Apex-Alpha/Beta™ Counting Productivity Software

7066294F V2.1

User's Manual

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The information in this document describes the product as accurately as possible, but is subject to change without notice.

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1. Introduction to Apex-Alpha/Beta

Welcome to Apex-Alpha/Beta™ Counting Productivity Software for alpha/beta counting facilities.

What is Apex-Alpha/Beta

Apex-Alpha/Beta is part of APEX™ family of software from Mirion. It combines the look and feel of the previous APEX products, with the unique requirements of Alpha/Beta system users. Apex-Alpha/Beta is a foundation product designed to provide a flexible interface for legacy, current and future alpha/beta systems.

Apex-Alpha/Beta is designed around the paradigm originally established by Apex-Gamma several years ago. By using the same basic user interface as Apex-Gamma and Apex-Alpha, laboratories should require less training because the basic interface is similar.

Why Use Apex-Alpha/Beta

Apex-Alpha/Beta is designed for the casual user as well as the power user. It is easy for the novice, yet extremely powerful for the most demanding applications. Even though people with many years experience provided input to the design, there are always improvements that can be made. Contact Mirion with any suggestions for improvements so that tomorrow's Apex-Alpha/Beta is even better than today's!

How Does Alpha/Beta Work

Calibration has been split into two parts in Apex-Alpha/Beta: device setup and calibration. Certain parts of the traditional gas-flow system's calibration are *device* specific such as Plateaus, Region of Interest adjustments, and Gain Characterizations (for solid state detectors). Other parts of the traditional calibration such as the backgrounds, efficiencies, and attenuation curves are *sample* specific. In Apex-Alpha/Beta, Device Setup and Calibration are two different functions.

Apex-Alpha/Beta requires the creation of specific named Calibrations. A Calibration consists of count mode, background, and efficiency types. Efficiencies can be a combination of constant efficiencies where the correction factor does not change as the weight of the sample changes, and fitted efficiencies based on attenuation curves. A Calibration can be reused for multiple counting Procedures.

Apex-Alpha/Beta uses categorized Counting tabs on the Sample Assigner to make routine tasks easier than ever. Daily tasks such as Backgrounds require only selecting the “Background” counting tab, the detectors to be included in the run and then the Calibration procedure to be used. Just click on the **COUNT** button to begin counting. Daily Background and Source Checks are automatically saved in the system database. The results can be viewed through the flexible QA interface for creating charts, or are available to be accessed using third party QA tools such as SQCpack (SQCpack is a registered trademark of PQ Systems and is not affiliated with Mirion Technologies, Inc.).

Sample Batches are pre-entered into Apex-Alpha/Beta via the Batches utility. Batches can be entered into Apex-Alpha/Beta as samples are brought into the laboratory. After the batches have been processed through any pre-analysis steps such as radiochemistry, the batch can then be counted. Samples that do not require any processing such as swipe/smears or air filters can be easily added to a new batch and counted. Either way, the Sample Helper feature allows users to easily create a sample batch quickly.

Batches of samples that are routinely analyzed only need to be created once. In the case of air filters, the location information would be pre-entered using the sample helper the first time the sample locations counted. The original batch can then be cloned each time a new batch of samples from the same location is to be analyzed. In the case where some locations are missing, Apex-Alpha/Beta makes removal easy.

After counting, the Data Review feature leverages the power of the SQL Server database so that users can easily find the batches or samples they are looking for. The results can then be displayed using the included reports, or on a custom report that is created through the integrated report writing tool. Apex-Alpha/Beta uses Stimul Reports as part of the default software package.

Integrated security allows system administrators to create custom security groups for the organization. Users are assigned to Groups so that each person in the laboratory can perform the job they are supposed to, but to not get themselves into trouble by accidentally starting a calibration count.

Display groups allow sample detectors with common features to be grouped together. If some detectors are set aside for only ultra-low level counting, they could be held in their own display group so that high-level samples are not accidentally assigned.

This operation manual includes the System Setup section which provides the basic information on setup, calibration, and sample counting. Additional sections are referenced in the System Setup section to provide more information on each of the items discussed.

Starting with version 2.0, Apex-Alpha/Beta works with many sample changer systems including legacy Tennelec and CANBERRA™ Series 5 XLX™ and Series 5 LB5500™ counters. There is a hardware upgrade path so users of firmware-based Series 5E systems can convert them to also operate with APEX-Alpha/Beta. Legacy Tennelec™ systems such as the LB5100 and LB5500 series have limited compatibility with Apex-Alpha/Beta 2.0 as long as they were previously upgraded to operate under Eclipse™ or LB5100-W software.

About this Manual

The Apex-Alpha/Beta Counting Productivity Software User's Manual is organized to lead both the system Administrator through all the steps required to set up the system and the daily Operator through all the Apex-Alpha/Beta functions.

Chapters

Chapter2, **Overview of Apex-Alpha/Beta Interface**, introduces you to the features and layout of the Apex-Alpha/Beta System and its user interface.

Chapter 3, **System Setup**, provides the set up steps for configuring your Apex-Alpha/Beta system.

Chapters 4-10, **Apex-Alpha/Beta's Views**, groups of Apex-Alpha/Beta operations, are covered in detail in these chapters.

Chapter 11, **Setup View**, explains each of the Setup View’s functions. Information that will be used by the System Administrator in setting up the system.

Appendices

Appendix A, **Software Installation**, provides complete information on installing the software.

Appendix B, **Report Customization**, provides information how to customize your own reports.

Appendix C, **Standard Sources**, provides information on the different types of sources.

Appendix D, **Field Update Tool**, provides information on how to use the Field Update Tool.

2. Overview of Apex-Alpha/Beta Interface

This Introduction describes general Apex-Alpha/Beta operations, such as:

- The logon procedure
- The Apex-Alpha/Beta Menu commands
- Apex-Alpha/Beta function buttons common to many data entry pages.

Logging On

Apex-Alpha/Beta is started with the default user name “Administrator” and the password (<blank>). You will be asked for your **User Name** and **Password** as shown in the Enter Logon Information dialog. The last logged in name will be remembered by the application.

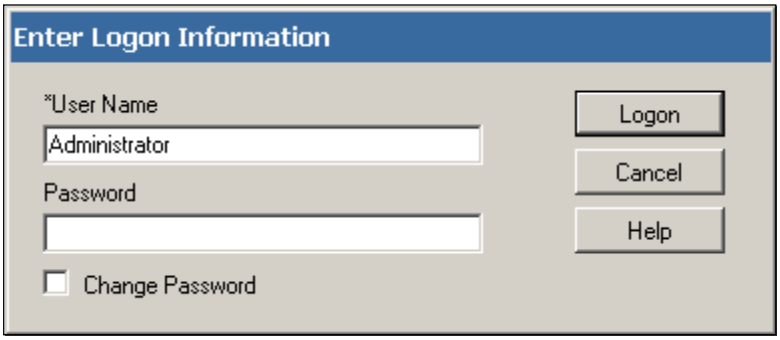


Figure 1 Logging On

If Apex-Alpha/Beta is already running and you want to log on as a different user, select **File | Logoff** and then **File | Logon** to enter your Name and Password.

Change Password

Select the **Change Password** option to change your password. After you have successfully logged on to Apex-Alpha/Beta, a dialog box will appear asking to enter your new password and to confirm it.

Display Organization

The Apex-Alpha/Beta screen is similar to other Windows applications. The Apex-Alpha/Beta screen includes a Title bar, a Menu bar, a Toolbar, and at the bottom of the screen, the Status bar.

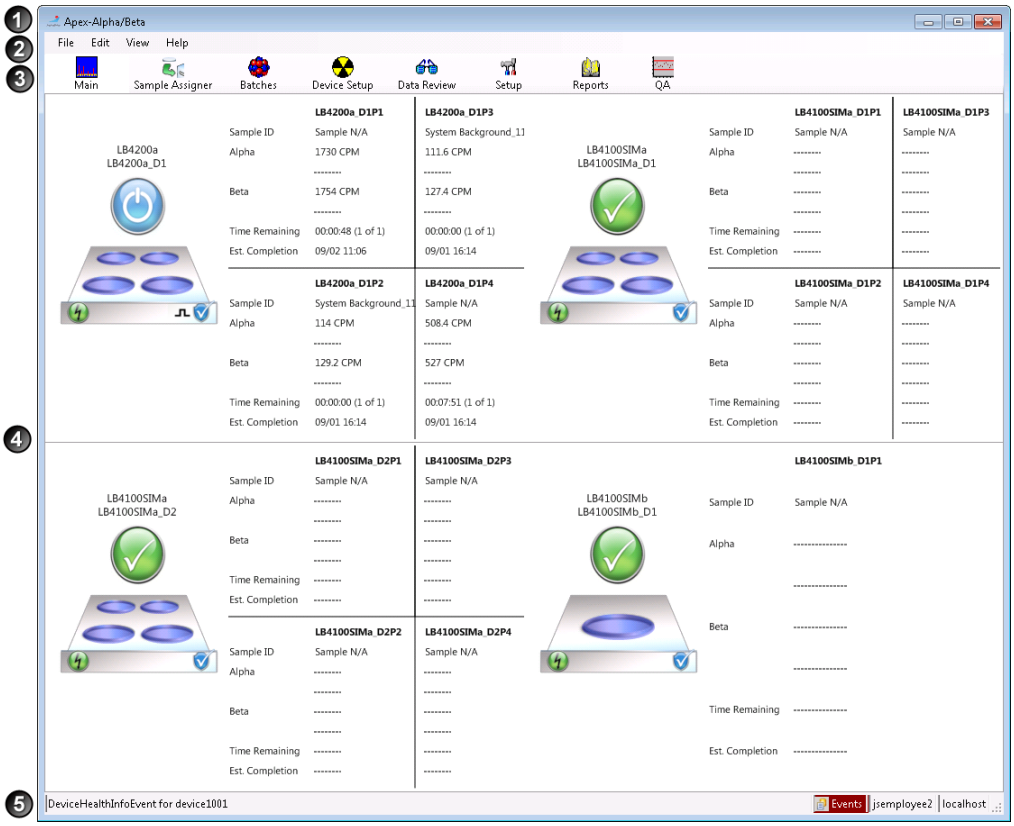


Figure 2 Typical Apex-Alpha/Beta Screen or “View”

①The Title Bar

The Title Bar contains Minimize, Maximize, and Close buttons at the upper right corner of the screen. An icon is displayed at the upper left corner of the screen. Clicking on it will display a program menu with options to move the screen, change the size, minimize, maximize, and to close the program.

②The Menu Bar

Apex-Alpha/Beta has a few menu commands that are not found in other applications. They are explained in Apex-Alpha/Beta Menu Commands.

③The Toolbar

Located directly under the Menu bar, offers an easy way to select any of the Apex-Alpha/Beta Views.

④The View

Shows the current view the user is using.

⑤The Status Bar

The Status bar provides information to the user about software "events" (see Events), the logged in user, and the computer.

The User Interface

This section introduces you to the Apex-Alpha/Beta System user interface.

Structure of the Apex-Alpha/Beta User Interface

The Apex-Alpha/Beta user interface is divided into Views, Pages and Sections.

Views

The Views are Apex-Alpha/Beta's major functions. Each one is covered in a separate chapter in this manual.

Views include: Main, Sample Assigner, Batches, Device Setup, Data Review, Setup, Reports, and Quality Assurance (QA).

Pages

The Device Setup, Setup and Reports Views have several "Pages", accessed via the tabs at the top of the View's screen. In this manual, each tab's section has the word "Page" in its title. These are not to be confused with a page in the manual. In fact, it often takes more than one manual page to explain one Apex-Alpha/Beta Page.

Sections

Within each Page, there are usually sections or groups of controls or parameters.

Events

Click on the **Events** in the status bar to show the most recent events.

Required Data

Any data field requiring an entry, such as Batch Name, is marked with an asterisk (*) or the  icon is displayed. You must fill in these fields before you can continue.

Access Rights

Apex-Alpha/Beta maintains a database of users, created and maintained by the System Administrator in *Security Setup* on page 145. This database defines the group each user is assigned to and each groups' access rights to Apex-Alpha/Beta functions.

Apex-Alpha/Beta Menu Commands

Apex-Alpha/Beta has a few menu commands that are not found in other applications. They are briefly explained here.

File Menu

The File menu has three options: Login, Logoff, and Exit.

Login

Signing on to Apex-Alpha/Beta is explained in Logging On.

Logoff

To leave the system, select **File | Logoff**. Since the system is still running, you can log on again with the same, or any other, username and password.

Exit

Select this menu option to quit Apex-Alpha/Beta.

Edit Menu

Not used at this time.

View Menu

The View menu lets you select any Apex-Alpha/Beta View.

Help Menu

The **Help** menu contains commands that provide access to on-line help or view the current software version by selecting the **About Apex-Alpha/Beta** menu option.

Common Apex-Alpha/Beta Function Buttons

Apex-Alpha/Beta function buttons common to most dialogs are defined here.

Approve

The Approve button approves the displayed data or analysis.

Cancel

The Cancel button removes any changes to the page's parameters.

Copy

The Copy button copies the current page's parameters for editing.

Delete

The Delete button deletes the highlighted data.

Edit

The Edit button edits the highlighted data.

New

The New button clears the current page's parameters for entering data.

Next

The Next button takes you to the function's next page.

OK

The OK button accepts all changes made and exits the dialog.

Plot

The Plot button sends a plot of the current function to the default printer.

Previous

The Previous button takes you to the function's previous page.

Print

The Print button sends a printout of the current function to the default printer.

Save

The Save button saves all changes made, but does not exit the dialog.

View

The View Report button generates and displays a report.

3. System Setup

This chapter provides the basic information required to setup Apex-Alpha/Beta. To create the basic Apex-Alpha/Beta configuration for counting a sample, follow the steps summarized in the following table.

Since many more functions are available than are listed in the table, it would be useful to spend a short time reviewing each of the other sections in the chapter to determine which of the setup functions would be most useful for your system.

The table's "Reference" column tells you which view and tabbed page to refer to for configuring the specified Action and where in the manual the Action is discussed.

Table 1 Configuring the Apex-Alpha/Beta System

Apex-Alpha/Beta Setup		
Step	**Action**	**Reference on Page**
1.	Install Apex-Alpha/Beta	*Appendix A – Software Installation* on page 197
2.	Log into Apex-Alpha/Beta	See *Overview of Apex-Alpha/Beta Interface - Logging On* on page 4
3.	Add the device/detector in Apex-Alpha/Beta	*Setup View – Devices Setup Page* on page 152
4.	Create display groups(s)	*Setup View– Display Groups Setup* on page 187
Enter Calibration Standards		
Step	**Action**	**Reference**
5.	Enter the calibration standard(s)	*Setup View - Standards Setup Page* on page 157
Determine Operating Voltages		
Step	**Action**	**Reference**
6.	Create Plateau Procedure	*Setup View – Plateau Procedure Setup Page* on page 161
7.	Perform Plateau	*Sample Assigner View – Plateau Count* on page 88
8.	Review Plateau and Reporting	*Device Setup – Plateau Review* on page 112
9.	Adjust Region of Interest (where applicable)	*Device Setup – ROI* on page 116

Calibration Overview		
Step	**Action**	**Reference**
10.	Create Calibration	*Setup View – Calibration Setup Page* on page 165
11.	Create Background Procedure	*Setup View – Procedure Setup Page* on page 161
12.	Perform Background Procedure	*Sample Assigner View – Background Count* on page 80
13.	Perform Data Review and Reporting	*Data Review – Background* starting on page 127
14.	Create Efficiency Procedure	*Setup View – Procedure Setup Page* on page 170
15.	Perform Efficiency Procedure Calibration	*Sample Assigner View – Constant Efficiency Count* on page 82 or *Fitted Efficiency Count* on page 85
16.	Perform Data Review and Reporting	*Data Review – Constant or Fitted Efficiency* starting on page 127
Sample Counting		
Step	**Action**	**Reference**
17.	Create Unknown Procedure	*Setup View – Procedure Setup Page* on page 170
18.	Create Batch	*Batches View* on page 101
19.	Assign Unknown Batch to detector and start sample count	*Sample Assigner View - Drag and Drop* on page 78
20.	Perform Data Review and Reporting	*Data Review* starting on page 127
Daily Checks		
21.	Create Background Check Procedure	*Setup View – Procedure Setup Page* on page 170
22.	Create Source Check Procedure	*Setup View – Procedure Setup Page* on page 170
23.	Perform Source Check and Background Check Calibrations	*Sample Assigner View – Source Check Count* on page 91 and *Background Check Count* on page 94

Apex-Alpha/Beta Setup

To begin you will need to set up your Apex-Alpha/Beta system as described in the first four sections.

Installing the Software

Install the software by following the instructions included in the *Software Installation Appendix* on page 197.

Logging onto the System

Start Apex by choosing the **Apex-Alpha/Beta** item from the Windows **Start** menu. Log in with the user name “Administrator” with a blank password.

Device Registration

Add the device(s) to be controlled by Apex-Alpha/Beta. Use the Device Wizard and follow the on screen prompts. Configurations vary by device type.

To register a device, perform the following steps:

1. After initial installation of the software, it will be necessary to register the device(s). Press the **Setup** view button then the **Devices** tabbed page.

2. Press the **Device Wizard** button to start the process. The Welcome screen appears. At any time, click **Next** to continue, **Back** to return to the previous screen or **Cancel** to exit the Device Wizard.

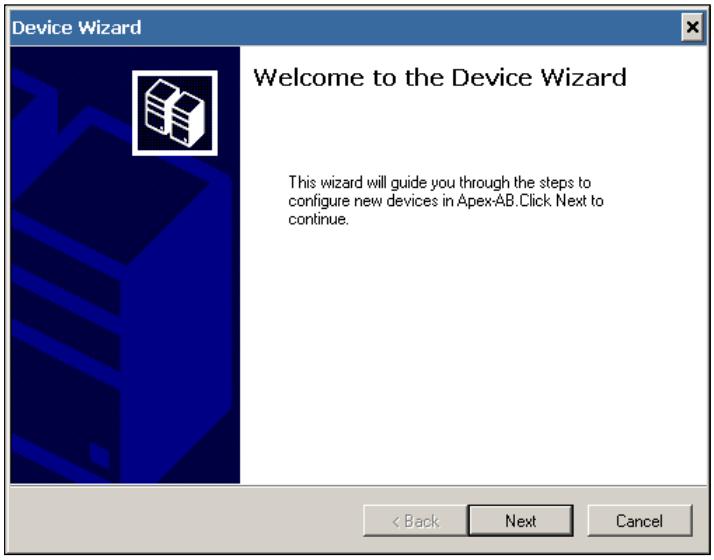


Figure 3 The Device Wizard Welcome Screen

3. On the Device Type screen, use the drop down list to choose the type of device to be connected, then click **Next**.

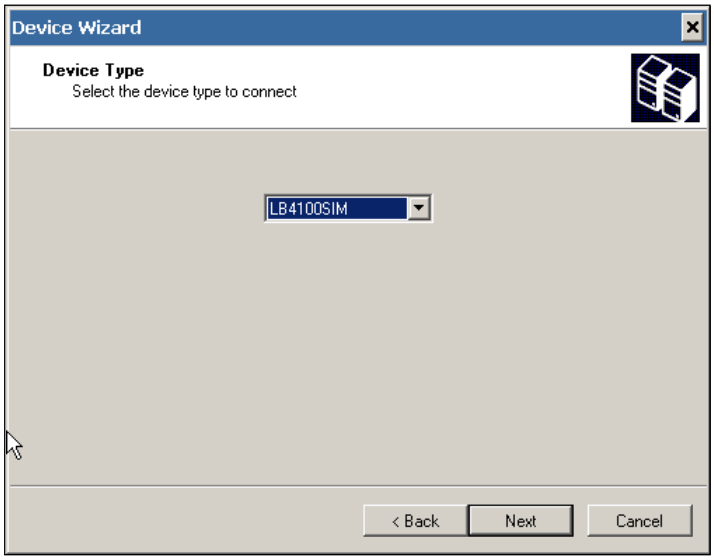


Figure 4 Selecting the Device Type to Install

4. Next, specify the necessary address information for your device. The following figure shows the LB4100 simulator device being configured.

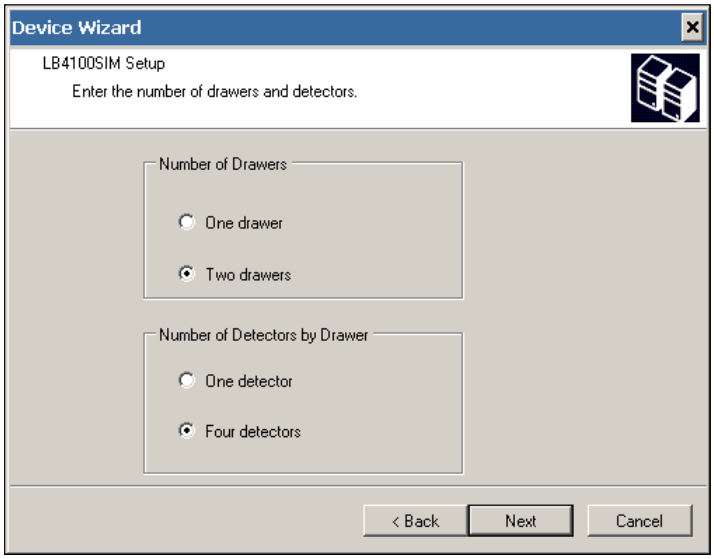


Figure 5 Selecting the Connecting Type

LB4100SIM – Specify the number of drawers and detectors per drawer. This type of device simulates an LB4100 and allows the software to be run without hardware for demonstration purposes.

LB4100 – Select the address that matches the dip switch settings for the LB4110 controller to be registered.

Note: If the LB4100 hardware includes more than two drawers, the Device Wizard will need to be used multiple times to register each LB4110 controller.

LB4200 – A list of addresses for unregistered (but physically connected) devices will be displayed. If no addresses are listed, verify all USB connections and click **Refresh**.

IN20 or MINI20 – Select the COM port address to which the device is connected.

Series 5 – Enter the address that matches the dip switch settings for the Series 5 controller to be registered.

Series 6 – A list of addresses for unregistered (but physically connected) devices will be displayed. If no addresses are listed, verify all USB connections and click **Refresh.**

5. Press the **Test** button to attempt device detection. A dialog will be displayed indicating the results of the test.

   If device detection fails, check the physical connection of the device to the host PC. For IEEE-488.2 connections, use the "Measurement and Automation Explorer" included with the driver software to scan for instruments to verify connectivity.

   If the device detection is successful, click **Next** to continue.

6. In the Device Information screen, enter the Device Name and Device Serial Number. The device name must be globally unique. This name will appear in the Devices list and in the Main View. Choose a meaningful name that will allow easy identification of the physical device.

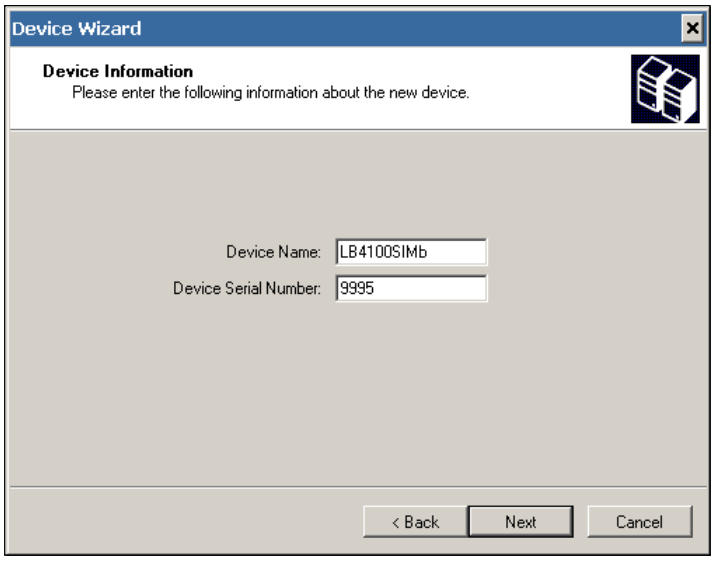


Figure 6 Entering the Device Name and Serial Number

7. Enter the Detector Information for all the detectors listed. If the detector serial numbers are not known, you can give each detector a unique identifier. If no detector serial numbers are added, Apex-Alpha/Beta will automatically generate serial numbers.

8. When you are done, click on **Finish** to exit the wizard. The new device(s) will appear in the Devices section of the Devices Setup tab.

After initial device registration, device, drawer and detector information can be edited by double-clicking on the appropriate item in the Devices List.

Creating a Display Group

Display Groups organize detectors into logical subgroups. This grouping can center around the drawer, controller, device, type of sample counted, proximity, or any other criteria desired. Detectors will not be available in the Sample Assigner View until they have been added to at least one Display Group. Note that a detector can be included in more than one Display Group.

In this example, we will create the display group “LB4100SIMa” for the LB4100 simulator device that contains two drawers and four detectors.

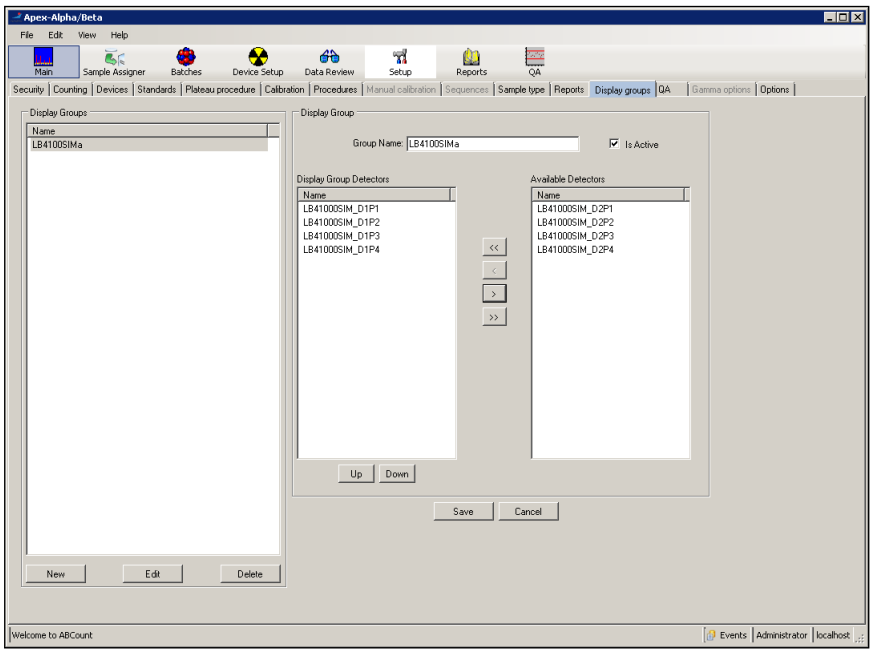


Figure 7 Creating a Display Group

9. Choose the **Setup** view button then the **Display Groups** tabbed page.

10. The **Display Groups** list shows previously created Display Groups.

11. Press the **New** button to create a new Display Group.

12. Enter a name for the Display Group in the **Group Name** field. The red “!” icon indicates a required entry. The group name should accurately describe the contents of the Display Group. This would require a more complex naming schema as the number of detectors, drawers, and devices increases.

13. Select each detector for the display group and press the **<** button to add individual detectors, or the **<<** button to add all detectors.

14. Once added, the **Up** and **Down** buttons are enabled. The detectors listed under Display Group Detectors can be reordered based on the order by which samples will be assigned to the detectors. For example, if one wanted only use detector “D1P3” as a last resort it could be moved down to the bottom. In this case, a batch would need to include at least eight samples before the detector was used if automatic sample assignment is utilized.

15. When finished creating the Display Group, select **Save**.

Adding Standards

Calibrated (NIST Traceable or equivalent) standards are required for the accurate calibration of the counting systems. Before these calibrations can be made, the sources that will be used must be entered into the Apex-Alpha/Beta database.

In this example, we will add the Sr-90/Y-90 standard to the database.

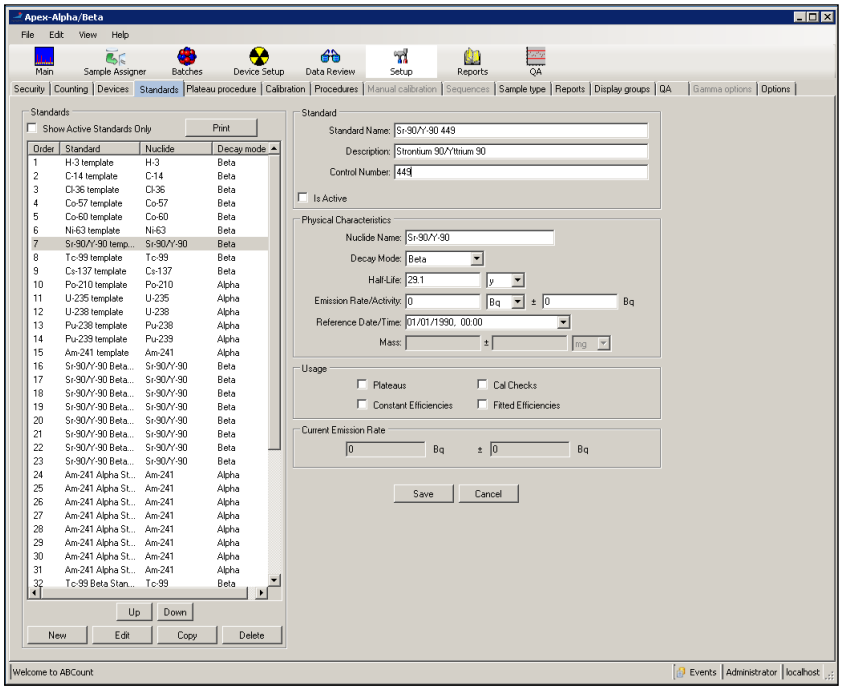


Figure 8 Creating a New Calibration Standard

To add a calibration standard perform the following steps:

1. Choose the **Setup** view button then the **Standards** tabbed page.

2. Press the **New** button.

3. Enter the **Standard Name**. This name should be unique and allow you to correctly select this source, versus other sources you might add later. In this example, “Sr-90/Y-90 449” was entered.

4. Enter the description and control number, if desired.

5. You may also select the **Is Active** check box now or later.

6. Enter the **Nuclide Name**. In this example, “Sr-90/Y-90 449” was entered.

7. Select the nuclide's **Decay Mode**. In this example, “Beta” was chosen.

8. If this standard was copied from an existing template, verify that **Half-Life**, **Half-Life Uncertainty**, and **Half-Life Unit** are consistent with those values recognized by your organization. In this example “29.1 ± 0 years (y)” was entered.

9. Enter the **Emission Rate** and **Emission Rate Uncertainty**, and **Emission Rate Unit** from the source certificate provide by the standards provider. For more information concerning choosing the correct values, please see the appendix *Standard Sources* on page 230.

10. Enter the **Reference Date/Time** in one of two ways. You may enter the date and time directly into the field. If a date/time is already present, you can increment or decrement any part of the date or time shown (day, month, year, hour, minute) by clicking on part of the date or time you want to change, then by pressing the up or down arrow keys on the keyboard.

    The date can also be changed by using the convenient drop-down calendar, find the year and month and click on the day of the month and the date will be inserted in the space in a mm/dd/yyyy format.

11. Next, choose the procedure **Usage(s)** where this standard will be used.

    For example, the standard shown is a plated type source that is appropriate for plateaus and daily check use, but is not of the same nuclide/geometry/matrix/media type as are samples actually being used. It is probably not appropriate for use as an efficiency that will be used to correct samples to an activity value.

12. When finished, select the **Save** button. The calculated **Current Emission Rate** is shown.

Voltage and Count Regions in the Apex-Alpha/Beta System

The counting system must be calibrated for bias voltage, gain, and spillover (crosstalk) prior to being placed into operation. Different system types have variable requirements as to what is required.

Plateau Overview

The first step in the setup of an alpha/beta counter is to determine the optimum Alpha, Alpha then Beta, and Alpha/Beta simultaneous bias voltages. This is accomplished by creating a Plateau procedure and then starting a Plateau count.

A plateau is generated by counting a source several times while increasing (stepping) the high voltage to the sample detector after each count. After the sources are counted, a graph is prepared that plots high voltage versus the count rate at each high voltage step. An alpha source and a beta source are each counted individually.

The quality of the counting gas affects the plateaus and instrument performance since the plateau is a measurement of performance. If, after running a new plateau, the resulting voltage(s) appear to be abnormal, the tank of gas should be replaced and another plateau performed.

Plateau Count Steps Recommendations

Apex-Alpha/Beta is compatible with a variety of different vintages of systems that require different start, stop, and step voltages. Table 2 gives recommendations on start, step, and number of steps for an Alpha plateau on various system types. Note that these recommendations are not all inclusive and apply to the most widely available detector size operated in a location that is fairly close to sea level and with P-10 gas.

Table 2 Alpha Plateau Settings by Instrument Type

	Start V	Step V	# Steps	Stop V
LB4200	90	30	47	1500
LB4100	90	30	52	1650
IN20	600	90	10	1500
MIN20	600	25	36	1500
S5 XLB	150	30	50	1650
S5 LB5500	150	30	50	1650
S6 LB	210	30	43	1500

Table 3 gives recommendations on start, step, and number of steps for a Beta plateau on various system types.

Table 3 Beta Plateau Settings by Instrument Type

	Start V	Step V	# Steps	Stop V
LB4200	780	30	24	1500
LB4100	900	30	25	1650
IN20	1200	50	16	2000
MIN20	1200	80	10	2000
S5 XLB	900	30	25	1650
S5 LB5500	780	30	29	1650
S6 LB	900	30	20	1500

The start, step, and (calculated) stop voltages would be entered for the Plateau procedure outlined in *Plateau Procedure Setup Page* on page 161.

Plateau Count Time

It is important that each step of the plateau measurements acquires enough counts that the voltage chosen is statistically reproducible. The traditional minimum value for number of counts has been 10,000 - 30,000 counts once the applied voltage is above the knee of the plateau. To determine the needed count time, let us look at the following example.

For a typical Standard the following applies:

- 370 bq (decay corrected)
- 10,000 minimum counts required
- Assume 25% efficiency

To calculate the count per seconds (cps):

0.25 * 370 = 92.5 cps

Converting to seconds yields:

$$\frac{10000}{92.5} = 108 \text{ seconds}$$

In this example a **108** second count would yield the required **10,000** counts. Note that 10,000 is the minimum and more is better especially for a system with multiple detectors that share a common high voltage power supply.

The count time would be entered for the plateau procedure described in *Plateau Procedure Setup Page* on page 161.

Plateau Procedure Creation

Prior to performing a plateau, it is necessary to create plateau counting procedures. Depending on the type of instrument selected under Instrument Type, the options may be different from the figures shown.

In this example we will create an alpha plateau procedure.

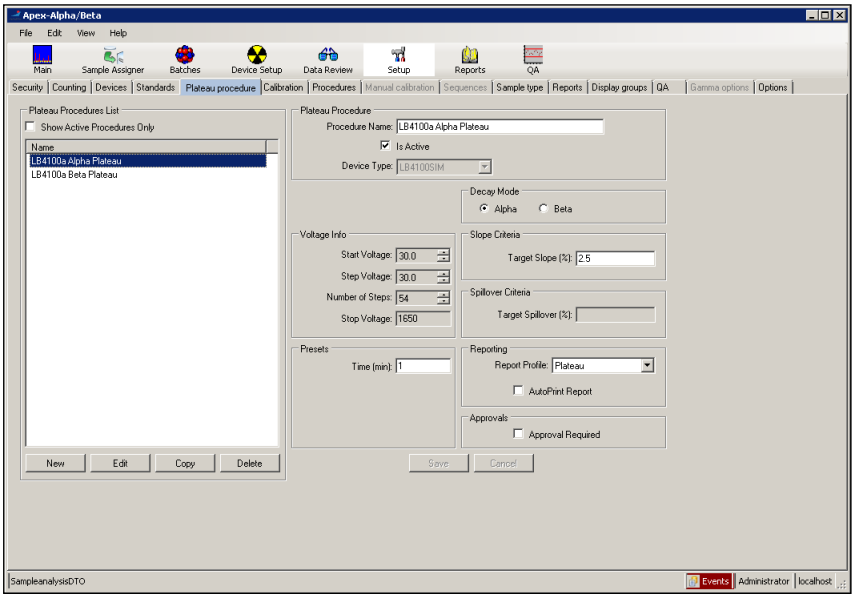


Figure 9 Creating an Alpha Plateau Procedure

1. Choose the **Setup** view button then select the **Plateau Procedure** tab.

2. Select the **New** button.

3. Enter the procedure name. In this example “LB4100a Alpha Plateau” was entered.

4. Select the **Is Active** check box and choose the device type. Once the device type is chosen it cannot be changed.

5. Choose the **Decay Mode** for the plateau to be consistent with the standards and count mode required. In this example “Alpha” was chosen.

6. Enter the count presets for the preset time, alpha counts, and beta counts, and gamma counts. In this example, a preset time of “1” minute was entered.

Note: Some system types do not allow the entry of Count Presets and others do not support Gamma Counts Preset. If Count Preset(s) are not supported, then those sections of the Procedures Setup page will be hidden.

7. Enter the **Start Voltage**, **Step Voltage**, and **Number of Steps**. In this example "30.0 / 30.0 / 54" was entered.

8. Depending on the system type chosen, either **Target Slope (%)** or the **Target Spillover** should be chosen.

   In this example "2.5" was entered for the Target Slope.

   Note: For all device types that use a Target Slope for determining the plateau voltage the default Target Slope value is 2.5%. For a beta plateau on a Series 6 the recommended Target Slope value is 3.5%.

9. Choose the **Report Profile** to be associated with this procedure.

10. The **Approvals** check box should be selected only if the plateau should be reviewed prior to use. Otherwise, the successful plateau is automatically approved.

11. Press the **Save** button when finished.

Performing a Plateau

Depending on the count mode(s) to be used, an alpha and/or beta plateau will be required as discussed in the Device Setup Requirements for System Types Table in *Device Type Setup Requirements* on page 111.

The Sample Assigner will assign the plateau standards to detectors and start the plateau run as described below. Next we will perform an Alpha Plateau count based on a procedure named "LB4100SIM_ Alpha Plateau Procedure".

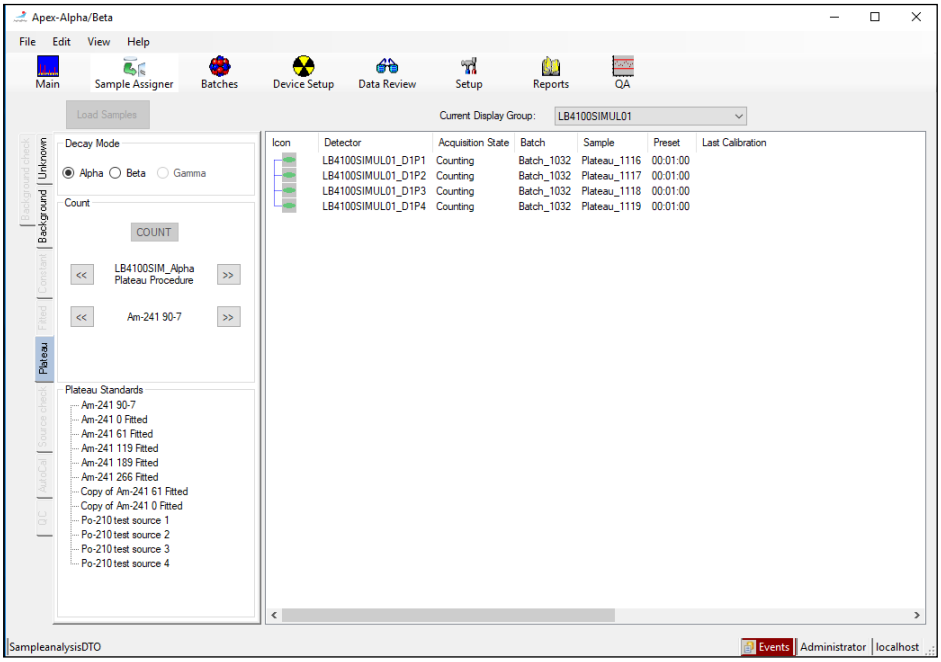


Figure 10 Performing a Plateau

1. Choose the **Sample Assigner** view button.

2. Choose the **Plateau** tab.

3. Choose the **Display Group**.

4. Choose the **Decay Mode** desired.

5. If this is the first time a plateau has been assigned for this detector for the radiation type, *or* to change to a different standard than was used previously, choose the first/next detector to be assigned.

   Note: To use the same assignment as the last time the same plateau procedure was performed, simply choose all the desired detectors and press the **COUNT** button.

6. Use the left and right buttons to locate the Plateau Procedure to be used.

7. Use the left and right buttons to choose the Plateau Standard assigned to the selected detector.

8. Press the **COUNT** button. Repeat this process until all desired detectors are assigned.

9. If the **Approval Required** check box was not checked in the plateau procedure, it will be necessary to acknowledge a message that running a plateau invalidates ALL calibrations.

10. Afterwards, the standard is no longer available. The detector icon changes from the Available state (blue) to the Assigned state (cyan).

11. After all assignments are made, press the **Load Samples** button.

    A summary report preview will appear detailing which standard should be placed in each detector.

    Note: If Sample Delay is enabled under Setup Options, the Load Samples button can still be used *or* the counts will start automatically once the timer expires. With Sample Delay enabled, the summary report will not be displayed.

    The detector icon changes to the Counting state (green).

12. Go to the Main View to see count data for the plateau. When the last plateau step has finished counting, the detector will return to the Available state (blue).

Review the Plateau Results

After counting a plateau, the results should be reviewed even if the Approval button was not selected in the Plateau Procedure Setup. Refer to *Plateau Review* on page 112 for more information.

To review a plateau count:

1. Select the **Device Setup** view button then the **Plateau Review** tabbed page.

2. Select the **Device** and **Drawer**.

3. Choose the **Decay Mode**.

4. Select the plateau that was generated from the selected device/drawer.

The data will be plotted along with a vertical line indicating the calculated voltage for the plateau. The slope at the calculated voltage appears in the grid below the plot.

Manually Adjusting the ROI

Manually adjust the region of interest as described. For more detailed information refer to *Perform Manual ROI* on page 117.

1. Choose the **Device Setup** view button then the **ROI** tabbed page.
2. Select the **Perform Manual ROI** check box.
3. Load a source (beta or alpha) into the detector(s) to be adjusted.
4. Choose the **Device**, **Drawer**, and **Detector** to begin.
5. Select the **Source Type**.
6. For a sample changer system, select the Group to be used. Physically load a sample holder containing the source to be used behind the selected group.
7. Select the **Link Beta Upper to Alpha Lower Level** check box then press the **Start Count** button.
8. On instruments that can show spectral data, the graph above the sliders will show the spectrum. In this case, the color of the graph represents the detector acquisition state.

   The Count Data on the right side of the screen automatically updates.
9. Press the **Halt Count** button to adjust levels.
10. Press the **Save** button when the spillover % meets the criteria.

Automatically Adjusting the ROI

Automatically adjust the region of interest as described. For more detailed information refer to *Perform Auto ROI* on page 120.

1. Adjust the region of interest as described.
2. Choose the **Device Setup** view button then the **ROI** tabbed page.
3. Select the **Perform Auto ROI** check box.

4. In the Perform Auto ROI section, enter the Beta Loss and Accuracy and the Beta → Alpha Spillover and Accuracy in percent.

   Note: Changing the default values of 3.5% beta loss, 3% accuracy, 0.08% beta to alpha spillover, and 5% beta to alpha spillover accuracy may cause unexpected results.

   Beta % Loss – The percentage of beta counts that fall above the Beta Upper Level.

   Beta % Accuracy – Calculates the number of total counts required to calculate the beta % loss.

   Beta -> Alpha % Spillover – The percentage of beta counts that fall above the Alpha Lower Level.

   Beta -> Alpha % Accuracy – Calculates the number of total counts required to calculate the alpha % spillover.

5. Load a beta source into the detector(s) or numbered sample holder to be adjusted. For a sample changer system, select the Group to be used. Physically load a sample holder containing the source to be used behind the selected group.

6. Choose the **Device**, **Drawer**, and **Detector** to begin.

7. The system will independently adjust the ROI values to the desired settings. The system will stop counting and the **Save** button will become available when complete.

   The **Halt** button may be used to interrupt the ROI adjustment.

8. Press the **Save** button to store the current settings or **Cancel** to discard the settings.

Calibration Overview

After the basic device setup is completed, the system should be calibrated. The sections below outline the basic steps to calibrate an instrument: creating a calibration, measuring alpha and beta backgrounds, then measuring alpha and beta efficiencies.

Define a Calibration

A *Calibration* must be created prior to beginning the calibration process. The Calibration holds the information that is used by Unknown procedures to partly determine how to count a sample and where to get the correction information needed to report the output as an activity.

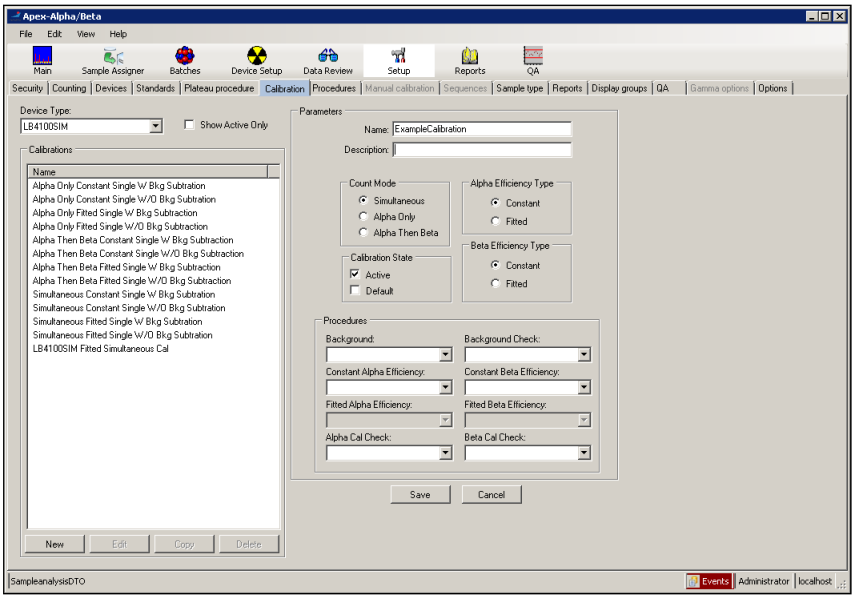


Figure 11 Creating a Calibration

To create a new Calibration:

1. Choose the **Setup** view button then the **Calibration** tabbed page.

2. Choose the **Device Type**.

3. Select the **New** button.

4. Enter the name of the calibration and description, if desired. In this example “ExampleCalibration” was entered.

   The calibration name should indicate what the calibration is for. For example, the name “LB4100SIM Sim Const Const” could describe a calibration is for simultaneous count mode on the LB4100 simulator using a constant alpha efficiency and a constant beta efficiency.

5. Choose the **Count Mode**. In this example “Simultaneous” was entered.

6. Choose the **Efficiency Type**. Options are Constant (single point) or Fitted (attenuation curve).

   In this example “Constant” was chosen for the Alpha and Beta efficiencies.

7. Press the **Save** button when done.

Count Mode

For the Gas Flow counters supported by Apex-Alpha/Beta, there are three different count modes available: Alpha Only, Alpha then Beta, and Alpha/Beta Simultaneous.

Alpha Only

Used if only alpha results are required. Alpha Only count mode calibrations do not require a beta efficiency.

Alpha then Beta

Counts alpha and then beta sequentially. Major advantage is that there is no spillover between alpha and beta channels but each count takes twice the count time. Alpha then beta calibrations that will be used with procedures to output an activity *must* include both an alpha and a beta efficiency.

Alpha/Beta Simultaneous

Counts both alphas and betas concurrently, but the spillover between channels can be a concern. Simultaneous calibrations that will be used with procedures to output an activity *must* include both an alpha and a beta efficiency.

Running a Background Count

A background procedure will need to be created prior to running a background count.

Background Procedure Creation

In this example we will create a background procedure for the LB4100 simulator.

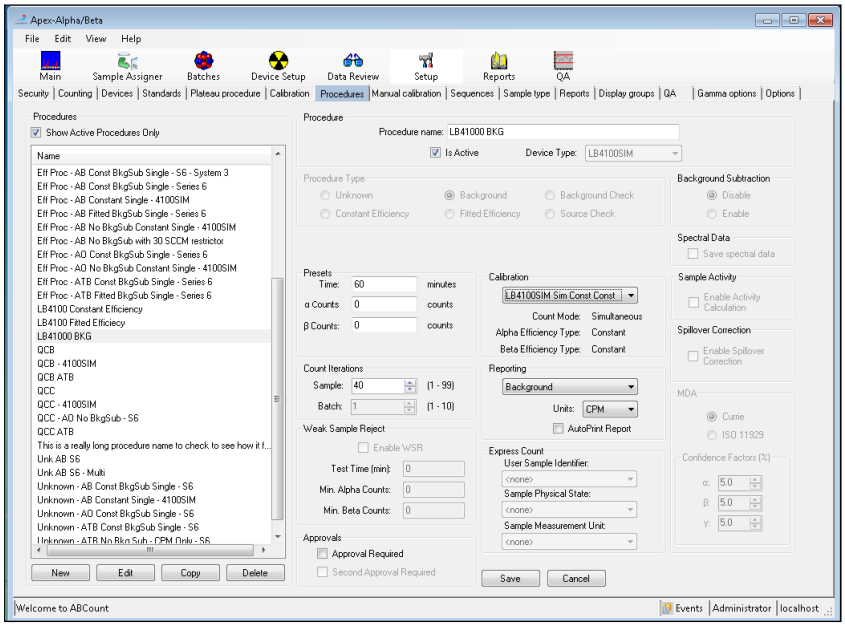


Figure 12 Creating a Background Procedure

To create a new Background procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.
2. Select the **New** button.
3. Enter the procedure name. In this example “LB4100 BKG” was entered.
4. Choose the **Device Type**.
5. Select the **Is Active** check box.
6. Select the **Background** procedure type.
7. Enter the sample **Presets Time** and/or **Counts**.

   Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

8. Enter the number of **Sample Count Iterations**.

9. Choose the **Calibration** that is going to be used with this procedure.

10. Select the **Approval Required** check box only if the results of the background calibration should not be made current automatically.

11. Press the **Save** button when done.

Starting with V2.0 of Apex A/B, the calibration selected in the background procedure will automatically have that background procedure associated to it. It is no longer necessary to go back and manually select the background procedure in the calibration. However, if a different background procedure is created and the same calibration is selected for it, the calibration must be updated to select the new background procedure in order for the calibration to use the new procedure.

Any efficiency or unknown batches counted with this calibration will use the results of the background procedure for the purposes of background subtraction.

Performing a Background Count

Next, we will perform a Background count based on the procedure named “AB Const BkgSub – S5”.

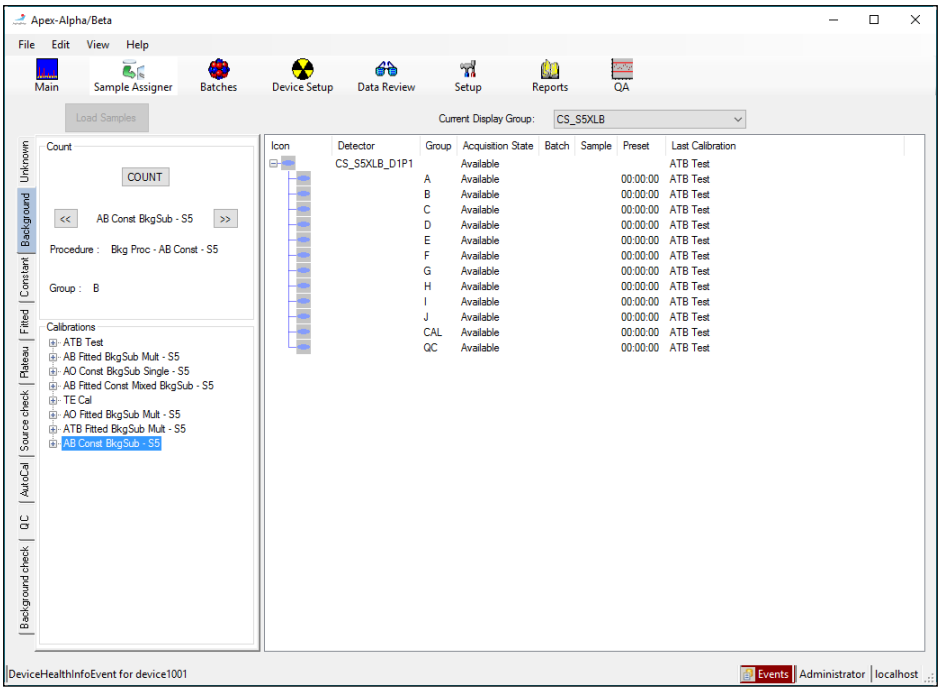


Figure 13 Performing a Background Count

To start a background calibration count:

1. Choose the **Sample Assigner** view button.

2. Choose the **Background** tab.

3. From the **Current Display Group** drop down list, choose a group of detectors that contain the detector(s) for the efficiency calibration.

4. Use the left and right buttons to locate the Calibration to be used.

5. Select all Detectors or Group (group plates A-J for automatic sample changers) to be included in the analysis.

6. Press the **COUNT** button. The detector icon should change from the Available state (blue) to the Assigned state (cyan).

   The count time shown will be the value entered when the Background procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).

7. After all assignments are made, press the **Load Samples** button.

   A summary report preview will appear detailing which detector(s) will have the background procedure executed.

   Note: If **Sample Delay** is enabled under **Setup Options**, the **Load Samples** button can still be used *or* the counts will start automatically once the timer expires. With **Sample Delay** enabled, the summary report will not be displayed.

   The detector color should change to the Counting state (green).

8. Select the **Main** view button for count status information during the count.

Unless “Approval Required” is selected in the procedure, the background values are made current automatically. The background results can be reviewed and approved as necessary on the Data Review screen as shown in *Background Data Review* on page 31.

Background Data Review

Finally, we will review the background results generated from the procedure “LB4100 BKG”.

To view the background data from the Calibration batch.

1. Choose the **Data Review** view button.

2. Select the **State** and then the **Procedure** that was used to acquire the Calibration.

3. The Search Results list automatically updates the list with all batches for the selected criteria.

   Note: To further narrow the search, clear the “Select/Unselect All” option and then select the desired procedure(s). The Search Results list will now display only the batches for the selected procedure(s).

4. From the Search Results list, choose one or more batches to review and then select **Next**.

The second page of the Data Review screen is displayed where the results can be reviewed and approved.

Running an Efficiency Count

An efficiency procedure will need to be created prior to running an efficiency count. An efficiency procedure will either be *constant* or *fitted*.

Constant Efficiency

A constant efficiency is the traditional efficiency. When applied to unknown samples, the efficiency does not vary based on the mass of the sample. This is useful in swipe/smear and air filter samples or in other samples where sample self-absorption is either not present, is well-defined and consistent, or is corrected for outside of the software.

Constant Efficiency Procedure Creation

In this example we will create a constant efficiency procedure for the LB4100 simulator.

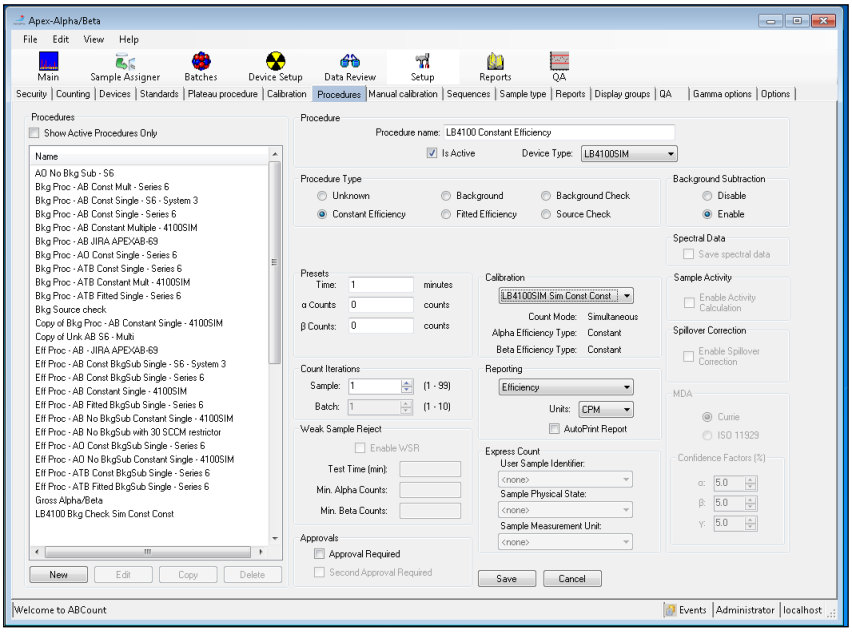


Figure 14 Creating a Constant Efficiency Procedure

To create a new constant efficiency procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.
2. Select the **New** button.
3. Enter the procedure name. In this example “LB4100 Constant Efficiency” was entered.
4. Choose the **Device Type**.
5. Select the **Is Active** check box.
6. Select the **Constant Efficiency** procedure type.
7. Enter the sample **Presets Time** and/or **Counts**.

Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

8. Enter the number of **Sample Count Iterations**.

9. Choose the **Calibration** that is going to be used with this procedure.

10. Select the **Background Subtraction** option. In this example “Enabled” was chosen.

11. Select the **Approval Required** check box only if the results of the efficiency calibration should *not* be made current automatically.

12. Press the **Save** button when done.

Starting with V2.0 of Apex A/B, the calibration selected in the efficiency procedure will automatically have that efficiency procedure associated to it. It is no longer necessary to go back and manually select the efficiency procedure in the calibration. However, if a different efficiency procedure is created and the same calibration is selected for it, the calibration must be updated to select the new efficiency procedure in order for the calibration to use the new procedure.

Any unknown batches counted with this calibration will use the results of the efficiency procedure for the purposes of activity calculation.

Performing a Constant Efficiency Count

Next, we will perform an alpha Constant Efficiency count based on the procedure named “AB Const BkgSub – S5”.

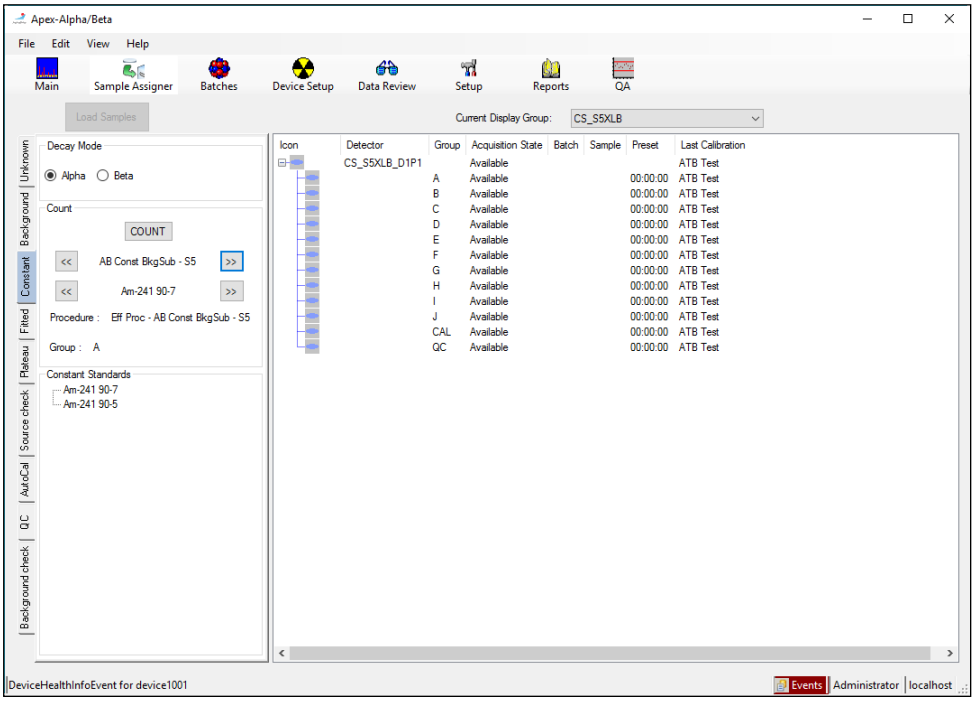


Figure 15 Performing an Alpha Constant Efficiency Count

To start an efficiency count:

1. Choose the **Sample Assigner** view button.

2. Choose the **Constant** tab.

3. From the **Current Display Group** drop down list, choose a group of detectors that contain the detector(s) for the efficiency calibration.

4. Choose the **Decay Mode** desired.

5. If this is the first time a constant efficiency has been assigned for this detector and for this Calibration and for this radiation Decay Mode, *or* to change to a different standard than was used previously, choose the first/next detector to be assigned.

   Note: To use the same assignment as the last time the same constant efficiency procedure was performed, simply choose all the desired detectors and press the **COUNT** button.

6. Use the left and right buttons to locate the **Calibration** to be used.

7. Use the left and right buttons to choose the **Standard** assigned to the selected detector.

8. Press the **COUNT** button. Repeat this process until all desired detectors are assigned.

   The count time shown will be the value entered when the Constant Efficiency procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).

9. Afterwards, the standard is no longer available. The detector icon changes from the Available state (blue) to the Assigned state (cyan).

10. After all assignments are made, press the **Load Samples** button.

    A summary report preview will appear detailing which standard should be placed in each detector.

    Note: If **Sample Delay** is enabled under **Setup Options**, the **Load Samples** button can still be used *or* the counts will start automatically once the timer expires. With **Sample Delay** enabled, the summary report will not be displayed.

    The detector icon changes to the Counting state (green).

Constant Efficiency Data Review

After the constant efficiency count has completed, it is necessary to go to Data Review if "approval required" was selected as part of the procedure settings. Otherwise, the constant efficiency will be automatically made current.

Refer to *Data Review* starting on page 127 for more information.

Fitted Efficiency

A fitted efficiency is used for calculating activity for such unknowns as water, soil, or other samples that have a residual mass after processing. The efficiency varies with the mass of the sample as measured after any chemistry, drying, or other processing has taken place. A fitted efficiency is also known as an attenuation curve, self-absorption curve, or efficiency curve.

Fitted Efficiency Procedure Creation

In this example we will create a fitted efficiency procedure for the LB4100 simulator.

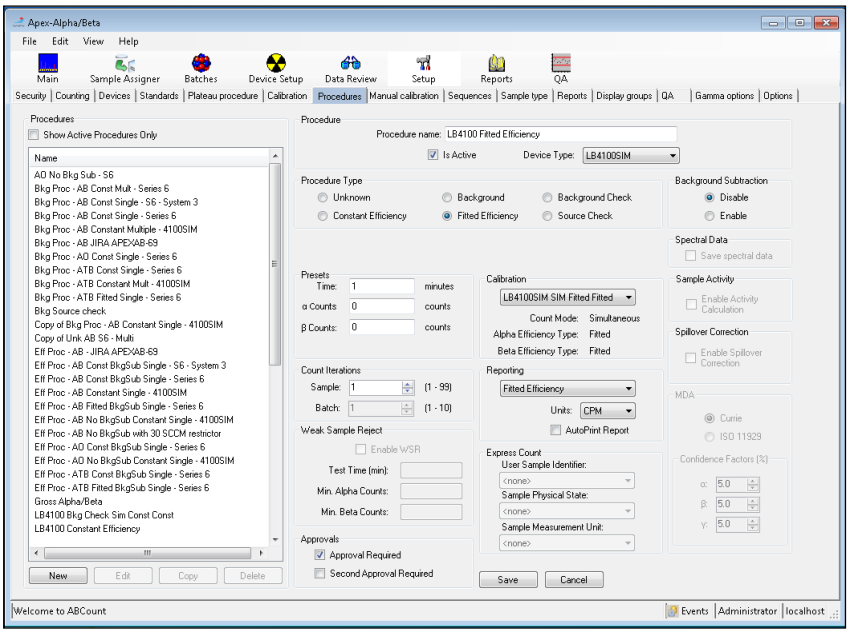


Figure 16 Creating a Fitted Efficiency Procedure

To create a new fitted efficiency procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.
2. Select the **New** button.
3. Enter the procedure name. In this example “LB4100 Fitted Efficiency” was entered.
4. Choose the **Device Type**.
5. Select the **Is Active** check box.
6. Select the **Fitted Efficiency** procedure type.
7. Enter the sample **Presets Time** and/or **Counts**.

   Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

8. Enter the number of **Sample Count Iterations**.

9. Choose the **Calibration** that is going to be used with this procedure.

10. Select the **Background Subtraction** option. In this example “Disable” was chosen.

11. Select the **Approval Required** check box only if the results of the efficiency calibration should *not* be made current automatically.

12. Press the **Save** button when done.

Starting with V2.0 of Apex A/B, the calibration selected in the efficiency procedure will automatically have that efficiency procedure associated to it. It is no longer necessary to go back and manually select the efficiency procedure in the calibration. However, if a different efficiency procedure is created and the same calibration is selected for it, the calibration must be updated to select the new efficiency procedure in order for the calibration to use the new procedure.

Any unknown batches counted with this calibration will use the results of the fitted efficiency procedure for the purposes of activity calculation.

Standards Entry

Next, the fitted efficiency standards should be added into Apex-Alpha/Beta as discussed in *Standards Setup Page* on page 157.

- A fitted efficiency will include a number of standards (usually 5 or more) that include varying amounts of solids mixed with radioactivity.

- The range of masses for the standards is usually dependent on the sample masses expected to be analyzed and usually varies between 0-120 mg for alpha and 0-200 mg for beta.

- Each standard for a fitted efficiency should have the “Fitted Efficiency” usage check box selected.

Batch Creation

Before sample assignment can take place for a fitted efficiency, a batch needs to be created that includes the attenuation standards to be counted.

In this example, a batch “FE Alpha LB4100 D1P3” is created for four alpha standards for the LB4100 simulator.

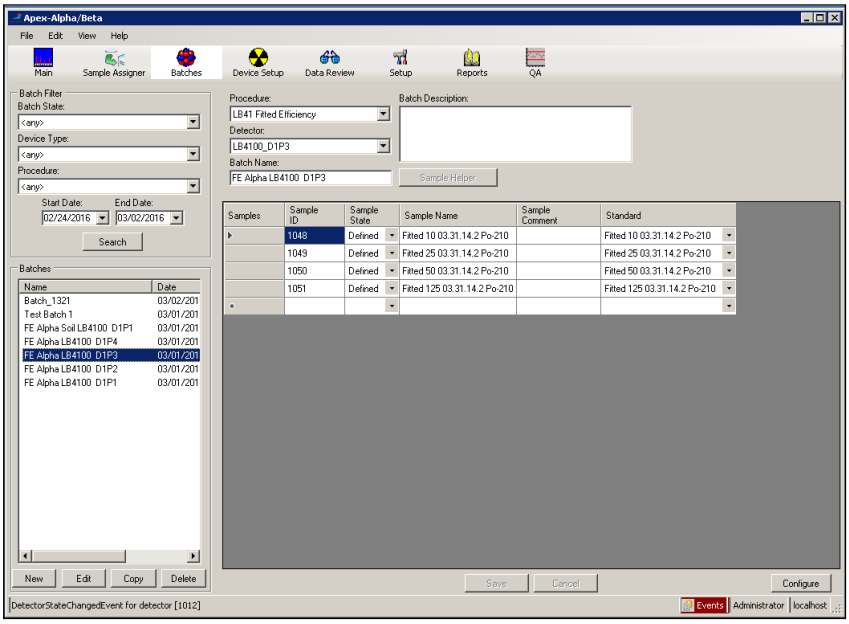


Figure 17 Creating Fitted Efficiency Batches

To create a new Fitted Efficiency batch:

1. Choose the **Batches** view button.

2. Select the **New** button.

3. From the Procedure drop down list, select a *Fitted Efficiency* procedure.

4. From the **Detector** drop down list, select a detector on which the Fitted Efficiency batch is to be counted.

5. Press the TAB key to move to the **Batch Name** field. Enter a name for the batch.

   Note: The name given to a Fitted Efficiency batch should include the name of the detector on which the batch is to be counted.

6. Press the TAB key to move to the **Batch Description** field. Enter a description if desired.

7. Press the TAB key to move to the Samples grid. On the first record, for a sample changer system, tab to the **Carrier ID/Ordinal** column. Enter the carrier number to be used for the first standard or enter '0' to have the Carrier ID assigned at count time. For a non-sample changer system or after entering the Carrier ID, tab to the **Standards** column. Repeat until all samples have been entered.

8. Click the **Save** button to save the batch. The batch will appear in the Batches list view to the left in the *Queued* state.

The **Copy** function can be used to create Fitted Efficiency batches for each detector. Select the batch to be copied from the Batches list view, then click the **Copy** button. Name each copy for a detector where the fitted efficiency standards are to be counted. If different standards are being used for each batch, edit each sample in the batch before saving.

Performing a Fitted Efficiency Count

Next, we will perform a beta Fitted Efficiency count based on the procedure named "Fitted Eff Proc AB BkgSub Mult - Beta".

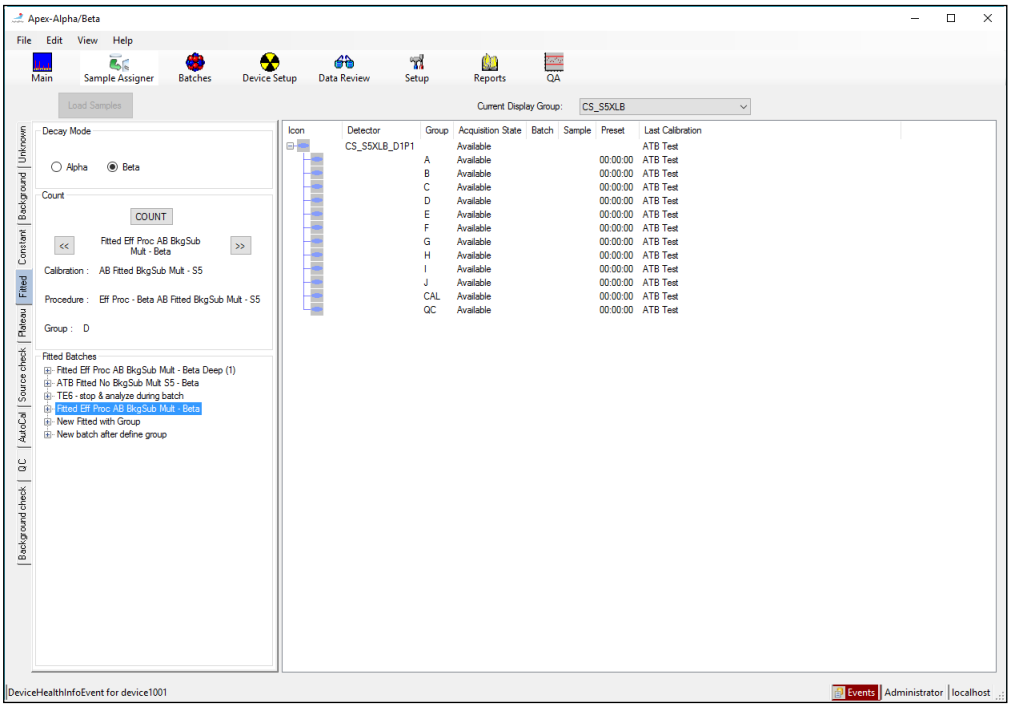


Figure 18 Performing a Fitted Efficiency Count

To start a fitted efficiency count:

1. Choose the **Sample Assigner** view button.

2. Choose the **Fitted** tab.

3. Select the **Decay Mode** (Alpha or Beta) that corresponds to the batch and standards to be counted.

4. From the **Current Display Group** drop down list, choose a group of detectors that contain the detector(s) for the efficiency calibration.

5. A list of uncounted fitted efficiency batches is listed on the left. For a non-sample changer system, press the + in front of the batch containing the standards to be counted. Choose the detector and then the Sample Name of the first standard of the batch to be counted on that detector. For a sample changer system, in the right panel select the group that contains the standards to be counted. Then select the batch to be counted.

6. Repeat for the next detector until all the standards (one for each batch) are assigned to each detector.

   The detector icon should change from the Available state (blue) to the Assigned state (cyan).

   Note: If **Sample Delay** is enabled steps 7 and 8 are not necessary.

7. Press the **COUNT** button.

   The count time shown will be the value entered when the Fitted Efficiency procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).

8. Press **Load Samples**.

   A summary report preview will appear detailing which standard should be placed in each detector.

9. Press **Start Count**.

   The detector icon should change to the Counting state (green).

10. Go to the **Main** view to observe count data and device status information during the count.

Fitted Efficiency Data Review

After the fitted efficiency has completed, it is *always* necessary to go to the Data Review screen to choose a fit method.

Choose the **Data Review** button on the main toolbar and run a search for Fitted Efficiency batches, then select the batch for review. Press **Next >>** to advance to the results page, then select the **Fitted Efficiency** tabbed page of the Data Review window to choose the best fit model.

The Fitted Efficiency tabbed page is used to select a fit model for data collected as a fitted efficiency. Viewing, approval, rejection, exporting, printing, and alternate reports are available.

Refer to *Data Review* starting on page 127 for more information.

Sample Counting

The samples counted are typically referred to as “unknowns”. This section describes how unknowns are counted using Apex-Alpha/Beta.

Unknown Procedure Creation

An unknown procedure and the calibration with which it is associated describe how an unknown will be counted.

We will create an unknown procedure for a Series 5 for a single unknown count.

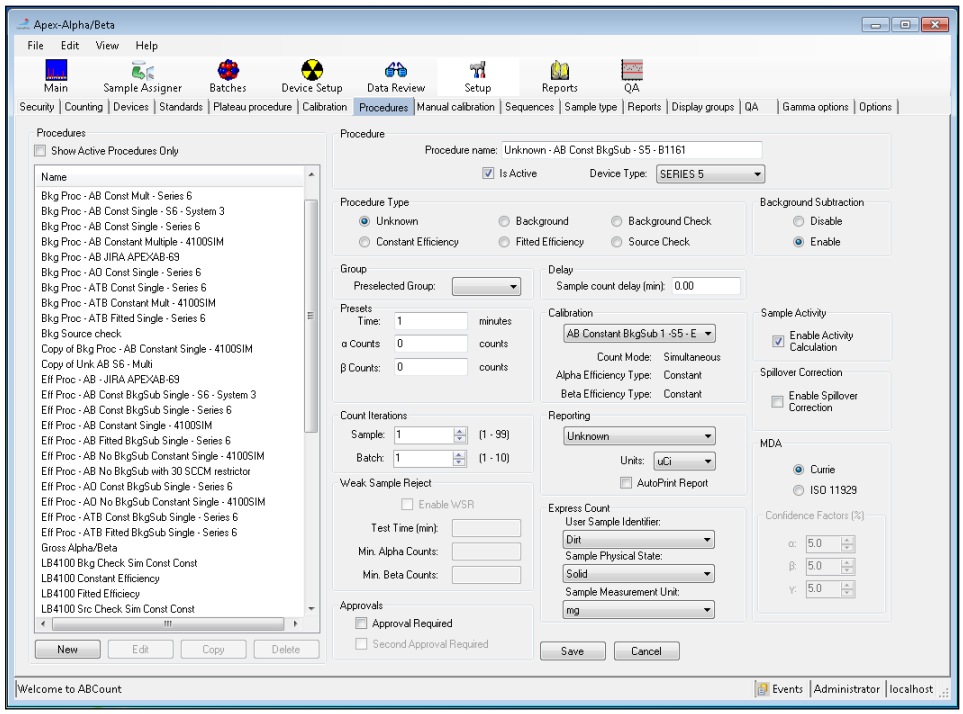


Figure 19 Creating an Unknown Procedure

To create a new Unknown procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.

2. Select the **New** button.

3. Enter the procedure name. In this example “Unknown - AB Const BkgSub - S5 - B1161” was entered.

4. Choose the **Device Type**.

5. Select the **Is Active** check box.

6. Select the **Unknown** procedure type.

7. Optionally choose the **Preselected Group** if using an automatic sample changer based system.

   Note: The counting group can be changed at count time if necessary.

8. Enter the sample **Presets Time** and/or **Counts**.

   Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

9. Enter the number of **Sample Iterations**.

10. Enter the number of **Batch Iterations**. This only applies to compatible systems and is otherwise disabled.

11. Enter a time for the **Sample count delay**. This is the time the system will wait prior to counting the sample. This only applies to some sample change systems and is otherwise not displayed.

12. Choose the **Calibration** that is going to be used with this procedure.

13. In this example, the following additional analysis options were chosen:

    Enable Background Subtraction

    Enable Activity Calculation

    Disable Spillover Correction

    Use Currie

14. Some device types' procedures offer the option to save spectral data for sample counts. This selection, if displayed, is disabled by default.

15. For this procedure to be eligible for use with **Express Count**, all three Express Count options must be specified. User Sample Identifiers can be defined on the **Sample Type** tab of the **Setup** view. Additional Sample Measurement Units can be defined on the **Counting** tab of the **Setup** view.

16. Press the **Save** button when done.

Repeat above steps to create additional unknown counting procedures.

Express Count

Express Count can be used in lieu of manual batch creation and assignment for Unknown counts.

Note: As with a manually created Unknown batch, all detectors involved in an Express Count must be calibrated in accordance with the options specified in the selected procedure. In addition, the User Sample Identifier, Sample Physical State, and Sample Measurement Unit in the Express Count section of the Unknown Procedure definition must all have selections made in order for the procedure to be available to be selected for an Express Count.

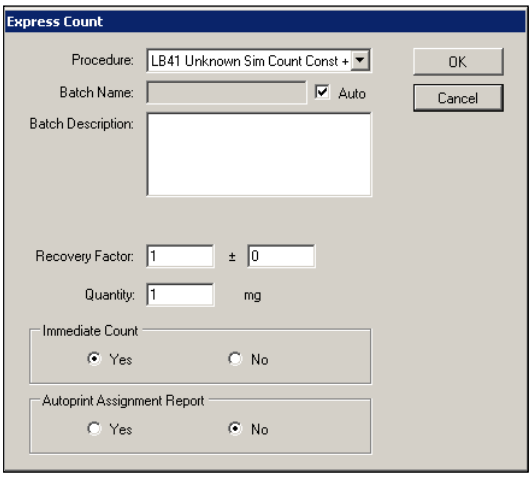


Figure 20 Express Count Dialog

To use Express Count:

1. Choose the **Sample Assigner** view from the application toolbar.

2. Select a **Display Group**, then choose one or more detectors (or for a sample changer system one or more groups) on which to count.

3. Click on the down arrow on the **COUNT** button and choose **Modify**.

4. In the Express Count dialog, select a **Procedure**.

5. Enter a **Batch Name**. Alternatively, if the **Auto check** box is selected, the Batch will be named automatically using the pattern specified on the Options tab of the Setup view.

6. Select "Yes" for **Immediate Count** to begin counting immediately.

7. Click **OK**.

Express Count will remember the settings specified until they are changed. To count additional batches, simply select one or more detectors and click on the **COUNT** button. To make changes to an Express Count, click on the down arrow and then select the **Modify** option. For more details on using Express Count refer to the *Express Count Configuration* on page 77.

Manual Unknown Batches

Unknown batches can also be created manually on the Batches view.

Unknown Batch Creation

An unknown batch can be created to count unknown samples. In addition to unknowns, an unknown batch can include a laboratory control standard, matrix spike, and duplicates.

In this example, a batch is created for four samples for the LB4100 simulator.

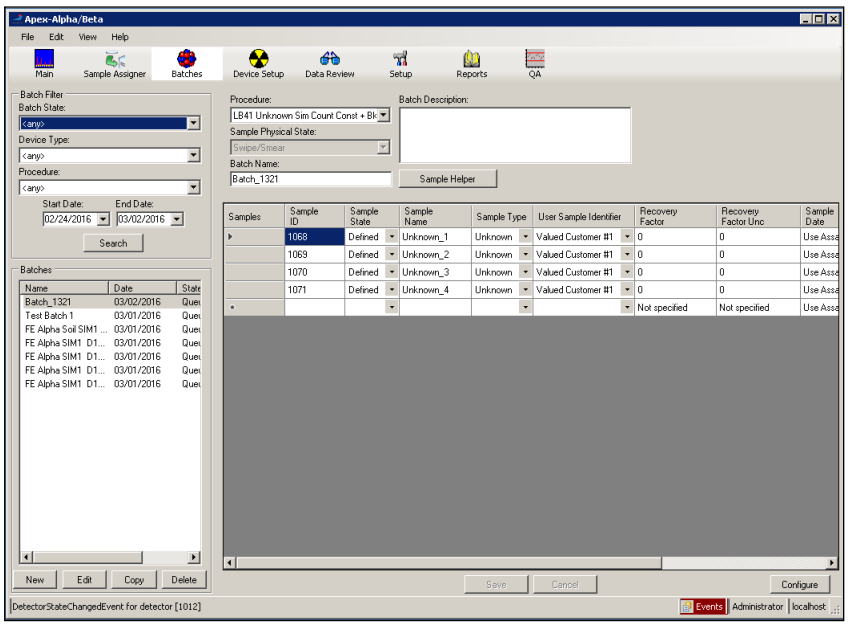


Figure 21 Creating an Unknown Batch

To create a new unknown batch:

1. Choose the **Batches** view button.

2. Select the **New** button.

3. From the **Procedure** drop down list, select an unknown procedure.

4. From the **Sample Physical State** drop down list, select a sample physical state. This choice will apply to all samples created for this batch.

5. Press the TAB key to move to the **Batch Name** field. Enter a name for the batch.

6. Press the TAB key to move to the **Batch Description** field. Enter a description if desired.

7. Press the TAB key to move to the Samples grid. On the first record, tab to the **Sample Name** column. Change the default if desired, or tab to the next field.

8. For a sample changer device, the Carrier ID/Sample Ordinal column will automatically be filled in starting with 1. Be sure the correct carrier number is entered in the order of the carriers used. Alternatively, enter zero ("0") and the Carrier ID will be updated at count time.

9. Tab through each field, modifying each as necessary. Note that the **Quantity** and **Quantity Unc** fields must be entered. At the end of the row, press the TAB key again to move to a new row.

10. When all samples have been entered, click the **Save** button to save the batch. The batch will appear in the Batches list view to the left in the *Queued* state.

Additional Tips

- To use this batch information as a template, select the **Copy** button and press the **Save** button. Rename the batch as required. A template batch can speed up creating batches of repetitive samples.

Unknown Sample Assignment

Unknowns are assigned to detectors using the Sample Assigner. The Sampler Assigner is accessed by selecting the **Sample Assigner** view button and then the **Unknown** tab. Refer to *Assigning Samples and Batches* on page 76 for more information.

Assign Batches

Click on the "Batch" node in the Batch tree view. The batch can then be assigned by dragging and dropping the batch onto available detectors.

The count time shown will be the value entered when the Unknown procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).

Assign Individual Samples

To assign individual samples to specific detectors, choose the + in front of "Batches" node in the Batch tree view so that the samples are visible, then drag a sample onto an available detector. Note that for a sample changer device the entire batch must be dragged to the detector or group.

Start Unknown Sample Count

After all assignments have been made, press the **Load Samples** button on the Sample Assigner page. When all samples have been placed in the instrument, press the **Start Count** button on the Assignment Summary report to start the count.

Notes: If the **Setup** | **Option** | **Sample Delay** is enabled it is not necessary to press the **Load Samples** button. It is still possible to override the delay by pressing the **Load Samples** button and following the prompts.

To view count progress, press the **Main** view button.

Unknown Sample Data Review

Data Review provides a means to search for and review count data for specific batches and samples.

From the Data Review screen, select "Unknown" count type, the Search results are automatically updated. Select one or more batches to review by checking the check box next to each batch name, then press the **Next >** button. Count data can be exported to a CSV or tab-delimited file. Please refer to the chapter *Data Review View* starting on page 127 for more information.

Daily Checks

Daily checks allow the user to establish data in the database that can be tracked on the QA chart for efficiencies and background.

Background Check

The Background Check is intended for frequent evaluations of ambient background radiation levels. These counts are used to identify background fluctuations which might affect sample count analysis results, including elevated activity due to contamination of the counting system hardware.

Calibration Source Check

Used to evaluate the continued correct performance, the Source Check is intended for routine system quality assurance testing.

Calibration Check Procedure Creation

Calibration checks are applied to the default calibration as defined during named Calibration creation as discussed in *Calibration Setup Page* on page 165.

Table 4 Available QA Parameters

	Count Rate	% Eff
Alpha BKG	Yes	NA
Beta BKG	Yes	NA
Alpha Cal Check	Yes	Yes
Beta Cal Check	Yes	Yes

Daily Background Check Procedure Creation

We will create a background check procedure for the LB4100 simulator for a single count.

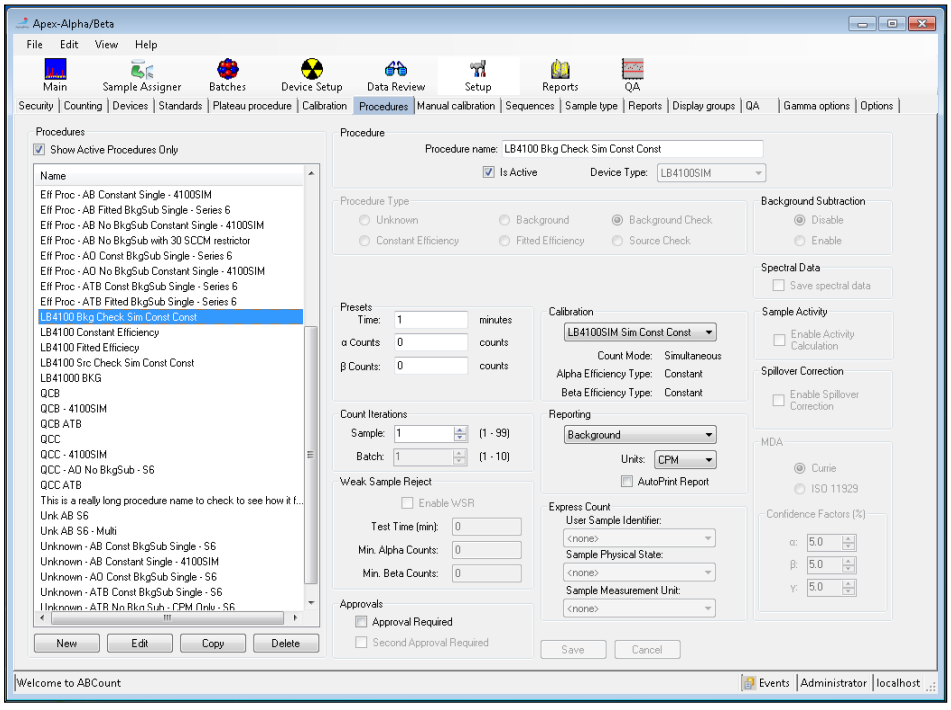


Figure 22 Creating a Background Check Procedure

To create a new Daily Background procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.

2. Select the **New** button.

3. Enter the procedure name. In this example “LB4100 Bkg Check Sim Const Const” was entered.

4. Choose the **Device Type**.

5. Select the **Is Active** check box.

6. Select the **Background Check** procedure type.

7. Optionally choose the **Preselected Group** if using an automatic sample changer based system.

   Note: The counting group can be changed at count time if necessary.

8. Enter the sample **Presets Time** and/or **Counts**.

   Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

9. Enter the number of **Sample Iterations**.

10. Enter the number of **Batch Iterations**. This only applies to compatible systems and is otherwise disabled.

11. Choose the **Calibration** that is going to be used with this procedure.

12. Select the **Approval Required** check box only if the results of the background check should not be added to the QA results automatically.

13. Press the **Save** button when done.

Daily Source Check Procedure Creation

We will create a source check procedure for the LB4100 simulator for a single count.

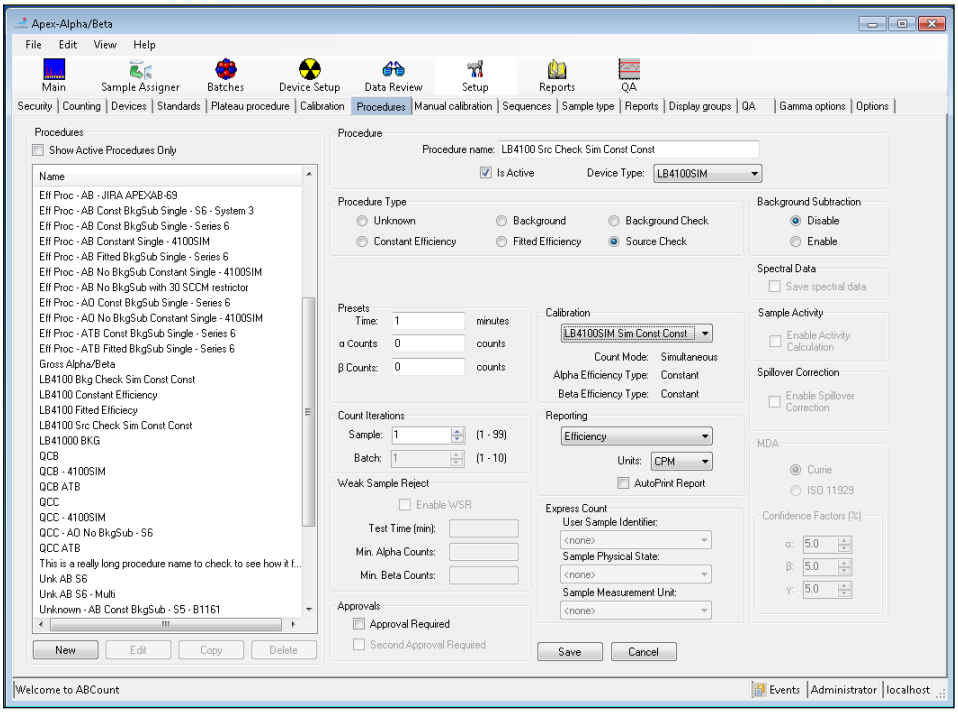


Figure 23 Creating a Source Check Procedure

To create a new Daily Source procedure:

1. Choose the **Setup** view button then the **Procedures** tabbed page.

2. Select the **New** button.

3. Enter the procedure name. In this example “LB4100 Src Check Sim Const Const” was entered.

4. Choose the **Device Type**.

5. Select the **Is Active** check box.

6. Select the **Source Check** procedure type.

7. Choose the **Preselected Group** if using an automatic sample changer based system.

   Note: The counting group can be changed at count time if necessary.

8. Enter the check **Presets Time** and/or **Counts**.

   Note: For a procedure that has an Alpha Then Beta count mode calibration selected, only a preset time is available. In addition, for an LB4200 or a Series 6 device and an Alpha Then Beta count mode, separate preset times for the alpha voltage phase and the beta voltage phase are available.

9. Enter the number of **Sample Iterations**.

10. Enter the number of **Batch Iterations**. This only applies to compatible systems and is otherwise disabled.

11. Select the **Background Subtraction** option. In this example “Disabled” was chosen.

12. Choose the **Calibration** that is going to be used with this procedure.

13. Select the **Approval Required** check box only if the results of the source check should not be added to the QA results automatically.

    Note: If the calibration to which this source check procedure is ultimately assigned has both alpha and beta channels, the same source check procedure may be used for both alpha and beta.

14. Press the **Save** button when done.

Daily Calibration Check Assignment

Next, we will perform a background (shown in the following figure) and source check (shown in the next figure) for a Series 5 device.

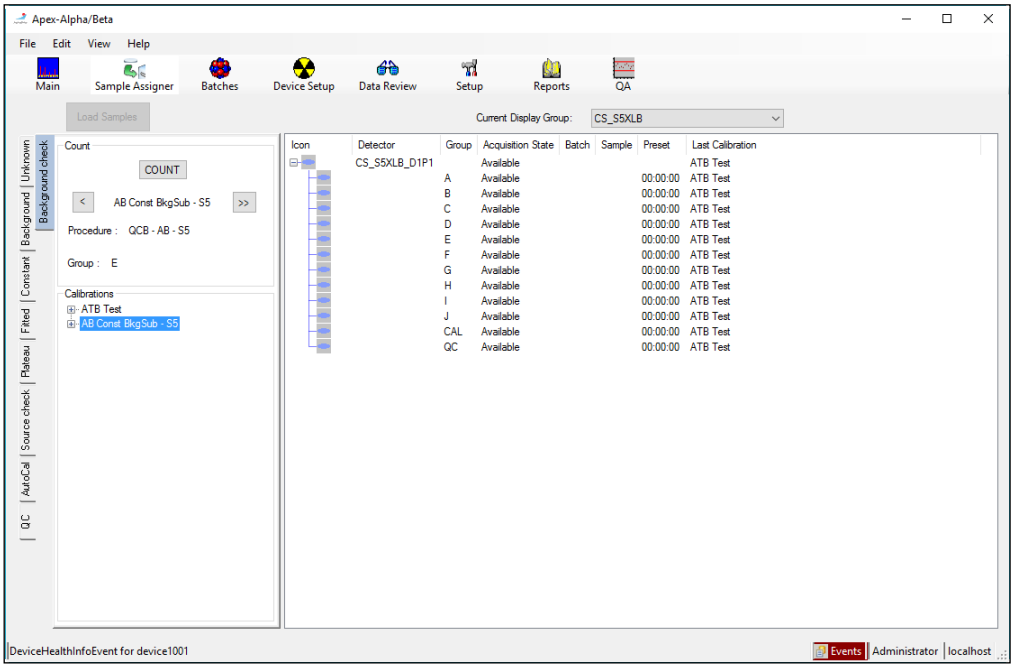


Figure 24 Performing a Background Check

To start a calibration background check count:

1. Choose the **Sample Assigner** button.

2. Choose the **Background Check** tab.

3. From the **Current Display Group** drop down list, choose a group of detectors that contain the detector(s) for the calibration check.

4. Highlight the detector(s) to be cal checked by clicking on a detector, holding the Ctrl key and select each detector to be used, or selecting all the detectors by clicking on the first detector, hold the Shift key and select each detector to be used.

5. Use the left and right buttons to locate the Calibration to be used or select the **Calibration** from the list in the lower panel.

6. Select the **COUNT** button.

The count time shown will be the value entered when the Background Check procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).

7. The detector icon should change from the Available state (blue) to the Assigned state (cyan).

   Note: If the **Setup** | **Option** | **Sample Delay** is enabled it is not necessary to press any additional buttons. It is still possible to override the delay by pressing the **Load Samples** button and following the prompts.

8. Press **Load Samples**.

   The Load Samples summary report preview will appear detailing which standard should be placed in each detector.

9. Press **Start Count**.

   The detector icon should change to the Counting state (green).

10. Select the **Main** view button for count status information during the count.

To start a calibration source check count:

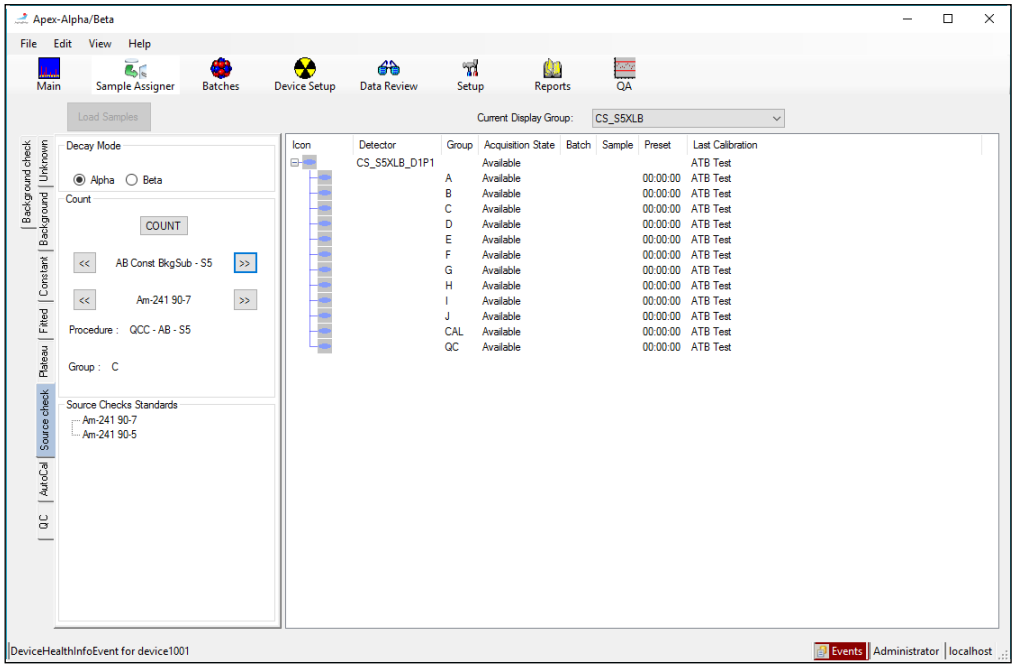


Figure 25 Performing a Source Check

1. Choose the **Sample Assigner** button.
2. Choose the **Source Check** tab.
3. Use the left and right buttons to locate the **Calibration** to be used.
4. Use the left and right buttons to choose the **Source Check Standard** assigned to the selected detector.
5. Press the **COUNT** button. Repeat this process until all desired detectors are assigned.

   The count time shown will be the value entered when the Background Check procedure was created, however it can be adjusted through the context menu by right-clicking on the detector (non-sample changer) or group (sample changer).
6. The detector icon should change from the Available state (blue) to the Assigned state (cyan).

   Note: If the **Setup** | **Option** | **Sample Delay** is enabled it is not necessary to press any additional buttons. It is still possible to override the delay by pressing the **Load Samples** button and following the prompts.
7. Press **Load Samples**.
8. The Load Samples summary report preview will appear detailing which standard should be placed in each detector.
9. Press **Start Count**.

   The detector icon should change to the Counting state (green).
10. Select the **Main** view button for count status information during the count.

Sequences

Apex-Alpha/Beta allows you the ability to create sequences of procedures that are available for sample changer based systems. A sequence allows one to “bundle” multiple procedures into a single Sequence so that groups of batches can be started with fewer mouse clicks. This is particularly useful for system calibration and for daily checks.

Calibration Sequence

As has been demonstrated earlier in this chapter, a system can be calibrated by using discreet batches to count everything from a plateau through to efficiency. By creating a calibration sequence, all of the discreet steps can be combined so that the unit can calibrate unattended. Even the ROI calibration step that is not normally associated with a batch can be included.

To create an AutoCal sequence for the complete, calibration or re-calibration of your system, the following conditions apply:

1. If you intended to count unknown samples using an alpha only or alpha then beta count mode, an alpha plateau as well as a beta plateau procedure must be included in the AutoCal sequence. Note that a beta plateau is not required for alpha only mode counting.

2. Any Plateau procedure included in a sequence must come before any non-plateau procedure in the sequence.

3. If an Auto ROI procedure is included in the sequence, it must come after all plateau procedures and before all other procedures. For details on Auto ROI see *Perform Auto ROI* on page 120.

4. The operating voltage determined by a plateau procedure run in the sequence becomes the current system operating voltage immediately upon completion of that plateau procedure. Any procedure executed after that plateau procedure, whether in the same sequence or not, uses the new voltage setting.

5. The discriminator settings determined by an auto ROI procedure are applied to all the remaining procedures in that sequence that use the status of the ROI procedure executed. While the ROI procedure is running the status and when it completes the results can be observed on the ROI page of the Device Setup view. The Beta Upper Level and Alpha Lower Level settings will be set in the Perform Manual ROI section. The alpha and beta counts and the % spillover for each iteration of the procedure will be seen in the Count Data section.

Daily Check Sequence

On a routine basis users typically perform background and efficiency checks to verify that the unit is operating normally. This consists of one or more background and source check batches. Apex-Alpha/Beta operating on a sample changer based unit can automatically bundle all of the diverse procedures into a single item to be started.

Create a Sequence

Finally, we will create an “AutoCal” counting sequence for a Series 5 device.

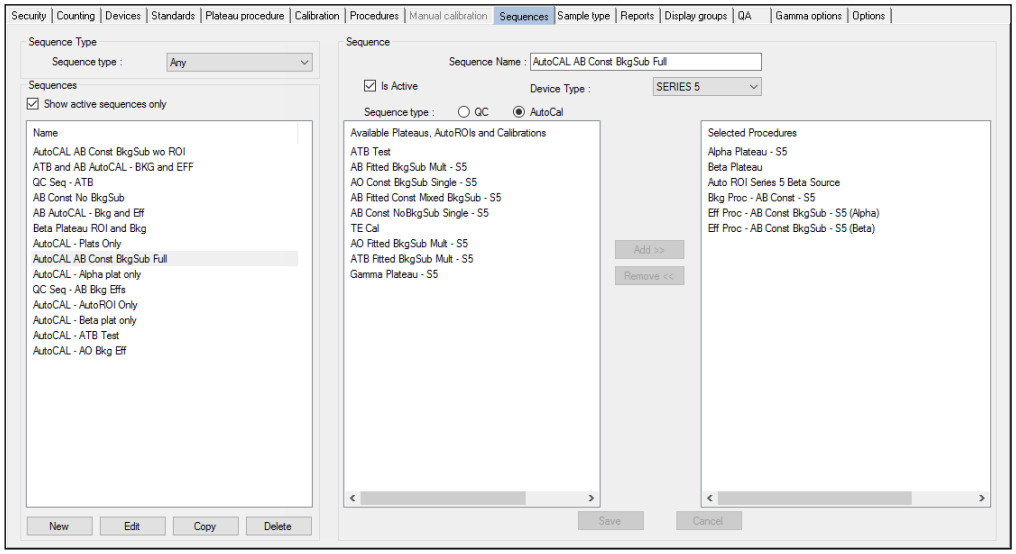


Figure 26 The Sequences Setup Page

To create a new sequence:

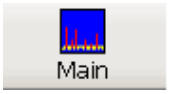
1. Choose the **Setup** view button then the **Sequences** tabbed page.
2. Enter the sequence name. In this example “AutoCAL AB Const BkgSub Full” was entered.
3. Select the **Sequence Type**. In this example “AutoCAL” was selected.
4. Select the **Device Type**.
5. Select the **Is Active** check box.
6. Select a plateau, AutoROI, or calibration for this sequence from the Available Plateaus, AutoROIs and Calibrations list. Note that any Background or Constant Efficiency procedures associated to a selected calibration will be seen in the Selected Procedures list.
7. Click on the **Add** button to move them to the Selected Procedures list. Repeat steps 6 and 7 for each component needed for the sequence. Be sure to add them in the order of execution (refer to the list of conditions given in *Calibration Sequence* on page 55).
8. In the Selected Procedures list, edit the Carrier ID for each procedure to correspond to the carrier number used for that procedure.
9. Press the **Save** button when done.

Start a Sequence

Refer to the following sections to count a sequence:

- AutoCAL sequences; see *AutoCAL Count* on page 96.
- QC sequences; see *QC Count* on page 98

4. Main View



The **Main** view can be accessed by pressing the **Main** button on the Apex-Alpha/Beta toolbar or by selecting the **View | Main View** menu option. The Main View shows the status of devices, drawers, and detectors. Drawers are displayed in two rows, and up to four drawers can be displayed at a time.

Note: The data displayed will vary according to device type.

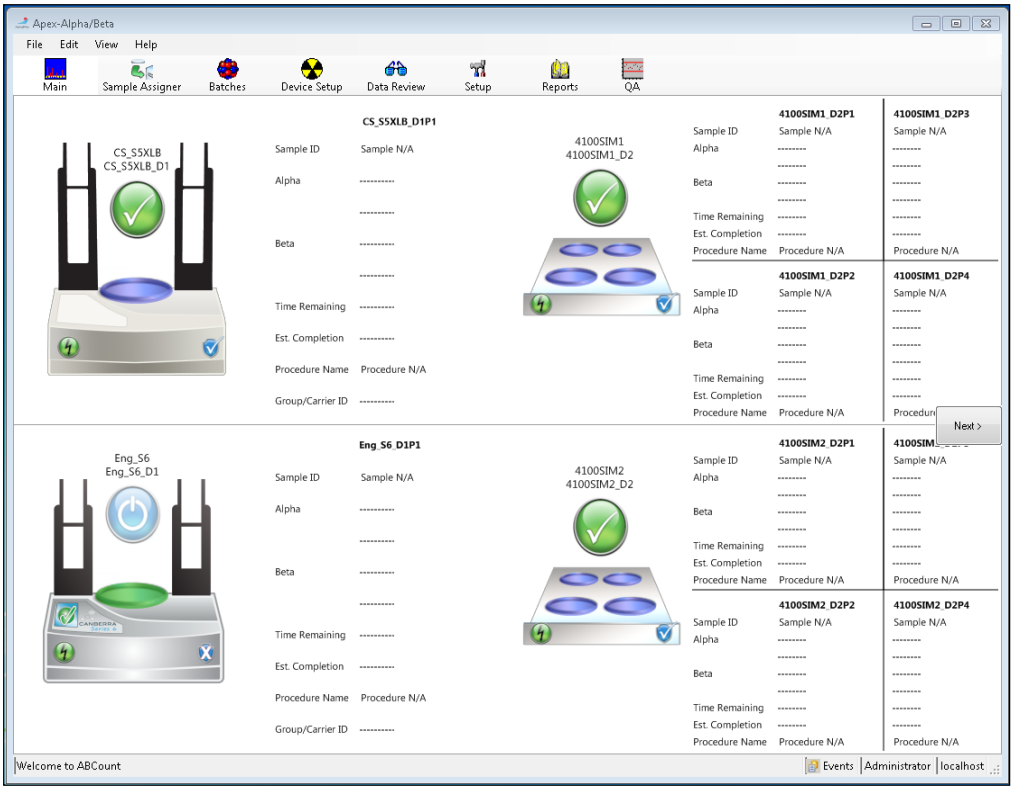


Figure 27 The Main Apex-AB View

Device Arrangement

A single device consists of the Device/Drawer Display Area and the Detector Display Area as shown in the following figures.

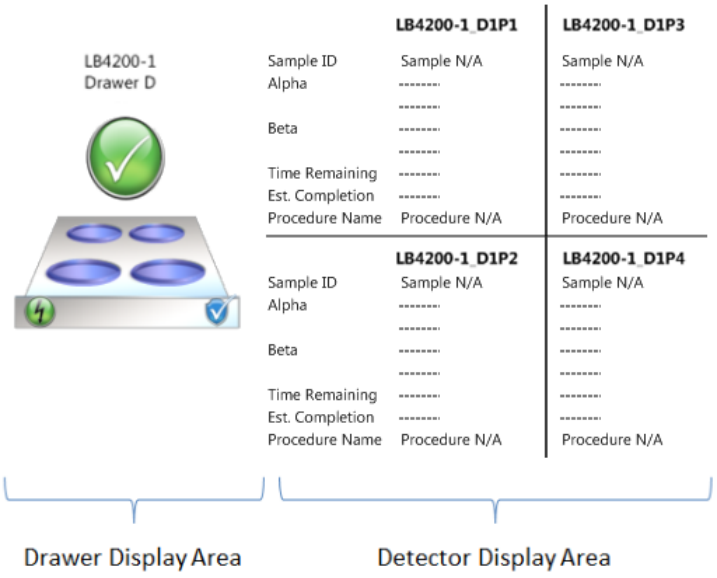


Figure 28 Sample Display Arrangement for LB4200

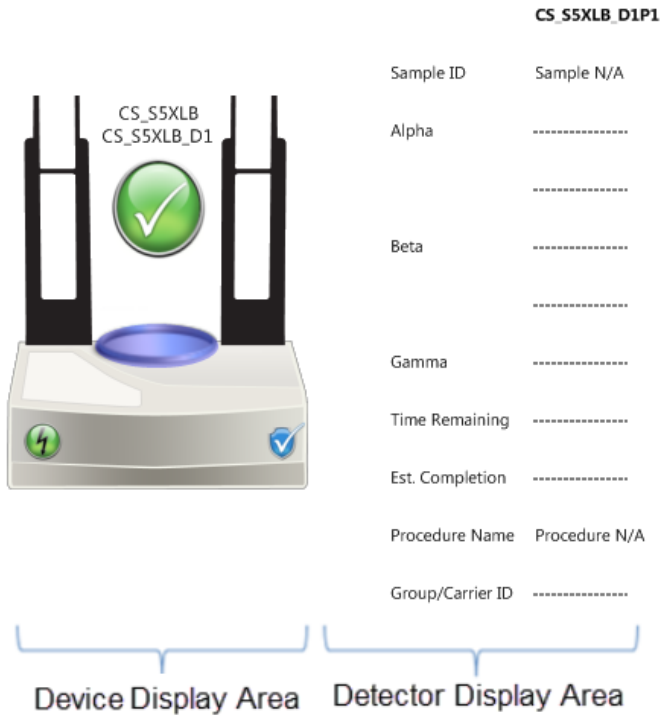


Figure 29 Sample Display Arrangement for a Series 5 Sample Changer Based System

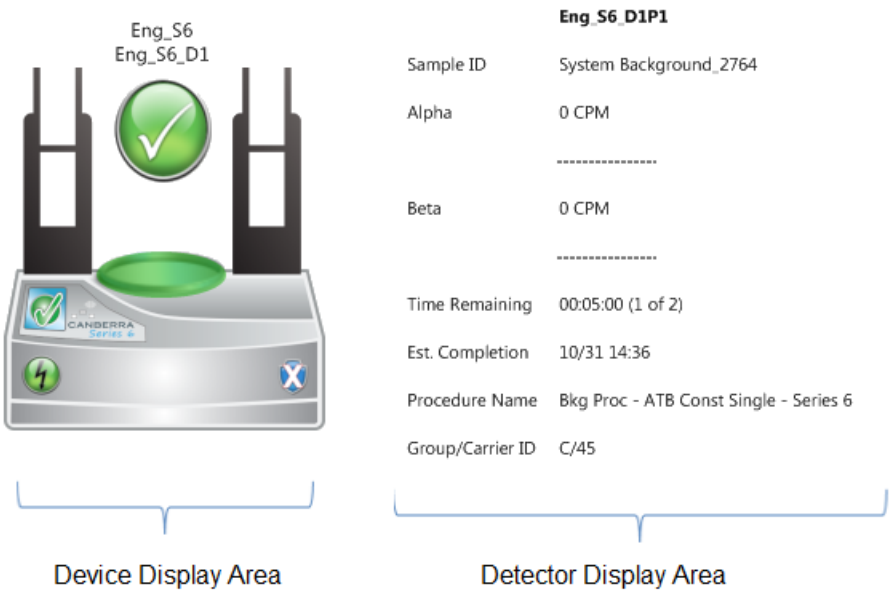


Figure 30 Sample Display Arrangement for a Series 6 Sample Changer Based System

Device/Drawer Display Area

The Device/Drawer Display Area shows status information for a drawer based system.

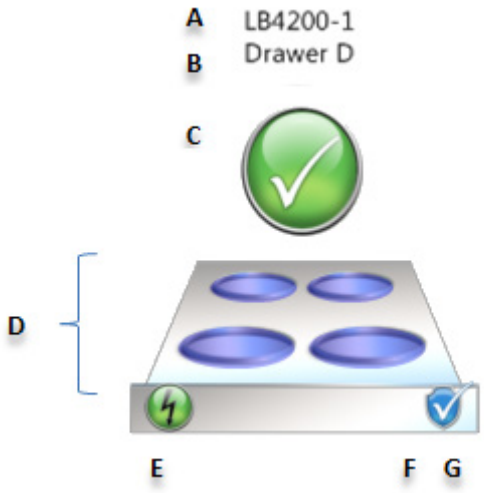


Figure 31 A Sample Device/Drawer Display Area for LB4200

A. Device Name

B. “Drawer” Name

C. Device/Drawer Status – This symbol represents the device and drawer status. Hover the mouse pointer over the status icon to see a description of the status.

   a. Check – Device/Drawer OK

   b. Check (flashing) – Gas purge or bias voltage initialization in progress

   c. Open Drawer – Drawer Open

   d. Universal power symbol (fading in and out) – Standby

   e. Triangle (yellow) – Gas Inlet Pressure problem

   f. Triangle (red) – Gas Outlet Flow problem

   g. X (white) on red background - device offline.

D. Detectors – One to eight detectors may be displayed in this section, depending on the device type and configuration. The layout of the detectors matches the physical arrangement of the detectors in the drawer.

   Detector Status – The color of each detector indicates the current status of that detector. Hover the mouse pointer over a detector icon to see a description of the status.

   a. Available – Blue

   b. Assigned – Cyan

   c. Counting – Green

   d. Out of Service – Red

   e. Offline – a red X

E. Voltage – Hover the mouse pointer over the voltage icon to see the sample detector voltage.

F. Pulser – Indicates that the test pulser is enabled. This icon is not visible when the pulser is disabled.

G. Guard – This symbol indicates the guard state. Hover the mouse pointer over the guard status icon to see the guard state and the guard count rate.

   a. Shield with check – Guard enabled

   b. Shield with X – Guard disabled

The Device Display Area shows status information for a sample changer based system.

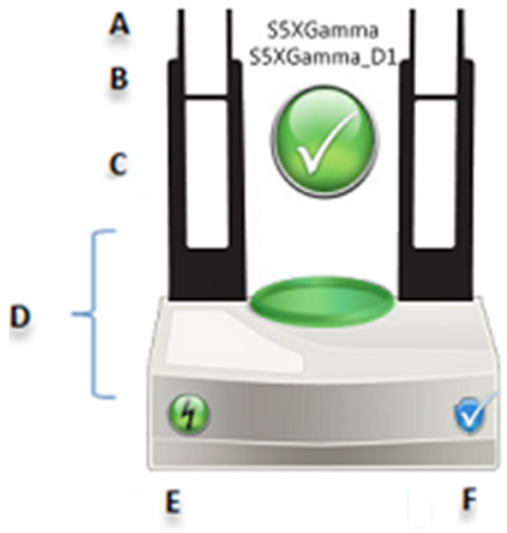


Figure 32 A Sample Device Display Area for a Series 5 Sample Changer Based System

A. Device Name
B. "Detector" Name
C. System Status – This symbol represents the device and drawer status. Hover the mouse pointer over the status icon to see a description of the status.
    a. Check – Drawer OK
    b. Check (flashing) – Gas purge or bias voltage initialization in progress
    c. Open Drawer – Drawer Open
    d. Universal power symbol (fading in and out) – Standby
    f. Triangle (red) – Gas Outlet Flow problem
    g. X (white) on red background - device offline.
D. Detectors – The color of the detector indicates the current status of that detector. Hover the mouse pointer over the detector icon to see a description of the status.
    a. Available – Blue
    b. Assigned – Cyan
    c. Counting – Green
    d. Out of Service – Red
    e. Offline – a red X

E. Voltage – Hover the mouse pointer over the voltage icon to see the sample detector voltage.

F. Guard – This symbol indicates the guard state. Hover the mouse pointer over the guard status icon to see the guard state and the guard count rate.

   a. Shield with check – Guard enabled

   b. Shield with X – Guard disabled

Context Menu

The context menu provides a mechanism to control certain device functions. Right-clicking on a detector in the Device/Drawer Display Area brings up a context menu.

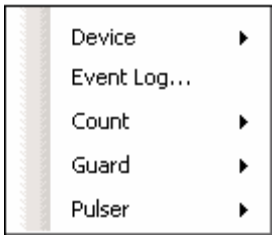


Figure 33 Main View - Drawer Display Context Menu

Device

To halt communications with a device, select the **Offline** option. Note that this will abort any counts that are currently in progress. To restart communications with a device, select the **Reconnect** option.

Event Log

The Event log displays the event log for all devices and drawers.

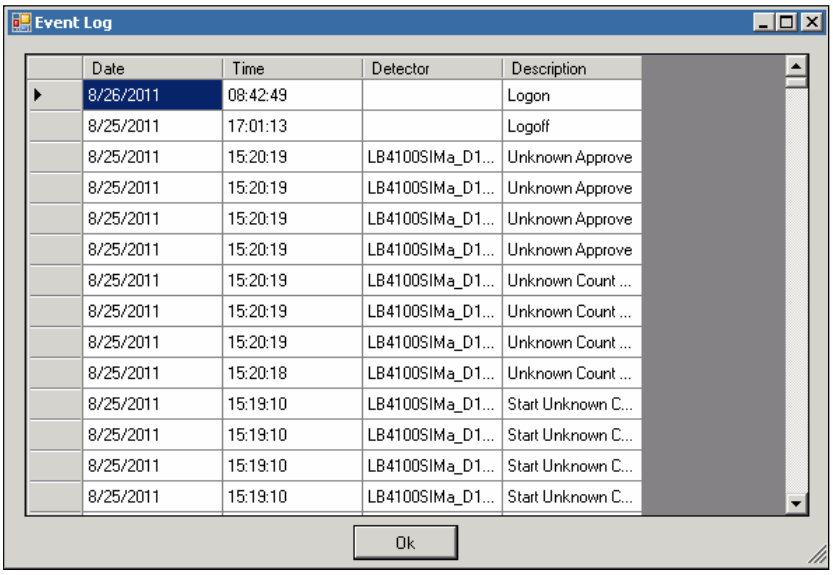


Figure 34 Event Log Screen

Count

A count that is in progress can be stopped in two ways. The **Abort** option stops the count and in the case of an unknown, the sample will be available to be counted again. The **Stop and Analyze** option stops the count and analyzes any data acquired, as though the preset has been reached.

Guard

The **Guard Enabled** and **Alpha/Beta Anticoincidence Enabled** should both be enabled for normal operation. These options can be disabled for diagnostic purposes.

The **Guard** option in general and the **Alpha/Beta Anticoincidence Enabled** option specifically will not be available for all device types.

Pulser

The **Pulser** will not be available for all device types. The test pulser can be used for diagnostic purposes. When enabled, the amplitude can be set to either **Beta** or **Alpha and Beta**.

Beta – Pulses below 17% full scale of the amplifier @ ~12000 counts per minute.

Alpha and Beta – Pulses @ ~6000 counts per minute below 17% full scale and ~6000 counts per minute above 17% full scale.

Note: With guard enabled the count rate in both the alpha or beta sample channel should be zero. Disable the guard to perform sample channel tests for count rate.

The Destination refers to the point at which test pulses are injected into the signal chain.

Preamplifier will send the signal through a preamplifier for a more through test and will verify the integrity of the entire signal chain.

Main Amplifier will bypass the Preamplifier of the system. This is useful for testing the system controller independent of the entire system. This option will not be available for all device types.

Detector Display Area

The Detector Display Area shows count data and allows control of the device through context menus. Data for one to eight detectors will be displayed, depending on the device type and configuration. The layout of the detectors matches the physical arrangement of the detectors in the drawer. For each row, a header is displayed, with the exception of Alpha and Beta which have two rows each for data.

At lower screen resolutions, text may be truncated due to space limitations. Hover the mouse pointer over any truncated item to see it in its entirety.

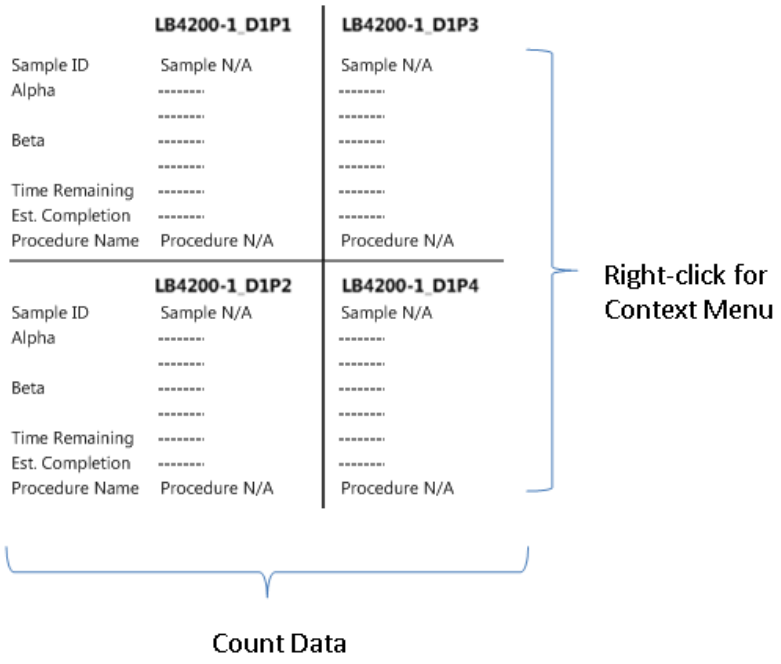


Figure 35 A Sample Detector Display Area for LB4200

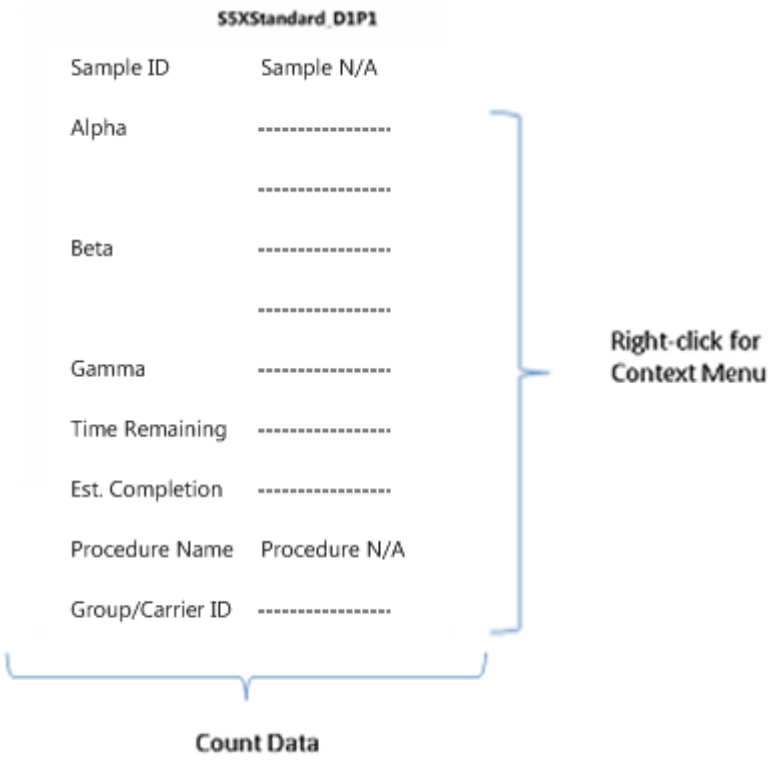


Figure 36 A Sample Detector Display Area for Sample Changer Based System

Count Data

An explanation of the count data is given below:

- **Sample ID** – Name of the most recently counted sample.
- **Alpha/Beta** – Each of these fields have two lines. Data displayed depends on the count type, count mode, and procedure analysis options.
  - **Plateau** – Count rate in CPM for the current channel. No data in the opposite channel.
  - **Background**, **Background Cal Check**, **Manual ROI** – Count rate in CPM in each channel. Beta shows no data for Alpha Only.
  - **Constant Efficiency**, **Efficiency Cal Check**, **Fitted Efficiency** – Count rate in CPM and % efficiency for the current channel. Count rate in CPM and % spillover for the opposite channel for Simultaneous counts. Beta shows no data for Alpha Only.

  - **Unknown** – Count rate in CPM for each channel when sample activity is disabled. Activity concentration in selected units and MDA for each channel when sample activity is enabled. Beta shows no data for Alpha Only.

- **Time remaining** – Count time remaining for current iteration/step
- **Est. Completion** – Estimated time remaining for all iterations/steps. This value does not include purge time or HV settling time.
- **Procedure Name** – Displays the current procedure name.
- **Group/Carrier ID** – Displays the letter of the selected Group and the Identification number of the sampler carrier.

Context Menu

The context menu provides a mechanism to control certain device functions. Right-clicking on a detector in the Detector Display Area brings up a context menu.

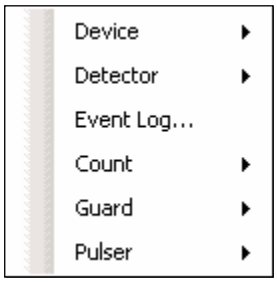


Figure 37 Main View - Detector Display Context Menu

Device

To halt communications with a device, select the **Offline** option. Note that this will abort any counts that are currently in progress. To restart communications with a device, select the **Reconnect** option.

Detector

A detector that is In Service may be used for counting.

- A detector that is Out Of Service may be used only for calibrations (plateau, background, and efficiency counts).
- A detector that is Offline cannot be used for counting. This option is useful if a detector has been physically removed from a device.

Event Log

The Event log displays the event log for all devices and drawers.

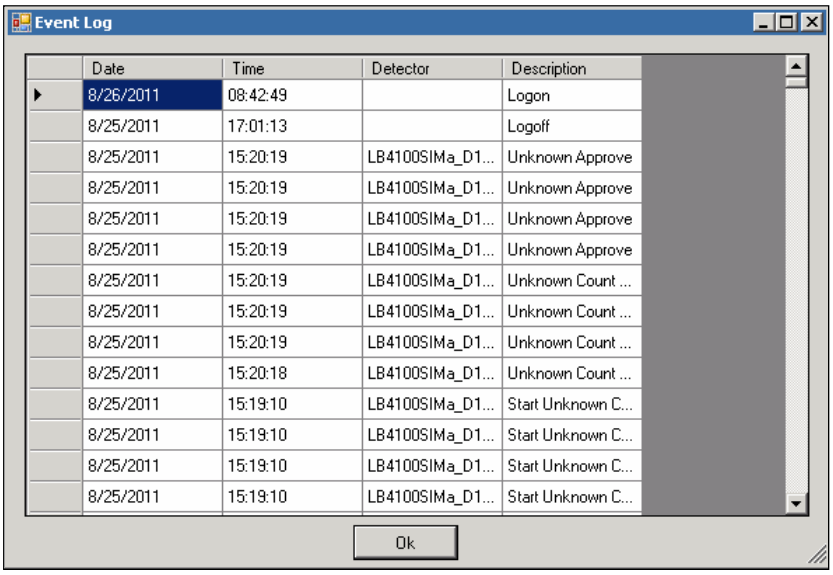


Figure 38 Event Log Screen

Count

A count that is in progress can be stopped in two ways. The **Abort** option stops the count and in the case of an unknown, the sample will be available to be counted again. The **Stop and Analyze** option stops the count and analyzes any data acquired, as though the preset has been reached.

Guard

The **Guard Enabled** and **Alpha/Beta Anticoincidence Enabled** should both be enabled for normal operation. These options can be disabled for diagnostic purposes. The **Alpha/Beta Anticoincidence Enabled** option will not be available for all device types.

Pulser

The test pulser can be used for diagnostic purposes. When enabled, the amplitude can be set to either **Beta** or **Alpha and Beta**.

Beta – Pulses below 17% full scale of the amplifier @ ~12000 counts per minute.

Alpha and Beta – Pulses @ ~6000 counts per minute below 17% full scale and ~6000 counts per minute above 17% full scale.

Note: With guard enabled the count rate in both the alpha or beta sample channel should be zero. Disable the guard to perform sample channel tests for count rate.

The Destination refers to the point at which test pulses are injected into the signal chain.

Preamplifier will send the signal through a preamplifier for a more through test and will verify the integrity of the entire signal chain.

Main Amplifier will bypass the Preamplifier of the system. This is useful for testing the system controller independent of the entire system. This option will not be available for all device types.

Resynchronize Hardware

Where supported by the device, it will be possible to resynchronize automatically with hardware and update count data. This action will interrogate the device to get the last data that were not sent by the device to the application.

Automatically performed when the application opens or, if the device had been taken offline, when it is reconnected through the context menu.

Gas State

The gas state is displayed the Main view. States available are:

- Gas off
- Standby
- Available
- Purging
- HV Settling
- Counting

5. Sample Assigner View

The **Sample Assigner** view is used to start a count by associating samples/batches with a detector. From this view you can assign and start all types of counts: Plateau, Background, Efficiency, Source Checks, Background Checks, and Unknowns. In addition, for sample changer systems, sequences for running calibration (AutoCal) and background and/or source checks (QC) can also be started.

The **Sample Assigner** view can be divided into three parts (from left to right):

- Nine Count type tabs.
- Middle pane shows the samples and batches that are available for counting based on the count type.
- The detector grid display is the same for all count types. This list represents the detector state.

Notes:

- An Express Count can be started by selecting the **COUNT** button. This quickly starts an unknown count without batch pre-entry. See *Express Count Configuration* on page 77 for more information.
- A sequence can only be assigned to a detector using the **COUNT** button from either the QC or AutoCal tab of the Sample Assigner view.
- An AutoCal sequence will always be assigned or can only be assigned to the CAL group and a QC sequence to the QC group as long as they are available.
- If you unassign all samples from the current display group, the Sample Assigner disables the **Load Samples** button.

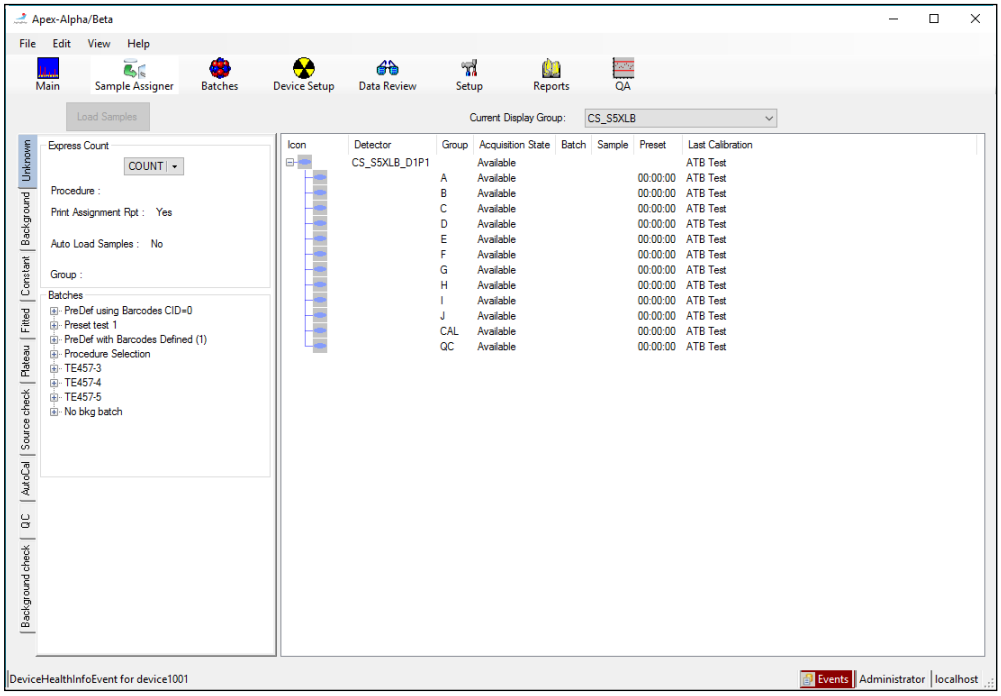


Figure 39 Sample Assigner View

Resizing the Display

The horizontal line separating the Batch/Sample Tree pane from the Detector grid can be dragged left or right to change the size of the panes.

Current Group Display

Displays the name of the current display group. From the drop down list, select from all display groups to quickly navigate to the desired group.

Detector Grid

The detector grid includes information on each detector in **Current Display Group**. The Sample Assigner dynamically updates this list to reflect any changes to detector status.

Note: If you right-click on the Detector grid's title bar, you can select the information that is displayed in the grid.

Detector Grid Information

Detector Icon

The color of the detector icon is a visual indication of the detector or device state:

- Blue for Available
- Cyan for Assigned
- Gray for Queued
- Green for Counting
- Red for Out of Service
- Grey with a red X for Offline (also indicates that the device is Offline)

Detector

Displays the detector name.

Group

Displays the group name for a Sample Changer based system.

Notes:

- For multi detector systems, only detector lines will be available.
- For sample changers, groups and detector lines will be available.

  The group list are:

  – From A to J (for unknown, background, constant and fitted efficiency, plateau and source check and background check procedures)

  – CAL (for AutoCal sequence)

  – QC (for QC sequence)

Acquisition State

The current state of the detector as:

- Available: Ready to be assigned
- Assigned: Ready to load samples
- Counting: Currently counting
- Offline: Not currently available
- Out of Service: Not available for counting

Batch

Display the batch name.

If batches are assigned (no counting in progress), data of the last batch assigned are displayed with the detector. If a counting is in progress, data of the counted sample are displayed with the detector.

Sample

Displays the sample name.

Preset

Displays the preset time.

Last Calibration

Displays the last calibration that was performed.

DetOrder

Displays the sequential order of the detector.

Detector Grid Context Menu

If you right-click on a detector you will see a context menu; its settings and functions are described.

Change Preset Count Time allows modification of the count time. The preset alpha and preset beta counts cannot be changed.

Unassign Samples will unassign only the sample assigned to the highlighted detector. For sample changer based systems, this option will unassign the batch from the assigned group. For Unknowns and Fitted Efficiencies it will return the sample or batch to the batch/sample assignment tree.

Unassign All Samples

- **In Batch** will unassign all assigned samples associated with the highlighted detector's batch and for Unknowns and Fitted Efficiencies return them to the batch/sample assignment tree.

- **In Display Group** will unassign all assigned samples associated with the highlighted detector's display group and returns them to the batch/sample assignment tree.

Changing the Preset Count Time

Once you assign a sample to a detector, the Sample Assigner sets the preset/count time according to the procedure associated with this sample or count type. You can change the preset time via the **Change Preset Count Time** option in the Detector Grid context menu.

Notes:

- For some devices, a warning message may be displayed stating "Overriding preset count time on a drawer that does not feature independent start/stop will override preset count on all its assigned detectors". Click **OK** to continue and enter the new preset count time.

- For sample changer systems, the preset count time cannot be modified from the detector line. It can only be modified from the group line. Also, be aware that changing the preset time of a sequence will change the preset for *all* procedures in the sequence, which is usually not desirable.

Count Type Tabs

The Count Type tabs to the left of the Sample Assignment View allows for quick access to each count type. The tabs displayed depend on the device in use.

Count Types

There are nine tabs:

Unknown – The top pane shows the configuration for Express Counts. The middle pane shows any uncounted predefined batches created from the **Batches** view. The bottom pane is currently not used.

Background – The top pane allows selecting the calibration to be used for the background calibration count. The procedure associated to the selected calibration is displayed. For a sample changer system, the preselected group (if defined in the procedure) is also shown. The bottom pane tree view can be expanded to list the details of the procedure associated to the calibration. The calibration can also be selected from this list.

Constant – The top pane allows selecting the decay mode (alpha or beta) of the constant efficiency calibration count. The middle pane allows selecting the calibration and standard to be used for the count. The procedure associated to the selected calibration is listed. For a sample changer system the preselected group (if defined in the procedure) is also shown. The bottom pane lists the standards available to be selected for the count, based on the Decay Mode selection. The standard can also be selected from this list.

Fitted – The top pane allows selecting the decay mode (alpha or beta) of the fitted efficiency calibration count. The middle pane allows selecting the batch to be used for the count. The calibration and procedure associated to the selected batch are listed. For a sample changer system the preselected group (if defined in the procedure) is also shown. The bottom pane lists the batches available to be selected for the count. The batch can also be selected from this list.

Plateau – The top pane allows selecting the decay mode (alpha or beta) of the plateau count. The middle pane allows selecting the plateau procedure and standard to be used for the count. The procedure associated to the selected calibration is listed. For a sample changer system the preselected group (if defined in the procedure) is also shown. The bottom pane lists the standards available to be selected for the count, based on the Decay Mode selection. The standard can also be selected from this list.

Source Checks – The top pane allows selecting the decay mode (alpha or beta) of the source check count. The middle pane allows selecting the calibration and standard to be used for the count. The procedure associated to the selected calibration is listed. For a sample changer system the preselected group (if defined in the procedure) is also shown. The bottom pane lists the standards available to be selected for the count, based on the Decay Mode selection. The standard can also be selected from this list.

AutoCAL – This tab is enabled only for sample changer systems. The top pane allows selecting the AutoCal sequence to be executed. It includes an expandable tree view of the procedures included in the sequence. The bottom pane lists the AutoCal sequences available to be selected. The sequence can also be selected from this list.

QC – This tab is enabled only for sample changer systems. The top pane allows selecting the QC sequence to be executed. It includes an expandable tree view of the procedures included in the sequence. The bottom pane lists the QC sequences available to be selected. The sequence can also be selected from this list.

Background Check – The top pane allows selecting the calibration to be used for the background check count. The procedure associated to the selected calibration is listed. For a sample changer system the preselected group (if defined in the procedure) is also shown. The bottom pane tree view lists the calibrations defined with background check procedures. The tree view can be expanded to list the details of the procedure associated to the calibration. The calibration can also be selected from this list.

Unknown Count

The **Unknown** tab allows counting an unknown sample batch either from a predefined batch or as an Express Count.

Predefined batches are listed in alphabetical order; their samples are listed by the order in which they were defined when the batch was created.

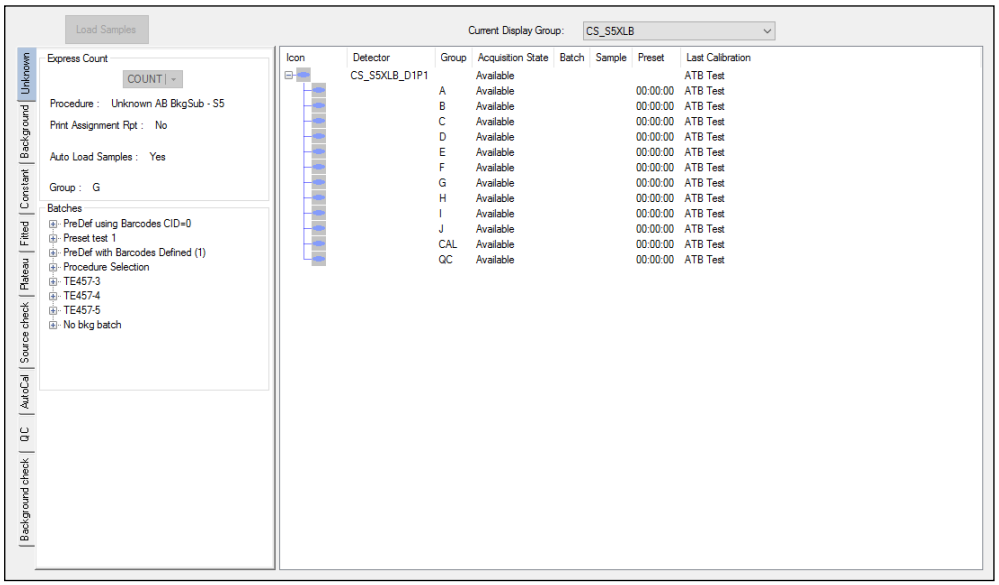


Figure 40 Unknown Counting Tab

Assigning Samples and Batches

Refer to *Express Count Configuration* on page 77 or *Drag and Drop* on page 78.

Batches samples can be either pre-entered or Express Count:

- Pre-entered batches are setup before counting.
- Express batches may not need data entry or data entry can be completed during or after the analysis.

For a sample changer system, selecting or dragging a batch onto a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Express Count Configuration

Note: When clicking the **COUNT** button to activate the Express Count feature for the first time, the configuration dialog will appear. The next time Express Count is selected, the previously selected configuration will be used automatically. To make changes to an Express Count, click on the down arrow and then select the **Modify** option. If the procedure used by the Express Count is modified, clicking the **COUNT** button will again display the configuration dialog.

For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) or onto the last group used if the preselected group is not defined. For the first Express Count, the first available group will be used if the preselected group is not defined. Note that once an assignment is made to any group, the **COUNT** button is disabled when the detector is selected. After the first assignment is made a specific group must be selected.

For a manual device, select one or more detectors and click the **COUNT** button. For a sample changer device, select the detector or one or more groups and click the **COUNT** button. Express Count will automatically assign the batch to the selected detector(s) or group(s). If the configuration screen is displayed (Figure 40) click the **OK** button to assign the Express count to the detector or group. If **Immediate Count** has been enabled the batch will be loaded and counting will start automatically. Otherwise click the **Load Samples** button which will display the Assignment Summary report. Click **OK** to the report to load the samples and start counting.

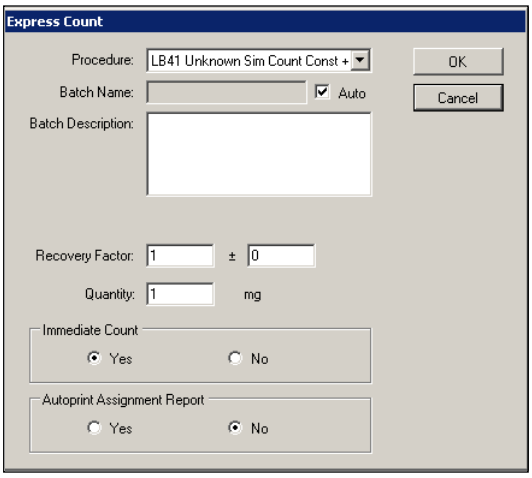


Figure 41 Express Count Dialog

Procedure

The drop down list contains all procedures that are currently available for Express Count.

Batch Name

Allows the user to specify a name for the batch. This is a required field if **Auto** check box is not selected.

Auto

When the Auto option is selected, batches will be named automatically according to the pattern specified on the Options tab of the Setup view.

Note: If Auto option is cleared, the Express Count dialog will appear each time the **COUNT** button is pressed.

Batch Description

Allows the user to provide a description for the batch.

Preselected Group

This field is displayed only for sample changer systems. This is a read-only field indicating the preselected group (A-J) if defined in the selected procedure.

Recovery Factor

Allows the user to specify a Recovery Factor and uncertainty for all samples in the Express Count batch. This factor is applied to the detector efficiency for the purposes of reporting activity, concentration, and Currie and Bayesian (ISO-11929) MDA.

Quantity

Allows the user to specify the quantity of the sample.

By default the quantity is set to 1 *unit*, where *unit* is the Sample Measurement Unit selected in the procedure used for the Express Count.

Immediate Count

When the “Yes” option is selected, assigned counts will start immediately when the Express Count is used. Otherwise, samples from the Express Count batch are assigned, but the user must click the **Load Samples** button for counting to begin.

Autoprint Assignment Report

When the “Yes” option is selected, the Assignment Report will be printed automatically when Immediate Count is also set to “Yes”.

Drag and Drop

You can assign a single sample from a batch by dragging and dropping a single sample or an entire batch at once by dragging and dropping the batch node. Once the Sample Assigner successfully completes the assignments, it removes all assigned samples from the Batch/Sample Tree.

If there are no more unassigned samples in the batch, the Sample Assigner also removes the batch node. If there are no queued batches left, the Sample Assigner removes the Queued Batches node completely.

Additional Notes

- Sample assignment starts with the first detector; if there is more than one sample, the detector assignments will be made in sequential order. Samples are assigned only to detectors that are available for counting.

- If not enough detectors are available for all of the samples, you'll be given the option of canceling the drop or choosing to have the Sample Assigner assign only as many samples as there are detectors available.

- For sample changers you cannot assign batches sample by sample. A batch shall be assigned onto a group or a detector.

- Dropping a batch onto the detector of a sample changer device will automatically assign the count to the preselected group (if defined in the procedure) or onto the last group used if no preselected group is defined. If no previous count had been performed and there is no preselected group defined in the procedure it will be assigned to the first group available.

- For a sample changer system, dropping a batch onto a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Express Count

Procedure

This field displays the procedure name of the last configuration. If no batches have been counted as an Express Count this field will be blank.

Print Assignment

This field displays the setting of the Autoprint Assignment Report selection in the Express Count configuration. If no batches have been counted as an Express Count this field will be blank.

Auto Load Sample

This field displays the setting of the Immediate Count selection in the Express Count configuration. If no batches have been counted as an Express Count this field will be blank.

Group

For sample changer systems, this field displays the preselected group (if defined) for the procedure last used for Express Count. If no batches have been counted as an Express Count this field will be blank.

Batches

The Batch tree view displays all predefined batches which can be expanded to show the defined sample names.

Background Count

The Background tab allows you to run a background count.

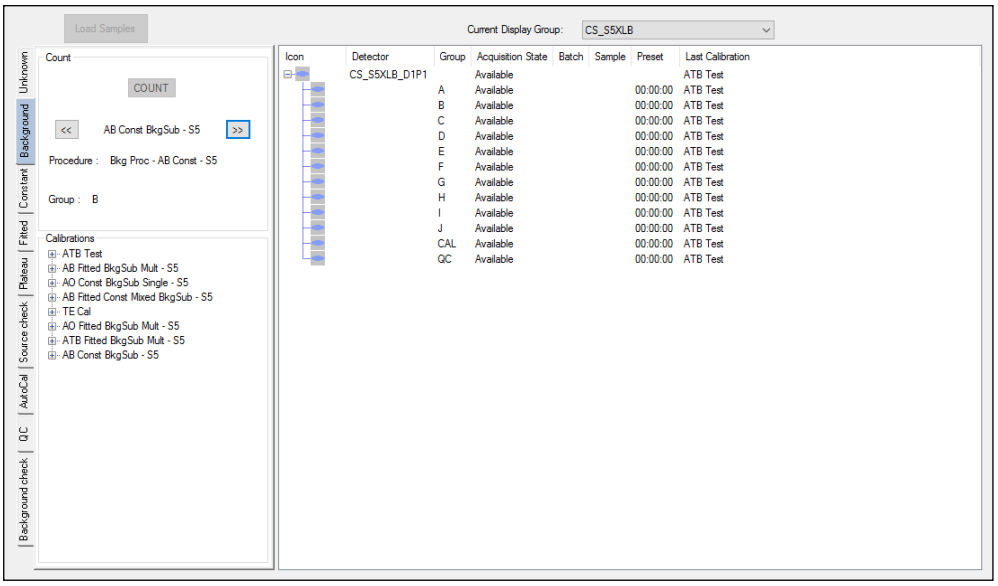


Figure 42 Background Counting Tab

Count

This section allows selecting the calibration to be used for the background calibration count. By default the first active calibration is selected.

Click on the **<<** and **>>** buttons to scroll through the active calibrations having a background procedure defined.

Procedure

Displays the background procedure name for the selected calibration.

Group

For sample changer based systems, displays the preselected group (if defined in the procedure) set for the selected background procedure.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector(s) for the background calibration.

2. Select the detector(s) or group (for a sample changer system).

   For a non-sample changer system highlight the detector(s) to be background calibrated by either holding the CTRL button and then selecting each detector, or select the first detector and then holding the SHIFT button while selecting the last detector in the group.

3. Choose the Calibration using the arrows.

4. Press the **COUNT** button.

5. For a sample changer system, steps 2 – 4 can be repeated for multiple calibrations on multiple groups.

6. Press the **Load Samples** button. See *Load Sample* on page 100 for more information.

Notes:

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Background

The Background tree view lists the active calibrations that have background procedures associated to them. When expanded the view lists the background procedure and its preset value.

For sample changer systems, the preselected group (if defined) for the background procedure is also listed in the expanded view.

The calibration for which the background procedure is to be run can be selected from this list.

Constant Efficiency Count

The Constant tab allows you to run a constant efficiency count.

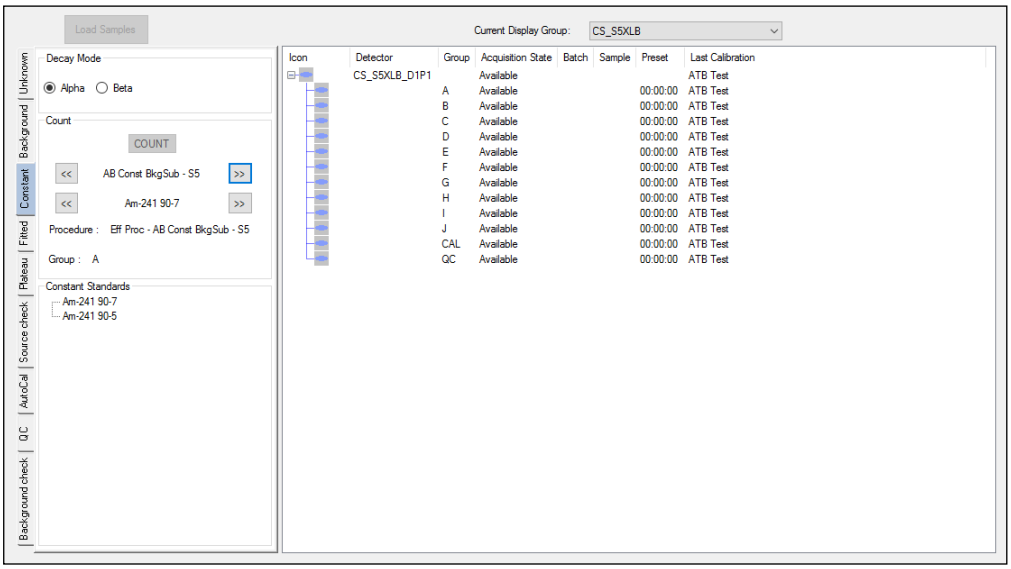


Figure 43 Constant Counting Tab

Decay Mode

This option allows selecting the decay mode (alpha or beta) of the constant efficiency calibration count.

Count

This section allows selecting the calibration to be used for the constant efficiency calibration count. By default the first active calibration having a constant efficiency procedure set for the selected Decay Mode is selected.

Standards List

Click on the **<<** and **>>** buttons to scroll through the standards for the selected Decay Mode and that have been defined to be used for Constant Efficiencies on the Standards Setup tab.

Procedure

Displays the constant efficiency procedure associated to the selected calibration and Decay Mode.

Group

For sample changer systems, displays the preselected group (if defined in the procedure) for the procedure associated to the selected calibration.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector(s) for the efficiency calibration.

2. Choose the **Decay Mode** desired.

3. Select the detector(s) or group (for a sample changer system).

   Notes:

   - For a non-sample changer system highlight the detector(s) to be efficiency calibrated by either holding the CTRL button and then selecting each detector, or select the first detector and then holding the SHIFT button while selecting the last detector in the group.

   - For the initial calibration each detector of a multi-detector system must be selected individually to assign the calibration and standard.

   - For a non-sample changer system, if the available standards had previously been used by the detectors in the Display Group, multiple detectors can be selected. When the **COUNT** button is pressed the detectors will automatically be assigned the standards used for that previous count.

4. Choose the Calibration using the arrows.

5. Choose the Standard to be assigned to the selected detector using the arrows.

Note that if multiple detectors have been selected the Standard selection is not enabled. Refer to notes in step 3 above.

6. Press the **COUNT** button.

7. For a sample changer system steps 2 – 6 can be repeated for multiple calibrations on multiple groups for both Decay Modes.

8. Press the **Load Samples** button. See *Load Sample* on page 100 for more information.

Notes:

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Constant Standards

The Constant Standards tree view displays the active standards that were defined as **Constant Efficiencies** under "Usage" on the **Standards Setup** tabbed page for the selected Decay Mode. The standard can also be selected from this list.

Fitted Efficiency Count

The Fitted tab allows you to run a fitted efficiency count.

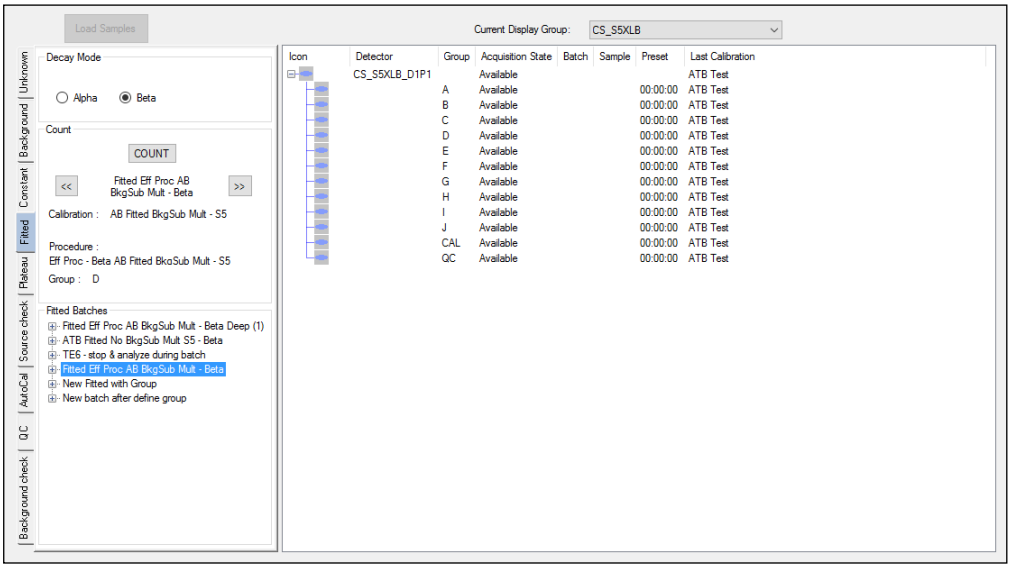


Figure 44 Fitted Counting Tab

Decay Mode

This option allows selecting the decay mode (alpha or beta) of the fitted efficiency calibration count.

Count

This section allows selecting the batch to be used for the fitted efficiency calibration count. The batches available to be selected are based on the standards defined in the batch and the selection of the Decay Mode. By default the last batch used is automatically selected. If no batches have been counted the first batch with standards defined for the selected Decay Mode is selected.

Click on the **<<** and **>>** buttons to scroll through the available batches created with a fitted efficiency procedure selected.

Calibration

Displays the calibration defined in the fitted efficiency procedure selected in the batch definition of the selected batch.

Procedure

Displays the fitted efficiency procedure defined in the selected batch.

Group

For sample changer systems, displays the preselected group (if defined in the procedure) in the defined fitted efficiency procedure of the selected batch.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector(s) for the efficiency calibration.

   Non-sample changer system:

2. Choose the **Decay Mode** desired.

3. Choose the detector to be calibrated.

4. Choose the standard to assign by expanding the batch for the selected detector using the + in the Fitted Batches tree view and select the standard to be counted.

5. Press the **COUNT** button.

6. Repeat steps 3 – 5 for the detectors to be calibrated.

7. Press **Load Samples**. See *Load Sample* on page 100 for more information.

   Sample changer system:

8. Choose the Decay Mode desired.

9. Select the group that contains the standards to be used for the calibration.

10. Select the batch for the detector of the selected group in the Fitted Batches tree view.

11. Press the **COUNT** button.

12. Steps 8 – 11 can be repeated for multiple batches on multiple groups for both Decay Modes.

13. Press the **Load Samples** button. See *Load Sample* on page 100 for more information.

Notes:

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

- For multiple selection:

  – For a non-sample changer system, if more that one detector is selected when the **COUNT** button is pressed, an error will be generated indicating an attempt to assign a batch designated for another detector.

  – For sample changer systems, if more than one group is selected, only the first group of the selection will be assigned, regardless if a preselected group is defined or included in the selection.

Fitted Batches

The Fitted Batches tree view displays all the batches defined with a fitted efficiency procedure and with standards of the selected Decay Mode. When expanded the view lists the Sample Name for each sample defined in the batch. Refer to *Batches View* on page 101 for more information. The batch can also be selected from this list.

Plateau Count

The Plateau tab allows you to run an alpha or beta plateau count.

Note: The Gamma option is available only for Series 5XLB devices that include the gamma option.

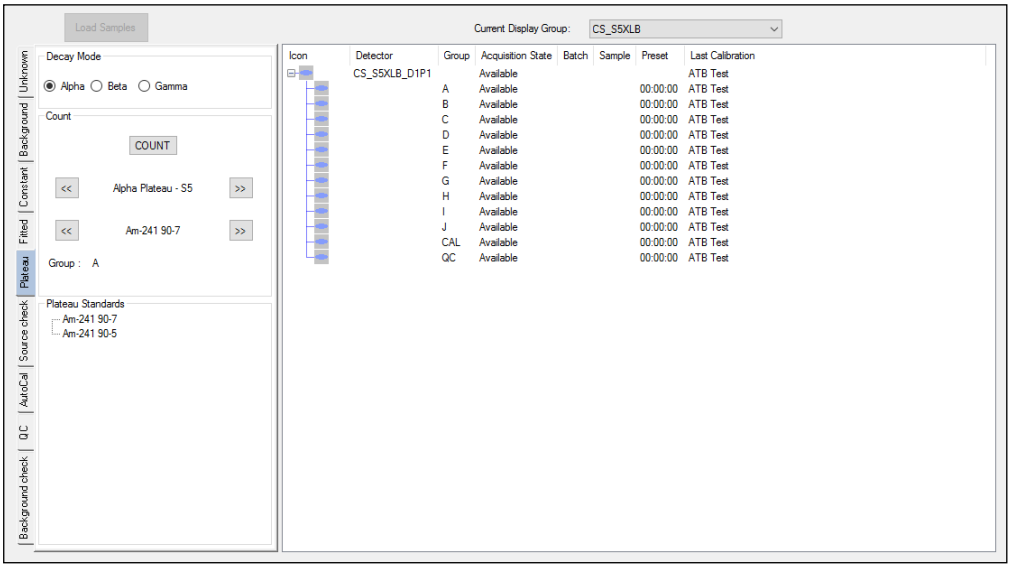


Figure 45 Plateau Counting Tab

Decay Mode

This option allows selecting the decay mode (alpha, beta, or gamma) of the plateau calibration count.

Count

This section allows selecting the plateau procedure to be used for the plateau calibration count. The plateaus available to be selected are based on the selection of the Decay Mode.

Procedures

Click on the **<<** and **>>** buttons to scroll through the procedure list. Displays the last procedure used for plateau. Otherwise, it will display the first active procedure set for the selected Decay Mode.

Standards

Click on the **<<** and **>>** buttons to scroll through the standards list. This list includes all active standards that have been defined to be used for plateaus on the Standards Setup tab, based on the selection of the Decay Mode. By default, the first active standard for the selected Decay Mode is selected.

Group

For sample changer systems, displays the preselected group (if defined in the procedure) for the selected plateau procedure.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector(s) for the plateau calibration.

   Non-sample changer system:

2. Choose the **Decay Mode** desired.

3. Select the detector(s) to be calibrated.

4. Choose the Plateau Procedure using the arrows.

5. Choose the standard assigned to the selected detector using the arrows.

6. Press the **COUNT** button.

   Notes:

   - If the plateau procedure does *not* have Approval Required checked, the message "Warning: plateau invalidates calibration" is displayed. Click **OK** to continue running the plateau or **Cancel** to not run the procedure.

   - For a non-sample changer system, if the available standards had previously been used by the detectors in the Display Group, multiple detectors can be selected. When the **COUNT** button is pressed the detectors will automatically be assigned the standards used for that previous count. Otherwise each detector must be individually selected to be assigned.

7. Repeat steps 3 – 6 for all detectors to be calibrated. Note that the same procedure must be used for all detectors or each must have the same start voltage, steps and count time.

   Sample changer systems:

8. Choose the **Decay Mode** desired.

9. Select the group that contains the standard to be used for the plateau.

10. Choose the Plateau Procedure using the arrows.

11. Choose the standard assigned to the selected detector using the arrows.

12. Press the **COUNT** button.

    Note: If the plateau procedure does *not* have Approval Required checked, the message "Warning: plateau invalidates calibration" is displayed. Click **OK** to continue running the plateau or **Cancel** to not run the procedure.

13. Steps 8 – 12 can be repeated for multiple plateaus on multiple groups for both Decay Modes.

14. After all assignments are made, press the **Load Samples** button. See *Load Sample* on page 100 for more information.

15. The Sample Assigner removes the standards from the Plateau Standards pane as each assignment is made. The standards are returned when the calibration has completed.

Notes

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Plateau Standards

The Plateau Standards tree view displays the active standards that were defined as **Plateaus** under "Usage" on the **Standards Setup** tabbed page for the selected Decay Mode. The standard can also be selected from this list.

Source Check Count

The Source Check tab is used to apply periodic runs (usually performed daily) that are used to verify an instrument is operating correctly. This is normally done using alpha and beta source checks.

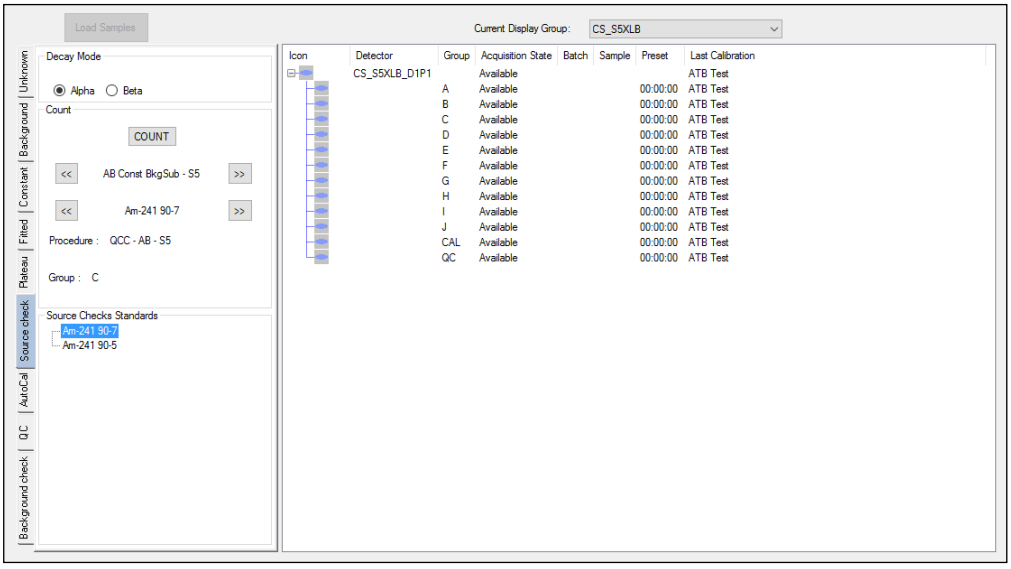


Figure 46 Source Check Counting

If no active source check procedures exist, the tab will be disabled. If no standards are available for source checks, this tab will also be disabled.

Decay Mode

This option allows selecting the decay mode (alpha or beta) of the source check count.

Count

This section allows selecting the calibration to be used for the source check count. By default the first active calibration having a Cal Check procedure set for the selected Decay Mode is selected.

Click on the **<<** and **>>** buttons to scroll through the active calibrations having a source check procedure defined.

Calibration List

Click on the **<<** and **>>** buttons to scroll through the Cal Check calibration list.

Standards List

Click on the **<<** and **>>** buttons to scroll through the standards for the selected Decay Mode and have been defined to be used for source checks on the **Standards Setup** tab.

Procedure

Displays the source check procedure associated to the selected calibration and Decay Mode.

Group

For sample changer systems, displays the preselected group (if defined in the procedure) for the procedure associated to the selected calibration.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector(s) for the source check count.

2. Choose the **Decay Mode** desired.

3. Select the detector(s) or group (for a sample changer system).

   Notes:

   - For a non-sample changer system, highlight the detector(s) to be cal checked by either holding the CTRL button and then selecting each detector, or select the first detector and then holding the SHIFT button while selecting the last detector in the group.

   - For a non-sample changer system, if the available standards had previously been used by the detectors in the Display Group, multiple detectors can be selected. When the **COUNT** button is pressed the detectors will automatically be assigned the standards used for that previous count. Otherwise each detector must be individually selected to be assigned.

4. Select the Calibration using the arrows.

5. Select the Standard to be assigned to the selected detector using the arrows.

   Note that if multiple detectors have been selected the Standard selection is not enabled. Refer to note in step 3 above.

6. Press the **COUNT** button.

   For a sample changer system steps 2 – 6 can be repeated for multiple source checks on multiple groups for both Decay Modes.

7. After all assignments are made, press the **Load Samples** button. See *Load Sample* on page 100 for more information.

Notes

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Source Checks Standards

The Source Checks Standards tree view displays the active standards that were defined as Cal Checks under "Usage" on the **Standards Setup** tabbed page for the selected Decay Mode. The standard can also be selected from this list.

Background Check Count

The Background Check is used to apply to periodic runs (usually performed daily) that are used to verify an instrument is operating correctly. This is normally done using a daily background.

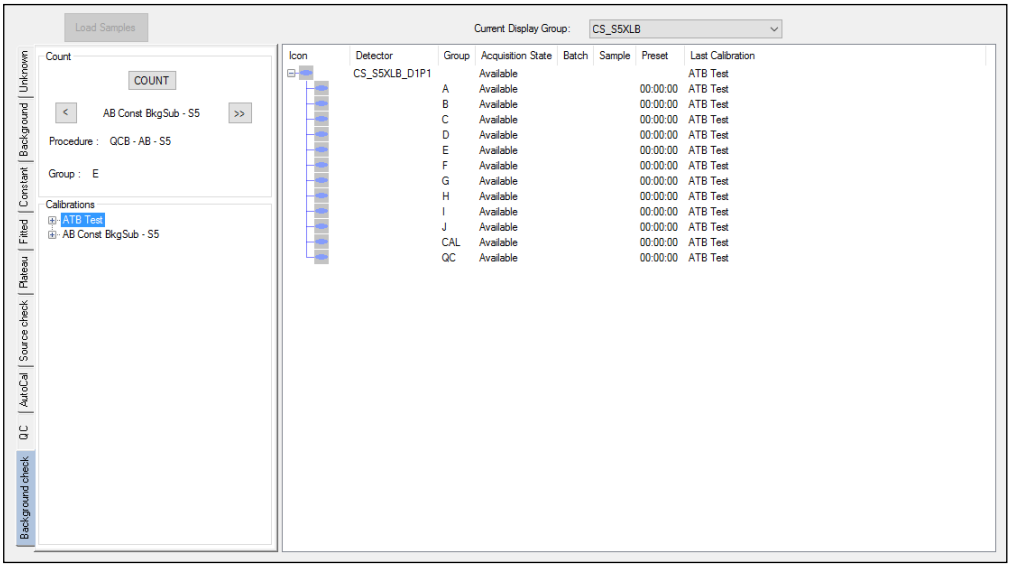


Figure 47 Background Check Counting Tab

Count

This section allows selecting the calibration to be used for the background check count. By default the first active calibration having a Background Check procedure is selected.

Click on the **<<** and **>>** buttons to scroll through the active calibrations having Background Check procedure defined.

Procedure

Displays the background check procedure associated to the selected calibration.

Group

For sample changer systems, displays the preselected group (if defined in the procedure) for the procedure associated to the selected calibration.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contain the detector(s) for the background check.

2. Select the detector(s) or group (for a sample changer system).

   For a non-sample changer system highlight the detector(s) to be background checked by either holding the CTRL button and then selecting each detector, or select the first detector and then holding the SHIFT button while selecting the last detector in the group.

3. Select the Calibration using the arrows.

4. Press the **COUNT** button.

   For a sample changer system steps 2 – 4 can be repeated for multiple background checks on multiple groups.

5. After all assignments are made, press the **Load Samples** button. See *Load Sample* on page 100 for more information.

Notes

- For a sample changer system, selecting a detector and clicking the **COUNT** button will automatically assign the count to the preselected group (if defined in the procedure) otherwise the group to be used must be selected.

- For a sample changer system, selecting a group will automatically assign to that group if the selected group and the preselected group in the procedure are the same. If the selected group is not the same as the preselected group a prompt will be displayed and the user can choose whether or not to continue the assignment.

Background Check Procedure

The Background check tree view lists the active calibrations that have background check procedures associated to them. When expanded the view lists the background check procedure and its preset value.

For sample changer systems, the preselected group (if defined in the procedure) for the background check procedure is also listed in the expanded view.

The calibration to have the background check procedure run can be selected from this list.

AutoCAL Count

AutoCal sequences are used to change the overall system calibration for sample changer systems. The AutoCAL tab is enabled when an active AutoCal sequence is defined for the selected Display Group detector and allows starting an automatic calibration sequence.

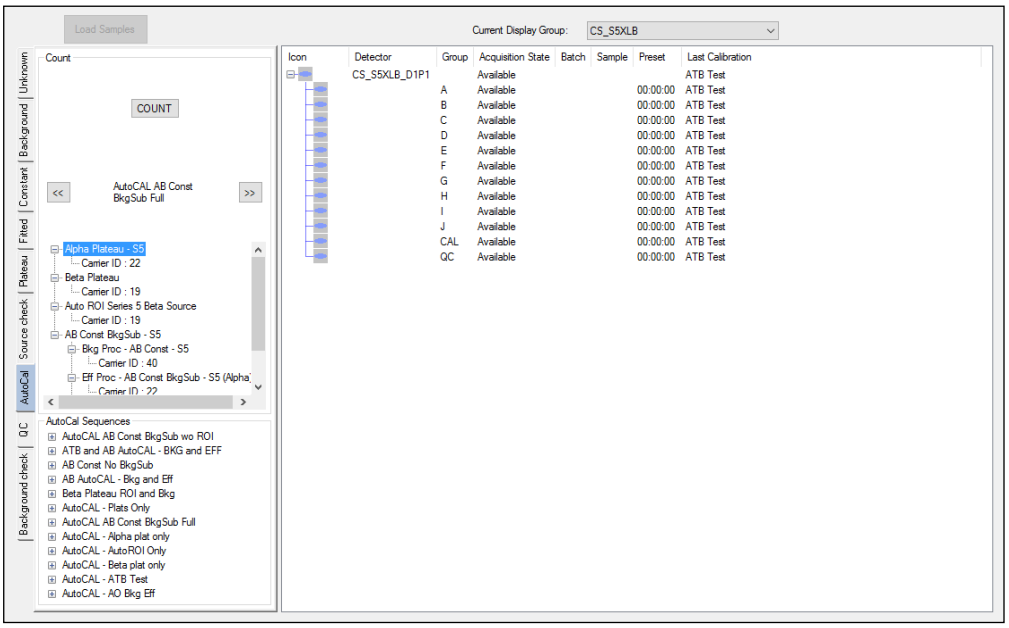


Figure 48 AutoCAL Counting Tab

Count

Sequence List

Click on the **<<** and **>>** buttons to scroll through the sequence list. By default, the sequence will be the last AutoCal sequence counted. If no AutoCal sequence has been counted, the first active sequence in the list will be selected.

An expandable tree view list of the selected AutoCal sequence is displayed. The collapsed view will show any Plateau and AutoROI procedures and any Calibration included in the sequence.

Alpha/Beta/Gamma Plateau Procedures

Displays the current alpha, beta, or gamma procedure names associated with the selected AutoCal sequence. Expanding the plateau procedure will list the Carrier ID to be used for that procedure.

AutoROI Procedure

Displays the current automatic ROI associated with the selected AutoCal sequence. Expanding the AutoROI procedure will list the Carrier ID to be used for that procedure.

Calibration

Displays the current Calibration procedure name associated with the selected AutoCal sequence. Expanding the calibration will list the background and/or efficiency procedure(s) associated to the calibration. Expanding the procedures will list the Carrier ID to be used for that procedure.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector for the AutoCal count.
2. Select the AutoCal counting sequence using the arrows.
3. Click on the **Count** button to start the count.
4. Sample Assigner will automatically assign the selected AutoCal sequence to the CAL group of the selected device.
5. The settings of the first procedure of the sequence are displayed in the detector list view.
6. The CAL group acquisition state becomes “Assigned”.
7. If the CAL group is unavailable, the assignment will fail.

8. Press the **Load Samples** button See *Load Sample* on page 100 for more information.

Notes

- If a detector has not done a plateau, the first procedure in the sequence must be “Plateau”.
- If a detector has not discriminator settings, AutoROI procedure must be used in the sequence.
- Gamma plateau is available only for the Series 5XLB device that includes the gamma option.

AutoCAL Sequences

The AutoCAL Sequences tree view displays all active AutoCAL sequences. Expanding the + next to a sequence will display its procedure and/or calibrations names and their carrier IDs.

QC Count

QC sequences are used to automate periodic runs (usually performed daily) that are used to verify an instrument is operating correctly for a sample changer system. The QC tab is enabled when an active QC Sequence is defined for the selected Display Group detector and allows starting an automatic QC sequence.

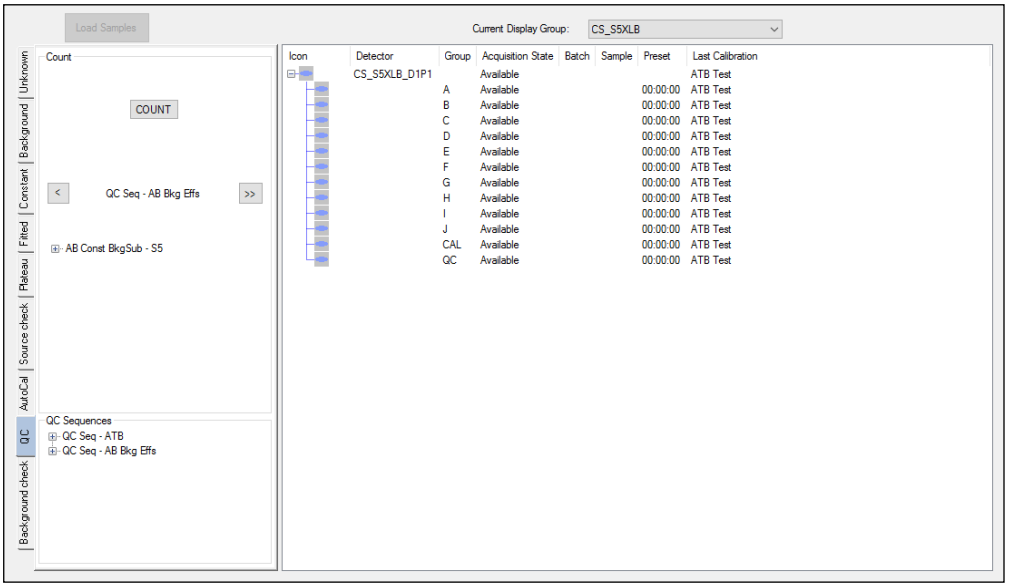


Figure 49 QC Counting Tab

Count

Sequence List

Click on the **<<** and **>>** buttons to scroll through the sequence list. By default, the sequence will be the last QC sequence counted. If no QC sequence has been counted, the first active sequence in the list will be selected.

Background/Background Check /Source Check Procedures

Displays the current background check and source check procedure names associated with the selected QC sequence.

Count

To start a count:

1. From the **Current Display Group** drop down list, choose the Display Group that contains the detector for the QC count.
2. Select the QC counting sequence using the arrows.
3. Click on the **Count** button to start the count.
4. Sample Assigner will automatically assign the selected QC sequence to the QC group of the selected device.
5. The settings of the first procedure of the sequence are displayed in the detector list view.
6. The QC group acquisition state becomes “Assigned”.
7. If the QC group is unavailable, the assignment will fail.
8. Press the **Load Samples** button. See *Load Sample* on page 100 for more information.

QC Sequences

The QC Sequences tree view displays all active QC sequences. Expanding the + next to a sequence will list its procedure name(s) and carrier ID(s).

Remaining Time

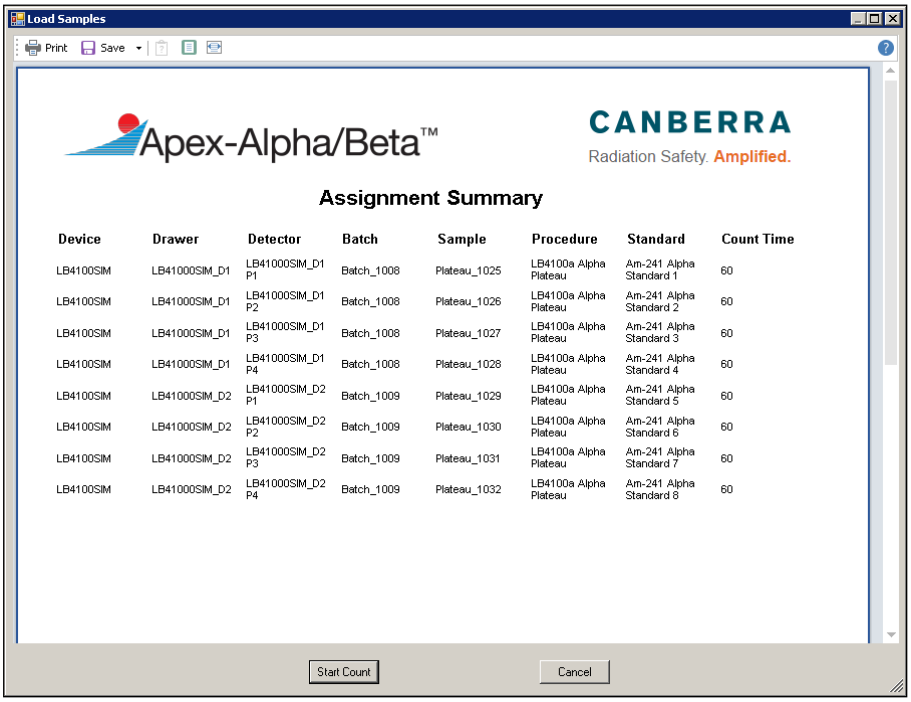
Samples are loaded automatically after a specific time as entered in the “Sample delay” field in the *Options Setup Page* on page 193.

Load Samples

Once you have successfully assigned one or more samples, the Sample Assigner will enable the **Load Samples** button. Pressing the **Load Samples** button displays a report showing which detector positions the samples should be loaded. After physically loading the samples, press the **Start Count** button to initiate the counting.

Notes:

- The Load Samples dialog will not appear when starting an Express Count when the **Immediate Count** option is set to "Yes".
- If **Sample Delay** is enabled in the **Setup Options** tabbed page, the **Load Samples** button can still be used or the counts will start automatically once the sample delay time expires. With **Sample Delay** enabled, the summary report will not be displayed at the end of the delay time.
- The remaining time before counting begins will be displayed next to the **Load Samples** button. The time will start counting down immediately after assigning a batch. Each time an additional batch is assigned the time will reset to the Sample Delay time and start counting down again.



Device	Drawer	Detector	Batch	Sample	Procedure	Standard	Count Time
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P1	Batch_1008	Plateau_1025	LB4100a Alpha Plateau	Am-241 Alpha Standard 1	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P2	Batch_1008	Plateau_1026	LB4100a Alpha Plateau	Am-241 Alpha Standard 2	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P3	Batch_1008	Plateau_1027	LB4100a Alpha Plateau	Am-241 Alpha Standard 3	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P4	Batch_1008	Plateau_1028	LB4100a Alpha Plateau	Am-241 Alpha Standard 4	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P1	Batch_1009	Plateau_1029	LB4100a Alpha Plateau	Am-241 Alpha Standard 5	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P2	Batch_1009	Plateau_1030	LB4100a Alpha Plateau	Am-241 Alpha Standard 6	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P3	Batch_1009	Plateau_1031	LB4100a Alpha Plateau	Am-241 Alpha Standard 7	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P4	Batch_1009	Plateau_1032	LB4100a Alpha Plateau	Am-241 Alpha Standard 8	60

Figure 50 Assignment Summary

6. Batches View

The **Batches** view allows you to create/edit/delete batches of samples to be counted. There are two types of batches that can be created: fitted efficiency and unknown sample.

- An Unknown Sample Batch includes one or more samples. Each sample is classified by **Sample Type** and **Sample State**.

- A Fitted Efficiency Batch is used to count a set of standards to create an efficiency curve based on the mass of each standard.

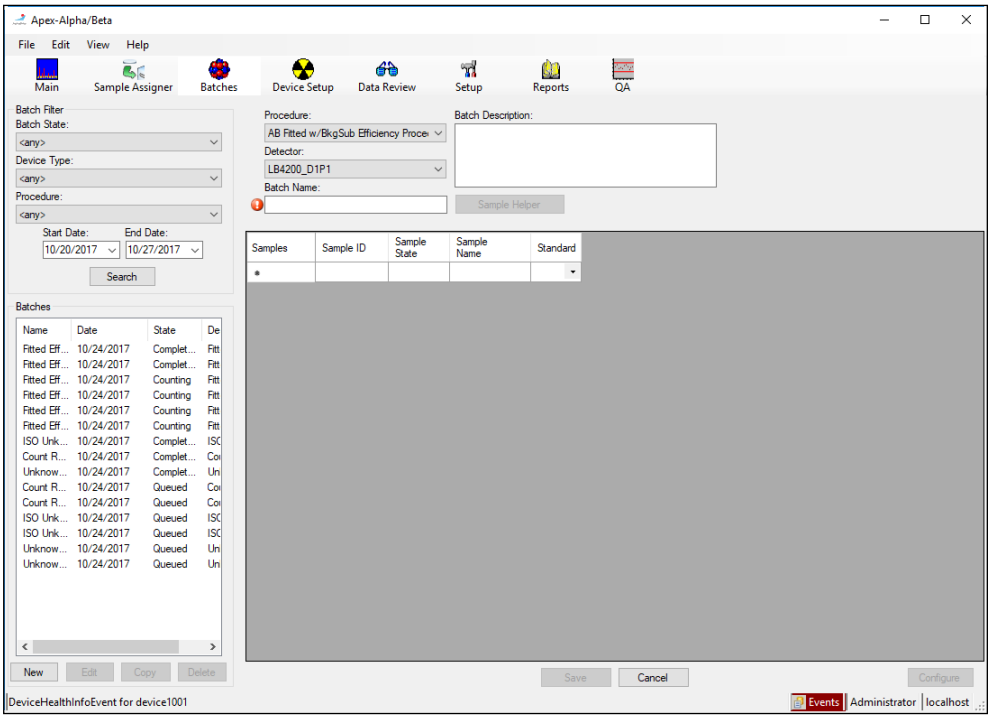


Figure 51 Batches View Page

Batches

A batch refers to a group of samples being analyzed for a similar purpose. To efficiently manage a large number of samples and manage analysis sample counting in a production batch mode environment, samples can be grouped into batches and managed in that mode.

For sample changer based systems:

- When counting a batch, if samples are counted but are not present in the batch definition, these samples can be reviewed and will be included on the batch definition with a sample state set to *Counted*.

- If a batch was incompletely counted, samples can be reviewed in **Batch** view and any uncounted samples will have the sample state set to *Defined*. These samples can be removed from the batch or counted later. Any counted samples in the batch should be physically removed from the group.

Batch Filter

The Batch Filter parameters specify which batches are to be shown in the Batches list.

Batch States

Will display only batches that are currently in the specified state. Selecting <any> will allow batches of all states to be included in the search.

Device Type

Will display only batches associated with a given device type. Selecting <any> will allow all registered device types to be included in the search.

Procedure

Will display only batches associated with a given procedure. Selecting <any> will allow all procedures to be included in the search.

Start and End Date

Will only search for batches in the specified date window. The filter uses the creation date of the batch (if Defined or Queued) or the acquisition date of the batch to determine if it meets the criteria.

Search

Searches can be automatically or manually.

- Changing a filter setting will automatically start another search.
- Click **Search** to refresh the results using the current settings.

Batches List

This list displays the batch name, date, state, and description of all batches as a result of the settings used in the batch filter.

Batch states:

- **Queued** – Samples are waiting to be counted. The batch has been defined but has not yet been assigned to a detector.
- **Assigned** – The batch has been assigned to a detector but has not yet been loaded to start counting.
- **In Changer** – The batch has been loaded and the sample changer is searching for the group. Counting has not actually started yet. If a purge cycle is necessary it will remain in this state until the purge and bias initialization have completed.
- **Counting** – The batch has been loaded and counting has started.
- **Completed** – The batch has completed counting. All samples defined in the batch have been counted.

Batch Buttons

The buttons located at the bottom of the Batches list allow you to create, edit, copy, or delete a batch.

New

To create a new batch, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Batch in the list, double-click on an entry or highlight the Batch then press the **Edit** button. Edit the remaining data as necessary, and then **Save** the updated batch.

Note: Batches may be edited in any state. However, there are some restrictions:

- Samples cannot be edited or deleted while in the *Assigned* or *Counting* states.
- Samples cannot be added when the batch is in the *Completed* state.
- Samples cannot be deleted once they have been counted.

Copy

The copy function lets you create a new batch by copying and then editing the data from the existing Batch.

Select the batch from the Batches list then press the **Copy** button to copy all the data to the right side of the screen. Enter a new batch name, edit the remaining data as necessary, then **Save** the new batch.

When you click **Copy** it initially uses the original name with (1) appended to it. Also note that in the Batch list, it shows original batch that was copied plus the newly named batch.

Delete

To delete a Batch, highlight it in the list, and then press **Delete**. You cannot delete counted batches.

Batch Parameters

Batch parameters are items that apply to all samples in a batch as opposed to Sample Parameters that are specific to each sample.

Procedure

The procedure used to count the batch. A batch cannot be saved without a procedure selected.

Sample Physical State

There are four types of sample states, select from *Filter*, *Liquid*, *Solid*, or *Swipe/Smear*. This option applies to *Unknown* batches only.

Filter

This is typically used for an air filter. When selected, the filter on date/time and the filter off date time can be entered along with the start and end flow. If these fields are entered, the quantity is automatically calculated. In lieu of entering the flow (start) and final (end) information, the quantity can be entered directly. The samples total contained activity is divided by the quantity (total volume) to calculate the activity concentration.

Liquid

This selection is for water and other liquid such as urine bioassay samples. The quantity and residual mass are typically entered. The residual mass is used in conjunction with a fitted efficiency algorithm to determine the efficiency at the sample's residual mass. The sample's total activity is then divided by the quantity to determine the concentration.

Solid

This selection is for soils and other non-soil solids such as fecal bioassay samples.

The quantity and residual mass are typically entered. The residual mass is used in conjunction with a fitted efficiency algorithm to determine the efficiency at the sample's residual mass. The sample's total activity is then divided by the quantity to determine the concentration.

Swipe/Smear

Selecting this state indicates that the sample does not require advanced data entry.

Detector

The detector on which the batch is be counted. This option applies to *Fitted Efficiency* batches only.

Batch Name

Alphanumeric field used to uniquely identify the batch to be counted. A batch cannot be saved without a name defined.

Batch Description

This field can be used to enter descriptive information about the batch.

Sample Helper

The **Sample Helper** enables quick entry of multiple samples that share the same or similar attributes. The entries in the **Sample Helper** match many of the sample parameters discussed in the next section.

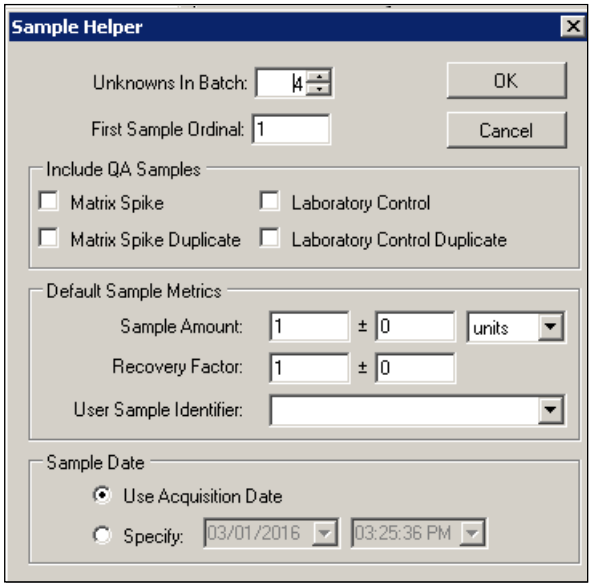


Figure 52 Sample Helper Dialog

Unknowns in Batch

The **Sample Helper** will create a batch with that number of sample unknowns. After the creation, the user can then go into the individual records and modify the individual sample information as needed.

First Sample Ordinal

This value will be the starting point of the numbering scheme for the samples in the batch where each subsequent sample increments this number by one.

Include QA Samples

Selecting any of the check boxes will add one of that type of sample to the batch of unknowns in addition to the **Unknowns in Batch** selection.

Other Fields

All other fields on the sample helper are duplicates of the fields specific to each sample and are discussed later.

Sample Grid

This section is used for data entry for samples belonging to a batch. The columns displayed in the grid are configurable by category for each **Sample Physical State** (for Unknowns) or Fitted Efficiency batches to customize the data entry experience.

To enter data, simply press the TAB key to move between fields or the arrow keys to move between rows. A new row is indicated by a * in the Samples column. Note that a new blank row will be created when leaving the previous row. However, if no data is entered for the new row, it will not be saved.

Note: If the same modification is applied to two samples, the user will be prompted as to whether the modification should be made to all samples of the current batch.

Columns are configurable by clicking the **Configure** button at the lower right of the **Batches** view.

Sample ID (All categories)

An integer value uniquely identifying the sample record. This field is read-only. It is populated when a batch is saved.

Sample State (All categories)

Describes the state of the sample in the system (e.g. *Defined*, *Assigned*, *Counted*, etc.). This field is read-only.

Carrier ID / Sample Ordinal (All categories)

This column is available only for sample changers. This is an integer value entered either directly or via Sample Helper. It defines the Carrier ID to be used for the samples in the batch. This field is required. When set to zero, the carrier number of each sample counted will replace the zero entry value. The order of the samples in the batch will correspond to the order of the carriers in the sample changer group. For Unknown batches the Sample Helper will set this field to zero (0) for all entries.

Sample Name (All categories)

This is the name used to uniquely identify the sample within the batch. When a new row is created, a default name will be generated automatically. This field is required.

Sample Type (Unknown, Matrix Spike, Matrix Spike Duplicate, Laboratory Control and Laboratory Control Duplicate)

This field is drop down list describing the type of *Unknown* sample.

Standard (Fitted Efficiency only)

This field associates a sample with a standard for the purpose of counting Fitted Efficiencies. Only standards that have the "Fitted Efficiency Usage" selected on the **Standards** tab in the Setup view will appear in this drop down list. This field is required.

User Sample Identifier (Swipe/Smear, Filter, Solid/Liquid only)

Associates the sample with a **Sample Type** (see *Sample Type Setup Page* on page 183). This field is optional.

Note: If a **Correction Factor** is specified for the selected **User Sample Identifier**, the **Correction Factor** will be applied to the final result for all Activity, Concentration, and Currie and Bayesian MDA values.

Recovery Factor & Unc (Swipe/Smear, Filter, Solid/Liquid only)

The **Recovery Factor** and **Uncertainty** values specified here are applied to the efficiency for the purposes of Activity, Concentration, and Currie and Bayesian MDA calculations. The default value of the **Recovery Factor** is 1. The default value of the **Uncertainty** is 0. These fields are required.

Sample Date (Swipe/Smear, Filter, Solid/Liquid only)

If specified, this is the date that a sample was collected. If set to “Use Assay Date”, the **Sample Date** will be assigned at the start of data acquisition.

Note: If a collection date has been specified by mistake, this value can be returned to “Use Assay Date” prior to counting by selecting the field and pressing CTRL+0 (zero).

Filter On Date (Filter Only)

Date and time at the beginning of the sampling period.

Filter Off Date (Filter Only)

Date and time at the end of the sampling period.

Start Flow Rate (Filter Only)

Flow rate at the beginning of the sampling period.

End Flow Rate (Filter Only)

Flow rate at the end of the sampling period.

Flow Volume Unit (Filter Only)

Specifies the unit for the volume portion of the flow rate.

Flow Time Unit (Filter Only)

Specifies the unit for the time portion of the flow rate.

Quantity & Unc (Swipe/Smear, Filter, and Solid/Liquid only)

Specifies the total amount and its uncertainty of the sample. These are a required field.

Note: For Filter samples when **Filter On Date**, **Filter Off Date**, **Start Flow Rate**, **End Flow Rate**, **Flow Volume Unit**, and **Flow Time Unit** are provided, **Quantity** is calculated automatically.

Quantity Unit (Swipe/Smear, Filter, and Solid/Liquid only)

This field specifies the unit associated with the specified quantity.

Tare (Solid/Liquid only)

Weight/Mass of an empty planchet prior to adding sample.

Final (Solid/Liquid only)

Weight/Mass of a planchet after adding sample and any chemical processing.

Mass/Weight Unit (Solid/Liquid only)

Specifies the unit associated with Tare and Final weight.

Residual Mass & Unc (Solid/Liquid only)

The actual mass/weight and its uncertainty of the sample to be analyzed. This information is important if the analysis results are to be attenuation corrected.

Note: If Tare, Final, and Mass/Weight Unit are specified for a given sample, the Residual Mass field will be populated automatically.

For sample changer based systems only:

Carrier ID

Identification number of the sampler carrier. If set to 0 (zero), as each carrier is counted the carrier ID is inserted into this field. If a barcoded sample is to be counted the barcode may be entered here as the carrier ID.

Adding New Samples After Counting

This functionality is automatic and applies only to sample changer systems. When a Batch is created, the user assigns a Carrier ID to each sample. All carriers are counted as part of the defined Group. If a carrier is physically in the group but was not included in the batch definition, it will be counted. A new Sample Id (for this carrier) is added to the batch with its Sample State set to *Counted*.

Delete Uncounted Samples from Within a Batch

For sample changer systems, if a batch was not counted completely or there were more samples defined in the batch than were physically in the group, samples can be reviewed in **Batches** view and uncounted samples (with a **Sample State** set to Defined) can be removed. If any samples in the batch remain in the *Defined* state, the batch will remain in the *Counting* state. If the Defined sample(s) are removed, the batch state will change to *Complete*.

7. Device Setup View

Device Setup refers to the part of the calibration that is specific to an instrument, yet independent of the background and efficiency parameters. This chapter discusses how to review plateau counts and to manually or automatically set up the Region of Interest (ROI). It also provides an overview of the system's health as well as allowing the user to change LB4200 and Series 5 settings.

For more detailed information on Plateaus, please refer to *Voltage and Count Regions in the Apex-Alpha/Beta System* on page 18.

Note: The Gamma option is available only for Series 5XLB devices that include the gamma option.

Device Type Setup Requirements

The items required for the setup differ with the type of instrument and the type of analysis to be performed. See the Table 5 for more information.

Table 5 Device Setup Requirements for System Types

Gas System Setup	Alpha Only Mode	Alpha then Beta Mode	Alpha/Beta Simultaneous
Alpha Plateau	All	All	Not required
Beta Plateau	Not required	All	All
ROI Adjust	Not required	Not required	All supported (not available on IN20 or MINI20)

Plateau Review

From the **Device Setup** view, select the **Plateau Review** tabbed page to view the results. Systems such as the LB4100/LB4200 and Series 5 / Series 6 use the slope calculation for both the alpha and beta plateau to determine the operating voltage. The IN20 and MINI20 also use the slope calculation to determine the operating voltage for the alpha count mode, but for the beta (alpha+beta) they use the spillover value.

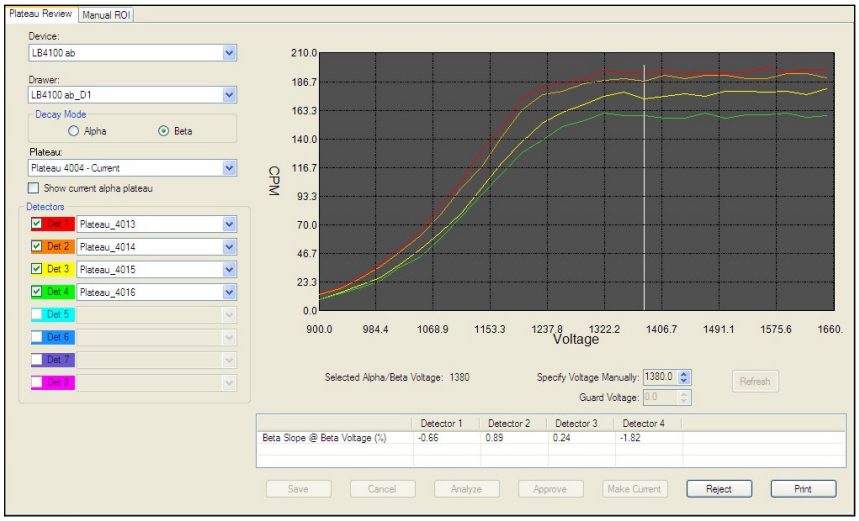


Figure 53 Displaying the Plateau Results

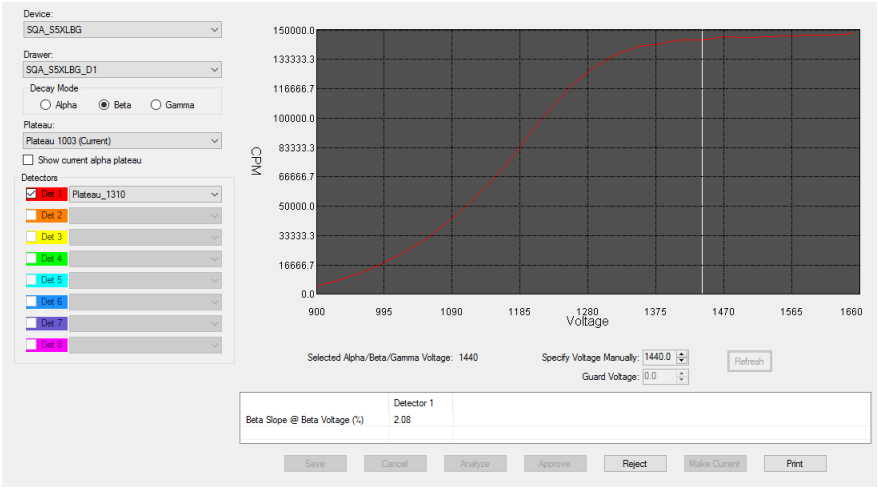


Figure 54 Alpha, Beta, Gamma Options

Plateau Review shows a graphical display of the plateau results and attempts to select the optimum operating voltages. The detectors are differentiated by displaying different colors for each graph.

Device

Any registered counting system. Select the device type from the drop down list.

Drawer

A list of all drawers associated with the selected device. Select the drawer location from the drop down list.

Decay Mode

Select the option that corresponds to the type of decay mode: **Alpha**, **Beta**, or **Gamma** (if applicable).

This identifies the plateau to be generated plus the identity of calculated voltage point. The **Alpha** plateau voltage is used for Alpha Only counting procedures and as the starting voltage for Alpha then Beta counting procedures. The **Beta** plateau voltage is used for the second count of Alpha then Beta procedures and for simultaneous Alpha plus Beta counting. The **Gamma** plateau voltage is used for operation of the Gamma channel detector for Series SXLB sample changer systems that include the gamma option.

Plateaus

Shows the state of the select plateau batch.

The drop down list displays the previous plateaus that have been run and saved. These plateaus will be labeled as “Current” next to the batch number.

Plateaus counted under procedures marked as “Approval Required” will be labeled as “Pending Review”. Only after review and approval will a plateau be marked as “Current”.

Show Current Plateau

If the **Alpha Decay Mode** is selected, the check box will be labeled “Show current beta plateau”. Checking the box will overlay the beta plateau on the displayed alpha plateau. Conversely, if the **Beta Decay Mode** is selected, the check box will be labeled “Show current alpha plateau”. Checking the box will overlay the alpha plateau on the displayed beta plateau.

Detectors

There can be up to eight detectors included in a plateau plot. Each detector will have its own color for identification on the plot. The color on the plot corresponds to the background color of the Det x name in the **Detectors** section.

The **Detectors** section of the **Plateau Review** screen shows which detectors are included in the displayed plateau. Only the detectors with check box selected will be included in the slope calculation of the plateau. Previous plateau runs for individual detectors can be chosen from the list box for each detector. This is useful if a laboratory uses fewer standards available than the number of detectors in a drawer; plateaus runs from different batches can be combined into a single Current plateau.

Plateau Plot

You can view the current and historical alpha, beta, or gamma plateaus for a device/drawer. Each detector can be viewed separately or simultaneously. When viewing plateaus for a drawer, data from all inputs used in the plateau will be displayed simultaneously on a single graph along with selected voltage.

General Notes

- The data will be plotted along with a vertical line indicating the calculated voltage for the plateau.
- The slope at the calculated voltage appears in the grid below the plot.
- The plot displays the CPM vs. Bias voltage (iteration).
- The calculated alpha/beta voltage calculated by the system is shown.
- The specific voltage and on some devices the guard voltage are shown and can be changed manually. Not all devices support changing the guard voltage. See next two sections.

Viewing the Plots

A vertical line will be drawn at selected operating voltage (Alpha or Beta) for the plateau currently being displayed for the selected **Decay Mode**. For example, if the **Decay Mode** selected is **Alpha** then the Alpha operating voltage would be marked with a vertical line.

The grid at the bottom of the screen shows the slope at the operating voltage for the selected **Decay Mode**. If the **Show current plateau** check box is checked, it will also show that slope at the **Decay Mode** voltage and the slope at its operating voltage.

For example, if the selected **Decay Mode** was **Beta**, the grid would show the Beta Slope @ Beta Voltage (%), Alpha Slope @ Beta Voltage (%), and the Alpha Slope @ Alpha Voltage (%) for the selected detector(s).

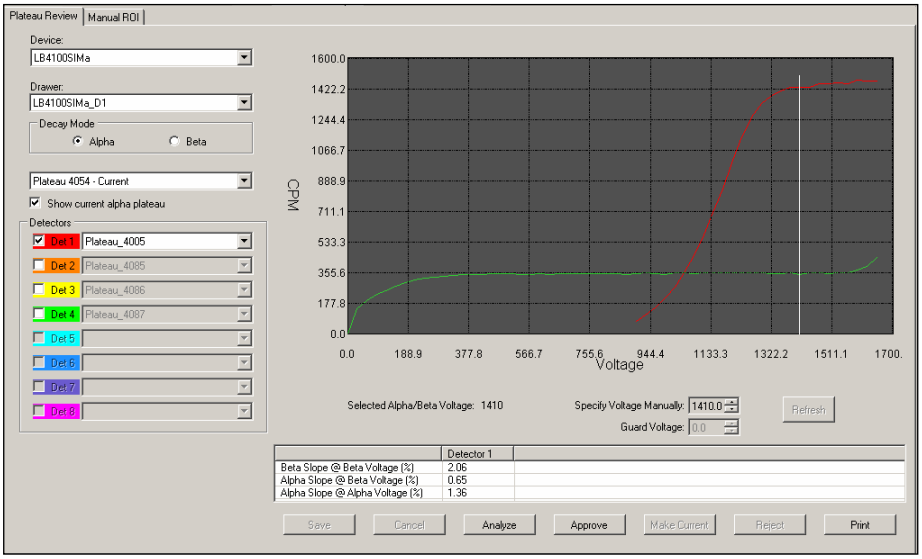


Figure 55 Viewing Both Alpha and Beta Plateaus

Specify Manual Voltage

It is possible to manually specify the operation voltage associated with a plateau. Use the up/down arrow to change the voltage.

Click on the **Refresh** button to update the plateau plot. Press **Save** to save the changes or **Cancel** to keep the original setting.

Guard Voltage

On some devices the guard voltage can be adjusted. If enabled, use the up/down arrow to change the voltage. Press **Save** to save the changes or **Cancel** to keep the original setting.

Analyze

You can change the plateau batches and/or detectors that are associated with a plateau as long as the batches are from a detector within the specified drawer. Having done this it will be possible to analyze the plateau to determine the operating voltage based on the newly specified inputs.

Approve

Press **Approve** to approve a plateau that is Pending Review or that has been Rejected.

Make Current

Makes the selected plateau/operating voltage current. It is only enabled if the selected plateau is approved and is not the current plateau.

Reject

Press **Reject** to reject plateau points that is Pending Review or was previously Approved.

Print

Press **Print** to print the plateau plot and data.

You can **Print** the report, **Save** the report to one of several files types or display the report in one of three ways (full screen, one page at a time, or full page width).

ROI Setup

The **ROI** tabbed page allows the user to specify regions of interest for Simultaneous counting mode manually or automatically. When counting in alpha/beta simultaneous mode, it is necessary to specify the Beta Upper Level and Alpha Lower Level discriminators.

Warning: Modifying ROI settings will cause current calibrations in simultaneous count mode to become invalid. If an invalid calibration is used for counting an Unknown batch, an error message is displayed indicating the calibration is no longer valid.

The **Count Data**, located on the right hand side of the screen, displays the count data.

General Notes

- Only active and on-line devices can be selected by the Device drop-down.
- Region of Interest setup is not applicable to MINI20 or IN20.
- ROI setup is not used for Alpha Only or Alpha then Beta count modes.

- The LB4200, Series 5, and Series 6 do not have a multi-channel analyzer. For devices of these types, no spectral data will be displayed.
- For sample changer based systems, the measurement will be done using the selected group.

Perform Manual ROI

Selecting **Perform Manual ROI** provides you with the ability to independently set the **Beta Upper Level** and **Alpha Lower Level** discriminators for the desired spillover and deadband.

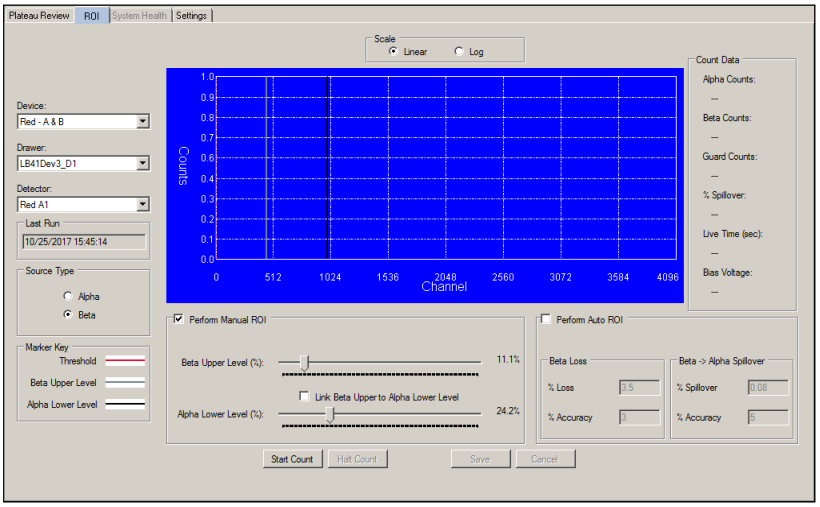


Figure 56 Manually Adjusting the ROI

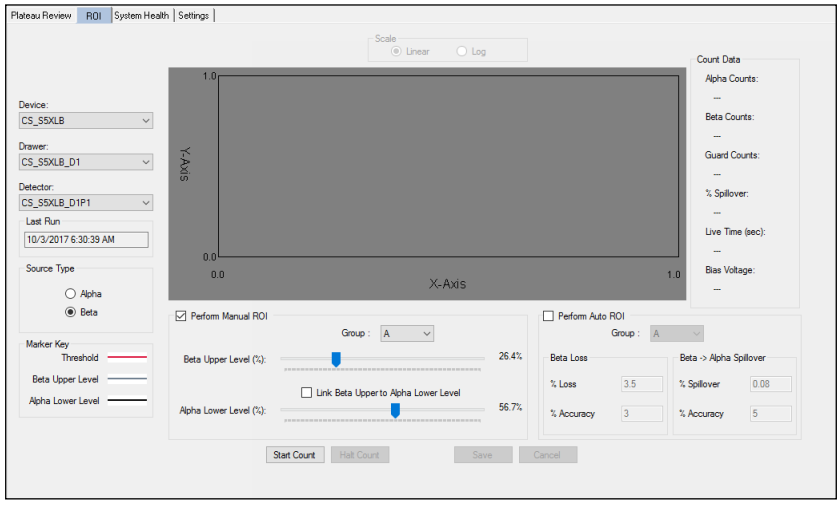


Figure 57 Manually Adjusting the ROI for a Sample Changer Based System

This is done by performing the following steps:

1. Choose the **Device Setup** view button then the **ROI** tabbed page.

2. Choose the **Device**, **Drawer**, and D**etector** to begin.

3. Select the “Perform Manual ROI” check box to enable the manual ROI fields.

4. Load a beta source into the detector(s) to be adjusted.

5. Choose the **Group** for a sample changer based system.

6. Select the “Link Beta Upper to Alpha Lower Level” check box and press the **Start Count** button.

7. If the device utilizes a multi-channel analyzer, the background changes from blue, to cyan, to green indicating that the detector is acquiring data.

8. Press the **Halt Count** button to adjust levels.

   Most users will set the **Beta Upper Level** and **Alpha Lower Level** in one of two ways: with or without a deadband.

   Without a deadband

   a. Press **Start Count**. After the detector begins acquiring data, notice the spectrum displaying the location of the counts. Allow the count to acquire a minimum of 10,000 counts in the Beta channel.

   b. Press the **Halt Count** button. If the spillover % value displayed under Count Data is greater than 1.10%, move the levels up. If the spillover % is less than 0.9% move the levels down.

   c. Press **Start Count** again to acquire data after the levels have been changed.

   d. Repeat the previous two steps as necessary. Press the **Save** button when the spillover % meets the 0.9-1.0% criteria.

With deadband

e. Press **Start Count**. After the detector begins acquiring data, notice the spectrum displaying the location of the counts. Allow the count to acquire a minimum of 10,000 counts in the Beta channel.

f. Press the **Halt Count** button. If the spillover % value displayed under Count Data is greater than 3.6%, move the levels up. If the spillover % is less than 3.4%, move the levels down.

g. Press **Start Count** again to acquire data after the levels have been changed.

h. Repeat the previous to steps as necessary to achieve the 3.4-3.6% criteria.

i. Clear the "Link Beta Upper to Alpha Lower Level" option and move only the **Alpha Lower Lever** slider up 20% over its current setting.

j. Press **Start Count**. After the detector begins acquiring data, notice the spectrum displaying the location of the counts. Allow the count to acquire a minimum of 10,000 counts in the Beta channel.

k. Press the **Halt Count** button. If the spillover % value displayed under **Count Data** is greater than 0.15%, move the **Alpha Lower Level** up. If the spillover % is less than 0.05% move the **Alpha Lower Level** down.

l. Press **Start Count** again to acquire data after the levels have been changed.

m. Repeat the previous two steps as necessary. Press the **Save** button when the spillover % meets the 0.05-0.15 % criteria.

Perform Auto ROI

Selecting **Perform Auto ROI** provides you with the ability to automatically set the **Beta Upper Level** and **Alpha Lower Level** discriminators for the desired spillover values that will include a deadband region.

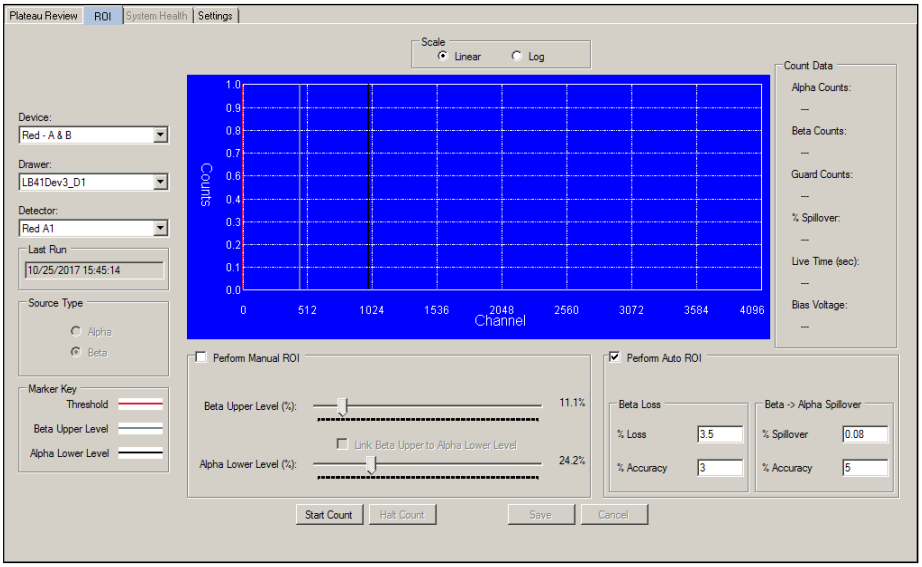


Figure 58 Automatically Adjusting the ROI

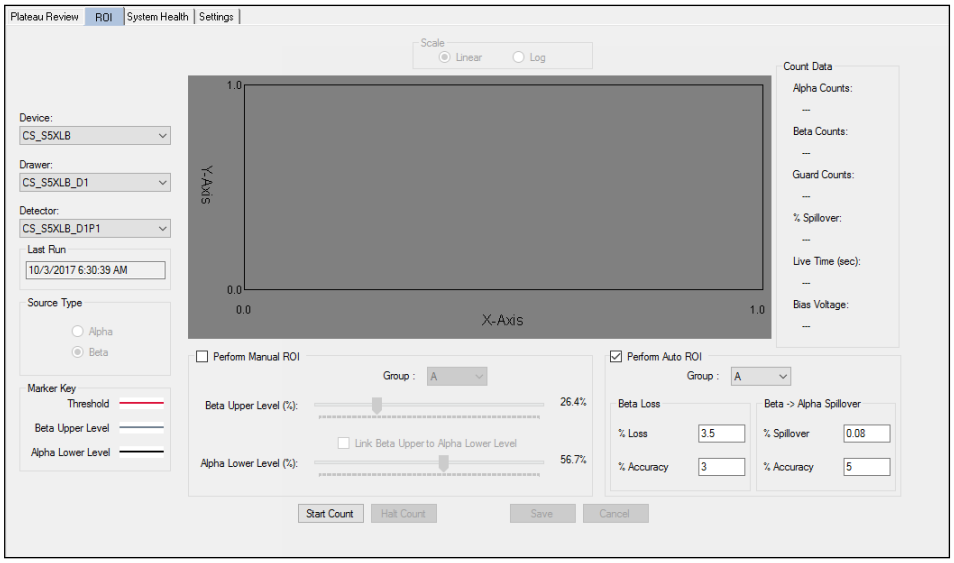


Figure 59 Automatically Adjusting the ROI for a Sampler Changer Based System

This is done by performing the following steps:

1. Choose the **Device Setup** view button then the **ROI** tabbed page.

2. Choose the **Device**, **Drawer**, and **Detector** to begin.

3. Select the “Perform Auto ROI” check box.

4. In the **Perform Auto ROI** section, enter the **Beta Loss** and **Accuracy** and the **Beta → Alpha Spillover** and **Accuracy** in percent.

   Note: Changing the default values of 3.5% beta loss, 3% accuracy, 0.08% beta to alpha spillover, and 5% beta to alpha spillover accuracy may cause unexpected results.

   Beta % Loss – the percentage of beta counts that fall above the Beta Upper Level.

   Beta % Accuracy – calculates the number of total counts required to calculate the beta % loss

   Beta -> Alpha % Spillover – the percentage of beta counts that fall above the Alpha Lower Level.

   Beta -> Alpha % Accuracy – calculates the number of total counts required to calculate the alpha % spillover.

5. Choose the **Group** for a sample changer based system.

6. Load a beta source into the detector(s) or numbered sample holder to be adjusted.

7. Press **Start Count** to begin the Auto ROI adjustment.

8. The system will automatically adjust the ROI values to the desired settings that will include a deadband region. The system will stop counting and the **Save** button will become available when complete.

9. Press the **Save** button or **Cancel** to start over.

Marker Keys

For a device that utilizes a multi-channel analyzer, this group box contains a colored marker key corresponding to the threshold and discriminators (**Threshold, Beta Upper level** (BUL), and **Alpha Lower Level** (ALL)) in the spectral data plot.

System Health

The **System Health** tabbed page provides a mechanism to monitor system health for devices that report these values.

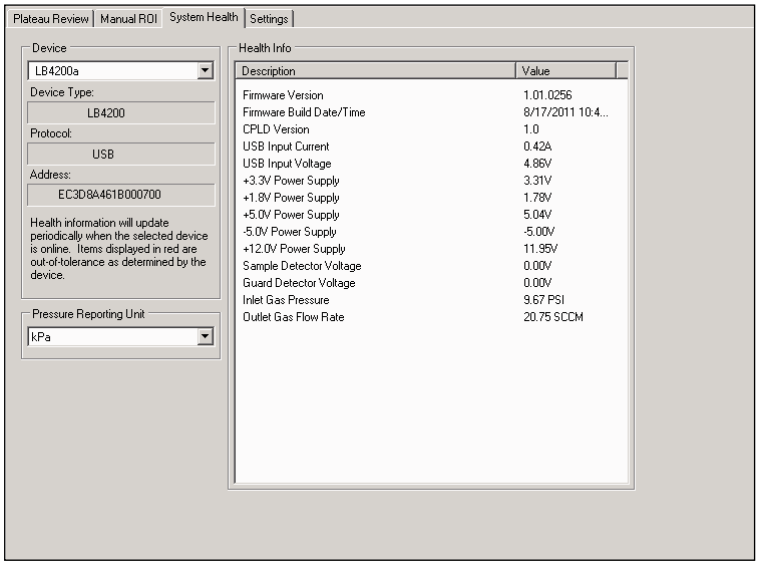


Figure 60 LB4200 System Health Page

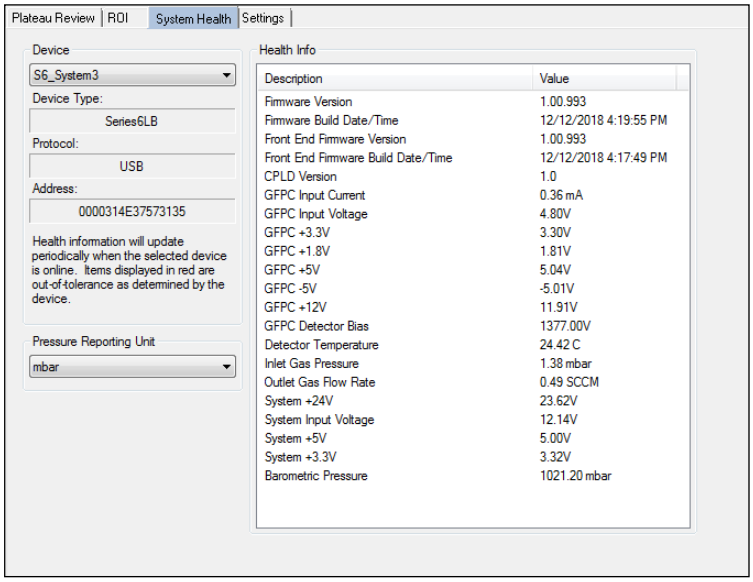


Figure 61 Device Setup - System Health for Series 6 Device

Device

The **Device** drop down is populated with all registered devices that support system health reporting. When a device is selected, the **Device Type**, **Protocol**, and **Address** fields are displayed for that device. If the device is active and in the Connected state, the **Health Info** section will display Health information for the device.

Pressure Reporting Unit

For the LB4200 device, the **Pressure Reporting Unit** drop down list allows to user to specify the desired units for reporting of gas pressure values. Modifying this value changes it for all LB4200 devices and users.

Health Info

The **Health Info** list displays System Health values for the selected device. Any values that are reported as out-of-tolerance will be shown in red. Any occurrences of an out-of-tolerance condition will be recorded in the **Events** pane and in the **Event Log** (see *Reports View – Event Log* on page 140, for more information on viewing the **Event Log**).

LB4200

LB4200 devices report the following System Health values. Tolerance is determined by the device. For the items indicated below (*), any out-of-tolerance condition is considered catastrophic and will result in the termination of any counts currently in progress.

- Firmware Version
- Firmware Build Date/Time
- CPLD Version
- USB Input Current (milliamperes)
- USB Input Voltage (volts)
- +3.3V Power Supply
- +1.8V Power Supply
- +5.0V Power Supply
- -5.0V Power Supply
- +12.0V Power Supply
- Sample Detector Voltage (volts) *
- Guard Detector Voltage (volts) *
- Inlet Gas Pressure (selected Pressure Reporting Unit) *
- Outlet Gas Flow Rate (SCCM) *

LB4100

LB4100 devices do not report System Health values. However, when the Inlet Gas Pressure goes out of tolerance, this will be logged to the **Events** pane and the **Event Log**. In addition, any counts currently in progress will be terminated.

Sample Changer Based System

Series 5 devices report the following System Health values.

- Firmware Version
- CPLD Version
- +24V Power Supply
- +15V Power Supply
- +12V Power Supply
- +5V Power Supply
- –12V Power Supply
- Batt Voltage (Battery Voltage)
- Main HV (Main High Voltage)
- Aux HV (Auxiliary Voltage)
- Current Flow
- Gas Mode
- Gas State
- Operating Flow
- Purge Flow
- Standby Flow
- Settle Time
- Purge Time
- Inactivity Time

All flow rates are in SCCM (Standard Cubic Centimeters per Minute) and are not changed by the Pressure Reporting Unit selection. All times are in minutes.

Series 6 devices report the following System Health values. Tolerance is determined by the device. For the items indicated below (*), any out-of-tolerance condition is considered catastrophic and will result in the termination of any counts currently in progress.

- Firmware Version
- Firmware Build Date/Time
- Front End Firmware Version
- Front End Firmware Build Date/Time
- CPLD version
- GFPC Input Current (milliamperes)
- GFPC Input Voltage (volts)
- GFPC +3.3V
- GFPC +1.8V
- GFPC +5V
- GFPC -5V
- GFPC +12V
- GFPC Bias Detector
- Detector Temperature (°C)
- Inlet Gas Pressure (selected Pressure Reporting Unit) *
- Outlet Gas Flow rate (SCCM) *
- System +24V
- System Input Voltage
- System +5V
- System +3.3V
- Barometric Pressure (mbar)

Device Settings

The **Settings** tabbed page provides a mechanism to modify certain device settings. Different device types expose different settings.

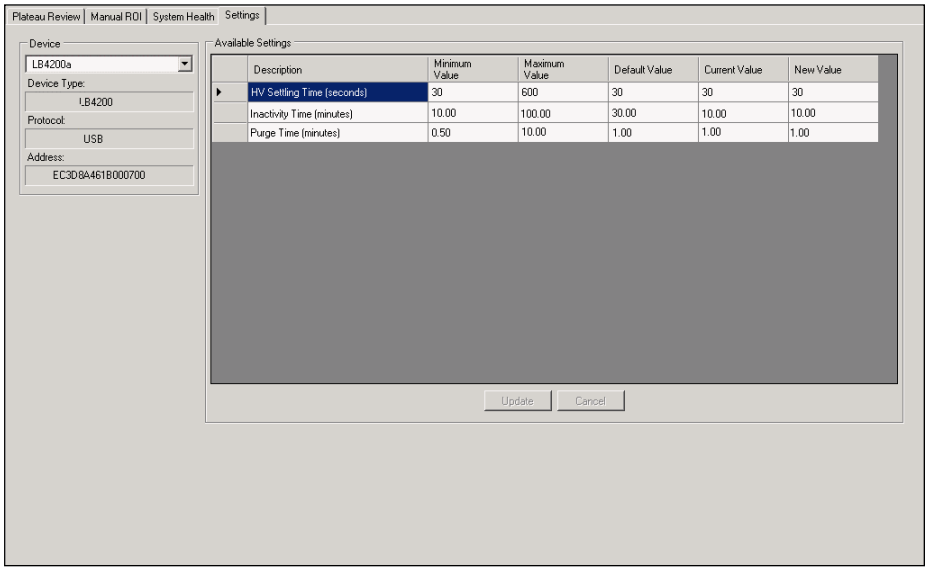


Figure 62 Adjusting the LB4200 Settings

Device

The **Device** drop down is populated with all registered devices. When a device is selected, the **Device Type**, **Protocol**, and **Address** fields are displayed for that device. The **Available Settings** grid will display settings that can be modified for the device. Note that it is not necessary for a device to be in the Connected state to change a setting.

Available Settings

The **Available Settings** grid shows the **Minimum Value**, **Maximum Value**, **Default Value**, and **Current Value** for each setting. To modify a setting, click the corresponding cell in the **New Value** column and enter the desired value. Press ENTER when finished or ESC to cancel the current change. When all settings have been modified, press the **Update** button to save the changes. **Cancel** will return all changes.

LB4100/IN20/MINI20

- **HV Settling Time (seconds)** – The amount of time in seconds that the device will allow for bias initialization.

LB4200

- **HV Settling Time (seconds)** – The amount of time in seconds that the device will allow for bias initialization.
- **Inactivity Time (minutes)** – The amount of time in minutes before the device enters the Standby operating state.
- **Purge Time (minutes)** – The amount of time in minutes that the device will purge after exiting the Standby operating state.

Sample Changer Based System

- **HV Settling Time (seconds)** – The amount of time in seconds that the device will allow for bias initialization.
- **Inactivity Time (minutes)** – The amount of time in minutes before the device enters the Standby operating state.
- **Purge Time (minutes)** – The amount of time in minutes that the device will purge after exiting the Standby operating state.

8. Data Review View

Data Review allows the user to search the system database for specific batches or samples for review and approval.

Note: Only procedures can be reviewed. To review sequence results, user must search each procedure of the sequence independently.

Data Review - Search

The **Search** page provides an interface to specify search criteria and to select specific results for review.

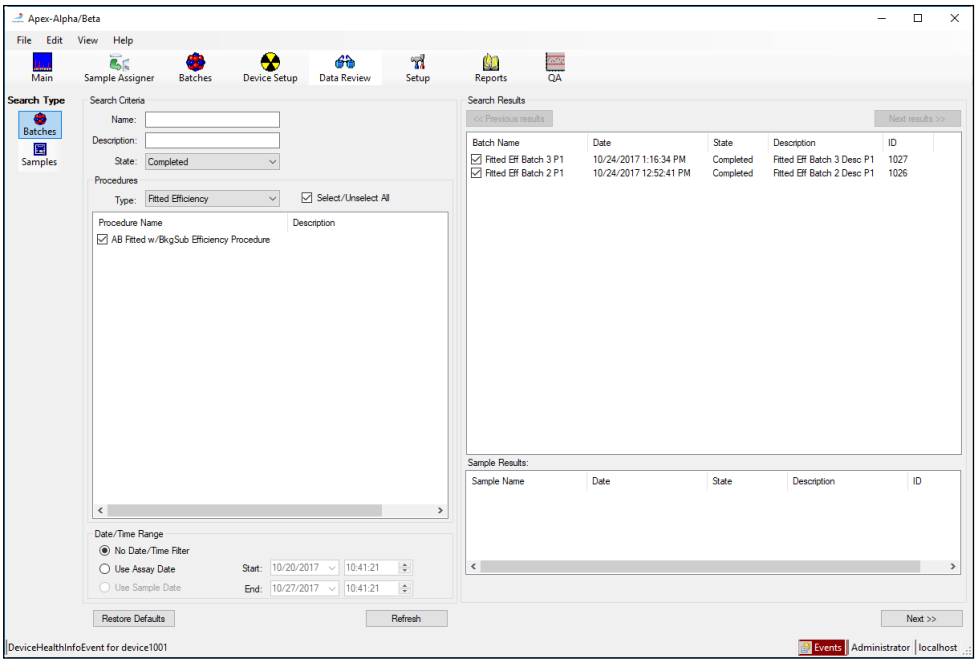


Figure 63 Data Review - Search Page

Search Type

Specifies whether to search by **Batches** or **Samples**.

Search Criteria

These parameters are used to limit the search of the database to **Batches** or **Samples** meeting the selected search criteria. A search will be performed automatically if any search criteria is changed.

Batches

The following criteria may be specified when the **Search Type** is “Batches”.

Name

Enter the name (or partial name) to search for a specific batch or range of batches with a common naming component. This field is case-sensitive.

Description

Enter the description (or partial description) to search for a specific batch or range of batches with a common description. This field is case-sensitive.

State

Limits search results to batches in the specified state. Note that it is possible to search for batches that are in the Counting state. Select **<any>** to search for batches in any state.

Samples

The following criteria may be specified when the **Search Type** is “Samples”.

Name

Enter the name (or partial name) to search for a specific sample or range of samples with a common naming component. This field is case-sensitive.

Description

Enter the description (or partial description) to search for a specific sample or range of samples with a common description. This field is case-sensitive.

State

Limits search results to samples in the specified state. Note that it is possible to search for samples that are in the Counting state. Select **<any>** to search for samples in any state.

Barcode

Limits search results to samples with the specified barcode.

Customer

Limits search results to samples with the specified customer.

Procedures

Select specific procedures from the list to limit search results by procedure or click on the **Select/Unselect** All check box to include all procedures in the search.

Date Time Range

There are three options to choose from:

- Select **No Date/Time Filter** to prevent filtering on date/time.
- Select **Use Sample Date** or **Use Assay Date** to limit search results to those samples falling within the specified date/time range.

Restore Defaults

Press the **Restore Defaults** button to reset search criteria.

Note: The **Start** and **End** dates and times have no default state; they will not be reset.

Refresh

Click on the **Refresh** button to update displayed data.

Search Results

The **Search Results** list box shows all batches or samples that meet the criteria entered previously. Check one or more batches/samples for review by checking the desired items in the list. Press the **Next** button to continue to the Results page.

Notes:

- When **Search Type** is set to “Samples”, the entire batch for each sample result will always be presented on the Results page.
- If sample data are selected in the search page, only procedures that match the selected batch type will be displayed.
- By default, **Unknown Completed** batches will be displayed.

Sample Results

If you have searched for batches, selecting a batch in the **Search Results** list will display a list of samples associated with that batch in the **Sample Results** list.

Previous Results/Next Results

If there is more than one page of search results, use the **Previous Results** and **Next Results** buttons to view additional results.

Data Review - Results

The **Results** page provides an interface to review, approve, and reject batches and samples.

Note: If the "Auto Export" option was selected in the *Options Setup Page* on page 193 the report is automatically saved to the defined **Export Path** using the selected **Extension type** when the Results page is displayed.

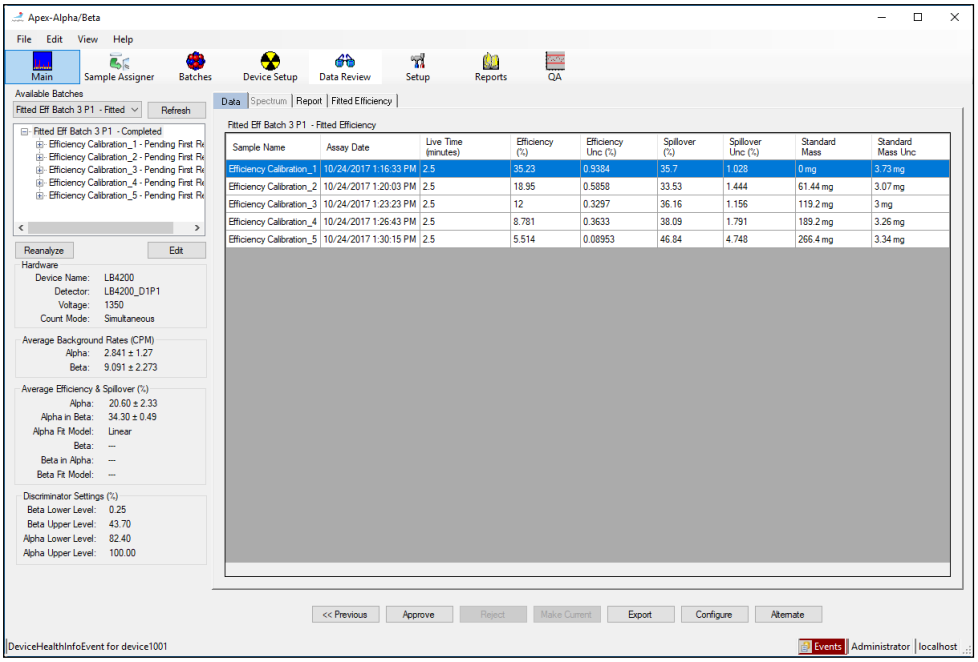


Figure 64 The Data Review Results Page

Available Batches

The **Available Batches** drop down list contains all the batches previously selected on the **Search** page. When a batch is selected from the drop down, a hierarchical view of the batch is then displayed in the Batch tree.

Press the **Refresh** button to update the **Batch Tree** and **Data** tabbed page for batches that are not yet in the *Completed* state. Note that the report will not render on the **Report** tabbed page until all batches listed in the **Available Batches** drop down list are in the *Completed* state.

- The top-level node in the **Batch Tree** shows the batch name and state. When the batch node is selected, the **Data** tabbed page will contain count data for each sample in the batch or a summary of the iterations for each sample.

- Nodes for each sample appear in the **Batch Tree** under the batch node. Each sample node shows the sample name and state. When a sample node is selected, the **Data** tabbed page will contain count data for all iterations of the selected sample.

- Samples with multiple iterations will have a + next to them which allows expanding the iteration list. When an iteration is selected, the **Data** tabbed page will contain the count data for the selected iteration only.

  – Double clicking on an Unknown Sample will take you to the *Batches View* on page 101. Click on the **Data Review** button to return.

Reanalyze

Clicking on this button will reanalyze a batch if its settings have changed. The previous results will still be saved in database but deactivated. The new results will be saved in database and displayed in Data Review with the message “Batch successfully reanalyzed”.

Edit Batch

When reviewing an Unknown or Fitted Efficiency batch, click the **Edit** button to view the current batch in the *Batches View* on page 101 with batch data displayed allowing you to delete samples if they are uncounted or define them if they were not.

Click on the **Data Review** button (

) to return.

Counting/Analysis Versioning

For unknowns a new version will be created when the batch is edited and saved. This will automatically become the “current” version. The history will be available via the **Versions** drop-down list. If a version other than the current batch is selected and the batch is approved then the **Make Current** button will be enabled. Only the version that is current may be modified. Previous version(s) that are not current cannot be edited unless made current or approved if in the “Pending Review” state. Batches counted with a procedure defined as requiring approval will revert to the “Pending Review” state if edited. Editing of batches can only be performed if the batch is *not* counting.

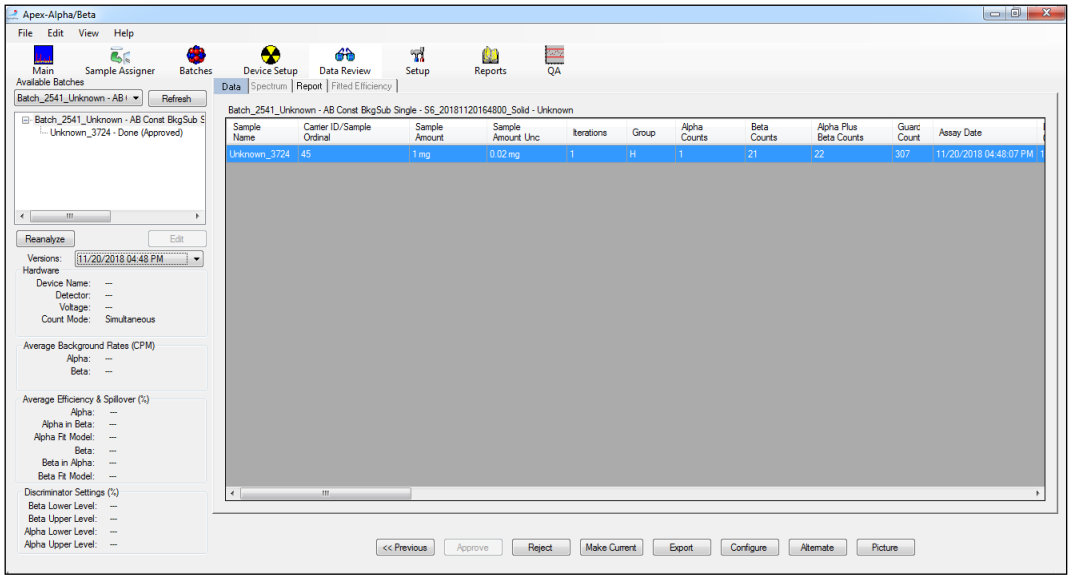


Figure 65 The Data Review Results Page – Showing Batch Revision

The Data Review Results Page – Showing Batch Revision

Hardware

The **Hardware** section displays the hardware for the selected Batch/Sample. For Unknown batches, it is necessary to select a sample in the Batch Tree for this field to be populated.

Device Name

Shows the device used to count the sample selected in the Batch Tree.

Detector

Shows the detector used to count the sample selected in the Batch Tree.

Voltage

Shows the voltage used to count the sample selected in the Batch Tree. For Alpha Then Beta count mode, both the alpha and beta voltages are shown.

Count Mode

Shows the count mode used for the Sample or the Batch selected in the Batch tree.

Average Background Rates

Alpha

Shows the average alpha background and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Beta

Shows the average beta background and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Average Efficiency & Spillover

Alpha

Shows the average alpha efficiency and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Alpha in Beta

Shows the average alpha spill down and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Alpha Fit Model

Shows the fit model used for the efficiency.

Beta

Shows the average beta efficiency and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Beta in Alpha

Shows the average beta spill up and uncertainty for the batch or sample (depending on what level of the tree is chosen).

Beta Fit Model

Shows the fit model used for the efficiency.

Discriminator Settings

When a sample counted in alpha/beta simultaneous mode is selected in the **Batch Tree**, discriminator settings are displayed. The levels are expressed as a percentage where 100% is the full scale of the amplifier used.

Data

The **Data** tabbed page shows the sample data results either as a consolidated sample (when the batch level of the tree is selected) or as iterations of a sample (when the sample level of the tree is selected).

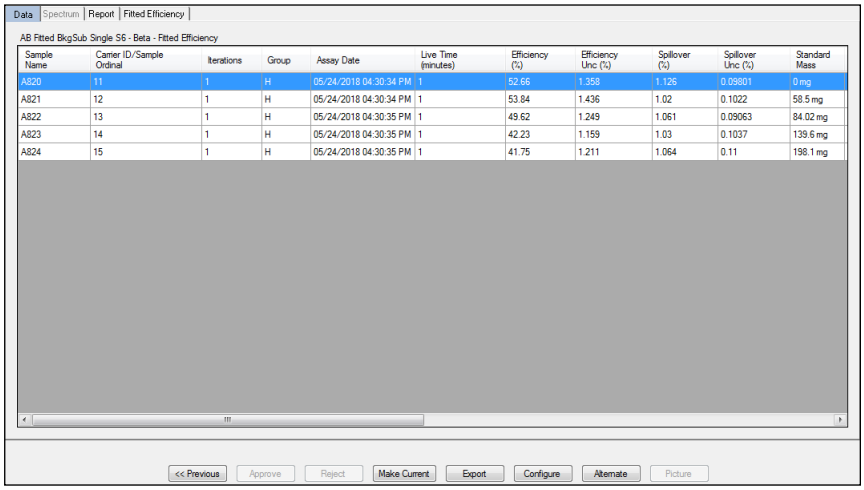


Figure 66 Data Tab of the Data Review Screen

The buttons along the bottom of the page are used to “Approve”, “Reject”, “Export the current”, “Make Current”, or “Configure the Data grid” or “select an Alternate report template”.

Approve

Press **Approve** to approve batches or samples that are associated with procedures that require approval.

Approving a sample will automatically approve all iterations of that sample.

Reject

Press **Reject** to reject batches or samples that are associated with procedures that require approval or to reject batches or samples that were previously approved.

Rejecting a sample will automatically reject all iterations of that sample except for Background Counts which can be rejected at the iteration level. A rejected iteration can no longer be used to retrieve batch and sample results.

Export

Press **Export** to export the contents of the **Data** tabbed page to a comma-delimited (CSV) or tab-delimited (TSV) file. Both formats create a file with a .TXT extension.

Make Current

Press **Make Current** to make the selected background or efficiency current.

Configure

Press **Configure** to select the fields to be displayed in the Data grid.

Alternate

Press **Alternate** to open a dialog box where you can select a new report (if available) based on the count type. Click on **OK** and the new report will be shown on the Reports tab.

Picture

If a batch has been counted on a Series 6 device with the camera enabled

If a batch has been counted on a Series 6 device with the camera enabled (See Setup | Devices | Custom Parameters) the **Picture** button will be enabled. Pressing the **Picture** button will bring up a dialog showing the before and after picture of the first sample in the batch. The **Sample** field will display the Sample Name of the sample. If more than one sample is present in the batch then the **Next** button in the dialog will be enabled. Click the **Next** button to display the before and after pictures for the next sample. This will now enable the **Previous** button. The **Next** and **Previous** buttons can then be used to scan through the picture sets for all the samples in the batch. If for some reason one picture is available and the other is not, the picture that is not available will be replaced by a red “X”. If neither picture is available that sample will be skipped and the next sample with at least one picture will be displayed.

Click the **Close** button to dismiss the picture dialog and return to the Data Review screen.

Spectrum

On select systems the **Spectrum** tabbed page shows the spectral data of the sample selected in the tree.

Note: For LB4100 devices, this tab is enabled for samples that the “Spectral Data” option was selected for an Unknown procedure at the time the batch was counted.

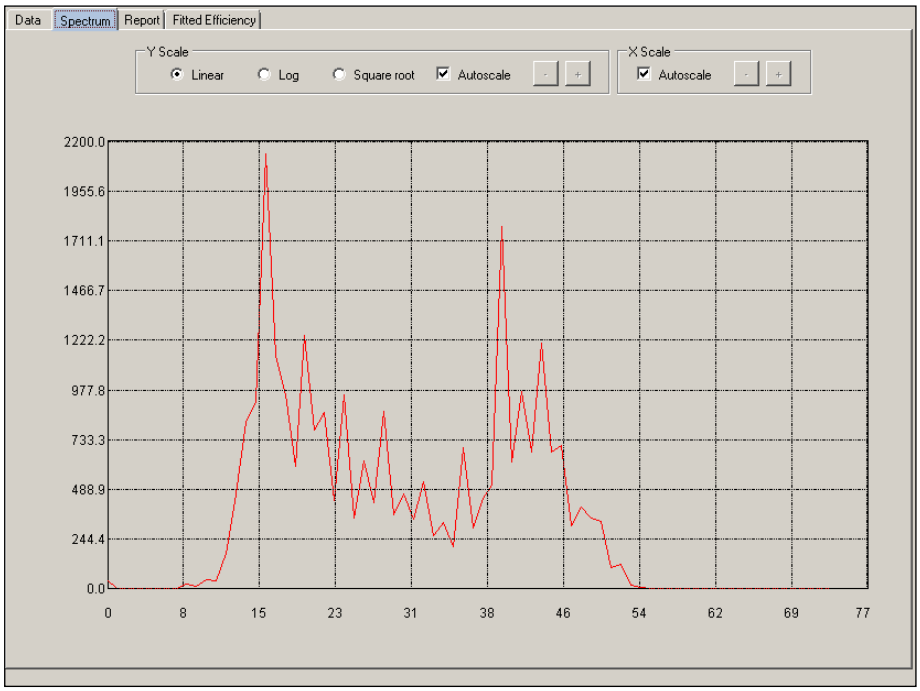


Figure 67 Spectrum Tab of the Data Review Screen

Y Scale

Select the option for the Y-axis scale as **Linear**, **Log**, or **Square Root**. Select the **Autoscale** check box to enable automatic scaling of the spectrum on the Y-axis. Clear the **Autoscale** check box to manually scale the spectrum on the Y-axis. Use the “ - ” button to decrease the scale (enlarge the spectrum) or the “ + ” button to increase the scale (shrink the spectrum).

X Scale

Select the **Autoscale** check box to enable automatic scaling of the spectrum on the X-axis. Clear the **Autoscale** check box to manually scale the spectrum on the X-axis. Use the “ - ” button to decrease the scale (expand the spectrum) or the “ + ” button to increase the scale (compress the spectrum).

Report

The **Report** tabbed page allows you to view batch report with the specified report template for the batch.

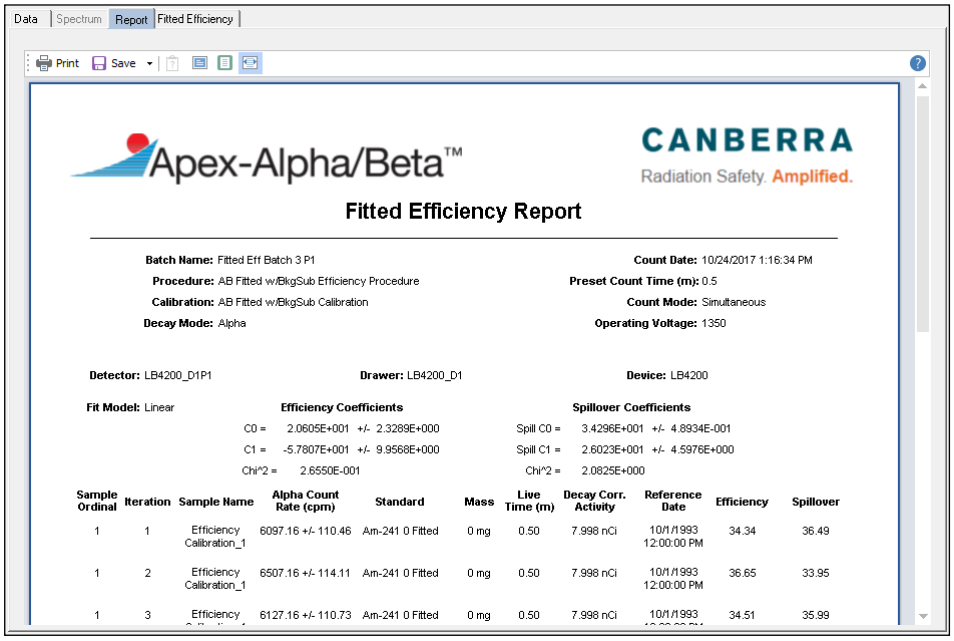


Figure 68 Report Tab of the Data Review Screen

You can **Print** the report, **Save** it to multiple file formats or display the report in one of three ways (full screen, one page at a time, or full page width).

In addition, the **Alternate** button may be used to select a different report (if available).

Fitted Efficiency

The **Fitted Efficiency** tabbed page is used to specify a fit model for Fitted Efficiency batches.

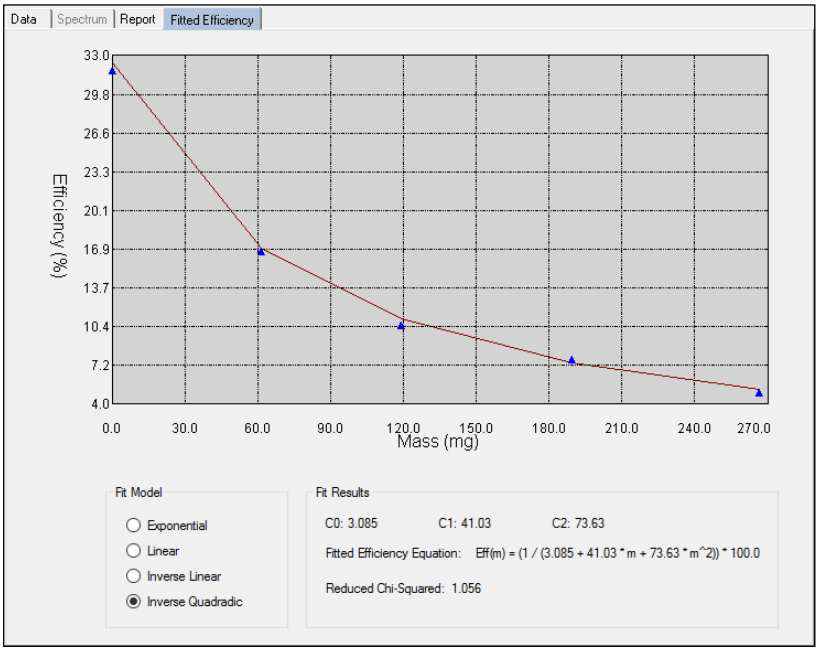


Figure 69 Fitted Efficiency Tab of the Data Review Screen

Fit Model

This identifies the mathematical model used to best describe the data accumulated for a fitted efficiency. Available models are **Exponential**, **Linear**, **Inverse Linear** and **Inverse Quadratic**.

If the Fit Model is changed after the efficiency has been approved, the **Approve** button will become enabled. The efficiency must be reapproved to use the new Fit Model.

Fit Results

This section shows the coefficients, **Fitted Efficiency Equation**, and **Reduced Chi-Squared** for the selected **Fit Model**.

9. Reports View

The **Reports** view in Apex-Alpha/Beta lets you view several types of system reports including Background summary, Efficiency summary and Event Log reports.

Summary Report

The **Summary Report** tabbed page enables users to view and print background summary and efficiency summary reports. Summary reports show the current active efficiency or background for each of the detectors and calibration.

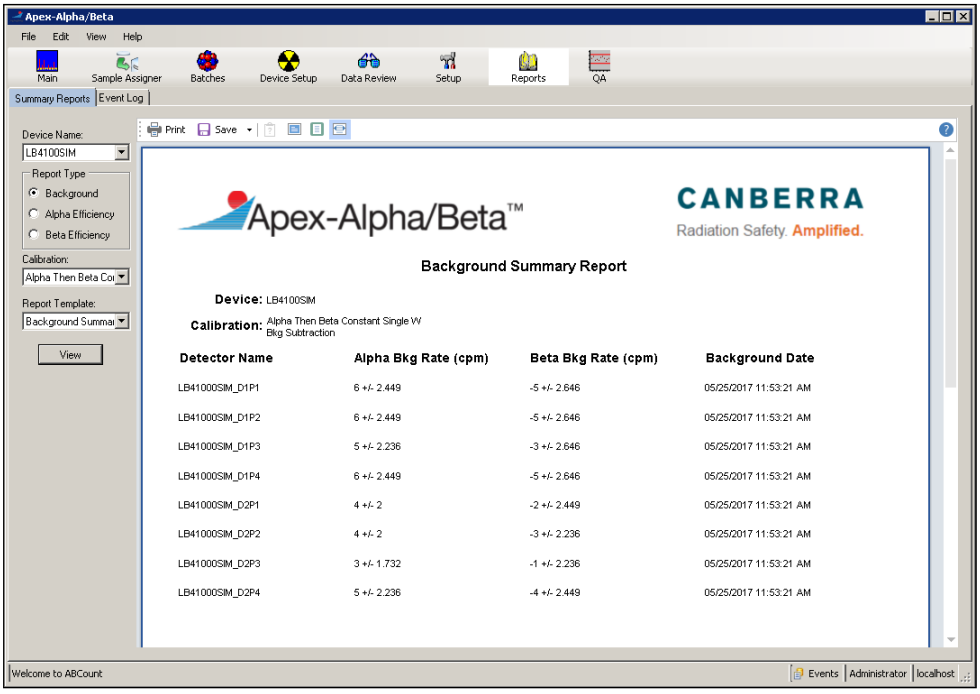


Figure 70 Report View - Summary Reports

Device Name

From the drop down list select the **Device** for which the report will be generated. You can print only one summary report for one device at a time.

Report Type

Select from one of the following report types: **Background**, **Alpha Efficiency**, or **Beta Efficiency**.

Calibration

From the drop down list select the **Calibration** for the report.

Report Template

From the drop down list select the **Report Template** to use for the report.

View

Press the **View** to generate and display the selected report type.

You can **Print** the report, **Save** the report to one of several files types or display the report in one of three ways (full screen, one page at a time, or full page width).

Event Log

The **Event Log** tabbed page lets you select which events to report, letting you select from several filters to further limit which events are displayed or printed. To display fewer events, use the **Event Types** filters.

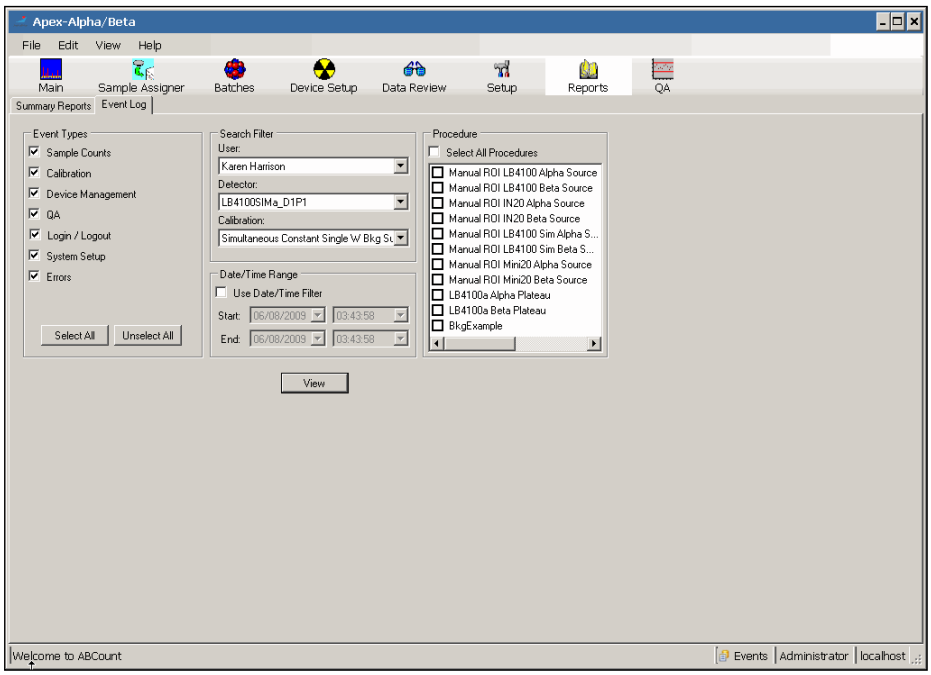


Figure 71 Event Log Report Page

Event Types

The **Event Types** section lets you choose which events to report. Event types include the following:

- Sample Counts
- Calibration
- Device Management
- QA
- Login/Logout
- System Setup
- Errors

Select All

The **Select All** button adds all events of all types to the report query by checking all the boxes in the **Event Types** section.

Unselect All

The **Unselect All** button removes all events of all types from the report query by clearing all the boxes in the **Event Types** section.

Search Filter

The events can be limited by the filter categories selected here. You can select a specific item in any of the search filters: **User**, **Detector**, **Calibration**, or select **<any>** to include all of a category's items in the search.

Data/Time Range

To narrow events to only a certain time period select the **Use Date/Time Filter** check box and enter a **Start** and **End** date and time.

Procedure

To complete your event selection, you must either check the **Select All Procedures** box or select one or more procedures from the list. Only events identified with the specified procedures will be reported.

View

After all search criteria has been entered, press the **View** button to query the data and produce the report.

You can **Print** the report, **Save** the report to one of several files types or display the report in one of three ways (full screen, one page at a time, or full page width).

10. Quality Assurance (QA) View

Apex-Alpha/Beta's Quality Assurance (QA) function monitors the performance of the instrument over time, performs statistical tests to monitor system degradation, and generates reports and charts presenting the data and results.

The **QA** view is used to setup and view QA data associated with the default calibration. QA parameter types include: Alpha Background Count Rate, Beta Background Count Rate, Alpha Efficiency, Beta Efficiency, Alpha Efficiency Count Rate, and Beta Efficiency Count.

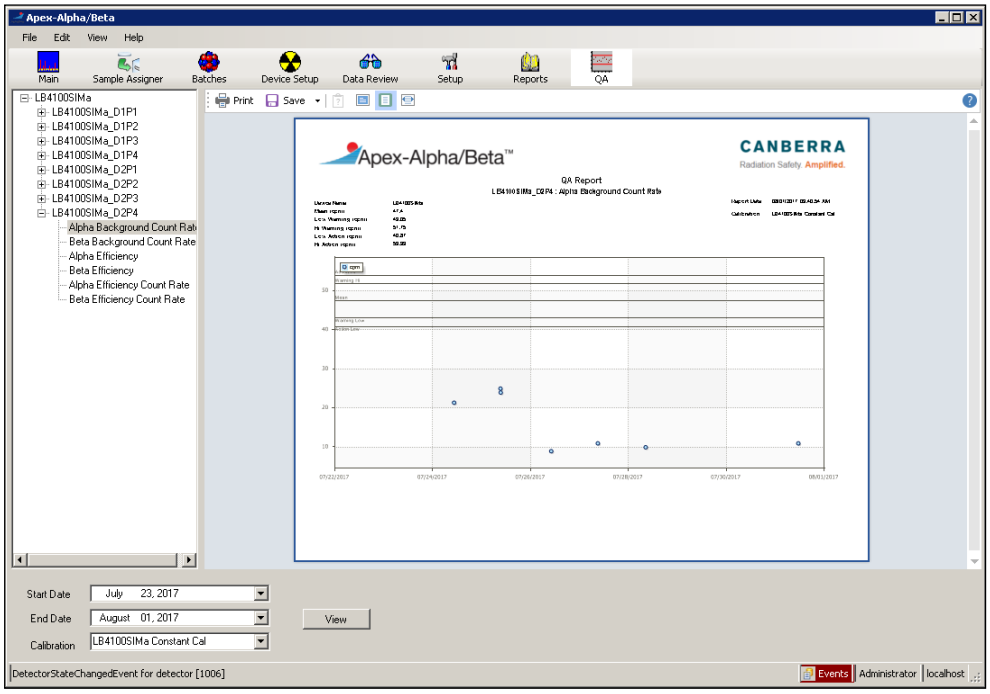


Figure 72 QA Chart and Report View

The Device/Detector Tree

The Device/Detector Tree on the left side of the view list QA parameter for each detector within a device. Expand the tree view by clicking the + to list the QA parameters for reporting. Select a QA parameter from the list. The parameters available are based on the profiles enabled on the profiles enabled on the **QA** tab of the **Setup** view for the particular device.

Notes:

- Devices are now displayed based on the order set in the **Devices** tabbed page in the **Setup** view.

Date/Time Range

The start and end date for the chart can be specified by entering a **Start** and **End** date.

Calibration

This filter limits the reported data to the selected **Calibration**. From the drop down list, select which calibration to use as the source for viewing the QA data.

View

Press **View** to display the QA report.

You can **Print** the report, **Save** the report to one of several files types or display the report in one of three ways (full screen, one page at a time, or full page width).

11. Setup View

The **Setup** view in Apex-Alpha/Beta lets the System Administrator set and maintain the system's security and lets an authorized user, defined by the Administrator, set system-wide defaults.

To access System Setup, launch the Apex-Alpha/Beta application, Logon using an Administrator-level account and select the **Setup** view. Then, select the appropriate tab for system options to be configured.

CAUTION: The default password for the Administrator user is blank. For maximum security, the Administrator should change this Username's Password when installation is complete. See *Security Setup Page* on page 145.

Security Setup Page

The Security Setup page lets the System Administrator create and maintain a database of users, their group assignments and the functions each group can access.

Only users in a group with the General Setup option under System Setup enabled have access to this page; its functions will be grayed out for all other users.

Note: A Group must be defined before a User.

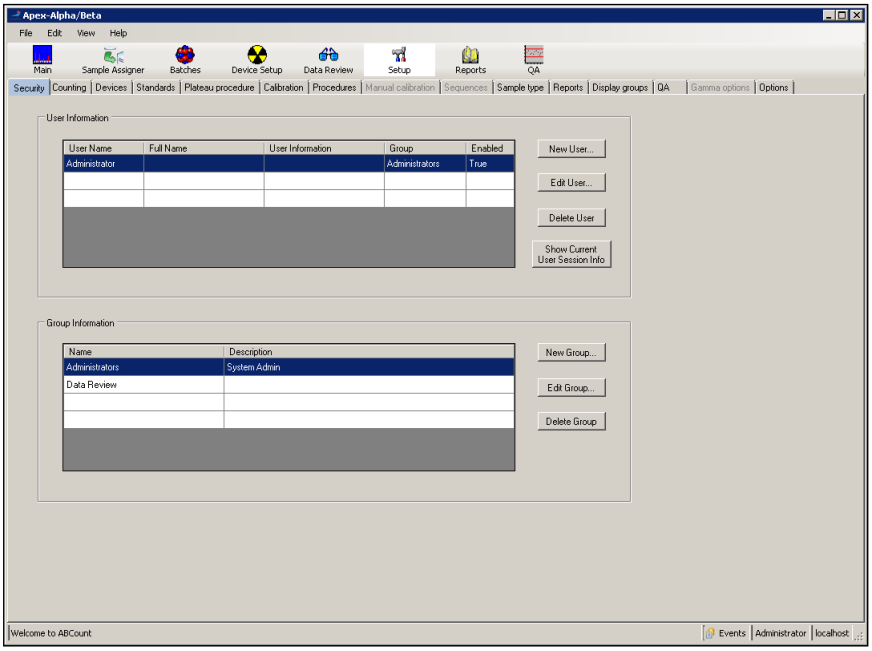


Figure 73 The Security Setup Page

User Information

User Name

The User Name identifies any User name entry. Initially, only the user name of *Administrator* is defined.

Full Name

Lists any Full Name entry for any defined User; this is an optional entry field.

User Information

Provides additional information about the user.

Group

Lists the assigned group for the user.

Enabled

Displays *False* if the User access has been temporarily disabled (check box is selected).

Displays *True* if the User has full access (check box is cleared).

Group Information

Group Name

Lists the Group names that have been defined. The user *Administrator* is assigned to the *Administrators* group (and cannot be changed or deleted). Default settings provide the Administrators group.

Group Description

Lists the description (if entered) for each of the Group Names.

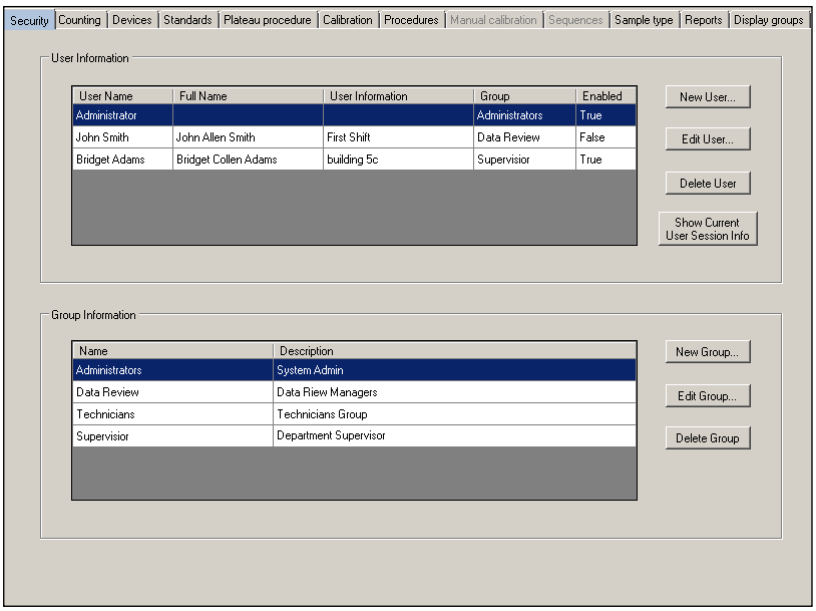


Figure 74 Security Setup - Users and Groups Defined

Show Current User Session Info

Click on the **Show Current User Session Info** button to display for the currently logged in users and their session information.

New User/Edit User

Click **New User** to create or **Edit User** to edit a User Name and Password and assign or change the user's Group. The user's security rights are those of the assigned group. Make your entries/selection and select **OK** to save it.

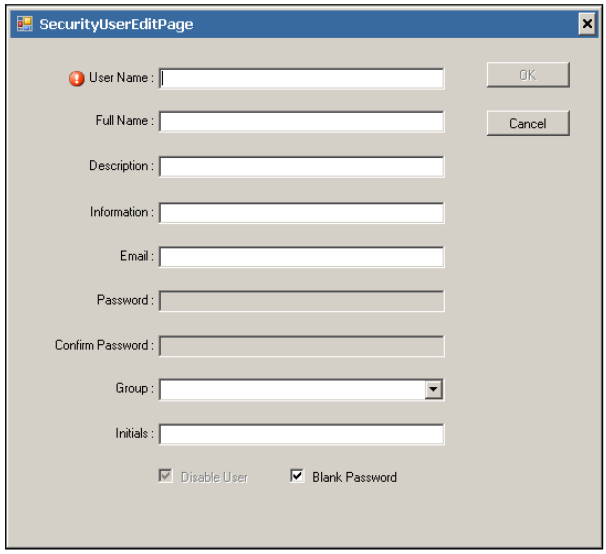


Figure 75 Creating a New User

Note: In order to assign a User to a Group, the Group name must be defined already.

User Name

This field is required; it must be between 1 and 16 characters.

Full Name, Description, Information, and Email

These fields are optional; they can be up to 64 characters each.

Password and Confirm Password

If the **Blank Password** check box is unchecked, these fields are enabled and required. The password must be between 1 and 16 characters. After typing in the **Password**, type it again in the **Confirm Password** field. The red "!" will disappear when the **Confirm Password** field matches the entry in the Password field.

Group

Required entry; each user is associated with one Group, for access privileges. Select the Group that this user is to be assigned to.

Initials

You can enter the user's initials here for a quick user ID.

Disable User

Select the **Disable User** check box to temporarily disable a user's access while retaining the full user definition.

Blank Password

Select the **Blank Password** check box to clear the User's password, allowing the user to log on without entering a password.

Delete User

Click the **Delete User** button to remove the selected user definition.

Note: The *Administrator* user cannot be deleted.

New Group/Edit Group

Click the **New Group** button to create a new group or **Edit Group** to edit an existing group's Description and Security Rights. Make your entries/selection and select **OK** to save it.

A *Groups* entry requires a Group Name entry, and may have a Description. Each Group is granted access Rights to features and functions by selecting check boxes for individual Apex-Alpha/Beta features.

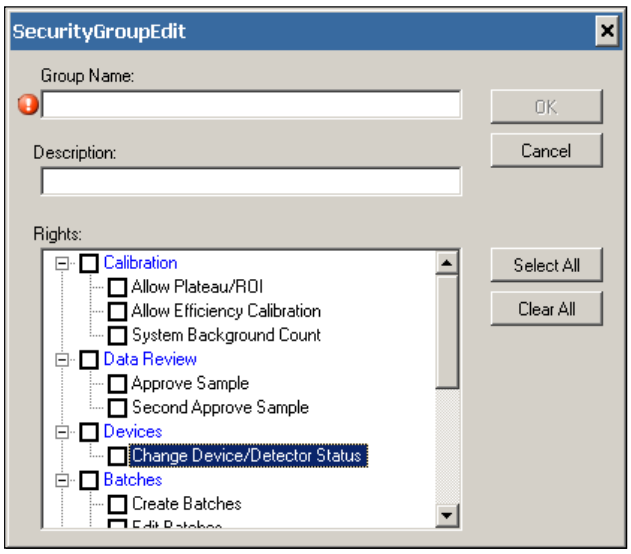


Figure 76 Creating a New Group

Notes: A new group has no rights to Apex-Alpha/Beta functions; rights must be assigned here before the group can use the system. The rights are described in *A Summary of Apex-Alpha/Beta Rights* on page 207.

The *Administrator* group has all rights assigned; these cannot be changed.

Group Name

Required entry; it must be between 1 and 16 characters.

Description

The Group Description is optional; it can be up to 64 characters.

Select All

Click **Select All** to enable all security parameters for this group. Otherwise select individual parameters as desired.

Clear All

Click **Clear All** to disable all security parameters for this group.

Delete Group

Click the **Delete Group** button to delete the highlighted group.

Notes: A group cannot be deleted if users are still assigned to it. The user's group assignments must be changed by editing the user or the users must be deleted from the system before the group can be deleted.

The *System Administrator* group cannot be deleted.

Counting Setup Page

The Counting Setup Page lets an authorized user define the units (physical values) used in Apex-Alpha/Beta.

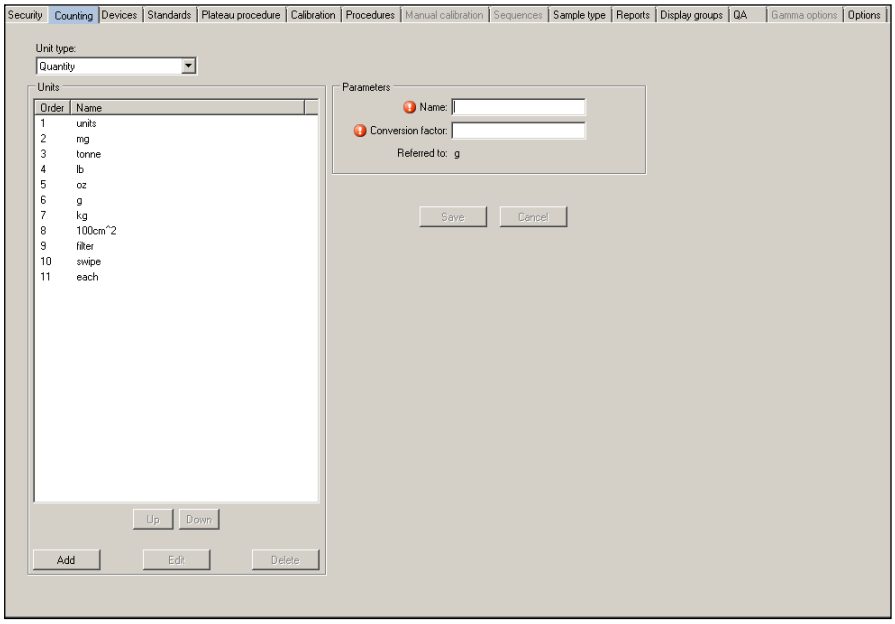


Figure 77 The Counting Setup Page

Unit Type

Select the **Unit Type** from the drop down list. Unit Types include: *Radiation*, *Quantity*, *Radioactivity*, *Time*, and *Volume*.

In the list box below are the physical values for the selected **Unit Type**.

Counting Buttons

The buttons located at the bottom of the Units list allow you to create a new, edit existing, or delete a counting unit.

Add

To create a new Unit, press the **Add** button, enter the **Name** and **Conversion factor**, then press **Save**.

Edit

To edit an existing Unit in the list, highlight the Unit, then press the **Edit** button. You can change the unit's name and conversion factor. **Save** the new unit.

Delete

To delete a Unit, highlight it in the list, then press **Delete**.

Up/Down

The **Up** and **Down** buttons move the selected Unit up and down in the list. This specifies the order the Units will be displayed in Apex-Alpha/Beta when selected.

Counting Parameters

The parameters that define the unit. All required fields have a red "!" next to it.

Name

Enter a descriptive name for the unit.

Conversion Factor

The **Conversion Factor** is used to convert between a base unit (keV, gram, Bq, seconds, liters) and its multiples. For example, the factor for liter is 1, for milliliters is 1000, and for gallons is 0.2642.

The system assumes that an added unit is a base unit and defaults to a conversion factor of '1'. If you create a multiple of this new unit, you must change the multiple's default conversion factor.

Referred to

The base unit used as the reference for all other units.

Devices Setup Page

The Devices Setup Page allows an authorized user to manage devices, drawers, and detectors.

Note: New Devices are created using the Device Wizard.

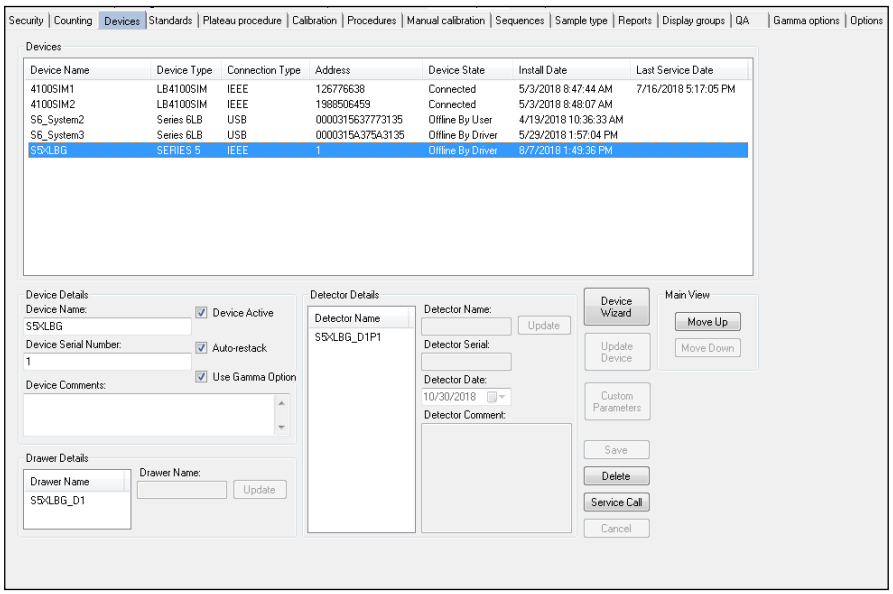


Figure 78 The Devices Setup Page

Devices

The Devices grid shows all the defined *devices* in Apex-Alpha/Beta. You can enter or edit Device and Detector information in the grid.

To edit the information, highlight an entry in the grid then edit the data in the appropriate detail section. Press the **Save** button.

Device Details

The **Device Details** section shows for each device its name, serial number, whether currently active, and optional comments.

Device Name

The **Device Name** should clearly identify a physical device. This name becomes most important when more than one device is to be controlled by the same computer. If **Device Name** is changed here, the new name will be displayed on any drawers associated with the device in the **Main** view.

Device Serial Number

This is the serial number of the system assigned by Mirion.

Device Active

Indicates that the device can be used for counting. If a device must be taken out of service, clear this check box to remove it from the **Main** view. A device that is made inactive is automatically set to the Offline state. Note that it is necessary to manually remove detectors from Display Groups for a device that is inactive.

Auto-restack

This check box appears for sample changer based systems.

Select the check box to enable the auto restack functionality; the device will automatically restack when all batches have completed counting. This is enabled by default when a sample changer device is created.

Gamma Option

Series 5XLB device only. Indicates that the device uses a gamma detector.

Device Comments

This field is used to add information about the selected device.

Drawer Details

The **Drawer Details** section shows the name of all drawers associated with the selected device.

Drawer Name

The **Drawer Name** should clearly identify a physical drawer. If the **Drawer Name** is changed here, the new name will be displayed on the corresponding drawer in the **Main** view.

Update

Press the **Update** button after making changes to the drawer information. This saves the information immediately if no other changes need to be made.

Detector Details

The **Detector Details** section shows for each detector its name, serial number, and optional comments.

Detector Name

This is a detector name available for editing. The default naming convention for a detector would be Device Name_DxPn where x is the drawer number (a=1) and n detector position in the drawer (1-8). If the **Detector Name** is changed here, the new name will be displayed on the parent drawer in the **Main** view.

Detector Serial Number

This is the serial number of the detector. The system will add default serial numbers. It is recommended that the actual serial number be entered if known.

Detector Date

This date field can be used to track when a detector was replaced in a device.

Detector Comments

This field is used to add information about the detector.

Update

Press the **Update** button after making changes to the detector information. This saves the information immediately if no other changes need to be made.

Device Wizard

Press the **Device Wizard** button to launch the Device Wizard. The Device Wizard provides a step-by-step process to configure new devices in Apex-Alpha/Beta. Use the **<Back** and **Next>** buttons to navigate through the wizard. At any time you can exit the wizard by pressing **Cancel**. Refer to *Device Registration* on page 11 for details.

Update Device

Press the **Update Device** button to launch the Field Update Tool. This allows certain devices to be updated to the latest firmware. Note that the selected device will be set to the Offline state, and any counts in progress will be aborted. This option should only be used at the direction of Mirion technical support. Refer to the *Field Update Tool Appendix* starting on page 233for details.

Custom Parameters

Series 6 devices only. Press the **Custom Parameters** button to launch the *Series 6 Options* dialog to enter gas input minimum and maximum pressure in units of PSI and the gas output tolerance, standby and operating conversion factors. The Custom Parameters screen also includes “Miscellaneous” options such as enabling the use of the Camera.

Important: Changing the Gas Input Pressure and Gas Output Flow parameters should only be done on the advice of Mirion personnel.

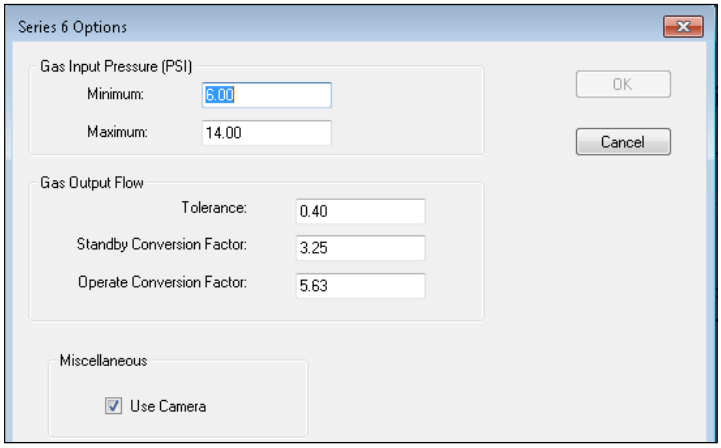


Figure 79 Series 6 Custom Options

Delete

Press the **Delete** button to delete a device. This should not be used except after consultation with Mirion technical support.

Note: If the device has been referenced by any counts it cannot be deleted. An alternative is to make the device inactive (see *Device Details* on page 153).

Service Call

Press the **Service Call** button to record a Mirion service call for the selected device. This will set the **Last Service Date** shown in the Devices grid to the current date and time.

Main View

Press the **Move Up** and **Move Down** buttons to change the display order in both the **Main** view and **QA** view. The current order is also reflected in the **Device** grid.

Standards Setup Page

The Standards Page lets an authorized user create or edit standards by name, source type, half-life, emission rate with uncertainty, calibration date/time, and source diameter. The system will decay correct the activity for each source for efficiency calculations.

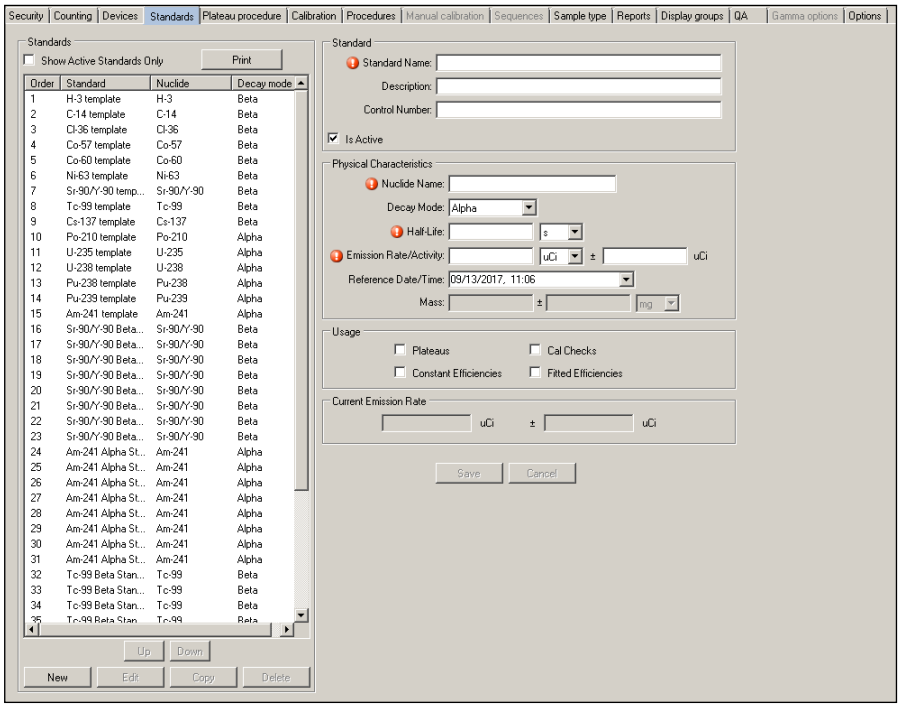


Figure 80 The Standards Setup Page

Standards List

The **Standards** list on the left side of the screen shows all the standards in the database.

Select the **Show Active Standards Only** check box to list only those standards which are currently active.

The first 16 are standard listed are templates pre-defined by Apex-Alpha/Beta.

H-3	C-14	CI-36	Co-57
Co-60	Ni-63	Sr-90/Y-90	Tc-99
Cs-137	Po-210	Th-230	U-235
U-238	Pu-238	Pu-239	Am-241

Print Button

Click on the **Print** button to generate a report of all listed standards. If the **Show Active Standards Only** check box is selected only the active standards will be included in the report.

You can **Print** the report, **Save** the report to one of several files types or display the report in one of three ways (full screen, one page at a time, or full page width).

Standards Buttons

The buttons located at the bottom of the Standards list allow you to create, edit, copy, or delete a standard.

New

To create a new Standard, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Standard in the list, highlight the Standard, then press the **Edit** button. Edit the data as necessary then press **Save**.

Copy

Press the **Copy** button to create a new Standard by transferring all data to the fields on the right side of screen. Enter a new name, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Standard, highlight it in the list, then press **Delete**. A standard that has been used for counting cannot be deleted.

Up/Down

The **Up** and **Down** buttons move the selected Standard up and down in the list. This specifies the order the Standards will be displayed in Apex-Alpha/Beta when selected.

Standards

The data in this section defines the current Standard. All required fields have a red “!” next to it.

Standard Name

This field is required and uniquely identifies the source standard. A nuclide specific name is recommended. This field can be up to 15 alphanumeric characters.

Description

This field is used to enter additional information about the standard.

Control Number

Intra-laboratory source control number (optional).

Is Active

Select the check box if the source is to be counted.

This check box is automatically selected when a standard is entered in Apex-Alpha/Beta. If a standard is taken out of service, this box can be cleared, making the source unavailable for the creation of calibration or unknown sample analysis procedures.

Physical Characteristics

The data in this section defines the standard's physical characteristics. All required fields have a red “!” next to it.

Nuclide Name

This is the name of the source nuclide such as Am-241.

Decay Mode

Select **Alpha**, **Beta**, or **Gamma**.

Half-Life

Accepted half-life of the nuclide.

Two input areas are provided. The first is for the half-life of the standard, the second is for the half-life units. Units are normally expressed in years.

Emission Rate

The amount of radioactivity that is escaping from the source matrix.

Three input fields are provided. The first is for the emission rate of the standard, the second is for the emission rate activity units and the third is for the emission rate uncertainty. Select the activity unit that corresponds to the units of the specification sheet of the standard. The uncertainty is entered in Absolute values or Relative (%) values based on the selection of the **Display Activity Uncertainty** on the **Options** tabbed page of the **Setup** view.

Reference Date/Time

The calibration date should be entered in this space in a mm/dd/yy hh:mm format. The drop down calendar can be used to input the calibration date. The keyboard up/down arrows can be used to change each value as well.

Mass

The final weight of the standard matrix.

Two input fields are provided. The first is for the mass of the standard and the second for the mass uncertainty. The standard mass is in units of mg.

These fields are enabled and required only when the **Fitted Efficiencies** option under **Usage** is checked.

Usage

Select the check box that corresponds to the type of procedure(s) for which the standard will be used.

Fitted Efficiencies

For Fitted Alpha or Beta Efficiency procedures. Checking this box enables the Mass inputs fields which are then required.

Constant Efficiencies

For Constant Alpha or Beta Efficiency procedures.

Plateau

For Alpha or Beta Plateau procedures or Gamma Plateau procedures for a sample changer system.

Cal Checks

For Alpha or Beta Cal Checks procedures.

Current Emission Rate

This is a read-only field. The calculated Current Emission Rate is shown and is displayed in the activity unit selected for the entered **Emission Rate**.

Plateau Procedure Setup Page

Sample detector operating voltages must be calculated prior to operation of a device. A Plateau Procedure describes how this calculation will be performed for a given device type and decay mode.

The Plateau Procedure Setup Page allows an authorized user to create a new or edit an existing Alpha, Beta, or Gamma (S5XLB only) plateau procedure.

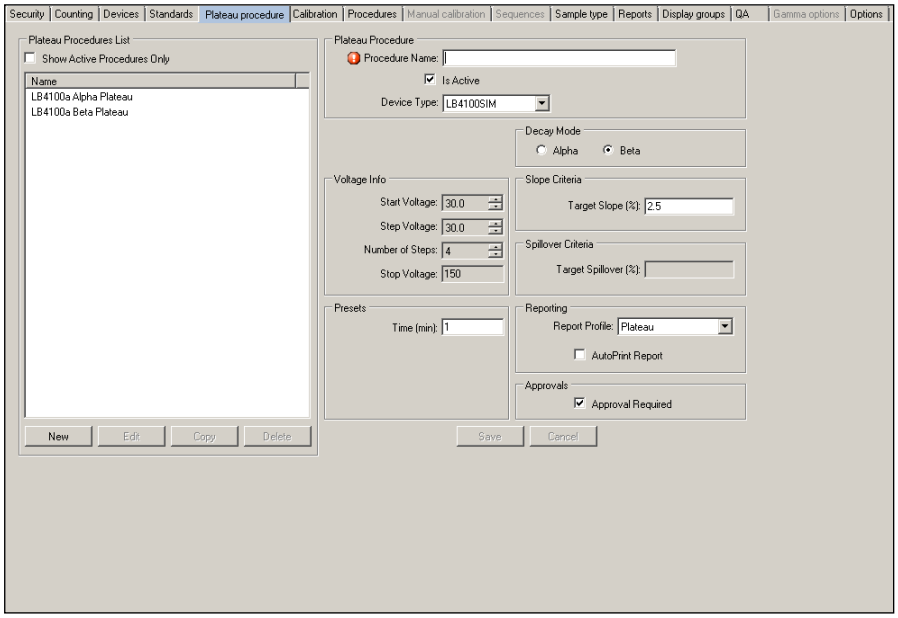


Figure 81 The Plateau Procedure Setup Page

Plateau Procedures List

The **Plateau Procedures** list on the left side of the screen shows active plateau procedures. Selecting a Plateau procedure makes the **Edit**, **Copy**, and **Delete** buttons available.

Show Active Procedures Only

Select this check box to display only active procedures in the Plateau Procedures list. Plateau procedures are made active by selecting the **Is Active** check box on the right side of the screen for a selected procedure.

Plateau Buttons

The buttons located at the bottom of the Plateau Procedures list allow you to create, edit, copy, or delete a plateau procedure.

New

To create a new Plateau procedure, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Plateau procedure in the list, highlight the procedure, then press the **Edit** button. Edit the data as necessary then **Save**.

Note: A procedure that is being used by a currently counting sample cannot be edited.

CAUTION: When you save the edited procedure definition, you will overwrite the old definition. There is no way to recover a definition that has been overwritten.

Copy

Press the **Copy** button to create a new Plateau procedure by transferring all data to the fields on the right side of screen. Enter a new name, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Plateau procedure, highlight it in the list, then press **Delete**. A procedure that has been used for counting cannot be deleted.

Plateau Parameters

The data on the right side of the screen define the current Plateau procedure. All required fields have a red "!" next to it.

Procedure Name

The Procedure Name can be up to 64 characters long. The procedure name should be sufficiently descriptive that you will clearly understand the data acquisition and analysis details of this procedure, when choosing it for execution.

Is Active

The **Is Active** check box is selected by default so that a new procedure will immediately be available for use. Clearing the check box removes a procedure from the list of active procedures.

Device Type

Select the device type from the drop down list.

Note: Once a new plateau procedure has been saved the device type cannot be changed.

Group

For sample changer based systems, A through J; default is “None” (blank).

If a Group letter, A through J, is selected from the drop-down list and the detector is selected in Sample Assigner to start the plateau procedure, this procedure will search the counting system for that Group carrier. Alternatively a different group may be selected to override the preselected group defined in the procedure. If no Group is preselected, you must make this selection at the time the procedure is initiated.

Decay Mode

Select **Alpha**, **Beta**, or **Gamma**. A voltage determined by an alpha plateau is used for subsequent calibration and unknown counts for **Alpha Only** count mode and for the starting voltage for **Alpha Then Beta** count mode. A voltage determined by a beta plateau is used for subsequent calibration and unknown counts for **Simultaneous** count mode and for the ending voltage for **Alpha Then Beta count** mode. The gamma plateau voltage is used for operation of the Gamma channel detector for sample changer systems that include the gamma option.

Voltage Info

Specifies the voltage range for this plateau. Refer to the table in *Plateau Count Steps Recommendations* on page 18 for recommendations on start voltage, step voltage, and number of steps for Alpha and Beta plateaus on supported device types.

Start Voltage

Specifies the starting voltage for a plateau count.

Step Voltage

Specifies the amount by which the voltage is incremented for each step in a plateau count.

Number of Steps

Specifies the number of steps in a plateau count. At least four steps (five points) are necessary to calculate a voltage.

Stop Voltage

The sum of the Start Voltage plus the (Step Voltage times the number of Steps). The ending voltage for a plateau should be about six step increments beyond the expected operating value.

Slope Criteria

Target Slope (%)

Used for systems with adjustable discriminators such as the CANBERRA™ LB4100™, LB4200™ and Series 5 and Series 6 sample changers. Also used for the alpha plateau voltage for Eurysis systems. This is normally set to 2.5%. The recommended slope for a beta plateau on a Series 6 sample changer is 3.5%.

Spillover Criteria

Target Spillover

Used for Eurysis systems where the beta plateau voltage is chosen based on the spillover at a given operating voltage. This is normally set to 1.0%.

Presets

Time

This is the maximum amount of time each *step* of the plateau will count. More information on choosing the correct plateau count time can be found in *Plateau Count Time* on page 19.

Reporting

Select the Report Profile from the drop down list to be associated with this procedure.

If the **Auto Print Report** check box is selected, the report will automatically output to the default system printer after the plateau count is analyzed.

Approvals

The **Approval** check boxes let you specify whether the data generated by running this procedure must be approved by authorized personnel. If the check boxes are cleared (unchecked), the successful Plateau is automatically approved.

For a sample changer system, a plateau procedure executed through an Auto Cal sequence, if analyzed successfully, will be automatically approved regardless of the setting of the **Approval** check box.

Calibration Setup Page

The Calibration page lets an authorized user create or edit a calibration.

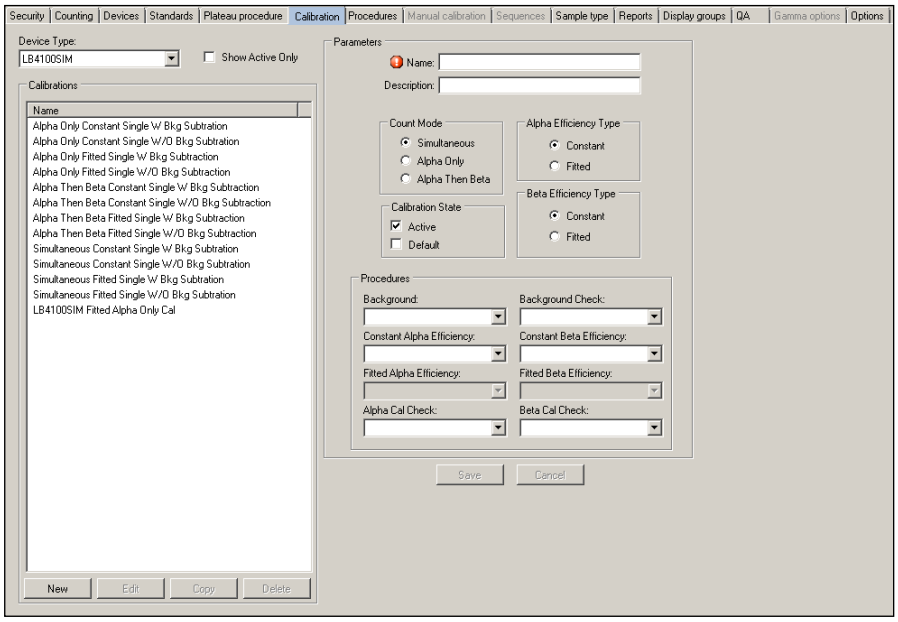


Figure 82 The Calibration Setup Page

A calibration consists of a Count Mode, one or two efficiency types, and a list of procedures whose results will be used for sample analysis.

Notes on Calibrations

- A calibration will usually have procedures assigned to it. These procedures link background or efficiency results to unknown results for the purpose of sample analysis. For example, any unknown count that uses this *calibration* will use the background *results* of the background *procedure* selected here for background subtraction (assuming the unknown procedure has background subtraction enabled).

- The calibration checks associated with this calibration are linked in the database for charting purposes.

- Every non-plateau procedure must be linked to a calibration whether or not corrections are to be applied.

- A calibration is not required to have procedures associated with it unless corrections are to be applied to procedures associated with it.

Device Type

Select the device type from the drop down list.

Note: Once a procedure has been created the device type cannot be changed.

Shared Calibrations

Starting with version 2.1, Background and Efficiency procedures can be shared among multiple Calibrations. It is required that the shared Calibrations have the same Count Type (Simultaneous, Alpha Only or Alpha Then Beta).

The calibration that is selected in the Calibration drop-down in the procedure (background or efficiency) is considered to be the "owning" calibration. Only this calibration will be listed to select for performing background or constant efficiency counts. In the case of a fitted efficiency, the "owned" fitted efficiency procedure is what will be listed to define a fitted efficiency batch. Once a procedure is created with the "owning" calibration, that procedure may be selected as the background or efficiency procedure for multiple calibrations.

All calibrations will be available to be selected for the background (constant and fitted) and efficiency (constant only) summary reports (Reports | Summary | Reports). The values and date of when the procedure was run will be the same for all calibrations that share that procedure.

Calibration List

The **Calibration** list on the left side of the screen shows all calibrations for the selected Device Type. Selecting a procedure makes the **Edit**, **Copy**, and **Delete** buttons available.

Show Active Only

Select this check box to display only active calibrations in the Calibrations list. Calibrations are made active by selecting the **Active Calibration State** option.

Calibration Buttons

The buttons located at the bottom of the Calibrations list allow you to create, edit, copy, or delete a calibration.

New

To create a new Calibration, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Calibration in the list, double-click on an entry or highlight the calibrations, then press the **Edit** button. Edit the data as necessary then press **Save**.

Note: A calibration that is being used by a currently counting sample cannot be edited.

CAUTION: When you save the edited calibration definition, you will overwrite the old definition. There is no way to recover a definition that has been overwritten.

Copy

Press the **Copy** button to create a new Calibration by transferring all data to the fields on the right side of screen. Enter a new name, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Calibration, highlight it in the list, then press **Delete**. A calibration that has been used for counting cannot be deleted.

Calibration Parameters

The data on the right side of the screen define the current Calibration. All required fields have a red "!" next to it.

Name

The calibration name can be up to 35 characters long. The symbols, \ / : * ? " < > and | cannot be used. The calibration name should be sufficiently descriptive that you will clearly understand the data acquisition and analysis details of this calibration, when choosing it for use with a procedure.

Description

This field is used to enter additional information about the calibration.

Count Mode

Three count modes are available for the analysis of unknown samples. If all three modes will be utilized in the analysis of unknown samples, the system must be calibrated for each mode.

Simultaneous

The **Simultaneous** count mode sets the sample detector high voltage to the beta plateau voltage. At this voltage, the proportional counter is sensitive to all ionizing radiation and the separation of alpha and beta particles is accomplished using pulse height. This is determined using the **ROI** tabbed page in the *Device Setup view* on page 152.

Alpha Only

The **Alpha Only** count mode sets the sample detector high voltage to the alpha plateau voltage. At this voltage, the proportional counter is only sensitive to alpha radiation.

Alpha Then Beta

In the **Alpha Then Beta** mode of operation, each sample is counted twice, first at the alpha only voltage and then at the simultaneous voltage. The simultaneous voltage counts are then corrected for the alpha only voltage counts.

Efficiency Type (Alpha or Beta)

The Efficiency Type determines how the samples are corrected to an activity from the count rate. For the Alpha or Beta efficiency types select **Constant** or **Fitted**. The Beta efficiency type is only available when **Simultaneous** or **Alpha Then Beta** count mode is selected.

Constant

Regardless of the residual mass (weight) of the sample the efficiency is the same.

Fitted

The efficiency changes (decreases) as the mass changes (increases). This is calculated from a fitted efficiency run with a fit method being chosen by the user.

Calibration State

Active

The **Is Active** check box is selected by default so that a new calibration will immediately be available for use. Clearing the check box removes a calibration from the list of active calibrations.

Default

Selecting the **Default** check box will mark the Calibration as the first one in the Calibration list in the Sample Assigner. This one is used as the basis for QA (check) counts.

Procedures

Select an appropriate procedure for each category. Only active procedures are listed, as specified on the Procedures Setup Page.

Note: Starting with version 2.0, choosing the Calibration when initially defining the Procedure automatically associates it to that Calibration procedure.

Starting with version 2.1, multiple calibrations may select the same background and/or efficiency procedure. Background Check and Alpha and Beta Cal Check procedures must be unique for each calibration.

Background

All active Background procedures for the Count Mode (Alpha Only, Simultaneous, Alpha Then Beta) of the selected calibration.

Background Check

All active Background Check procedures for the Count Mode (Alpha Only, Simultaneous, Alpha Then Beta) assigned to the selected calibration.

Alpha/Beta Constant Efficiency

Available when **Constant** efficiency type is selected. All active Constant Efficiency procedures for the Count Mode (Alpha Only, Simultaneous, Alpha Then Beta) of the selected calibration.

Alpha/Beta Fitted Efficiency

Available when **Fitted** efficiency type is selected. All active Fitted Efficiency procedures for the Count Mode (Alpha Only, Simultaneous, Alpha Then Beta) of the selected calibration.

Alpha/Beta Cal Check

All active Calibration Check procedures for the Count Mode (Alpha Only, Simultaneous, Alpha Then Beta) assigned to the selected calibration.

Procedures Setup Page

The Procedure Setup Page lets an authorized user create a new or edit an existing procedure. Procedure types include:

- **Unknown** – For the analysis of unknown samples.
- **Background** – If unknown sample analysis results are to be corrected for system background, the system must be calibrated to determine the alpha and beta backgrounds.
- **Background Check** – The Background Check count type is intended for frequent evaluations of ambient background radiation levels. These counts are used to identify background fluctuations which might affect sample count analysis results, including elevated activity due to contamination of the counting system hardware.
- **Efficiency** (**Fitted/Constant**) – If unknown sample analysis results are to be corrected for activity, the system must be calibrated to determine the alpha and beta efficiencies.
- **Source Check** – Used to evaluate the continued correct performance, the Calibration Check count type is intended for routine system quality assurance testing.

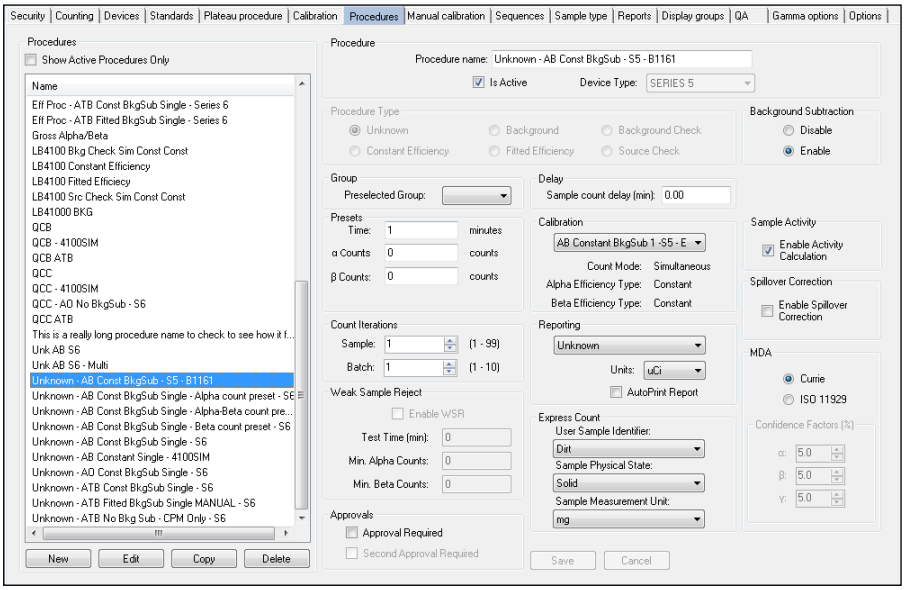


Figure 83 The Procedure Setup Page

Procedures List

The **Procedures** list on the left side of the screen shows all Procedures in the database. Selecting a procedure makes the **Edit**, **Copy**, and **Delete** buttons available.

Show Active Procedures Only

Select this check box to display only active procedures in the Procedure list. Procedures are made active by selecting the **Is Active** check box on the right side of the screen for a selected procedure.

Procedure Buttons

The buttons located at the bottom of the Procedures list allow you to create, edit, copy, or delete a procedure.

New

To create a new Procedure, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Procedure in the list, highlight the procedure, then press the **Edit** button. Edit the data as necessary then press **Save**.

Note: A procedure that is being used by a currently counting sample cannot be edited.

CAUTION: When you save the edited procedure definition, you will overwrite the old definition. There is no way to recover a definition that has been overwritten.

Copy

Press the **Copy** button to create a new Procedure by transferring all data to the fields on the right side of screen. Enter a new the data, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Procedure, highlight it in the list, then press **Delete**. A procedure that has been used for counting cannot be deleted.

Procedure Parameters

The data on the right side of the screen define the current Procedure. All required fields have a red "!" next to it.

Procedure Name

This field is required. The Procedure Name can be up to 64 characters long. The procedure name should be sufficiently descriptive that you will clearly understand "what this procedure measures" when choosing it for execution.

Is Active

The **Is Active** check box is selected by default so that a new procedure will immediately be available for use. Clearing the check box removes a procedure from the list of active procedures. The procedure will remain in the database so samples associated with it can be analyzed.

Device Type

Select the device type from the drop down list.

Note: Once a procedure has been saved the device type cannot be changed.

Procedure Type

Choose the procedure type by selecting the appropriate radio button.

Group

Preselected Group

For sample changer based systems, A through J; default is "None" (blank).

If a Group letter, A through J, is selected from the drop-down list and the detector is selected in Sample Assigner to start the procedure, this procedure will search the counting system for that Group carrier. Alternatively a different group may be selected to override the preselected group defined in the procedure. If no Group is preselected, you must make this selection at the time the procedure is initiated.

Delay

Sample Count Delay

Available only for Series 5 sample changer based systems; selectable from 0 to 9999 minutes.

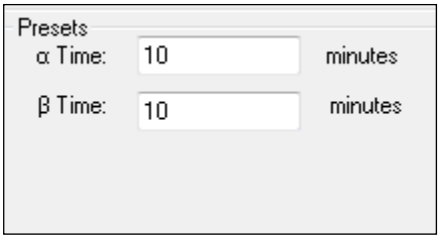
The delay time between counting intervals. If a value other than "0" is entered, the system will wait for the amount of time selected for the Sample Count Delay before counting each sample and iteration for the selected Count Time.

Note: Available for Unknown, Background and Background procedures. Not available for Fitted or Constant Efficiency or Source Check procedures.

Presets

The sample count will be terminated when either the preset **Count Time** or any one of the **Count Presets**, Alpha or Beta, is reached.

When counting in the Alpha then Beta mode with a Series 6 or LB4200 device, separate Preset times for the Alpha and Beta voltage phase for the count are shown. **Count Presets** are not available for Alpha then Beta count mode procedures.



Time

Enter the counting time for each sample in minutes. Acquisition will stop when elapsed time equals the preset value.

Alpha Count Preset

Enter the count value used for preset count termination. If the total alpha counts reach the preset value before the preset beta count is reached or the preset time elapses, the count will be terminated at the next whole 1/100th of a minute.

Beta Count Preset

Enter the count value used for preset count termination. If the total beta counts reach the preset value before the preset alpha count is reached or the preset time elapses, the count will be terminated at the next whole 1/100th of a minute.

Count Iterations

Sample

This is the number of times a sample will be counted for the selected Count Time before the next sample is inserted for analysis.

Batch

Available only for sample changer based systems; this is the number of times a Batch (Group) of samples will be counted before the system proceeds to another Group or Batch of samples.

Note: Available for Unknown and Fitted Efficiency procedures. Not available for Background or Constant Efficiency or Background or Source Check procedures.

Weak Sample Reject

NOTE: Disabled for V2.0.

This option can be extremely valuable when counting large numbers of samples for long counting times. Generally, a sample count is terminated when the preset counting time is reached. This option allows you to terminate a count if less than a specified number of counts, generally based on background, is acquired within a specified amount of time. This option is not available for the Alpha then Beta Count Mode.

Select the **Enable WSR** check box to enable this option.

Test Time

Apex-Alpha/Beta will, at this preset time, evaluate the count rate and make a reject or continue decision.

Min. Alpha/Beta Count

If this preset count rate, CPM, is equaled or exceeded within the Test Time, Apex-Alpha/Beta will continue counting until the Preset Time is reached. If this count rate is not equaled, Apex-Alpha/Beta will terminate the counting of this sample.

Calibration

Note: Starting with version 2.0, choosing the Calibration when initially creating a Background or Efficiency Procedure automatically associates that procedure to the Calibration procedure.

Select from the drop down list. Refer to *Calibration Setup Page* on page 165 for more information on how to customize calibration procedure.

Shown are the Count Mode and if it applies, the Alpha and Beta Efficiency Type.

Background Subtraction

Select the **Enable Background Subtraction** option to correct the efficiency data results for background. Select the **Disable Background Subtraction** option to ignore the contribution of background to the efficiency results.

Sample Activity

If the **Enable Activity Calculation** box is cleared, it will report the results of the sample count in CPM (Counts per Minute) or CPS (Counts per Seconds). The Units drop down list under Reporting will list CPM and CPS.

If the **Enable Activity Calculation** box is checked Apex-Alpha/Beta will correct the counting data for system efficiency and report the results as an activity, as determined by the activity unit chosen for this procedure. The activity units are selected in the Units drop down list under Reporting.

Spillover Correction

Option only available for Unknown procedures if the **Enable Activity Calculation** check box is selected and the selected calibration mode is **Simultaneous**.

When performing an efficiency calibration in the **Simultaneous Count Mode**, Apex-Alpha/Beta will determine the % of beta interactions that spillover and are stored as alpha events plus the % of alpha interactions that spillover and are stored as beta events.

Note: This option is not available for the Alpha Only or the Alpha then Beta Count Modes.

MDA

Select either Currie or ISO 11929 methodology for detection parameters. This option is only available for Unknown procedures when the **Enable Activity Calculatio**n check box is selected.

Currie

Choose **Currie** to use the standard minimum detectable activity (MDA) calculation.

ISO 11929

Choose **ISO 11929** to use the minimum detectable activity calculations. Enter the "Confidence Factors (%)" for α, β, and γ.

α – probability of a false positive

β – probability of a false negative

γ – Bayesian confidence interval used for Best Estimate, etc.

Spectral Data

Enabled for Unknown procedures only and unchecked by default. As of version 2.0, only LB4100 devices support spectral data.

When this option is enabled, a graph of the spectral data is displayed on the **Spectrum** tab of the **Data Review** view for an unknown sample.

Reporting

Select the default Report profile from the drop down list to be used in the procedure.

Units

From the drop down list select the units.

Auto Print Report

If the **Auto Print Repor**t check box is selected the report will be automatically directed to the default Windows printer. However, if the **Approval Required** check box is selected the report will not be printed until the batch has been approved

Approvals

The **Approval** check boxes let you specify whether the data generated by running this procedure must be approved by authorized personnel. If the check boxes are cleared (unchecked), the successful Procedure is automatically approved.

For Fitted Efficiency procedures, the check box is enabled by default.

For Plateau, Background, Constant Efficiency and Background and Source Check procedures executed by an Auto Cal or QC sequence on a sample changer system the procedure is automatically approved regardless of the setting of the **Approval** check box.

Express Counts

To be eligible for use with the Express Count feature in the **Sample Assigner**, all three fields of an Unknown procedure must be populated. For more details on using Express Count refer to the *Express Count Configuration* on page 77.

User Sample Identifier

This indicates the User Sample Identifier to be associated with all samples in any batch counted via the Express Count feature. User Sample Identifiers may be created on the **Sample Type** tab of the **Setup** view.

Sample Physical State

This indicates the sample physical state (Solid, Liquid, etc.) of all samples in any batch counted via the Express Count feature.

Sample Measurement Units

This indicates the default measurement unit for all samples in any batch counted via the Express Count feature.

Manual Calibration Setup Page

The Manual Calibration page lets an authorized user manually enter the calibration information (background values and efficiency coefficients).

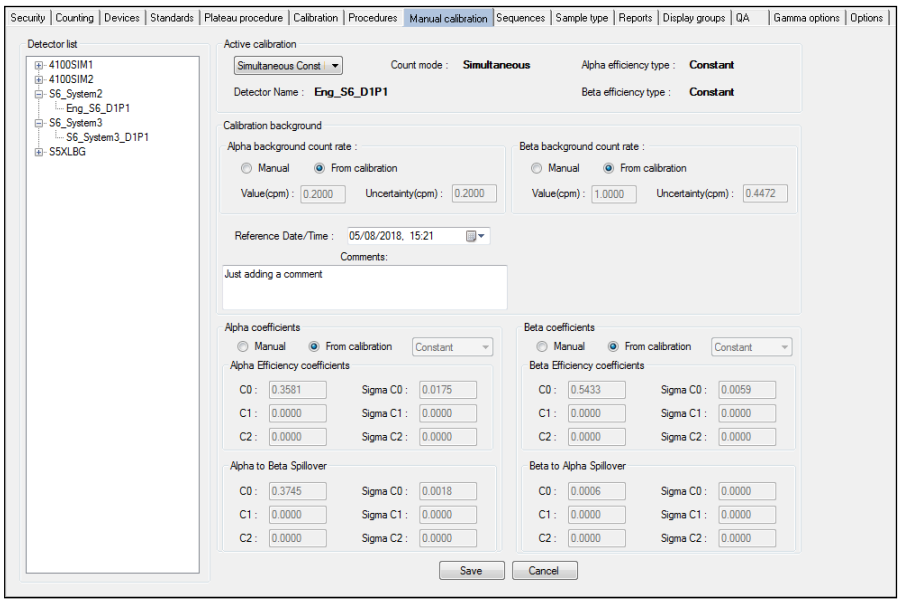


Figure 84 The Manual Calibration Setup Page

Drawer / Detector List

The Drawer/Detector tree on the left side of the screen allows for individual selection of a detector grouped by drawers. After making the selection, the right side allows for the setup of individual parameters for each detector.

The tree is updates calibration data automatically. The first active calibration for the selected detector will be selected.

Manual Calibration Parameters

Data is entered for “Manual” calibrations only. When the “From Calibration” option is selected, the data entered in the fields are displayed from the selected Active calibration.

Active Calibration

Select the active calibration from the drop down list. The Alpha efficiency type, Beta efficiency type, and Count Mode are displayed for the selected calibration.

Calibration Background

Alpha/Beta Background Count Rate

Displays the alpha/beta background determined by this count and the uncertainty of that background.

Select either the **Manual** or **From Calibration** option:

- **Manual** – Enter the “Value” and “Uncertainty” in CPM. The data will be stored for each detector/value pair.
- **From Calibration** – Displays the values from the selected active Calibration.

Reference Data/Time

Enter the calibration date/time or use the drop down calendar to select the date/time.

Comments

Enter any additional information on the alpha/beta background count rate.

Alpha/Beta Coefficients

Select the **Manual** option and its alpha/beta enter the alpha/beta calibration coefficients for:

- C0 / C1 / C2
- Sigma C0 / Sigma C1 /Sigma C2

Select the **Manual** option to display the values from the selected active Calibration.

Save / Cancel Buttons

Once all of the selections have been made, click **Save** to save this calibration or **Cancel** to exit this without saving your changes.

Edit Calibration Data

There will be a mechanism allowing editing calibration parameter if “manual calibration” has been selected.

It will possible to enter manually only some calibration coefficients and to keep other from the calibration.

Save Calibration Data

Calibration data entered manually will be saved in database and will be used during counting.

Sequence Setup Page

For a sample changer system, a Counting Sequence is defined as a series of procedures to run in a specified order. The Sequence Setup page lets an authorized user create a new or edit an existing counting sequence.

Sequence types include:

- **QC** sequences are used to measure system performance for quality control checks.
- **AutoCAL** sequences are used to change the overall system calibration.

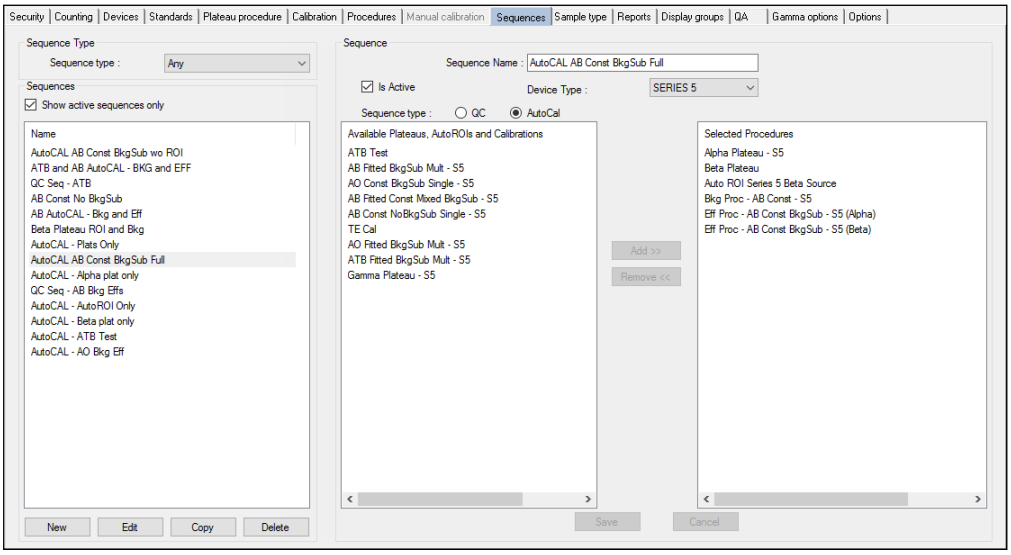


Figure 85 The Sequences Setup Page

Sequence Types

Select the Sequence type: **Any**, **QC**, or **AutoCAL** from the drop down list to populate the left panel with existing sequences.

Sequences List

The Sequences list on the left side of the screen shows all existing Sequence depending on the Sequence Type selected. Selecting a sequence makes the **Edit**, **Copy**, and **Delete** buttons available.

Show Active Sequences Only

Select this check box to display only active Sequences in the list. Sequences are made active by selecting the **Is Active** check box on the center section of the screen for a selected Sequence.

Sequence Buttons

The buttons located at the bottom of the Sequences list allow you to create, edit, copy, or delete a sequence.

New

To create a new Sequence, press the **New** button and select the **Sequence type**. Then, for a QC sequence select a calibration, or for an Auto Cal sequence individually select each Procedure and/or Calibration from the **Available Plateaus**, **AutoROIs** and **Calibrations** list box in the order they are to be executed and click the **Add** button to move them to the **Selected Procedures** list box. If any procedure is not to be executed it can be selected in the **Selected Procedures** list and removed using the **Remove** button. Press **Save** when edits are complete.

Edit

To edit an existing Sequence in the list, highlight the procedure, then press the **Edit** button. Edit the data as necessary then press **Save**.

Note: A procedure that is being used by a currently counting sample cannot be edited.

CAUTION: When you save the edited sequence definition, you will overwrite the old definition. There is no way to recover a definition that has been overwritten.

Copy

Press the **Copy** button to create a new Sequence by transferring all data to the fields on the right side of screen. Enter a new the data, select the Procedure to the right side of the screen to add or remove from the **Selected Procedures** list box, then press **Save**.

Delete

To delete a Sequence, highlight it in the list, then press **Delete**.

Sequence Name

This field is required. The Sequence Name can be up to 64 characters long. The sequence name should be sufficiently descriptive that you will clearly understand "what this sequence measures" when choosing it for execution.

Is Active

The **Is Active** check box is selected by default so that a new sequence will immediately be available for use. Clearing the check box removes a sequence from the list of active sequences. The sequence will remain in the database so procedures associated with it can be analyzed.

Device Type

Select the device type for sample changer based system from the drop down list.

Sequence Type

When Sequence Type is "Cal", then the following are shown:

- Alpha, Beta, and Gamma Plateau procedures
- Auto ROI procedures*
- Calibration

*Only Simultaneous calibration can allow an ROI procedure as part of a sequence.

When Sequence Type is "QC", then the following are shown:

- Available Calibrations:
  - Calibrations

Available Plateaus, AutoROIs and Calibrations

Based on the Sequence Type selected, this is a list of all active plateau and AutoROI procedures and calibrations for AutoCal or calibrations for QC. A vertical scroll bar will appear, if necessary, to allow viewing of all items in the list box.

Note: Auto ROI procedures are predefined by the software.

Selected Procedures

Based on the Sequence Type selected, this is a list of all procedures that currently define this sequence. Calibrations selected for a QC or AutoCal sequence will be expanded to show their background and/or constant efficiency procedures.

The sequence will execute in the order the procedures are listed in the Selected Procedures list box, regardless of the order in which the group plates are stacked on the sample changer.

QC / Auto Cal Sequences

Within this list box you must define the ID number of the sample carrier containing the standard or Background media for the selected procedure. The carrier plate IDs do not have to be unique.

Add Button

The **Add** button is used to add the item selected in the **Available Plateaus**, **AutoROIs** and **Calibrations** or **Available Calibrations** list box to the **Selected Procedures** list box.

Remove Button

The **Remove** button is used to remove the procedure selected in the **Selected Procedures** list box. Not until all of the procedures associated to a calibration are removed will the calibration be added back into the **Available Plateaus**, **AutoROIs** and **Calibrations** or **Available Calibrations** list box.

Sample Types Setup Page

The Sample Types Setup Page lets an authorized user review all current sample types and create new ones as needed.

Sample can be defined as Unknown, Matrix Spike, Matrix Spike Duplicate, Laboratory Control Sample (LCS), or LCS Duplicate. In addition, a User Sample Identifier can be defined through this setup page to further describe the sample being counted. The identifier includes a name and description and can optionally include customer information.

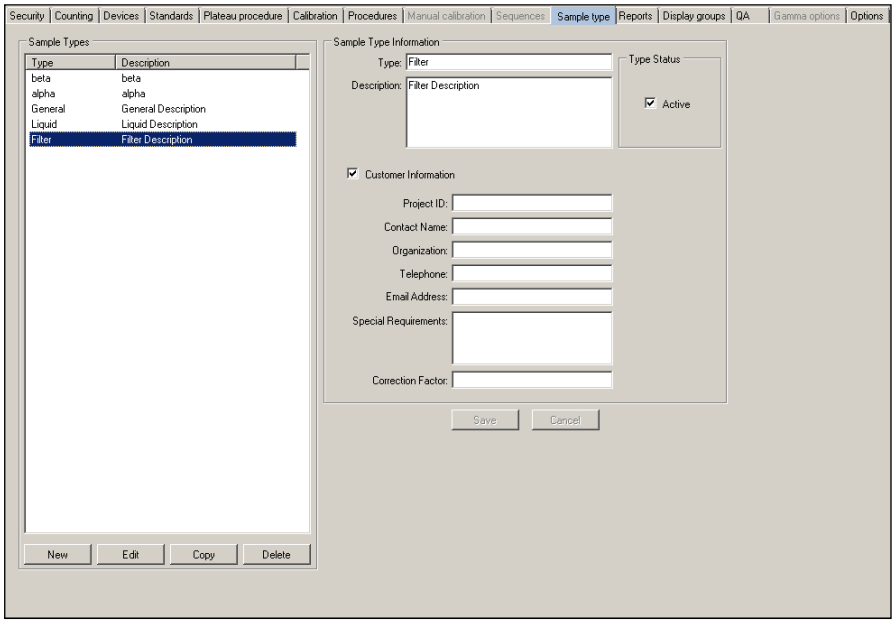


Figure 86 The Sample Types Setup Page

Sample Types List

The **Sample Types** list on the left side of the screen shows all sample types in the database. Selecting a sample type makes the **Edit**, **Copy**, and **Delete** buttons available.

Sample Types Buttons

The buttons located at the bottom of the Sample Types list allow you to create, edit, copy, or delete a sample type.

New

To create a new Sample type, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Sample Type in the list, highlight the Sample Type, then press the **Edit** button. Edit the data as necessary then press **Save**.

Copy

Press the **Copy** button to create a new Sample Type by transferring all data to the fields on the right side of screen. Enter a new name, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Sample Type, highlight it in the list, then press **Delete**.

Sample Information

The data in the **Sample Type Information** section defines the current Sample Type. All required fields have a red "!" next to it.

Type

This field uniquely identifies the sample type. This field is required.

Description

This field is used to enter additional information about the sample type. This field is required.

Type Status

The **Active** check box is selected by default so that a new sample type will immediately be available for use. Clearing the check box removes a sample type from the list of active sample types.

Customer Information

This section is optional. Press the **Customer Information** check box to enter the necessary customer information.

Reports Setup Page

The Reports Setup Page lets an authorized user create or edit previously defined Report Templates.

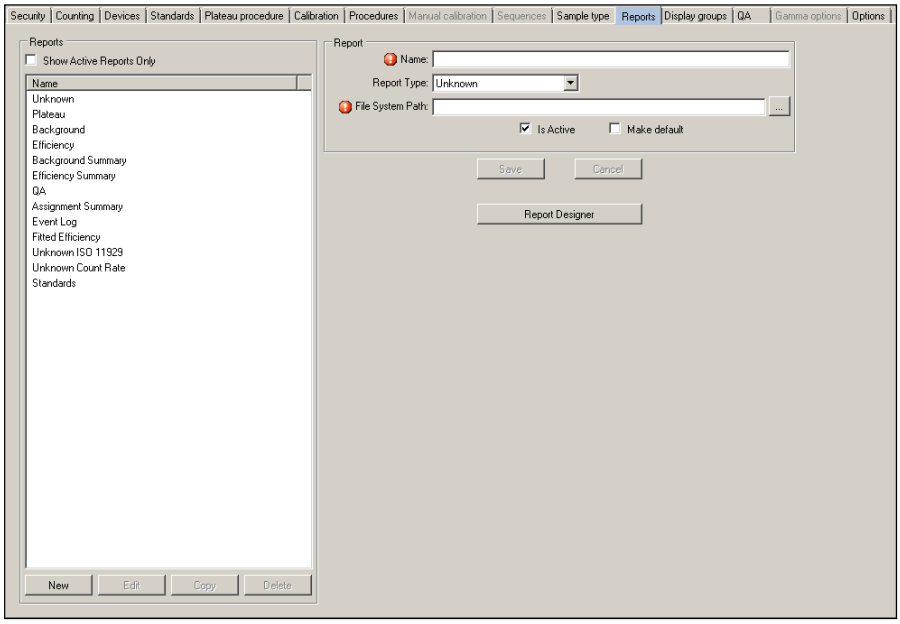


Figure 87 The Reports Setup Page

Reports List

The Reports list on the left side of the screen shows all the reports in the database.

Show Active Reports Only

Select this check box to display only active reports in the Reports list. Reports are made active by selecting the **Is Active** check box on the right side of the screen.

Report Buttons

The buttons located at the bottom of the Reports list allow you to create, edit, copy, or delete a report definition. The report template itself is modified using the **Report Designer** button (see below).

New

To create a new Report, press the **New** button, enter all required data to the right side of the screen, then press **Save**.

Edit

To edit an existing Report in the list, highlight the Report, then press the **Edit** button. Edit the data as necessary then press **Save**.

Copy

Press the **Copy** button to create a new Report by transferring all data to the fields on the right side of screen. Enter a new name, edit the remaining data as necessary, then press **Save**.

Delete

To delete a Report, highlight it in the list, then press **Delete**. A report template that is associated to a procedure cannot be deleted.

Report Parameters

The data on the right side of the screen defines the current Report. All required fields have a red "!" next to it.

Name

This field uniquely identifies the report.

Report Type

Select from the drop down list the report type: Unknown, Plateau, Background, Efficiency, Background Summary, Efficiency Summary, QA, Assignment Summary, Event Log , Fitted Efficiency and Standard.

File System Path

Either type in the full path name or select the **Browse** button to locate the file.

Is Active

The **Is Active** check box is selected by default so that a report will immediately be available for use. Clearing the check box removes a report from the list of active reports. Only active reports are available to be selected for use by a procedure.

Make Default

If multiple reports are available for a particular procedure type (e.g. **Unknown**), selecting the **Make Default** check box will make that report the default when selecting the report in the procedure setup.

Report Designer

Press the **Report Designer** button to launch the Report Designer where you can create new or edit existing report templates. Refer to the *Report Customization Appendix* on page 213 for more information.

Note that the default language for the Report Designer is in English. To change to French or German, refer to *How to Change the Default Language* on page 218.

Display Group Setup

The Display Group Setup Page lets an authorized user create new or edit existing display groups, then add or subtract defined detectors for the convenience in displaying common detectors in a single group in the **Sample Assigner** view.

Display Groups are used by the Apex-Alpha/Beta to visually link various detectors into logical subgroups. This grouping can center around the drawer, controller, device, type of sample counted, proximity, or any other criteria desired. To be utilized, *each detector must be included in at least one Display Group*.

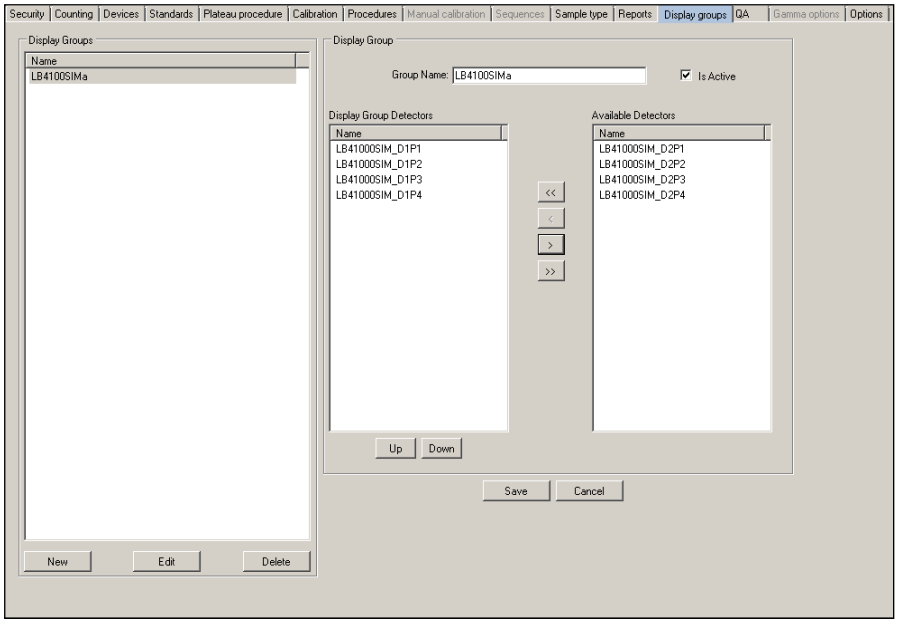


Figure 88 The Display Group Setup Page

Display Groups List

The Display group list shows previously created Display Groups.

Display Group Buttons

The buttons located at the bottom of the Display Groups list allow you to create a new, edit existing, or delete a display group.

New

To create a new Display Group, press the **New** button, enter the required data, then press **Save**.

Edit

To edit an existing Display Group in the list, highlight the Display Group, press the **Edit** button to edit the data as necessary and press **Save**.

Delete

To delete a Display Group, highlight it in the list, then press **Delete**.

Display Group

Group Name

This is a required field. Enter a descriptive name for the group. Please keep in mind this requires a more complex naming schema as the number of detectors, drawers, and devices increases.

Is Active

Select the **Is Active** check box to define the current group as an active group and to be displayed in the Current Display Group drop down list in the **Sample Assigner** view.

The << and < Buttons

The double **<<** button moves all detectors in the **Available Detectors** list on the right to the **Display Group Detectors** list on the left. This button is not enabled if the detectors in the **Available Detectors** list are from different types of devices.

The single **<** button moves only the selected detectors in the **Available Detectors** list to the **Display Group Detectors** list. This button is not enabled if the only detectors in the **Available Detectors** list are from different types of devices than what have been placed in the **Display Group Detectors** list.

The >> and > Buttons

The double **>>** button deletes all detectors from the **Display Group Detectors** list on the left and restores them to the **Available Detectors** list on the right.

The single **>** button deletes only the selected detectors from the **Display Group Detectors** list and restores them to the **Available Detectors** list.

Display Group Detectors

The group's detectors are defined by moving selected detectors to this list from the **Available Detectors** list.

Up / Down

The **Up** and **Down** buttons move the selected detector in the **Display Group Detectors** list up and down in the list. This will determine the order of the detectors when their display group is selected in the **Sample Assigner** view.

Available Detectors

Available detectors listed here can be moved to a Display Group. Please note that detectors from different device types cannot be mixed in a display group. For example, a sample changer detector cannot be included with detectors from an LB4200 device.

QA Setup Page

The QA Procedures Setup Page lets an authorized user create QA profiles for a specified device and detector and group (if applicable). If the **Enable Profile** check box is selected then the QA profiles is include with the selected Device/Detector pair.

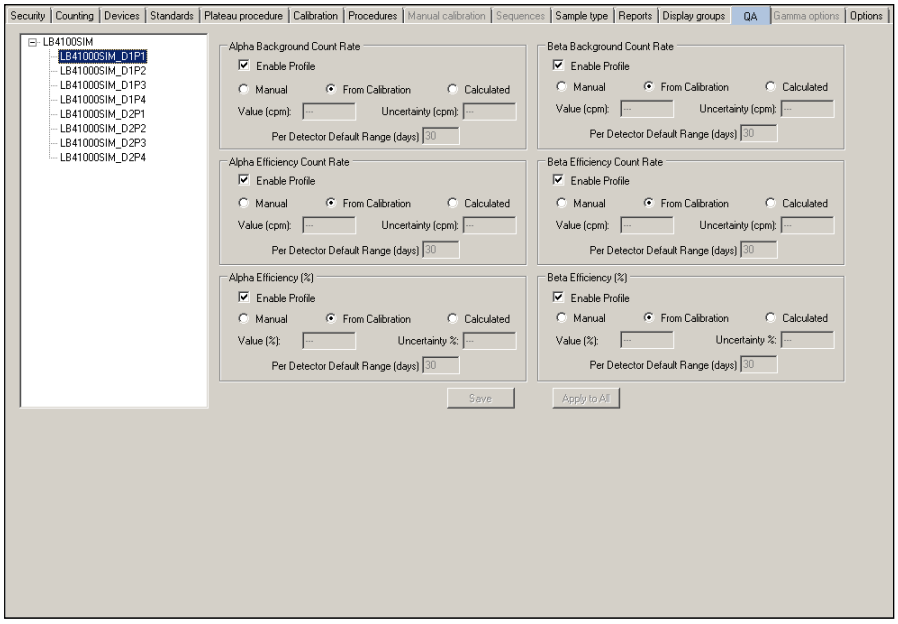


Figure 89 The QA Procedures Setup Page

Devices

The Device/Detector tree on the left side of the screen allows for individual selection of a detector grouped by devices. After making the selection, the right side allows for the setup of individual parameters for each detector.

Notes:

- Devices are displayed based on the order set in the *Devices Setup Page* on page 152.

Parameters

Select the options that correspond to the type of QA count type. The QA parameters include:

- Alpha Background Count Rate
- Beta Background Count Rate
- Alpha Efficiency Count Rate
- Beta Efficiency Count Rate
- Alpha Efficiency %
- Beta Efficiency %

Enable Profile

Selecting the check box will display the profile in the tree view in *QA View* on page 143.

Mean Determination

Can be manually entered, determined from calibration, or calculated.

Select the **Manual** option then enter the Value and Uncertainty. The Value will be used as the mean and the Uncertainty used to determine the low and high warning and action level values.

Select the **From Calibration** option to use the current calibration value as the mean and the calibration uncertainty to determine the low and high warning and action level values.

Select the **Calculated** option to calculate the weighted mean from calibration and daily checks (selected when doing charting) going back the number of days entered in the **Per Detector Default Range (days)**.

Per Detector Default Range

When **Calculated** is selected as the Mean Determination method (see above), this value is the number of days the program will go back starting with the newest entry to determine the mean and uncertainty values. The mean and uncertainty will be calculated from the accumulated data from that number of days.

Save Button

Click on **Save** to save the changes.

Apply to All

For a multiple detector system such as an LB4200, click **Apply to All** to save the changes for all detectors of all drawers of the currently selected device.

Gamma Options Setup Page

The Gamma Options Setup Page (second to last tab) will be enabled only when a Series 5 XLB with the Gamma Option is defined and active. The Gamma Options Setup Page lets a user setup the Gamma SCA (Single Channel Analyzer) levels.

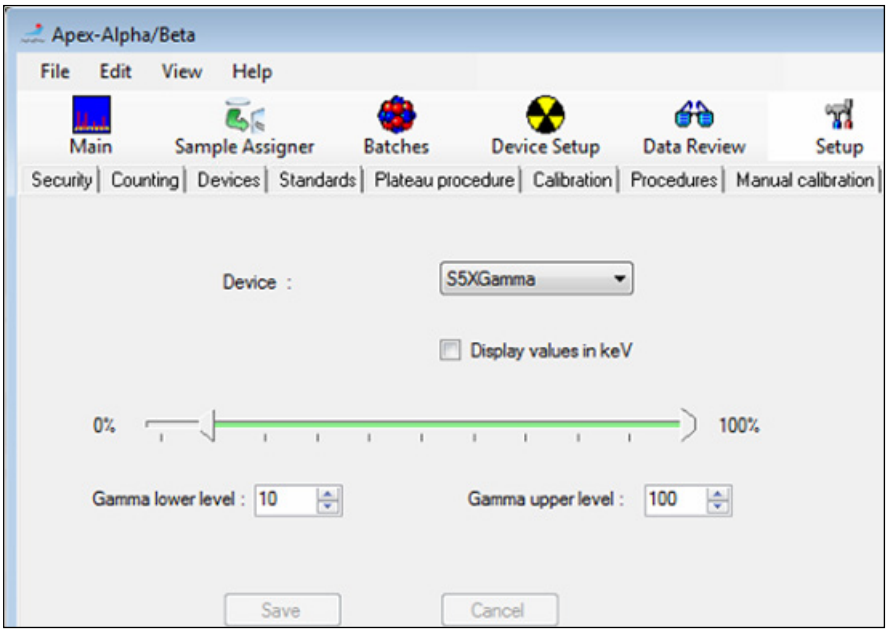


Figure 90 The Gamma Options Setup Page

Gamma Amplifier Discriminator Adjustment

A Gamma energy window must be specified before counting samples with the Gamma counting channel enabled. The Gamma channel is energy calibrated for a full-scale (100%) energy range of 2.0 MeV, thus the Gamma channel energy window should be set to 10% to 100% which corresponds to 0.2 to 2.0 MeV.

Devices

Select the device from the drop-down list of all active devices configured with the gamma option.

Gamma Amplifier Adjust Window

Use the slider to select both the **Gamma Lower Level** and **Gamma Upper Level** energy window values of 10% and 100%. The settings may also be entered manually or the up/down buttons used to set each value.

Select the **Display in keV** check box to change the slider scale units to keV.

Save

Once both discriminators are set at the correct values for the energy range, click on **Save** button.

Options Setup Page

The Options Setup Page lets an authorized user create templates used for auto-naming for Express batches. In addition the following options can also be set:

- Enable and set Sample Delay (Auto Start)
- Enable and Configure Auto Export
- Choice of Uncertainty Display

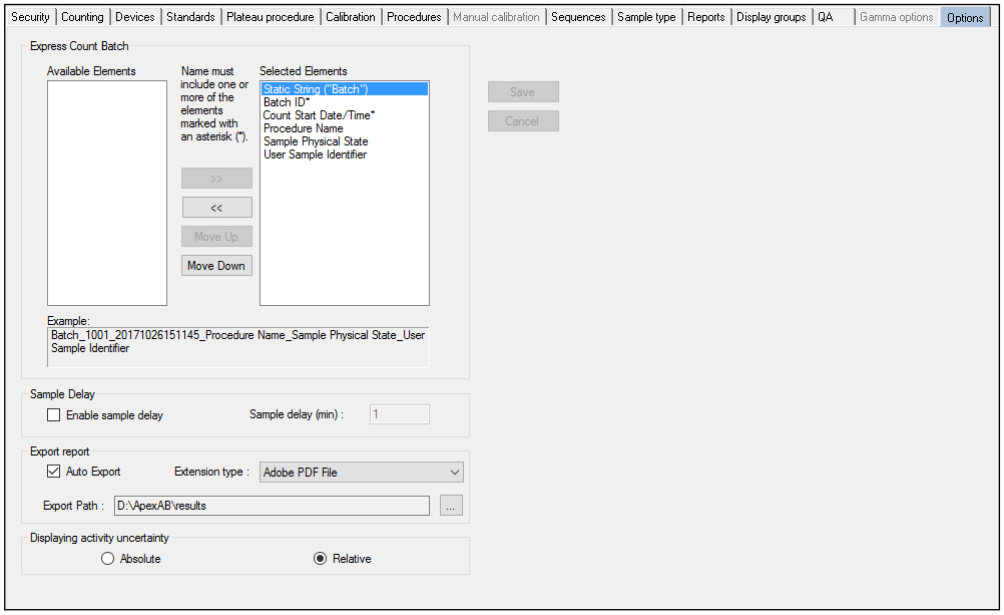


Figure 91 The Options Setup Page

Express Count Batch

Express Count Batch allows the user to build a template used for auto-naming batches. The template pattern will be built from a predefined list of elements as well as a customizable static string element.

Changes are saved immediately, but currently counting batches are not affected (because batch names are assigned at count start).

Available Elements

Elements that are available for use:

Static String
Batch ID*
Count Start Date/Time*
Procedure Name
Sample Physical State
User Sample ID

One or more of the elements with the asterisk (*) above must be included in the Selected Elements list to ensure a unique Batch name will be generated (batch names must be globally unique). If only one required element remains in the Selected Elements list, if it is selected the **<<** button will not be enabled.

By default, a Static String (“Batch”) and the Batch ID are selected elements. If the Static String is removed and selected again, the string can be redefined.

Selected Elements

Elements that have been selected for use in the Batch name template.

Control Buttons

>> Button

The double **>>** button moves the selected item in the **Available Elements** list on the left to the **Selected Elements** list on the right.

<< Button

The double **<<** button moves the selected item in the **Selected Elements** list on the right to the **Available Elements** list on the left.

Up / Down

The **Up** and **Down** buttons move the selected element up and down in the **Selected Elements** list in order to define where it appears in the Batch name.

Example

Displays an example pattern based on the selected elements.

Sample Delay

When the “Enable Sample Delay” check box is selected, assigning a batch on the **Sample Assigner** page will skip the Assignment Report preview and after the time entered in the **Sample Delay (min) time** expires load the samples and begin counting. Prior to the expiration of the time, the **Load Samples** button can be selected to access the Assignment Summary report and load the samples the samples manually and begin counting.

Export Report

When the **Auto Export** check box is selected, in **Data Review** after selecting the batch to review, by clicking the **Next** button, the report selected for output in the Procedure Setup for the batch selected for review will automatically be exported. The report format can be selected as Adobe PDF, a text file, or Microsoft Excel file and will be stored in the location specified in the Export Path without interaction from the user. The file name uses the following format: AUTO-DDMMMYYYY-HHMMSS.EXT where DD is the two digit day, MMM is the three letter month, YYYY is the four digit year, HH is hour, MM is minute and SS is second. "EXT" will be PDF for Adobe PDF, TXT for a text file and XLS for an Excel file.

Displaying Activity Uncertainty

The **Displaying Activity Uncertainty** option is used to display the emissions rate uncertainties of defined sources (**Setup** | **Standards**) as either **Absolute** or **Relative**. **Absolute** will display the uncertainties in the selected activity unit for the selected standard and **Relative** will display uncertainties as a percentage (%) of the activity.

A. Software Installation

This appendix describes the Apex-Alpha/Beta software installation and setup process.

Before You Begin

The following sections describe the computer hardware and software requirements for Apex-Alpha/Beta installation.

Apex-Alpha/Beta PC Hardware

- Intel Core i7-4790 Processor (Quad Core, 8 MB, 3.60 GHz with HD4600 Graphics.)
- 2 GB RAM required (8 GB or more recommended)
- Hard disk with 500 GB or more free
- A DVD +RW drive
- IEEE-488.2-compliant interface for LB4100 or Series 5
- Available Serial Interface Com Port for IN20/MINI20
- Available USB port for LB4200 / Series 5

Apex-Alpha/Beta PC Software

The following section describes the operating system and application software requirements for Apex-Alpha/Beta software installation.

- Windows 7 x86 (32-Bit)

  Is not officially supported, but should retain ability to install and use the software assuming SQL compatibility. Once SQL Server version is no longer Windows 7 compatible, the software will “officially” not be supported either.
- Windows 7 x64 &Windows10 x64 (Primary)
- Microsoft Windows 7 (64-bit) – Service Pack 1 or higher
- Microsoft Windows 10 (64-bit)
- NI-488.2 for Windows, Version 16 (for LB4100 and Series 5 only)

Installing Apex-Alpha/Beta

1. Verify that the logged in Windows user is a local administrator or has domain administrator privileges before you begin the Apex-Alpha/Beta Installation.

2. Make sure you have the required minimum version of Windows and Windows service packs.

3. Stop all running applications.

4. Place the Apex-Alpha/Beta installation CD in your CD-ROM drive. If you have “Autorun” enabled, the installation process will start automatically. If you choose to run the installation manually, you can explore the contents of your CD using Windows Explorer and select the Setup icon (Setup.exe) in that folder.

   Note: The Apex-Alpha/Beta installer will check the PC for prerequisites. Some computers may already have some components installed.

5. Press the **Desktop Software and Utilities** button to start the Apex-Alpha/Beta installation. This installation uses a typical Windows Installer Wizard.

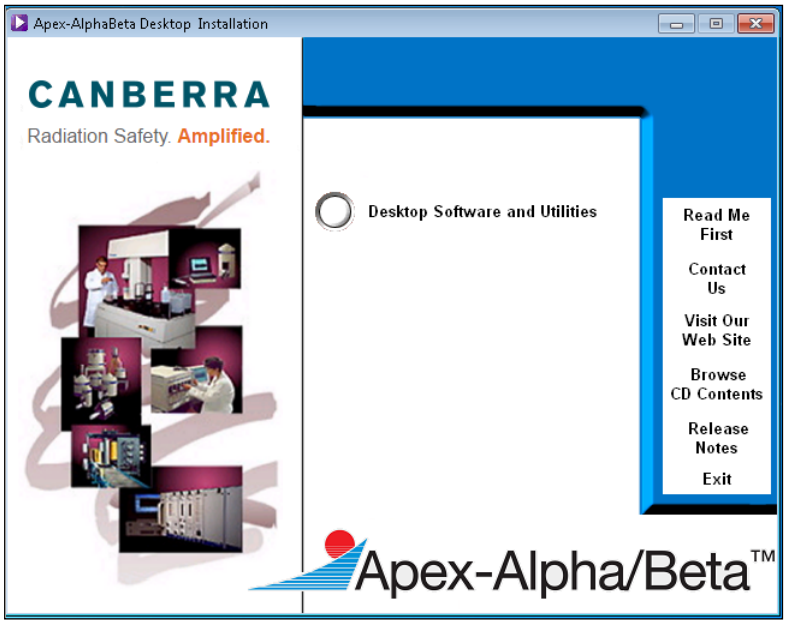


Figure 92 The Apex-Alpha/Beta Installer

6. Apex-Alpha/Beta will automatically perform a check to verify all required prerequisites software is installed. If not found, a window similar to the one shown below, is displayed.

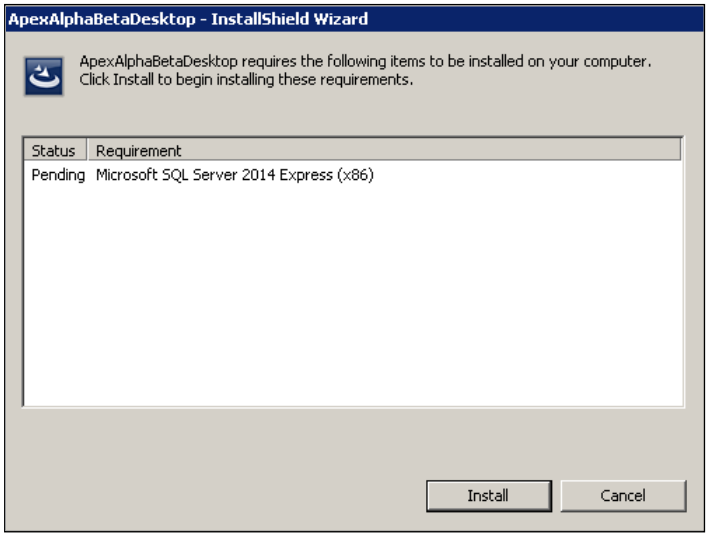


Figure 93 Items Required to be Installed

Click on the **Install** button to begin the installation. If the Microsoft .NET Framework 3.5 Service Pack 1 has not been installed on the target computer, it will be shown as a prerequisite and installed prior to installing Apex-Alpha/Beta. No user interaction is required. After .NET is installed it will continue the installation automatically.

If the Microsoft SQL Server 2014 Express (32-bit) has not been installed on the target computer, it will also be shown as a prerequisite and install automatically after clicking the **Install** button. No user interaction is required. The system may require rebooting after the SQL Server installation is complete, but you should not have to restart the Desktop Installer. It should restart and install Apex-Alpha/Beta automatically.

7. Once all prerequisite software has been installed, the Welcome screen is displayed. Press the **Next>>** button to start the Apex-Alpha/Beta installation. Follow the on screen instructions of the Windows Installer Wizard.

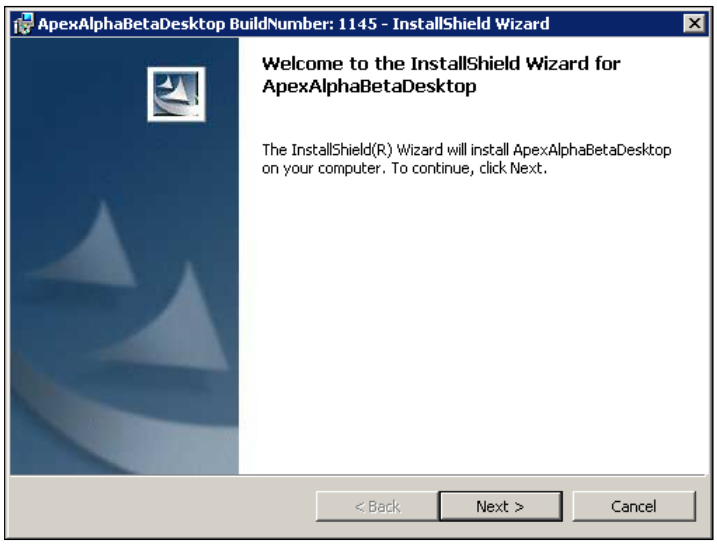


Figure 94 ApexAlphaBetaDesktop Installation Wizard

a. Use the **<Back** and **Next>** buttons to navigate through the installation.

b. Select the radio button to accept its license agreement. End User License must be accepted before installation can proceed.

Figure 95 Accepting the License Agreement

c. Select the language for the installation.

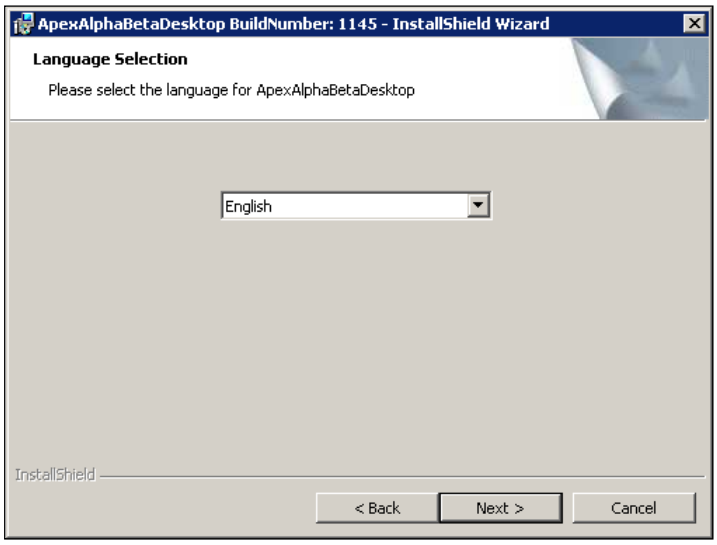


Figure 96 Selecting the Language

d. Enter your name and organization.

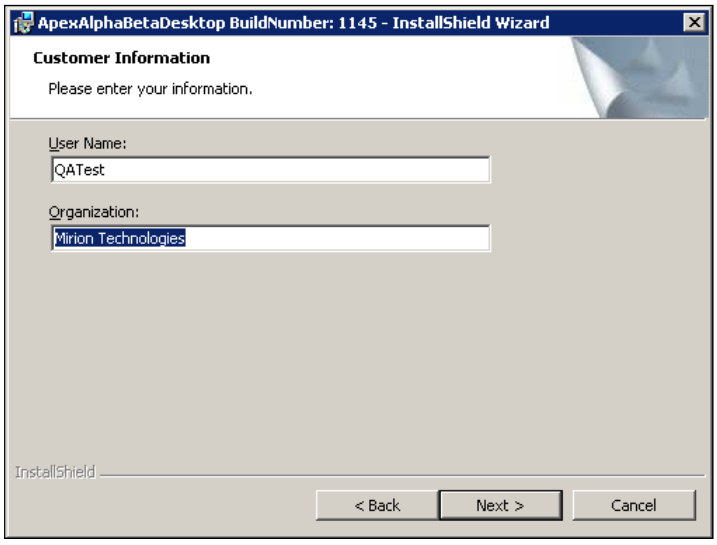


Figure 97 Entering the Customer Information

e. You can choose either a Default Installation or a Custom Installation. The Custom option allows you to choose where to install the software and how to set up the database.

For a Default setup, proceed to step 8. For a Custom setup, proceed to step f.

Note: If an appropriate instance of SQL Server 2014 (32-bit) is discovered during installation, the Apex-Alpha/Beta installer will elect to use that instance rather than installing a new one. If this is the case, please select **Custom** on the Setup Type screen in the InstallShield Wizard. You must know the "sa" (system administrator) password of the existing SQL Server 2014 instance to continue.

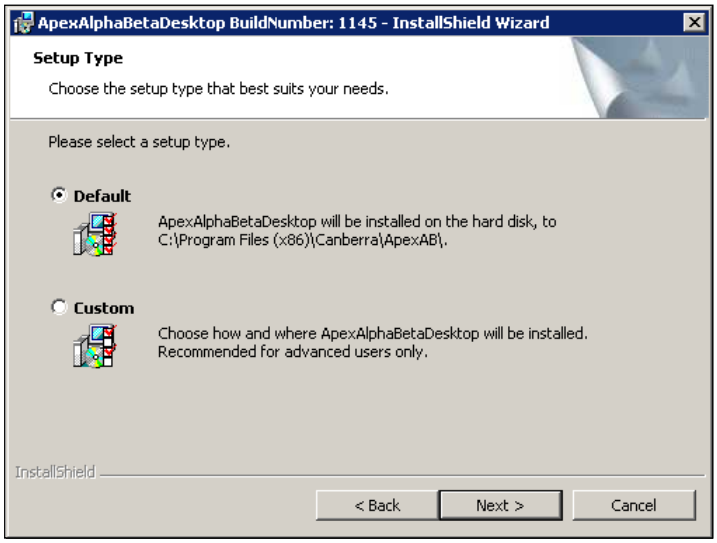


Figure 98 Choosing the Setup Type

f. For a custom install a new database should be created.

Note: If creating a database with the Apex-Alpha/Beta installation, the software will create a database container named "CI_APEXAB" unless another name is entered.

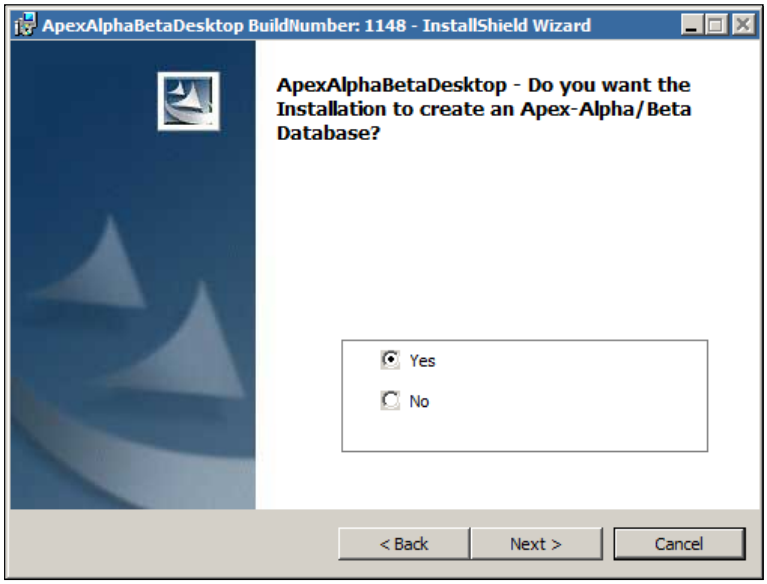


Figure 99 Creating an Apex-Alpha/Beta Database

g. Accept the name of the database and Privileged User account information as shown in the following figure and then press the **Next** button.

The default User ID is “sa” and password is “@CanberraUser7”.

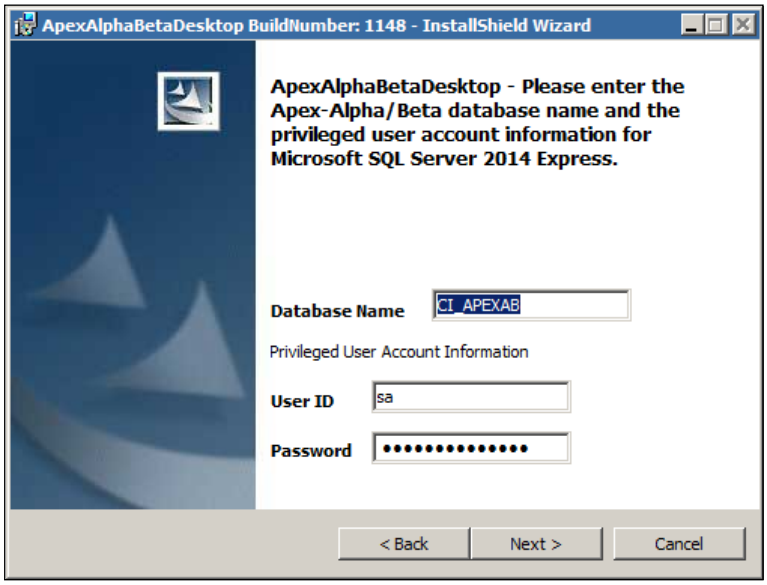


Figure 100 Entering the Database Name and Privileged User Account Information

h. On the Database Information screen, enter the database information needed to create the Apex-Alpha/Beta database.

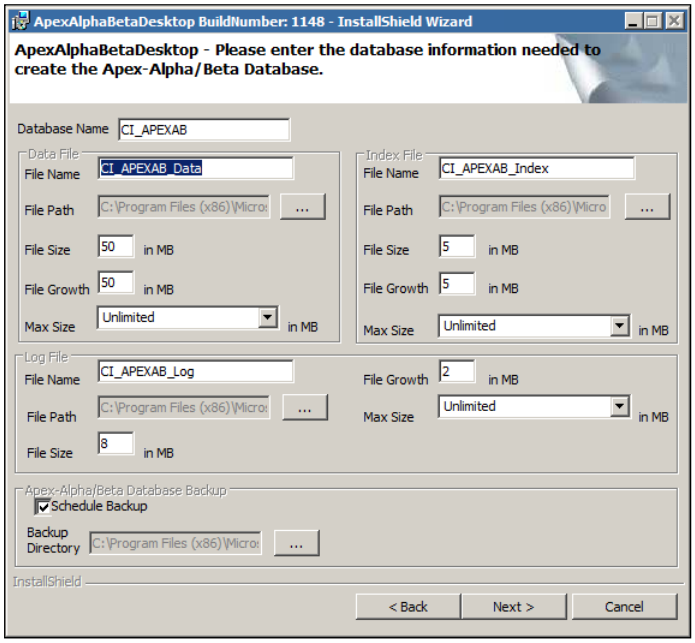


Figure 101 Entering the Database Requirements

8. At this point, all information has been gathered. At the next screen press **Install**. The installation will proceed without further user input.

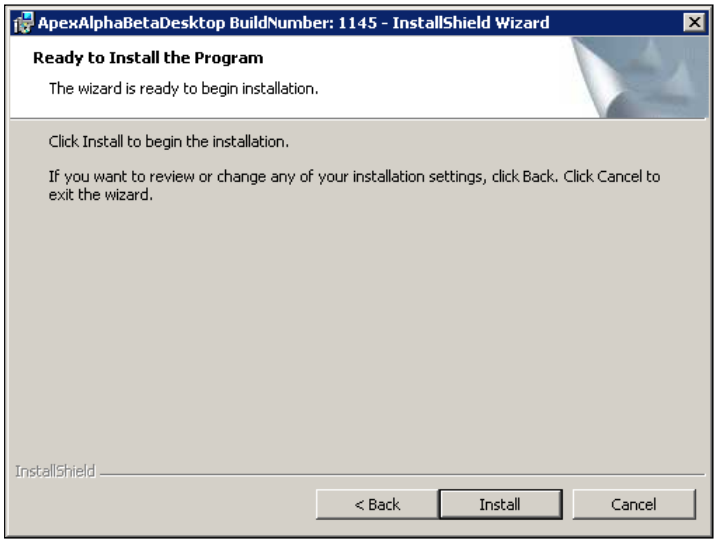


Figure 102 Installing the Software

9. Press the **Finish** button when prompted.

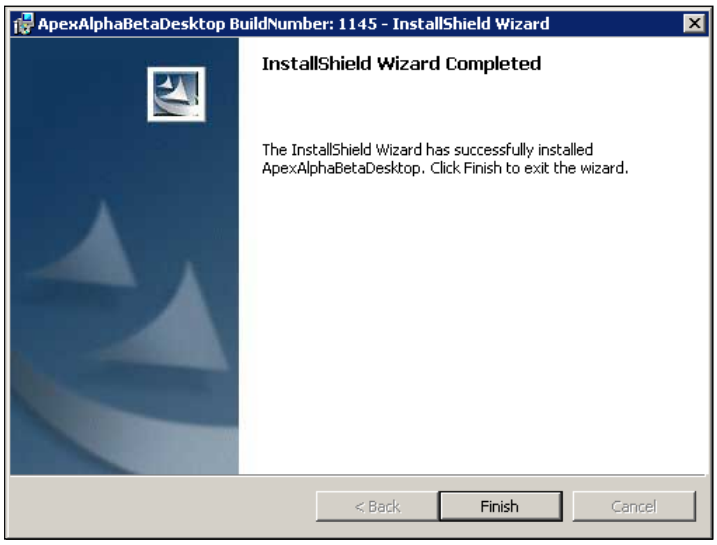


Figure 103 Installation Completed

10. Once the software has been installed, the installation wizard will indicate that the computer should be rebooted. Click *Yes* to reboot immediately or *No* to reboot later.

System Administration – Apex-Alpha/Beta vs. Database

The Apex-Alpha/Beta administrator is not necessarily the database administrator, but they can be the same person. These two people must work together to keep an Apex-Alpha/Beta database operating efficiently and properly, but the work they do differs greatly.

Duties of the Database Administrator

The database administrator is responsible for the maintenance of the database and the related software. This person does not need to know the workings of a laboratory, but must have a working knowledge of database software and how to maintain high performance for any database. The database administrator should also know how to set up a client PC on the network and how the connection is made from the computer to the database server. The database administrator must also know how to authorize a user access to the database.

Duties of the Apex-Alpha/Beta Administrator

The Apex-Alpha/Beta administrator is responsible for the setup and maintenance of the basic counting system parameters. This includes user security and all user accessible setup options. The administrator is also responsible for the initial setup of the system. This includes the site-specific information including items such as sample quantity units, report profiles, types of samples, types of procedures, QA policies, etc. The Apex-Alpha/Beta administrator is responsible for the information in the database and the organization of that information. The Apex-Alpha/Beta administrator must have a good overall view of how data will be used from each Apex-Alpha/Beta screen and how that data interrelates. Knowledge about how a laboratory functions is a must; knowledge of how a database operates is a plus, but not a necessity.

Authorizing Apex-Alpha/Beta Users

Although this topic is covered in more detail on the Security page in Apex-Alpha/Beta's Setup view, a brief description of Apex-Alpha/Beta user administration is covered here since it is so important to the proper operation of the Apex-Alpha/Beta system.

By default, when an Apex-Alpha/Beta desktop or server installation is completed, a single user “Administrator” in the “Administrator Group” is created. This user as a member of the administrator group has full privileges to perform any operation within Apex-Alpha/Beta.

In addition to changing the Administrator password, the administrator should set up security groups with the appropriate rights for different categories of users. By maintaining a secure system, modification of key settings by unauthorized users can be avoided.

To create user groups and change the rights assignments, use the **Edit Group** button on the **Security** page in the **Setup** view. Note that the administrator group is always granted all rights.

A Summary of Apex-Alpha/Beta

The following table lists all privileges and their descriptions, sorted by functional category.

Category	Privileges	Description
Calibration Operations		
	Allow Plateau/ROI	Can perform a plateau count.
	Allow Efficiency Calibration	Can perform an energy calibration.
	System Background Count	Can perform a background count.
Data Review		
	Approve Sample	Can approve counts in data review (first approval)
	Second Approve Sample	Can approve counts in data review (second approval)
Devices		
	Change Device/Detector Status	Can change device/detector status between On-line and Off-line.
Batches		
	Create Batches	Can create batches.
	Edit Batches	Can edit batches.
	Delete Batches	Can delete batches.
QA		
	Calibration Check or Background Check	Can start a calibration (source) check or background check count.
Sample Counting		
	Allow Sample Counting	Can start sample counts.
	Abort Sample Count	Can stop a sample count.
System Setup		
	General Setup	Can access the setup tabs not explicitly protected.
	Procedure Setup	Can create and edit procedures.
	Standard Setup	Can create and edit standards.

Apex-Alpha/Beta Service Manager

The Apex-Alpha/Beta Service Manager allows the user to monitor the state of the Apex-Alpha/Beta software. This Service applet starts automatically and appears in the notification area (a.k.a. system tray) of the Task bar in the form logo icon ( ).

The icon's color indicates the status of the service: *green* if the service is running, *yellow* if start is pending or *red* if the service is stopped.

Using the right mouse button, clicking on the Service Manager icon will display the context menu that offers several options.

- Starts, stops, or restarts the service
- Provides access to the database setup options
- Exits the service

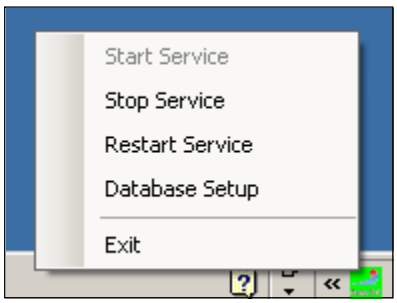


Figure 104 The Service Manager Context Manu

Database Setup

The defaults applied during installation should be sufficient for most users. If you choose to change the defaults, consult your SQL Server 2014 documentation before making any changes. If you need to modify the application configuration after installing Apex-Alpha/Beta, use the Database Setup option from the context menu.

The Database page lets you change the database setup information.

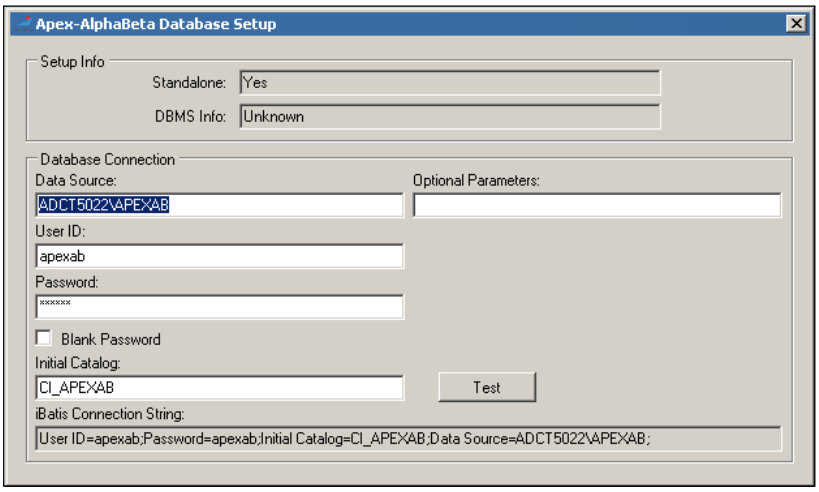


Figure 105 Apex-Alpha/Beta Service Database Setup

Setup Info

Standalone: A value of "Yes" indicates this is a Desktop installation.

DBMS Info: This field will be updated to show the database version and driver information when you click the **Test** button.

Database Connection

Data Source: This field shows the name of the server database computer and the SQL Server instance name. After a desktop install this will be set to < computer name>\APEXAB.

Optional Parameters: Additional information that will be appended to the connection string.

User ID: Set to the name of the non-privileged Apex-Alpha/Beta user. Desktop installation automatically creates an "apexab" user for you.

Password: Set to the password of the non-privileged user.

Blank Password: Check this if your non-privileged user has a blank password.

Initial Catalog: This is the name of the SQL Server database Apex-Alpha/Beta will use.

Connection String: Shows the complete connection string that will be used to connect to the database.

Test

Allows you to verify that the database is configured properly.

Apex-Alpha/Beta Backup

To prevent data loss, you should back up your data frequently. This section describes the minimum steps necessary to accomplish a complete backup for Apex-Alpha/Beta. Please coordinate with your IT department to come up with a backup strategy that is right for your site.

The following steps need to be performed.

1. Close the Apex-Alpha/Beta application.

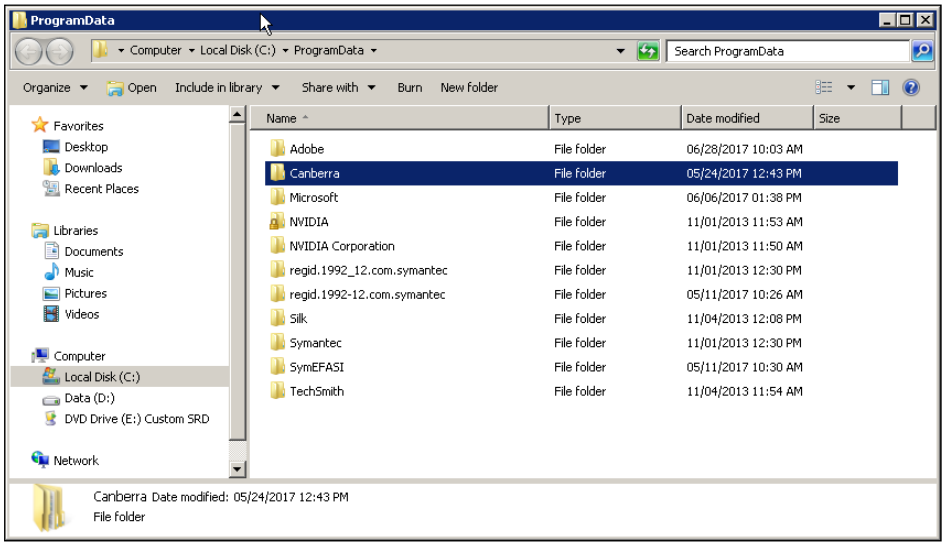
2. Right click on the Apex-Alpha/Beta System Status icon in the system tray and select Stop Service from the context menu. The icon should change from green to red.

3. Back up the contents of the %allusersprofile%\Canberra\ApexAB\ReportTemplates. To determine the location of the %allusersprofile% directory:

   a. Click on **Start**.

   b. In the search box, enter `%allusersprofile%`.

   c. Click on **OK** to navigate to the file's location as shown below.



4. Back up the Apex-Alpha/Beta database as follows:

    a. Start the SQL Server Management Studio (found in the Start Menu in the Microsoft SQL Server 2014 program group).

    b. In the Connect to Server dialog, specify the Server name (typically <computer name>\APEXAB), select Windows Authentication, and click the **Connect** button.

    c. In the Object Explorer, expand the Databases folder for the appropriate SQL Server instance. If the Object Explorer is not visible, press F8 or select Object Explorer from the View menu.

    d. Right click on the node for the Apex-Alpha/Beta database (typically CI_APEXAB) and select Backup... from the Tasks menu. The Back Up Database dialog should appear.

    e. In the Destination section, click the **Add...** button. The Select Backup Destination dialog should appear. Specify a backup file name and click **OK**.

    f. On the Back Up Database dialog, **click OK**. The backup operation may take some time, depending on the size of the database and the speed of the computer. When the backup is complete, a notification dialog will appear. Click **OK** to finish.

Database Installation Error Recovery

Due to the complexity of trying to perform database upgrades during an installation, unexpected errors may occur. To help recover from a database installation error, some basic utilities have been installed to "%programfiles(x86)%\Canberra\ApexAB\SQL". Note that "%programfiles(x86)%" is for a Windows 64-bit operating system. For a 32-bit operating system use "%programfiles%".

The main utility, **installdb.hta**, can be run by double-clicking on the file name. If you are encountering unrecoverable errors during the database portion of the Apex-Alpha/Beta installation, you can use this utility to diagnose the problem. Contact Mirion Customer Service for more details.

Most of these fields will be filled with default data based on the information entered during the Apex-Alpha/Beta Install.

Apex-AB Root – The default network share used by the Apex-Alpha/Beta application.

Database Type – The type of database, Oracle or SQL Server. For Apex-Alpha/Beta always select SQL Server.

Database Instance – The SQL server instance name entered during installation.

Database Catalog (SQL server only) – The Apex-Alpha/Beta database name. This can be viewed through the sys.sysdatabases (SQL server 2014) on SQL server.

Privileged User/Password – The privileged database user and password entered during the Apex-Alpha/Beta Install.

Application User – The database user under which the Apex-Alpha/Beta application will run after the install is successfully completed.

Sql File – This file is a script used to update the Apex database, the default location is %programfiles(x86)%\Canberra\Apex-AB\Sql\apexabsql.dat.

Shared sql file – This file is a script used to update tables shared between other Apex and Apex-Alpha/Beta. The default location is %programfiles(x86)%\Canberra\APEX-AB\Sql\ApexShare.dat.

After correcting the problem with the installation, click first on “Install Shared Tables” then on “Install or Update Schema”.

B. Report Customization

Apex-Alpha/Beta includes several pre-configured Reports. Users can edit existing reports or create completely new reports using the integrated report editor. This section is intended to give a brief overview of the report designer tool. More information can be found visiting the Stimulsoft homepage at http://www.stimulsoft.com. Each type of analysis has a report by default that should be used as a template for customized reports. Reports are saved with a *.mrt name.

How to Begin

Begin editing a new report by opening an existing report. Review the existing reports and choose the one that most closely resembles the final product to be produced.

CAUTION: It is important to rename the report file before you alter it.

Follow these steps:

1. Press the **Setup** view button then the **Reports** tabbed page.
2. Select a report from the list in the left panel. The name and path to the report file appear in the screen on the right. Press the **Report Designer** button.
3. Select **File | Save Report As** to copy the report.
4. Modify the report as desired. See Using the Report Designer for more details.
5. Press **Save Report** button (top third).
6. Select **File | Exit** to close the designer.
7. Back on the **Reports** page, press **New**.
8. Enter a **Name** for the new report.
9. Select a **Report Type**. This should be the same type as the original report.
10. Press the "…" button to navigate to the report template file location and select the new file saved in step 3 above.
11. Insure the **Is Active** check box is selected.
12. Press **Save** to save the new report as an entry in the **Reports** list.
13. The edited report will now be available for use in Apex-Alpha/Beta.

Report Designer

This section provides a brief overview for the Report Designer.

Each report is based on one or more “VO”s which acts as a query to supply data to the report. It prevents the user from needing to know the intimate details of the database. It also limits the user to elements which are only available as the part of VO. For example, the Unknown Report uses the data source DataReviewReportVO_BatchReportVO for sample specific information.

You can edit a field in a report by right clicking the mouse over the field to be edited. It opens a writer where you can edit the report.

Layout of Report

The screen shot below shows a Sample report opened in the standard Report Designer interface.

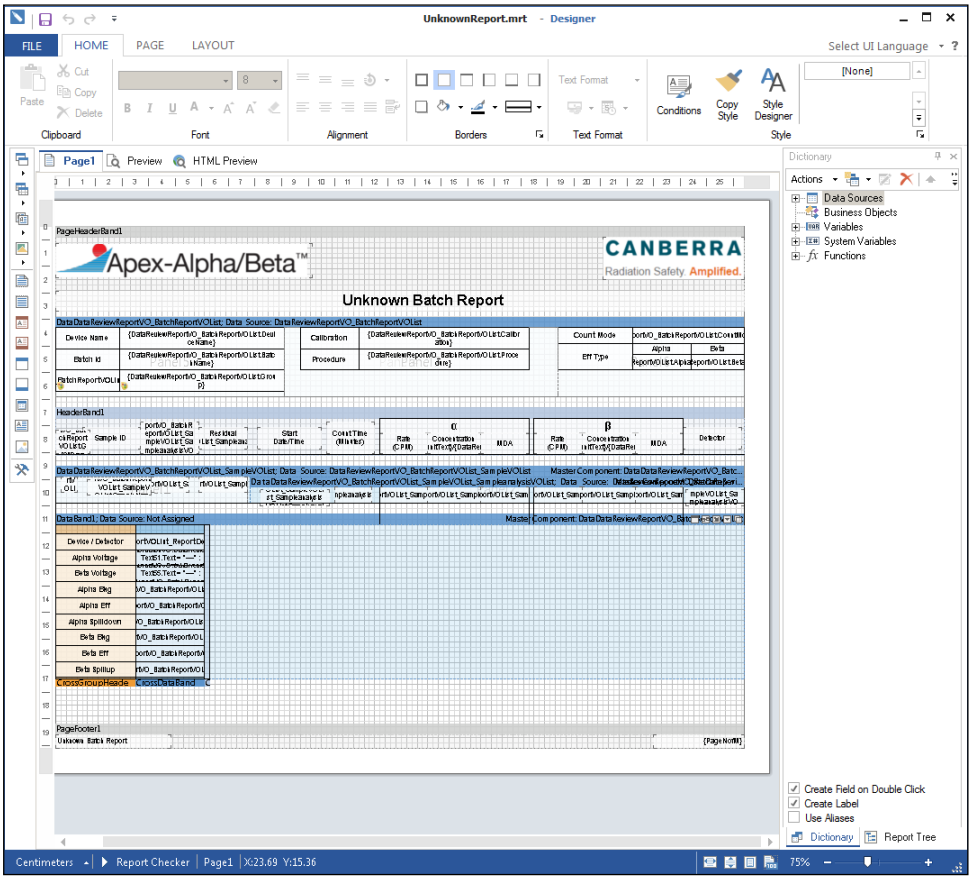


Figure 106 A Sample Report Opened in the Report Designer

Sections of the Report

All reports contain at least four sections:

- Report Title – This section is at the top of the first page of the report.
- Group Header/Footer – Each set of batch related data is bounded by a header and footer.
- Data Section – This section contains the repeating sample data. In Apex-Alpha/Beta reports, it is where fields of the database and formula are placed for calculations.
- Page Footer – This section is at the bottom of each page of a report. It usually contains data such as the name of report and the number of pages, etc.

Properties

The Properties tabbed page provides the properties of the report including the page size, column width, appearance, etc. Each field in a report has properties such as font, number format, etc.

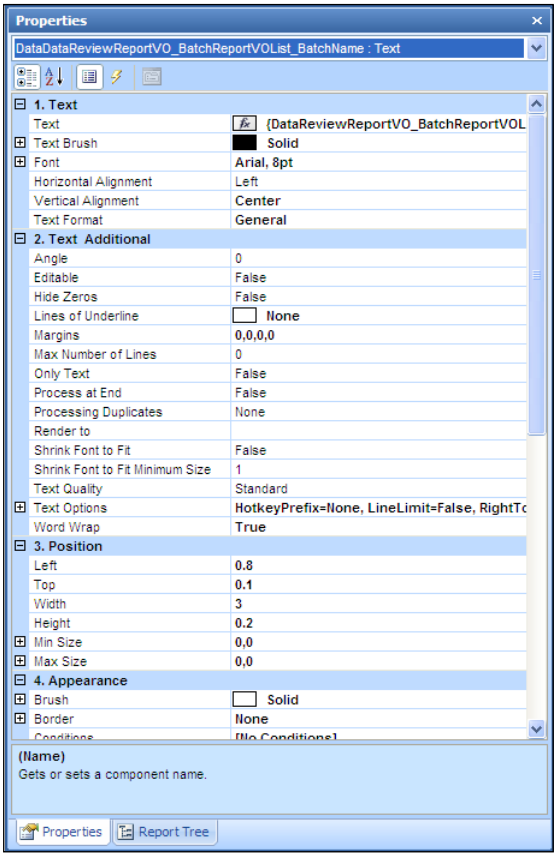


Figure 107 Properties of the Report

Dictionary

Variables, created in a dictionary, can be used in expressions. The Data dictionary includes: data sources, system variables, functions, totals.

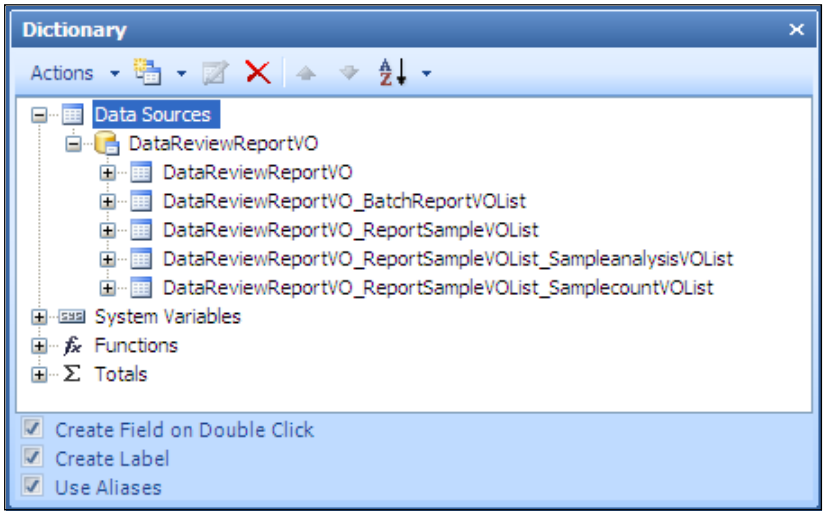


Figure 108 The Data Dictionary

Report Tree

The Report Tree shows each section of the report. Press the + to view individual items found in each section.

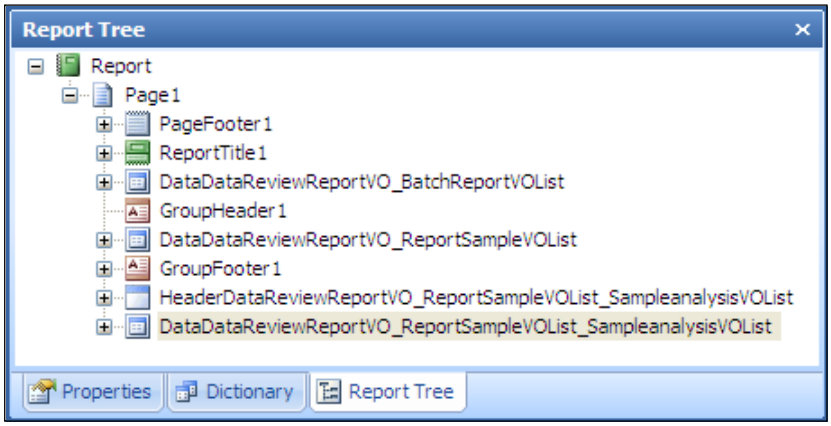


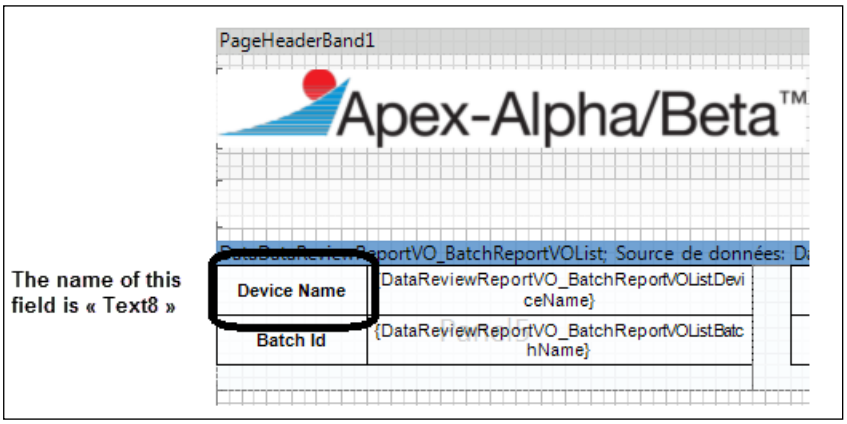
Figure 109 The Report Tree

How to Change the Default Language

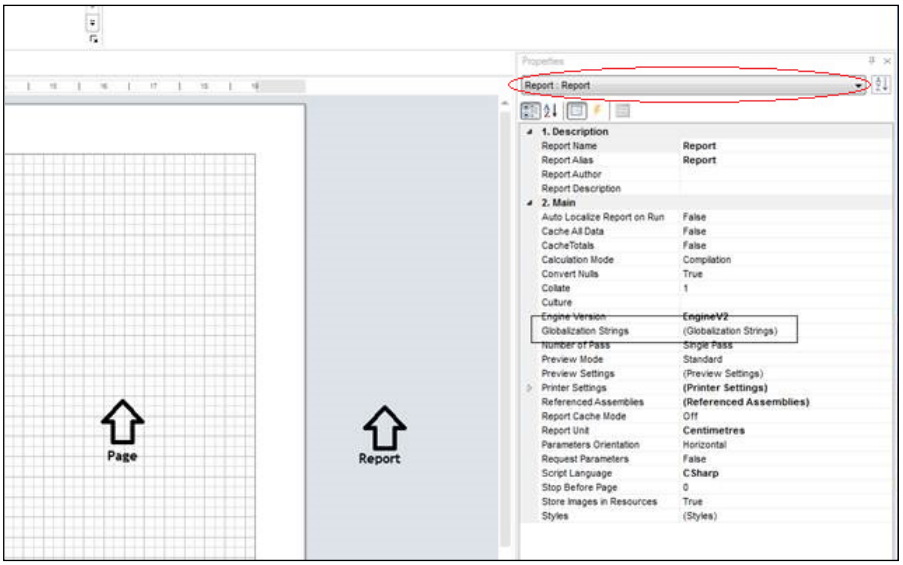
Upon opening a Stimulsoft report, the default language is in English. You can modify each field on a report for another language by using the Globalization Editor.

To access the Globalization Editor, click anywhere on the report or the “background” (blank) area next to the report.

1. To update a specific field, click on that field in the report. The bottom status bar will display the information for that field including the name (e.g. Text8).



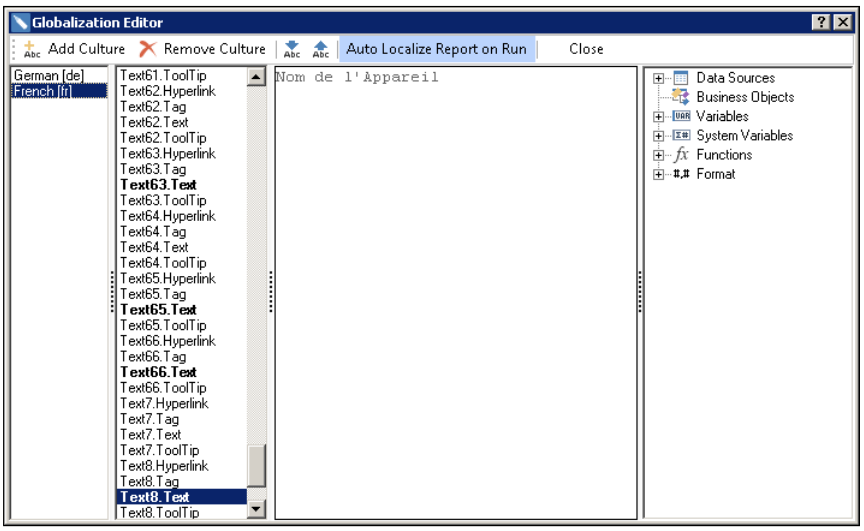
2. Right click on the blank area next to the report and select Properties. This will display the Properties tab.



If you right click on the report itself, after selecting Properties click the drop-down arrow at the top of the tab. Scroll to the top and select Report – Report.

3. In the Main section, click on Globalization Strings. This will active the Execution button (|…|).

4. Click the Execution button to launch the Globalization Editor.



5. Scroll to the field you wish to edit in the list in the second column. Select the .Text item from the list (e.g. Text8.Text).

6. Select the culture (language) you with to change in the left column. The translation for that text will be displayed in the third column. Change as desired.

7. Select any other .Text item to change that text translation for the selected culture (language).

8. Click Close on the menu bar when finished.

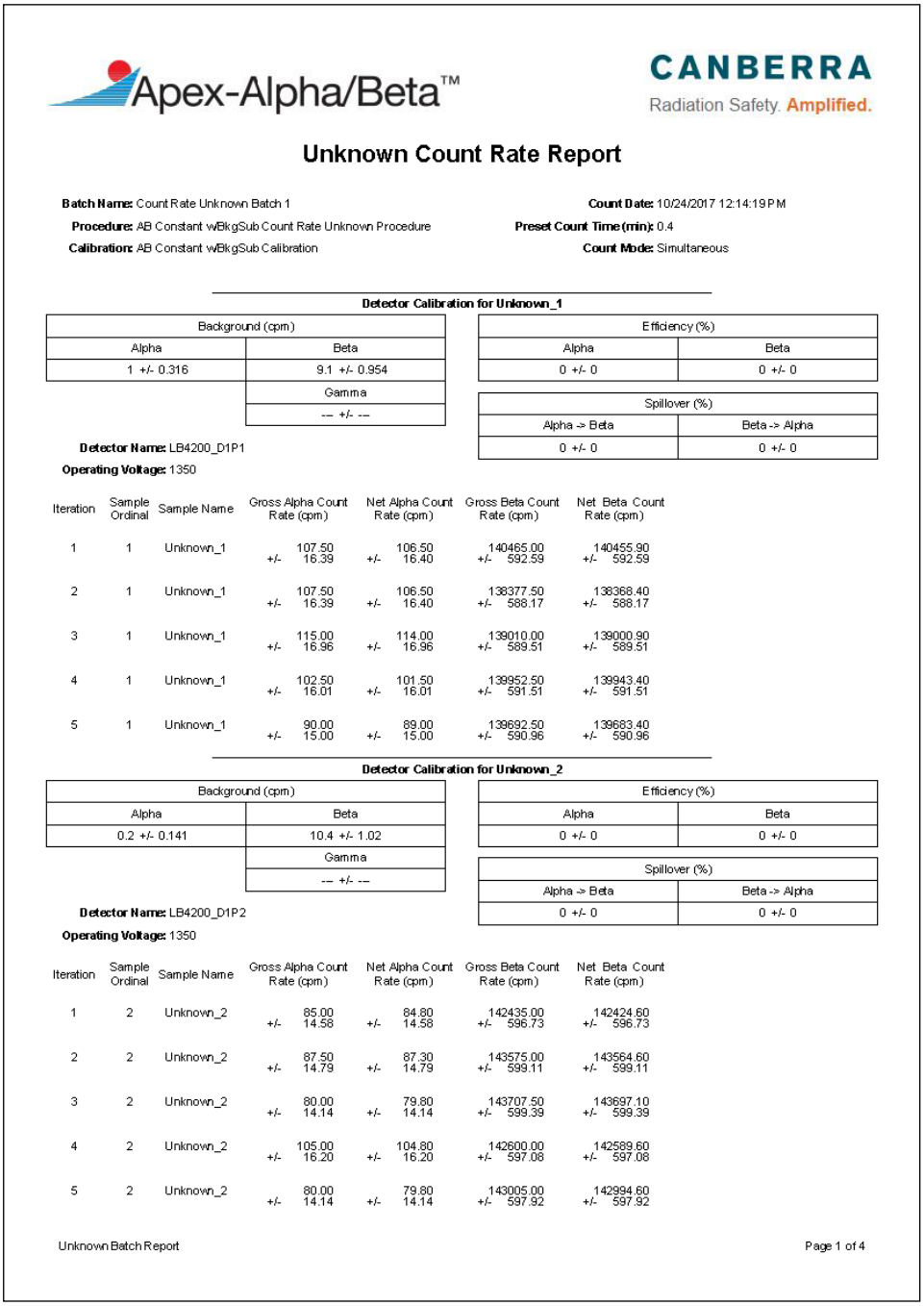
9. Save the changes and close the designer.

Sample Reports

This section describes the various types of printed reports which can be generated using the standard Apex-Alpha/Beta software.

Unknown Report

The Unknown report is used to print and view sample data from sample batches. It can be accessed by choosing the **Data Review** view, choosing a unknown batch, and choosing the **Report** tab.



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Unknown Count Rate Report

Batch Name: Count Rate Unknown Batch 1
Procedure: AB Constant wBkgSub Count Rate Unknown Procedure
Calibration: AB Constant wBkgSub Calibration
Count Date: 10/24/2017 12:14:19 PM
Preset Count Time (min): 0.4
Count Mode: Simultaneous

Detector Calibration for Unknown_1

Background (cpm)	
Alpha	Beta
1 +/- 0.316	9.1 +/- 0.954
	Gamma
	--- +/- ---

Efficiency (%)	
Alpha	Beta
0 +/- 0	0 +/- 0

Spillover (%)	
Alpha -> Beta	Beta -> Alpha
0 +/- 0	0 +/- 0

Detector Name: LB4200_D1P1
Operating Voltage: 1350

Iteration	Sample Ordinal	Sample Name	Gross Alpha Count Rate (cpm)	Net Alpha Count Rate (cpm)	Gross Beta Count Rate (cpm)	Net Beta Count Rate (cpm)
1	1	Unknown_1	107.50 +/- 16.39	106.50 +/- 16.40	140465.00 +/- 592.59	140455.90 +/- 592.59
2	1	Unknown_1	107.50 +/- 16.39	106.50 +/- 16.40	138377.50 +/- 588.17	138368.40 +/- 588.17
3	1	Unknown_1	115.00 +/- 16.96	114.00 +/- 16.96	139010.00 +/- 589.51	139000.90 +/- 589.51
4	1	Unknown_1	102.50 +/- 16.01	101.50 +/- 16.01	139952.50 +/- 591.51	139943.40 +/- 591.51
5	1	Unknown_1	90.00 +/- 15.00	89.00 +/- 15.00	139692.50 +/- 590.96	139683.40 +/- 590.96

Detector Calibration for Unknown_2

Background (cpm)	
Alpha	Beta
0.2 +/- 0.141	10.4 +/- 1.02
	Gamma
	--- +/- ---

Efficiency (%)	
Alpha	Beta
0 +/- 0	0 +/- 0

Spillover (%)	
Alpha -> Beta	Beta -> Alpha
0 +/- 0	0 +/- 0

Detector Name: LB4200_D1P2
Operating Voltage: 1350

Iteration	Sample Ordinal	Sample Name	Gross Alpha Count Rate (cpm)	Net Alpha Count Rate (cpm)	Gross Beta Count Rate (cpm)	Net Beta Count Rate (cpm)
1	2	Unknown_2	85.00 +/- 14.58	84.80 +/- 14.58	142435.00 +/- 596.73	142424.60 +/- 596.73
2	2	Unknown_2	87.50 +/- 14.79	87.30 +/- 14.79	143575.00 +/- 599.11	143564.60 +/- 599.11
3	2	Unknown_2	80.00 +/- 14.14	79.80 +/- 14.14	143707.50 +/- 599.39	143697.10 +/- 599.39
4	2	Unknown_2	105.00 +/- 16.20	104.80 +/- 16.20	142600.00 +/- 597.08	142589.60 +/- 597.08
5	2	Unknown_2	80.00 +/- 14.14	79.80 +/- 14.14	143005.00 +/- 597.92	142994.60 +/- 597.92

Unknown Batch Report
Page 1 of 4

Figure 110 Sample Unknown Batch Report

Plateau Report

The Plateau report is used to print and view plateau curves from the **Device Setup** view **Plateau Review** tab.

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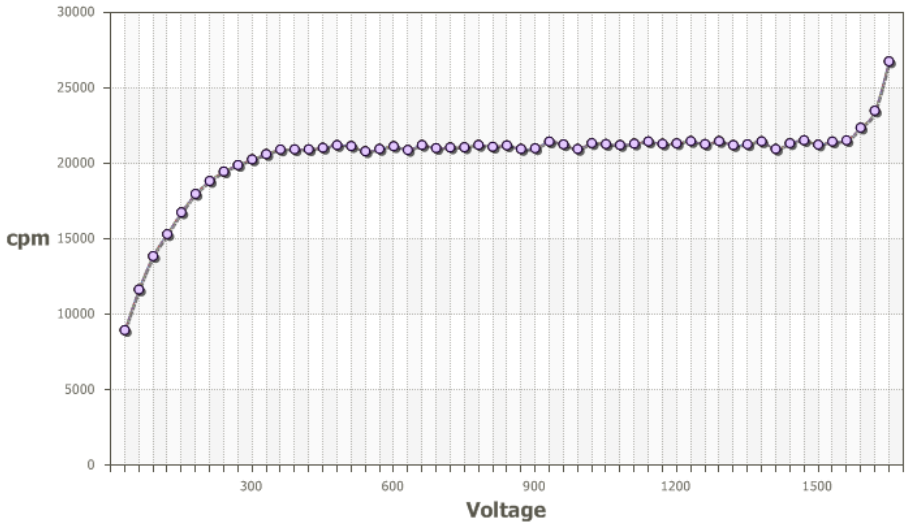
Plateau Report

Plateau: Plateau 1001
Plateau Date: 7/21/2017 4:17:46 PM
Decay Mode: Alpha
Drawer: LB4100SIMa_D1
Device: LB4100SIMa
Operating Voltage: 390



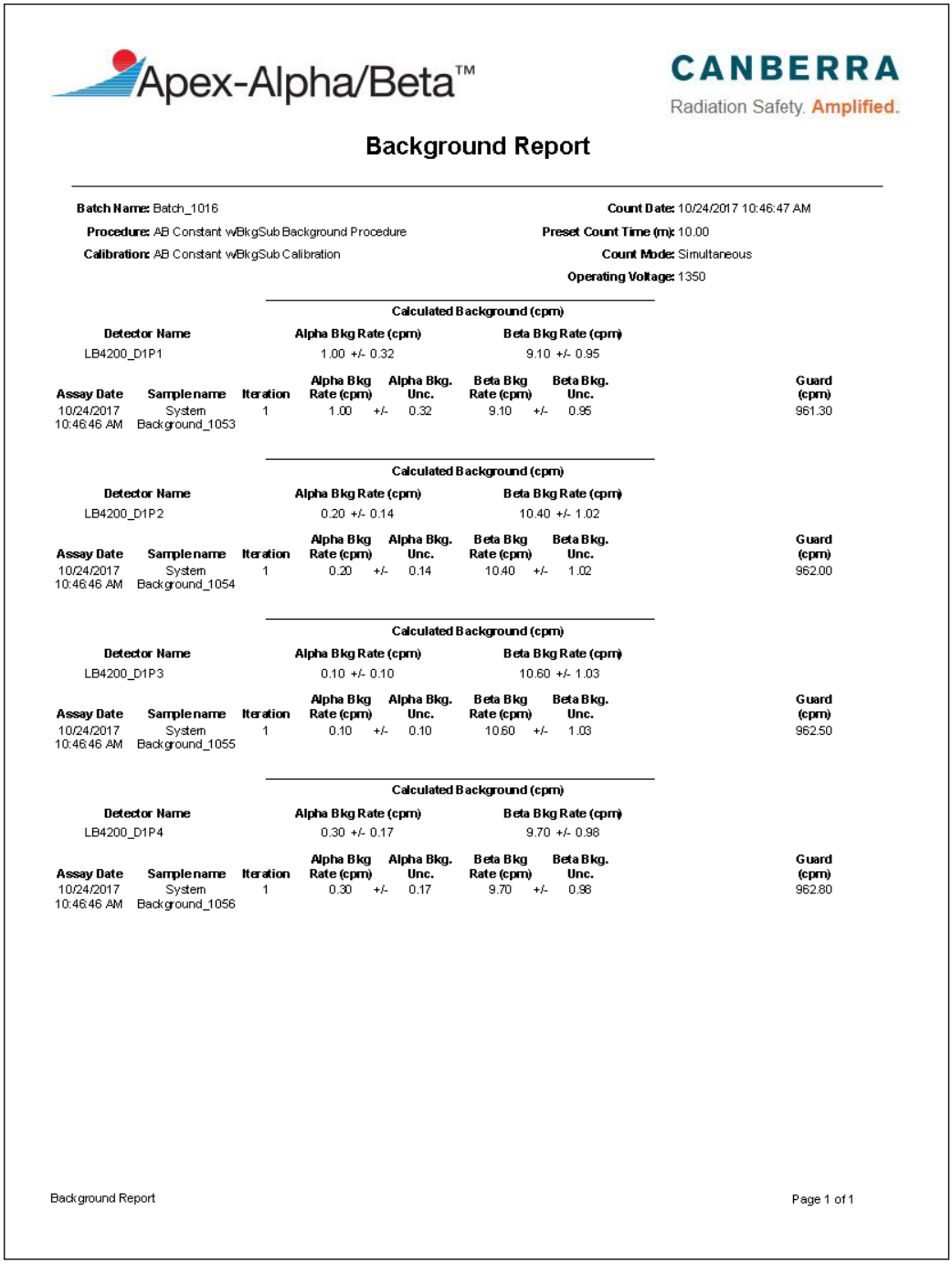
Iteration	LB4100SIMa_D1P1		LB4100SIMa_D1P2		LB4100SIMa_D1P3		LB4100SIMa_D1P4		Voltage
	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	cpm	Slope (%)	
1	8981		8980		8979		8981		30
2	1.167E+04		1.167E+04		1.167E+04		1.167E+04		60
3	1.389E+04	46.27	1.388E+04	46.26	1.388E+04	46.28	1.388E+04	46.27	90
4	1.534E+04	33.84	1.534E+04	33.82	1.534E+04	33.83	1.534E+04	33.83	120
5	1.679E+04	25.07	1.678E+04	25.07	1.678E+04	25.07	1.678E+04	25.07	150
6	1.801E+04	19.21	1.8E+04	19.21	1.8E+04	19.22	1.801E+04	19.21	180
7	1.886E+04	13.68	1.886E+04	13.7	1.886E+04	13.69	1.886E+04	13.68	210
8	1.949E+04	9.612	1.949E+04	9.629	1.949E+04	9.621	1.949E+04	9.608	240
9	1.992E+04	7.291	1.992E+04	7.294	1.992E+04	7.282	1.991E+04	7.288	270
10	2.029E+04	5.981	2.029E+04	5.967	2.029E+04	5.954	2.029E+04	5.981	300
11	2.064E+04	4.422	2.064E+04	4.418	2.064E+04	4.408	2.064E+04	4.422	330
12	2.094E+04	2.624	2.094E+04	2.63	2.094E+04	2.631	2.095E+04	2.632	360
13	2.096E+04	1.355	2.096E+04	1.36	2.096E+04	1.368	2.095E+04	1.357	390
14	2.095E+04	1.082	2.096E+04	1.082	2.096E+04	1.09	2.096E+04	1.08	420
15	2.106E+04	1.13	2.106E+04	1.119	2.106E+04	1.132	2.106E+04	1.127	450
16	2.123E+04	-0.2198	2.123E+04	-0.2198	2.123E+04	-0.2214	2.123E+04	-0.2276	480
17	2.117E+04	-0.8895	2.117E+04	-0.8801	2.118E+04	-0.8847	2.117E+04	-0.8864	510
18	2.083E+04	-0.541	2.083E+04	-0.5345	2.083E+04	-0.5378	2.083E+04	-0.5346	540

Plateau Review
Page 1 of 2

Figure 111 Sample Plateau Report

Background Reports

The Background report is used to print and view Calibration Background batches and Daily Background Check batches. It can be accessed by choosing the **Data Review** view, choosing a Background or Background Check batch, and choosing the **Report** tab.



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Background Report

Batch Name: Batch_1016
Procedure: AB Constant wBkgSub Background Procedure
Calibration: AB Constant wBkgSub Calibration
Count Date: 10/24/2017 10:46:47 AM
Preset Count Time (m): 10.00
Count Mode: Simultaneous
Operating Voltage: 1350

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
LB4200_D1P1	1.00 +/- 0.32	9.10 +/- 0.95

Assay Date	Sample name	Iteration	Alpha Bkg Rate (cpm)	Alpha Bkg. Unc.	Beta Bkg Rate (cpm)	Beta Bkg. Unc.	Guard (cpm)
10/24/2017 10:46:46 AM	System Background_1053	1	1.00 +/-	0.32	9.10 +/-	0.95	961.30

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
LB4200_D1P2	0.20 +/- 0.14	10.40 +/- 1.02

Assay Date	Sample name	Iteration	Alpha Bkg Rate (cpm)	Alpha Bkg. Unc.	Beta Bkg Rate (cpm)	Beta Bkg. Unc.	Guard (cpm)
10/24/2017 10:46:46 AM	System Background_1054	1	0.20 +/-	0.14	10.40 +/-	1.02	962.00

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
LB4200_D1P3	0.10 +/- 0.10	10.60 +/- 1.03

Assay Date	Sample name	Iteration	Alpha Bkg Rate (cpm)	Alpha Bkg. Unc.	Beta Bkg Rate (cpm)	Beta Bkg. Unc.	Guard (cpm)
10/24/2017 10:46:46 AM	System Background_1055	1	0.10 +/-	0.10	10.60 +/-	1.03	962.50

Calculated Background (cpm)

Detector Name	Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)
LB4200_D1P4	0.30 +/- 0.17	9.70 +/- 0.98

Assay Date	Sample name	Iteration	Alpha Bkg Rate (cpm)	Alpha Bkg. Unc.	Beta Bkg Rate (cpm)	Beta Bkg. Unc.	Guard (cpm)
10/24/2017 10:46:46 AM	System Background_1056	1	0.30 +/-	0.17	9.70 +/-	0.98	962.80

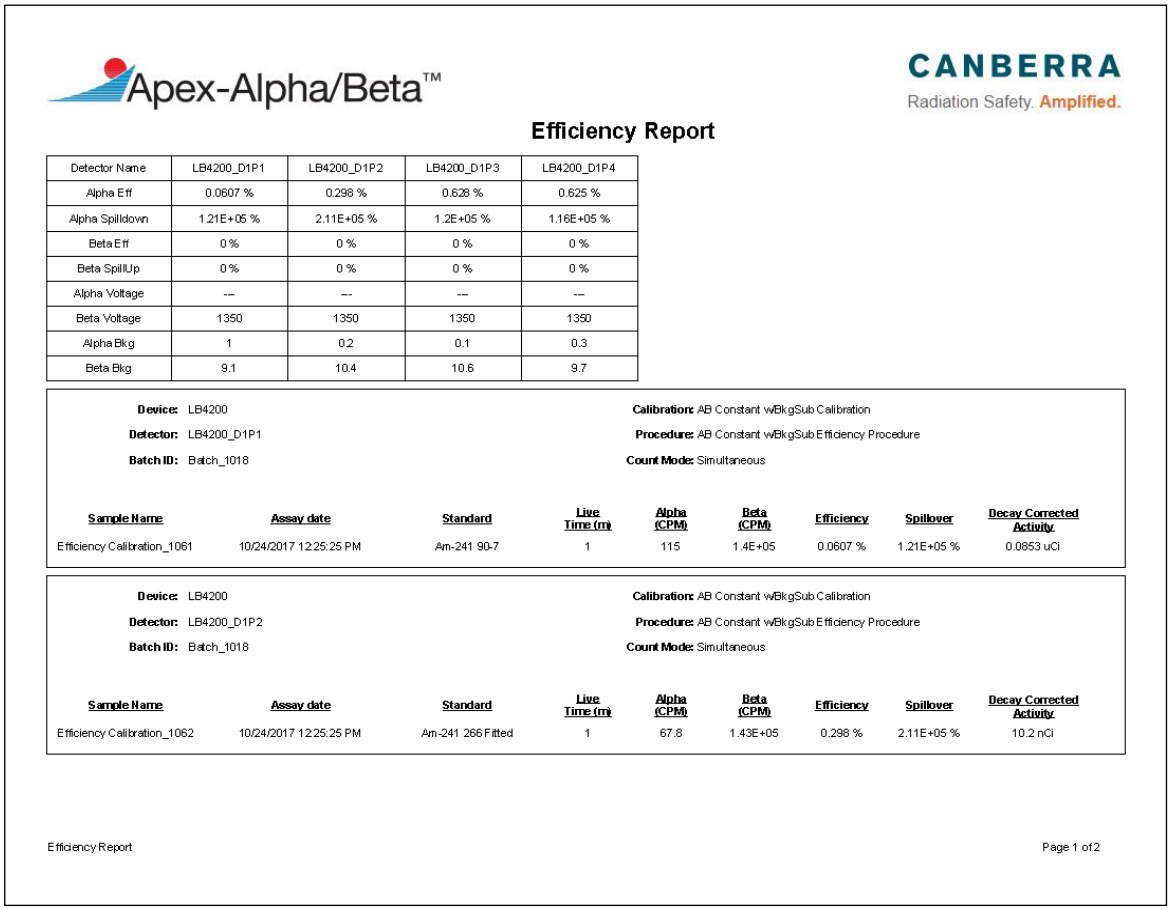
Background Report

Page 1 of 1

Figure 112 Sample Background Report

Efficiency Reports

The Efficiency report is used to print and view Calibration Constant Efficiency batches and Daily Source Check batches. It can be accessed by choosing the **Data Review** view, choosing a Constant Efficiency or Source Check batch, and choosing the **Report** tab.



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Efficiency Report

Detector Name	LB4200_D1P1	LB4200_D1P2	LB4200_D1P3	LB4200_D1P4
Alpha Eff	0.0607 %	0.298 %	0.628 %	0.625 %
Alpha Spilldown	1.21E+05 %	2.11E+05 %	1.2E+05 %	1.16E+05 %
Beta Eff	0 %	0 %	0 %	0 %
Beta SpillUp	0 %	0 %	0 %	0 %
Alpha Voltage	---	---	---	---
Beta Voltage	1350	1350	1350	1350
Alpha Bkg	1	0.2	0.1	0.3
Beta Bkg	9.1	10.4	10.6	9.7

Device: LB4200 **Calibration:** AB Constant wBkgSub Calibration
Detector: LB4200_D1P1 **Procedure:** AB Constant wBkgSub Efficiency Procedure
Batch ID: Batch_1018 **Count Mode:** Simultaneous

Sample Name	Assay date	Standard	Live Time (m)	Alpha (CPM)	Beta (CPM)	Efficiency	Spillover	Decay Corrected Activity
Efficiency Calibration_1061	10/24/2017 12:25:25 PM	Am-241 90-7	1	115	1.4E+05	0.0607 %	1.21E+05 %	0.0853 uCi

Device: LB4200 **Calibration:** AB Constant wBkgSub Calibration
Detector: LB4200_D1P2 **Procedure:** AB Constant wBkgSub Efficiency Procedure
Batch ID: Batch_1018 **Count Mode:** Simultaneous

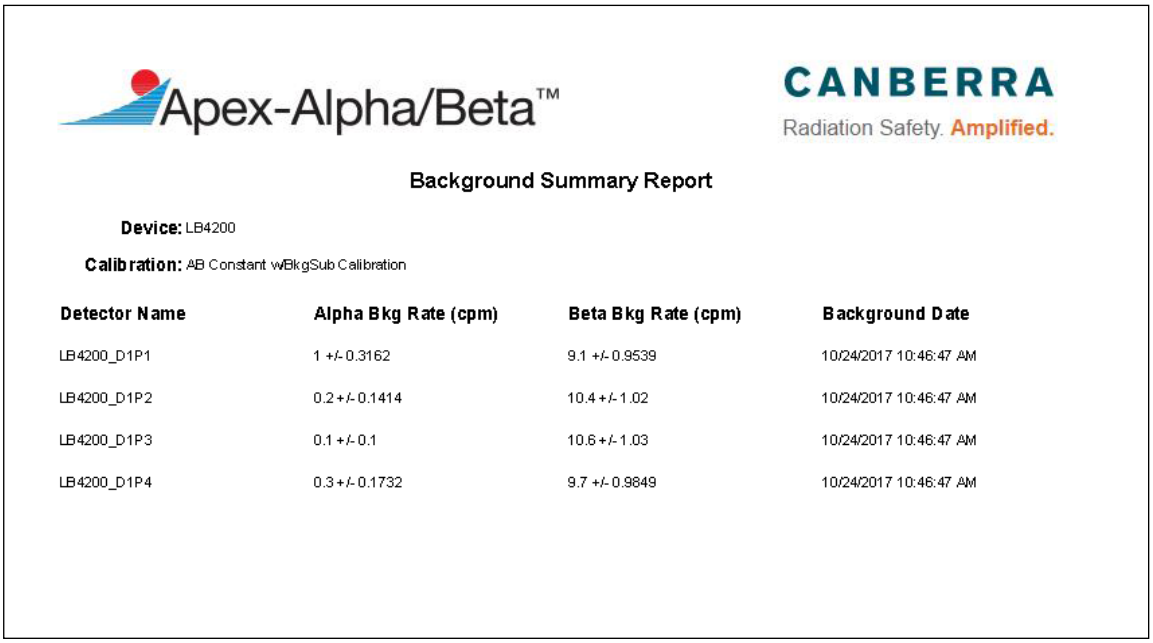
Sample Name	Assay date	Standard	Live Time (m)	Alpha (CPM)	Beta (CPM)	Efficiency	Spillover	Decay Corrected Activity
Efficiency Calibration_1062	10/24/2017 12:25:25 PM	Am-241 266 Fitted	1	67.8	1.43E+05	0.298 %	2.11E+05 %	10.2 nCi

Efficiency Report Page 1 of 2

Figure 113 Sample Efficiency Report

Background Summary Reports

The Background Summary report is used to print and view current backgrounds for each detector by a Calibration. Summary reports are accessed by pressing the **Reports** button on the toolbar.



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Background Summary Report

Device: LB4200

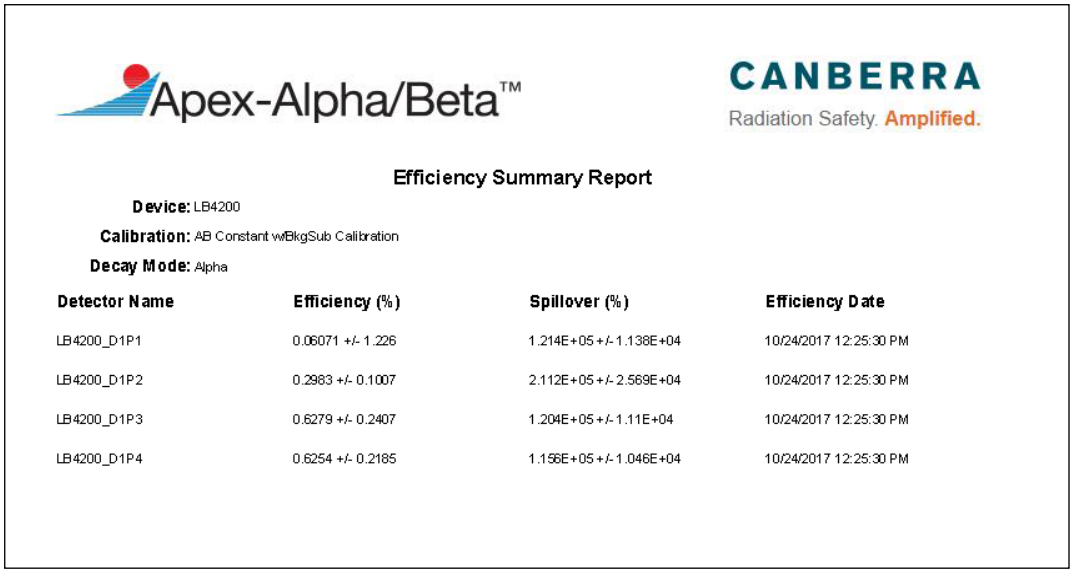
Calibration: AB Constant wBkgSub Calibration

Detector Name	Alpha Bkg Rate (cpm)	Beta Bkg Rate (cpm)	Background Date
LB4200_D1P1	1 +/- 0.3162	9.1 +/- 0.9539	10/24/2017 10:46:47 AM
LB4200_D1P2	0.2 +/- 0.1414	10.4 +/- 1.02	10/24/2017 10:46:47 AM
LB4200_D1P3	0.1 +/- 0.1	10.6 +/- 1.03	10/24/2017 10:46:47 AM
LB4200_D1P4	0.3 +/- 0.1732	9.7 +/- 0.9849	10/24/2017 10:46:47 AM

Figure 114 Sample Background Summary Report

Efficiency Summary Report

The Efficiency Summary report is used to print and view current efficiencies for each detector by a Calibration. Summary reports are accessed by pressing the **Reports** button on the toolbar.



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Efficiency Summary Report

Device: LB4200
Calibration: AB Constant w/BkgSub Calibration
Decay Mode: Alpha

Detector Name	Efficiency (%)	Spillover (%)	Efficiency Date
LB4200_D1P1	0.06071 +/- 1.226	1.214E+05 +/- 1.138E+04	10/24/2017 12:25:30 PM
LB4200_D1P2	0.2983 +/- 0.1007	2.112E+05 +/- 2.569E+04	10/24/2017 12:25:30 PM
LB4200_D1P3	0.6279 +/- 0.2407	1.204E+05 +/- 1.11E+04	10/24/2017 12:25:30 PM
LB4200_D1P4	0.6254 +/- 0.2185	1.156E+05 +/- 1.046E+04	10/24/2017 12:25:30 PM

Figure 115 Sample Efficiency Summary Report

QA Reports

The QA report is used to print and view a graph of background count rates, efficiency count rates, and efficiency (%) by detector, date (range), and Calibration. QA reports are accessed by pressing the **QA** button on the toolbar.

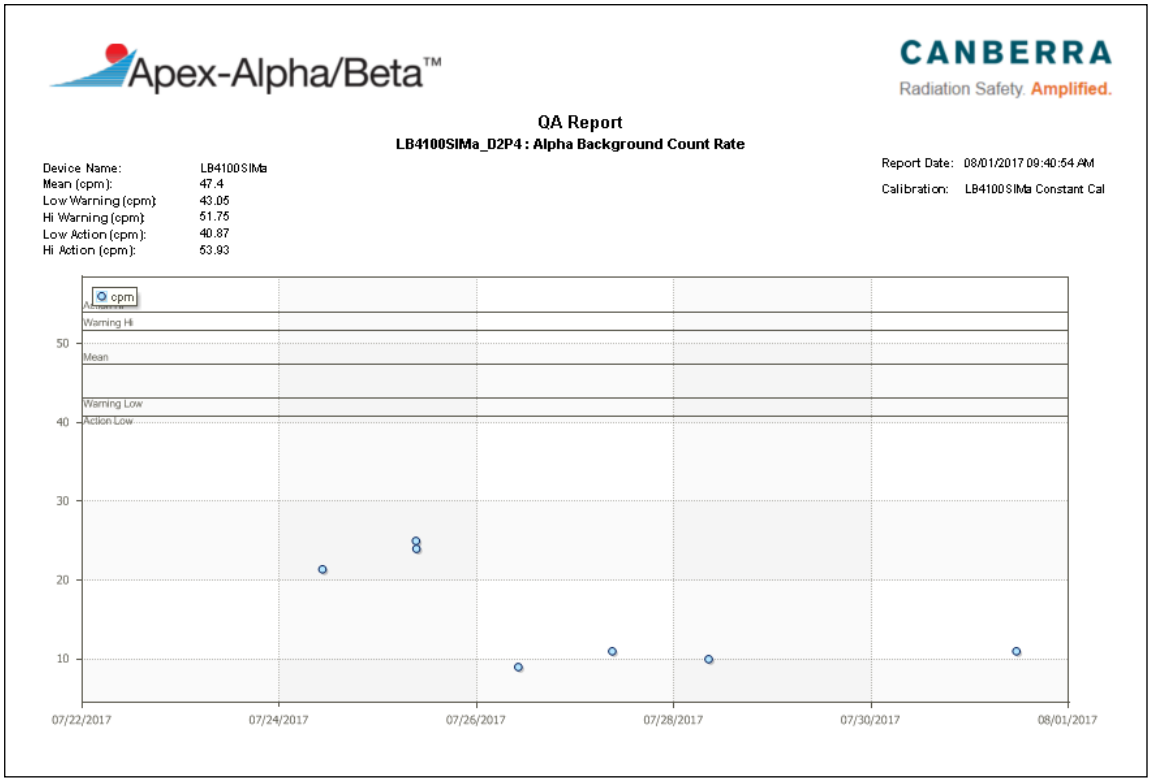
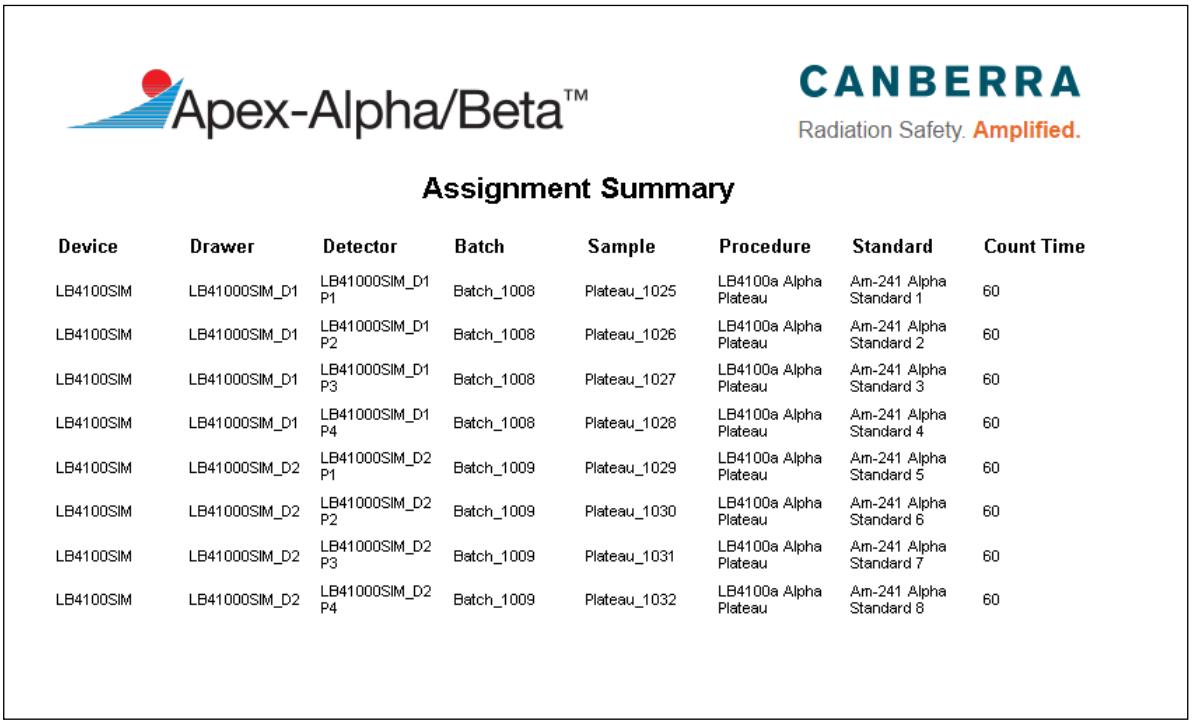


Figure 116 Sample QA Report

Assignment Summary Report

The Assignment Summary report is used to view and print a report showing where samples or standards should be loaded in the instrument. This report is accessed automatically after the **Load Samples** button is selected on the **Sample Assigner** page.



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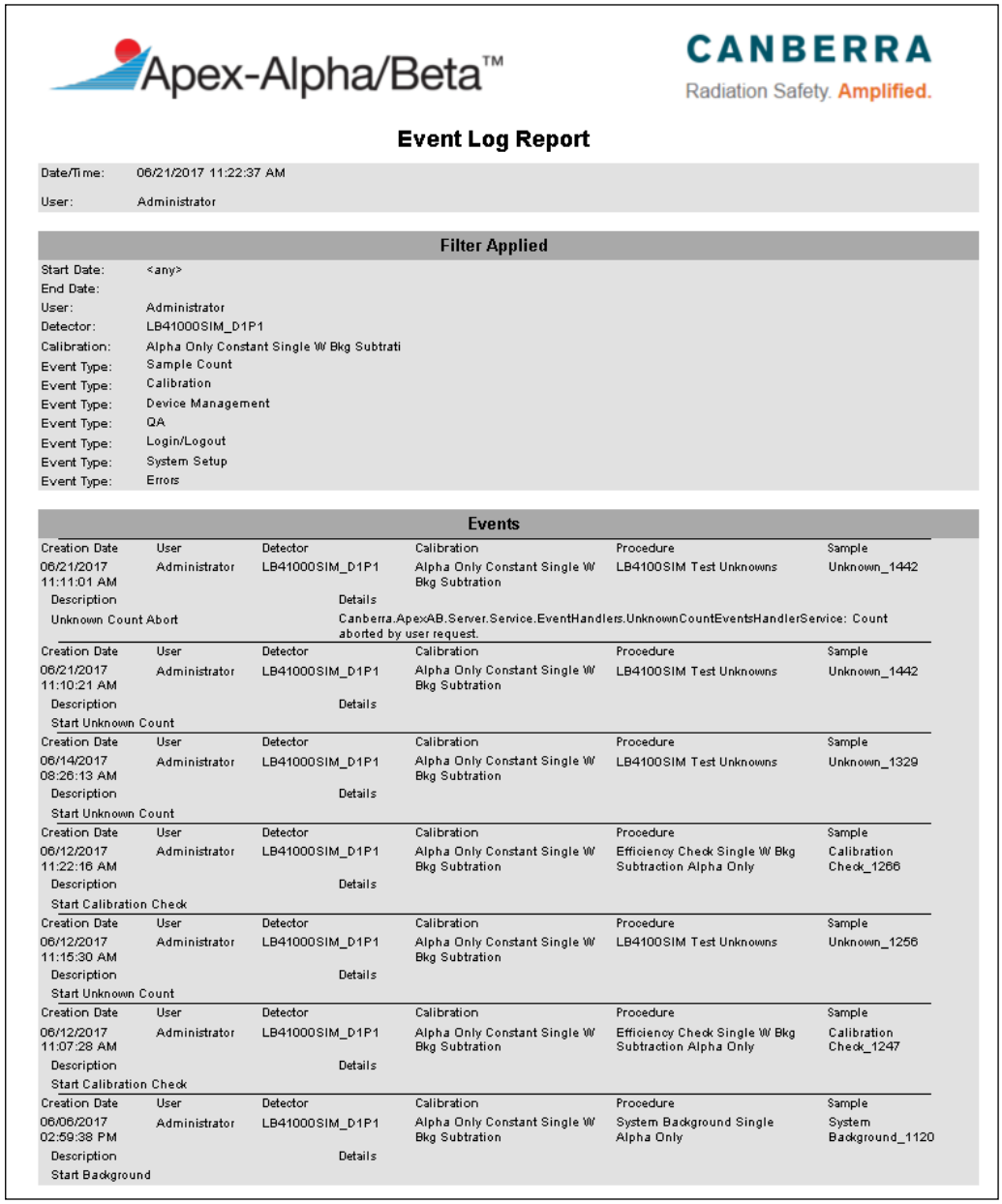
Assignment Summary

Device	Drawer	Detector	Batch	Sample	Procedure	Standard	Count Time
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P1	Batch_1008	Plateau_1025	LB4100a Alpha Plateau	Am-241 Alpha Standard 1	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P2	Batch_1008	Plateau_1026	LB4100a Alpha Plateau	Am-241 Alpha Standard 2	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P3	Batch_1008	Plateau_1027	LB4100a Alpha Plateau	Am-241 Alpha Standard 3	60
LB4100SIM	LB41000SIM_D1	LB41000SIM_D1 P4	Batch_1008	Plateau_1028	LB4100a Alpha Plateau	Am-241 Alpha Standard 4	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P1	Batch_1009	Plateau_1029	LB4100a Alpha Plateau	Am-241 Alpha Standard 5	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P2	Batch_1009	Plateau_1030	LB4100a Alpha Plateau	Am-241 Alpha Standard 6	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P3	Batch_1009	Plateau_1031	LB4100a Alpha Plateau	Am-241 Alpha Standard 7	60
LB4100SIM	LB41000SIM_D2	LB41000SIM_D2 P4	Batch_1009	Plateau_1032	LB4100a Alpha Plateau	Am-241 Alpha Standard 8	60

Figure 117 Sample Assignment Summary Report

Event Log Report

The Event Log report is used to print events logged by the system. It is accessed by choosing the **Event Log** tab after selecting the **Reports** button on the toolbar.



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Event Log Report

Date/Time: 06/21/2017 11:22:37 AM

User: Administrator

Filter Applied

Start Date:	<any>
End Date:	
User:	Administrator
Detector:	LB41000SIM_D1P1
Calibration:	Alpha Only Constant Single W Bkg Subtrati
Event Type:	Sample Count
Event Type:	Calibration
Event Type:	Device Management
Event Type:	QA
Event Type:	Login/Logout
Event Type:	System Setup
Event Type:	Errors

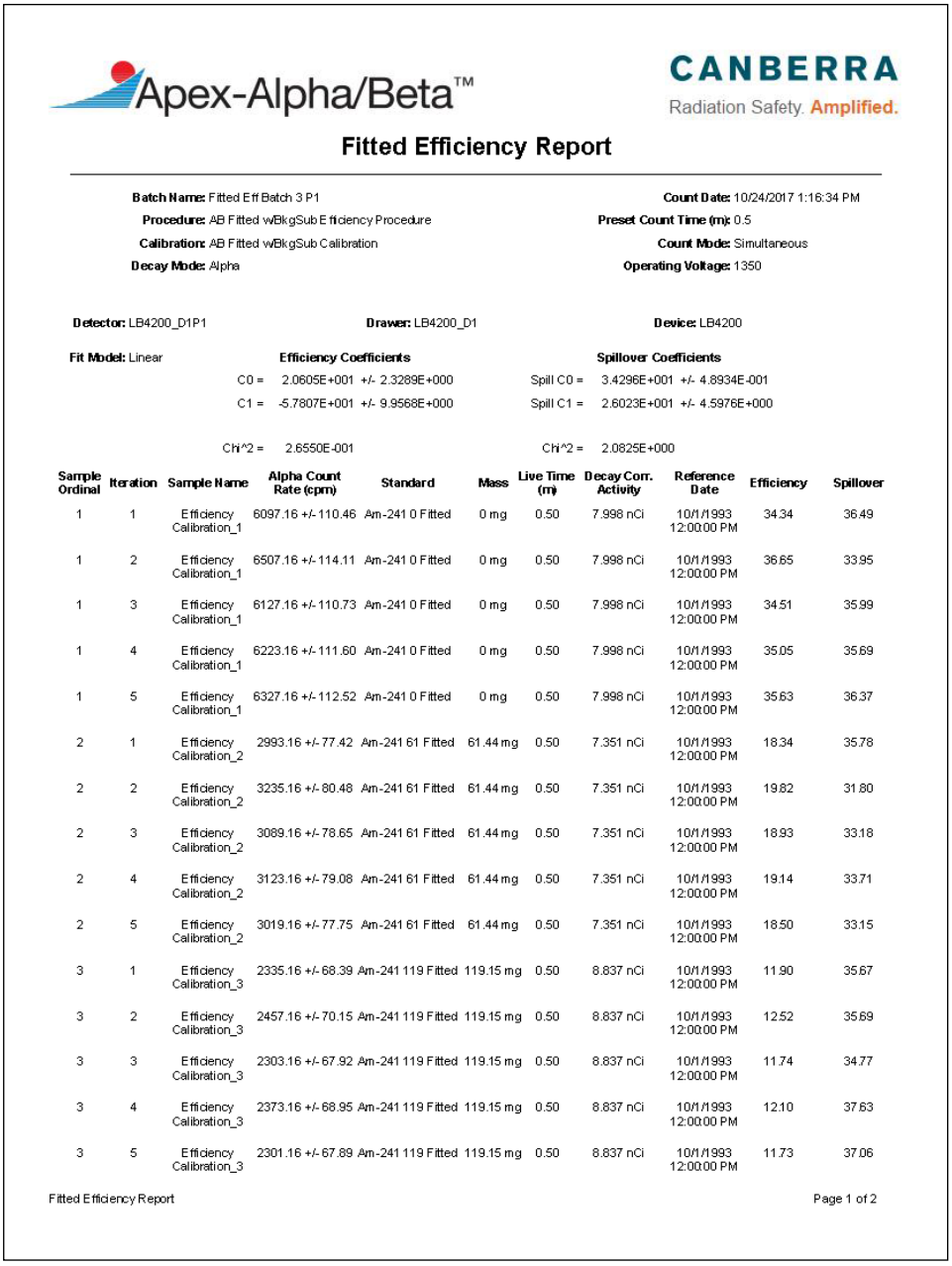
Events

Creation Date	User	Detector	Calibration	Procedure	Sample
06/21/2017 11:11:01 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	LB4100SIM Test Unknowns	Unknown_1442
Description		Details			
Unknown Count Abort		Canberra.ApexAB.Server.Service.EventHandlers.UnknownCountEventsHandlerService: Count aborted by user request.			
Creation Date	User	Detector	Calibration	Procedure	Sample
06/21/2017 11:10:21 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	LB4100SIM Test Unknowns	Unknown_1442
Description		Details			
Start Unknown Count					
Creation Date	User	Detector	Calibration	Procedure	Sample
06/14/2017 08:26:13 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	LB4100SIM Test Unknowns	Unknown_1329
Description		Details			
Start Unknown Count					
Creation Date	User	Detector	Calibration	Procedure	Sample
06/12/2017 11:22:16 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	Efficiency Check Single W Bkg Subtraction Alpha Only	Calibration Check_1266
Description		Details			
Start Calibration Check					
Creation Date	User	Detector	Calibration	Procedure	Sample
06/12/2017 11:15:30 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	LB4100SIM Test Unknowns	Unknown_1256
Description		Details			
Start Unknown Count					
Creation Date	User	Detector	Calibration	Procedure	Sample
06/12/2017 11:07:28 AM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	Efficiency Check Single W Bkg Subtraction Alpha Only	Calibration Check_1247
Description		Details			
Start Calibration Check					
Creation Date	User	Detector	Calibration	Procedure	Sample
06/06/2017 02:59:38 PM	Administrator	LB41000SIM_D1P1	Alpha Only Constant Single W Bkg Subtration	System Background Single Alpha Only	System Background_1120
Description		Details			
Start Background					

Figure 118 Sample Event Log Report

Fitted Efficiency Report

The Fitted Efficiency report is used to print and view Calibration Fitted Efficiency batches. It can be accessed by choosing the **Data Review** toolbar tab, choosing a Fitted Efficiency batch, and choosing the **Report** tab. The report shows the data for each of the samples in the fitted efficiency batch.



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Fitted Efficiency Report

Batch Name: Fitted Eff Batch 3 P1
Procedure: AB Fitted wBkgSub Efficiency Procedure
Calibration: AB Fitted wBkgSub Calibration
Decay Mode: Alpha
Count Date: 10/24/2017 1:16:34 PM
Preset Count Time (m): 0.5
Count Mode: Simultaneous
Operating Voltage: 1350

Detector: LB4200_D1P1 **Drawer:** LB4200_D1 **Device:** LB4200

Fit Model: Linear

Efficiency Coefficients
C0 = 2.0605E+001 +/- 2.3289E+000
C1 = -5.7807E+001 +/- 9.9568E+000
Chi^2 = 2.6550E-001

Spillover Coefficients
Spill C0 = 3.4296E+001 +/- 4.8934E-001
Spill C1 = 2.6023E+001 +/- 4.5976E+000
Chi^2 = 2.0825E+000

Sample Ordinal	Iteration	Sample Name	Alpha Count Rate (cpm)	Standard	Mass	Live Time (m)	Decay Corr. Activity	Reference Date	Efficiency	Spillover
1	1	Efficiency Calibration_1	6097.16 +/- 110.46	Am-241 0 Fitted	0 mg	0.50	7.998 nCi	10/1/1993 12:00:00 PM	34.34	36.49
1	2	Efficiency Calibration_1	6507.16 +/- 114.11	Am-241 0 Fitted	0 mg	0.50	7.998 nCi	10/1/1993 12:00:00 PM	36.65	33.95
1	3	Efficiency Calibration_1	6127.16 +/- 110.73	Am-241 0 Fitted	0 mg	0.50	7.998 nCi	10/1/1993 12:00:00 PM	34.51	35.99
1	4	Efficiency Calibration_1	6223.16 +/- 111.60	Am-241 0 Fitted	0 mg	0.50	7.998 nCi	10/1/1993 12:00:00 PM	35.05	35.69
1	5	Efficiency Calibration_1	6327.16 +/- 112.52	Am-241 0 Fitted	0 mg	0.50	7.998 nCi	10/1/1993 12:00:00 PM	35.63	36.37
2	1	Efficiency Calibration_2	2993.16 +/- 77.42	Am-241 61 Fitted	61.44 mg	0.50	7.351 nCi	10/1/1993 12:00:00 PM	18.34	35.78
2	2	Efficiency Calibration_2	3235.16 +/- 80.48	Am-241 61 Fitted	61.44 mg	0.50	7.351 nCi	10/1/1993 12:00:00 PM	19.82	31.80
2	3	Efficiency Calibration_2	3089.16 +/- 78.65	Am-241 61 Fitted	61.44 mg	0.50	7.351 nCi	10/1/1993 12:00:00 PM	18.93	33.18
2	4	Efficiency Calibration_2	3123.16 +/- 79.08	Am-241 61 Fitted	61.44 mg	0.50	7.351 nCi	10/1/1993 12:00:00 PM	19.14	33.71
2	5	Efficiency Calibration_2	3019.16 +/- 77.75	Am-241 61 Fitted	61.44 mg	0.50	7.351 nCi	10/1/1993 12:00:00 PM	18.50	33.15
3	1	Efficiency Calibration_3	2335.16 +/- 68.39	Am-241 119 Fitted	119.15 mg	0.50	8.837 nCi	10/1/1993 12:00:00 PM	11.90	35.67
3	2	Efficiency Calibration_3	2457.16 +/- 70.15	Am-241 119 Fitted	119.15 mg	0.50	8.837 nCi	10/1/1993 12:00:00 PM	12.52	35.69
3	3	Efficiency Calibration_3	2303.16 +/- 67.92	Am-241 119 Fitted	119.15 mg	0.50	8.837 nCi	10/1/1993 12:00:00 PM	11.74	34.77
3	4	Efficiency Calibration_3	2373.16 +/- 68.95	Am-241 119 Fitted	119.15 mg	0.50	8.837 nCi	10/1/1993 12:00:00 PM	12.10	37.63
3	5	Efficiency Calibration_3	2301.16 +/- 67.89	Am-241 119 Fitted	119.15 mg	0.50	8.837 nCi	10/1/1993 12:00:00 PM	11.73	37.06

Fitted Efficiency Report Page 1 of 2

Figure 119 Sample Fitted Efficiency Report

C. Standard Sources

There are two basic types of standards available for use with alpha/beta counters: *calibration* standards and Quality Control *check* standards.

Types of Standards

Calibration Standards are sample matrix and geometry standards used for measuring the efficiency of the instrument. They should reproduce the expected sample geometry and isotope found in a process sample. These standard sources should be purchased or fabricated in a radiochemistry laboratory. These types of sources are also called calibration sources or calibration standards. Calibration standards are used to determine the counting efficiency of the instrument for use in the counting applications.

QC Check Standards are usually electroplated sources. They are selected for instrument plateaus, setting the instrument's discriminators, and tracking the instrument's performance. Electroplated sources have very little self-absorption, and will give the best possible response from the sample detector. These type sources are called QC Check standards, QC sources or QC standards. Check standards are not typically used to determine the instrument's efficiency; they are only used tracking performance.

Selection of Standards

In Apex-Alpha/Beta, standards for Device Setup can be of either type, but *Check* style standards are more prevalent because of the consistency over time. Never use mixed radionuclide sources for calibrating the instrument, even if the mixed source is made of all alpha or beta emitting radionuclides. Please note standards that include the in-growth of daughter product(s) are acceptable.

Any source used for instrument Calibration of an instrument should contain only one primary radionuclide. Sources should contain the major isotope expected to be found in a measured sample(s).

The recommended radionuclides for device setup and testing are Po-210 or Am-241 for alpha, and Sr-90/Y-90 for beta. It may be necessary to use other isotopes. Be aware that by using other nuclides the instrument will produce different plateau shapes, efficiencies, and spillover percentages compared with those in the published specifications. Other recommended sources include Pu-239, Pu-238, U-238, U-235, Tl-204, Cs-137, Cl-36 and Tc-99.

Calibration standards should represent each type of alpha and beta emitter expected to be present in unknowns. The efficiency standard's activity should be high enough that calibration data can be acquired in a reasonable amount of time.

Standards for Fitted Efficiency

A set of five or more standards using a common sample solution and attenuation media should be created to be counted as a fitted efficiency. The nuclide of the solution should be consistent with the recommendations given earlier in this appendix. The activity of these standards can be kept constant as is required by some methods, or can be varied as is required by other methods. The set of standards is counted in multiple batches; one for each detector.

The sample mass is then corrected for efficiency and charted. The user will choose the appropriate fit model that best matches the data. This procedure is discussed in more detail in *Fitted Efficiency Calibration* on page 35.

Choosing the Correct Value for Standard Activity

There is often confusion as to what number from a source certificate is to be used for efficiency determination. Two of the most common “activity” units used on source certificates include:

Activity – The total contained radioactivity of a standard.

Emission rate – The amount of radioactivity that escapes from the standard due to covering, plating, etc.

Standards Activity General Rules

Some general rules are given below.

1. If given both of these, the *emission rate* would normally be entered for a constant efficiency.

2. If a set of standards is intended to be used to create a fitted efficiency, the *Activity* would be used.

3. If only the activity of Sr-90 (not Sr-90/Y-90) is stated, the activity value should be doubled.

4. If the *emission rate* of Sr-90 is given, the Y-90 in-growth is assumed to be included in the emissions rate.

5. The *emission rate* can be entered as activity, though emission rate is usually stated in 2pi. In this case, the emission rate should be doubled if added as an activity unit or as a 4pi emission rate.

6. The *emission rate* can be entered without modification regardless of the nuclide if entered as a 2pi emission rate.

D. Field Update Tool

The Field Update Tool provides a mechanism to update the firmware and CPLD on an LB4200 device or the firmware of a Series 6 device in the field.

Important: Firmware updates should only be performed with the direction of Mirion personnel.

LB4200

This section provides the information to update the firmware and CPLD on an LB4200 device in the field.

Before You Begin

When invoked from Apex-Alpha/Beta, this should be done in the context of Apex-Alpha/Beta security. Users must be logged in as a user that includes the General Setup right under System Setup to invoke the utility. If Apex-Alpha/Beta is inoperative for some reason, it is possible to invoke the utility from the command line or the separate TI utility.

The device containing the drawer to be updated should be taken offline before starting the update process. If not, a message indicating the device is online and any counts in progress will be aborted. Press **OK** to continue with the update or **Cancel** to abort the update process.

All activity including error messages will be logged both to the display and to a text file. When available, version information for the resident Firmware and CPLD will be displayed. The user will be prompted to continue if attempting to write an older version of the Firmware or CPLD to the LB4200.

The utility can program the Firmware in either LB4200 mode or TI mode. TI mode is used to handle the case where the resident firmware is inoperative.

An update to only one drawer at a time is allowed to occur.

User Interface

This section describes the user interface for the Field Update Tool.

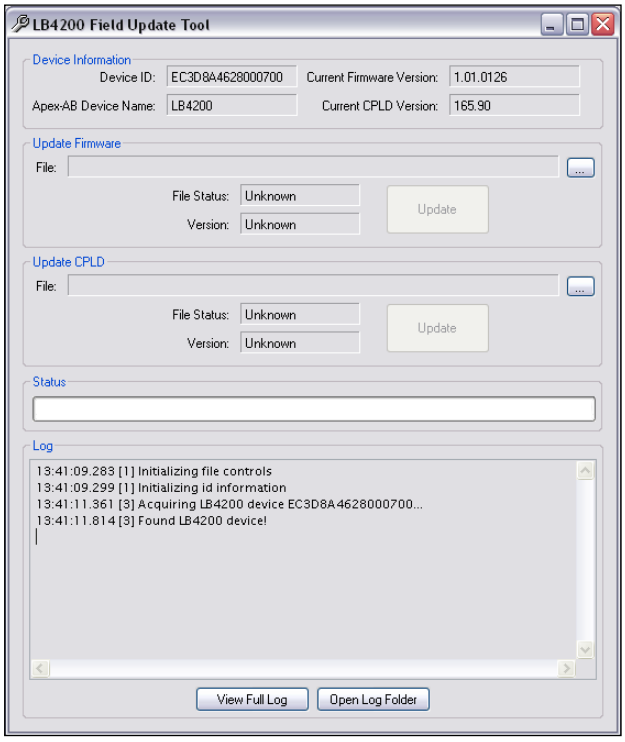

Figure 120 The LB4200 Field Update Tool Screen

Device Information

Information about the current device.

Device ID

The hex representation of the LB4200 device unique ID (passed via the /ID argument when using the command line utility).

Apex-AB Device Name

The device name (passed via the /N argument when using the command line utility).

Current Firmware Version

Reports the device firmware version. This field is only populated when the device has been accessed in the LB4200 mode.

Current CPLD Version

Reports the device CPLD version. This field is only populated when the device has been accessed in the LB4200 mode.

Update Firmware/Update CPLD

Custom controls that encapsulate the details of file unpacking and header verification.

Note that the **Update CPLD** function is reserved for future use.

File

File system path to the selected file.

Browse button

Opens a common file dialog to allow the user to select a file. File selection is constrained to CBIN (firmware) or CLPD file extensions.

File Status

Displays a localized string representing the file status:

- **Unknown** – no file is currently selected
- **FileError** – the selected file does not have the correct header information
- **BadChecksum** – the payload checksum for the selected file does not match the checksum in the header
- **OK** – selected file is OK

Version

This field displays the version of the selected file when the file status is **OK**.

Update

Press this button to begin the update process. The button is only available when the File Status is **OK.**

Status

The progress bar reflects the progress of the current operation. While attempting to access the device, the progress bar is in marquee (moving) mode. While loading the firmware or CPLD, the progress bar is in block (fill in left to right) mode.

View Full Log

Press this button to view the log report.

Open Log Folder

Press this button to open the log folder.

Command Line Interface

This section describes the command line interface for the Field Update Tool.

If the Apex-Alpha/Beta program is not available or accessible, the command line interface can be used to launch the User Interface described above.

Two pieces of information are required to use the command line interface – the hex address of the drawer to be updated and a security password that changes based on the date.

The password is calculated by taking the current year, subtracting the month, then adding the day. For example, if the date is July 21 2015 the password is calculated as 2015 – 7 + 21 = 2029.

To use the command line interface, open a command window and set the folder directory to "%program files (x86)%\Canberra\ApexAB\Exefiles\Client"

The format of the command is as follows:

Canberra.ApexAB.FieldUpdateTool /ID=<USB address> /P=<password>

For a drawer with an address of 2416904603000E00 and using the example date above the command would be as follows:

Canberra.ApexAB.FieldUpdateTool /ID=2416904603000E00 /P=2029

This will launch the same User Interface that is launched from the Apex-Alpha/Beta application. See the previous section for details on the User Interface.

TI Utility Interface

This section describes the TI Utility interface Firmware Update Tool. The TI Utility should only need to be used in the unlikely event that neither the User Interface nor the Command Line Interface can access the device.

To use the TI Utility, access to the front panel of the drawer assembly is required. To access the front panel, pull the detector drawer out until it stops as though samples were being loaded. Carefully pry the protective cover away from the cabinet far enough to gain access to the drawer body. The cover can rest on the detector drawer.

The drawer must be in the “TI” mode for the utility to access it. To put the drawer into “TI” mode, perform the following steps:

1. Remove the USB cable from the left side of the drawer assembly.

2. Insert a pin such as a paperclip into the pinhole of the drawer assembly to press the switch inside. Refer to Figure 117 to locate the USB cable and the pinhole.

3. While holding the switch in, reattach the USB cable. The status LED on the front of the drawer assemble will not turn on.

   Note: The drawer is now in “TI mode”. The User Interface Firmware Upgrade Tool through Apex-Alpha/Beta may also be able to be used at this point to upgrade the firmware. The status will show it cannot find an LB4200 device, but it should find the TI device.

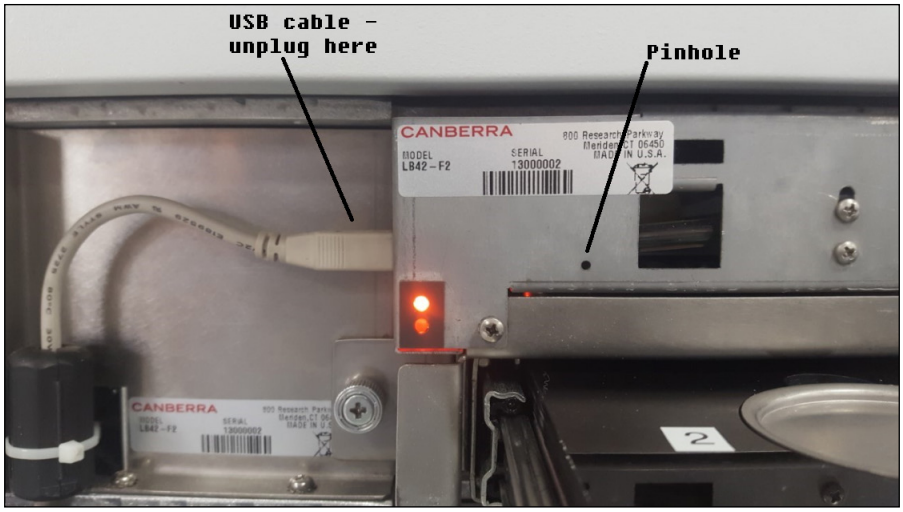

Figure 121 USB Cable and Pinhole Locations

To continue using the TI Utility, navigate to the “\LB4200 DEVICE FILES\TI Utility” folder on the distribution media and double-click on “BSL_USB_GUI.exe”.

At the initial screen press **Next** to continue. At the license agreement screen, if you agree to the license, select the “I accept the license agreement” radio button and press **Next**.

On the next screen, under the Upgrade Firmware button it should indicate that a device was detected. If not, repeat the three steps above.

Select the “Select Firmware” radio button.

Press the **Browse** button and navigate to the folder containing the firmware files on the distribution media (\LB4200 DEVICE FILES). The **Browse** button will filter file selections to "*.txt". Select the file supplied on the Apex-Alpha/Beta media which will be the latest version at the time of the release of Apex-Alpha/Beta. The full path and filename will appear below the **Browse** button.

Press the **Upgrade Firmware** button. The status will be displayed in the lower part of the screen. When Done, press **Close** to exit the utility.

Series 6

This section provides the information to update the firmware of a Series 6 device in the field.

Before You Begin

When invoked from Apex-Alpha/Beta, this should be done in the context of Apex-Alpha/Beta security. Users must be logged in as a user in the Administrators group to invoke the utility.

The device to be updated should be taken offline before starting the update process. If not, a message indicating the device is online and any counts in progress will be aborted. Press **OK** to continue with the update or **Cancel** to abort the update process.

All activity including error messages will be logged both to the display and to a text file. When available, version information for the resident Firmware will be displayed.

User Interface

This section describes the user interface for the Field Update Tool. To start the Field Update Tool, select the device to be updated from the Devices section of the Device tab on the Setup page and click the **Update Device** button. A “Choose Series 6 Firmware File” dialog will be presented. The default folder location is “%ProgramData%\Canberra\ApexAB\Firmware” which is where the firmware file on the Apex-AB distribution is copied to during installation. If a firmware file has been received separately, such as from an update, the folder where it resides can be navigated to using the dialog as it is a standard Windows file open dialog. The dialog filters to *.tb (Tarball files) for the firmware files. Select the file to be used for the update and click **Open**. If the file is verified as being a valid firmware file the Series6 Firmware Update Tool dialog will open and it will immediately start transferring the file to the device.

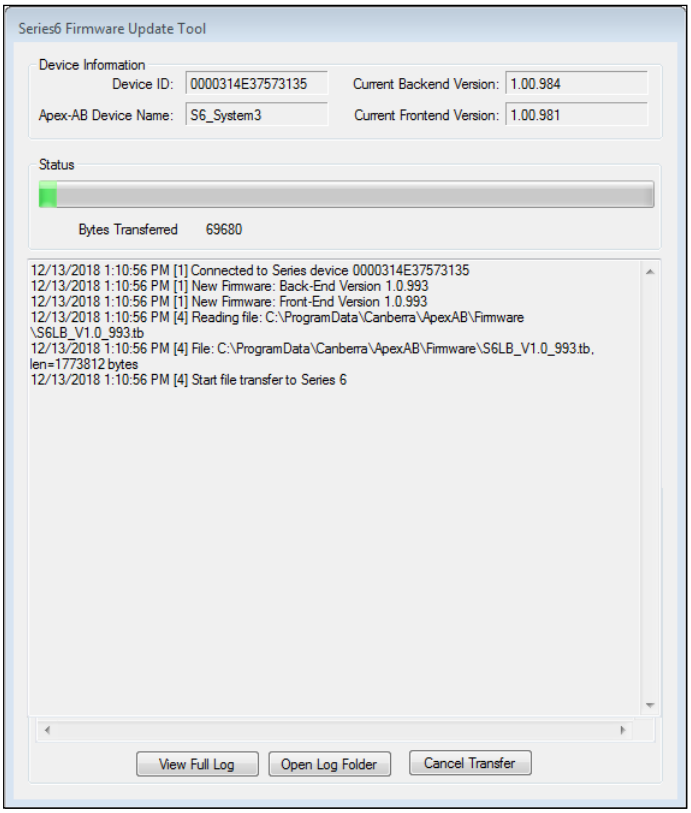

Figure 122 The Series 6 Firmware Update Tool Screen

Device Information

Information about the current device.

Device ID

The hex representation of the Series 6 device unique ID.

Apex-AB Device Name

The device name given to the device when defined in *Devices Setup Page* on page 152.

Current Backend Version

Reports the device firmware version of the Backend board.

Current Frontend Version

Reports the device firmware version of the Frontend board.

Status

The progress bar reflects the progress of the current operation. While loading the firmware, the progress bar is in block (fill in left to right) mode.

View Full Log

Press this button to view the log report.

Open Log Folder

Press this button to open the log folder.

Cancel Transfer

Press this button to cancel the update process.

Update Process

The update process from the Apex-AB side is simply transferring the firmware file to the Series 6 device. Once the file has been successfully transferred the **Cancel Transfer** button will change to an **Exit** button and the Log area will instruct to turn off power to the device, wait 10 seconds and power it back on to actually perform the firmware update. Press the **Exit** button to close the Series6 Firmware Update Tool dialog.

On the Series 6 device, turn the power off, wait 10 seconds and power it back on. The system will detect the presence of the firmware file and if it determines it to be a different version that what is currently installed (older or newer) it will begin the update process.

The device screen will report the version being updated from and to and the progress for first the backend board then the frontend board. When both updates have been completed the screen will instruct to turn off power to the device, wait 10 seconds and power the device back on. The device initialization should then report the updated firmware versions.

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