AC Basic Electronics

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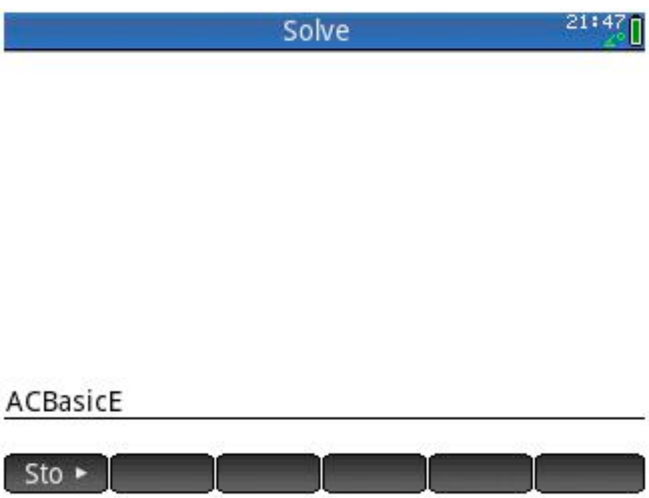
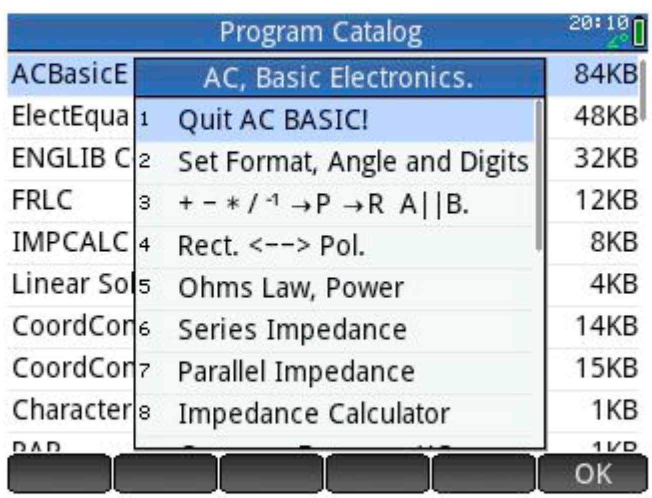
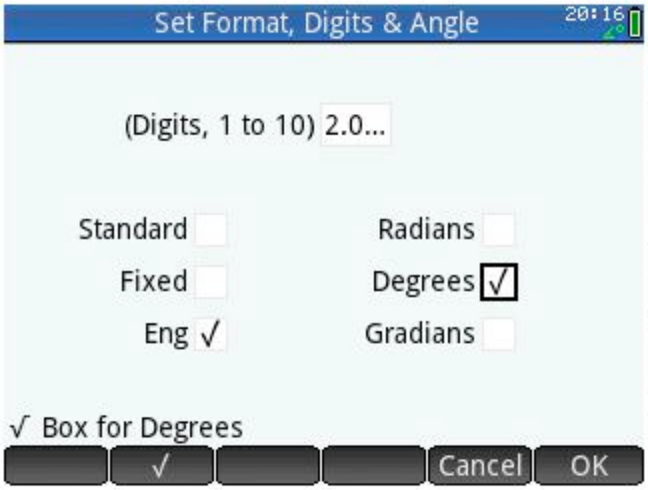
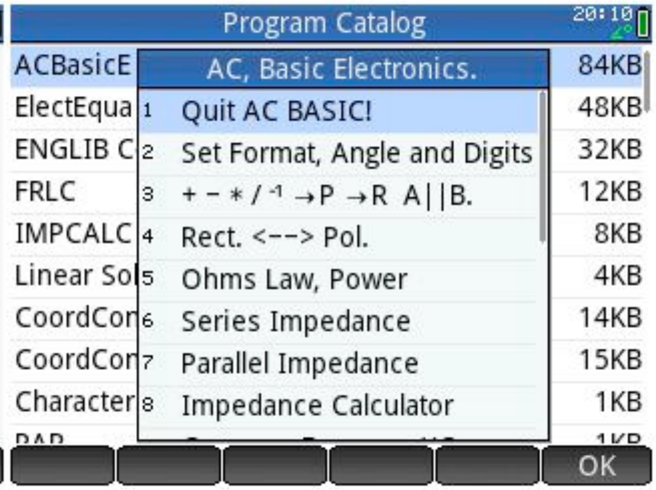
This program “ACBasicE”, is mainly a revision or update of the previous program I made last year “ACDC2. It contains some extra sections “like RC and RL Transients, and uses some new programming techniques I discovered since I started programming and should thank E.W. Shore and Dante Camargo (SLK3.3) and others from whom I have learned much and used as a platform for my own meager efforts. This version replaces ACDC2 which was a lengthy program, perhaps not so user friendly as ACBasicE as you will experience. There are many topics that can be incorporated in such a program, but due to time limitations I selected a few basic ones from which I will expand in the near future. **Most sections in this program work for DC as well as AC.**
I have started an Equation Library for Electronic using the SOLVER App but I put it on the back burner for now. The reason is, I find the Solver App very cumbersome for at least two reasons. 1- the Solver App or any other Apps for that matter cannot return to the calling program as a subroutine would. The calling program has to be restarted upon exiting the App. 2- The limitations placed on the variables are very restricting and not very motivating in pursuing programming using the Apps, since only a limited set of characters are available such as (A B C D …etc) which have to be used to represent math symbols extensively used in Physics and Engineering et all. On the other hand, maybe I need to do more research on this attractive and practical HP Prime calculator and be content with it and leave those features to more advanced devices. ACBasicE contains presently 16 topics as seen in the Main Menu. If errors are found, please let me know. Thank you and hope you find this program helpful.





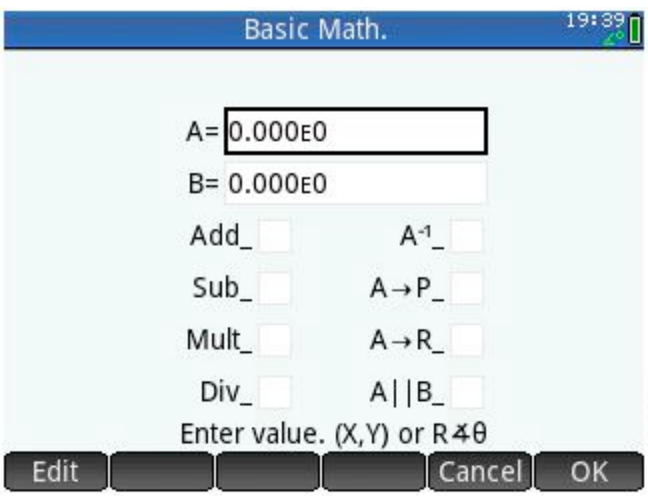
You can type ACBasicE on the command line and press [Enter] or select it from the Program list. Start by pressing ‘2’ and Set Number Format, Angle type and # of digits. See next frame.

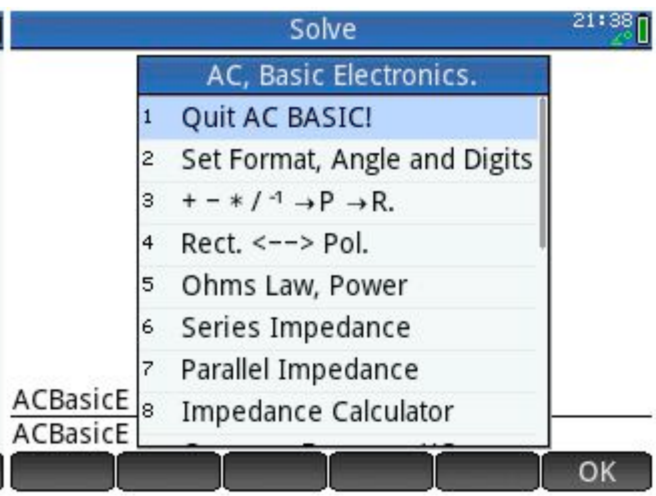




Enter '2' in the Digit box and press [Enter]. Next TAP the box beside 'ENG twice then TAP 'Degrees twice. You can also navigate to the box and press [Enter] to toggle the check mark. Press OK to activate and go back to the Main Menu.

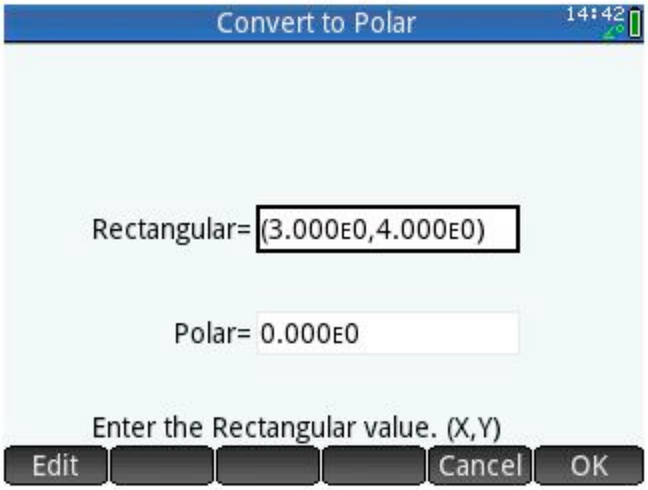
Pressing 3 will allow you to do basic math in Real or Complex mode without exiting the program itself. Go to next screen. A||B can solve 2 Z,s in Parallel Za||Zb.





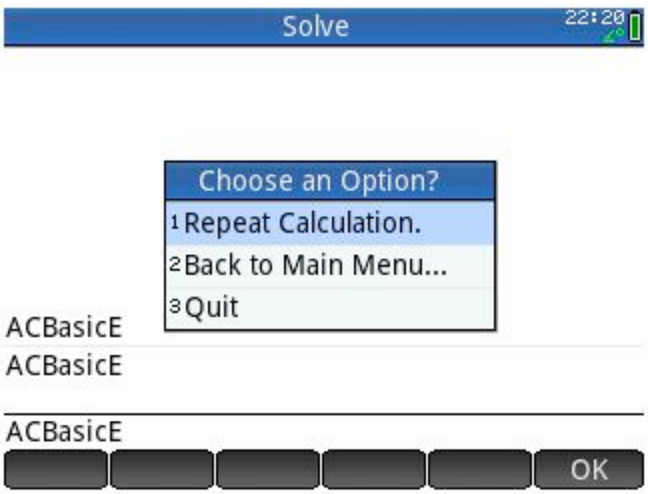
Enter # in A and # in B then tap the function box below twice, in this case Add. Tap [OK]. Note also the A||B which solves 2 Res. In Parallel 'Ra||Rb.

Press 4 for Rect. to Polar conversion. You can also use # 3 Math to do the same.

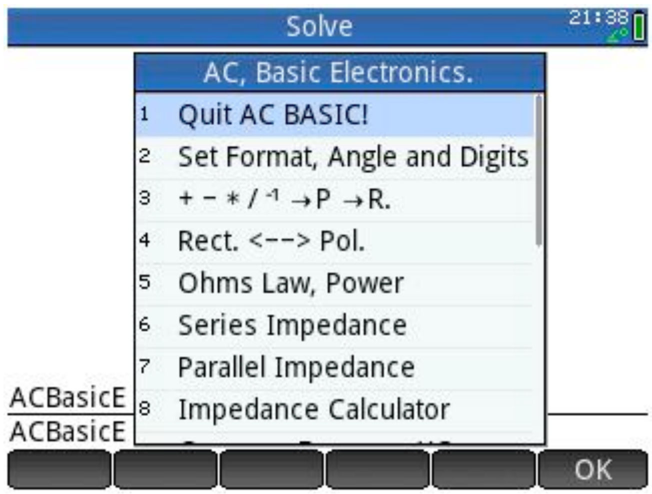


Enter (3,4), Press [Enter] Next screen.

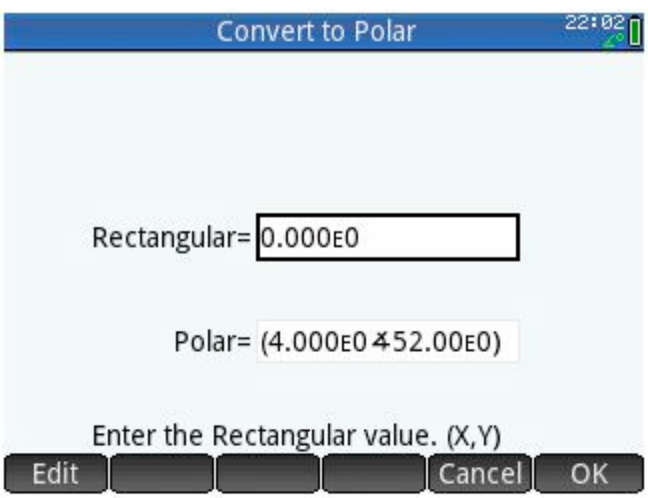
The answer is 5.00 @ 53.13 degrees.

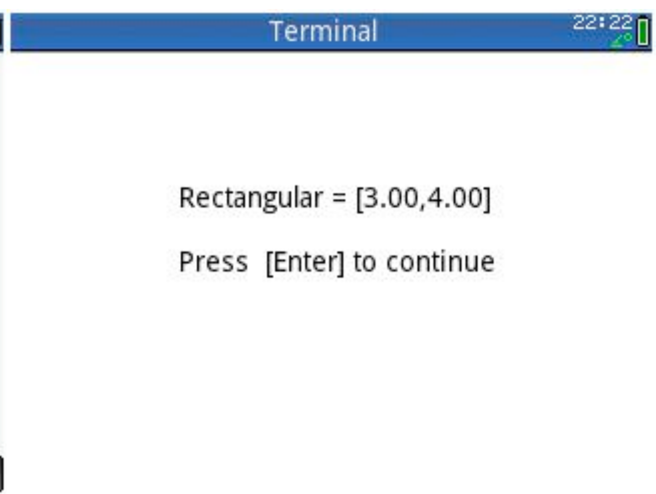


You can Repeat Rect to Pol. or 2 for Main Menu.

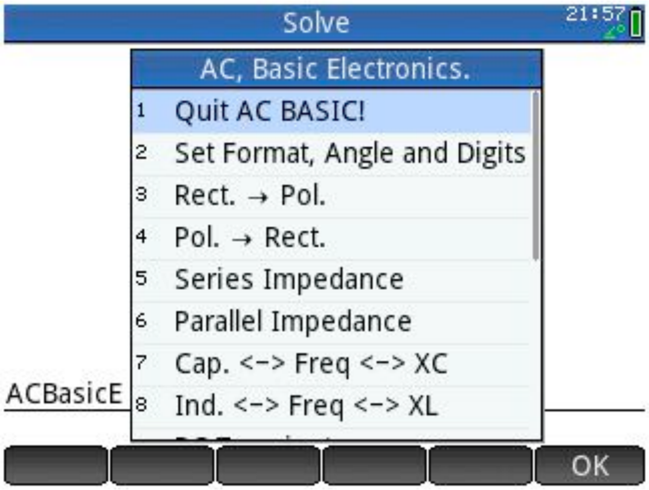


Select ‘4 for Pol. <-- > Rect.

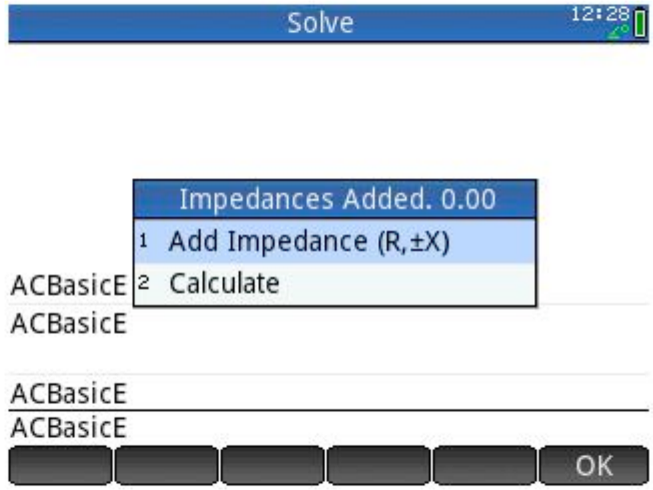




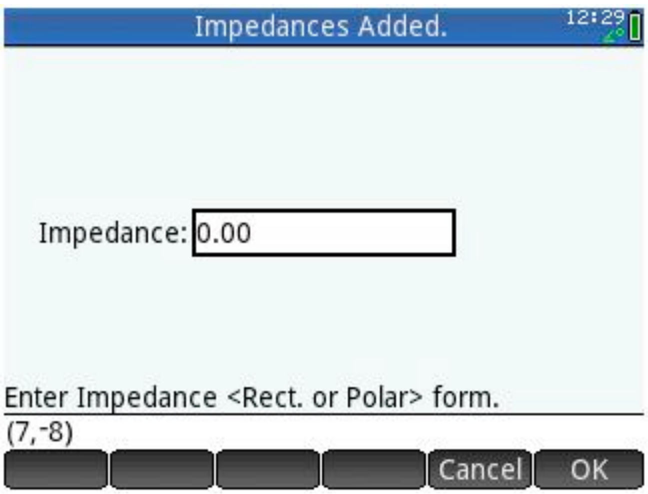
Enter 5 /_53.13 ‘5 Shift X 53.15’ in Polar [Enter]. Answer screen.

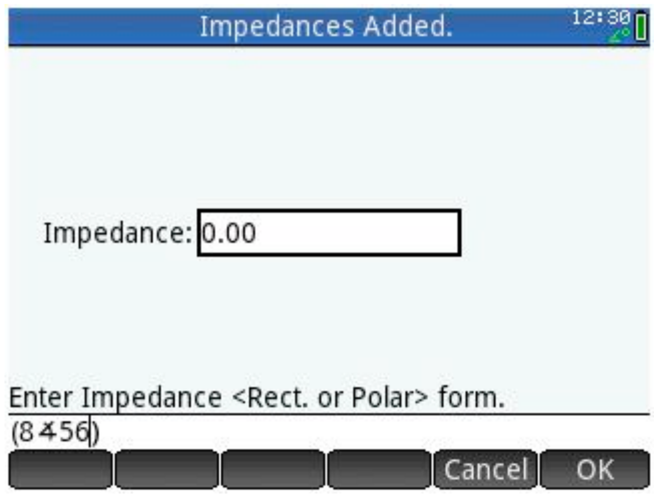


Press ‘5’ for Series Impedance.

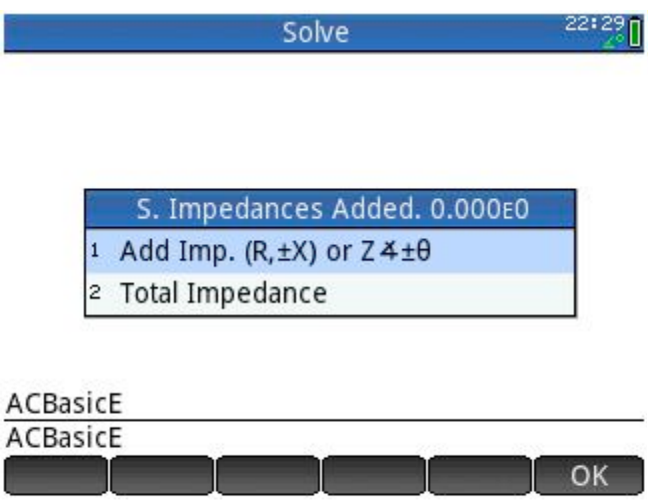


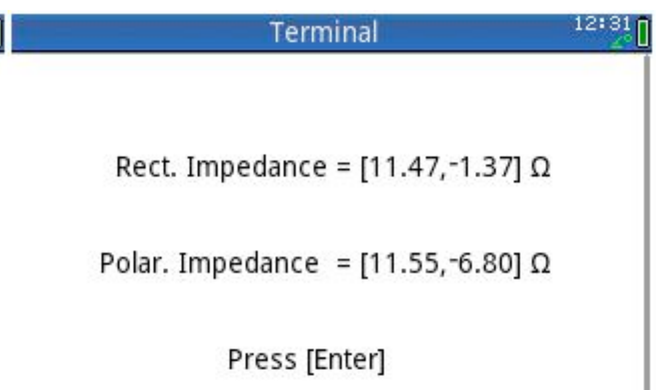
In the screen above press 1 to add the first Impedance in Rect. or Pol. form. See next screen.

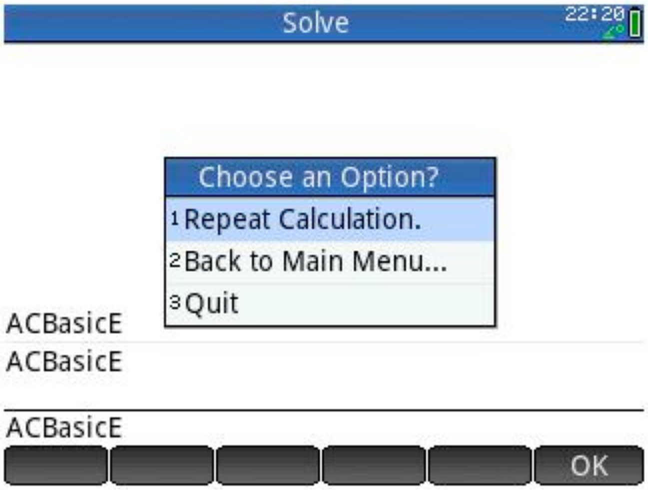




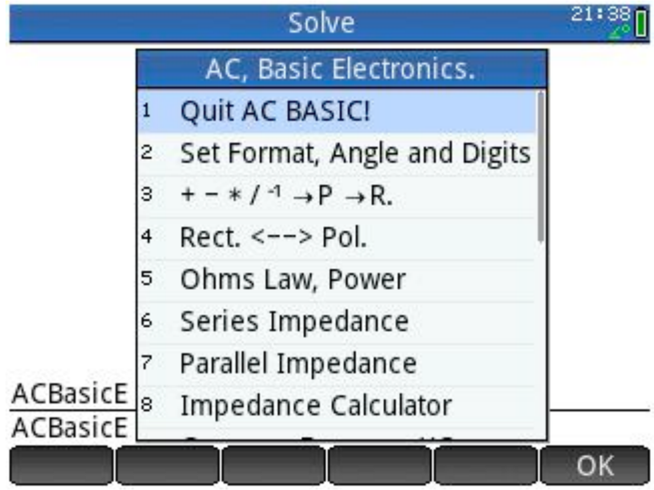
Rectangular form (7,-8), [Enter] . Polar form 8/_56 . [Enter] .



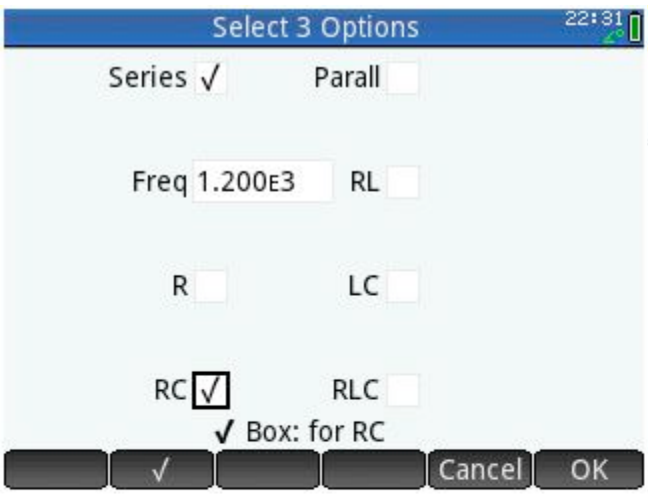


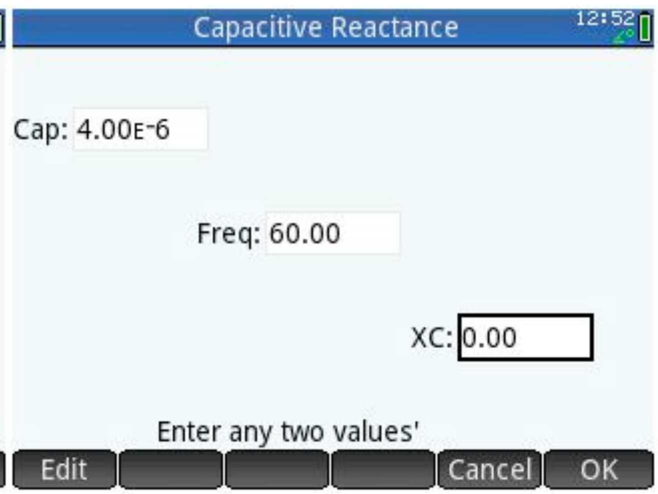


Go back to the Main Menu.



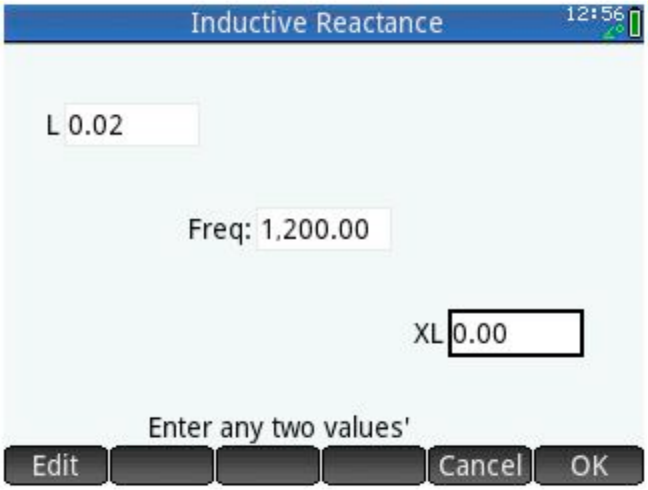
Press 8 for Impedance Calculator.

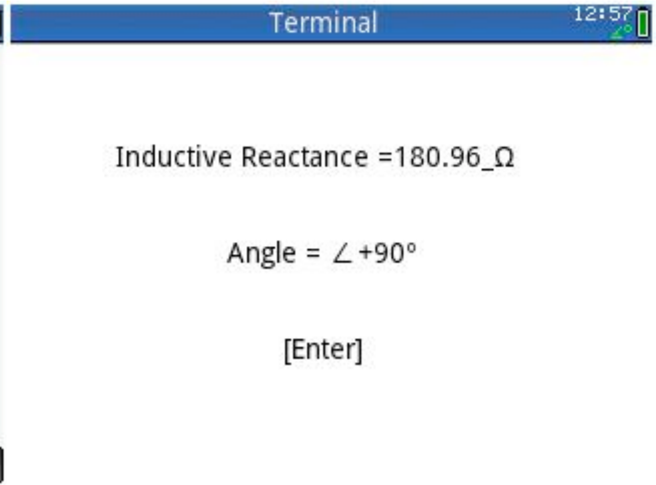




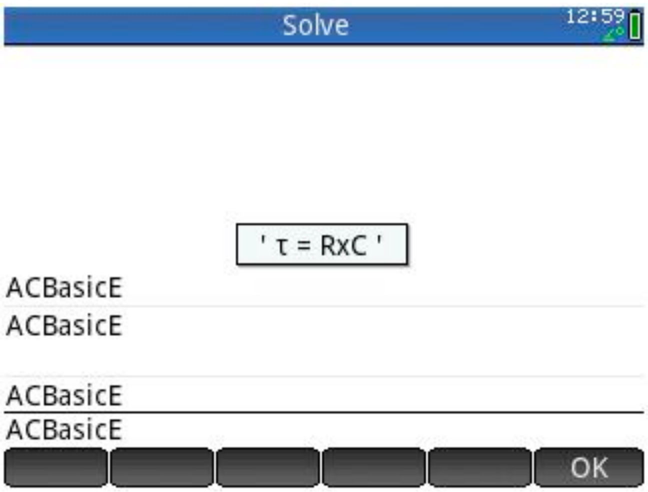
Start by selecting Series or Parall. By tapping twice on the adjacent box. Enter a frequency of 1200 H. Double Tap on RC box, press [OK]. After pressing OK you can enter a value for R and C, press OK. Result = (R,-XC).

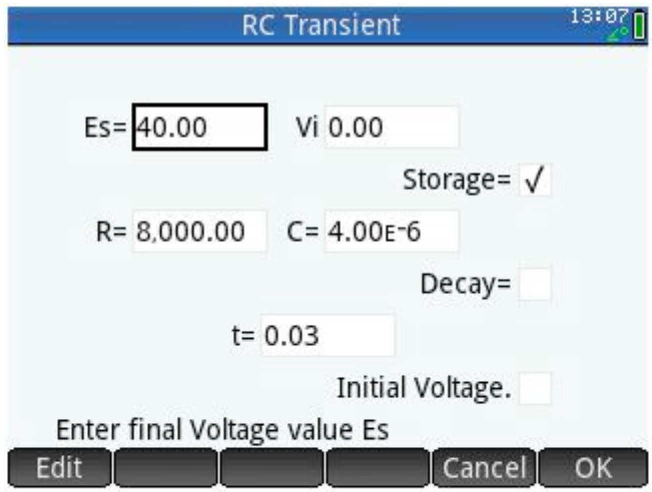
Pressing 9 in the Main Menu will generate this screen which will solve for Cap. Freq. or XC. Enter any two value and solve for the unknown by pressing [OK]. Enter values for Cap. And XC and solve for Freq.



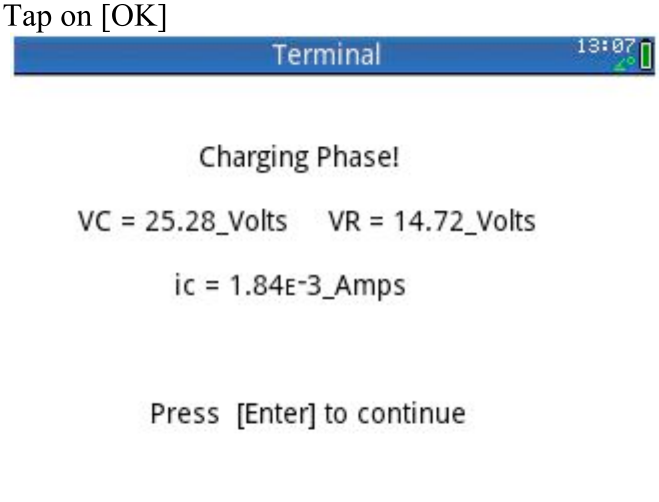


Press A and you can solve for L, Freq., or XL . An example is given for solving for XL.

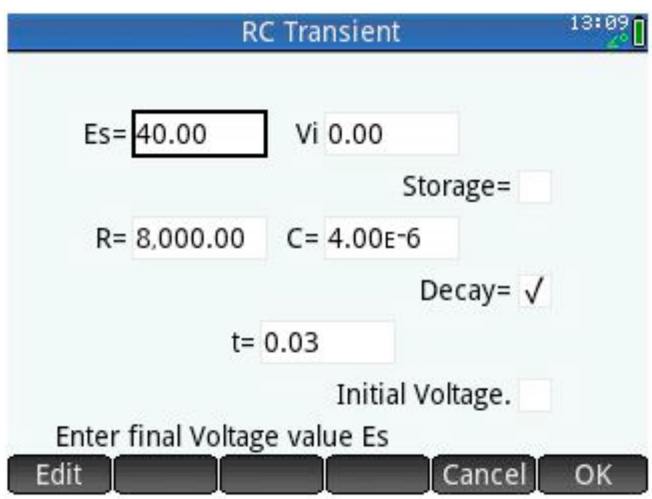




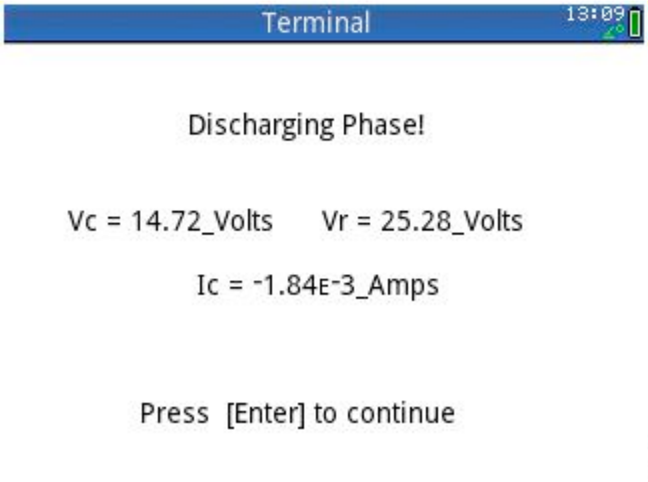
Pressing B in the Main Menu will open the RC Transient section as seen above. In the screen above you will enter a voltage Es. For the Storage phase Vi is not required so enter '0'. Enter R=8000, C=4E-6, T= .032ms, Digit limited to 2 so the full number not displayed. Double tap on the Storage box to check. Tap on [OK]



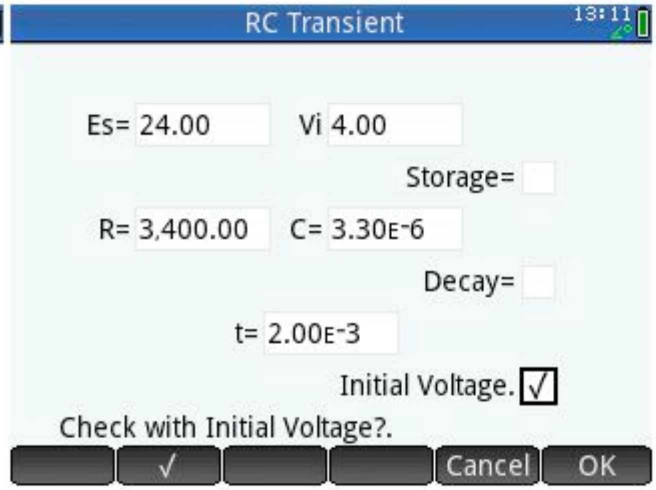
Result for Charging Phase above.



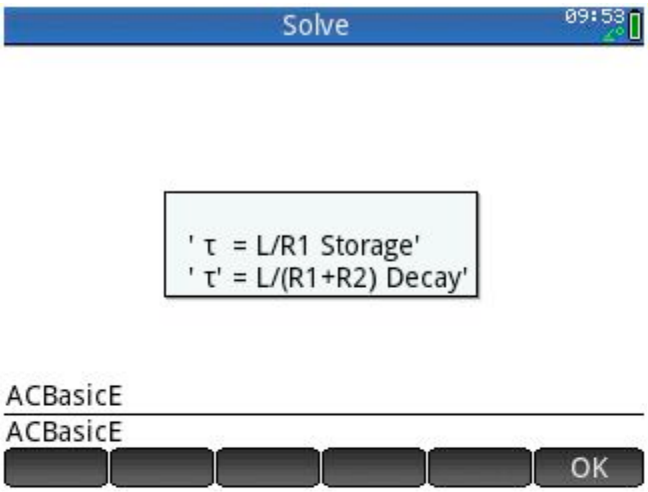
This is the Decay or Discharging Phase.

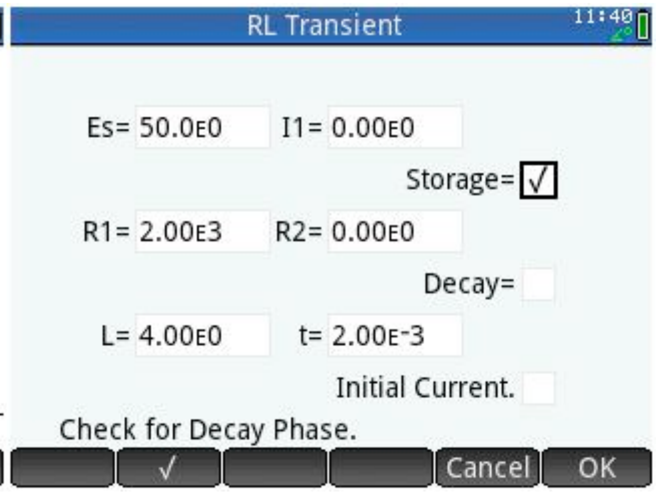


Result for Discharging or Decay Phase.

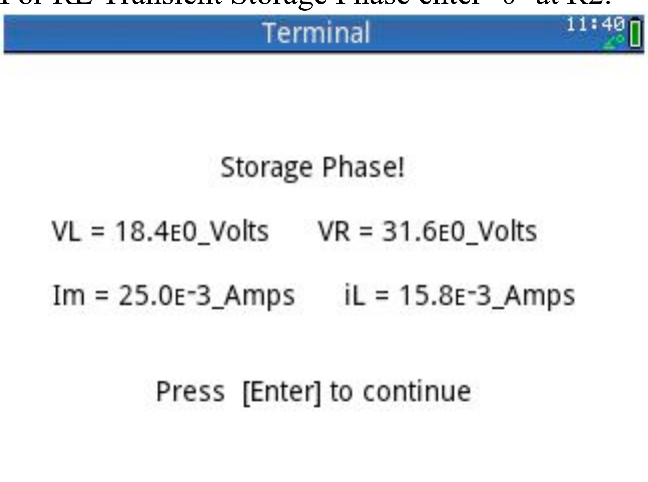


This screen indicates that the Capacitor contains an Initial voltage of 4 volts 'Vi'.

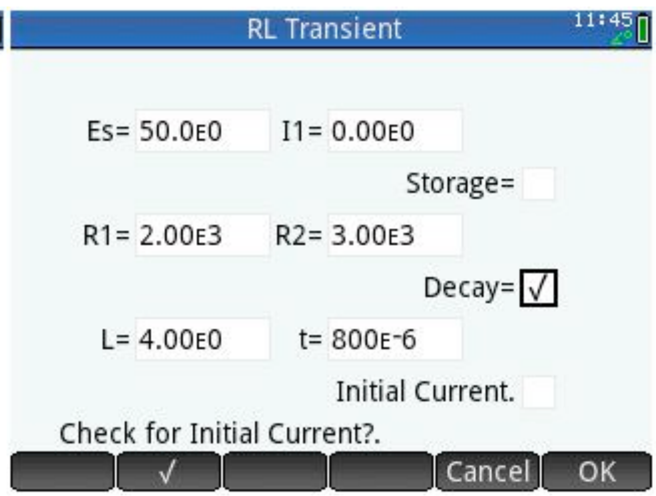




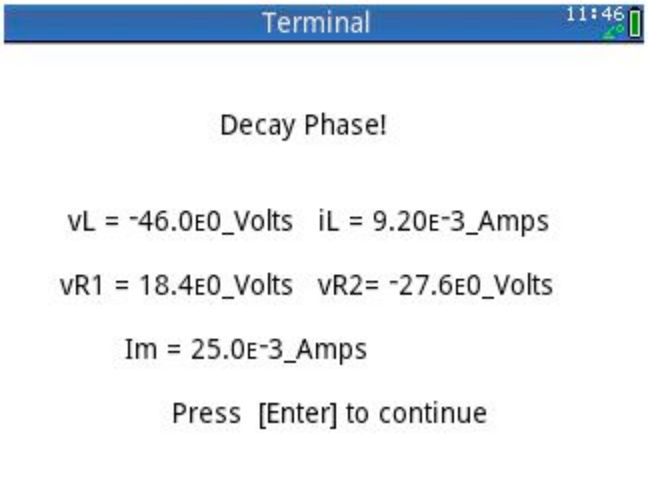
For RL Transient Storage Phase enter '0' at R2.



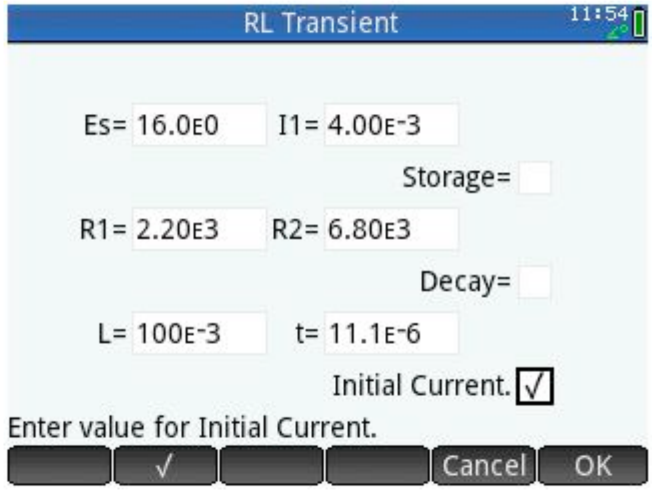
Result for RL Storage Phase.



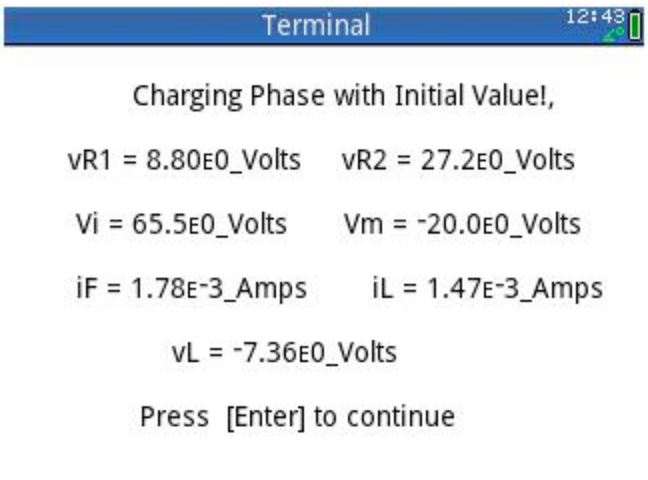
In the Decay circuit we now have R2=3E3, 3KΩ.



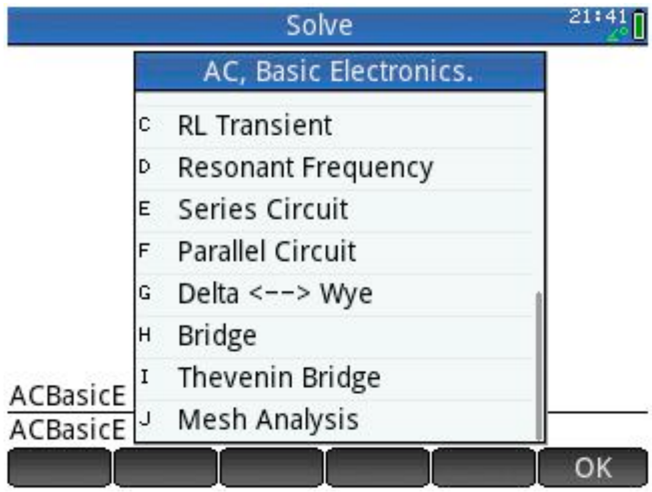
Result for Decay Phase.



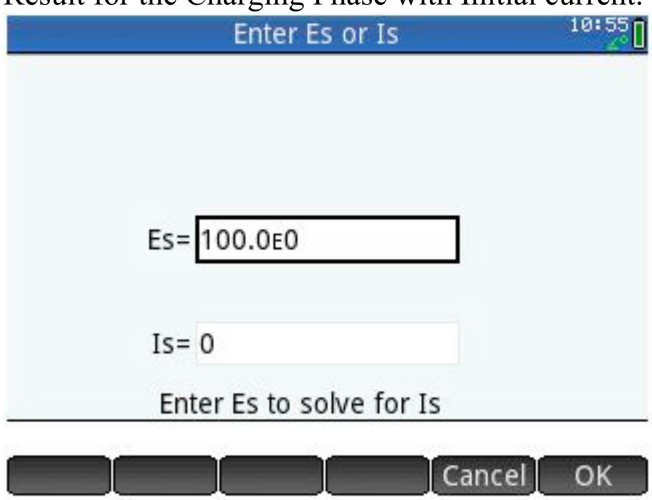
This is the Initial Current Phase.



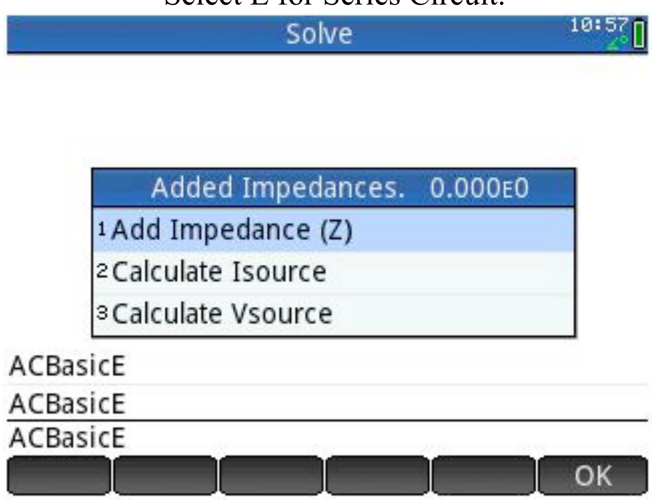
Result for the Charging Phase with Initial current.



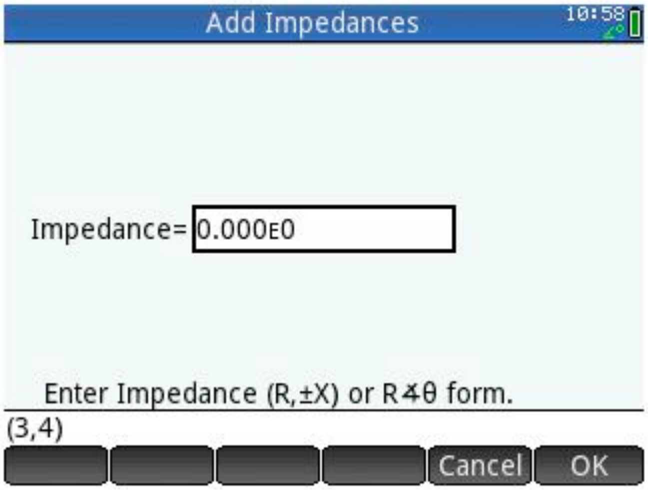
Select E for Series Circuit.

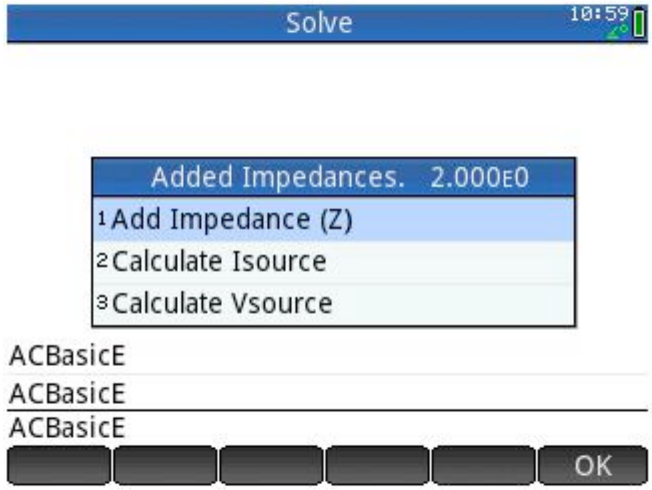


Enter 100 in Es, press Enter then [OK.]

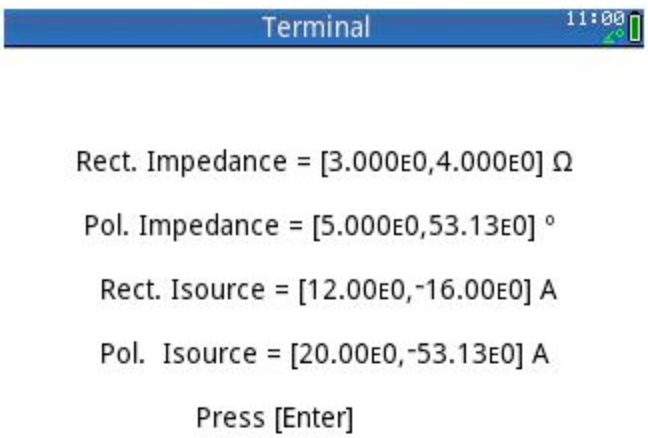


Press 1 to add an Impedance.

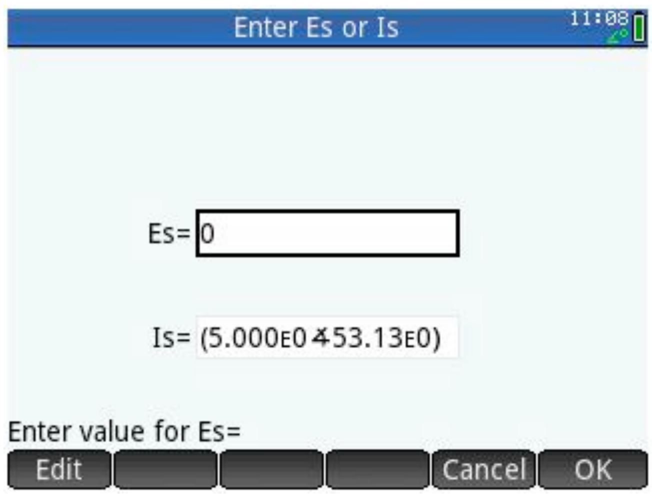




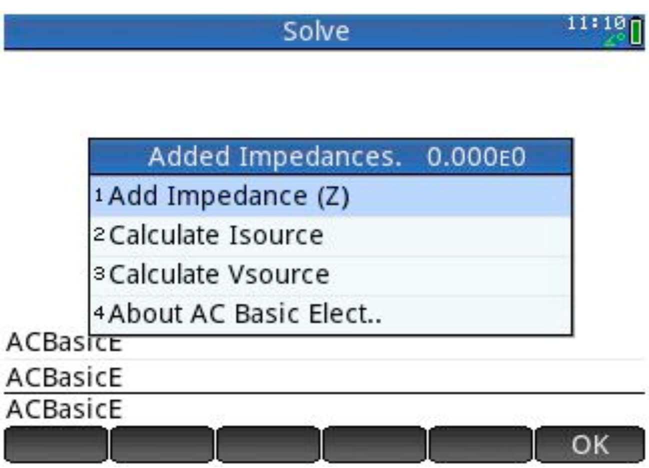
Type (3,4) and Enter. Program returns to screen on the right. Add as many Impedances as you like in Rectangular or Polar form. The Impedances will be accumulated as ZTotal. Lastly press 2 to calculate the total current source Is. By multiplying Is by any of your impedances you can calculate the voltage across any impedances. If you enter Is you can solve for Es instead.

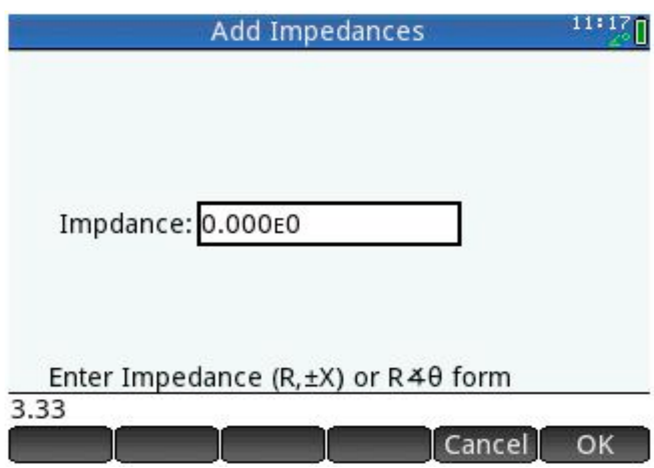


Result for Series Circuit.

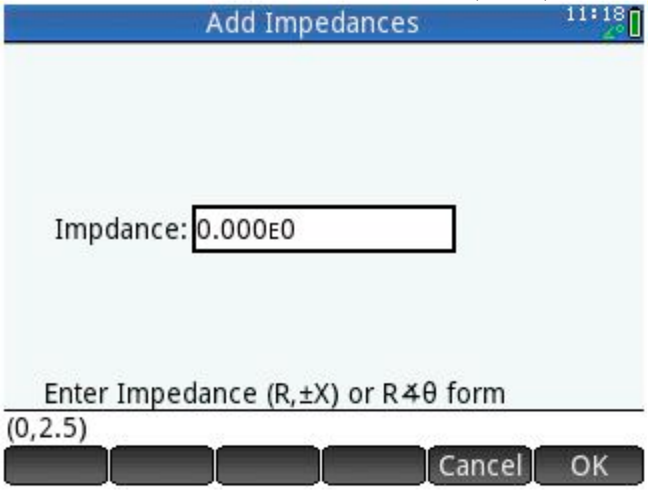


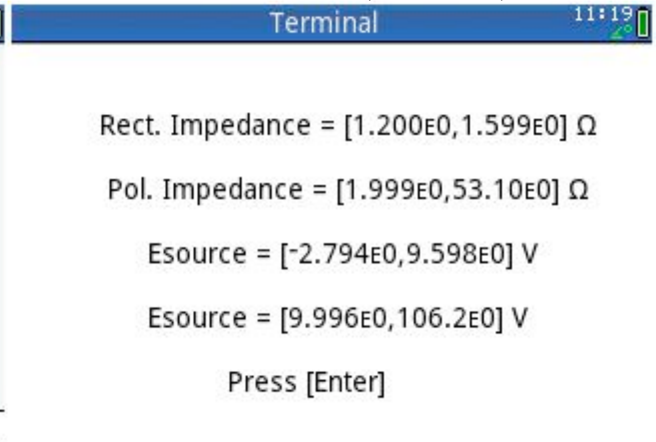
This is the Parallel Circuit version and Is is provided. We can now calculate Es.

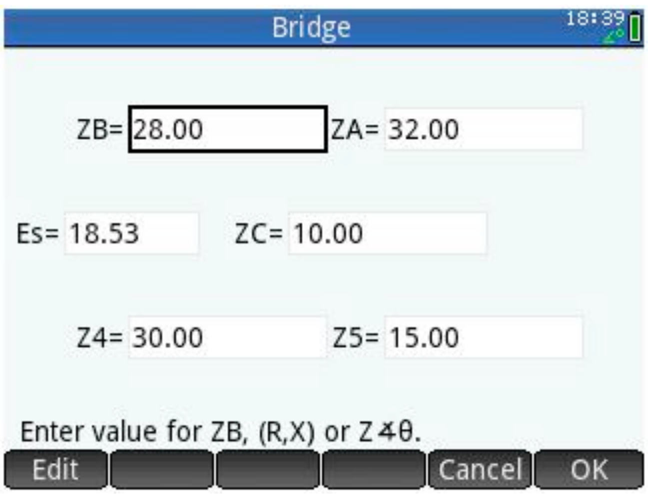


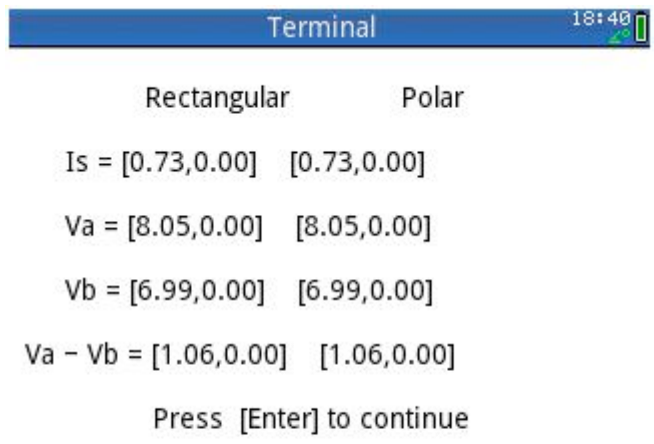


Above we entered 3.33Ω and below (0,2.5)Ω for an inductor. The Parallel Z= (1.99, 53.1)

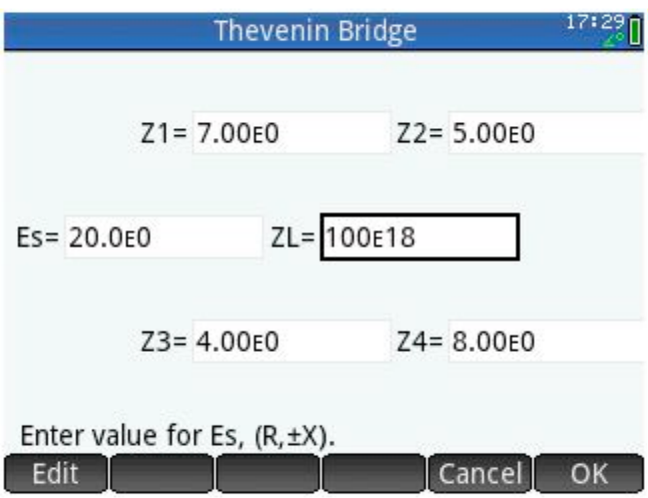


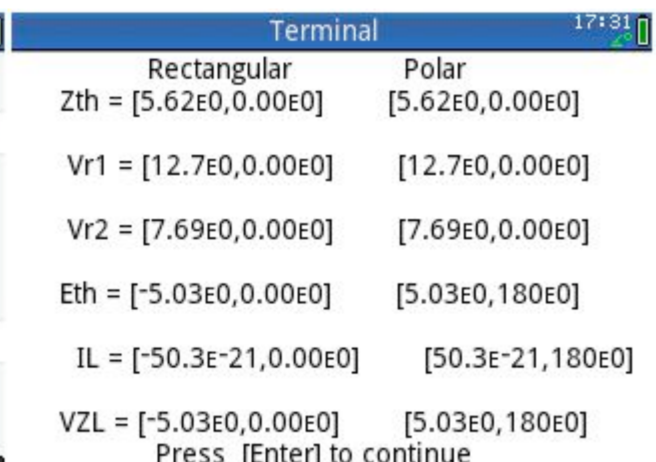






From the Main Menu press H for Bridge. Result for Bridge circuit.

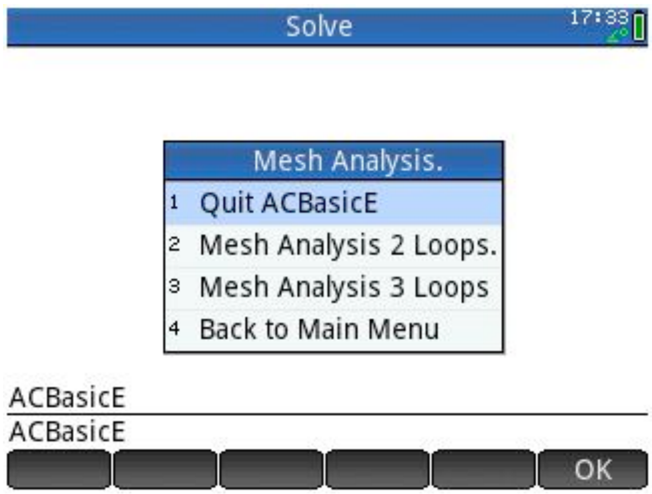




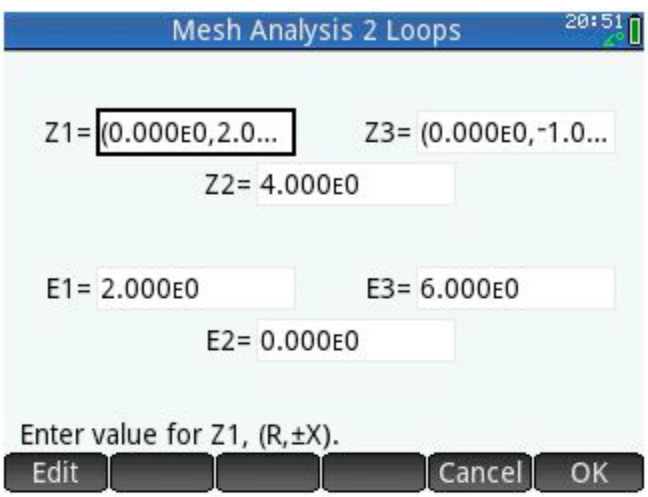
On the left the values are entered for the Thevenin Bridge. On the right the result.
Note: The value for ZL above is 100E18 representing an open in order to calculate Zth.

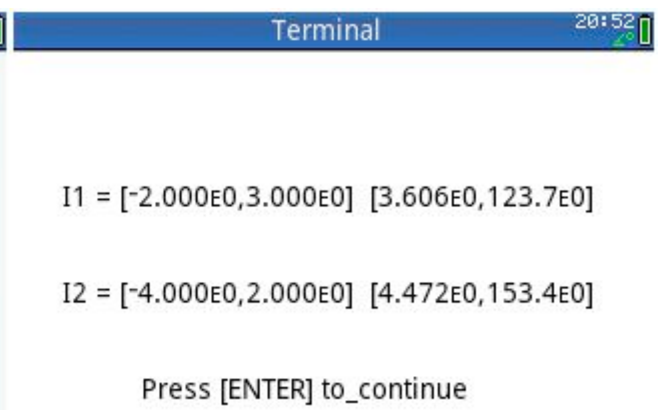
If you then want to replace Zth with a practical value say 5.6KΩ, you can change Zth to that value and repeat the calculation. The only change will be the current IL from -50.3E-21 to -898µA. Again simply divide Eth -5.03 by the 5.6K = -898E-6Ω. You can do this by returning to the Main Menu, press 3 for the Math function and do this division without leaving the program.

The next section will solve MESH Analysis circuit with 2 Loops and 3 Loops.



Press 2 for a 2 Loop Mesh Analysis.





Above, the position of the boxes represent the position of the impedances in the circuit (Z1,Z2,Z3). Below, the position of E2 is assumed to be between E1 and E3. I've tried to make this program without drawing actual circuitry. On the right of course is the result calculation. NOTE: When entering the voltages E1,E2 and E3, always enter the polarity **at the top** of the voltage symbol whether AC or DC.