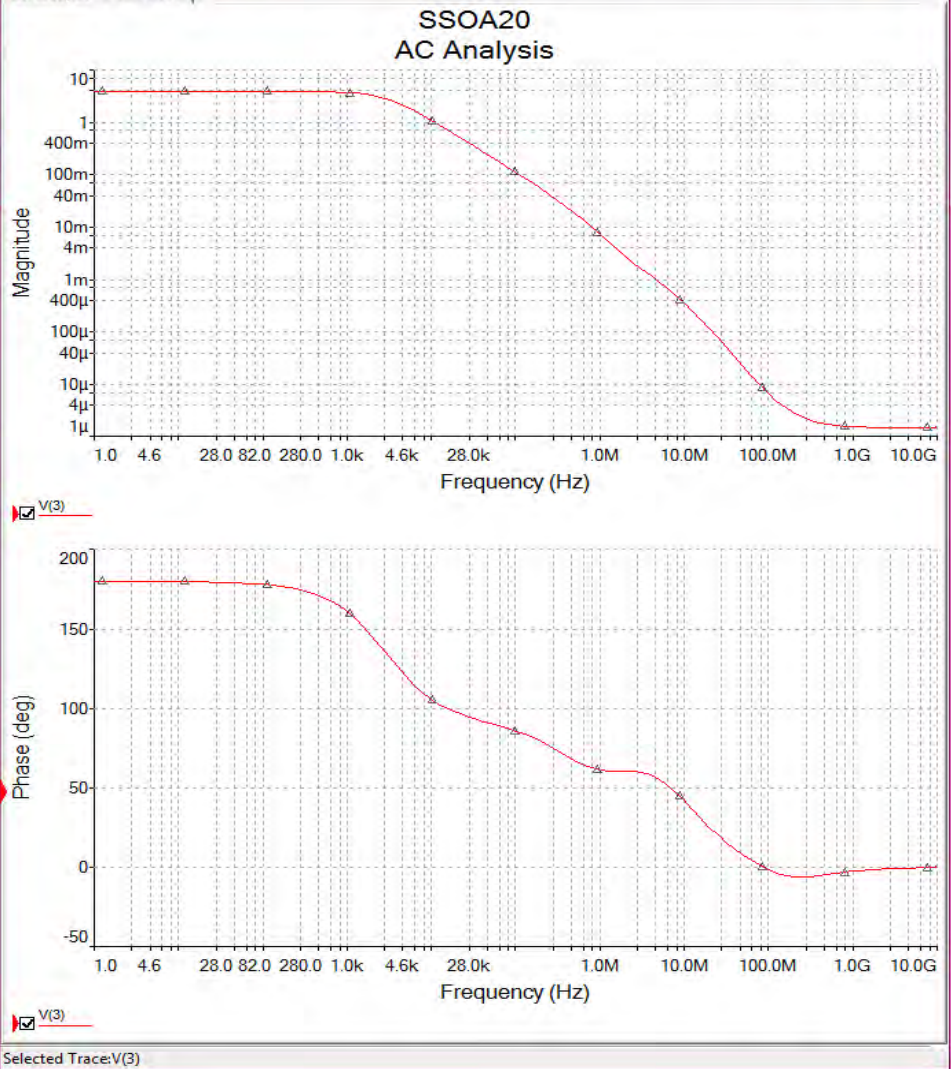


Next, expand the window vertically, reverse the background from black to white and add a Grid background.

Grapher View

File Edit View Graph Trace Cursor Legend Tools Help

AC Analysis | AC Analysis



Selected Trace:V(3)

Measurement co

SSOA20 * | SSOA16 | SSOA17 *

amp anal 01

SSOA20 - Multisim - [SSOA20 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Ci

XFG1

0

5

R1
1.0kΩ

2

4

R3
10kΩ

R4
12Ω

0

Clicking "Cursors" from the above Menu after clicking on the Plot of concern will allow the cursors to be moved anywhere on the PLOT.

Grapher View

File Edit View Graph Trace Cursor Legend Tools Help

AC Analysis | AC Analysis

SSOA20
AC Analysis

Cursor

	V(3)
x1	1.0000
y1	3.8962
x2	12.4342k
y2	885.7327m
dx	12.4332k
dy	-3.0105
dy/dx	-242.1310µ
1/dx	80.4300µ

Magnitude

10 1 400m 100m 40m 10m 4m 1m 400µ 100µ 40µ 10µ 4µ 1µ

1.0 4.6 28.0 82.0 280.0 1.0k 4.6k 28.0k 1.0M 10.0M 100.0M 1.0G 10.0G

Frequency (Hz)

V(3)

Phase (deg)

200 150 100 50 0 -50

1.0 4.6 28.0 82.0 280.0 1.0k 4.6k 28.0k 1.0M 10.0M 100.0M 1.0G 10.0G

Frequency (Hz)

V(3)

Selected Trace:V(3)

Measurer

SSOA20 * SSOA16 SSOA17 *

For Help, press F1

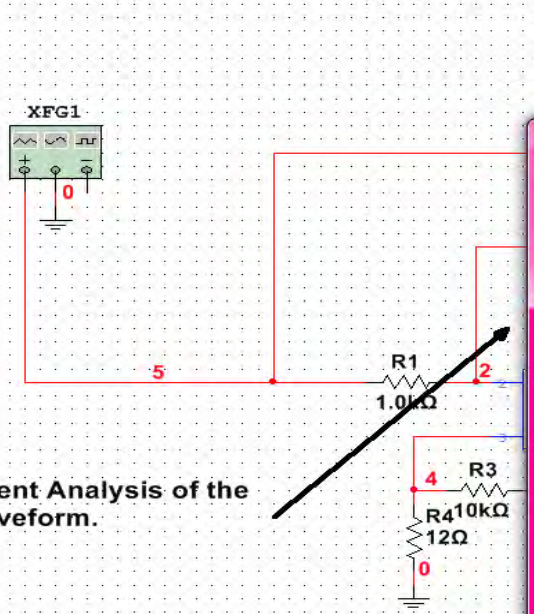
amp anal 01

- The Transient Analysis at the Output of the OP-Amp.

SSOA22 - Multisim - [SSOA22 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Circuit.



The Transient Analysis of the Output Waveform.

Transient Analysis

Analysis parameters | Output | Analysis options | Summary

Initial conditions: Calculate DC operating point — Reset to default

Parameters

Start time (TSTART): 0 s

End time (TSTOP): 0.007 s

Maximum time step settings (TMAX)

- Minimum number of time points: 100
- Maximum time step (TMAX): 1e-005 s
- Generate time steps automatically

More options

- Set initial time step (TSTEP): 1e-005 s
- Estimate maximum time step based on net list (TMAX)

Simulate | OK | Cancel | Help

JOR

SSOA22 * | SSOA16 | SSOA17 *

amp anal 01

SSOA22 - Multisim - [SSOA22 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Ci

XFG1

0

5

R1
1.0kΩ

2

4

R3
10kΩ

R4
12Ω

0

The Transient Analysis of the Output Waveform.

Cursor

	V(3)
x1	0.0000
y1	4.4115
x2	0.0000
y2	4.4115
dx	0.0000
dy	0.0000
dy/dx	
1/dx	

Grapher View

File Edit View Graph Trace Cursor Legend Tools Help

AC Analysis | AC Analysis | Transient Analysis | Transient Analysis | Transient Analysis | Fourier Analysis | Transient Analysis | Transient Analysis

SSOA22
Transient Analysis

Voltage (V)

9
6
3
0

0 1m 2m 3m 4m 5m 6m 7m

Time (s)

V(3)

Selected Trace:V(3) | Selected Cursor: 1

Measurement co...

SSOA22 * SSOA16 SSOA17 *

For Help, press F1

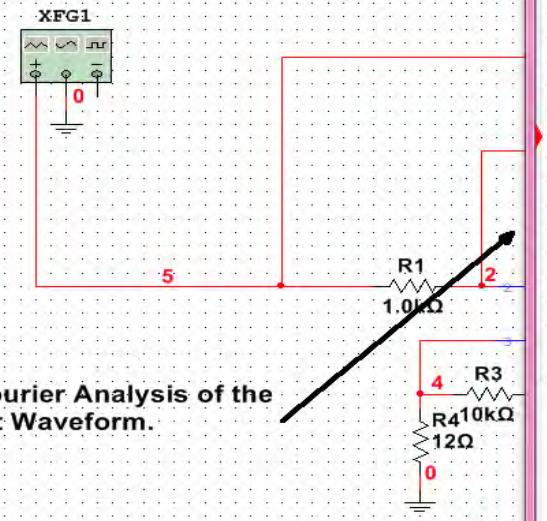
amp anal 01

- The Fourier Analysis of the Output Waveform.

SSOA21 - Multisim - [SSOA21 *]

File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help

Checking the Bandwidth of the OP-Amp Ci



The Fourier Analysis of the Output Waveform.

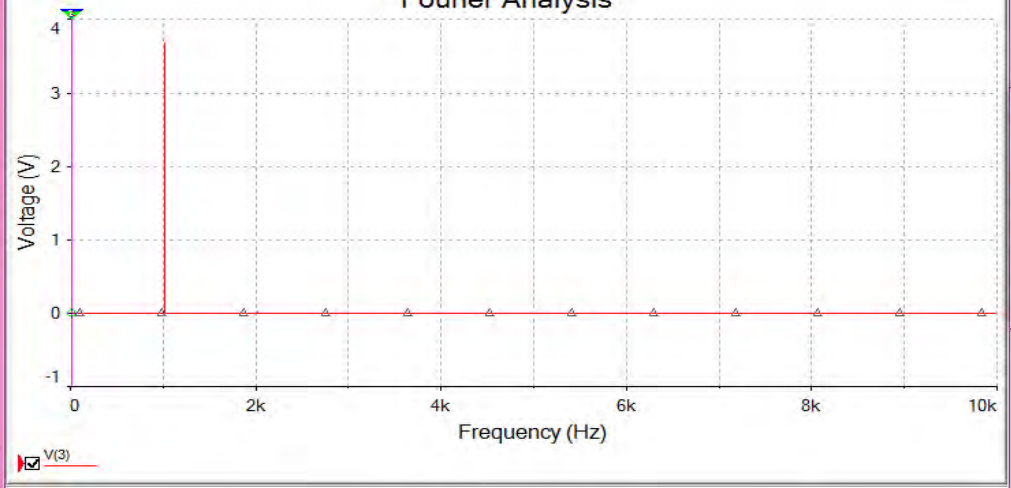
Grapher View

File Edit View Graph Trace Cursor Legend Tools Help

AC Analysis | AC Analysis | Transient Analysis | Transient Analysis | Transient Analysis | Fourier Analysis

SSOA21

1	Fourier analysis for V(3):				
2	DC component:	4.39361			
3	No. Harmonics:	9			
4	THD:	0.399461 %			
5	Grid size:	256			
6	Interpolation Degree:	1			
7					
8	Harmonic	Frequency	Magnitude	Phase	Norm. Mag
9	1	1000	3.6821	160.923	1
10	2	2000	0.0147075	-163.11	0.00399432
11	3	3000	0.000174909	-80.878	4.75025e-005
12	4	4000	2.80238e-006	6.64854	7.61082e-007
13	5	5000	1.27178e-006	123.352	3.45395e-007
14	6	6000	1.29183e-006	97.9825	3.50839e-007
15	7	7000	2.08399e-006	74.0054	5.65978e-007
16	8	8000	1.29925e-006	101.273	3.52855e-007
17	9	9000	1.79878e-006	138.647	4.88521e-007
18					



Measurement co...

Cursor

x1
y1
x2
y2
dx
dy
dy/dx
1/dx

SSOA21 * | SSOA16 | SSOA17 *

For Help, press F1