

# Circuits Solver Operation Manual

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Submitted as the course project for Electric Circuits, First Year, Computer Engineering Department.

## 1 Circuit Data Input

On opening the program, the user is required to enter the number of nodes  $n$ , which must be greater than 1. The program assigns each node a number between 0 and  $n-1$ , and then prompts the user to input the elements connected to each node.

Every element must be of the form  $[T][N]$  where  $[T]$  represents one of three circuit element types:  $[R]$ esistors,  $[E]$  voltage sources, and  $[J]$  current sources, and  $[N]$  is the index of the element, which has to be nonnegative. Pressing any key other than  $R/E/J$  will exit the current node's input.

On finishing the input for all nodes, the program checks the validity of the circuit as it is, if no errors happen, the program checks the power balance and then continues on to the next step.

## 2 Circuit Data Output

There are three types of output the program can show:

1. Direct Responses: the user is required to enter the type ( $R/V/I$ ) of the required response and the element (resistor/source) or the nodes (for potential difference) that the response is required

for. For example:  $I R1$  for the current in  $R1$ , and  $V 2 3$  for the potential difference between the two nodes.

2. Superposition responses: the user is required to enter the source's name (type+index) and then the desired response as in step 1. For example:  $E1 V 2 3$  for the voltage between nodes 2 and 3 due to the voltage source  $E1$ . Please note that if another source is removed, the user can not get the responses (current/voltage) on it, because it is no longer a part of the circuit (but is returned after superposition input is over).
3. Maximum power transfer & load resistance for it: the user is required to enter one of  $MP$ ,  $PM$ , or  $RM$  for the program to compute the maximum possible power transfer to a resistor, and the name ( $R + \text{index}$ ) of the load resistor. The program will then print both the maximum possible power transfer as well as the value of the load resistance required for that.

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\*Section 1, BN. 8

†Section 1, BN. 3

‡Section 1, BN. 15

§Section 2, BN. 15