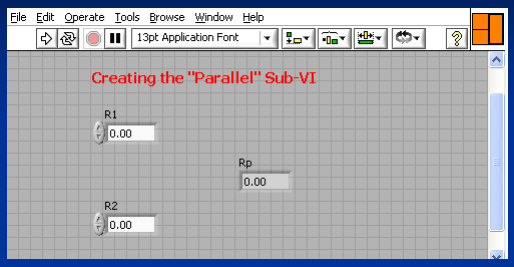
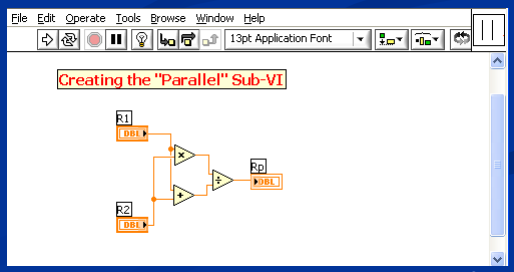
Engin 103
Fall ‘06
Meeting #18: October 31, 2006
Circuit Analysis with LabVIEW IV: the equations for wiring in the Block Diagram are shown in the link to this lab in the e-syllabus.

Circuit 3 with Sub-VI
Step 1: Creating the Parallel VI:



(a) Place two numeric controls labelled As R1 and R2, and one indicator as Rp into the Front Panel

(b) In the Block Diagram produce Rp using the formula:
Rp= (R1*R2)/(R1+R2)



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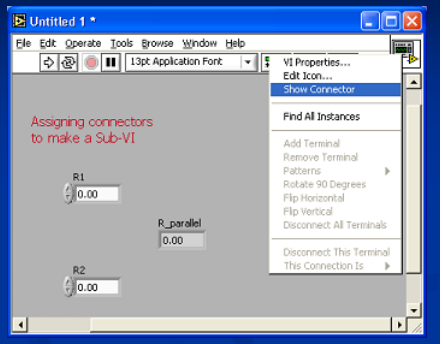
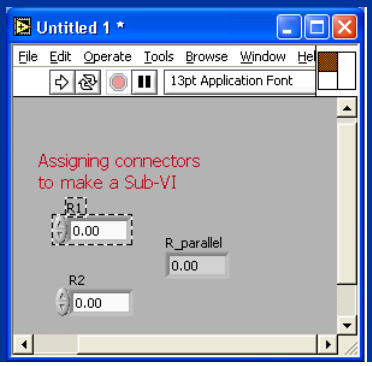
LabVIEW:
How to convert a VI (Virtual Instrument) into a Sub-VI or subroutine:
Assigning connectors:

1.- Right click on icon, select show connectors





2.- Pair connectors (boxes in icon) with input elements in Front Panel by clicking on connector, then click on element

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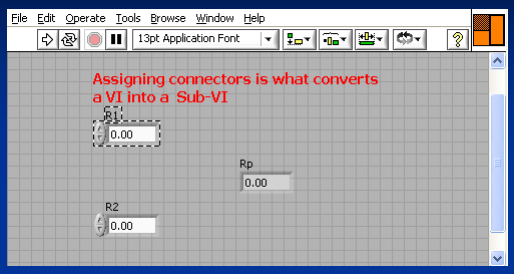
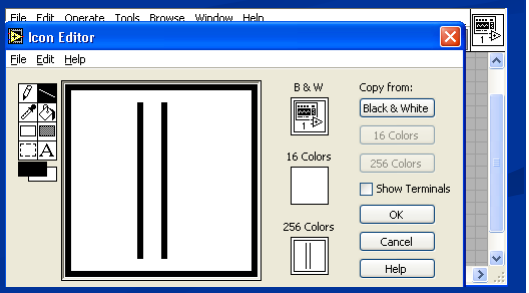
Step 2: Making "Parallel VI" becomes a "Parallel SubVI"

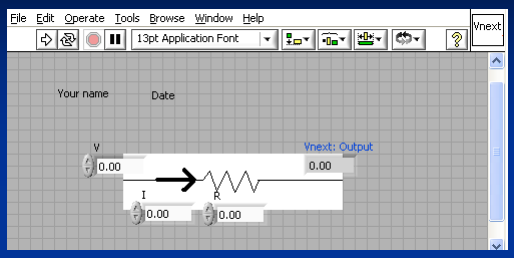


(a) Right click on the icon, select Show Connectors, then pair the left connectors with numeric controls (by right clicking on one and another consecutively) and the right ones with numeric indicators

(b) Double click on the icon, use dotted rectangle to select icon contents, then hit backspace to delete. Use line to draw two vertical bars to represent the Parallel subVI. Then click OK.

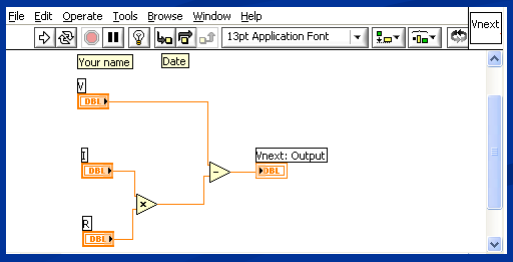


Step 3: Creating the Vnext subVI:

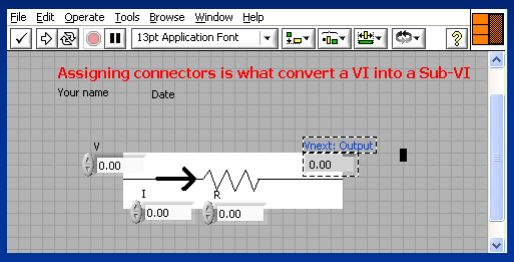


(a) As with the Parallel subVI, we start Creating the VI by placing three numeric Controls labelled as V, I, and R, and One numeric indicator as Vnext

(b) In the Block Diagram, Vnext is given by the expression:
Vnext = V – I*R



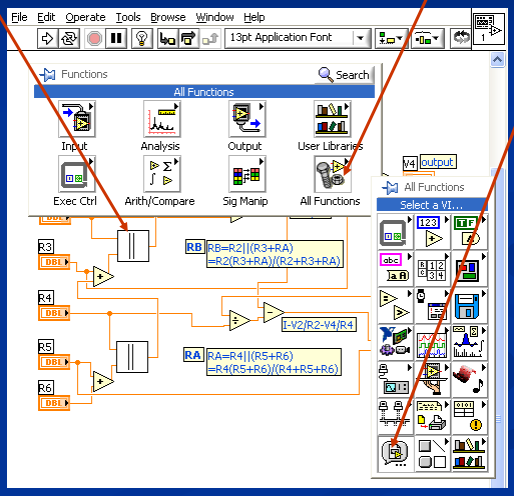
Step 4: Assigning connectors and editing icon in Vnext subVI



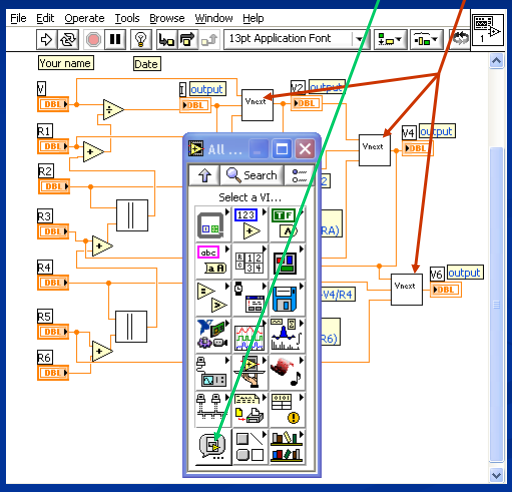
(a) To convert the Vnext VI into a subVI connectors are assigned As with the Parallel subVI

(b) And the icon is edited to mark its function

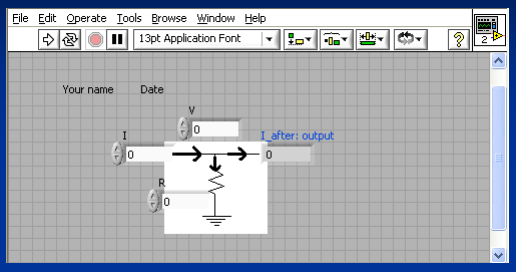
To call in a subVI you created to perform a group of operations (e.g. the Parallel subVI), right-click within the Block Diagram, All Functions/Select a VI. Then wire its terminals (defined during the process of assigning connectors) to the rest of the circuit.



For Circuit III with subVI's, repeat the same steps to insert the Vnext subVI: right-click within the Block Diagram, All Functions/Select a VI. Then wire its terminals (defined during the process of assigning connectors) to the rest of the circuit.

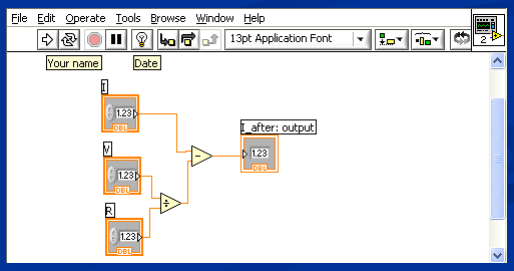


A third subVI, called I_after, or current I after certain node can be introduced in Circuit III

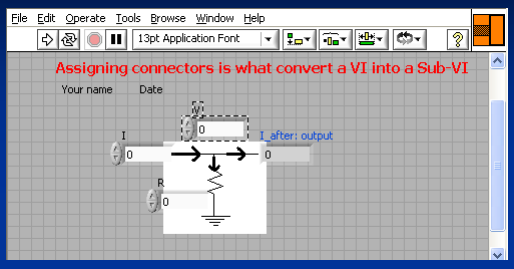


1) The subVI can be created by inserting the inputs I, V, R as numeric controls and output I_after as numeric indicator, in the Front Panel.

2) Then connecting them together in the Block Diagram according to
I_after = I – V/R

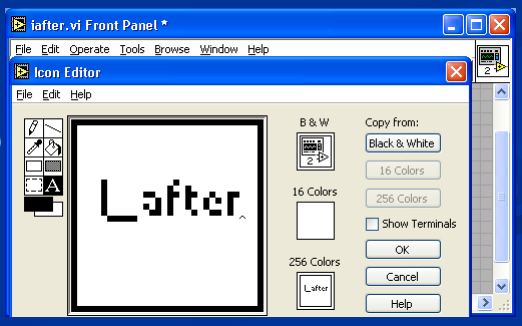


Steps 3) and 4) that convert a VI into a subVI:



3) Right-click on icon, Show Connector, then pair Front Panel's elements with connectors on icon by clicking on the element then its corresponding connector.

4) The icon can be edited to indicate its function by using the Dotted Rectangle (to select)/Backspace (to delete) /A (text box). Then type in "I_after" and click OK.



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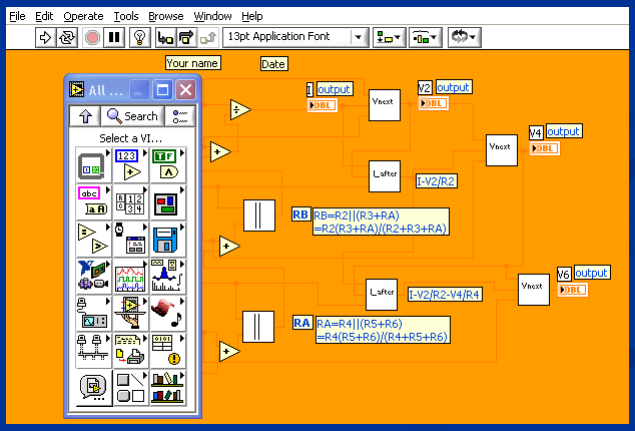
The Block Diagram for Circuit III when the three subVI's (Parallel, Vnext, I_after) are used contains only 11 operators now. This illustrates the purpose of using subVI's (or subroutines), that is, to simplify the reading of a code, it is easier to pinpoint and fix an error. Also, in a graphical programming language, such as LabVIEW, the interconnections between a subroutine and other elements in the code are easy to see.



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Suggested items to write in the Engin 103 logbook:

1) How many icons in the Block Diagram did you use to implement equation (1) in the Circuit Analysis with LabVIEW III link with and without the parallel sub VI ? Repeat the same for equations (2), (3), and (4) to obtain V2, V4, V6
2) Explain in your own words the advantages and disadvantages of using sub VI's