

VI Logger

Getting Started with VI Logger

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Contents

About This Manual

Conventions	ix
Related Documentation.....	x

Chapter 1

Using VI Logger

Overview.....	1-1
VI Logger Features.....	1-2
Using VI Logger VIs in LabVIEW	1-4
Checking Your System Requirements	1-4
Installing Your Hardware	1-4
Installing Your VI Logger Software	1-4
Configuring and Testing Your Hardware	1-4

Chapter 2

Creating and Running a VI Logger Task

Configuring, Modifying, and Testing Your Measurement Device.....	2-1
Using an RDA Device with VI Logger	2-1
Creating Virtual Channels	2-2
Modifying Virtual Channels.....	2-2
Testing Virtual Channels.....	2-2
VI Logger Basics	2-3
Creating and Configuring Your Task Using VI Logger.....	2-3
Setting Up the Virtual Channels in Your Task to Acquire and Log Data.....	2-5
Setting the Logging and Data Acquisition Conditions.....	2-6
Using the Default Acquisition and Logging Settings for Your Task	2-6
Using Conditional Acquisition for Your Task	2-7
Using Conditional Logging for Your Task	2-9
Using Channel Events for Logging.....	2-10
Using Both Conditional Acquisition Triggers and Conditional Logging for Your Task.....	2-14
Setting Up Network Publishing to View Your Data from Another Computer.....	2-15
Creating Calculated Channels	2-15
Modifying Your Task	2-17
Duplicating Your Task.....	2-18
Deleting Your Task and Data	2-18

Running Your Task	2-18
Stopping Your Task.....	2-19
Viewing Your Data.....	2-19
Viewing Your Data Graphically	2-20
Monitoring Your Acquired Data.....	2-21
Viewing Your Logged Data	2-21
Plotting Your Data	2-22
Zooming In or Out on Your Data.....	2-22
Modifying Your Plots or Display View	2-23
Modifying the Legend.....	2-25
Determining Time Difference, Frequency, and Values Using Plot Cursors	2-25
Printing Your Data	2-26
Exporting Your Data	2-27
Setting Advanced Export and Programming Options.....	2-28
Loading a User-Defined Export Template	2-29
Loading an HTML Export Template	2-29
Modifying the Template	2-30
Variables	2-30
Export Template Examples	2-34
Creating a New Database	2-35
Compact a Database	2-36
Rename a Database	2-36
Delete a Database.....	2-36
Exporting a Task to Another Computer	2-36
Exporting a Task	2-36
Importing a Task	2-37
Setting Up Your Destination Computer for Remote Access	2-37

Chapter 3

Controlling Your Task Programmatically Using LabVIEW

Executing a Task Using the VI Logger VIs	3-1
Using Easy VI Logger VIs.....	3-2
Using Intermediate VI Logger VIs	3-2
Using Advanced VIs	3-3
Executing a Task Using the VI Example Logger VIs.....	3-3
Reading Historic Data Using the VI Logger Data VIs.....	3-3
Using the Easy VI Logger Reader Data VI.....	3-3
Using the Intermediate VI Logger Reader VIs	3-3
Using the Advanced VI Logger Reader VIs	3-3
Using VI Logger Reader Example VIs	3-4

Appendix A
Math Expression Editor Function Descriptions

Appendix B
Setting Up an Event E-mail

Appendix C
Technical Support Resources

Glossary

About This Manual

Use this Getting Started guide as a resource to using VI Logger, from installing software and hardware to executing and analyzing data logging data.

Conventions

The following conventions appear in this manual:

[]

Square brackets enclose optional items—for example, [response].

»

The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a tip, which alerts you to advisory information.



This icon denotes a note, which alerts you to important information.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.

bold

Bold text denotes items that you must select or click on in the software, such as menu items and dialog box options. Bold text also denotes parameter names, controls, and buttons on the front panel, dialog boxes, sections of dialog boxes, menu names, and palette names.

italic

Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text that is a placeholder for a word or value that you must supply.

monospace

Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and code excerpts.

monospace bold

Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also emphasizes lines of code that are different from the other examples.

monospace italic Italic text in this font denotes text that is a placeholder for a word or value that you must supply.

Related Documentation

The following documents contain information that you might find helpful as you read this manual:

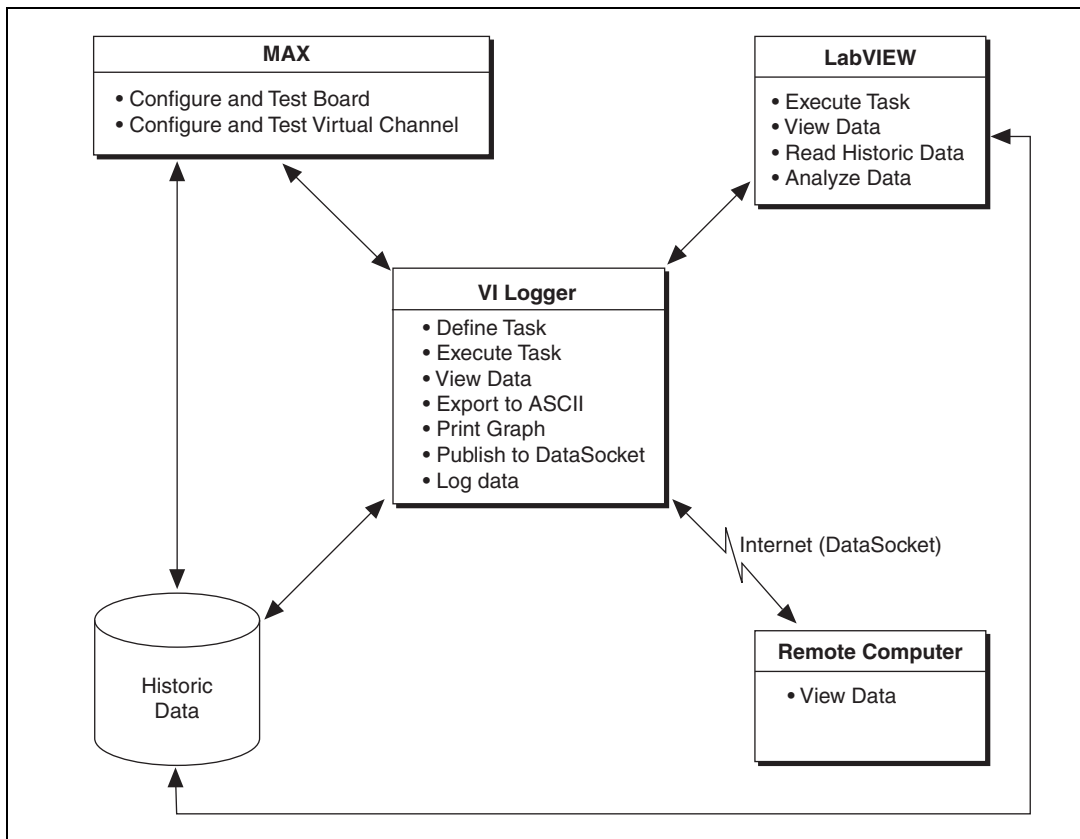
- *VI Logger Help*, available by selecting **Help»VI Logger** in LabVIEW
- *LabVIEW Help*, available by selecting **Help»Contents and Index**
- *Measurement & Automation Explorer Help*, available by selecting **Help** in MAX
- The getting started or user manuals for the devices you use

Using VI Logger

VI Logger equips you with the necessary software tools to define and execute a data logging task. With VI Logger, you can view real-time data, share data, and browse and manage historical data. Using VI Logger in Measurement & Automation Explorer (MAX), and features such as triggered acquisition, event detection, and actions and calculated channels, you can define advanced tasks without any programming. Using LabVIEW and the VI Logger VIs, you can execute a task, view live data, browse historical data, and build logging applications using all of the advanced programming capabilities of LabVIEW.

Overview

VI Logger provides dialog boxes to configure data logging tasks. When the task runs, acquired data can be displayed in a temporary window with the task, and logged data is stored internally. See the following figure for an overview of how VI Logger interacts with other software.



A VI Logger task can run in a stand-alone mode from MAX or as part of an application in LabVIEW. A VI Logger task controls data acquisition (DAQ) and logging. With VI Logger, you can customize start and stop conditions for acquisition. The VI Logger task also logs data for one or more channels. After logging data, you can view the data for each time the task is run. You can view data from each executed task.

Chapter 2, *Creating and Running a VI Logger Task*, describes how to create your VI Logger task in MAX. Chapter 3, *Controlling Your Task Programmatically Using LabVIEW*, describes how to control a logging task from LabVIEW.

VI Logger Features

VI Logger helps you log data from your National Instruments DAQ devices. In order to set up the logging system, you first set up the measurement system. You can configure the logging system with

configuration dialog boxes. Refer to Chapter 2, *Creating and Running a VI Logger Task*, for information about the measurement system components that you need to configure and instructions to set up and use a VI Logger task.

A VI Logger task requires the following three pieces of information:

- Task name
- DAQ measurement device
- One or more virtual channels to acquire and log data

To see these three pieces, navigate through the MAX hierarchy. VI Logger tasks are listed under the VI Logger Tasks category. DAQ virtual channels are organized under Data Neighborhood and DAQ devices are stored under Devices and Interfaces.

You can further define a task by defining the following additional options:

- Per-channel scan rate
- Start and stop conditions for your task
- Events
 - Detection (high, low, outside/inside range)
 - Action (turn logging on/off, write analog output value, write to digital line, pop-up message, send an e-mail, and make sound)
- Calculated channels
- Data publishing to DataSocket

Once you have defined a task, you can easily execute it and view the data using VI Logger. With the calculated channels feature, you can perform mathematical functions on virtual channels and log these calculated channels. With DataSocket publishing, while logging a task, you can publish your data over the Internet and retrieve and view the data on a remote computer. When a task is finished, you can select all or some of the data and export the data to a text file from any specified task run. This text file can be read by spreadsheet programs or by a Web browser if you export data using an HTML template. Refer to the *Loading an HTML Export Template* section in Chapter 2, *Creating and Running a VI Logger Task*, for more information about using an HTML template to format exported data.

Using VI Logger VIs in LabVIEW

You can add functionality to VI Logger by using the LabVIEW VI Logger VIs, to execute data logging tasks and retrieve historical data, in conjunction with other LabVIEW VI libraries. For example, use the mathematical and analysis functions in LabVIEW to perform real-time analysis.

Checking Your System Requirements

Before you unpack and install your VI Logger software kit, make sure you have the following necessary system requirements to run this system:

- Windows 2000/NT/Me/9x
- DAQ device—VI Logger works with E Series, NI 435X, and NI 611X devices

Installing Your Hardware

For instructions for installing your hardware, refer to your hardware installation document.

Installing Your VI Logger Software

To install VI Logger, insert the VI Logger CD in your CD-ROM drive, and follow the instructions that appear on your screen. Click **Finish** when the installation is complete. You can then access the VI Logger utility through MAX. See Chapter 2, *Creating and Running a VI Logger Task*, for more detailed instructions on using VI Logger.

Configuring and Testing Your Hardware

Once you have installed your hardware, configure and test it using the instructions contained in your hardware installation guide or user manual.

Creating and Running a VI Logger Task

This chapter explains how to configure and run a task using VI Logger and how to view or export the resulting data.

Configuring, Modifying, and Testing Your Measurement Device

Before you create a VI Logger task, you should configure and test at least one measurement device and one virtual channel to verify the operation of your data logging hardware. While most DAQ devices that are supported by VI Logger are plug and play, you should make sure that they are set up correctly. In the **Devices and Interfaces** category of MAX, check to see if your device is listed. Modify and test the device by selecting it and using toolbars supplied with the device.



Note If you have a plug and play device and it does not appear under Devices and Interfaces in MAX, press <F5> to refresh the list of devices. If it still does not appear, then refer to the installation instructions for the NI-DAQ board.

Using an RDA Device with VI Logger

If you want to use a remote device access (RDA) device, VI Logger supports E Series, NI 435X, and NI 611X devices, which you can access directly on your computer or via the RDA server for a device. The RDA server is documented in detail in your device user manual.

There are certain limitations to using an RDA device with VI Logger. If you are using an RDA device, it is essential that the system clocks of the client and server computers are synchronized. If the client clock is ahead of the RDA server clock, the data will appear to be old data. If the RDA server clock is ahead of the client clock, the client will not be able to display any data until its clock catches up to the time that the data started being logged according to the RDA server computer. Also, if you use an RDA device with VI Logger, any action involving digital lines will not work.

If your device does not support plug and play or if you are using a device across the Internet as an RDA device, then you need to register and configure it manually on your computer. Refer to the instructions supplied with your DAQ device for information about installing and configuring an RDA on your computer.

Creating Virtual Channels

Before you create a VI Logger task, you need to first create a virtual channel and test it. Complete the following steps to create the virtual channels to use in your data logging task.

1. Launch the **Measurement & Automation Explorer**.
2. In the MAX configuration tree, right-click **Data Neighborhood** and select **Create New** from the pop-up menu.
3. The Create New Channel wizard opens. Follow the wizard instructions to create your new virtual channel.

Modifying Virtual Channels

Complete the following steps to modify a virtual channel.

1. In the configuration tree of MAX, right-click a virtual channel under **Data Neighborhood**.
2. Select **Properties**.
3. Make any modifications necessary in the **Properties** window that appears.
4. Select **OK** when you are finished.

Testing Virtual Channels

The Virtual Channel Test Panels show actual readings so you can directly control the different channels you have configured. Complete the following steps to test the virtual channels.

1. In the configuration tree of MAX, right-click a virtual channel under **Data Neighborhood**.
2. Select **Test**.
3. View the readings and change any parameters in the **Virtual Channel Test Panels**.
4. Click **Close** when you are finished.



Note For information on panel items or buttons, right-click an item and select **What's This?**

VI Logger Basics

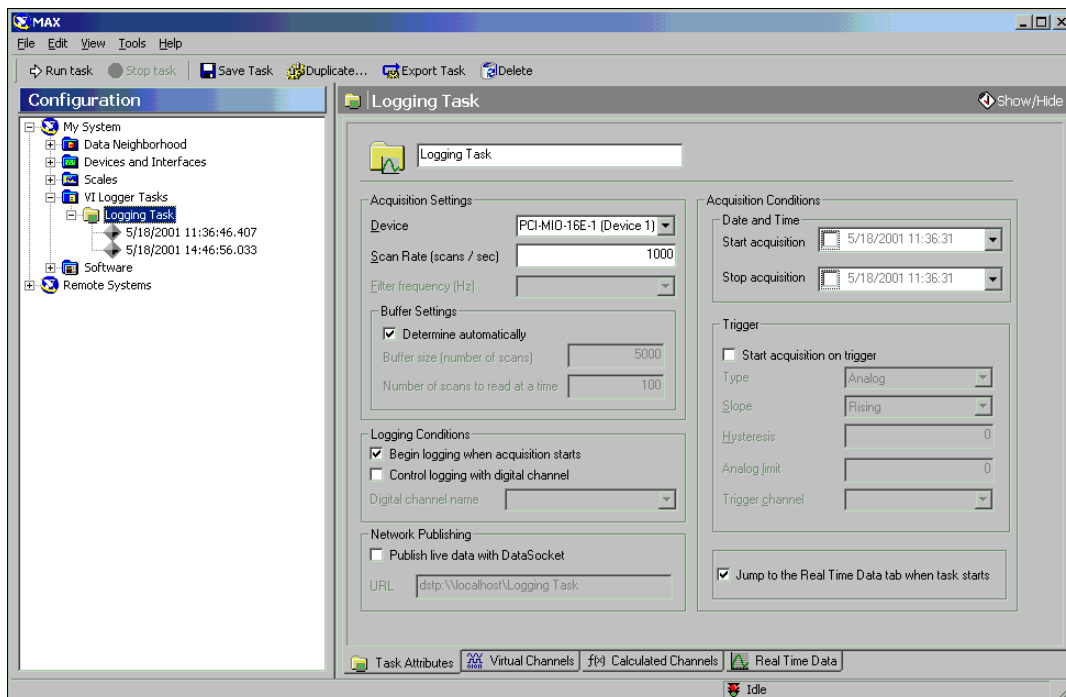
With VI Logger, you can configure your logging task. VI Logger provides feedback if any choices you make are invalid. VI Logger defines a logging task by determining the following information:

- **Acquisition Settings**—On the Task Attributes page, you can select the device from which you want to acquire and log data, enter the scan per channel rate for each channel, and set the buffer settings.
- **Logging Conditions**—On the Task Attributes page, you can set when and how the logging begins.
- **Network Publishing**—From the Task Attributes page, you can publish your data to DataSocket, which enables you to access the data through a network.
- **Acquisition Conditions**—On the Task Attributes page, you can define the acquisition conditions in which the task will run. The measurement task can be started and stopped at a specific time. Also, measurement tasks allow a variety of hardware triggering conditions.
- **Virtual Channels**—On the Virtual Channels page, you can view the list of virtual channels you created under Data Neighborhood. You can choose to enable logging for each of these channels on this page.
- **Calculated Channels**—If you need to perform some arithmetic transformations on the measured data, on the Calculated Channels page you can define new channels based on acquired channels. You can define linear combinations of two channels, logarithmic or normalized logarithmic of acquired channels (dB and dBv), or define a custom function of multiple acquired channels.
- **Events**—Use events on the Virtual and Calculated Channels pages to control stop and start logging conditions.

Creating and Configuring Your Task Using VI Logger

Launch VI Logger by selecting **Start»Programs»National Instruments»VI Logger**. Complete the following steps to create a data logging task.

1. In the configuration tree in MAX, right-click **VI Logger Tasks** and select **Create New**. The **Create New** dialog box appears.
2. Select **Logging Task** and click **Finish**. In the MAX configuration tree, the newly created task is selected and the **Task Attributes** tab is selected.



VI Logger automatically gives your task a unique default name, which appears in the task name field as **Logging Task**. You can rename your task by deleting the default task name and entering a new name in the task name field.

3. In the **Acquisition Settings** section, **Device** field, click the down arrow to select the device you are using.
4. In the **Acquisition Settings** section, **Scan Rate (scans/sec)** field, use the default scan rate or enter the rate at which you want to acquire data per second.



Tip You cannot log data from more than one device per task; however, you can define one task for each device and can run more than one task at the same time.

5. In the **Buffer Settings** section, you can define buffering parameters for the task. With these parameters, you can modify the performance of VI Logger, specifically if you are trying to log data at a high rate.

Setting Up the Virtual Channels in Your Task to Acquire and Log Data

For each VI Logger task you configure, you can select which specific channels acquire and log data within that task.

Complete the following steps to set up the channels that acquire and log data.

1. Click the **Virtual Channels** tab. The following configuration view appears.



Tip Right-click the **Events** column heading and select **Events** to enable or disable the information displayed in the table.

Active Channel	Log Enabled?	Type	High	Low	Deadband	Event	Action	Action Channel	Digital Line S
Temperature	<input checked="" type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0
Pressure1	<input checked="" type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0
Control Signal - SP1	<input checked="" type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0
Dev1Ch3	<input type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0
Dev1Ch4	<input type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0
Dev1Ch5	<input type="checkbox"/>	No event	0.000000	0.000000	0.000000	No Action			0

2. The **Active Channel** column displays all the virtual channels you have created in MAX for your device. To enable logging on each channel, click the **Log Enabled?** box to the right of each channel name.



Tip To add a virtual channel, click **Create channel** and follow the instructions in the Create New Channel wizard.

3. To configure an event, right-click the **Events** column and select **Events**. Check and uncheck the desired events. You can also right-click the table cells to access more options to modify these conditions.

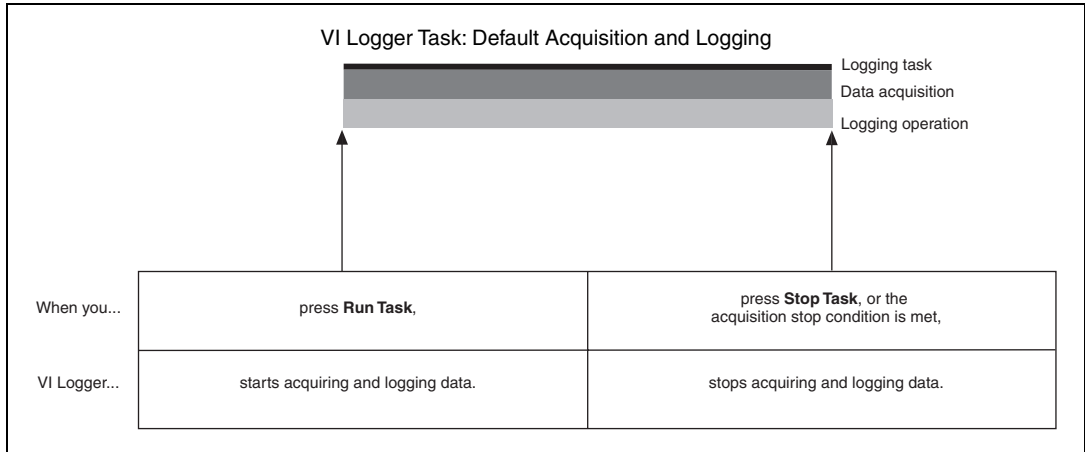
Refer to the [Creating Calculated Channels](#) section for information about creating calculated channels for VI Logger tasks.

Setting the Logging and Data Acquisition Conditions

You can define both logging and acquisition conditions for your task. Logging occurs when the data is actually being logged to where you want to store the data. Acquisition occurs when the data is being acquired and is available for viewing in the Real Time Data tab. The data is not necessarily being logged anywhere, although you can both acquire and log data at the same time. There are four ways to set up your task using VI Logger that are discussed in the following sections.

Using the Default Acquisition and Logging Settings for Your Task

In the **Task Attributes** tab, **Logging Conditions** section, the **Begin logging when acquisition starts** checkbox is enabled by default. When you use the default logging and acquisition settings for your task, you can optionally set the acquisition stop condition and then save and run the task with this condition, or you can just click **Stop Task** to stop acquisition. After you click **Run Task**, both the data acquisition and the logging immediately start at the same time. Logging and acquisition stop when you click **Stop Task** or when your stop acquisition condition is met. The following figure illustrates this default scenario.



Refer to the [Setting a Stop Condition for Acquiring Data](#) section for instructions to set an acquisition stop date and time.

Using Conditional Acquisition for Your Task

In addition to setting up start and stop conditions for logging, you can also set start and stop conditions for acquiring data in your task. To learn how to set up conditional logging conditions in your task, refer to the [Using Conditional Logging for Your Task](#) section.

Setting Start Conditions for Acquiring Data

There are three ways to start acquiring data. The first way is to start acquisition on a particular date and time. The second way is to start acquisition with a trigger. The third is a combination of the two above, where the DAQ hardware searches for a digital trigger after a specific start time is met. Refer to the [Using Both Conditional Acquisition Triggers and Conditional Logging for Your Task](#) section for further details on this feature.



Note When you start acquisition, you start acquisition on the virtual channels selected in the **Log Enabled?** column of the table for a task.

Setting a Date and Time Start Condition for Acquiring Data

Complete the following steps to set an acquisition start condition using a date and time.

1. Click the **Task Attributes** tab.
2. In the **Acquisition Conditions, Date and Time** section, enable the **Start acquisition** checkbox.
3. Enter a date and time when you want to start acquiring data.

To begin acquiring data, click **Run Task**. To stop acquiring data, either wait for the stop acquisition date and time to be met or click **Stop Task**.

Verify changes to your acquisition settings by clicking **Save Task**.

Setting a Trigger Start Condition for Acquiring Data

Complete the following steps to set the acquisition start conditions using a trigger.

1. Click the **Task Attributes** tab.
2. In the **Acquisition Conditions, Trigger** section, enable the **Start acquisition on trigger** checkbox to apply any triggered start conditions to your task.
3. In the **Acquisition Conditions, Trigger** section, select the appropriate start conditions in the active fields that apply to the trigger. To get a more detailed description of what each field does, right-click its label and select **What's This?**

Setting a Stop Condition for Acquiring Data

The only stop condition you can set to stop acquiring data for the task is the date and time. You can also stop the task by manually selecting the **Stop Task** button. Complete the following steps to set the date and time stop condition.

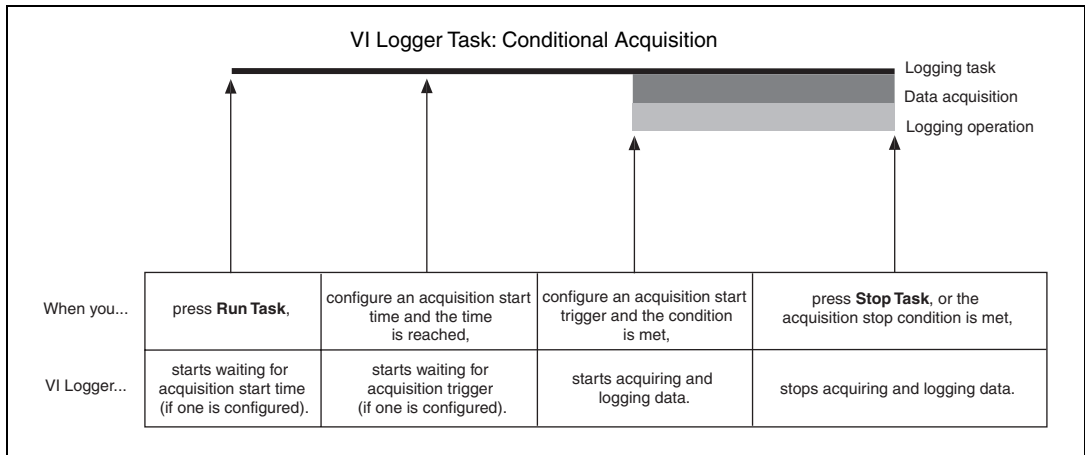
1. Click the **Task Attributes** tab.
2. In the **Acquisition Conditions, Date and Time** section, enable the **Stop acquisition** checkbox.
3. Enter a date and time when you want the task to stop acquiring data.

To begin acquiring data, click **Run Task**. To stop acquiring data, either wait for the stop acquisition date and time to be met or click **Stop Task**.



Note When you set the acquisition start and stop conditions, you still need to start your task manually by clicking **Run Task**. Once you have begun the task, VI Logger waits for the appropriate start conditions to begin acquiring data, and then stops when the stop condition is met.

The following figure demonstrates what happens in VI Logger when you set start and stop conditions for data acquisition.

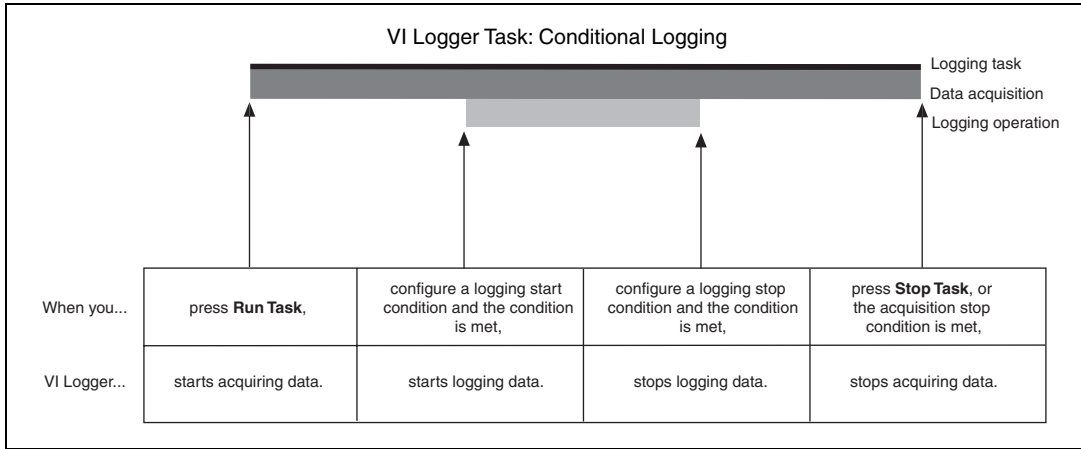


Using Conditional Logging for Your Task



Note Turning logging on and off does not affect the task. Click **Stop Task** or set a stop task condition to stop logging.

You can either log some or all of the channels within a task. You can configure the task to start logging when you run the task, or you can configure an event to start logging data. Use the **Control logging with digital channel** checkbox on the Task Attributes tab to control logging for the task. You configure events to control logging by right-clicking the **Events** column of the table on the Virtual Channels or Calculated Channels tab, and selecting **Events**. Check or uncheck events from the drop-down menu to configure logging events. The following figure illustrates what happens in VI Logger when you set up conditional logging.



There are three ways to control the logging of your task, which are described in the following sections.

Using Default Settings for Logging

You can use the default settings to control logging for your task. When you use the default settings, you start logging when you click **Run Task** and stop logging when you either click **Stop Task** or your stop data acquisition condition is met. Refer to the *Setting Up an Event Detection* section for information about using events to control logging.

Using Channel Events for Logging



Note This feature is available for both the virtual and calculated channels. When the term channel is used throughout this section, it is referring to both virtual and calculated channels.

You can also control start and stop logging conditions using the channel events feature. Refer to the *Setting Up an Event Detection* and *Setting Up an Event Action* sections for more information about using the channel events feature.

Setting Up an Event Detection

An event is similar to a DAQ trigger. When a specific condition occurs, VI Logger performs a specified action. The specific condition is called an event detection.



Note You can only configure one event per channel.



Note By default, all channels are configured without an event defined for them.

Complete the following steps to set up event detection.

1. In either the **Virtual Channels** or the **Calculated Channels** tab, **Active Channel** field, right-click a channel name for which you want to set an event.
2. Select **Events** to open the **Event properties for** dialog box.
3. Click the **Event Detection** tab.

4. Under **Event Type**, select the type of event. The type of event you select determines which fields may appear in the dialog box for you to customize.
 - If you select **Outside Range** in the **Event Type** field, in the **Range Min** and **Range Max** fields, enter the minimum and maximum range for the event.
 - In the **Deadband** field, enter a value to prevent noise in the signal from triggering multiple events. A higher value provides greater noise immunity. The value is in the same units as the channel.

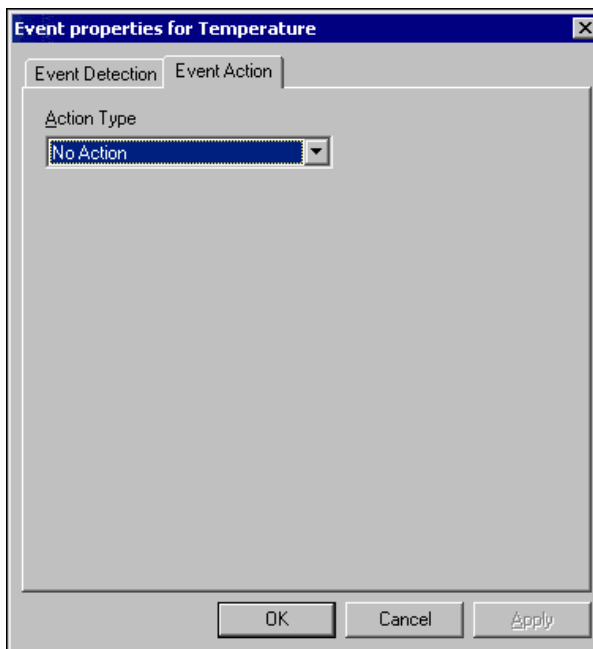
- In the **High** field, enter a high limit to trigger a High, Outside Range, or Inside Range event. The units are the same as for the channel.
 - In the **Low** field, enter a low limit to trigger a Low, Outside Range or Inside Range event. The units are the same as for the channel.
5. Refer to *Setting Up an Event Action* to finish configuring your task event.

Setting Up an Event Action

The event action is what you want done once VI Logger detects the specific event condition.

Complete the following steps to set up event action.

1. Click the **Event Action** tab. The **Event properties for** dialog box appears.



- Under **Action Type**, click the down arrow and select an event action. As necessary, customize any additional fields that appear when you make your selection.

The event actions that you can select are as follows:

- **No Action**—Nothing happens when VI Logger detects an event condition.
 - **Write to Digital Line**—Writing to a DAQ digital output line.
 - **Write to Analog Channel**—Writing to an analog output channel.
 - **Pop Up Message**—Message appears.
 - **Send Email Message**—Sending e-mail to the user account. Refer to Appendix B, *Setting Up an Event E-mail*, for details on how to use this feature.
 - **Sound**—Using multimedia, such as a beeping terminal (sound).
 - **Toggle Logging**—Changes between logging on and logging off states.
 - **Turn Logging Off**—Turns logging off when the event detection condition occurs.
 - **Turn Logging On**—Turns logging on when the event detection condition occurs.
- Click **OK** to save the new event detection and action settings for your event.
 - Click **Save Task** to save your changes in the task.

Refer to the *Modifying Your Task* section for more information about modifying a task before running.

Using a Digital Channel to Control Logging



Note To use this feature you must already have a virtual channel set up for digital line input.

Using the Control Logging with digital channel feature, you can control logging with a digital channel. You can wire a hardware switch to one of your digital input virtual channels to control when a task logs. When the line is high, logging is enabled. When the line is low, logging is disabled. For detailed information on setting up your hardware switch, refer to your device documentation.

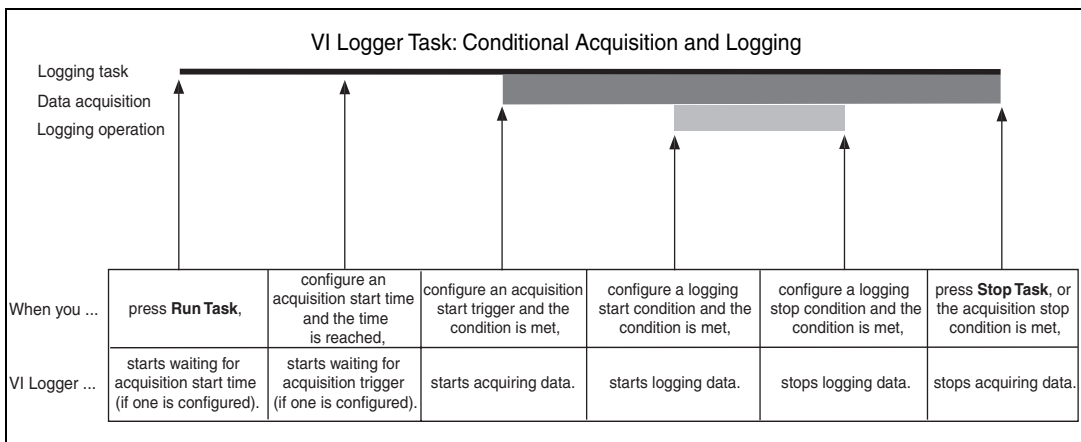
Complete the following steps to set up the start conditions for logging a task.

1. Verify you have a digital input channel for which to toggle logging.
2. In the MAX configuration tree under Data Neighborhood, right-click the digital input line virtual channel and select **Test**. Test the virtual digital input channel by flipping the hardware switch on or off and verifying if it powers on or off the LED in the software test panel in MAX.
3. In the **Task Attributes** tab in the **Logging Conditions** section, select **Control Logging with digital channel**.
4. Click the down arrow in the activated field and select **Digital channel name**.

As you toggle the hardware switch, you toggle the data logging on or off. Each time you turn logging on, a new date and time run appears under the VI Logger task name in the MAX configuration tree.

Using Both Conditional Acquisition Triggers and Conditional Logging for Your Task

When you set up both conditional acquisition and conditional logging, the following figure illustrates what happens in VI Logger. If you set both start time for acquisition and a trigger for starting logging, the start time begins acquisition, the trigger begins logging, and then your logging conditions are evaluated. Refer to the [Using Conditional Acquisition for Your Task](#) section for detailed information on setting up conditional acquisition. Refer to the [Using Conditional Logging for Your Task](#) section for detailed information on setting up conditional logging.



Setting Up Network Publishing to View Your Data from Another Computer

With network publishing, on your host computer, you can specify a specific URL where you want to publish the data so you can monitor the data from that location. You can use a tool like LabVIEW to create a DataSocket client for the web.

Complete the following steps to publish data using your network.

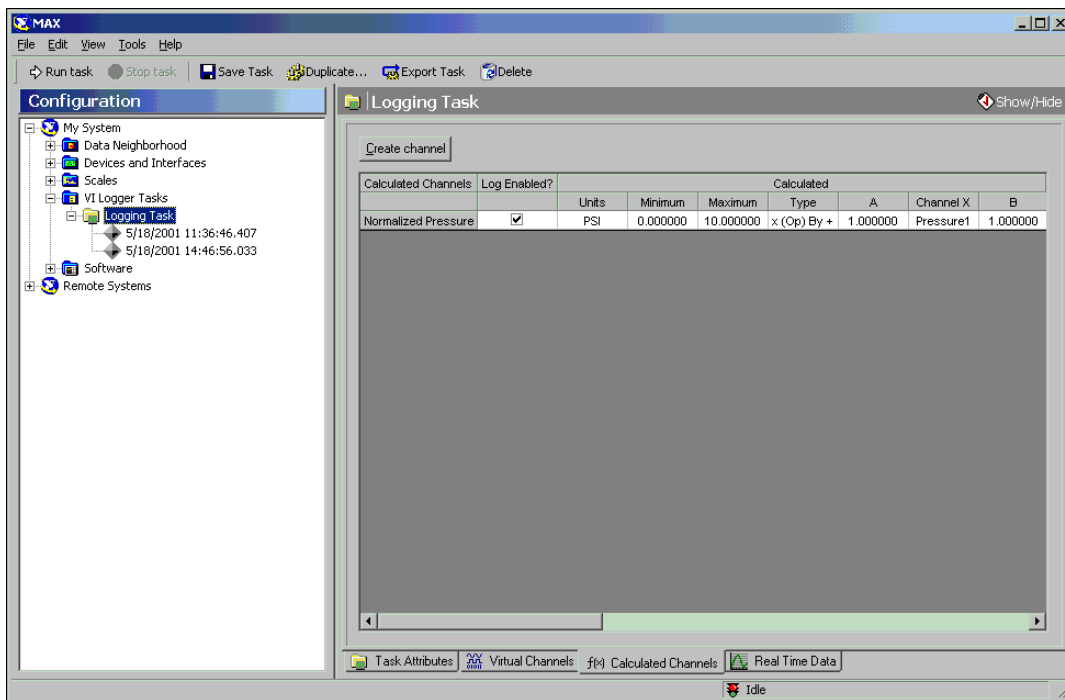
1. Click the **Task Attributes** tab.
2. In the **Network Publishing** section, enable the **Publish to DataSocket** checkbox. The **URL** field below that specifies where you want to publish data.
3. In the **URL** field, enter a URL of a client computer from where you want to monitor the data being acquired and logged from your task.
4. If you have LabVIEW, you can refer to the LabVIEW DataSocket example VI provided to view the data from the client computer.

Creating Calculated Channels

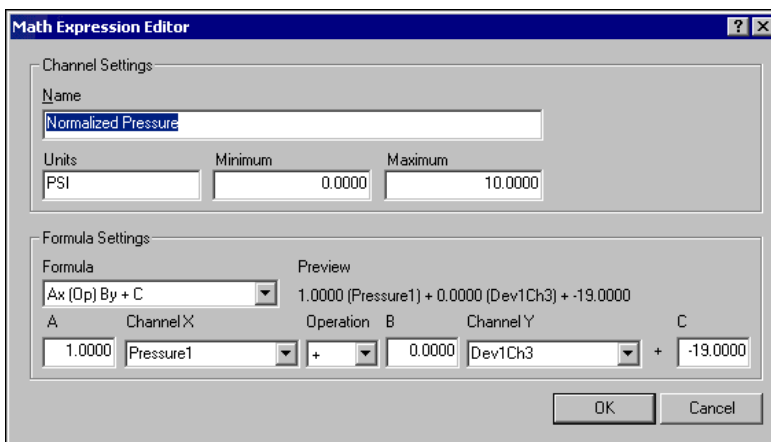
With math channels, you can set up mathematical equations using virtual channels. For example, for channels **Channel 0** and **Channel 1**, you could type the equation `Channel 0 - Channel 1` to subtract one from the other. The result would be a calculated channel.

Complete the following steps to create a calculated channel.

1. Click the **Calculated Channels** tab.



2. Click **Create channel**. The **Math Expression Editor** dialog box appears where you can define your math channel.



3. In the **Channel Settings** section in the **Name** field, enter an appropriate name for your math channel.
4. In the **Units** field, enter the appropriate unit type.
5. In the **Minimum** and **Maximum** fields, enter a range of units that apply to your math channel.
6. In the **Formula Settings** section in the **Formula** field, click the down arrow, and select one of four formulas to apply to your math channel, which are as follows:
 - **Ax (Op) By + C**—This is a linear combination formula. Fill in fields **A**, **Channel X**, **Operation**, **B**, **Channel Y**, and **C** with the appropriate values.
 - **db x/y**—A measurement of noise (db)—power base 10. Select the channels you want for **Channel X** and **Channel Y** fields.
 - **dBVx**—A single channel noise measurement. Select the channel you want for the **Channel X** field.
 - **User Defined**—Enter a formula into the **User defined formula** field. Refer to Appendix A, *Math Expression Editor Function Descriptions*, for a complete detailed list of the valid functions you can use in this field.
7. Click **OK**.

Modifying Your Task

Once you have created your task, you may want to modify the task. Complete the following steps to modify a task.

1. In the MAX configuration tree, expand **VI Logger Tasks**. Click your task name. The summary of your task configuration appears in four tabs in the configuration view: Task Attributes, Virtual Channels, Calculated Channels, and Real Time Data. To access one of these views, click the tab at the bottom of the MAX screen.
2. Modify your task by changing any information in the appropriate fields.

You are now ready to run your new data logging task. Running a task automatically saves the modified task.

Duplicating Your Task

To save time when configuring more than one task, you can duplicate your task and then modify anything in it. Complete the following steps to duplicate a task.

1. Right-click the task in the MAX configuration tree and select **Duplicate**. The **Duplicate a VI Logging** task dialog box appears.
2. Enter a task name in the **New task name** field.
3. Click **OK**.

The duplicate task appears in the MAX configuration tree at the end of the task tree.

Deleting Your Task and Data

Complete the following steps to delete an entire task.



Caution When you delete a task, all data associated with that task will also be deleted.

1. Right-click the task in the MAX configuration tree and select **Delete**. A **MAX-VI Logger** dialog box appears asking you to confirm that you want to delete the task.
2. Click **Yes** to delete the task or click **No** to cancel the deletion.

Running Your Task

Complete the following steps to run a task.

1. Select the task you want to run in the MAX configuration tree.
2. Click the **Run Task** button below the menu toolbar.

Let the task run for several seconds to acquire some data. Click **Stop Task** to stop running the task, or wait for your stop condition or trigger to occur. The data is collected and stored by MAX. You may also store the data by enabling the **Publish to DataSocket** checkbox in the Task Attributes tab to send the data to DataSocket to view from a remote computer.

Stopping Your Task

If you set a stop condition for your task, it stops acquiring and logging automatically. If you do not specify stop conditions when you create your task, your task normally runs until you manually click the **Stop Task** button.

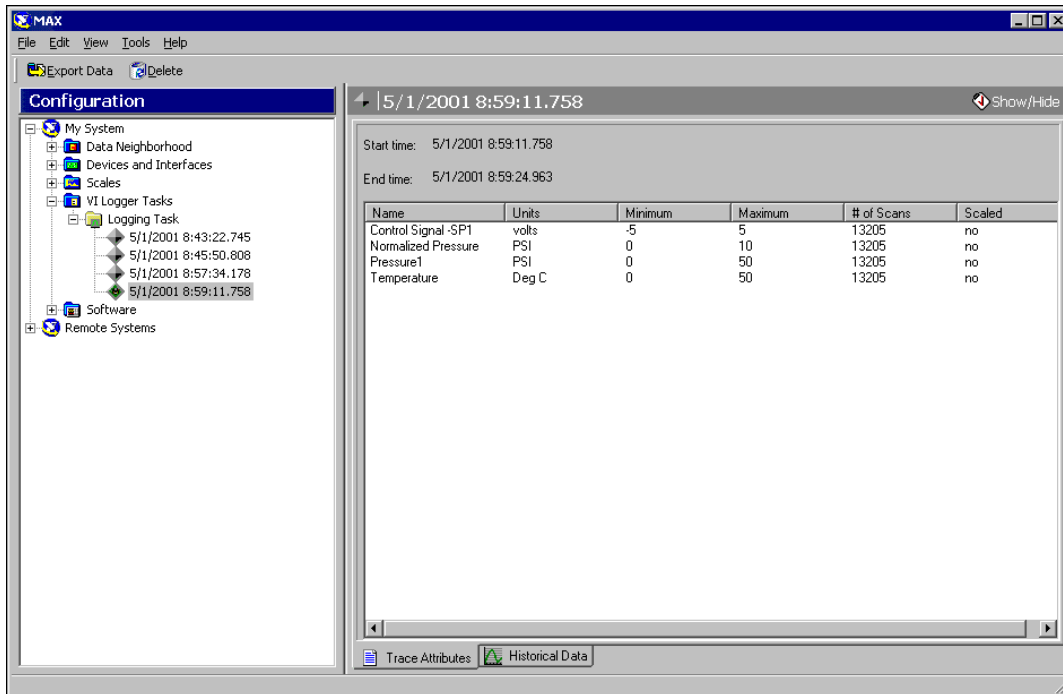
Viewing Your Data



Tip You can move the Task Attributes, Virtual Channels, Calculated Channels, and Real Time Data tabs around to dynamically interchange them. You can also separate the tab from the MAX interface by clicking and dragging the tab away from the MAX dialog box.

When you view your logged data, you can view data such as the start and stop time, engineering units measured, minimum and maximum value set for the channel after scaling, and number of scans. In addition, you can view your data in a display view before, during, or after the data is logged. Complete the following steps to view the logged data.

1. In the MAX configuration tree under **VI Logger Tasks**, click your task name.
2. Click the run you want to view.
3. If not already selected, click the **Trace Attributes** tab. The following configuration view appears.



From this view, you can find the following information about the task you ran:

- Start time—Time task began
- End time—Time task ended
- Name—Channel name from which the data was logged
- Units—Engineering units measured
- Minimum—Minimum value set for that channel after scaling
- Maximum—Maximum value set for that channel after scaling
- # of Scans—Number of times the channel was scanned
- Scaled—*Yes* means the data was scaled before it was logged. *No* means the data was not scaled before it was logged.

Viewing Your Data Graphically

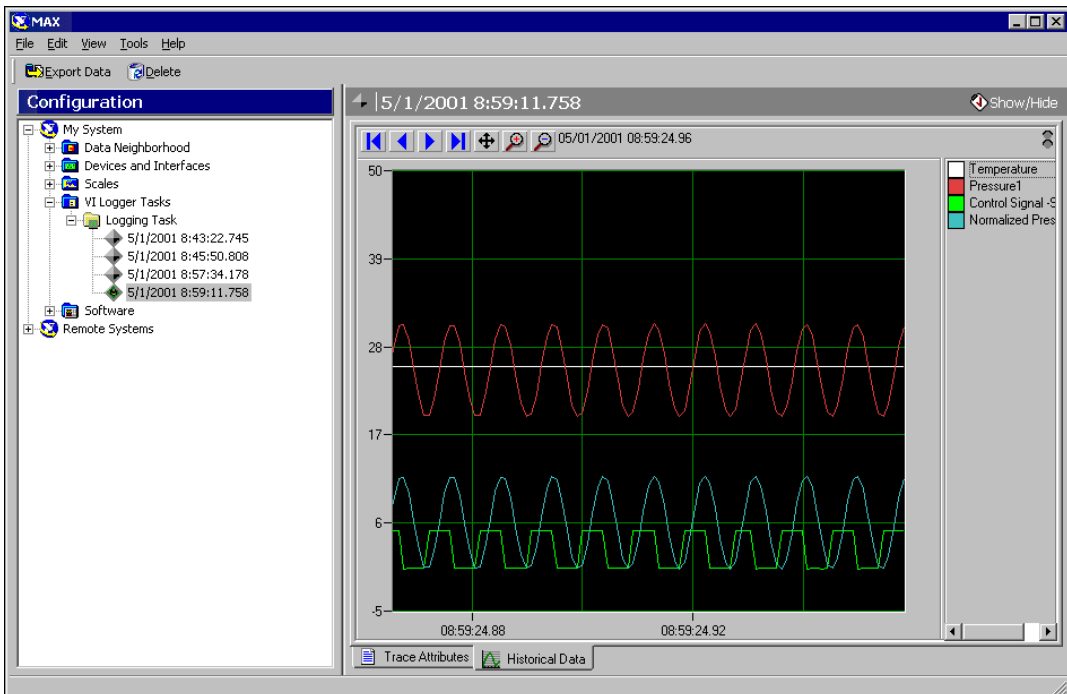
Click the **Historical Data** tab at the bottom of the configuration view to see the graphical view of the data logged from each channel.

Monitoring Your Acquired Data

There are two tabs available where you can view your data. The first display tab, Real Time Data, is available when you select a task name in the Configuration view. You can use this display to monitor data that is being acquired, regardless of if the data is being logged or not. VI Logger automatically jumps to this tab to monitor the data when logging starts. For high-speed data logging, you can disable this default behavior by removing the check from the **Jump to the Real Time Data tab when task starts** checkbox on the Task Attributes tab.

Viewing Your Logged Data

The Historical Data tab appears when you select a run under the task name. This tab shows only your logged data that has already been stored in the task run, as shown in the following figure.



Plotting Your Data

A red and green LED indicator appears on the upper right corner of the Historical Data tab and the Real Time Data views when you are running the task. If the green light is lit, you are viewing the task data while it is being acquired, which means that the data on the screen reflects what is currently being acquired. If the red light is lit, you are viewing the data that has already been collected and logged.

- To switch between viewing current and historical data, click the LED indicator. You can only switch between viewing current and historical data if a task is running.
- To snap the view to the beginning of the logged data, click once on the home arrow button. To snap the view to the end of the data, click once on the end arrow button.
- To scroll back and forth through the logged data, click several times on the forward or backward scroll arrows. To scroll faster through the data, click the forward or backward scroll arrow buttons, and drag your cursor to the right or left of the arrow buttons and hold the mouse button down for it to scroll faster left or right. The further away you drag the cursor from the arrow, the faster the data scrolls.

Zooming In or Out on Your Data

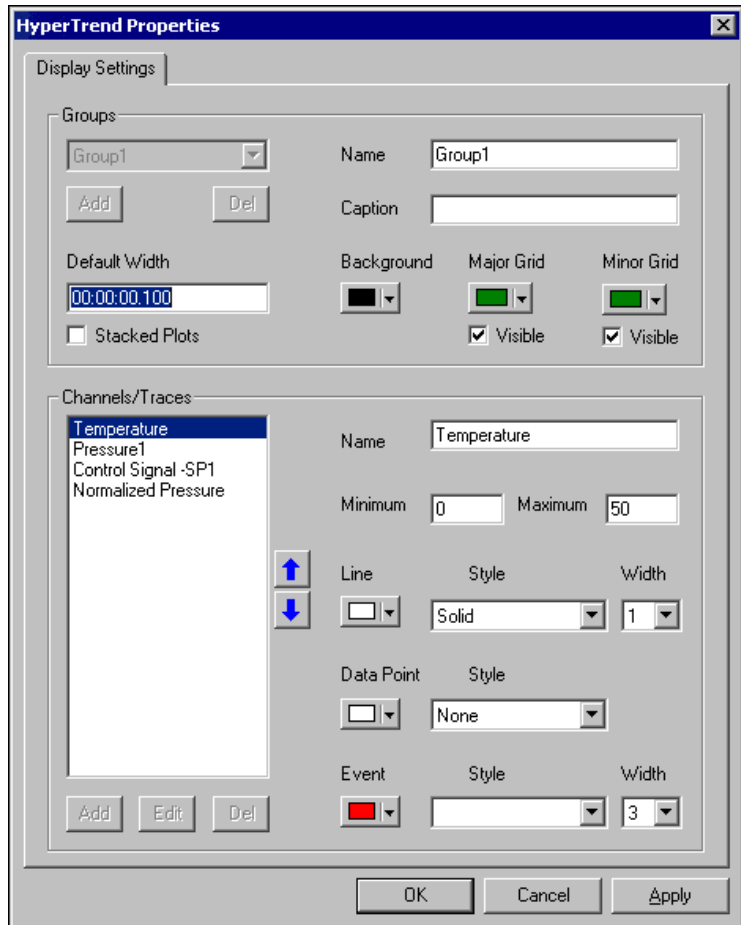
Click the magnifying glasses at the top of the display view to zoom in or zoom out on the current view. The view is magnified twice or decreased by half on the x-axis as you zoom in or out.

Additionally, in the display view, you can click and drag to the right or left to zoom in on the x-axis data. You can also right-click in the view, select **Zoom/Pan Mode**, then click in the view and drag the square for the x- and y-axis area you want to magnify. Then select the zoom out magnifying glass on the top of the window to zoom out again.

Modifying Your Plots or Display View

Complete the following steps to modify plots or display view.

1. Right-click in the graphical view and select **Properties**. The **HyperTrend Properties** dialog box appears.



In the Groups section, you can modify the following fields:

- **Name**—Specifies the group display plots and view that you are modifying
- **Caption**—Describes the group and the text then appears beneath the Real Time Data view
- **Background**—Modifies the background color in the view

- **Default Width**—The default width of the entire Real Time Data view is one second from beginning to end. You can enter any time frame in the **Default Width** field to change what amount of data you see in the view. Once you are in the Real Time Data view and you make modifications to the width of the view, you can right-click and select **Restore X-axis width** to return to the default width.
 - **Background**—Click the down arrow to modify the background color of the Real Time Data view.
 - **Major Grid**—Click the down arrow to modify the color of the major grid lines. Select the **Visible** box if you want the major grid lines to show.
 - **Minor Grid**—Click the down arrow to modify the color of the minor grid lines. Select the **Visible** box if you want the minor grid lines to show.
 - **Stacked Plots**—Select this box to split the plots into stacked plots in the view instead of plots that are on top of each other.
2. Under **Channels/Traces**, select the channel on which your task ran. Click the up and down blue arrows to change the order of the channels as they appear to the right of the display. Additionally, you can add, edit, or delete the channels from the view by clicking the buttons beneath the channels.
 3. In the **Channels/Traces** section, you can modify the following fields:
 - **Name**—The name of the channel appears in this field
 - **Minimum and Maximum**—Enter a number to adjust the y-axis height of the plot
 - **Line**—Click the down arrow button to select a line color. You can also modify the style and width in the **Style** and **Width** fields next to the color.
 - **Data Point**—Click the down arrow button to select a line color. You can also modify the style in the **Style** field next to the color.
 - **Event**—Click the down arrow to select a line color. You can also modify the style and width in the **Style** and **Width** fields next to the color.
 4. Click **Apply** to apply your modifications to the Real Time Data view.
 5. Click **OK** to exit the **HyperTrend Properties** dialog box.
 6. Right-click in the Real Time Data tab and select **Fixed Grid** to make additional modifications to the view. With this feature checked, the

grid stays in one place while the data still scrolls in the view. With this feature unchecked, the grid moves with the data as it scrolls.

Modifying the Legend

The legend is the area to the right of the display view that shows your channel names from which the data is taken. To modify the legend or channels in the legend, follow these steps:

1. Right-click the channel name you want to modify in the legend and select one of the following items:
 - **Display**—When you check this item, it displays the channel you selected in the legend and shows the data plot from that channel in the view.
 - **Hide**—When you check this item, it grays out the channel you selected in the legend and does not show the data plot in the view. You can also double-click the channel name to hide it. To display the channel again, double-click the grayed out channel name.
 - **Select All**—When you check this item, it selects all the channels in the legend so you can modify them all at once. You can also select more than one channel by pressing <Ctrl+Shift> while clicking a channel.
 - **Rename**—You can enter a different channel name when you select this item.
2. To hide or show the legend, right-click in the graph area, and select **Show Legend**, depending upon which is needed.
3. Click the channel name colored box to change the plot color in the view.

Determining Time Difference, Frequency, and Values Using Plot Cursors

If you have a periodic waveform to view, use this feature to measure the time difference between two points in the display or to calculate the frequency of a periodic waveform. With the Display Cursors feature, you can see the value of a plot wherever you place a cursor, which appears as a green vertical line in the displays view. You can also get the time difference between two cursors that you place on the plot, and you can get the inverse of that, which is the frequency.

Complete the following steps to change the cursor displays.

1. Click the **Cursor** button located above the display view to access the **Display Cursors** dialog box.
2. Select the **Two Cursors** box to be able to use two cursors at the same time in the view.
 - **First Cursor and Second Cursor**—You can modify the date and time of where the cursor is placed in the view using these fields. If you run the task for more than one day, then you might need to modify the day.



Note **Time Diff** and **Freq** fields are hidden if the **Two Cursors** checkbox is not checked.

- **Time Diff**—The time difference is calculated between the two cursors. The maximum time that will show in this field is the maximum width of the view window.
- **Freq**—Calculates the inverse of the Time Diff field, which is the frequency.

First Cursor		Second Cursor	
1/1/2001	8:59:24	5/1/2001	8:59:24
Time Diff: 00:00:00.034		Freq.: 3.0000E+1	
Trace Name	Value	Trace Name	Value
Temperature	25.5199	Temperature	25.5127
Pressure1	26.3072	Pressure1	19.7898
Control Signal -SP1	0.26222	Control Signal -SP1	3.05956
Normalized Pressure	7.30481	Normalized Pressure	0.789823

Two Cursors Close

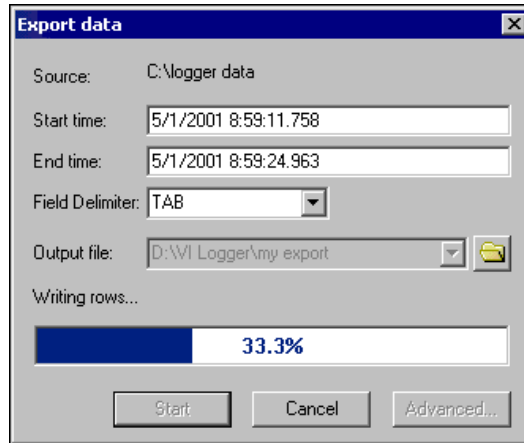
3. Click **Close** to exit from the dialog box.

Printing Your Data

To print the data graph, right-click in the Historical Data or Real Time Data display view and select **Print**. You can only print what is showing in the view on your screen.

Exporting Your Data

To export your data to another file, under **VI Logger Tasks**, right-click a run, and select **Export Data**. The **Export data** dialog box appears as shown in the following figure.

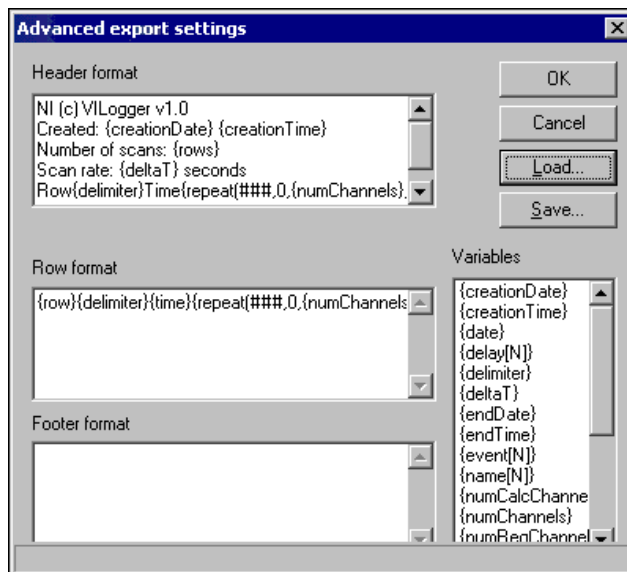


- **Source**—File path where the database source to export is located.
- **Start time**—Time stamp on the first point returned in the data plot. You can manually change this field. This date and time are the `startDate` and `startTime` variables in the **Advanced export settings** dialog box.
- **End time**—Time stamp on the last point returned in the data plot. You can manually change this field. This date and time are the `endDate` and `endTime` variables in the **Advanced export settings** dialog box.
- **Field Delimiter**—Use this option to select what is placed between the different fields in your data in the export file. For example, you can separate the fields in your export file with a comma or a tab. This field is the `delimiter` variable in the **Advanced export settings** dialog box.
- **Output file**—File path where data is exported. You need to name the export file in this field before you generate it. Use any file extension and include the complete path to the file.
- **Writing rows**—Progress bar that monitors the export function.
- **Start**—Starts generating the export file.
- **Cancel**—Interrupts the export function and exits the **Export data** dialog box without saving any changes.

- **Advanced**—Accesses the advanced programming options, such as the header and footer formats, and variables you want to appear in your export file. Refer to the *Setting Advanced Export and Programming Options* section for further details on this feature.

Setting Advanced Export and Programming Options

To access the advanced programming options feature, click **Advanced** in the **Export data** dialog box. Refer to the *Exporting Your Data* section for more information about exporting data. The **Advanced export settings** dialog box appears, as shown in the following figure.



A description of the **Advanced export settings** dialog box fields follows:

- **Header format**—Enter the header that you want to appear in your export file. You can use variables in this field.
- **Row format**—Enter the way you want the row of data to be formatted. You can use variables in this field.
- **Footer format**—Enter the footer that you want to appear in your export file. You can use variables in this field.
- **Variables**—Variables contain values that can vary depending upon the task from which you are pulling data. Refer to the *Variables* section for more information about using variables with VI Logger.

- **Load**—Use this button to load predefined templates included with VI Logger or a template you created and customized. Refer to the following sections for more information about loading templates.
- **Save**—Use this button to save any customized formats.

Loading a User-Defined Export Template

You can load a user-defined template, which is included with the VI Logger software. Complete the following steps to load a user-defined template.

1. Right-click a run in the MAX configuration tree and select **Export Data**. Click **Advanced** to open the **Advanced export settings** dialog box.
2. In the **Advanced export settings** dialog box, click **Load**. The **Load export template** dialog box appears.
3. Select `default.vet` from the `VI Logger\Export` folder and click **Open**. The **Advanced export settings** dialog box now contains the default template settings.
4. Click **OK** to apply the template formatting to the data you are exporting.

Loading an HTML Export Template

You can format your data into HTML by loading an HTML template, which is included with the VI Logger software. Once you apply the HTML format to your data, you can then view your data using a browser such as Microsoft Internet Explorer. Complete the following steps to load the HTML template.

1. Right-click a run in the MAX configuration tree and select **Export Data**. Click **Advanced** to open the **Advanced export settings** dialog box.
2. In the **Advanced export settings** dialog box, click **Load**. The **Load export template** dialog box appears.
3. Select `html.vet` from the `VI Logger\Export` folder and click **Open**. The **Advanced export settings** dialog box now contains the default template settings.
4. Click **OK** to apply the template formatting to the data you are exporting.

Modifying the Template

You can modify the template or create your own template by altering the **Header format**, **Row format**, and **Footer format** fields and saving the modified template with a new name. Complete the following steps to save custom export settings.

1. Right-click a run in the MAX configuration tree and select **Export Data**. Click **Advanced** to open the **Advanced export settings** dialog box.
2. In the **Advanced export settings** dialog box, click **Save** to save the export settings you customize. The **Save export template** dialog box appears.
3. Enter *filename.vet*.
4. Select the folder where you want to save the new template. The default folder is C:\Program Files\National Instruments\VI Logger\Export.
5. Click **Save** to save your file to this path.

Variables

Variables contain values that can vary depending upon the task from which you are pulling data. There are two types of variables that you can use to program specific text and data into your export file: global and index list row format. You can program what variables and text you want to appear in the header and footer of your export file using the Header format and Footer format fields, and you can program how you want the rows of data to be presented using the Row format field. Refer the following tables for specific descriptions and categories of the variables.

Global

Global variables are variables that apply to the entire export file, meaning that you can use these variables in all three fields in the dialog box: Header format, Row format, and Footer format. The global variables and descriptions are in the following table.

Global Function	Description
repeat (N, X, Y, "S")	Refer to the Repeat Function section for a detailed description of the repeat variables

Global Index

Table 2-1. Global Variables

Variables	Description
name [N]	N=[0...numChannels). Name of channel on the N channel trace.
delay [N]	N=[0...numChannels). How long it took to take measurement from time of scan on the N channel trace.
units [N]	N=[0...numChannels). Units that appear in the VI Logger summary view for the N channel trace.

One Value

One value variables contain only one value.

Table 2-2. One Value Variables

Variables	Description
creationDate	Date that exported file is created
creationTime	Time that exported file is created
delimiter	The delimiter selected in the Field Delimiter field in the Export data dialog box
deltaT	Scan rate (in seconds) for logged task that produces plot or run
endDate	End date specified in export dialog box
endTime	End time specified in export dialog box
startDate	Start date specified in export dialog box
startTime	Start time specified in export dialog box
numChannels	Number of virtual channels that appear in the VI Logger Trace Attributes tab. Amount equals total number of channels when you combine the numRegChannels and numCalcChannels variables.
rows	Number of total rows of data exported

Table 2-2. One Value Variables (Continued)

Variables	Description
numRegChannels	Number of virtual channels excluding calculated channel
numCalcCchannels	Number of calculated channels only

Index List Row Variables

Index List Row variables are variables that you can only use in the Row format field. The Row format variables with their description are given in the table that follows.

Table 2-3. Index List Row Variables

Row Format Variables	Description
row	Row number (0 to number of scans)
date	Date of current row
time	Time of current row
timeOffset	Time of scan since the start of the export: $\text{Row number} \times \text{deltaT}$

One Channel Value in a Row Export Variables

Table 2-4. One Channel Value in a Row Export Variables

Row Format Variables	Description
value[N]	$N=[0 \dots \text{numChannel}]$. Value of the N channel trace in the current row.
Event [N]	$N=[0 \dots \text{numChannels}]$. Event of the N channel trace in the current row.

Repeat Function

You can use the Repeat (N, X, Y, “S”) function for string replacement. For example, you can use this function when you have ten channels in one run and five channels in another run, and you need to alter the number of channels in the runs.

Table 2-5. Syntax Characters for Repeat Function

Character	Description
N	String which needs to be replaced in S
X	Beginning value of N, the valid range is between [0..numChannels)
Y	Ending value of N, the valid range is between [0..numChannels)
“S”	Statement whose value N will be replaced

Special Syntax Characters

There are four different special syntax characters that you can use in the repeat function. They are described in the table that follows.

Table 2-6. Special Syntax Characters for Repeat Function

Syntax Characters	Description
plain text	Any plain text character is output to export file verbatim
[]	Used for channels only for indexing into a variable that has multiple channels
" "	Whatever text or characters are inside the quotes are output verbatim in the export file
\	Outputs verbatim whatever follows the backslash, unless the backslash is inside quotes
{ }	Indicates the start or end of the variable or function

Export Template Examples

Export All Channels Plus Associated Events

Enter the following text in the **Advanced export settings** dialog box fields:

Header Format

```
NI (c) VILogger v1.0
Created: {creationDate} {creationTime}
Number of scans: {rows}
Scan rate: {deltaT} seconds
Number of total channels: {numChannels}

row {delimiter} time{delimiter}
{repeat(###, 0, {numChannels}, "{name[###]} {delimiter}
{name[###]}."event" {delimiter}")}
```

Row Format

```
{row} {delimiter} {time} {delimiter} {repeat(###, 0,
{numChannels}, "{value[###]} {delimiter} {event[###]}
{delimiter}")}
```

Export Regular Virtual Channels Only

Enter the following text in the **Advanced Export settings** dialog box fields:

Header Format

```
NI (c) VILogger v1.0
Created: {creationDate} {creationTime}
Number of scans: {rows}
Scan rate: {deltaT} seconds
Number of virtual channels: {numRegChannels}

row {delimiter} time{delimiter}
{repeat(###, 0, {numRegChannels}, "{name[###]}
{delimiter}")}
```

Row Format

```
{row} {delimiter} {time} {delimiter} {repeat(###, 0,
{numRegChannels}, "{value[###]} {delimiter}")}
```

Export Calculated Channels Only

Enter the following text in the **Advanced Export settings** dialog box fields:

Header Format

```
NI (c) VILogger v1.0
Created: {creationDate} {creationTime}
Number of scans: {rows}
Scan rate: {deltaT} seconds
Number of calculated channels: {numCalcChannels}

row {delimiter} time{delimiter}
{repeat(###, {numRegChannels}, {numChannels}, "{name
[###]}{delimiter}")}
```

Row Format

```
{row}{delimiter}{time}{delimiter}{repeat(###,
{numRegChannels}, {numChannels}, "{value [###]}
{delimiter}")}
```

Creating a New Database

The VI Logger database is where your task runs are stored. Complete the following steps to create a new database.

1. Select **Tools»VI Logger»Database**. The **Database** dialog box appears. If this is the first time you are creating a database, the default database path should already be checked.
2. Click **Create New**. The **Create Database** dialog box appears.
3. Enter a descriptive name for the new database.
4. Enter a file path for the database.
5. Click **OK**. The **Database** dialog box appears with the new name and path where data is being stored.
6. If you want to store your task runs to your new database, right-click the new database, and select **Set as Default** or double-click the database. A check mark appears to the left of the database name.
7. Click **OK**.

Once you have created a database, you can compact, delete, and rename the database.

Compact a Database

To save disk space, you can compact a database in VI Logger. Complete the following steps to compact a database.

1. Select **Tools»VI Logger»Database**. The **Database** dialog box appears.
2. Right-click a database and select **Compact**.

Rename a Database

Complete the following steps to rename a database in VI Logger.

1. Select **Tools»VI Logger»Database**. The **Database** dialog box appears.
2. Right-click a database and select **Rename**.
3. Type the new name for the database.

Delete a Database

Complete the following steps to delete a database.

1. Select **Tools»VI Logger»Database**. The **Database** dialog box appears.
2. Right-click a database and select **Delete**.

Exporting a Task to Another Computer

You can export your defined task in XML format and import it to a destination computer. To export your task to another computer, you need to set up the DAQ configuration and the task on the destination computer. On your destination computer, you can either use the same DAQ hardware configuration as your source computer or you can access your source computer's DAQ hardware configuration remotely from the destination computer. Refer to the *Exporting a Task* and *Importing a Task* sections for more information about how to set up your computer one of these two ways.

Exporting a Task

Complete the following steps to export a task to another computer.

1. Select a VI Logger task name in the MAX configuration tree.

2. Click **Export** in the toolbar, or select **Tools»VI Logger»Export Task**, or right-click the VI Logger task and select **Export**. The **Save As** dialog box appears.
3. Enter a task name followed by an `.xml` file extension.
4. Choose a location on your computer where you want to save the task.
5. Click **Save**. The `.xml` file is then saved to the specified location on your computer.

Refer to the *Importing a Task* and *Setting Up Your Destination Computer for Remote Access* sections for more information about accessing a device and its hardware configuration remotely from a destination computer. If your destination computer has an identical device and device hardware configuration setup as your source computer, continue to the following *Importing a Task* section.

Importing a Task

Complete the following steps to import a task into VI Logger.

1. From the menu, select **Tools»VI Logger»Import Task**.
2. Select the task `.xml` file you exported earlier. If you are remotely accessing the device, select the `.xml` file from the source computer.
3. Click **Save Task** and then **Run Task**.

Setting Up Your Destination Computer for Remote Access

Complete the following steps to configure a destination computer for remote access.

1. On your source computer, select **Start»Programs»National Instruments»NI-DAQ»Remote Device Access Server**.
2. On destination computer in the MAX configuration tree, right-click **Devices and Interfaces** and select **Create New**.
3. Select **RDA/Ethernet device** and click **Next**.
4. Enter the **Remote Computer/IP Address** of the source computer and click **Finish**.
5. In the **Remote Devices** field, select the device that your task was configured for on your source computer and click **Next**.
6. Define the local device number that you want to use. Only the available device numbers appear.

7. On the destination computer, select the task, and select the **Task Attributes** tab.
8. Select the destination computer's remote device number in the device list.

The device shows under the Devices and Interfaces level of the MAX configuration tree and the virtual channels for that device are copied into Data Neighborhood.

Controlling Your Task Programmatically Using LabVIEW

Although VI Logger is a stand-alone tool, you also can use LabVIEW to control tasks programmatically, which gives you greater control over executing tasks. This chapter explains background information about using the LabVIEW VI Logger VIs. Refer to the *VI Logger Help* for more information about specific VIs.

Before you start building a VI Logger application in LabVIEW, you should know some of the following basic concepts about VI Logger in MAX:

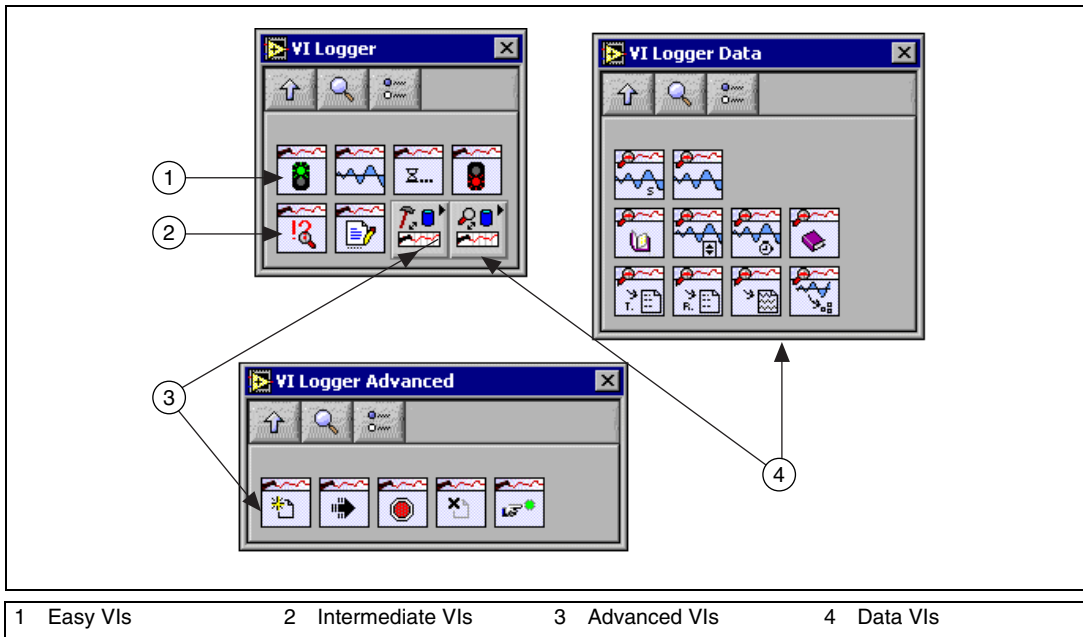
- Configuring a VI Logger task in MAX
- Running a VI Logger task in MAX
- Viewing data from a VI Logger task run in MAX

Refer to Chapter 2, *Creating and Running a VI Logger Task*, for detailed information about VI Logger tasks in MAX.

Executing a Task Using the VI Logger VIs

Use the VI Logger VIs located on the **Functions»VI Logger** palette to run your task. The VI Logger palette contains Easy, Intermediate, and Advanced VIs. Refer to the *VI Logger Help* for more detailed information about specific VIs.

The following figure of the LabVIEW VI palette shows the location of the VI Logger VIs on the palette.



Using Easy VI Logger VIs

Use the Easy VI Logger VIs to perform high-level VI Logger operations. With these VIs, you can begin executing a VI Logger task configured in MAX, read live data from the task while it is logging, wait for the task to finish, or manually stop a VI Logger task.

Using Intermediate VI Logger VIs

Use the VI Logger Status VI to obtain status information from the currently executing task. The status contains information about the state of the task, such as how many points have been logged and if a backlog exists. A growing backlog indicates a lack of CPU bandwidth to log the data. You can free CPU processor time by turning Event Detection off, not publishing data to DataSocket, or not reading all the logged data in LabVIEW. You can configure these options in MAX or programmatically using the Logger Set Output VI.

Using Advanced VIs

Use the Advanced VI Logger VIs to gain more control of VI Logger tasks. Use the Advanced VIs to load a VI Logger task and have multiple start and stop sequences before unloading the task. You can also reset a specific task, which is useful if your previous execution aborted abnormally.

Executing a Task Using the VI Example Logger VIs

Refer to the `Examples\VI Logger\Logging Examples.llb` directory for common solutions using the VI Logger Reader VIs. These examples show you how to use the VI Logger Easy Reader VIs to view the logged data of a task named My Task1.

Reading Historic Data Using the VI Logger Data VIs

Use the VI Logger Data VIs located on the **Functions»VI Logger»VI Logger Data** to read and analyze logged historic data.

Use the VI Logger Data VIs to open, read, get attributes, and close the tasks you created in MAX. The **VI Logger Data** palette contains Easy, Intermediate, and Advanced VIs.

Using the Easy VI Logger Reader Data VI

Use the Easy VI Logger Reader VI to perform simple read operations. You can run this VI from its front panel or use it as a subVI in basic reading applications. The Easy VI Logger Reader VI outputs polymorphic data as waveform data or as a 2D scaled data array.



Note All data has time stamps, so you can view it with its time information.

Using the Intermediate VI Logger Reader VIs

Use the Intermediate VI Logger Data VIs to provide more functionality for complex historical data and analysis. From any logging task, you can view any run and access its attributes.

Using the Advanced VI Logger Reader VIs

Use the Advanced VI Logger Data VIs to provide additional functionality for complex historical data analysis, such as opening any logging task or access any runs or a selected attribute.

Using VI Logger Reader Example VIs

Refer to the `Examples\VI Logger\Reading Examples.llb` directory for common solutions using the VI Logger Data VIs. The VI examples show you how to use the VI Logger Easy Data VIs to view the logged data of a task named My Task1.



Math Expression Editor

Function Descriptions

This appendix describes the math expression editor functions in detail. Complete the following steps to access these functions for use in a calculated channel.

1. Click **Add Channel** from the **Calculated Channels** tab. The **Math Expression Editor** dialog box appears.
2. Select **User Defined** in the **Formula** field of the **Formula Settings** section. You can use these functions in formulas for a calculated channel.

Example

$$\sin(\text{Ch } 1/\text{Ch } 2) + 3*\tan(\text{Ch } 3)^2-2$$

You can use the following operators:

+ and – for addition and subtraction

* and / for multiplication and division

** and ^ for exponentiation

Function	Name	Purpose
abs(x)	Absolute Value	Returns the absolute value of x
acos(x)	Inverse Cosine	Computes the inverse cosine of x in radians
acosh(x)	Inverse Hyperbolic Cosine	Computes the inverse hyperbolic cosine of x
asin(x)	Inverse Sine	Computes the inverse sine of x in radians
asinh(x)	Inverse Hyperbolic Sine	Computes the inverse hyperbolic sine of x in
atan(x)	Inverse Tangent	Computes the inverse tangent of x in radians
atanh(x)	Inverse Hyperbolic Tangent	Computes the inverse hyperbolic tangent of x in degrees

Function	Name	Purpose
ceil(x)	Round to +Infinity	Rounds x to the next higher integer (smallest integer is greater than or equal to x)
cos(x)	Cosine	Computes the cosine of x in radians
cosh(x)	Hyperbolic Cosine	Computes the hyperbolic cosine of x in degrees
cot(x)	Cotangent	Computes the cotangent of x in radians (1/tan(x))
csc(x)	Cosecant	Computes the cosecant of x in radians (1/sin(x))
exp(x)	Exponential	Computes the value of e raised to the x power
expm1(x)	Exponential (Arg-1)	Computes the value of e raised to the x power minus 1 (e^(x-1))
floor(x)	Round to -Infinity	Truncates x to the next lower integer (largest integer is smaller than or equal to x)
getexp(x)	Mantissa & Exponent	Returns to exponent of x
getman(x)	Mantissa & Exponent	Returns to mantissa of x
int(x)	Round to Nearest	Round its argument to the nearest integer
intrz(x)	Round Toward 0	Rounds x to the nearest integer between x and 0
ln(x)	Natural Logarithm	Computes the natural logarithm of x (to the base e)
lnp1(x)	Natural Logarithm (Arg + 1)	Computes the natural logarithm of (x + 1)
log(x)	Logarithm Base 10	Computes the logarithm of x (to the base of 10)
log2(x)	Logarithm Base 2	Computes the logarithm of x (to the base 2)
pow(x, y)	x^y	Computes the value of x raised to the y power
rand()	Random Number (0-1)	Produces a floating-point number between 0 and 1 exclusively
sec(x)	Secant	Computes the secant of x, where x is in radians (1/cos(x))

Function	Name	Purpose
sign(x)	Sign	Returns 1 if x is greater than 0, returns 0 if x is equal to 0, and returns -1 if x is less than 0
sin(x)	Sine	Computes the sine of x, where x is in radians
sinc(x)	Sinc	Computes the sine of x divided by x radians (sin(x)/x)
sinh(x)	Hyperbolic Sine	Computes the hyperbolic sine of x in degrees
Sqrt(x)	Square Root	Computes the square root of x
tan(x)	Tangent	Computes the tangent of x in radians
tanh(x)	Hyperbolic Tangent	Computes the hyperbolic tangent of x in degrees
pi(1), pi(2)	pi, 2pi	—

Setting Up an Event E-mail

This appendix describes how to set up an event e-mail using the Event Action feature in VI Logger. The event e-mail is sent when an event starts and when it stops. VI Logger uses the SMTP Send Message VI from the LabVIEW Internet toolkit to generate the e-mail.

Complete the following steps to set up an e-mail event action.

1. In either the **Virtual Channels** or the **Calculated Channels** tab, **Active Channel** field, right-click a channel name for which you want to set an event.
2. Select **Events** to open the **Event properties for** dialog box.
3. In the **Event properties** dialog box, in the **Action Type** field, select **Send Email Message**.
4. In the **Mail Server** field, enter the SMTP server to send the message through.
5. In the **Message** field, enter a custom message to include in the e-mail. Your custom message appears first, and then the default message is appended to your custom message.
6. In the **To:** field, enter a list of e-mail addresses to which to send the event message.
7. Click **OK**.

This is what an example e-mail message may look like:

```
From: VI Logger  
To: John Smith@ni.com  
Subject: "My Temperature Channel 1" has exceeded its  
event limit.
```

```
testing
```

```
Thursday, March 15, 2001
```

```
8:34:29 AM
```

```
DAQ Channel: "My Temperature Channel 1"
```

```
Current value: 51.000000 C
```

```
Event Type: High
```

```
High Limit: 50.000000 C
```

```
Values of all Channels:  
My Temperature Channel 1: 51.000000 C
```

The appropriate values and strings that are entered into the e-mail message are shown:

```
{Custom message here}  
{Day of week, Month, Date, 4-digit year}  
{HH:MM:SS AM/PM}  
DAQ Channel: "{Channel Name}"  
Current value: {Current Value} {Channel Units}  
Event Type: {Event Type}  
High Limit: {High Limit} {Channel Units}  
Low Limit: {Low Limit} {Channel Units}  
  
Values of all Channels:  
{First Channel Name}: {First Channel Value} {First  
Channel Units}  
{Second Channel Name}: {Second Channel Value} {Second  
Channel Units}  
...  
{Last Channel Name}: {Last Channel Value} {Last Channel  
Units}
```



Technical Support Resources

Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of ni.com.

NI Developer Zone

The NI Developer Zone at ni.com/zone is the essential resource for building measurement and automation systems. At the NI Developer Zone, you can easily access the latest example programs, system configurators, tutorials, technical news, as well as a community of developers ready to share their own techniques.

Customer Education

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System Integration

If you have time constraints, limited in-house technical resources, or other dilemmas, you may prefer to employ consulting or system integration services. You can rely on the expertise available through our worldwide network of Alliance Program members. To find out more about our Alliance system integration solutions, visit the System Integration section of ni.com.

Worldwide Support

National Instruments has offices located around the world to help address your support needs. You can access our branch office Web sites from the Worldwide Offices section of ni.com. Branch office Web sites provide up-to-date contact information, support phone numbers, e-mail addresses, and current events.

If you have searched the technical support resources on our Web site and still cannot find the answers you need, contact your local office or National Instruments corporate. Phone numbers for our worldwide offices are listed at the front of this manual.

Glossary

D

DAQ *See* data acquisition.

data acquisition DAQ. Process of acquiring data, typically from A/D or digital input plug-in devices.

L

LED Light-emitting diode.

M

MAX Measurement & Automation Explorer. *See also* Measurement & Automation Explorer.

Measurement & Automation Explorer The standard National Instruments hardware configuration and diagnostic environment for Windows.

N

noise An undesirable electrical signal—noise comes from external sources such as the AC power line, motors, generators, transformers, fluorescent lights, soldering irons, CRT displays, computers, electrical storms, welders, radio transmitters, and internal sources such as semiconductors, resistors, and capacitors. Noise corrupts signals you are trying to send or receive.

P

Plug and Play devices Devices that do not require DIP switches or jumpers to configure resources on the devices. *Also called* switchless devices.

S

scan rate The number of scans per second. For example, a scan rate of 10 Hz means sampling each channel 10 times per second.

T

trigger Any event that causes or starts some form of data capture.

V

VI *See* virtual instrument (VI).

virtual instrument (VI) Program in LabVIEW that models the appearance and function of a physical instrument.