Keysight Technologies 14585A Control and Analysis Software

Quick Start Guide

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Assistance

This product comes with the standard product warranty. Warranty options, extended support contacts, product maintenance agreements and customer assistance agreements are also available. Contact your nearest Keysight Technologies Sales and Service office for further information on Keysight Technologies' full line of Support Programs.

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Introduction

The Keysight 14585A Control and Analysis software is a Windows-based PC application that is designed to control up to four Keysight N6705 DC Power Analyzers, N7900 Advanced Power Systems, or RP7900 Regenerative Power Systems. The Keysight 14585A application has four primary functions: scope measurements, data logging, CCDF/histogram, and arbitrary waveform generation. Additionally, the software has an instrument control pane that emulates the front panel controls of the instrument.

There are two preliminary steps that need to be completed in order to use the Keysight 14585A software.

- The first step is to install the Keysight IO Libraries Suite 15.5 or higher. This software is included on the Automation-Ready CD-ROM that was shipped with your instrument. Alternately you can download it from the Web at www.keysight.com/find/iolib

- The second step is to connect your instrument to one of the supported interfaces as explained in the instrument's User's Guide.

NOTE	You can contact Keysight Technologies at one of the following telephone numbers for warranty, service, or technical support information.

You can contact Keysight Technologies at one of the following telephone numbers for warranty, service, or technical support information.
In the United States: (800) 829-4444
In Europe: 31 20 547 2111
In Japan: 0120-421-345
Or use our Web link for information on contacting Keysight in your country or specific location: www.keysight.com/find/assist
Or contact your Keysight Technologies Representative.

The web contains the most up to date version of the manuals. Go to www.keysight.com/find/N6705, www.keysight.com/find/N7900, or www.keysight.com/find/RP7900 to get the latest version of the manuals.

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System Requirements

Computer:

- Pentium 2 GHz, with 2 Gbytes of RAM, 2 Gbytes disc space

Supported Platforms:

- Windows XP SP2 with Microsoft .NET framework version 3.5 SP1 only

- Vista SP1

- Windows 7 (32-bit and 64-bit)

Supported Interfaces:

- Keysight 82350B GPIB Interface

- Keysight 82357A USB/GPIB Interface

- Keysight E5810A LAN/GPIB Gateway

- National Instruments GPIB card (requires NI-488.2 (Win32) version 1.6 or later)

- LAN

- USB (not recommended for long-term data logging)

Supported Libraries (requires one):

- Keysight IO Libraries Suite 15.5 or later

  o Supplied on a CD-ROM with your instrument or downloadable from www.keysight.com/find/iolib

  o This must be installed before you install the Keysight 14585A application

- National Instruments VISA Run-time Engine version 2.6

Supported Instruments:

- One to four Keysight N6705A, N6705B, or N6705C DC Power Analyzers

- One to four Keysight N7950A, N7951A, N7952A, N7953A, N7954A, N7970A, N7971A, N7972A, N7973A, N7974A, N7976A, N7977A, N7953ALG, N6991AT Advanced Power Systems

- One to four Keysight RP7951A, RP7952A, RP7953A, RP7961A, RP7962A, RP7963A, RP7951AT, RP7952AT, RP7953AT, RP7961AT, RP7962AT. RP7963AT Regenerative Power Systems

Keysight 14585A Limitations:

- The arbitrary Waveform generator output frequency is limited to 10 kHz

- Data logger measurements are limited to either voltage or current on N6700 power modules that do not have simultaneous measurement capability (refer to http://literature.cdn.keysight.com/litweb/pdf/N6700-90001.pdf).

Installation

Before running the Keysight 14585A application, you must have installed and connected a Keysight N6705 DC Power Analyzer, N7900 Advanced Power System, or RP7900 Regenerative Power System to a computer with the appropriate interface cable. You must also have the appropriate interface card or IO libraries installed and configured. If you are using a Keysight interface card, you must have the appropriate VISA library drivers installed.

To Install the Keysight 14585A application:

- Place the Keysight N6705 CD-ROM into your computer and run Keysight 14585A.exe. Note that you can download the latest version of the software at www.keysight.com/find/14585

  When the installer runs, it puts up the following dialog box:
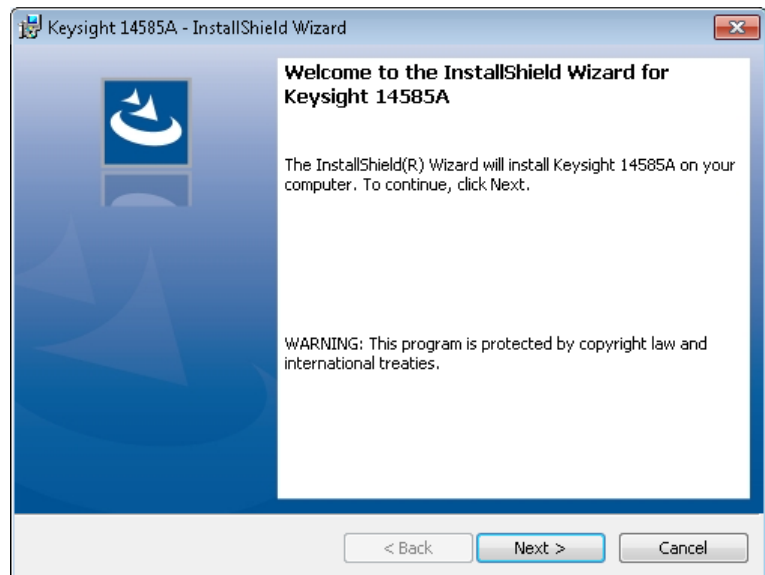
- Follow the directions on the screen to install the software. If supplied, a readme.txt file will provide product updates or corrections that are not documented in the built-in help. Use any text editor to open and read this file.

To Run the Keysight 14585A application:

- Click on its Desktop icon:

  You can also click on the Start   button and select: Programs | Keysight 14585A Control and Analysis Software.

2
Getting Started

This chapter shows you how to quickly get started. It describes how to connect to a Keysight N6705 DC Power Analyzer, N7900 Advanced Power System, or RP7900 Regenerative Power System. In the example given, an output turn-on sequence is programmed and displayed using the scope function. The scope measures the actual output voltages as the outputs turn on. The scope waveforms are then saved and exported.

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Connect to Your Instrument

Step 1. Click the Connect button next to the instrument label (A, B, C, or D) that will identify the instrument to which you will be connecting. Click the right arrow to display labels C and D.
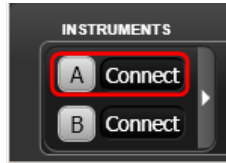
Step 2 The application automatically searches to find all the instruments on the network and VISA resources. If the VISA resource does not appear, you may need to manually add the VISA resource using your IO library software. If you want to re-run the search, click the **Search** button.

If your instrument does not appear on the list, click **Manual Connection**. If using the Sockets IO library, provide the IP address or Hostname. If using VISA, provide the VISA resource descriptor. Click Test Connection to verify the connection and add the instrument to the list.

Select your instrument and click **OK** to connect.
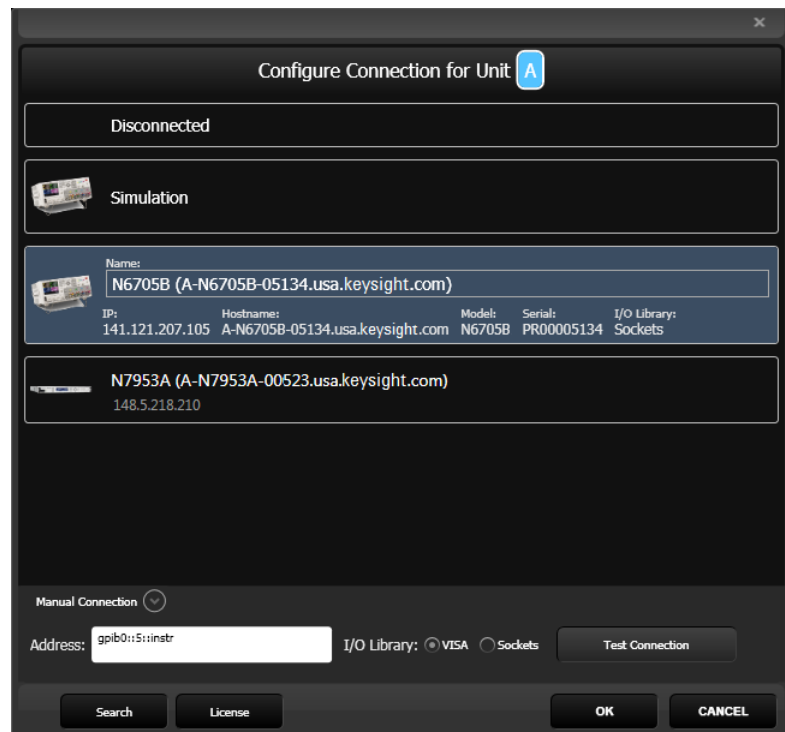
Click **Simulation** if you want to run the application in simulation mode with no instruments connected. This only provides limited functionality of the application.

Step 3   If you have previously connected to an instrument, you can also connect
to one of the instruments listed in the drop-down **Connect** menu shown
on the bottom of the main window under Instrument **A**, **B**, **C**, or **D**.
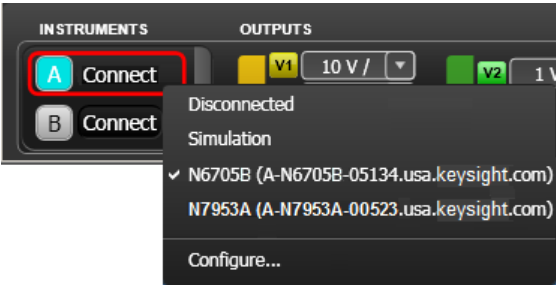
Step 4   Click **Configure** to access the Configure IO dialog.

<div>

NOTE   You can configure the connections options by selecting the **Tools** menu,
User Preferences, **IO Configuration**.

</div>
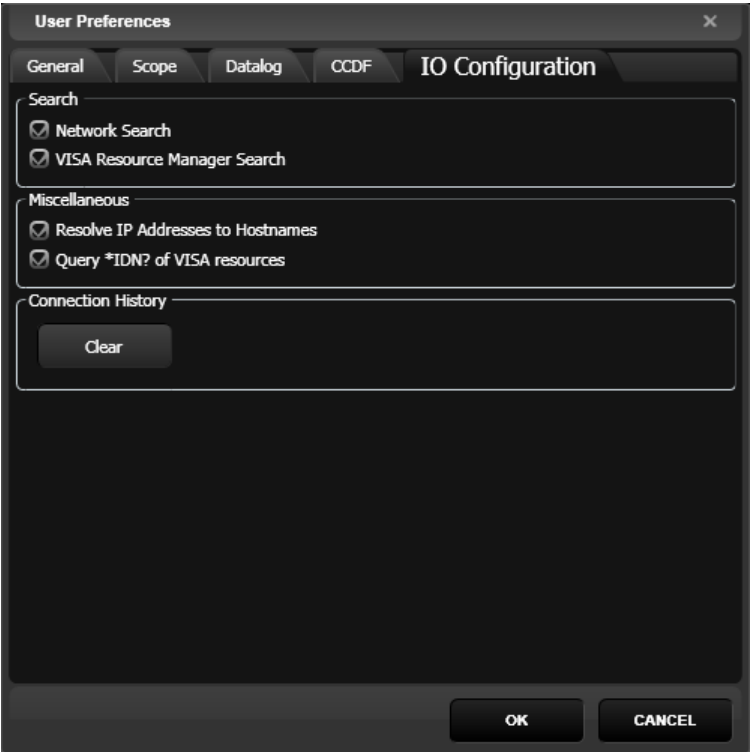
Set Up the Instrument

To set up your instrument, select the **Instrument Control** tab on the left side of the display. You can directly control the instrument using the controls on this display, or use the front panel controls. Note that the changes made on either interface (the PC application or actual front panel) will be mirrored in the other interface.

Step 1. **Keysight N6705 DC Power Analyzer**
In Meter View, set the output voltages and currents of all four outputs of the DC Power Analyzer to 10 volts and 1 ampere.

Keysight N7900 APS and RP7900 RPS
In Meter View, set the output voltage and current of the Advanced Power System to 10 volts and 1 ampere.
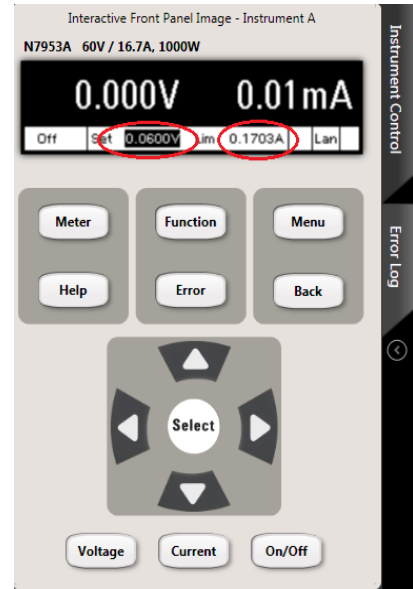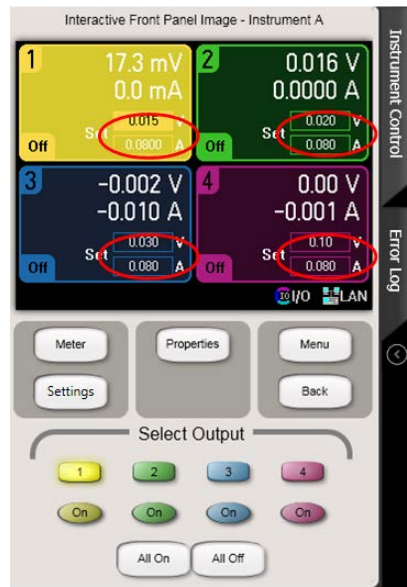
Step 2. Click the Settings button twice. In the Output On/Off Delay area, configure the output turn-on sequence as follows. You will only need to configure the Turn-on delays, not the Turn-off delays.

Output 1: 0 ms;
Output 2: 10 ms;
Output 3: 20 ms;
Output 4: 30 m
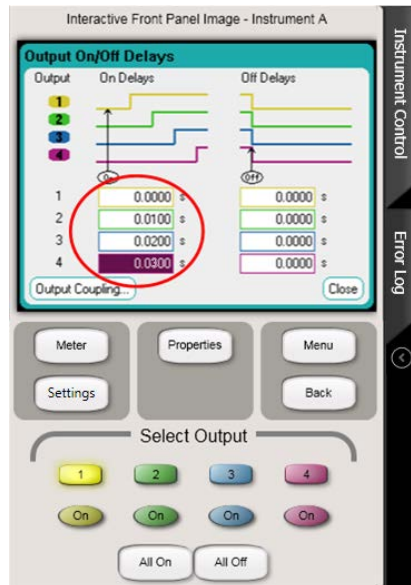
The Keysight N7900 Advanced Power System and RP7900 Regenerative Power System does not have multiple output channels.

Select and Configure the Scope Function

Step 1. Select the Scope function from the functions listed on top of the window.

Step 2. Select which output traces to display. The first figure shows four traces selected for the DC Power Analyzer.
The second figure shows one trace selected for the Advanced Power System, which has only one output.
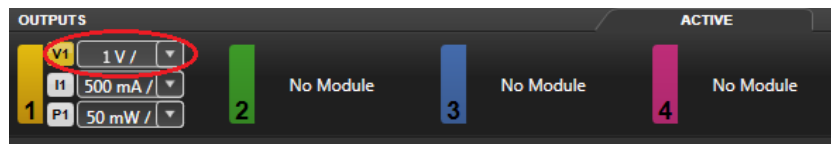
Step 3. Configure the vertical scale for all outputs (set the vertical scale to 10 volts/division).

Step 4. Configure the horizontal scale for all outputs (set the timebase to 20 milliseconds/ division).
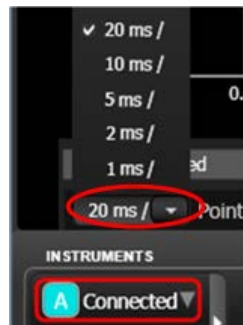
Step 5. Select a voltage level on output 1 as the Scope trigger source. Set the level to 1 volt.

Step 5. Select single mode.
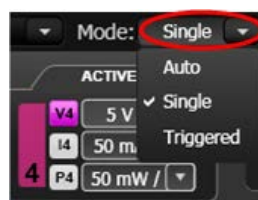
Run the Scope and Turn on the Outputs

Step 1. Press the Scope button on the bottom of the screen to run the scope. The arrow icon indicates the start action.
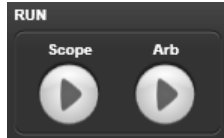
Step 2. In the Instrument Control area on the front panel of the instrument, press the All Outputs On button to start the output sequence.

Step 3. The selected waveforms will be displayed on the screen.

NOTE   The Keysight N7900 Advanced Power System and RP7900 Regenerative Power System will only display the trace for V1, as it does not have multiple output channels..
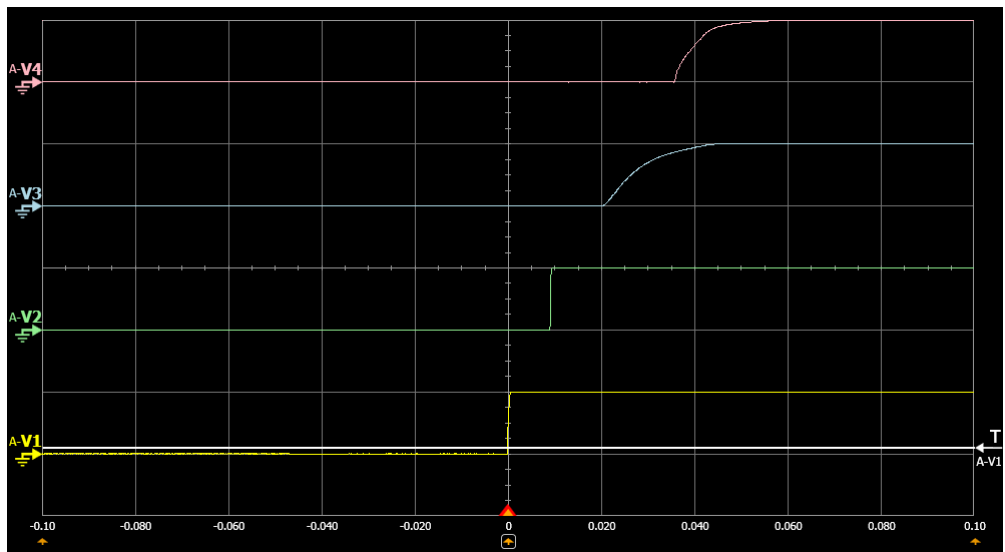
The Run buttons can also be used to stop the application. The square icon indicates the stop action.
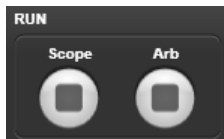
NOTE   You can copy any display image to the clipboard by selecting the **Edit** menu, **Copy Chart Image**.

Save and Export the Display Data

All waveforms in the measurement display can be saved to an internal file or exported to an external .csv file.

To save the Display Data

In the **File** menu, select **Save**. Specify the directory and filename in which you will save the waveform data. All Scope waveform data is saved with a .scp file extension. These Internal files can be loaded or overlayed onto an existing "active" display for comparison purposes.

To Export the Display Data

In the **File** menu, select **Export Data**. This command lets you select the traces to export. Note that the Advanced Power System only contains waveform data in Channel 1.
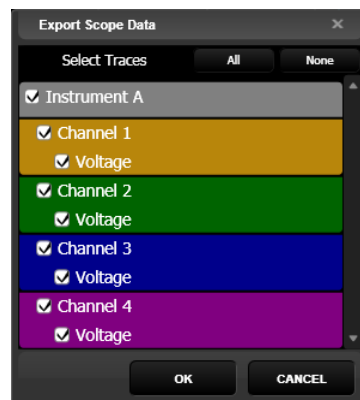
The data from the selected traces is written to a .csv file. This file may be opened using a number of applications such as Microsoft Excel. Each trace is assigned its own column in the file, followed by all of the data points for the trace.

3
Using the Keysight 14585A

This chapter describes how to use the Keysight 14585A software. It describes the four primary functions: scope, data logger, CCDF, and Arb. It also discuses how to trigger the functions, how to obtain detailed measurement information using the markers, and how to export the measurement data.

Additional information on specific features and capabilities of the Keysight 14585A software are included in the built-in help, which can be accessed at any time via the Help menu.

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Controlling the DC Power Analyzer

Click the Instrument Control tab to open the instrument control window. The functions of this window emulate the front panel controls of the Keysight N6705 DC Power Analyzer.

Meter – Displays the meter view. Toggles between single output and multiple output views.

Settings – Displays the settings of the selected output. Toggles between source settings and output delay setting.

Properties – In meter view, displays the meter properties of the selected output. In source settings view, displays the N6705 ratings.

Menu – Displays the instrument command menu.

Back – Returns to the previous view

Select Output 1, 2, 3, 4 – Lets you select an output to control.
                          On, On, On, On – Turns an output on or off.

All On – turns all outputs on.

All Off – turns all outputs off.

Controlling the Advanced and Regenerative Power System

Click the Instrument Control tab to open the instrument control window. The functions of this window emulate the front panel controls of the Keysight N7900 Advanced Power System and RP7900 Regenerative Power System.
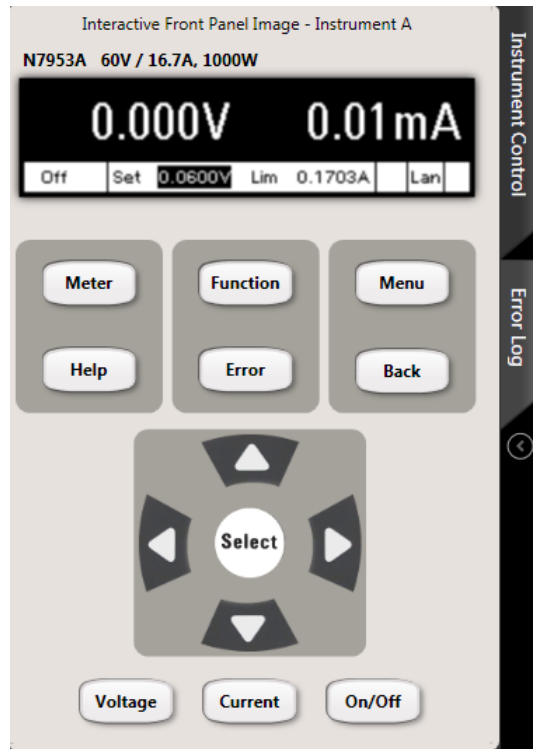
Meter - Displays the meter view. Toggles between current and power measurements.

Help - Accesses information about the displayed instrument control menu.

Function – This key is not active.

Error – Displays any instrument error messages.

Menu - Displays the instrument command menu.

Back - Returns to the previous view.

^ v < > - Use the arrow keys to navigate to the selections in the command menu.

Select - Use this key to make selections in the command menu.

Voltage - Opens the output voltage dialog.

Current - Opens the output current dialog.

On/Off - Turns the output on or off.

Using the Scope Function

Select the Scope button from the top of the window.

Making a Scope Measurement

Step 1. Select the traces (voltage V, current I, or power P) you want to capture in the Output boxes on the bottom of the display. You can also display Formula traces that are calculated from active voltage or current traces.

Note that there is a limit to the number of measurement traces that you can select, depending on the power module.

Step 2. Specify the measurement setup:

Ranges – selects the measurement range. Select the range that is the best fit for your expected measurements.

Offset - offsets the measurement trigger from the horizontal reference point.

Points – lets you specify the number of measurement points (this determines the sample period)

Trigger – lets you specify the trigger source (see "Triggering Measurements and Arbs").

Mode – lets you select the measurement mode: Automatic, Single measurement, or Triggered.

Slope/Level - if you have specified a voltage or current level trigger source, you must also specify the signal slope and level.

Step 3. Click the Run Scope button to start the measurement.

Step 4. Click the Run Scope button again to stop the measurement.

NOTE If you are running an Arb in conjunction with a scope measurement, you can configure the Run Arb button as the scope trigger source. Arm the scope by clicking the Run Scope button. Then click the Run Arb button to start the scope and the Arb.

Step 5. After the measurement is taken, you can use the measurement markers to calculate data from specific areas of the measured waveform. Click Markers and Measurements to display the measurement markers. The Marker Delta measurements (Min, Ave, Max, RMS, Peak-to-peak, Charge/Energy) are calculated on the portion of the waveform between the marker positions. The information under Marker 1 and Marker 2 indicate the location of the markers. Click Setup to select or deselect the measurement items. See "Marker and Display Measurements" for more information.

Step 6. You can use the Grid controls (time/div, autoscale, zoom in, zoom out, etc.) to inspect the measurement in greater detail.

Step 7. You can export selected traces from the display to a .csv file. See "Export the Display Data" for more information.

Using the Data Logger Function

NOTE The Data Logger function is not available on Keysight N6705 mainframes with Option 055 "Delete Data Logger".

Select the Data Logger button from the top of the window.
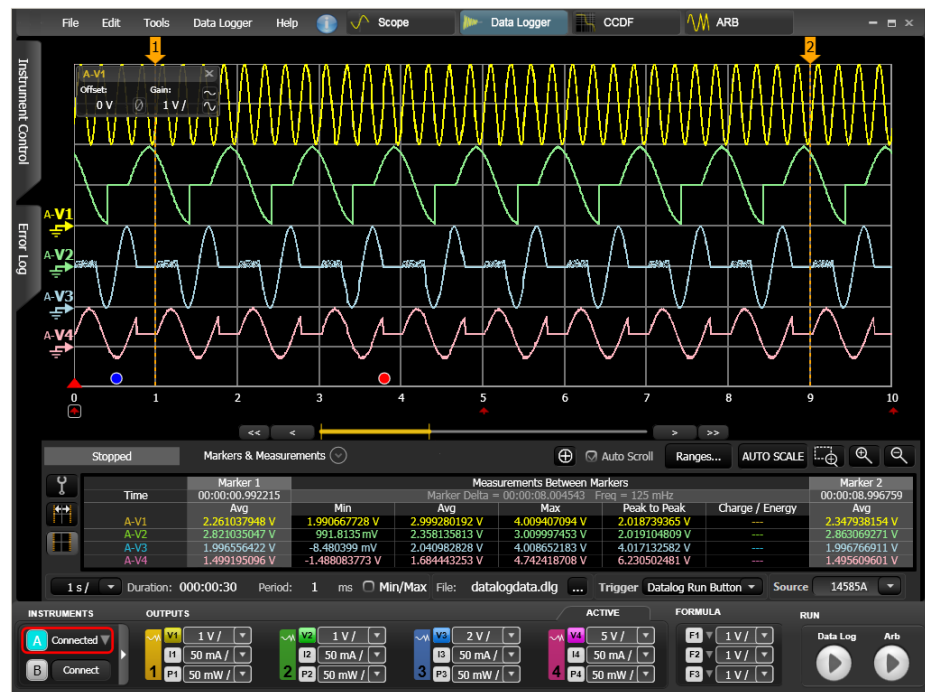
Running the Data Logger

Step 1. Select the traces (voltage V, current I, or power P) you want to capture in the Output boxes on the bottom of the display. You can also display Formula traces that are calculated from active voltage or current traces.

Note that there is a limit to the number of measurement traces that you can select, depending on the power module.

Step 2. Specify the data logger setup:

Ranges – selects the measurement range. Select the range that is the best fit for your expected measurements.

Duration – lets you specify the duration of the data log in hours, minutes, and seconds.

Sample Period – specifies the interval between data samples in milliseconds. This is the integrated sample period.

Log Min/Max - logs the minimum and maximum values of each sample to the data log file in addition to the average value.

Filename – specifies a filename in which to save the data. Data will be logged to this filename the **next** time the data logger runs. It is recommended to save data to a local hard drive.

Trigger – specifies the trigger source (see "Triggering Measurements and Arbs").

Source – specifies the data logger source - either 14585A or N6705x

Step 3. Click the Run Data Log button to start the data logger.

Step 4. Click the Run Data Log button again to stop the data logger.

NOTE	If you are running an Arb in conjunction with the data logger, you can configure the Run Arb button as the data log trigger source. Arm the data logger by clicking the Run Data Log button. Then click the Run Arb button to start the data logger and the Arb.

Step 5. After the data logger is finished, you can use the measurement markers to calculate data from specific areas of the logged data. Click Markers and Measurements to display the measurement markers. The Marker Delta measurements (Min, Ave, Max, Peak-to-peak, Charge/ Energy) are calculated on the portion of the data between the marker positions. The information under Marker 1 and Marker 2 indicate the location of the markers. Click Setup to select the measurement items. See "Marker and Display Measurements" for more information.

Step 6. You can use the Grid controls (time/div, autoscale, zoom in, zoom out, etc.) to inspect the data in greater detail.

Step 7. You can use the Insert Tag button ⊕ to insert event tags (the round objects) to describe specific conditions or events on the datalog.

Step 8. You can export selected traces from the data log to a .csv file. See "Export the Display Data" for more information.

Using the CCDF Function

NOTE	The CCDF and histogram functions only apply to Keysight Models N6781A, N6782A, N6785A, and N6786A and only for current measurements.

Select the CCDF button from the top of the window.

The CCDF or Complimentary Cumulative Distribution function concisely summarizes short and long-term battery drain measurements for analysis and comparison. It is a cumulative distribution of the amplitude versus the frequency (or percent) of occurrence. This is especially useful for analyzing signals that are random over time.

Click the Histogram tab to view the Histogram function.

The histogram function plots the frequency of measurement values in successive numeric intervals of equal size. The data collected in the histogram forms the basis for the CCDF function.
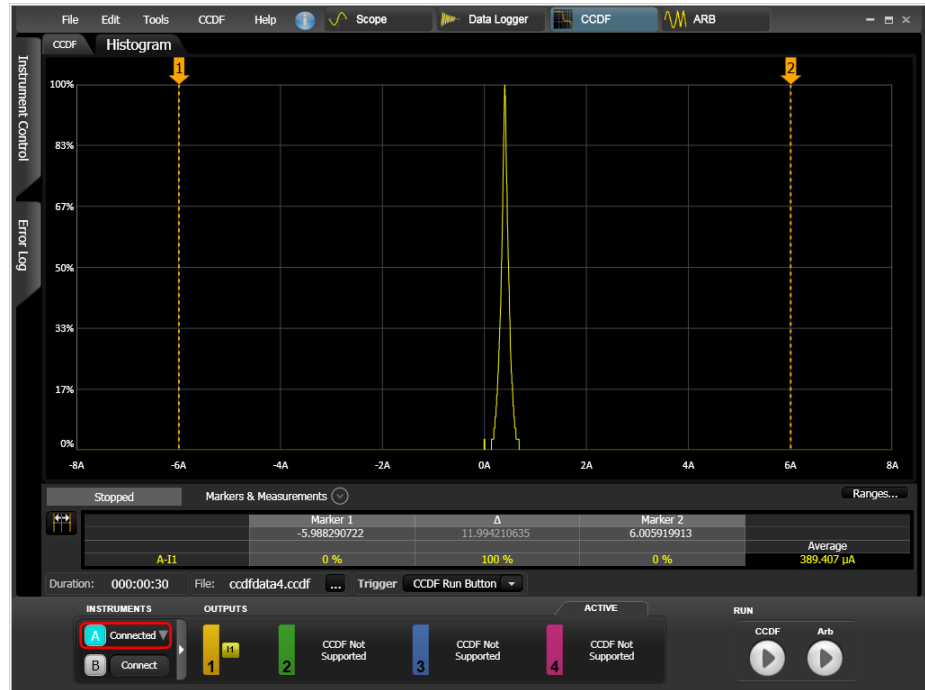
Making a CCDF/Histogram Measurement

Step 1. Select the traces (voltage V, current I, or power P) you want to capture in the Output boxes on the bottom of the display

Step 2. Specify the measurement setup:

Ranges – selects the measurement range. Select the range that is the best fit for your expected measurements. Select Auto if your measurement encompasses multiple ranges.

Duration – lets you specify the duration of the data log in hours, minutes, and seconds.

Filename - specifies the filename to which the data will be saved. It is recommended to save data to a local hard drive.

Trigger – lets you specify the trigger source (see "Triggering Measurements and Arbs").

Properties – summarized the properties that have been specified for the CCDF measurement.

Step 3. Click the Run CCDF button to start the measurement.

Step 4. Click the Run CCDF button again to stop the measurement.

NOTE   If you are running an Arb in conjunction with a CCDF measurement, you can configure the Run Arb button as the CCDF trigger source. Arm the CCDF measurement by clicking the Run CCDF button. Then click the Run Arb button to start the CCDF measurement and the Arb.

Step 5. After the measurement is taken, you can use the measurement markers to calculate data from specific areas of the measured waveform. Click Markers and Measurements to display the measurement markers. The Marker Delta measurements (10%, 1%, 0.1%) are calculated on the portion of the waveform between the marker positions. The information under Marker 1 and Marker 2 indicate the location of the markers. You can select the CCDF range to display data from the combined histogram ranges, only the high range, or only the low range.

Step 6. You can select the Histogram tab to view the histogram data from which the CCDF plot was derived. The Marker Delta measurements are calculated on the portion of the waveform between the marker positions. The information under Marker 1 and Marker 2 indicate the location of the markers. You can select the Histogram range to display data from the combined histogram ranges, only the high range, or only the low range. See "Marker and Display Measurements" for more information.

Step 7. You can export selected traces from the display to a .csv file. See "Export the Display Data" for more information.

Using the Arbitrary Waveform Function

NOTE There is a 10 kHz frequency limit for all arbitrary waveforms. This is the highest frequency available that still provides good output fidelity for each Arb. Also, the 512-point sequence type does not apply to Keysight N7900 Advanced and RP7900 Regenerative Power Systems

Select the ARB button from the top of the window.
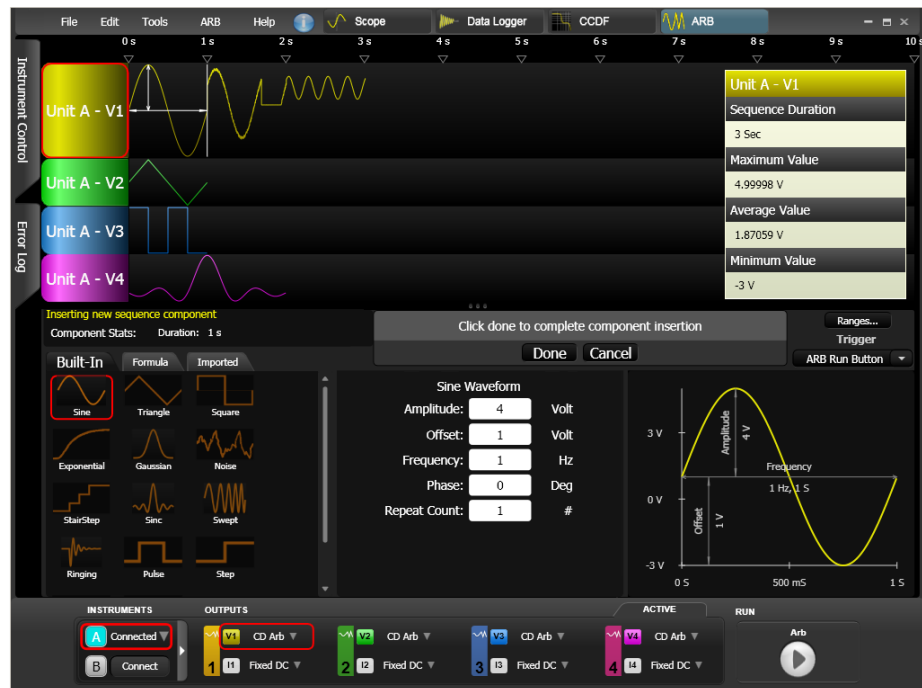
Creating an Arb Sequence from the Built-In Waveforms

Step 1. Select an output function using the V or I button in one of the Output boxes on the bottom of the display.

Step 2. Select the Sequence type, either 64K-point Constant Dwell, 512-point Sequence, or Fixed DC Level.

Step 3. Click the Add button in the Navigation area to start adding sequence components.

The following steps add a sine wave to the sequence.

Step 4. Click the Built-in tab and select the sine wave. Use the scroll bar to display all of the components.

Step 5. You can modify the parameters of the sine wave in the parameter fields in the center.

Step 6. You can view the results of any modification in the Preview area on the right side.

Step 7. When you are satisfied with the edits, click Done in the Navigation area to add the sine wave to the Arb sequence.

Repeat steps 4 - 7 and add a triangle to the sequence.

Step 8. Select the Fixed DC trace on the bottom of the Arb Waveform window and specify a value for the fixed parameter of the output. If a voltage Arb is programmed, the current level is fixed. If a current Arb is programmed, the voltage level is fixed. The diagram on the lower left of the display indicates the range of acceptable values for the fixed voltage or current parameter.

Step 9. Use the Navigation controls to edit the sequence. The arrow buttons select the component. Move Left moves the component one position to the left. Move Right moves the component one position to the right. Add adds a new component. Modify lets you modify the selected component. Delete deletes the selected component.

Step 10. Specify the Sequence setup:

Sequence Repeat – lets you specify the number of times the sequence repeats: select Continuous to run the sequence continuously, or enter a specific repeat count in the Count field.

Ranges – lets you specify the source ranges.

Trigger – lets you specify the trigger source (see "Triggering Measurements and Arbs").

Step 11. Click the Run Arb button to start the Arb. Click the Run Arb button again to stop the Arb.

You can save some or all Arb waveform sequences that were created. See "Save and Load the Waveforms" for more information. You can also add waveform components from a formula or from an imported waveform file. "See Creating a Formula Waveform" and "Importing a Waveform File" for more information.

Save and Load the Waveforms

Saving the Waveform

Saved waveform information includes all Arb waveform sequences that were created. You can select which waveforms to save.

Step 1. Select the File menu from the top of the main window. Then select Save Waveform to save the selected waveform.

The Save Waveform command applies to the Arb function only. You can select any or all waveforms that were created in the Arb function window by checking the appropriate waveform in the "Select Traces" column.

Step 2. Select a directory and filename in which to save the waveform data. File format extensions include:

".wfpk" for Arb waveform sequences

Loading a Waveform

Loading waveforms differs from importing waveforms. You can only load Arb waveform sequences that have been previously saved using the Save Waveform command. Waveforms are loaded directly into the target

output channel.

Importing waveforms, on the other hand, places any number of individual internal or external waveform components into the Imported folder. From there they can be renamed, edited, and added to an Arb sequence. See Import a Waveform File.

Step 1. Select the File menu from the top of the main window. Select Load Waveform to load a previously saved Arb waveform sequence.

The Load Waveform command applies to the Arb function only.

Step 2. Select the directory and filename to load.

Step 3. Select the waveforms from the loaded file and assign them to an output channel.

The Arb waveforms can be assigned to an output channel, then run. Assign a waveform to an output channel by dragging it from the "Waveforms loaded from file" column to the target output channel. You can only output a voltage Arb or a current Arb on a given channel; not both.

Creating a Formula Waveform

The following steps create three waveforms using formulas: superimposed noise, masked segment, and absolute value.

Step 1. Select an output function using the V or I button in one of the Output boxes on the bottom of the display.

Step 2. Select the Sequence type, either 64K-point Constant Dwell, 512-point Sequence, or Fixed DC Level.

Step 3. Click the Add button in the Navigation area to start adding sequence components.

The following steps superimpose noise on a sine wave.

Step 4. Click the Formula folder, select the sin(x) formula, set the duration to 1.5 seconds, and press Preview.

sin(2*PI*x)

Step 5. Select the + sign, then select the Random formula and press Preview.

sin(2*PI*x)+random(0.5)

The following step moves the part of the waveform between 0.15 s and 0.3 s up 1 volt.

Step 6. In the Formula folder, select the + sign, then select the MaskOn formula. Change the range of the MaskOn formula from 0.15 s to 0.3 s and press Preview.

sin(2*PI*x)+random(0.5)+MaskOn(x,0.15,0.3)

The following step applies the absolute value function to the formula.

Step 7. In the Formula field, move the text cursor all the way to the left of the formula string and type "abs(". Move the text cursor all the way to the right of the formula string and add another ")" as shown below. Press Preview.

abs(sin(2*PI*x)+random(0.5)+MaskOn(x,0.15,0.3))

Step 8. In the Navigation area, click Done to add the formula components to the selected output channel.

Step 9. Select the Fixed trace on the bottom of the Arb Waveform window and specify a value for the fixed parameter of the output. If a voltage Arb is programmed, the current level is fixed. If a current Arb is programmed, the voltage level is fixed. The diagram on the lower left of the display indicates the range of acceptable values for the fixed voltage or current parameter.

Importing a Waveform File

The following steps import a waveform file into the Arb sequence.

Step 1. Select an output function using the V or I button in one of the Output boxes on the bottom of the display.

Step 2. Select the Sequence type, either 64K-point Constant Dwell, 512-point Sequence, or Fixed DC Level Constant Dwell Arb, an Arb Sequence, or Fixed.

Step 3. Click the Add button in the Navigation area to start adding sequence components.

Step 4. Click the Import folder and select New. Then navigate to and select a file to import. A thumbnail of the imported component will appear in the Imported folder. A Preview of the component will also appear in the Component Preview area.

NOTE	Scope traces can be directly placed into the Imported folder. Go to the Scope function and select a trace from the display. In the Scope menu, select **Save Trace to Arb**

Step 5. You can modify the file by selecting Modify. This displays the Modify Waveform window.

Step 6. When you are satisfied with the edits, click Done in the Navigation area to add the waveform to the Arb sequence.

Step 7. Select the Fixed trace on the bottom of the Arb Waveform window and specify a value for the fixed parameter of the output. If a voltage Arb is programmed, the current level is fixed. If a current Arb is programmed, the voltage level is fixed.

Triggering Measurements and Arbs

There are a number of ways to trigger measurements and Arbs. Start by selecting a trigger source. Trigger selections are located in the drop-down **Trigger** control of all functions.

The Run buttons

The following Run buttons can be selected to trigger a measurement or an Arb, depending on which function is presently selected:

The Run Arb button can also be used to trigger a measurement for the Scope, Data Logger, and CCDF functions.

Note that the Keysight N6705 front panel [Arb Run/Stop] button can also be selected as the trigger source for the Arb function. After you select the N6705 Arb Button as the N6705 trigger source, you must also press the front panel [Arb Run/Stop] button to start the Arb.

Voltage or Current Levels

The Scope function lets you select a voltage or current level as the trigger source. The voltage or current level from any input channel on any connected mainframe can be selected as the trigger source. You can select only ONE current or voltage level.

A-Current 1 for example, selects a current level on channel 1 on the "A" mainframe.

Note that after specifying a voltage or current trigger level as the trigger source, you must specify the actual trigger level on the display by moving the trigger trace up or down. Also, the **Slope** control specifies whether a rising edge or a falling edge generates the trigger when the signal edge intersects the voltage or current level.

BNC Input

Located under "External" in the drop-down Trigger control.

The BNC input on the rear panel of the Keysight N6705 can be selected as the trigger input. This selection is not available on Keysight N7900 Advanced and RP7900 Regenerative Power Systems. This requires a 5V low-true trigger signal for a minimum of 10 microseconds.

BNC Input with Trigger Out

Located under "External" in the drop-down Trigger control.

This is a special configuration only used when trigger signals must be synchronized across multiple mainframes. This selection is not available on Keysight N7900 Advanced and RP7900 Regenerative Power Systems.

Digital Port Pin <n>

Located under "External" in the drop-down Trigger control.

This selects one of the seven digital port pins as the trigger source. This does not apply to the N6705 Arb function. These pins require a 5 V low-true trigger signal for a minimum of 10 microseconds.

Marker and Display Measurements

Select Markers & Measurements at the bottom of the Scope, Data Logger, and CCDF display area.

Two vertical markers are available for making precise measurements on portions of the waveform traces. Use the mouse to select and move the markers on the display. The marker positions and distance between the markers is displayed in the Marker column. The marker measurements are displayed in the columns that appear in between the Marker columns.

Scope and Data Logger measurements

Measurements Between Markers

Minimum	The minimum value of the waveform segment between markers or the portion of the waveform that is displayed.
Average	The average (dc) value of the waveform segment between markers or the portion of the waveform that is displayed. The number of data points upon which the measurement is based is determined by the sample rate.
Maximum	The maximum value of the waveform segment between markers or the portion of the waveform that is displayed.
RMS (not available on Data Logger)	The RMS value of the waveform segment between markers or the portion of the waveform that is displayed. The number of data points upon which the measurement is based is determined by the sample rate
Peak to Peak	The peak to peak value of the waveform segment between markers or the portion of the waveform that is displayed.
Charge(Ah/ Energy(Wh)	For current traces, this integrates the Amp/hours of energy between markers or the portion of the waveform that is displayed. For power traces, this integrates the Watt/hours of energy between markers or the portion of the waveform that is displayed.

Charge(C)/ Energy(J)	For current traces, this integrates the Coulombs/second of charge between markers or the portion of the waveform that is displayed.
	For power traces, this integrates the energy in Joules between markers or the portion of the waveform that is displayed.

CCDF/Histogram measurements

Measurements Between Markers

Δ	Indicates the time span in seconds between the markers.
% between markers	Indicates the percent occurrence of the measurement values between the markers.

Measurements from entire display

10%	Indicates the current value at the horizontal 10% decade.
1%	Indicates the current value at the horizontal 1% decade.
.1%	Indicates the current value at the horizontal 0.1% decade
Average	Indicates the average current of all measurement values

Exporting the Display Data

The export data function lets you information from selected measurement traces to a .csv file.

Step 1. Select the File menu from the top of the main window. Then select Export Data.

The Export Data command applies to the Scope, Data Logger, and CCDF functions only.

Step 2. Select the data traces that your wish to export.

Step 3. Select a directory and filename in which to save the display data. File format extensions include:

".csv" for comma-separated values

The saved .csv file may be opened using a number of applications such as Microsoft Excel or a text editor. It can also be imported into the Arb Waveform function. The first row in the file is the title. The second row indicates the sample rate in seconds for collected data. The first column indicates the time of the data points. Each trace is assigned a subsequent column in the file, with a column label followed by all of the data points for each waveform.

4
Reference Information

This chapter contains reference information about the menu commands, toolbars, and navigation controls. It describes the built-in waveform parameters and how to obtain and install the Keysight 14585A software license.

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Command Menu

File menu

Load	Applies to the Scope, Data Logger, and CCDF functions only. Loads a display that was previously saved.
Save	Applies to the Scope and CCDF functions only. Saves the present display to a file.
Load Waveform	Applies to the Arb function only. Loads an Arb waveform sequence that was previously created and saved.
Save Waveform	Applies to the Arb function only. Saves the Arb waveforms that were created.
Save Workspace	Apples to all functions. Saves all function settings, connection settings, and Arb selections to a file.
Load Workspace	Apples to all functions. Loads all function settings, connection settings, and Arb selections that were previously saved.
Export Data	Apples to the Scope, Data Logger, and CCDF functions only. Selects the traces to export. The data from the selected traces is written to a CSV file.
Print	Displays a preview of the waveform output. The preview can then be sent to the specified printer.
Exit	Exits the application.

Edit menu

Copy Chart Image	Copies the display content to the clipboard.
Copy Chart Image (white background)	Copies the display content to the clipboard with a white background.

Tools menu

Configure IO	Configures the interface that will communicate with the instrument.
Instrument Control	Controls the selected instrument. Displays the front panel view as seen on the actual instrument.
Trace Settings	Lets you change the trace names and colors.
User Preferences	Configures the measurement preferences and IO search parameters.

Scope menu

Clear Display	Clears all scope measurement data.
Deselect All Traces	Removes all selected traces from the left side of the display.
Measurement Ranges	Specifies a measurement range for the output.
Save Trace to Arb	Saves a selected scope trace to the Arb Import tab.
Properties	Displays the scope properties that have been set.

Data Logger menu

Clear Display	Clears all logged data.
Deselect All Traces	Removes all selected traces from the left side of the display.
Measurement Ranges	Specifies a measurement range for the output.
Edit Event Tags	Add/Edit/Delete event tag labels and categories to the datalog.
Convert to CCDF	Converts the opened datalog traces to CCDF.
Properties	Displays the data logger properties that have been set.

CCDF menu

Clear Display	Clears all CCDF/Histogram data.
Deselect All Traces	Removes all traces that have been selected on the bottom of the display.
Measurement Ranges	Specifies a measurement range for the output.
Properties	Displays the CCDF properties that have been set.

ARB menu

|	
Clone Trace	Copies the selected trace to another channel or moves the trace to the alternate function of the same channel.
Clear Display	Clears all Arb sequences.
Source Ranges	Specifies an output range for the output.
Run button	Specifies the output state and Arb data source when the Arb runs.
Statistics	Displays all statistics about the Arb Waveform function.

Help menu

Help	Displays the built-in Help in a separate window.
About	Displays information about the selected DC Power Analyzer mainframe and the installed power modules.
i	Displays the same information as **Help About**.

Error Log

Click on the **Error Log** tab to list all the application errors that occur.
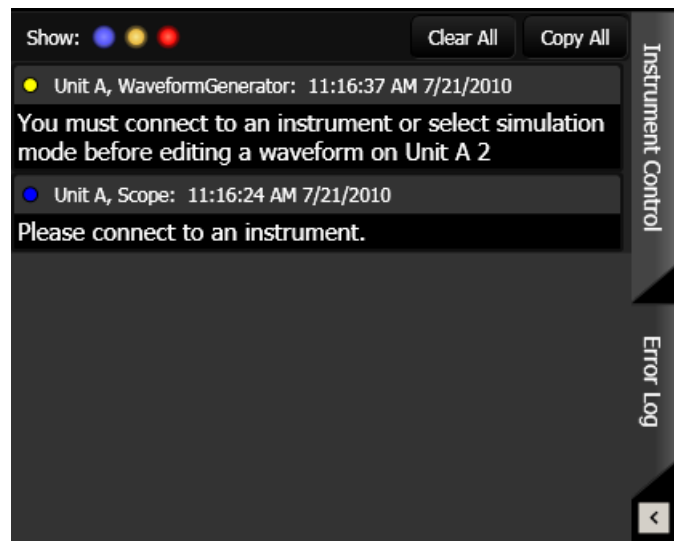
Errors are categorized as follows:

- Blue - indicates a low impact error, usually providing instructions on what to do to continue.

- Yellow - indicates a medium impact error, such as the value entered is outside the acceptable parameter range.

- Red - indicates a severe impact error, such a when connectivity to an instrument has been lost.

Clicking on the colored **Show** ● ● ● buttons includes or excludes the error category from the error log.

Clear All clears all errors from the error log.

Copy All copies all errors to the Windows clipboard.

Toolbars

Function Toolbar

Scope - lets you capture and display output waveforms.

Data Logger - lets you log output voltage and current data for an extended time period.

CCDF - lets you concisely summarize short and long-term battery drain measurements for analysis and comparison. The CCDF function is not available on Keysight N7900 Advanced Power Systems.

ARB - lets you create complex waveforms based on combinations of basic waveforms using an interactive editor.

Sequence Toolbar

The Sequence toolbar is located in the center of the Arb Waveform window.

Browse controls (**<<, <, >, >>**)

Browse controls let you traverse the sequence to select (activate) a component for editing. Browse controls do not reposition the components in the sequence.

Edit Controls (**Move Left, Add, Modify, Delete, Move Right**)

Edit controls let you move and edit and the selected component. **Move Left** moves the selected component one position to the left. **Move Right** moves the selected component to the right. **Add** appends or adds a component to the end of the sequence. **Modify** lets you edit the selected component. **Delete** deletes the selected component.

Sequence Repeat specifies how many times the entire sequence will repeat.

Markers Toolbar

The Markers toolbar is located on the left of the marker area in the Scope and Data Logger windows.

Lets you select the measurement items.

Resets the markers to the edges of the display.

Removes the markers. Calculations will be based on the visible data in the display.

Navigation controls

Mouse

Click and hold down the mouse on any area of the display. The display moves horizontally or vertically as you move the mouse.

Wheel

Moving the mouse wheel changes the horizontal time/division of the display. If one of the traces has been selected by clicking on it, moving the wheel changes the vertical gain of the trace.

Zoom Controls

The Zoom controls are located in the lower right of the Scope and Data Logger windows.

AutoScale scales the display so that all traces fit into the display area.

☐ zooms in on the selected area of the display. Use the mouse to draw a rectangle of the zoom area.

+ zooms in on the center of the display.

– zooms back out of the zoom area.

Data Bar

The Data bar is located in the lower center of the Scope and Data Logger windows.

The yellow part indicates the portion of the data that is visible on the display.

The gray part represents the data that is not visible. Note that when you get to the end of the data, you can move all of the data off the display.

Browse controls (<<, <, >, >>) let you traverse the data.

Built-in Waveforms

NOTE	There is a 10 kHz frequency limit for all arbitrary waveforms. This is the highest frequency available that still provides good output fidelity for each Arb.

Exponential	Start Amplitude – the amplitude before the waveform starts
	End Amplitude – the final amplitude of the waveform
	Delay – the delay after the trigger is received but before the waveform starts
	Rise Time – the transition time from the start amplitude to the end amplitude
	Time Constant – the time constant of the exponential curve
	Repeat Count - the number of times the waveform repeats
Gaussian	Peak Amplitude – the peak amplitude of the waveform
	Offset – the offset from zero
	Peak Positive Time – the time from the start to the peak amplitude
	Half Width Time – the width of the waveform at half of the peak amplitude
Noise	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Frequency – the frequency of the waveform
	Start Time – the start time of the waveform
	Duration – the duration of the waveform
Pulse	Start Amplitude – the amplitude before and after the pulse
	End Amplitude – the amplitude of the pulse
	Delay – the delay after the trigger is received but before the pulse starts
	Pulse Time – the time (width) of the pulse
	End Time – the time the output stays at the start amplitude after the pulse
	Repeat Count - the number of times the pulse repeats
Ramp	Start Amplitude – the amplitude before the ramp
	End Amplitude – the amplitude after the ramp
	Delay – the delay after the trigger is received but before the ramp starts
	Ramp Time – the time that the output ramps up
	End Time – the time the output remains at the end amplitude
	Repeat Count - the number of times the waveform repeats

Ringing	Delay – the delay after the trigger is received but before the waveform starts
	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Frequency – the frequency of the waveform
	Decade – the duration of the ringing in decades
Sinc	Peak Amplitude – the peak amplitude of the normalized waveform
	Offset – the offset from zero
	Peak Position Time – the time until the peak position of the waveform
	Zero Crossing Frequency – the zero crossing frequency of the waveform
Sine	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Frequency – the frequency of the sine wave
	Phase – the start phase angle of the sine wave
	Repeat Count – the number of times the sine wave repeats
Square	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Frequency – the frequency of the square wave
	Duty – the duty cycle of the square wave
	Phase – the start phase angle of the square wave
	Repeat Count – the number of times the waveform repeats
Stair Step	Start Amplitude – the amplitude before the staircase starts
	One Step Amplitude – the amplitude of each step
	Number of Steps – the total number of staircase steps
	Delay – the delay after the trigger is received but before the waveform starts
	Stair Step Time – the time to complete all of the steps
	End Time – the time the waveform stays at the final amplitude
	Repeat Count – the number of times the waveform repeats
Step	Start Amplitude – the amplitude before the step
	End Amplitude – the amplitude of the step
	Delay – the delay after the trigger is received but before the step occurs
	End Time – the time the output stays at the end amplitude
Swept	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Start Frequency – the start frequency of the waveform
	End Frequency – the end frequency of the waveform
	Duration – the duration or length of the waveform

Trapezoid	Start Amplitude – the amplitude before and after the trapezoid
	Delay – the delay after the trigger is received but before the trapezoid starts
	Peak Amplitude – the peak amplitude of the trapezoid
	Start Time – the time before the trapezoid ramps up
	Rise Time – the time that the trapezoid ramps up
	Peak Time – the time at the peak amplitude
	Fall Time – the time that the trapezoid ramps down
	End Time – the time the output stays at the start amplitude after the trapezoid
	Repeat Count – the number of times the waveform repeats
Triangle	Amplitude – the amplitude or peak value
	Offset – the offset from zero
	Frequency – the frequency of the waveform
	Phase – the start phase angle of the waveform
	Repeat Count – the number of times the waveform repeats

Licensing

The Keysight 14585A software requires that each connected Keysight N6705 DC Power Analyzer and N7900 Advanced Power System has a License key installed in it. You can order a license key with the instrument at purchase (order N6705 option 056, or 14585A) It can also be purchased separately as N6705U Option 056, or 14585A.

One license key is required for each instrument. The license key is based on the instrument's serial number and is installed into the specific instrument for which it was ordered. Once a license key has been redeemed, it cannot be transferred to a different instrument.

Obtaining the License Key

Step 1. To obtain a Keysight 14585A license key you will need:

a. The Keysight 14585A Control and Analysis Software. (This software is free to download and use for a specific time.)

b. The serial number of the instrument for which you will be obtaining the license key. The serial number is a 10-character string in the format MY12345678. You can obtain the serial number as follows:

- Look at the serial number tag on the rear panel of the unit.
- On the front panel of the Keysight N6705, press Settings, then Properties.
- On the front panel of the Keysight N7900 and RP7900, press Menu, then navigate to System\About.
- Query the power analyzer with the *IDN? Command.

c. Your email address.

d. Your Order number and Certificate number. These appear in the upper right cornet of the Software Entitlement Certificate that was provided when you ordered the Keysight N6705 -056 or 14585A.

Step 2. To get the license key. log onto the website https://software.business.keysight.com/asm and follow the on-screen directions. These include:

a. Creating a user account, if one is not already set up.

b. Entering your Order and Certificate number
   (these appear in your Software Entitlement Certificate).

c. Entering the Host instrument's 10-character serial number
   (this is located on the rear panel of the instrument).

d. Selecting the software license for the instrument.

When you have completed the license request, a license key will be sent to your email. When received, refer to "Installing the License Key".

Installing the License Key

A license key was emailed to you after you completed the procedure under "Obtaining the License Key".

To Install the license key using the Keysight 14585A software:

Step 1. Run the Keysight 14585A software and select Configure IO in the Edit menu.

Step 2. From the list, select the instrument that you wish to license. Click on the License button to display the Licensing dialog.

Step 3. Enter the license key from the email into the License Key field and click Enter.

Step 4. The license is now installed. Use a black permanent marker and check the "[ ] Add License for 14585A Control and Analysis Software" box on the Options label on the back of your instrument.

To Install the license key using the Keysight N6705 DC Power Analyzer:

Step 1. Turn on the DC Power Analyzer and select Utilities in the front panel Menu.

Step 2. Scroll to Administrative Tools and log in (refer to the Keysight N6705 User's Guide for details).

Step 3. When logged in, select Install Options.

Step 4. In the Option drop-down box, select "056 – Enable 14585A Software"

Step 5. Use the keypad to enter the license key from the email into the Key field and click Enter.

Step 6. The license is now installed. Use a black permanent marker and check the "[ ] Add License for 14585A Control and Analysis Software" box on the Options label on the back of your instrument.

To Install the license key using the Keysight N7900 Advanced and RP7900 Regenerative Power Systems:

Step 1. Turn on the Advanced Power System and press the Menu key to access the front panel menu.

Step 2. Navigate to System, then Admin and log in (refer to the Keysight N7900 Operating Guide for details).

Step 3. When logged in, select Options.

Step 4. In the Option drop-down box, select "056 – Enable 14585A Software"

Step 5. Use the keypad to enter the license key from the email into the Key field and click Enter.

Step 6. The license is now installed. Use a black permanent marker and check the "[ ] Add License for 14585A Control and Analysis Software" box on the Options label on the top of your instrument.

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