SPECTRUM TECHNIQUES ST365 Sodium Lodide Counting System User Manual

Spectrum Techniques

ST365 Android Mobile Application

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ST365 Sodium Lodide Counting System

Note: If your ST365 has a serial number that is SN200 or higher (e.g. ST365x-SN200) you must download the ST365WiFiAccess .apk file, referenced below, with version 1.14 or higher (e.g. ST365WiFiAccess-1.14.apk). The .apk files are backward compatible with earlier ST365 serial numbered units.
Spectrum Techniques provides an application designed specifically for Android based mobile devices that provides remote command and control of the ST365 using built in Wi-Fi capability. The application is available on the Spectrum Techniques web page at http://www.spectrumtechniques.com/products/components/.

It is in the form of an .apk file (e.g. ST365WiFiAccess-1.12.apk). An .apk file is the package file format used by the Android operating system for distribution and installation of mobile applications. It contains all of a program's code, resources, assets, certificates, and manifest file. The Android operating system can install an application from this file.
See the section on Installation and Launch below. There may be Settings changes you need to make on your device to allow both downloading and installation of .apk files. The procedures and menu selections to do this will vary depending on the Android version your device uses.

Installing and Using the ST365 Android Mobile Application

Installation and Launch

Using a browser on your android mobile device, navigate to **http://www.spectrumtechniques.com**. Locate the Spectrum Techniques mobile application icon 0and click on it. This will download the mobile application to your device. Depending on the version of Android your device has installed, you may see a request or requests to confirm your intent to install since the application is not coming directly from the Google Play Store. In all cases, answer yes to continue. In the event that the installation process does not start, you may have to locate the file ST365WiFiAccess-1.0x.apk using a file explorer and tap on it to install. It will generally be found in the Downloads directory of internal memory.
If you have difficulty getting the app to install, it may be necessary to give permission to your Android device to download and install files from all sources. If so, navigate to Settings Security and see that the device has permission to install apps from locations other than the Google Play Store. The exact menu structure for doing this can differ depending on the version of Android your device has installed. When permissions are set, retry the installation process as described above.

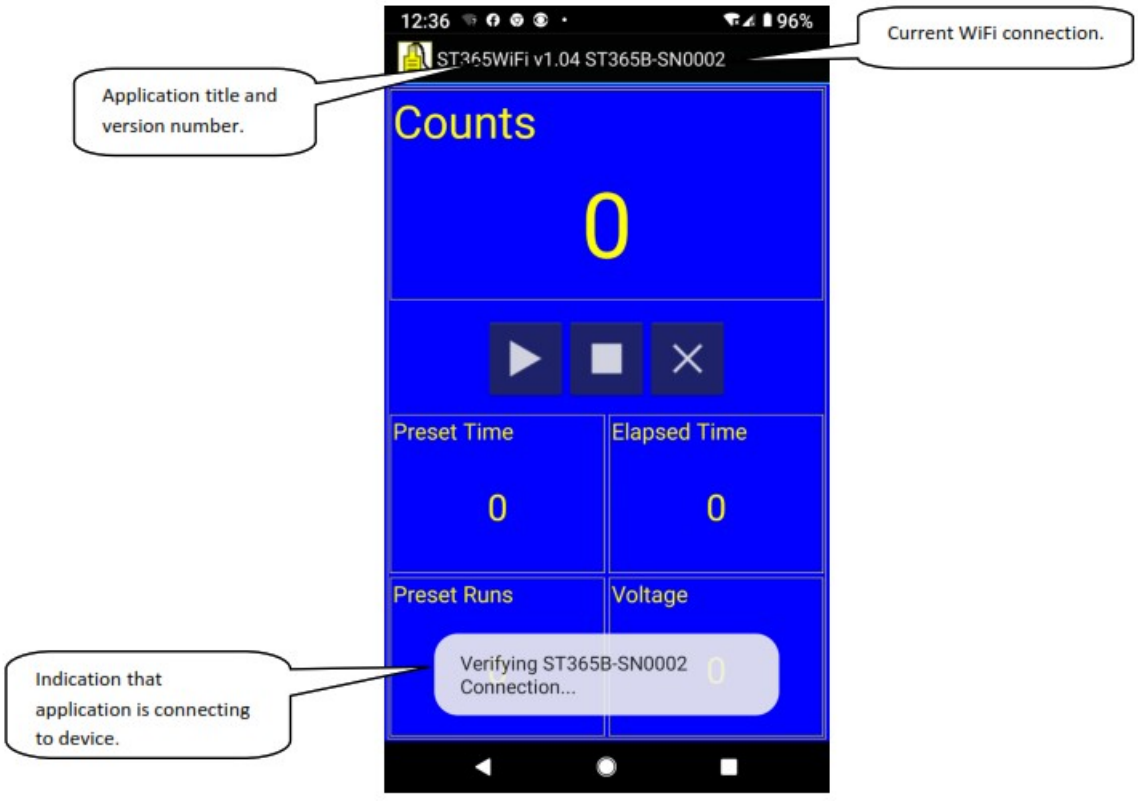
After Installation
Do not try to launch the application until the steps described below have been completed.
Before launching the application:

1. Navigate to your device's Settings page, select and turn off Mobile Data. Some versions of Android may not require this step, but to be safe, make sure mobile data is off. Failure to do this will result in the inability to connect and communicate with an ST365.
2. Make sure the ST365 that you wish to connect to is within connection distance. This will vary greatly depending on the number of barriers (walls) between the mobile device and the ST 365 as well as the range capabilities of the mobile device. Maximum unobstructed distance is approximately 35 feet or 10 meters.
3. Make sure the ST365 you wish to connect with is powered on. Then, from the Settings page of your mobile device, view the list of Wi-Fi networks available and observe that the ST365 is on the list. The ST365 connection can be identified by its serial number which is printed on the label on the bottom of the ST365. Navigate to this unit in the Wi-Fi network list and select it for connection.

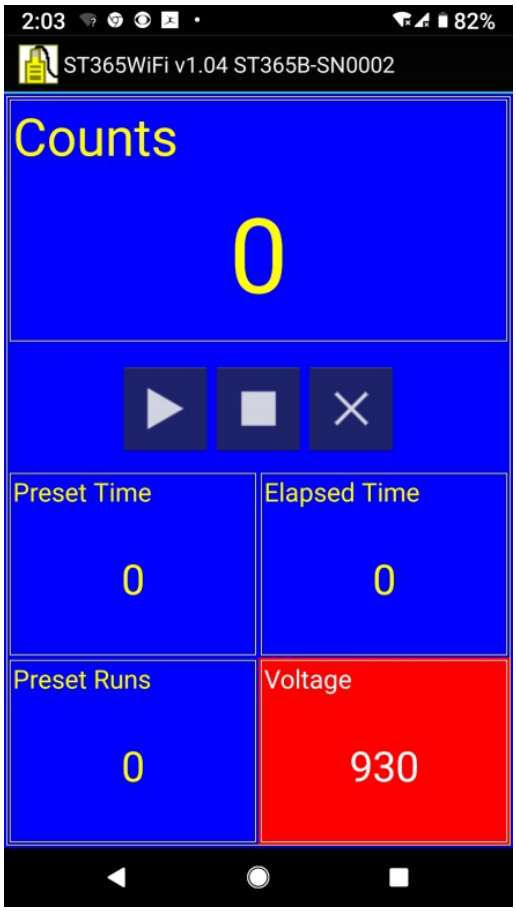
Please Note:
If any warnings appear reporting that the device does not have internet capability, tap on the warning for options. If there is an option choice to stay connected, choose this and select YES.
Otherwise, the ST365 connection may be automatically broken in favor of another connection within range that does have internet capability.
Only one connection is allowed to a single ST365 at a time. Once a connection has been made, other attempts by other Android devices to connect to the same ST365 will fail.

After connecting your device's Wi-Fi to the ST365, you are ready to launch the application. Find the  icon on your applications page and launch the app. The screen below will appear:

After about 3 seconds, the main control screen will appear:



The title bar indicates the application version and network connection. The ST365 application must also verify the connection with the ST365 device and retrieve some information from it before it can operate.
This will take a few seconds. When this verification is complete, the screen will reflect the present state of the ST365 reflecting any previously set preset time, and most notably, the high voltage setting will appear with a red background as shown below:



At this point the application is ready to control the connected ST365.

Operation

Notice that the screen is made up of 5 sections. In the case shown above, Counts are in the main display window. The main window contains a large display of the parameter with controls for counting or data entry below it. In this example, Preset Time, Elapsed Time, Preset Runs, and Voltage (representing the detector high voltage) are displayed in 4 equally sized smaller windows. Any of these smaller windows can become the main display window by simply tapping the one to enlarge. Those parameters that can be set by the user – Preset Time, Preset Runs, and Voltage, must be in the main display window in order to be set.

Starting, Stopping, and Resetting the Counter

The counting controls appear under the Counts and Elapsed Time displays. The solid right arrow starts a count. The solid block stops the count. The “X” resets the counts and elapsed time to zero, and any collected data runs are cleared.

START

STOP

RESET

Data Entry Controls

When data entry controls are displayed, the up and down arrows increment and decrement the parameter displayed respectively. Tapping the data entry between the arrows brings up a data entry keypad where a value may be entered directly. The exact configuration of your data entry keypad will vary depending on Android version.

Data Entry

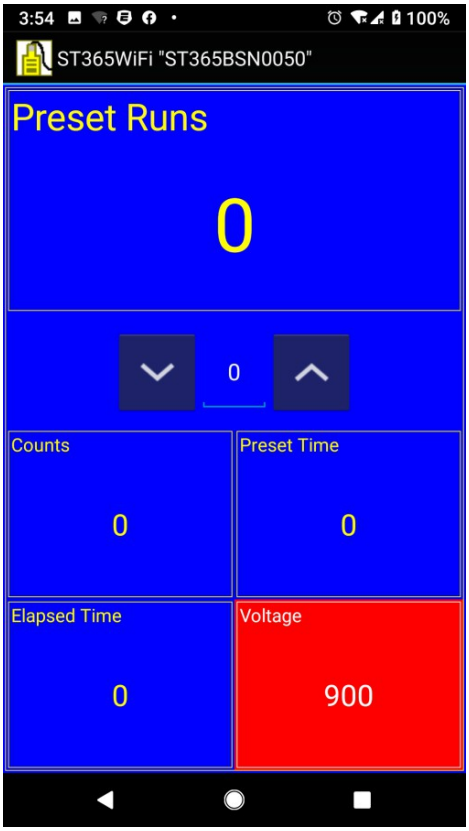
Setting a Preset Time

In order to set a preset counting time, the Preset Time display must occupy the large main window display area. To place the Preset Time in the main window display block, tap anywhere in the current Preset Time display block. The main display block will switch to the current Preset Time. Note that the display on the connected ST365 will also switch Preset Time. To change the Preset Time, the up and down arrows in the control/data entry section may be used to increment or decrement the counting time in seconds. Tapping the displayed number between the arrows will bring up a data entry keypad allowing a number to be set directly. Note that Preset Time cannot be set below zero. See the screen shot below for an example of the screen used to set a preset counting time of 10 seconds:

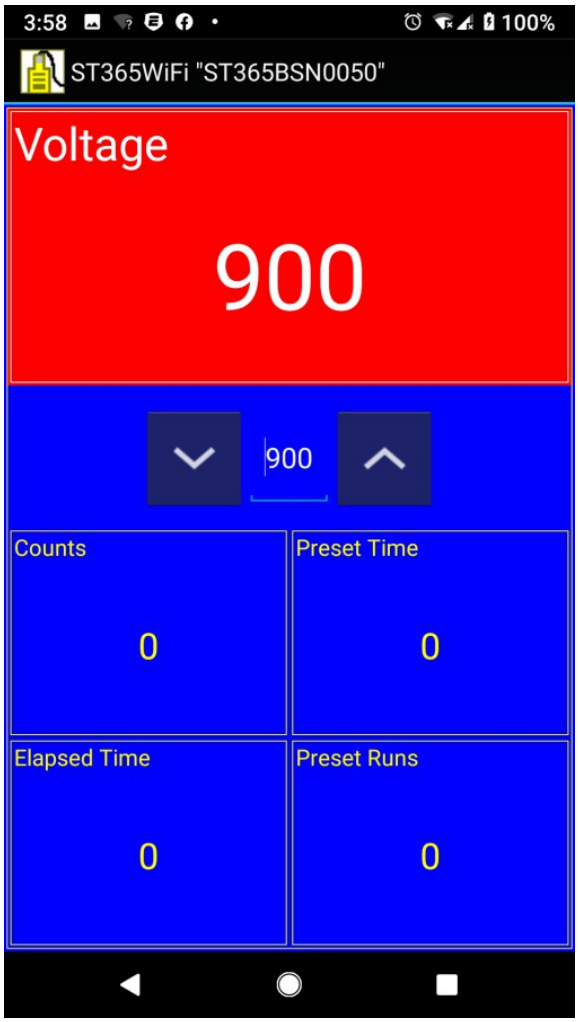
Note: If no preset time is set (Preset Time = 0), the ST365 will count indefinitely.
All other parameters on the ST365 main control screen are set similarly.

Preset Runs

A preset number of automatic count intervals (runs) may be set using Preset Runs. To set Preset Runs, tap the preset run display block to place it is in the main display block. A Preset Time of something other than 0 must be entered in order for the Preset Runs feature to work. With a valid Preset Time and a number of Preset Runs set, the ST365 will count to the preset time, stop, write the data to the data table, and restart this sequence until the number of Preset Runs has been reached.

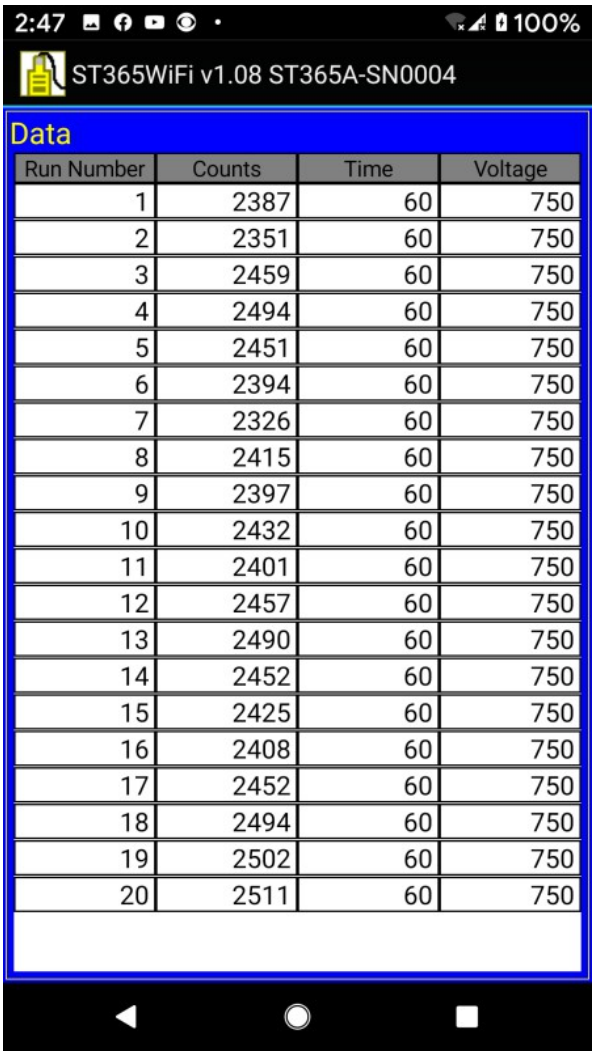


Detector Voltage
Tapping the Voltage block places the Voltage in the main display. Use the up and down arrows, or the data entry keypad to enter a desired voltage.



When using the up and down arrows, the voltage will change in 20 volt increments. Tapping the displayed number between the arrows will bring up a data entry keypad allowing a number to be set directly.

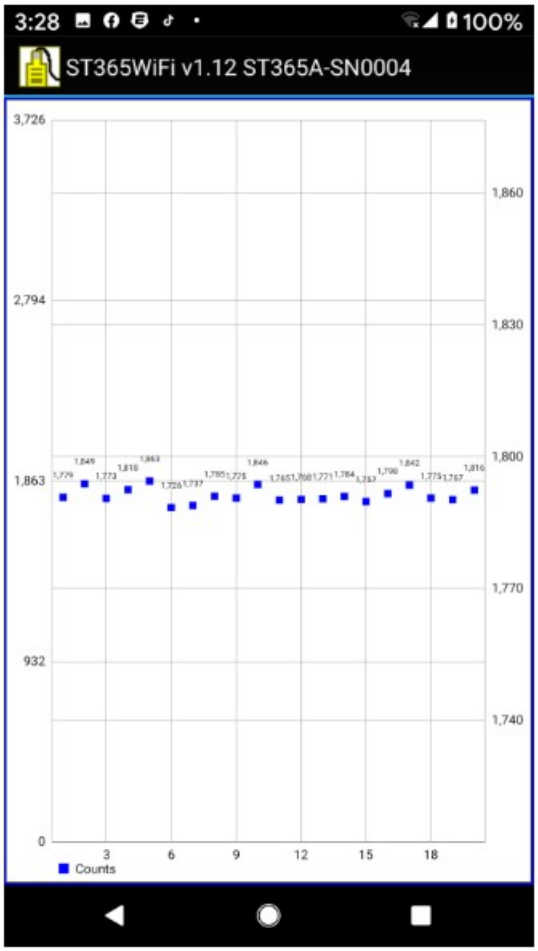
Collecting Data
Whenever a count is stopped, by either the user tapping the STOP icon or a preset time out, the run number, counts, elapsed time, and voltage are stored in a data table. To see the data table, swipe the screen to the left. When multiple runs are set, the data will automatically continue to be collected in the data table. The data table becomes scrollable when more runs than can be displayed on the screen are collected.
An example data table from a typical mobile phone running the ST365 application is shown below:

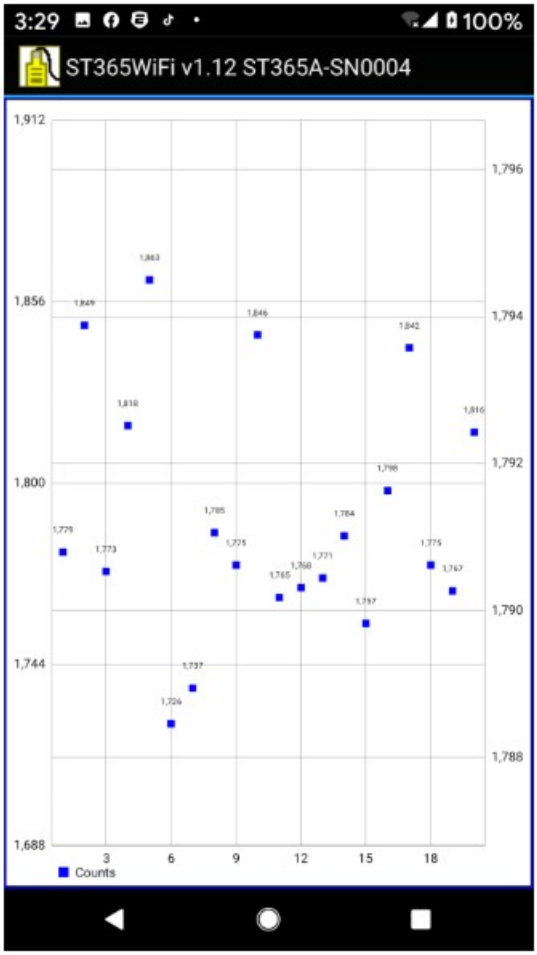


Run Number	Counts	Time	Voltage
1	2387	60	750
2	2351	60	750
3	2459	60	750
4	2494	60	750
5	2451	60	750
6	2394	60	750
7	2326	60	750
8	2415	60	750
9	2397	60	750
10	2432	60	750
11	2401	60	750
12	2457	60	750
13	2490	60	750
14	2452	60	750
15	2425	60	750
16	2408	60	750
17	2452	60	750
18	2494	60	750
19	2502	60	750
20	2511	60	750

Plotting the Data

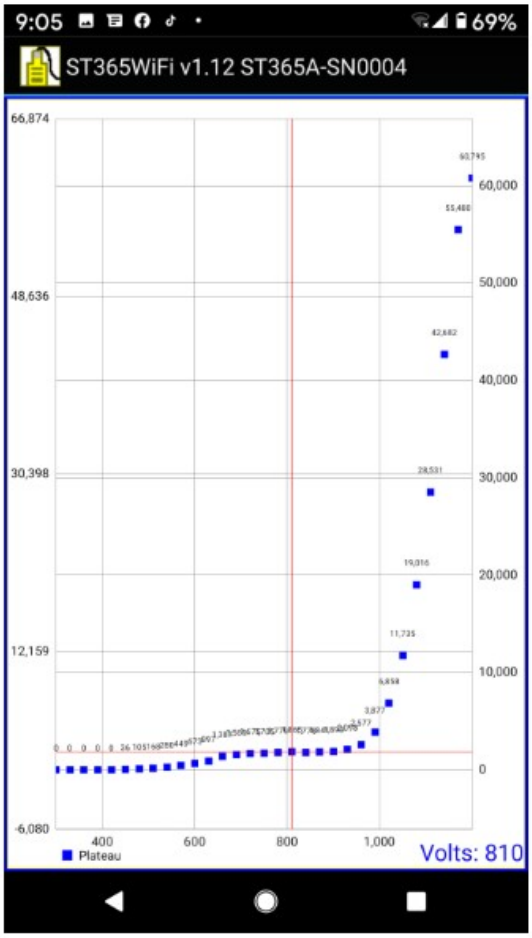
Swiping again to the left from the data table brings up a plot of the data collected. This is an X Y plot with the counts on the Y axis and the X axis defined by the data collection procedure. The plot view may be modified by placing the thumb and forefinger on the screen and using expansion gestures (spreading the fingers) to expand sections of the plot for better viewing. See the section on Menu Functions below for more information about how to set up the automatic data collection procedures.

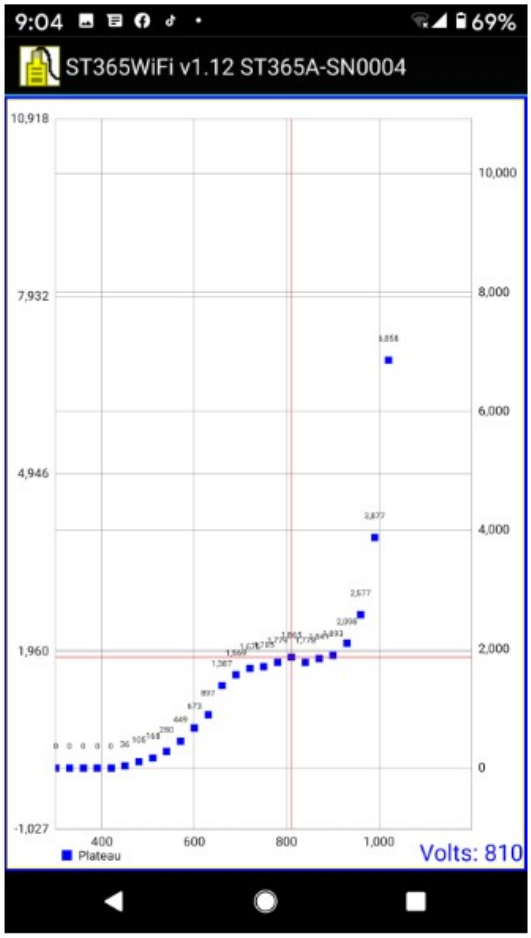




Both figures shown here represent a plot of the data collected by counting for 30 seconds, with 20 preset runs. The plot on the left shows the initial view. The plot on the right shows that same view with the data expanded in the Y direction by using the gesture method. The count run number is represented on the X axis. Just above each data point the count value is displayed.

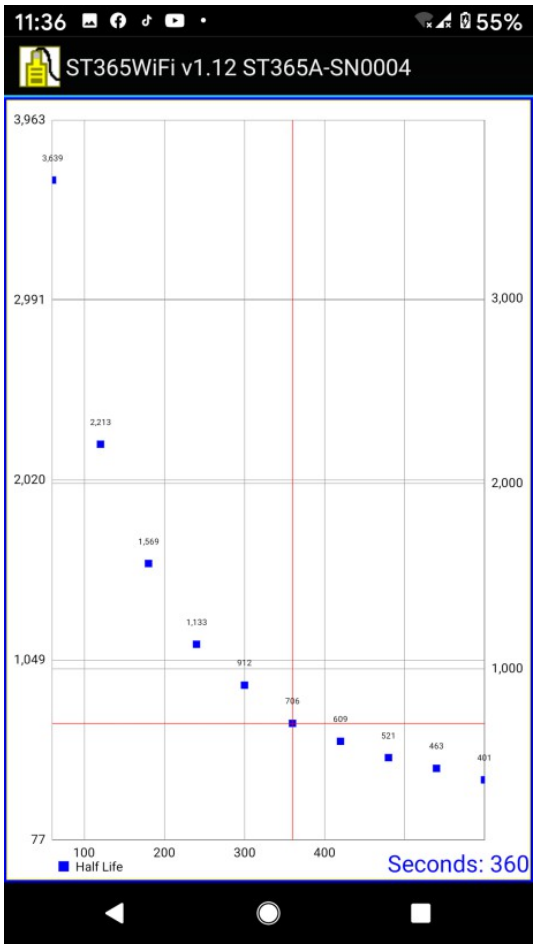
Plateau Plot: A typical plateau (counts vs. voltage) would be plotted as shown:





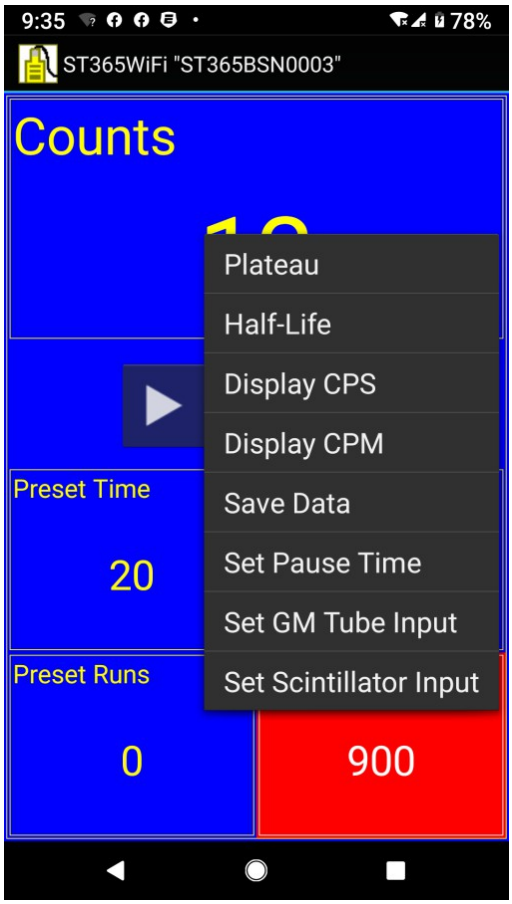
In the plot on the left the plateau curve is shown as it appears when the plot screen is first swiped into view. In the plot on the right, the view has been expanded in the vertical direction using gestures in the Y direction. The X axis value for any data point, in this case voltage, may be examined by tapping a data point. This brings up the red crosshair to mark the data point. The X axis value (or voltage) for the highlighted data point is displayed in the lower right corner of the view.
For determining the plateau voltage, this feature could be used to determine the best voltage value from the data display.

Half-Life Plot:
The half-life plot represents a series of counts, each for a preset time. The X – axis is labeled in increasing time. In this simulated example, 10 data points were collected with each representing a 60 second count. The data point at 360 seconds has been highlighted.



Menu Selections

The ST365 Mobile Application offers additional functionality through the use of a context menu that can be accessed at any time. Tap and hold anywhere on the screen for approximately one second. The menu will appear as shown below:

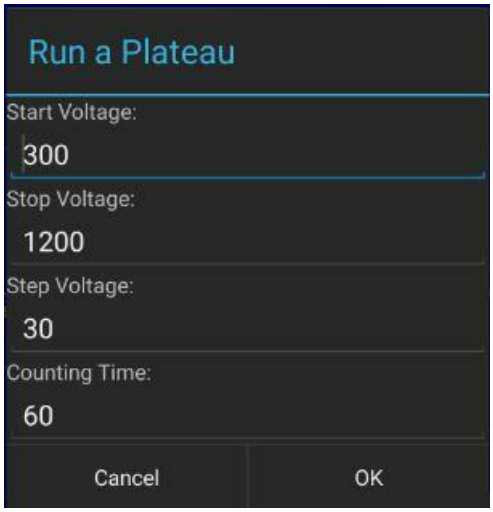


On devices with smaller screens, the menu is scrollable if it is activated close to the upper or lower screen boundaries. The menu offers the options listed below. Tap one to select.

Plateau

The correct operating voltage for a Geiger-Mueller tube may be determined experimentally using a long lived radioactive source such as Cs-137 or Co-60. The plateau experiment consists of counting for a fixed length of time while the high voltage is increased by a constant step amount between each count. The resulting count plot can be examined to determine the optimum voltage to set for the detector attached to the ST365.

The Plateau menu choice allows an automatic procedure to be set up to determine the plateau. The Plateau opens a data entry dialog shown here:



This example shows a typical plateau experiment setup where the start voltage is 300V and the ending voltage is 1200V. The voltage will step up 30 volts per run and each run or count will last 60 seconds. All the collected plateau runs will be stored in the data table for later evaluation.

In this example, when the first count is started, the voltage will be automatically set to 300 volts and the unit will count for 60 seconds. At the end of each count, the counting data will be stored, the voltage will be “stepped” up by

30 volts, and the next count will begin. This will continue until a count is completed at 1200 volts. To run another plateau with the same parameters, press RESET to clear the data and another plateau may be started. To exit the plateau counting mode, set the detector voltage to any value. This allows the data to be examined, a plateau voltage determined and the detector voltage set to that value.

Half Life
It is possible to observe the half-life decay of a source by performing repeated counts at the same preset time and constant detector voltage. For a source with a short half-life, the decay can be observed by the decrease in counts across the count intervals. The Half-Life menu selection provides a convenient way to set up the instrument to do this. The number of runs, preset time per run, and the detector voltage may be set from this dialog.
The half-life data entry dialog is shown here:

Display CPS and Display CPM
To change the Counts display from raw counts to either CPS (Counts per Second) or CPM (Counts per Minute) rates, select these display choices from the menu. Note that when the display has been switched to either of these rates, a Display Counts menu item replaces the one chosen in order to return the display to raw counts. Also observe that the ST365's display will change to the counts display mode chosen.

Pause Time
It is possible to enter a time for the instrument to pause between preset timed counts. When a preset time has been reached, the ST365 will wait for this time interval before starting the next count.

Saving Data
The data collected in the data table may be saved to a file on the Android device. Files are saved in a comma separated value format (.CSV) files. Note: This extension is not automatically appended.

- It may be necessary to go in to your Android device Settings – Application Manager and give the ST365 Android Mobile App permission to save files.

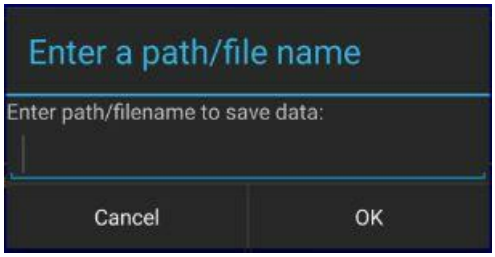
For example, the data table shown here:

Run Number	Counts	Time	Voltage
1	78569	10	800
2	78166	10	800
3	78223	10	800
4	78006	10	800
5	77339	10	800
6	77761	10	800
7	77507	10	800
8	77371	10	800
9	77841	10	800
10	77318	10	800

would create a text file with the data form:

Run Number,Counts,Time,Voltage\n
1,78569,10,800\n
2,78166,10,800\n
3,78223,10,800\n
4,78006,10,800\n
5,77339,10,800\n
6,77761,10,800\n
7,77507,10,800\n
8,77371,10,800\n
9,77841,10,800\n
10,77318,10,800\n
where '\n' = a newline.

Files of this format are readable by most external spreadsheet applications allowing custom creation of graphs or plots of the data. To save a file, choose Save Data from the context menu. The following dialog appears:



A file may be saved to any existing folder in the device by providing the full path and filename. If only a filename is entered, the file will be created and saved in the main storage directory of the device.

This is usually in internal memory. For example, to save a file named "ST365DataFile1" in this space, simply type: **ST365DataFile1.csv** and tap OK.
To save this same file in a subfolder of the main storage directory, you must include the full path that describes that location to the Android file system. For example, to save the same file in the Download folder, you must type: /**storage**/**emulated**/**0**/**Download**/**ST365DataFile1.csv** and tap OK.
Use a separate File Explorer application to see available storage locations. In most cases, the File Explorer application can also be used to create new folders where ST365 data can be saved. You can also use a File Explorer to move files to cloud storage locations such as Google Drive.
If no path or file name is entered and OK is tapped, no action will be taken and the dialog will remain on the screen.
There are some restrictions to using the Android file system as noted below:

- It may be necessary to go in to the Android device Settings – Application Manager and give the ST365 Android

Mobile App permission to save files.

- Unlike filenames on a PC or a MAC, Android paths and filenames to internal memory are case sensitive. Files saved to external memory formatted to accept FAT file types, such as an SD card formatted on a PC, are not case sensitive.
- All files will appear in File Explorer running on a PC when the Android device is connected to the PC over USB and is configured as an external storage device.

Please note that some of these items may depend on the Android operating system version present on the device. As Google upgrades Android periodically, many features and options change, are added, or eliminated.

Input Selection
The ST365 has gain and threshold settings that are preset at the factory for both GM tubes and sodium iodide (NaI) scintillation detectors. Separate connections are available on the back of the ST365 for both. It is important that only one of these inputs has a detector connected to it at a time. In order to set the gain and thresholds for the detector type being used, the context menu provides a choice of either GM or Scintillation.

Set GM Tube
Input Tap this menu selection to set the instrument to use the internal gain and threshold settings for GM Tube counting.

Set Scintillator Input
Tap this menu selection to set the instrument to use the internal gain and threshold settings for Scintillation counting.

Android Version Compatibility
As of this writing, the ST365 Android Mobile App has been successfully tested on a variety of mobile devices with Android versions from 4.2.2 to 10.0.

Documents / Resources

	SPECTRUM TECHNIQUES ST365 Sodium Lodide Counting System [pdf] User Manual ST365, ST365x-SN200, ST365 Sodium Lodide Counting System, Sodium Lodide Counting System, Lodide Counting System, Counting System

References

- Home - Spectrum Techniques, LLC