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Audio Graphing Calculator 3.0
User Manual
Revision: 202001207

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I. Introduction

I.A. Preface

The Audio Graphing Calculator provides the functionality of handheld scientific calculators commonly used in the classroom. Operating on a flexible Windows platform and augmented with audio and tactile feedback, the AGC provides an alternative for people who cannot effectively use a handheld calculator, or those seeking a more interactive interface.

I.B. Specifications

Operating System	Windows 10 (32- and 64-bit), Windows 7 (32- and 64-bit), Vista (32- and 64-bit), XP (32-bit)
CPU	200 MHz Pentium (or equivalent) processor
Memory	256MB or more
Hard drive usage	Up to 35 MB
Sound	Windows compatible sound card
Display resolution	800x600 or more

II. Self-Voicing

AGC is designed to speak all menus, data fields, commands, functions and any other text information that is presented. This allows access to every part of the program without a separate screen reader. A Microsoft SAPI-compliant speech engine is required to use the self-voicing feature and is included with AGC.

Because the key arrangement of the calculator screen is created to resemble a standard keypad calculator, this part of AGC can be difficult to use with a standard screen reader. We recommend that screen reader users access AGC using the self-voicing feature. AGC users who use screen readers for access to other programs should configure their screen reader to go to sleep when focus is in AGC.

III. Program Setup

III.A. Installation

Before updating Audio Graphing Calculator (AGC) from a former version, please make sure to uninstall any previous version from your computer.

Make sure to execute the AGC installation file on your Windows system with administrator rights. Select 'yes' if a prompt ask you to allow changes to your computer.

AGC installation follows mainstream advanced installer procedures. You will be prompted with screens during installation process asking to select custom options and to confirm installation proceedings.

The first screen is the Welcome screen, where you can select 'Next' to proceed with the installation, or select 'Cancel' to cancel the process and exit the AGC setup wizard.

The next screen is your End-User License Agreement. Press A, or select 'I accept the terms of the License Agreement' checkbox, before pressing Enter, or clicking 'Next' to continue with the installation process.

Before selecting 'Install' on the following screen to start installation process, you may want to select a custom file folder for program location, or leave given default location within Windows program files folder.

A Window with progress indicator will show during program setup.

Successful installation will be confirmed by a final dialog. This dialog will offer an option to select for immediate AGC launch upon exiting program setup wizard. Select 'Finish' to exit the wizard.

After installation, the Audio Graphing Calculator can be started from Windows start menu within ViewPlus section. Windows search bar should find it as soon as you start typing "Audio..."

III.B. Uninstallation

To uninstall, find the Audio Graphing Calculator in your programs/apps and features list on your computer and select the uninstall option to execute the request. Please allow this app to make changes to your PC to complete successfully.

After Audio Graphing Calculator has been uninstalled, all parts of it will be gone from the list of programs/apps and features of your Windows system.

IV. VP License Manager

ViewPlus Software licenses are managed through the VP License Manager. This application starts automatically when choosing to register AGC upon starting the program. VP License Manager is also launched when selecting menu item 'Activate', or 'Deactivate' from AGC 'Help' menu.

VP License Manager will also start stand alone when called from Windows start menu in list of ViewPlus programs. In this case **please make sure to run VP License Manager with administrator rights!**

Depending from where the license manager was called, and which ViewPlus software products are installed on the system, the application wizard may show only Audio Graphing Calculator, or more ViewPlus products listed.

Depending on current activation status, the information within columns of list item will be filled, like license number, activation status, and expiration date. Each list item provides a button 'Details', which will lead to registration and activation details if any exist yet.

Additionally, in last column on list, a button is provided which will lead to either activation, or deactivation procedure. If AGC is not currently activated, the button will be labelled 'Activate'. If AGC is currently activated, the button will be labelled 'Deactivate'.

IV.A. Activation of Audio Graphing Calculator

After installation of the Audio Graphing Calculator, it must be activated online. There are two methods for activating the software: one method for computers with active internet connection, and one for computers without internet connection.

IV.A.1. Activation on computer with internet connection

1. From the Audio Graphing Calculator list item in VP License Manager, select button 'Activate'.
2. Then select 'Activate Online' from the next dialog window that pops up.
3. Within the 'Viewplus Activation and Registration' window enter AT LEAST the license number provided by ViewPlus. A company name, first name, and last name are useful for support but not required.
4. Please read and check data protection policy note and then select button 'Activate Online'.
5. A pop-up window will confirm successful activation.

IV.A.2. Activation on computer without internet connection

To activate offline you must generate an activation request, transfer it to a computer with internet, and then provide the activation response file to the license manager. Follow these instructions:

1. From the Audio Graphing Calculator list item in VP License Manager, select button 'Activate'.
2. Then select 'Activate By File' from the next dialog window that pops up.
3. A pop-up window will open, asking whether you have received a response file. Click 'No' at this point to proceed to the activation and registration window.
4. Within the 'Viewplus Activation and Registration' window enter AT LEAST the license number provided by ViewPlus. A company name, first name, and last name are useful for support but not required.
5. Please check data protection policy note and then select button 'Generate Activation File'.
6. The next pop-up will inform you, that an activation request file has been created in your documents folder.
7. Transport the file named "AGC3_ActivationRequest.dat" to a computer with internet connection.
8. On a computer with internet connection open your preferred internet browser and direct to <https://viewplus.com/software/activation/>
9. Select 'Manual Activation' button from this webpage.
10. On next form browse to your AGC3_ActivationRequest file in your documents folder and click 'Open' on browser window. Then select 'Submit' on this form.
11. An activation file will be generated, which you need to download using 'Download' button of next page. Save the file titled "ActivationResponse.dat".
12. Transfer file "ActivationResponse.dat" to the computer where AGC is supposed to be activated.
13. On the computer where you like to activate AGC, open VP License Manager if not open currently. Open it from Windows start menu ViewPlus section, making sure to choose 'Run as administrator'.
14. From the Audio Graphing Calculator list item in VP License Manager, select button 'Activate'.
15. Then select 'Activate By File' from the next dialog window that pops up.
16. A pop-up window will open, asking whether you have received a response file. Click 'Yes' at this time.

17. Browse to the file in next browser dialog and click 'Open'.
18. ViewPlus License Manager dialog window should show Audio Graphing Calculator being activated now.

IV.B. Deactivation of Audio Graphing Calculator

To transfer your software to another computer you must deactivate the program on original computer before attempting to activate it on a new computer. The process for deactivation is similar to activation. There are also two methods for deactivation: one method for computers with active internet connection, and one for computers without internet connection.

IV.B.1. Deactivation on computer with internet connection

1. From the Audio Graphing Calculator list item in VP License Manager, select button 'Deactivate'.
2. Then select 'Deactivate Online' from the next dialog window that pops up.
3. A pop-up window will open to confirm that you wish to deactivate your software. Click 'Yes' to complete the process.
4. Another pop-up window will confirm successful deactivation and VP License Manager dialog window should show Audio Graphing Calculator in status deactivated now.

IV.B.2. Deactivation on computer without internet connection

To deactivate offline you must generate an activation request, transfer it to a computer with internet, and then provide the deactivation response file to the license manager. Follow these instructions:

1. From the Audio Graphing Calculator list item in VP License Manager, select button 'Deactivate'.
2. Then select 'Deactivate By File' from the next dialog window that pops up.
3. A pop-up window will open, asking whether you are sure you want to deactivate. Select 'Yes'.
4. The next pop-up will inform you, that a deactivation request file has been created in your documents folder.
5. Transport the file named "AGC3_DeactivationRequest.dat" to a computer with internet connection.
6. On a computer with internet connection open your preferred internet browser and direct to <https://viewplus.com/software/deactivation/>
7. Select 'Manual Deactivation' button from this webpage.
8. On next form browse to your AGC3_DeactivationRequest file in your documents folder and click 'Open' on browser window. Then select 'Submit' on this form.

9. Now you should get a confirmation message that your software has become deactivated. Your AGC license number is now free for activation on any other computer again.

V. Using AGC - Screens

V.A. Calculator Screen

The calculator is useful for people who want or need to use a calculator that works like the keys on a hand-held calculator. Proficient users may find the Evaluator more convenient. It offers functionality similar to that of the Calculator screen, but allows users to type in the formula to be calculated instead of pressing buttons.

- Trigonometric Checkboxes

There are two checkboxes labeled Inv (inverse) and Hyp (hyperbolic) for use in trigonometric calculations.

Using a trigonometric function while the inverse box is checked will return the inverse of that function (sine, cosine and tangent will return arcsine, arccosine and arctangent, respectively). You can enable or disable the inverse checkbox with the hotkey Ctrl+I.

Using the sine, cosine or tangent function while the hyperbolic checkbox is checked will return the hyperbolic sine, hyperbolic cosine or hyperbolic tangent, respectively. You can enable or disable the hyperbolic checkbox with the hotkey Ctrl+H.

- Display

All numbers entered into the calculator appear in the display as they were entered. Once the equals (=) button is selected, the answer will be displayed in this area.

- Mode Selection

There are two mode selection drop down menus. The first menu allows the calculator to switch between degrees, radians and gradients. The second drop down menu allows you to switch between hexadecimal, decimal, octal and binary. Changing the number base from one type to another will restrict or make available additional buttons. The active buttons for decimal are 0 through 9, for binary are only 0 and 1 and for hexadecimal are 0 through 9 and A through F.

- Memory Indicator

Next to the drop down menus is a space. This space will show the letter M if there is a number stored in the calculator memory. Using the hotkey Ctrl+M with self-voicing enabled will cause the AGC to recall the contents of the memory to the display box and voice it. The contents stored in memory can be erased at any time by using the hot key Ctrl+Shift+Del.

- Scientific Notation

Buttons F-E and EE deal with scientific notation. Entering a number and then pressing the F-E button will convert it to scientific notation. Pressing the F-E button again will convert it back. The EE button allows you to deal with the exponent of the scientific number. Entering a number and then pressing the EE button will allow you to enter the exponent. You can then press the equals (=) button to convert back to decimal or the F-E button to convert to standard scientific notation.

- Display Controls

The next three buttons clear the display in different ways.

The first button, backspace, will remove the rightmost digit from the display.

The next button, CE, will delete the current number from the display, but not any numbers entered or calculated previously.

The last button, C, will erase the contents of the display and anything previously entered and calculated except what is stored to the calculator memory. You can perform this function using the hot key Ctrl+Del.

- Calculations

The next section contains all the buttons used for inputting numbers and calculating functions. The hotkeys for each button can be found in the calculator hotkeys list, accessible from AGC's help menu.

There are three sections of buttons. The section on the right contains the buttons for performing standard functions and using the memory. The buttons 0 - 9 enter the numbers 0 - 9. The "." button enters a decimal point. The "+/-" button will change the currently entered number from a positive to a negative or vice versa. The "(" button and ")" button enter parentheses, for use in expressions. The " π " button enters the value of pi.

The right column of this section contains the operation buttons, which are +, -, \times , \div and =.

The bottom row of buttons controls the memory. The buttons are MS, M+, MC and MR. MS stores the currently entered number in the memory. M+ adds the currently entered number to the memory. MC clears the memory. MR recalls whatever number is stored.

The middle section has two columns of buttons. The following are the buttons in the right column, from top to bottom and their functions. The x^2 ($x^{\wedge}2$) button squares the currently entered number ($x * x$). The x^3 ($x^{\wedge}3$) button cubes the currently entered number ($x * x * x$). The x^y ($x^{\wedge}y$) button raises the currently entered number to a number that is entered after the x^y ($x^{\wedge}y$) button is selected. The = button must be selected for the result to display. The sqrt button returns the square root of the currently entered number. The 1/x button returns the reciprocal of the currently entered number. The n! button returns the factorial of the currently entered number ($4! = 4 * 3 * 2 * 1$).

The left column contains the buttons sin, cos, tan, e^x ($e^{\wedge}x$), ln and log.

The left section has two columns of buttons. The following are the buttons in the right column and their functions. The And, Or, Xor and Not buttons perform, respectively, the And, Or, Xor and Not operations that are used in Boolean algebra. The Mod button returns the mod of two numbers. The mod is the remainder of a division (ex. $5/3 = 1R2$, $5 \text{ mod } 3 = 2$). The Lsh button performs a binary left shift (multiply the number by two or add a zero on the right side of the binary number). A binary right shift (divide the number by two or get rid of the last digit on the right of a binary number) can be performed by selecting the Inverse checkbox and then the Lsh button.

The left column contains hexadecimal numbers. They are only available when Hex mode is selected. The buttons are A, B, C, D, E and F. A, B, C, D, E and F correspond to 10, 11, 12, 13, 14 and 15 in decimal respectively.

V.B. Matrix Screen

- Entering Matrices

The matrix screen consists of two fields. There is a text field at the top where matrices can be entered into the calculator.

Matrices must be entered in a specific format. A matrix must begin and end with a square bracket. Any numbers (on the same row) within the matrix must be separated by commas. The end of each row except the last must be indicated by a semicolon. If you are using the self-voicing feature of the AGC to operate the matrix screen, please note that commas and semicolons will be voiced as "column" and "row", respectively.

After a matrix has been entered into the textbox, press the Enter key. If the matrix was entered correctly, the graphical representation of the matrix will appear in the display area below the matrix entry text field.

In addition to entering a full matrix every time, you may assign a particular matrix a name and use that instead. To do this, type name=[...] where name represents your variable name and ... represents the contents of your matrix. After pressing the Enter key to store the values, you can then substitute your variable name for every calculation in which that matrix is needed.

The calculator will automatically assign your most recent matrix operation's answer to the name ANS. This is helpful if you want to use the result of a matrix operation quickly without having to assign it a name. Keep in mind that ANS will be overwritten once you enter another matrix operation, and that only answers resulting in a matrix will be stored to ANS.

The matrix evaluator also has the ability to store your last 100 entries. After you have entered a matrix, you may press the up or down arrow in the matrix entry line on the keyboard to switch between the entries.

- **Matric Calculations**

The matrix calculator can handle basic math outside of a matrix. You may multiply matrices by whole numbers or fractions by typing an asterisk following the matrix or matrix name and then typing the number you want to multiply the matrix by. If you are multiplying by a fraction, make sure to use parentheses around the fraction.

The matrix evaluator has the ability to solve linear equations.

You can find the determinant of a square matrix by typing DET before the opening bracket.

You can find the inverse of a square matrix by typing INV before the opening bracket.

You can find the transpose of a matrix by typing T before the opening bracket.

V.C. Evaluator Screen

The evaluator will be familiar to you if you have used a graphing calculator before. There are three areas to this screen.

The uppermost area labeled "Expression:" is where the expression should be entered. Press the enter key to display the result.

The result will appear both in the text box labeled "Result:" and in the larger history box located below. After the expression has been evaluated, you may scroll through the results using the up and down arrow keys.

You may also save constants to the evaluator. If you are planning to use a constant in an expression, make sure to store the value of the constant before entering the expression in which you intend to use it. To save a constant, enter a name followed by the equals sign and then the constant's value. Now whenever you wish to use this number, you can use the name you gave it. This is useful when your constant is a long or hard-to-remember number.

The evaluator accepts these mathematical functions with the following syntax:

Function	Written Representation	Syntax
Absolute value of x		ABS()
Hyperbolic arc sine of x	\sinh^{-1}	HASIN()
Hyperbolic arc cosine of x	\cosh^{-1}	HACOS()
Hyperbolic arc tangent of x	\tanh^{-1}	HATAN()
Arc sine	\sin^{-1}	ASIN()
Arc cosine	\cos^{-1}	ACOS()
Arc tangent	\tan^{-1}	ATAN()
Hyperbolic sine	sinh	HSIN() or SINH()
Hyperbolic cosine	cosh	HCOS() or COSH()
Hyperbolic tangent	tanh	HTAN() or TANH()
Square root x	$\sqrt{\quad}$	SQRT()
Exponential	e	EXP()
Natural log	ln()	LN()
Log base 10	log()	LOG()
Sine	sin	SIN()
Cosine	cos	COS()
Tangent	tan	TAN()

Convert radians to degrees		DEG()
Convert degrees to radians		RAD()
Addition		+
Subtraction		-
Multiplication		*
Division		/
Exponent		^
Factorial		!

Please note that the evaluator uses radians by default. If you wish to use degrees, you must first convert the number from radians.

Any equation or expression using the functions above may be evaluated. The evaluator will calculate the expression and display the resulting answer. An error will be returned if any variable used in the expression was undefined, or if a function or variable was entered incorrectly.

V.D. Data 1 Screen

The Data 1 screen allows the first of two possible functions to be evaluated for plotting.

- Entering Data

The input box for the Data 1 screen is similar to the input box on the evaluator screen. It can accept the same functions and equations.

Most input for the Data 1 screen should be entered as a function of x . The input values for x are defined on the plot screen (see Section G). After you have entered a function of x , press the enter key to evaluate it. A table will appear below the input box listing the input and output values for your evaluated function.

You can also enter a set of data points manually. To do this, type `points=` followed by the number of points you wish to enter into the input box and then press enter. For example, to enter five data points, type `points=5` into the input box and press enter. Below the input box, a table will appear into which you can enter the data points.

Directly below the input box, there are two coordinate options: rectangular and polar. Select one of these two option boxes according to which coordinate system that you want the graph to use. When using polar coordinates, $f(x)$ corresponds to r in polar and x corresponds to θ in polar. In other words, the equation $r(\theta) = \theta$ is typed in the input box as $f(x) = x$.

Below the coordinate options is the data table. When using rectangular (Cartesian) coordinates, the first and second columns of the data table list input values for x and output values, respectively. The third column lists the derivative of the function, and the fourth column lists the definite integral starting from the x minimum up to the current value of x . The fifth column lists whether the second derivative is positive, negative or zero. When using polar coordinates, only the first two columns, for r and θ , appear. When using user-defined points, only the first two columns, for x and y , appear.

For additional information, including sums, means, deviations and regression analysis (among other options), you can select the "Statistical Description of Data Set" button. Pressing the "Return to Data Table" button will return you to the data table.

- Graphing

The main purpose of entering data into the Data 1 screen is graphing. All functions entered into the Data 1 screen are automatically graphed. In order to see the graph, you must display it. The fastest way to display the graph is to use the hotkey, F3. You may also use the menus at the top of the screen. Select the Graph Menu, and then choose Show Graph.

After displaying the graph, the function you entered will be visible. If the function is bigger than the graph window, it is possible to change the window size to get a better view. See Section F for instructions.

One of the best features of the AGC is its ability to not only display graphs visually, but audibly as well. When a function is graphed and the appropriate sound options have been set, your computer will emit differing pitches for differing values. See Section F for instructions.

V.E. Data 2 Screen

The Data 2 screen is very similar to the Data 1 screen. The only difference between Data 1 and Data 2 is the color of the plotted line or data points.

If you are only plotting one function, use the Data 1 screen. Data 2 is used to plot a second function simultaneously with Data 1.

You can use the plot screen to adjust those settings having to do with the plotted data and functions. See Section F for instructions.

V.F. Plot Screen

From the plot screen, you can define how information is represented on the graph. All adjustments to the range plotted, data set plotted and number of points plotted are performed here.

- Source

The first section of the plot screen is the source group box. The source group box will direct AGC on how to plot each function.

If Data Set 1 is selected, the function entered in the Data 1 screen will be displayed as either red dots or a black line. The function from the Data 2 screen will appear as either yellow dots or a yellow line. Selecting Data Set 2 will cause the line colors to change. The function entered into Data 2 screen will now appear as a black line while the function from Data 1 screen will appear in red.

The selected data set will be the one represented audibly by the graphing utility. When printing the graph, the selected data set will be printed as a darker or heavier line.

There are two more options in the source section, Sum (1+2) and Difference (1-2). If Sum (1+2) is selected, the sum of the two equations will be displayed as either a black line or green dots. If Difference (1-2) is selected, the difference of the two equations will be displayed as either a black line or blue dots.

- Calculus Plot

This section lets you choose to plot the function itself, the derivative of the function or the definite integral of the function.

- Function Domain

There are three edit boxes in the Function Domain section. They are used to fill out the Data table when you enter an expression on the Data 1 or Data 2 screen.

The first two edit boxes are Start and Finish, which could also be considered X minimum and maximum, respectively, and define where AGC will start and stop evaluating the function. The third option is #Pts. This lets you change how many points are used when evaluating and graphing.

- Graph Limits

There are six options in the Graph Limits section, three each for X and Y. The three options are X (or Y) Min, X (or Y) Max and Auto-Scale X (or Y). The Min and Max are set by typing into edit boxes for X and Y, or you can select X and/or Y Auto-Scale, which will allow AGC to choose the graph display window dimensions for X and/or Y.

- Mode

The mode group box is the next section. Here, you can select the visual representation of the graph. By checking or unchecking boxes, you can select to display the graph as points, a line or error bars. Any combination of these checkboxes can be selected. Unchecking all the boxes will cause the function to not be plotted. Error bars will show the level of uncertainty of a data point. If your data point is being calculated through an expression, there will never be any uncertainty. The only time error bars will be shown is when data is imported from an outside source.

- Axes and Frame

The last two group boxes, axes and frame, allow you to choose the visual representations of the scale.

The axes group box allows you to display the x and y axes and the labels for each axis. You may check or uncheck any combination of these options.

The frame group box allows you to display measurement markings in the graph window. You may select one of three options, none, tick or grid. The none option will allow only the axes to be marked on the graph window. The tick option will cause small lines to also be displayed along the bottom and left sides of the window. The third option, grid, will cause dashed lines to be added to the entire window. This option makes matching the values of the function to the labeled value much easier.

V.G. Wave Screen

The wave screen is where most of the audio related options can be adjusted.

- Volume

The first set of options is volume control. The first volume control option is how loud the data set will be played. Moving the slider to the right will increase the volume, while moving the bar to the left will decrease it.

The second option in the volume controls refers to tick marks. The checkbox controls whether or not tick marks on the graph will be played when the file is saved to disk. You always have the option to play back the data set with or without tick marks regardless of the status of this checkbox. The slider determines how loudly they will be played. If the data set slider is already set to one hundred percent, the tick mark slider is not functional for increasing the volume of the tick marks. You may still use the tick mark slider to reduce their volume. If you wish the tick marks to be played more loudly than the function, reduce the volume of the data set and increase the volume of the tick marks. Finally, there is an option to enter the quantity of tick marks to be played.

- Y Threshold

The next option is the Y Threshold. During graph play, segments of a plotted data set falling below this threshold will be played with static in the background. The default threshold is 0. This means that if part of your plotted function falls below 0, static will play in the background during that part of the data set when you play the graph. Unchecking the Y Threshold level checkbox will prevent static from playing during graph play.

- Play Time and Wave Type

The next two options change how AGC plays the data set. The option on the left is Play Time. Moving this sidebar to the right increases the amount of time over which AGC plays the data set. Moving the sidebar to the left decreases this time.

The other option is Wave Type. There are two choices: Mono Output and Stereo Output. Selecting Mono Output plays the same audio through both speakers attached to the computer. Selecting Stereo Output plays audio going from the left speaker to the right speaker.

- Frequency Range

These options control how the data set sounds when it is played. The minimum sidebar controls the pitch of the sound heard when the data set reaches the lowest point of the window. The maximum sidebar indicates the pitch of the sound heard when the data set reaches a point equal to the maximum height of the window.

- Auto-Speak Coordinates

The 'Speak X & Y values at each step' checkbox dictates whether or not coordinates will be spoken (if the self-voicing option is active). If this checkbox is enabled, clicking on a point in the graph's window or scrolling through it with the hot keys will cause the AGC to voice the x coordinate selected and its corresponding y value.

V.H. Speech Screen

The speech screen is where all self-voicing options are controlled.

- Main Sound Controls

The first two checkboxes are the main sound controls. The first, Sound Effects, when checked, allows AGC to play sound effects when actions such as checking and unchecking checkboxes occur. The second

checkbox, Allow Self-Voicing, is used to activate and deactivate self-voicing. The self-voicing checkbox can be toggled using the hotkey Alt+S or Ctrl+Q.

- Self-Voicing Controls

The next set of options control the self-voicing options. The first option allows you to choose the voice you wish to use. Scroll through the list using the up and down arrow keys.

After you choose a voice, you can set the voice rate, pitch and volume. The Rate option controls how fast the voice speaks. Choosing a faster rate by adjusting the slidebar to the right will cause the program to voice more rapidly. The next option, Pitch, adjusts the sound of the voice. Decreasing the pitch by adjusting the slidebar to the left will lower the sound of the voice to a deeper tone. Finally, you can select the Volume of the voice selected. This volume control is independent from the wave volume. This is useful if you want the voice to speak louder than the data set plays or vice versa.

Below the volume, pitch and rate options is the "Number of decimal places to voice" option. There is a data box that allows for numerical input. Whatever number is entered is the amount of numbers after the decimal that will be voiced when coordinates are spoken.

VI. Using AGC - Menus

VI.A. File Menu

The file menu provides access to all file related options plus option to exit the program, which is the last item in exploded file menu.

The first section of the file menu deals with the loading and saving of data sets. The first option, Open Data Set, allows you to load a previously saved data set. The second option enables you to save your current function or data by choosing Save Data Set.

The next section allows you to save or load constants and restore the default parameters. The first option, Load Constants, allows you to load constants from a file for use in the AGC. The second option, Save Constants, allows you to save any constants that you have defined while using the AGC. The last option, Restore Default Parameters, changes all parameters back to their defaults.

Also accessible from the File menu is the Print option. Selecting Print Graph (Ctrl+P) will open a new form that offers all the options relating to printing. If your selected printer is a ViewPlus embosser, then you will also be able to print to file. Just check the print to file checkbox then click print. A dialog box will open and prompt you for the name with which you wish to save your printed copy. It is very important that you type .prn after your file name, or you may not be able to open your saved file.

Save Graph To SVG... after graph is shown, this option becomes active. This is used for sonification in IVEO. When saving graph to SVG from AGC, each data point is tagged with x and y values for audio feedback in IVEO.

VI.B. Edit Menu

There are two options, Paste Data from Clipboard (Ctrl+V) and Copy Data to Clipboard (Ctrl+C), that allow you to paste from or copy to the clipboard any function or data set you have created. Paste data copied to clipboard in MS Office Excel for example.

VI.C. Options Menu

The Options menu allows for navigation around the AGC. In addition, many of the accessibility features can be quickly accessed from here.

The first section of the Options menu enables you to navigate between screens without the use of the tab key. Simply choose your desired screen from the menu and that screen immediately comes to the front of the calculator. Some of the navigation options offer submenus. For instance, the Plot option offers the subchoice of Range. This will navigate you to the plot screen and then the group box range will gain focus. The other navigation option that offers submenus is Wave.

The next two options allow for easier use of the calculator. The first option, AutoReturn, will be useful if you prefer the numeric keypad (10-key) over the row of number keys across the upper center of the keyboard. On the calculator, AutoReturn causes the equals sign to automatically be selected after every keystroke. In essence, the Enter key becomes the equals key for use on the calculator. The other option in this section is Self-Voicing. This option is the equivalent of checking the self voicing box on the Speech Screen.

The final two options deal with the size of the AGC. The first option, Larger, increases the size of the calculator on your screen, while the second option, Smaller, reduces the size. The Larger and Smaller commands can also be accessed with the F8 and F7 keys respectively.

VI.D. Graph Menu

The graph menu contains all the options related to the graphing of data sets.

The first option, Evaluate Expression, causes the currently selected data set to be (re)evaluated. This option is useful when making changes to the window size, function domain or other input or graphing option.

The next two options, Play Data Set and Play Data Set and Ticks, represent the graph audibly through your computer's speakers or headphones. Play Data Set will play the graph from the beginning to the end. A plotted data set with a rising value will be represented by an increase in the pitch of the playback, while a decrease in value will result in a decrease in pitch. When the Play Data Set and Ticks option is selected, the graph will be played back as normal, but there will be small interruptions whenever the graph passes through a tick mark. The number of tick marks on the graph can be set on the Wave screen.

Write Wave File will open a save file dialog box that allows you to specify a file name and location. After your choices have been selected, the AGC will play the selected data set as it is saved to disk. You can then play back your data set at any time.

The next two options are for finding intersections with another graph and finding where the current graph crosses the x-axis. Find Intersection only works when two data sets are graphed. When Find Intersection is selected, the AGC will play the data set from the current x-value to the next intersection of the two graphs. The Find Zeros option will play the graph from the current x-value to the next intersection of the graph and the x-axis.

The next option is Show Graph or Hide Graph, depending on the current state of the graph. If the graph is not being shown visually, selecting Show Graph will cause the graph to appear on the screen. Likewise, if the graph is being shown, selecting Hide Graph will cause it to disappear.

VI.E. Help Menu

The help menu is used to access the user manual, hotkey lists, product information screen, and to activate or deactivate current AGC license.

The manual option brings up this document in your default web browser. The next three options, Calculator Hotkeys, Graphing Hotkeys and Navigational Hotkeys display corresponding hotkey list in your default web browser.

The About option displays the product information for your copy of AGC.

Activate/Deactivate menu item will show according to activation status. As soon as you activate your AGC license, the activation control within this menu will turn into deactivation control. These controls will call VP License Manager. For further reference please see chapter IV of this document about VP License Manager. These controls will not be described further at this point.

VI.E.A Hotkeys

- **Calculator Hotkeys**

Calculator Hotkeys	
Basic Calculation	
Enter a digit	1, 2, 3, 4, 5, 6, 7, 8, 9, 0, a, b, c, d, e, f
Addition, subtraction	+, -
Division, multiplication	/, *
Evaluate equation	= or RETURN (if AutoReturn is enabled)
Toggle positive/negative	SHIFT+M
Open and closed parentheses	(,)
Decimal point	.
Trigonometric Functions	
Cosine	SHIFT+C
Sine	SHIFT+S
Tangent	SHIFT+T
Pi	SHIFT+P
Other Functions	
Factorial	SHIFT+F or !
Log base 10 (log)	SHIFT+G
Natural log (ln)	SHIFT+L
Reciprocal	SHIFT+O
Square	SHIFT+Q
Cube	SHIFT+U

Square root	SHIFT+R
e to the x power	SHIFT+X
Alter exponent, scientific notation	SHIFT+E
x to the y power	SHIFT+Y or ^
Modulo	#
Mode Controls	
Base change select box	CTRL+B
Trig mode select box	CTRL+T
Hyperbolic function toggle	CTRL+H
Inverse function toggle	CTRL+I
Scientific/standard notation toggle	CTRL+N
Memory Controls	
Add display contents to memory	CTRL+A
Store display contents to memory	CTRL+C
Clear memory contents	CTRL+SHIFT+DEL
Recall and voice memory contents	CTRL+M or CTRL+V
Delete last digit entered	BACKSPACE
Delete all digits entered	DEL
Clear display of entire equation	CTRL+DEL
Logical Operators	
Bitwise AND operation	&
Bitwise OR operation	
Bitwise XOR operation	-
Bitwise NOT operation	~

Binary left shift	<
Binary right shift	> or < if invert function is on

- **Graphing Hotkeys**

Graphing Hotkeys	
General Graph Functions	
Display the graph	F3
Hide the graph	CTRL+F3
(Re)evaluate an expression	F4
Print the graph	Ctrl+P
Audio Graph Functions	
Play data set audibly	F5
Play data set audibly with ticks	F6
Stop audio playback	ESC
Play next data point	ALT+RIGHT ARROW
Play previous data point	ALT+LEFT ARROW
Play until next minimum	ALT+PAGE DOWN
Play until next maximum	ALT+PAGE UP
Play until next x-axis intersection	ALT+0
Play until previous x-axis intersection	CTRL+ALT+0
Play until next function intersection	ALT+I
Go to the start of the graph	ALT+HOME
Go to the end of the graph	ALT+END

- **Navigational Hotkeys**

Navigational Hotkeys	
Enable/disable self-voicing	CTRL+Q or ALT+S
File menu	ALT+F
Edit menu	ALT+E
Options menu	ALT+O
Graphing menu	ALT+G
Help menu	ALT+H
Reduce calculator size	F7
Increase calculator size	F8
Open user manual	F1

VII. Support

The support section of ViewPlus website will lead you to online information and resources like product manuals, tutorials, FAQs, or the ViewPlus knowledge base for help on specific topics.

The knowledge base can also be accessed directly at <https://support.viewplus.com/kb/index.php>.

If you need to submit a support ticket to get personal help from a ViewPlus support representative, please go to "Support Tickets" under support section of ViewPlus website and choose to open a ticket, or use this Support Desk to check on status of any current tickets that you own.

Direct links to contact ViewPlus support are provided at <https://viewplus.com/contact/contact-support/>.

Additional training and support is available for purchase through your authorized ViewPlus distributor or from ViewPlus Technologies.

ViewPlus Technologies, Inc.

1965 SW Airport Ave.

Corvallis, OR 97333

Toll free phone number: 866.836.2184

www.viewplus.com