Getting Started with the Audio Graphing Calculator

Contents:

1. Using AGC and this Document Simultaneously

Users with good vision can display the AGC and this "Getting Started" document on screen simultaneously, so it should be easy to read instructions and just do them on AGC. Users without good vision may need to switch back and forth. One can do this conveniently from the keyboard with ALT-TAB. AGC Self-voicing can be active when focus is in AGC. If a screen-reader is being used, it should go to sleep when in AGC and wake up when focus is switched to this document. Instructions for configuring screen readers is given in the document " AGC, Magnification, and Use with Screen Readers" accessed from the Audio Graphing Calculator menu in Programs.

2. Registration Screens

The first time AGC starts, a registration screen appears. It has a "register" button, a "continue" button, and a text box telling you how many days remain on your free trial period. You may read these aloud by moving through them with TAB if you first turn speech on with ALT-s.

If you have not reached the end of your trial period you may continue by pressing ENTER at the "continue" button. If you have run out of time your only choices are "register" and "exit".

To register you must purchase a license from ViewPlus Software, Inc, Contact instructions are given on the screen reached by pressing the "register" button. Once you have a license number, enter your name in the Name field and license number in the number field. Then click "finish", and if both your name and number are entered correctly, your copy will convert to a registered copy, and the name and number of your licensed copy will appear on the splash screen whenever the program is started in the future. The splash screen disappears when the bell sounds, and AGC is ready for use at that time.

3. Controlling Sound and Screen Enlargement

You may enlarge the AGC screen by pressing F7 and decrease its size with F8. Equivalently you may use the "larger" or "smaller" selections in the Options menu. Repeated use of either option continues to increase/decrease the size.

ALT-s toggles speechoff and on. Since AGC starts with speech off, you should press ALT-s once to start speech whenever you start AGC. You may also start or stop speech, change the voice, change volume, rate, and pitch on the Speech Tab Page, and you may also turn other sound effects off and on. One can reach the Speech Tab Page by clicking the Speech button with the mouse or by going to the "Options" menu with ALT-o, then arrowing down to the "Speech" menu item. Press ENTER to reach the top item of the Speech Tab Page. That item is spoken, and you may read it again with CTRL-r. It may be very useful to remember that CTRL-r is a general "read focus" key that reads the item that has focus except in menus. Menu items are voiced only when focus is moved to them.

List of items on the Speech Tab Page,
[directions for setting them, and our recommended setting are indicated. Move among items with TAB - or SHIFT-TAB to move backward.]

* Allow sound effects - checked (toggle check boxes with mouse or spacebar).

* Allow program to be self-voicing - checked.

* Speech Voice List combo box with many voices; arrow among voices - Use Sam or Mary.

* Speech rate slider; set with mouse or arrows, PgUp, and PgDn - start at slow rate and increase rate as you become accustomed to the voice.

* Speech pitch slider; set with mouse, arrows, PgUp, and PgDn - recommend pitch around 65 initially.

* Speech volume slider - set to what you find comfortable.

* Series of buttons that call detailed configurations for your speech engine. These pages are opened outside AGC and cannot be self-voiced, so people who need speech must have a screen reader. Unfortunately we find most speech engine configuration pages to be inaccessible even with screen readers, so sighted assistance must be sought by blind people who want to tweak their speech engines.

If you continue to TAB past these buttons you will rotate to the top of the Speech Tab Page and hear that heading spoken. Note that you may reach any other tab page by arrowing when you are in a Tab Page heading, but you may also reach Tab Pages through the "Options" menu.

Once you have set these speech options, they will be saved and remain in effect whenever you open AGC. Most AGC options are saved when you exit the program normally.

4. Tutorial on Using Visual and Audio Graphing

AGC can be used as a on-screen keypad calculator or a powerful expression evaluator, but the audio/visual graphing calculator capability is what makes it unique. The on-screen keypad calculator and expression evaluator are well-described in the manyual. This introductory tutorial is confined to the most elementary features of the audio/visual graphing calculator capability.

AGC has seven TAB pages whose purposes are described in the program manual. The Speech Tab Page was introduced in the previous section. We'll use four more Tab Pages in this tutorial. The purpose of the tutorial is to teach the user how to calculate and plot an expression that depends on a variable x, then display a graph of that function on screen and in an audio tone plot. We will first learn how to set parameters that determine the visual and audio options for plotting and then calculate and plot two examples, the expressions y=x and y= x squared.

4a. Setting plot parameters. Begin by going to the Plot Tab page to examine and set the many available plot parameters. Press ALT-o to reach the options menu, arrow down to the Plot item, press ENTER to reach a sub-menu and then ENTER again. Focus moves to the first item on the Plot Tab Page. The items on this page are given below along with directions for use and our recommended settings. Use TAB to move among items or Shift-TAB to move backwards.

* Source combo box Use arrows to move among various choices of what to calculate and plot. Set to Data Set 1.

* X min, the smallest value of x for which the expression is to be evaluated and plotted. You may move around the edit box as in any edit box, with arrows, home, and end. You may delete characters with the DEL key. Set this value at minus ten (-10).

* x max, the maximum x for which the expression is to be evaluated and plotted. Set it to ten (10).

* Number of points to plot, tells the program how many points to calculate and plot. Set to 500.

* Y min. Ignore this, since it will be determined by autoscaling.

* Y max. Ignore this also.

* AutoScale y axis check box. You will find few occasions when this box should be unchecked. If it is unchecked, then check it with the mouse or space bar. If you do not autoscale, then you must set Y min and Y max above to the values you want for your graph.

* Draw data points - unchecked

* Draw line through data - checked

* Draw error bars - unchecked

* Show x axis - checked

* Show y axis - checked

* show x axis labels - checked

* Show y axis labels - checked

* Plot frame - combo box. Arrow to choice of tick marks on axes, full grid lines, or none. Tick marks are normal on visual graphs, but if graph is to be printed for a blind reader, grid lines are sometimes more useful. Set to tick marks unless you want another choice.

* Plot data derivative - unchecked (important)

This is the last item on the Plot Tab page. One more TAB takes you to the top of the page. You should hear "Plot Tab Page".

4b. Setting Non-speech sound parameters. Non-speech sound parameters are on the Wave Tab Page. If you ended the last section with focus on the heading of the Plot Tab Page, you may arrow right to reach the "Wave Tab Page", or you can reach the Wave Tab Page through the Options menu by pressing ALT-o, arrowing down to "Wave", pressing ENTER to a sub-menu, and then ENTER again. The items on this page, directions for setting, and our recommended settings are given below. TAB among these items or SHIFT-TAB to move in the opposite direction.

* Data Set Volume slider permits one to set the volume of the graph tone plot between 0 and 100 percent of its maximum volume. Use the mouse, arrows, PgUp, and PgDn to change setting. Set at 50.

* Play Y axis tick marks. Set Unchecked.

* Tick mark volume slider, set as described for other volumes. Set at 50.

* Play noise below Y threshold. Check this.

* Y threshold value. Set to 0.

* Wave file length slider, settable from 1 to 30 seconds. Set at 10.

* Wave typecombo box , settable with arrows as stereo or mono. Set to stereo if your computer has stereo speakers. Otherwise set to mono.

* Minimum Frequency slider, settable from 40 to 500 Hertz using arrows. Set to 200.

* Maximum frequency slider, settable from 500 to 4000 Hertz using arrows and PgUp and PgDn. Set at 2500.

Tabbing again takes you to the heading of the Wave Tab Page.

4c. Computing and Plotting the expression y=x as Data Set 1. You should select the Expression 1 edit box. You may reach it by moving to the Data Set 1 Tab Page and going to the first item - which is the expression box. There are a number of ways to do this. You may always press ALT-o to open the Options menu. Then arrow down to find the "Data Set 1" option and press ENTER. Focus goes to the Expression 1 edit box.

Delete any characters in this box and type a single x. You can read the box with CTRL-r, but the box is also voiced if you press HOME to go to the first character. You may right arrow to move through and hear each character, or you may go to the end and left arrow backwards, also hearing each character. DEL deletes the character just voiced (which is just behind the insertion cursor). Backspace deletes the previous character (which is just before the insertion cursor).

If focus is in this expression box, which should now have x in it, you may calculate the data set by pressing ENTER. You will hear a short tone when the computation is finished. Note that you may also do this computation by pressing function key F4 or by going to the "Graph" menu with ALT-g and pressing ENTER on the first item - "Evaluate Expression 1". Note that the last two options require that the source be set to Data Set 1.

You have previously set the number of points parameter at 500, and it usually takes only a fraction of a second to compute such a simple function as y=x, so you should hear the

tone rather quickly after pressing any of the options that cause the function in Expression 1 to be calculated.

You may display the graph on screen with function key F3 or by going to the "Graph" menu with ALT-g and arrowing down to "Display graph" and pressing ENTER.

Finally you may play an audio tone plot of this graph by pressing function key F5 or by going to the "Graph" menu with ALT-g, arrowing down to "Play data set" and pressing ENTER.

Sighted people will see a graph on screen showing a straight line from the bottom left to upper right of the graph, which is correct for the expression y=x. The audio tone plot is a tone representing the y value when x is swept from its minimum to its maximum value as you hear the tone graph. Since y rises linearly, the tone of y rises linearly on a harmonic scale also. If you have set all parameters as we suggested, you should also hear some static (technically known as "white noise") for the first half of the tone graph. You hear this because you have set the tone graph to "Play noise below y threshold" and set that threshold to zero. So you hear noise when y is less than zero and do not hear that noise when y is greater than 0. Press F5 to listen again so you can hear that there is noise for half the graph but not for the last half of the graph.

We note that the tone graph is often accompanied by an unintentional quiet high-pitched chirping sound on some computers and sound cards. It is usually minor and should just be ignored.

4d. Computing and Plotting the expression y equals x squared as Data Set 2. You should now be able to move focus to the Expression box in Data Set 2. If not, then return to the last subsection and review how to move focus to Expression box 1 and do the same except that you now go to the Expression box in Data set 2.

Delete any characters in this expression box and type y^2. The ^ symbol (shift 6) is "calculator notation" for power.

For reference if you want to try some graphs on your own, a full description of calculator notation is given in the AGC manual, but for now it's probably enough to know that + is plus, - is minus, * is times, / is divide, and ^ is power. Use parentheses if you are not sure about which operation is done first in multiple operation expressions. For example there is a difference between (4+5)*2 and 4+(5*2)

Having typed x^2 in the expression box of Data Set 2, you may evaluate it by pressing Enter while focus is in that box. The calculator is clever enough to realize that if focus is in the Data Set 2 expression box, you want Data Set 2, so the Source box is automatically set to Data Set 2, and the data set is computed. Of course you may laboriously go to the Source box in the Plot Tab Page and set it to Data Set 2 by hand and then evaluate by pressing F4 or the "evaluate data set" item in the "Graph" menu

Now play the tone graph for x squared by pressing function key F5. y = x squared is a curve that starts at the top left of the visual graph, curves down to zero in the middle and then rises to the right upper corner. It is a bowl-shaped function and is always positive. So you hear a high pictched tone falling to a minimum at the mid-point of the tone plot,and then rising again.

4e. Additional audio display capabilities. Now you should calculate the expression (x squared) minus ten. Put the expression x^2 -10 in the expression box of Data Set 2. If you still have x^2 in that box, you may move to the end of the expression with the END key and type -10. The precedence rules explained in the manual will tell you that x^2-10 is (x^2)-10, not x^(2-10).

Now evaluate this new graph by pressing ENTER while focus is still in Expression Box 2. The graph of x^2-10 is much like the graph of x^2 except that it is moved down by 10. You will hear the white noise near the middle when you play this graph by pressing F5. Otherwise the tone plot is similar to that of x squared.

Now explore some of the navigation possibilities for tone graphs.
1. Press ALT-PgDn, and the tone graph will play to the first minimum. That's the point where y is smallest. Try that now.

You may read the values of x and y at any point by pressing ALT-x to voice the x value and ALT-y to voice the y value. Read the x and y aloud at the current point - the graph minimum. The minimum should be exactly at x=0 and y should be minus ten. Generally the values are close to the correct value but not exactly. You may step one x value at a time with ALT arrow keys and examine several x,y points near this minimum.

You should red the manual to learn more details and how to use the keypad calculator and the expression evaluator. The manual covers every feature and includes many tutorial exercises.

5. TroubleShooting

5a. Error on first start. If you get a run-time error the first time you try to run AGC, it probably means that there's some problem with speech engines. We strongly recommend that users uninstall any speech engines that are no longer being used. Some early speech engines cause the computer to crash when the Microsoft speech engine is used. The early DEC speech engine in particular conflicts with many other speech engines. The Eloquent and IBM speech engines used with currently popular screen readers and the IBM Home Page Reader coexist with each other and with the Microsoft speech engine used by AGC, so there's no need to remove those.

If you remove other speech engines or have any other reason to suspect that the AGC installation might have been faulty, you should uninstall AGC and reinstall being careful that the "Install Microsoft Speech Voices" is checked on the installation screen. You can

uninstall programs by going to the Windows "Start" menu, ENTER "Settings", ENTER the Control Panel. Arrow right to the third item in the Control Panel - the Add/Remove Programs item and press ENTER. Tab to the Remove page, select the Audio Graphing Calculator and tab to the add/remove button. Press the button and follow instructions to remove AGC. If you are given options for removing shared files, accept the recommended decision. If there is a dialog box informing you that all components cannot be removed, continue the removal process, and you will end with a note that all components were not removed. You should then open Windows Explorer and ENTER the Program Files folder. Delete the folder labeled Audio Graphing Calculator. Then the program is fully uninstalled.

5b. Crash when cursoring rapidly with speech enabled. Some sound cards, particularly on older computers, are prone to various errors. You may find that AGC crashes when speech is interrupted quickly several times by, for example, arrowing through a menu rapidly. We have found no easy solution except to slow down a bit. This error may be "ignorable", so that one can recover by pressing i. In all known cases of an ignorable sound card error, it occurs twice, and it is necessary to press i twice.

5c. Crash when key pressed during audio plot. Many older sound cards are unable to accept wave forms from two sources simultaneously. If so you should not press any key that speaks information while the tone graph is playing. You may either let the tone graph finish or stop it with ESC. None of these errors should occur with a new computer or high quality sound card.