Orion TI-84 Plus Talking Graphing Calculator^{TM} User's Guide

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Introduction

This guide is designed to guide you in the use and care of the Orion TI-84 Plus Talking Graphing Calculator. The Orion TI-84 is a specially modified TI-84 Plus, based on the popular TI-84 Plus Graphing Calculator. The functionality and operation of the Orion are identical in all respects to the standard TI-84 Plus Graphing Calculator. The only differences are additional controls, jacks, speakers, and software for accessible feedback of both equations and graphs. This User's Guide covers the accessibility enhancements to the TI-84 Plus.

An accessible version of the TI-84 Plus Guidebook is included on a USB flash drive in the packaging of the Orion TI-84 Plus. You can access the Orion Resources page for accessible versions in DAISY, PDF, and HTML formats. You may also refer to the numerous online user manuals and guidebooks from Texas Instruments[TM] for the TI-84 Plus Graphing Calculator, as well as third-party tutorials.

About This Guide

This guide was accurate and complete at the date of its publication. For the latest version, see http://tech.aph.org/gc_info.htm

The Orion TI-84 Plus information page contains the Quick Start guide, a Getting Started video, the accompanying software, and information about updates.

In addition to the User's Guide, there is an e-mail list that discusses the Orion TI-84 Plus. To subscribe, send an e-mail to gc-subscribe@tech.aph.org.

APH's customer support, developers, and interested and knowledgeable users exchange information here; the e-mail list is a great place to get usage tips, ask questions, or make suggestions.

Features

The Orion TI-84 is a modified TI-84 Plus Graphing Calculator for the user with visual impairment. Below is a list of some of the features the Orion has to offer:

- LCD display and keypad functionality are identical to the standard TI-84 Plus, making it easy for teachers already familiar with the TI-84 to help students.
- Calculator functions have the benefit of decades of experience from Texas Instruments[TM], the world leader in calculators.
- Full speech access to all menus, mathematical expressions, text, and symbols displayed on screen
- Full access to graphs through speech output of coordinates
- Graphs can be accessed by audio tones.
- Clear, high-quality synthetic speech (FonixTalk[TM] text-to-speech from SpeechFX[TM]) also available for dynamic text
- Each key is announced when pressed.
- Repeat capability to announce the displayed screen (or parts of it) at any time
- Unique Help mode for immediate key identification without interruption of operation
- Comprehensive choice of speech modes for various levels of feedback
- High capacity, rechargeable battery
- Battery or AC adapter operation
- Ergonomically designed
- Large, tactile, and functionally zoned keys
- Easy on/off control and auto power-off

Conventions Used in This Guide

This guide references various functions of the calculator in the following manner:

- The keys on the calculator are divided into two sections for easier accessibility. The top part of the calculator is referred to as the Orion, and the bottom part is referred to as the TI-84 Plus.

- When referencing the location of a TI-84 Plus key, the rows begin at the bottom and the columns begin on the left. For example, the **On** key is located at the bottom left of the TI-84 Plus in column 1, row 1.

- The location of certain keys on the Orion section of the unit is described as follows:

- The six keys on the left side are referenced as top, middle, bottom, and left, right. For example, the *Preference* key (**Pref.**) is the top-right key.

- The five keys on the right side are referenced as up, down, left, right, and home.

- Both sets of keys can be used in conjunction for navigation and other functions. For example, pressing both the **CTRL** key, which is the bottom-left key on the left side of the Orion, and the *Left Arrow* key, which is located on the right side of the Orion, lets you navigate to the far left of the review line.

The following example demonstrates how to calculate the square root of 9 using the keys on the TI-84 Plus section of the calculator:

1. Press the **2nd** key, located in column 1, row 9.

2. Press the *Square Root* ($\mathbf{X^2}$) key (the square root symbol is displayed above this key), located in column 1, row 5.

3. Press the numeral **9** key, located in column 4, row 4.

4. Press the **Enter** key, located in column 5, row 1.

The TI-84 Plus announces the answer. If you wish to repeat the answer, press the *Repeat* key. Repeat is denoted by a looping arrow (the word Repeat is displayed above the key). Repeat is the top-left key in the left set of keys of the Orion.

Becoming Acquainted With Your Orion TI-84 Plus Talking Graphing Calculator

Parts List

The box contains the following items:

- Orion TI-84 Plus Talking Graphing Calculator

- Hard slide cover

- Standard A male to Mini-B male USB Cable

- Earphones

- Pack of four triple-A batteries

- USB flash drive containing documentation and software

- Quick-Start Guide in braille format

- Quick-Start Guide in print format

Orientation and Functions

This section helps you become familiar with the location and various functions of your Orion TI-84 Plus Talking Graphing Calculator.

To begin the exploration process, position the Orion TI-84 Plus so that the keys face up and the ports are at the top. This is the normal operating position. The ports at the top of the calculator begin with the TI-84 serial link port on the left, followed by the micro port, the Mini-B port, and finally the earphone jack on the right. On the left and right side of the unit, at the top and near the ports, are the two speaker grills.

On the front of the Orion section of the calculator, there are 11 keys grouped like a game pad. Six keys are on the left in a three row, two column layout (like a braille cell); and an arrow key configuration is on the right, with a center *Home* key (denoted by a graphic of a house).

The keys on the bottom half of the calculator are the TI-84 Plus keys. There are 41 keys laid out in five rows and nine columns and a four-key directional pad in the top-right corner. The four keys of the directional pad are the arrow keys for the TI-84 Plus. The 12 number keys in the bottom and middle feel concave, while the other keys feel convex. There are two exceptions: The **On** key is flat and slanted forward, and the **Enter** key is larger than the other keys.

The rectangular, flat section between the Orion and the TI-84 Plus is the screen. Just below the screen is an additional row of five keys. These are the TI-84 Plus Function keys.

Power Supply and Charging

There are two separate power sources for the Orion TI-84 Plus Talking Graphing Calculator. The calculator uses four triple-A batteries, and the accessible extension (Orion) uses its own internal chargeable battery.

To install the batteries and charge the unit, follow these steps:

1. Turn the calculator so that the keys are pointing down and make sure the two rubber feet are positioned at the top. Using your thumb, find the battery door lever in the middle of the unit and pull down toward the bottom of the unit. While applying downward pressure, pull your thumb away from the unit and the battery door should open and come off completely.
2. Place each triple-A battery so that the flat end of the battery is positioned against the spring. Tilt the battery and press it against the spring. Push the battery flat into the opening until it snaps into position.
3. To close the battery cover, place the cover at an angle with the thumb lever at the top and the two tabs at the bottom. Position the tabs under the plastic edge of the opening and lower the lever until it snaps into place.
4. Turn the calculator over so the keys face up. Plug the Mini-B end of the USB cable into the Mini-B port on the top right side.

Note: Fully charge the battery the first time you use the calculator. This should take about four hours. You can use the Orion TI-84 Plus while it is charging.

The triple-A batteries in the TI-84 should have a battery life of several months. If they become low, you receive a message at 5%. At that point, you have several days of charge remaining in the triple-A batteries. Until you replace the batteries, each time you turn on the calculator, it announces that the batteries are low.

The chargeable battery in the Orion lasts several days, depending on usage. Always charge the unit before any important test or assignment.

Operation Procedure

Follow these steps to turn the calculator on and off:

1. To turn the device on, press the **On** key located at the lower left-hand corner of the calculator positioned in column 1, row 1.
2. To turn the device off, first press the **2nd** key located in column 1, row 9, and then press the **On** key.

Note: If the calculator is on and not in use for 5 minutes, it automatically powers off safely without loss of data. At restart, it returns to the location and procedure of when the unit was powered off. If you were using the Help mode, the calculator returns to the location and procedure prior to the initiation of Help mode.

Help Mode

The Orion TI-84 Plus is equipped with a Help mode designed to assist you with locating keys and confirming their functionality. Help mode can be used at any time, even in the middle of a calculation. When the unit is in Help mode, the calculator retains its previous status (i.e., if you were in the middle of an operation, the calculator is not interrupted and the display remains unchanged). To enter the Help mode, quickly press the **2nd** key (column 1, row 9) three times.

In Help mode, to assist you with locating a particular key, each key is announced when pressed. Its primary function is also announced. When used in combination with various modifying keys, such as **2nd** and **Alpha**, the Orion announces the secondary functions as set by the modifying key.

To exit the Help mode, press the **On** key, press and hold the **2nd** key, or by pressing the **2nd** key three times quickly. The calculator returns to the speech and operational mode you were using prior to entering Help mode and restores all the previously set preferences. You can resume operation from precisely the point where you left off.

Accessibility Features

The Orion TI-84 Plus Talking Graphing Calculator is a modified TI-84 Plus. The modifications are found at the top of the unit called the Orion. On the left side of the Orion, there are six keys laid out in three rows of two columns. On the right side, there are five keys in the form of a directional pad. The Orion keys are used to review text and graphs and to set accessibility preferences, such as volume, rate, voice selection, and playback tone duration, as well as many other useful settings.

Many of the keys have multiple functions if used with the [Shift](#) or the [CTRL](#) keys. The following sections describe each key by function.

Control and Pause

The bottom-left key on the left-hand side of the Orion is the **CTRL/PAUSE** key. Pressing it in conjunction with other Orion keys changes the function of those keys. Tapping the **CTRL** key alone pauses speech feedback. Tapping the key a second time restarts the speech function at the point it left off. Pressing any other key while the speech function is paused deletes the buffered text.

Shift and Mute

The bottom-right key on the left-hand side of the Orion is the **Shift/Mute** key. Pressing the **Shift** key with other Orion keys changes the functionality of the key. Pressing the **Shift** key alone silences the speech mode.

Resetting the Orion

The Orion can occasionally get out of sync with the TI-84. This usually happens when the batteries are changed or if a bug is encountered. It is rare that will you need to use the reset function, but it is here for those unusual times when it is necessary. If the speech function stops, or if you think the Orion is not audibilizing the graphs correctly, you will need to reset the Orion. To reset, turn the Orion TI-84 Plus off by pressing the **2nd** key followed by the **On** key. When the calculator is off, press the **Shift** and **CTRL** keys on the Orion together. Then, turn the calculator back on by pressing the **ON** key. You should hear the Orion TI-84 Plus power on, at which point you can continue your work from where you left off. If the Orion does not come on, repeat the above steps. You may need to do this a couple of times. If it still doesn't turn on, call customer service.

Adjusting the Volume

The middle two keys on the left-hand side of the Orion are the Volume keys. Pressing the middle-left key, denoted by a speaker symbol and a minus sign, lowers the volume by one level and announces the current level. Pressing the middle-right key, denoted by a speaker symbol and a plus sign, raises the volume by one level and announces the current level. There are 10 levels, with 1 as the lowest and 10 as the highest. There are two separate settings for earphones and speakers. If you are using earphones, the volume control adjusts the earphone volume. When earphones are not connected, the volume control adjusts the volume of the speakers.

Adjusting the Rate of Speech

The middle two keys on the left-hand side of the Orion also control the rate of speech when pressed in conjunction with the **CTRL** key. Pressing *both* the **CTRL** key and the middle-left key, labeled as **S.R. Down**, once decreases the rate of speech by one level and announces the current rate.

Pressing *both* the **CTRL** key and the middle-right key, labeled as **S.R. Up**, once increases the rate of speech by one level and announces the current rate. There are 10 rates of speech, with 1 as the lowest and 10 as the highest.

Repeat and Spell

The top-left key on the left-hand side of the Orion is the **Repeat** key (denoted by a looping arrow). Pressing this key once repeats the last spoken text.

Press and hold the **Repeat** key to hear the last announced item, letter by letter.

Preferences

The Orion TI-84 Plus has many Preference options for changing the accessibility features. To access the Preferences menu, press the Preference (**Pref.**) key located at the top-right, on the left-hand side of the Orion.

When the Preference (**Pref.**) key is pressed, the Orion announces a list of vertically arranged items. Using the Orion navigation keys on the right, press **Up** or **Down** to move through the list. Press the **Home** key, located in the center of the arrow keys, to make a selection.

The Preferences menu contains the following options:

- Graph Options
- Speech Options
- Silent Startup mode
- Turn off speech
- Battery Status
- Firmware Version
- Serial Number
- Reset All
- Exit

Graph Options

Selecting Graph Options from the Preferences menu opens a menu that contains the following options:

Coordinate Announcement

This option sets the order in which the X- and Y-coordinates are announced and sets if both are announced.

Sounds

- Navigation tone duration—sets the duration of an individual tone for hearing a whole graph or reviewing a graph step-by-step.
- Equation playback duration—sets the speed of the duration of playback of a whole graph. The smaller the number, the faster the playback.
- Negative value noise—enables or disables the static noise and adjusts the tone level while in the negative Y-region of a graph.

Indicators

- Axis Cross Indication—enables a sound indication when the graph is played and the audibilized position crosses the X or Y axis. Each axis has its own unique sound.
- Axis Tick Indication—enables a sound indication each time the audibilized position reaches an X axis tick mark.
- Intersection Indication—an Intersection indication sound is generated (in continuous waveform playback mode) and a number is spoken (in trace mode) to indicate that the current graph crosses another graph.

  If the graph crosses multiple graphs, it says multiple numbers. In playback mode, once a graph is plotted on the screen, Orion plays the equation sound. If the current coordinate intersects with another graph, Orion plays intersection indication.

  In trace mode while navigating the graph, Orion plays the coordinate sound. If the coordinate is intersecting with another graph, Orion plays the intersection indication and announces the graph number.

- Maximum and Minimum Indication—(in trace mode and/or during the continuous waveform playback mode) a minimum or maximum sound is generated to indicate that the current graph point is either a local minimum or maximum.

  In playback mode, once the graph is plotted on the screen, Orion plays the equation sound. If the current coordinate is either minimum or maximum, the coordinate sound is mixed with min/max indication, respectively.

  In trace mode, Orion plays the coordinate sound. If the current coordinate is either minimum or maximum, the coordinate sound is mixed with the min/max indication, respectively.

- Shaded Regions—during cursor navigation in Graph mode, an indication tone (in tone mode) is generated for the current cursor position within the region (inside shaded, out of shaded, and on graph line). This is followed by an announcement (inside shaded, out of shaded, and on graph line) for the respective graph.

  In speech mode, Orion announces the current cursor coordinates (x, y values) followed by announcement of current cursor position (shaded region, out of shaded region, and on graph line).

  The following conditions must be satisfied to use this feature:

  1. Graph style must be chosen as either shaded above or shaded below.
  2. Graph mode—graph free cursor selected.

When the above conditions are met, tones are played in tone mode and speech announcements are played in speech mode.

- Cursor Location—indicates the location of the cursor by a tone generated during graph playback.

Graph Screen Sonograph[TM]

The Graph Screen SonoGraph mode is designed to help a user understand the groupings of points on non-contiguous graphs while in the Graph screen. It is arrived at by pressing the Graph key after entering the functions. It can also be used to view contiguous graphs on the Graph screen, but this method may have limited impact to a user's understanding of contiguous graphs. If viewing contiguous data it is better to use the trace screen to audibilize the graph.

To turn on Sonograph Mode:

1. Press the **Pref** (Preference) key.
2. Press the **Home** key to select Graph options.
3. Arrow down to Sonograph and press the **Home** key to select.
4. Arrow down to On and press the **Home** key to select.
   Note: the default setting is Off.

Orion announces "sonograph enabled" when the steps are completed.

Important Note: Sonograph only works when graphing using the Graph key not the Trace key.

The Graph Screen Sonograph feature has two modes, selectable by hot key combinations when in the Graph screen.

1. Sonograph Density Mode—pressing the key combination (**CTRL** + **PREF**), generates density sonograph of the TI-84 Plus screen. An imaginary cursor moves from left to right and plays pitch proportional to number of pixels in each column.
2. Sonograph Average Pitch Mode—pressing the key combination (**SHIFT** + **PREF**), generates average frequency sonograph of the TI-84 Plus screen. An imaginary cursor moves from left to right and plays average pitch of each column.

Important Note: When using Graph screen Sonograph mode, all information present in the sweep region is included in the sweep sound. To avoid nongraphical information (axis, coordinate information) in sweep sound, select Axis Off, and then Coord Off from the Format menu. To avoid nongraphical information (cursor) in sweep sound, press the **Graph** or **Enter** keys.

When using Sonograph for either Density or Average, there are four possible sweep region cursor sizes: full, one-half, one-forth, and one-eighth screens. Depending on the size of sweep cursor chosen, the corresponding amount of the screen from top to bottom will be swept. The sweep cursor is moved by pressing the Orion **Up** and **Down** arrow keys. If you are at the bottom of the screen and the bandwidth is set to one-forth screen, the sweep cursor moves by fourths. If you press the Orion **Up** arrow key, it moves up by one-forth from the bottom. If you press the Orion **Down** arrow key, the sweep cursor will wrap to the top and sweep the top one-forth of the screen. Once you move the sweep cursor, the graph will be swept and the region selected will be played.

To resize the bandwidth, press the Orion **Left** and **Right** arrow keys for smaller and bigger bandwidths, respectively.

Another method to move the sweep location is called Variable Band Location. If you press the **Home** key, the sweep cursor will move to the point where the calculator cursor is and the width of the band at that location will be swept and played.

Example 1

1. Enable Sonograph mode in Graph Options.
2. Enable stat plot 1.
3. Select L1 and L2 lists for plot 1.
4. Enter values in lists. Fill L1 and L2 as follows:
   L1: 1, 2, 3, 4, 5, 6
   L2: 2, 3, 4, 5, 6, 7
5. Press the **Graph** key to plot the graph.
6. Select "center" for the band location with the Orion **Up** and **Down** arrow keys.
7. Select "full screen" for the bandwidth with the Orion **Right** and **Left** arrow keys.
8. Press the playback key combo (**SHIFT** + **PREF**) to hear the Sonograph feature for the Graph screen.

The Sonograph feature generates tones depending on the bandwidth. In Example 1, the Sonograph feature generates tones for all six points in the following ways:

- Full screen bandwidth—generates sound for all six stat plot points
- Half screen bandwidth—band 1 plays 4 points
- Half screen bandwidth—band center plays 3 points
- Half screen bandwidth—band 2 plays no points

So in the statistical graph for Example 1, most of the points are trending to the top of the stats graph.

To use variable band location, press the the TI-84 arrow keys (not the Orion arrow keys) until you find a location on which you want to center the sweep. When you have selected your location press the Orion **Home** key. This moves the band to the calculator cursor. You may then select a smaller band like one-forth or one-eighth to get a good estimate of the number of points in that sweep region.

When you have chosen the bandwidth, press the **Graph** key. This removes the calculator cursor from the graph screen. Then press the Orion **Shift** key and select Playback to hear the Sonograph of the selected bandwidth.

Example 2

1. Disable stat plots if selected
2. Press the **Y=** key.

3. Enter the equation: 5 sin(x).
4. Press the **GRAPH** key to enter the graph screen for the Sonograph feature.
5. Select "center" for the band location with the Orion **Up** and **Down** arrow keys.
6. Select "full screen" for the bandwidth with the Orion **Right** and **Left** arrow keys.
7. Press the playback key combo (**SHIFT** + **PREF**) to hear the Sonograph feature for the Graph screen.

Negative Value Vibration

This option enables or disables the haptic feedback while in the negative Y-region of a graph.

Reset Graph Settings

This option resets all graph settings to the factory defaults.

Speech Options

Selecting Speech Options from the Preferences menu opens another menu that contains the following options:

Voice

This option presents a list of voices that enables the user to change how the Orion sounds.

Pitch

This option presents a list of values to adjust the pitch of a selected voice.

Menu Item Number Announcement

This function activates announcement of the Menu Item Numbers in the menus that support number navigation. When enabled, the number that corresponds to the menu choice is announced. This function is used to quickly return to a menu choice. For example, the number **3** key in the **Math menu** is the function for cube. Pressing the **3** key, followed by Enter, prompts the cube function (because it is the third menu choice in the Math menu).

Help mode announcement

This setting turns on or off the announcement about Help mode at startup.

Reset Speech Settings

Selecting this option returns the speech settings to the default factory settings.

Braille Options

Nemeth and UEB Braille output has been added to the Orion TI-84 Plus Version 2.0. Currently, the Orion TI-84 Plus only supports braille displays that use the Baum USB HID protocol. This is due to the memory limitations of the Orion accessory unit. Orbit Research and APH continue to investigate methods in supporting other displays.

To connect the Orion TI-84 Plus to the APH Refreshabraille 18 or other Baum protocol device you need a cable that converts from Micro-A to Mini-B. It can be ordered through the [Amazon®](#) website.

For other Baum devices you may need the Micro-B cable, which can be found at the [Digikey®](#) website.

When you plug in the Braille device, the Orion TI-84 Plus announces "Braille display connected."

To change from the default setting of Nemeth to UEB and back, select Braille Option from the Preference menu. Then choose the format of braille and press Select.

Silent Startup Mode

Selecting Silent Startup mode opens a dialog with the following two options:

- **On** - allows you to boot up and shutdown without any audible sounds or haptic feedback, so it is not a distraction during class. Note that the device still announces speech and graphing audible sounds when this mode is selected.
- **Off, Default** - returns the Orion TI-84 Plus to regular operations.

Turn Off Speech

Choosing Turn Off Speech in the Main menu opens a Yes/No dialog. Selecting "Yes" turns off all access sounds and speech, until any Orion key is pressed or the device is turned off and on. This mode is for users who do not want the accessibility options while using the device.

Battery Status

This item informs you of the current charge of the Orion battery. (xx%)

Firmware Version

This item informs you which version of Orion software is currently running. (xx.xx.xxx)

Serial Number

This item tells you the internal hardware serial number, which you need if calling customer service. This number is different from the serial number on the outside of the unit; however, either will suffice when contacting customer service. (xxxxxxxxxxx)

Note: The x's are replaced by numbers, or in the case of the serial number, the x's are replaced by numbers and letters.

The options are always available, but do not have to be selected. For example, if battery status is selected, it shows the percentage of battery available and nothing else. To return to the menu, exit out of preferences. The battery status percentage is on the main menu already and does not need to be selected.

Reset All

The Reset All option resets all previous changes made to the factory defaults settings. When choosing the Reset All option, a dialog asks "Are you sure?" If you wish to reset the settings, press the **Up** (or yes) key and then the **Home** key on the Orion. If you choose not to reset the settings, press the **Down** (or no) key and then the **Home** key.

Speech and Tone Mode

Orion TI-84 has two modes of accessibility: **Speech** and **Tone**. The Speech and Tone settings change the method of listening to and reviewing a graph. To switch between Speech and Tone modes, press and hold the Orion **Shift** key with the **Repeat** key. Orion announces which mode you are in.

When using Speech mode, the coordinates are announced as the user navigates through a graph. The following factors determine what is announced:

- If the coordinates are turned off in the TI-84 Plus **Format** menu, they are not displayed on the screen, and therefore, are not announced by the Orion. The Format menu is accessed by pressing the **2nd** key and then the **Zoom** key, which is the middle key of the five function keys directly below the screen.
- Orion coordinate preferences found in the Graph Options menu.

When in Tone mode, the duration of the tone is controlled by **Navigation Tone Length** found in the Orion Preferences menu under Graph Options.

For more information on Orion Preferences, see the Graph Options section of this user guide.

Replaying a Graph

To replay the last graph displayed, press and hold the **Shift** key with the Preference (**Pref.**) key. To modify the length of the tones or the duration of the graph playback, change the preferences in Graph Options.

Replaying Indicators of a Graph

To replay **only the indicators** of the last graph displayed, press and hold the **CTRL** key with the Preference (**Pref.**) key. To modify the length of the tones or the duration of the graph playback, change the preferences in Graph Options.

Reviewing the Screen

The Orion TI-84 Plus has a review cursor that can be used to review the screen without disrupting current calculations. The arrow keys on the right-hand side of the Orion, used alone or in combination with the **Shift** or **CTRL** keys, direct the review functions.

Reviewing Lines and Characters

To review the text on the screen line by line, press the Orion **Up** or **Down** arrow key to read the previous or next line, respectively. When you reach the top or bottom of the text, a tone sounds.

To review the text on the screen character by character, press the Orion **Right** or **Left** arrow key to move forward or backward, respectively. When you reach the end of a line, a tone sounds, and your cursor moves to the next or previous line.

Reading Text

Below is a list of the different options for reading text using the Orion:

- To read the current line of text, press the **Home** key located in the center of the Orion arrow keys.
- To read the entire screen, press and hold the Orion **Up** arrow key until Orion begins to read the text; then, release the key. When Orion completes the reading, it moves the review cursor to the top of the screen.
- To read from the current location of the review cursor through the last line, press and hold the Orion **Down** arrow key until Orion begins reading. When Orion has completed the reading, your review cursor returns to the original starting location.
- To read from the current location of the review cursor to the end of the line, press and hold the Orion **Right** arrow key until Orion begins reading. When Orion has completed the reading, your review cursor returns to the original starting location.
- To read from the start of the line to the current location of the review cursor, press and hold the Orion **Left** arrow key until Orion begins reading. When Orion has completed the reading, your review cursor returns to the original starting location.
- To read the text at the input position of the calculator cursor, press and hold the **Shift** key and then press the **Home** key. The Orion first announces "Home" and then reads the text at the input position. The review cursor does not move.

Move Review Cursor

To move the review cursor to the start or end of the line, press and hold the **CTRL** key and press the **Left** or **Right** arrow key, respectively. Orion moves the review cursor to the desired location and announces either start or end.

To move the review cursor to the top or bottom of the screen, press and hold the **CTRL** key and press the **Up** or **Down** arrow key, respectively. Orion moves the review cursor and announces top or bottom.

To move your review cursor to the calculator cursor, press and hold the **CTRL** key and press the **Home** key. This moves the review cursor, and Orion announces that it is set to the home location.

Navigating Long Lists of Data

When dealing with answers that generate long lists of data, the TI-84 sometimes goes into a special mode that versions prior to 2.0 could not read correctly. Version 2.0 has added a method to help walk through those long lists of data. If you get a long list of data surrounded by brackets, you only need to move left and right using the TI-84 arrow keys (below the screen). Because the screen does not have a cursor, it is difficult to get the information and therefore acts a little different than other screens. As you move right and left, Orion TI-84 Plus announces the number and the index value of the number. Between the numbers it clicks letting you know you are not yet on a number. Sometimes there are multiple clicks between the numbers. **Example**

1. Press the **Math** key.
2. Press the TI-84 **Right** arrow key until "Probability Menu" is announced.
3. Press the TI-84 **Down** arrow key until "Random integer generator" is announced.
4. Press enter. The screen will display: randInt(
5. Enter the following items: 1,10,50)
6. Press enter.

When the steps above are completed, the Orion TI-84 Plus creates a list of 50 random numbers from 1 to 10. Pressing the TI-84 **Right** arrow key will read each integer and its index in the list of integers. If you save this list to a variable, you can then use the announced index to get the spoken value in an equation.

Calculator Operations With the Orion TI-84 Plus

The Orion TI-84 Plus operations are identical to those of the TI-84 Plus with one exception. The Orion announces or creates audible representations of the output. The following section is an overview of how the accessible features of the Orion TI-84 work. For additional information about the operations of the TI-84 Plus, see the accessible versions of the TI-84 Plus Guidebook found at the [Orion TI-84 Plus Resources page](#) or the original Texas Instruments[TM] [TI-84 Plus Guidebook.](#)

Home Screen Operations

To go to the Home screen operations, upon turning on the calculator, press the **Clear** key (column 5, row 7) twice; or press the **2nd** key and then the **Quit Mode** key (column 2, row 9) on the calculator.

The Home screen is the primary screen of the TI-84 Plus. On this screen, you enter instructions to execute or expressions to evaluate. The answers are displayed on the same screen in a list of 16 lines called the history. Most calculations and answers are stored in the history on the Home screen. You can press the **Up** or **Down** key to scroll through the history of entries on the Home screen.

For additional information about the Home screen not covered in this guide, see the accessible versions of the TI-84 Plus Guidebook found at the [Orion TI-84 Plus Resources page](#) or the original Texas Instruments[TM] [TI-84 Plus Guidebook.](#)

Entering Expressions

When entering an expression, Orion announces each key you press. When you press a modifier key (such as **Alpha** or **2nd**), Orion also announces that key and the modified function of the next key you press.

When the **+** (add), **-** (subtract), ***** (multiply), or **/** (divide) keys are pressed, without entering any digits first, the calculator assumes that operation should be performed on the previous answer. This is indicated by anouncing **Answer** followed by the text of the key pressed.

The following calculator keys are not announced when pressed:

- Enter
- Up Arrow
- Down Arrow
- Left Arrow
- Right Arrow

When the **Enter** key is pressed at the end of an expression, the answer is announced and placed in the history.

Expression Editing (Delete and Insert)

When entering or editing a previously entered equation that is copied from the history, you can move through the equation using the TI-84 left and right navigation keys. As you arrow left or right, your cursor lands on individual items. In most cases, the item is a character or a digit, but it can also be a symbol such as sine, cosine, or a matrix name. The symbols take up one spot in an equation and can be replaced or deleted like any other character or digit.

The default editing mode when moving through an equation is Overtype. To change an item your cursor is on, just enter a new value for the item you want to change. For example, if your cursor is on the "+" sign and you want to switch the sign to minus, enter "-" and it Overtypes the "+".

To switch to Insert mode, press the **2nd** key followed by the **Del** key. You remain in Insert mode until you press **2nd** followed by **Del** key again or until you press a TI-84 Plus navigation key. For example, to change the number under your cursor from "8" to "78," press the **2nd** key, followed by the **Del** key, followed by the numeral 7.

To delete the item under the cursor, press the **Del** key. When the character is deleted, the next character is moved under the cursor and announced, unless there are no more characters.

If the TI-84 Plus cursor is unable to move when a navigation key is pressed (most frequently because it reached the limits of the navigation area), a tone is generated to indicate this status.

If the TI-84 Plus is in History mode (previous item is selected), some editing operations are not supported by the calculator. In this case, a tone sounds to indicate that an error has occurred.

Copying the Previous Expression

To copy the previous expression, first navigate through the history by using the TI-84 Plus Up and Down navigation keys. When you reach the answer or expression you wish to copy, press the **Enter** key and the history item you are on is copied to the point where your calculator cursor was before moving through the history.

When the **Enter** key is pressed with nothing at the calculator cursor and no item selected, both the previous expression and answer are copied at the calculator cursor location. In this case, the complete expression with its answer is announced.

If the **2nd** key and **Enter** key are pressed, the previous expression is copied on the screen and announced.

Note: You cannot copy a matrix. If you attempt to copy a matrix from the history, the cursor is returned to the calculator cursor.

Clear Operations

While on the Home screen, pressing the **Clear** key produces the following results:

1. If you select an expression or answer and press Clear, the calculator clears the selection and moves the cursor to the next item.
2. If no particular expression or answer is selected, the calculator clears the entire screen and Orion announces "Empty screen."
3. If you press Clear while entering an expression, the calculator clears the entire expression and announces "Expression Cleared." Other screen content is not affected.

Note: Clearing the screen does not clear the history. It clears the screen and moves your cursor to the top of the screen. You can still retrieve your history by pressing the TI-84 Plus Up navigation key.

Graph Screen Operations

The sections below describe the Graph screen operations with the Orion TI-84 Plus. It is important to note when graphing with the Orion TI-84 Plus, you should use the **Trace mode**, not the Graph mode. The Trace mode cursor delineates the graphed equation, while the Graph mode cursor moves freely around the graph; however, the Graph mode currently does not give much helpful information in regards to the equation. You can do almost all graphing functions in Trace mode.

Equations Announcement - Trace Cursor Announcement

In the Trace mode, equations are announced in the following situations:

1. When the Graph screen is entered
2. When equations are switched using the Up or Down cursor keys
3. If the Expression Off setting (ExprOff) is enabled in the **Format** menu, only the equation number is announced and not the entire equation.

X-Y Coordinates Announcement Cursor

X- and Y-coordinate values of the cursor are announced as the user tracks through the graph. The Coordinate On setting (CoordOn) needs to be enabled in the **Format** screen. Otherwise, coordinate values are not announced or visible on the screen. Depending on the Orion setting selected, either speech or tone output is provided for the coordinate values.

Busy Indicator

The busy indicator is the series of short beeps that sound when graph data is being plotted on the calculator screen.

Complete Equation Playback

The complete equation is defined as the portion of the graph that is visible on the screen. When this feature is enabled, the equation is represented by a sequence of tones corresponding to the coordinate values.

The complete graph is always played by default when a graph is being plotted for the first time. Also, whenever there is a change in the graph because of changes in various settings, equations, or as a result of panning or re-centering the graph, the complete visible graph is played.

Playback can also be engaged through the use of dedicated Orion keys. Refer to the section titled "SonoGraph^{TM}" below for more details.

Exiting the Graph Screen

When the Graph screen is active, you can exit it in the following ways:

1. To exit either the Graph screen or the Trace screen, press the **Y=** key to return to the graph equation editor on Y1.
2. To exit the Trace mode, press the **Clear** key. This switches the active screen to Graph mode (free-moving cursor), which is indicated by an announcement.
3. To exit the Graph mode, press the **Clear** key. This takes you to the Home screen, which is indicated by an announcement.
4. Pressing the **2nd** key followed by the **Quit** key takes you to the Home screen regardless of the current active screen (Trace or Graph mode). This is announced to you.

Trace screen tone audible Graph playback

Tone audible Graph playback (TAGP) refers to the announcement of the graphs in the form of audible tones. TAGP is applicable only when Tone mode is selected and the active screen on the TI-84 Plus is in Trace mode. Tone mode is when each plotted point of an equation is made audible with a tone corresponding to its Y-coordinate. As you navigate (trace) the plotted graph of the equation, tones are issued for each point. Alternately, the entire graph for an equation can be heard by pressing both Orion Playback **Pref.** key and the **Shift** key together.

Details are as follows:

- The frequency of the tone generated corresponds to the Y-coordinate values of the plotted points of an equation.
- The balance between the left and right speaker represents the X-coordinate value. (The left-most point plays only in the left speaker. As the X-value increases, the location of the sound moves from the left speaker to both speakers, and then finally to the right speaker only.)
- The duration of the tone played for each point can be adjusted from the Preferences menu. The default setting is 1 second.
- For negative values of the Y-coordinate, white noise is mixed with the tone. This setting can be changed in Orion Preferences.
- For playback of the entire equation, tones are generated in sequence starting from the minimum X-coordinate value to the maximum X-coordinate value; the frequency of the tone corresponds to the Y-coordinate value of each point.
- If you navigate to a coordinate value outside of the visible screen area, no tone is generated. Instead, the coordinates are announced in speech format regardless of the mode selected.
- Regardless of the output mode (tone or speech), pressing the Orion Repeat **Toggle Mode** key always announces coordinates in speech format.
- If the previous operation on the TI-84 Plus was switching equations (switching between graphs), pressing the **Repeat** key results in speech announcement of the active equation along with the coordinate values.
- While graphs are being plotted on the TI-84 Plus screen, the calculator is "busy" and does not accept additional inputs. This is indicated with a series of short beeps, until plotting is completed.

Y-Value Corresponding to X-Value in Trace Mode

When in Trace mode, you can enter an X-value or an expression followed by the **Enter** key to re-position the graph cursor to a particular point on the graph. The X entry and edit operations are announced. When the active cursor moves to a new X location, the corresponding X- and Y-coordinates are announced in Speech mode while the corresponding tone is played for the coordinate in Tone mode

"Y=" Menu

Pressing the **Y=** key takes you to the "Y=" menu. The "Y=" menu is where you add the expressions to be graphed. After the key is pressed, the "Y1" expression is spoken. There are 10 graphs that can be plotted on the same screen; they are labeled "Y1" to "Y0."

To navigate from one expression to the next, use the TI-84 Plus Up and Down navigation keys.

If on the "Y1" and the TI-84 Plus Up key is pressed, the Plot menu is selected.

When in the Plot menu, moving left and right with the TI-84 Plus navigation keys announces the status of the plot 1 through 3 and whether they are enabled and disabled.

The following is announced with each "Y#" equation:

1. The equation string
2. If the equation is enabled or disabled
3. The style of the graph

You can navigate through various "Y=" equations by pressing the Up and Down arrow keys on the TI-84 Plus. If the equation string is blank, only the equation number (Y1 to Y0) is announced.

You can also navigate through an equation using the Left and Right arrow keys to review the elements of an equation.

Enabling, Disabling, and Editing Equations

To enable or disable an equation, first select the equation, and then press the TI-84 Right arrow navigation key until the Orion says "cursor moved from equation to equals" followed by the announcement of the status (either "enabled" or "disabled"). To toggle the setting, press the **Enter** key.

When in the equation section of the "Y#" editor, you can edit an equation the same as you would on the Home screen.

To change the Graph Line style in the "Y=" menu, navigate to the equation you wish to change. Using the TI-84 Plus navigation keys, move left until you hear "cursor moved to graph style," followed by the current setting, e.g., "line." To rotate through the possible line choices, press **Enter** until you reach the style you prefer.

Horizontal Split Screen Mode

In this mode, the display screen is divided horizontally into two parts. The two screens appear one above the other. One of them is always a graph screen. Only one screen is active at a time. Navigation and editing operations remain the same. Speech announcement is the same as that mentioned above for the Home screen and/or Graph screen.

Switching Between Various Screens and Menus

Whenever there is a change in the active screen, the change is indicated by an announcement.

Error Screen

Whenever there is an error, an Error screen appears. It contains information about the error type, which is indicated to you as well as two options: Quit and Go To. These options are announced as you navigate through the menu.

Embossing and Printing and Data Transfer

You can use the Orion TI-84 Plus to emboss graphs the same way you would use the TI-84 Plus to print them. You must use an embosser with graphic capabilities or with software that modifies graphics for printing on regular braille embossers. Consult the user guide for your braille embosser to determine how to print graphics.

It is also possible to transfer data via e-mail to yourself or others (e.g., a teacher's e-mail address).

To print or emboss, it is first necessary to connect your Orion TI-84 Plus to your computer. You need two things to enable the calculator to communicate with your computer for printing and embossing: TI Connect^{TM} Software and a TI Connectivity USB Graph Link Cable. (Note: This is not the same as the Standard A to Mini-B cable included with your purchase.) If you already have a TI Connectivity USB Graph Link Cable, you can download the free software from the [Texas Instruments^{TM} Downloads](#) page online. The TI Connectivity USB Graph Link Cable is not included with the purchase of your TI-84 Plus Talking Graphing Calculator. If you do not have the cable, it can be purchased at [Schoolmart](#) It comes with a TI Connect^{TM} Software CD. You may also be able to find one cheaper on online stores like Amazon.

Note: If using the Orion TI-84 at school, check with your Mathematics department before you purchase the Graph Link Cable. You may be able to borrow one.

Download the TI Connect^{TM} Software

The following steps tell you how to download the current, free version of TI Connect^{TM} software from the [Texas Instruments^{TM} Downloads](#) website:

1. Go to the Texas Instruments^{TM} Downloads website.
2. In the Technology drop-down list, select TI-84 Plus, TI-84 Plus Silver Edition.
3. In the View drop-down list, select Connectivity Software.
4. Click on the Find button.
5. Choose either the TI Connect^{TM} Software for Macintosh® or the TI Connect^{TM} Software for Windows®, depending on the type of computer you are using.
6. Select the appropriate language download.
7. If you are not already logged onto the TI website, the Sign In page appears. You can continue as a guest or sign up for free. If you are already a member, enter your e-mail address and password.
8. Follow the directions to download the software. Be sure to make a note of the directory in which you save the download file.

How to Install and Run TI Connect^{TM}

To install the TI Connect^{TM} Software, after downloading has completed, double-click the file saved in programs on your computer. Follow the installation directions.

The TI Connect^{TM} program contains many sub-programs. To learn how to use these sub-programs, click the **Help** button in the lower-right corner of the screen. Each of the sub-programs in TI Connect^{TM} have excellent Help menus with information about how to use the program.

How to Connect the TI-84 Plus Calculator and PC

Use the TI Connectivity USB Graph Link Cable to connect your calculator to your computer. If you don't already have a TI Connectivity USB Graph Link Cable, you can purchase one from the [Texas Instruments^{TM} Store](#) online.

The TI-84 Graph Link Cable is a serial to USB cable. Because the ends of this cable are of different sizes, it's easy to figure out how to connect your calculator to your computer; the small end fits in the left hole on the top of your calculator, and the larger end plugs into one of your computer's USB ports.

Graph and Print or Emboss

To print a graph to either a printer or an embosser, follow these steps:

1. Create a graph or multiple graphs on the TI-84 Plus.
2. Change any formatting options on the screen you do not wish printed. For example, turn off the expression, coordinates, or borders if you don't want them to print out.
3. Run the TI Connect^{TM} Software.
4. Choose Screen Capture from the menu options.
5. Select Get Screen from the Actions drop-down menu or CTRL G. You can also click on the Camera icon in the toolbar.
6. Choose Default Screen Size from the View drop-down menu if you wish to change the size of the graph.
7. Save the graph in a file on your computer.
8. Open the file in an image program on your computer. For example for Windows® 8, use the built-in Photos app; for Windows® 7, use the Microsoft® Windows® Paint program or just open it from the file browser.
9. Print to the embosser or printer of your choice.

Warranty

American Printing House for the Blind, Inc.

Hardware Limited Warranty

APH's warranty obligations for the Orion TI-84 Plus Talking Graphing Calculator are limited to the terms set forth below:

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1. Repair the product at no charge, using new or refurbished replacement parts (or)
2. Exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product.

A replacement product or part provided by APH or its manufacturer assumes the remaining warranty of the original product or thirty (30) days from the date of replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes APH's property. Parts provided by APH or its manufacturer in fulfillment of its warranty obligation must be used in products for which warranty service is claimed.

If a defect arises and a valid claim is received by APH after the first one hundred and eighty (180) days of the Warranty Period, a shipping and handling charge may apply to any repair or exchange of the product undertaken by APH.

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C. to damage caused by operating the product outside the permitted or intended uses described by APH
D. to damage caused by service (including upgrades and expansions) performed by anyone who is not a representative of APH
E. to a product or part that has been modified to alter functionality or capability without the written permission of APH or its manufacturer
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OBTAINING WARRANTY SERVICE

Please access and review the online help resources referred to in the documentation accompanying this hardware product before seeking warranty service. If the product is still not functioning properly after making use of these resources, please send an e-mail to: cs@aph.org for instructions on how to obtain warranty service. You must follow APH's warranty procedures.

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