Run-Time System Guide

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National Instruments Corporate Headquarters
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About This Manual

The *BridgeVIEW Run-Time System Guide* contains the information you need to get started with the BridgeVIEW Run-Time System software package. This manual explains the BridgeVIEW environment, tag configuration, alarms and events, and historical data logging and extraction.

This manual assumes that you know how to operate your computer and that you are familiar with its operating system.

Organization of This Manual

- Chapter 1, *Introduction*, describes the unique BridgeVIEW approach to Supervisory Control and Data Acquisition (SCADA). It also contains system configuration, installation instructions and basic information that explains how to use BridgeVIEW.
- Chapter 2, *BridgeVIEW Environment*, describes the BridgeVIEW environment. It explains the BridgeVIEW Engine Manager, system errors and events, the Tag Monitor utility, and the Tag Browser utility. This chapter also explains how to access online help for BridgeVIEW.
- Chapter 3, *Tag Configuration*, explains tags, the Tag Configuration Editor, and how you edit tags within the BridgeVIEW system.
- Chapter 4, *Alarms and Events*, introduces the basic concepts of alarms and events, and explains how to view, acknowledge, and configure them within the BridgeVIEW system.
- Chapter 5, *Historical Data Logging and Extraction*, explains the concept of a trend, how to log and extract historical data, and how to use the Historical Trend Viewer (HTV), a utility that displays historical data that has been logged to disk with BridgeVIEW.
- Chapter 6, *BridgeVIEW Security*, explains BridgeVIEW Environment Security.
- Chapter 7, *Servers*, explains how to use servers with BridgeVIEW. BridgeVIEW supports several types of servers including OPC Servers, DDE Servers, and IA Device Servers.
- Appendix A, *Citadel and Open Database Connectivity*, describes the Citadel database and the Open Database Connectivity (ODBC) driver, and includes several examples of how to use it.

- Appendix B, *Customer Communication*, contains forms to help you gather the information necessary to help us solve your technical problems, and a form you can use to comment on the product documentation.
- The *Glossary* contains an alphabetical list of terms used in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.
- The *Index* contains an alphabetical list of key terms and topics in this manual, including the page where you can find each one.

Conventions Used in This Manual

The following conventions are used in this manual:

bold	Bold text denotes a parameter, menu name, palette name, menu item, return value, function panel item, or dialog box button or option.
italic	Italic text denotes mathematical variables, emphasis, a cross reference, or an introduction to a key concept.
bold italic	Bold italic text denotes an activity objective, note, caution, or warning.
`monospace`	Text in this font denotes text or characters that you should literally enter from the keyboard. Sections of code, programming examples, and syntax examples also appear in this font. This font also is used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, variables, filenames, and extensions, and for statements and comments taken from program code.
`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 that you must enter the appropriate words or values in the place of these items.
<>	Angle brackets enclose the name of a key on the keyboard—for example, <PageDown>.
-	A hyphen between two or more key names enclosed in angle brackets denotes that you should simultaneously press the named keys—for example, <Control-Alt-Delete>.
<Control>	Key names are capitalized.

»	The **»** symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** option from the last dialog box.
paths	Paths in this manual are denoted with backslashes (\) to separate drive names, directories, and files, as in `C:\dir1name\dir2name\filename`.
☞	This icon to the left of bold italicized text denotes a note, which alerts you to important information.

Related Documentation

The following document contains information that you might find helpful as you read this manual:

- BridgeVIEW Run-Time System *Online Reference*, available online by selecting **Help»Online Reference**

Customer Communication

National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix B, *Customer Communication*, at the end of this manual.

1

Introduction

This chapter describes the unique BridgeVIEW approach to *Human Machine Interface (HMI)* and Supervisory Control and Data Acquisition (SCADA). It also contains system configuration, installation instructions, and basic information that explains how to use BridgeVIEW. This chapter refers you to other chapters or manuals for more information.

Welcome to BridgeVIEW

The BridgeVIEW Run-Time System provides an environment to run Human Machine Interface (HMI) and SCADA applications developed in the BridgeVIEW Full Development System.

Required System Configuration

The BridgeVIEW Run-Time System is distributed on a CD-ROM that includes the complete BridgeVIEW Run-Time System2.0 release.

The Windows 95/NT version of the BridgeVIEW Run-Time System runs on any system that supports Windows 95 or Windows NT 4.0. A minimum of 24 MB of RAM is required for this version to run effectively. We recommend 32 MB of RAM and at least 30 MB of swap space available on your system.

☞ **Note** ***The standard BridgeVIEW Run-Time System installation requires approximately 40 to 60 MB of disk space. If you plan to install the NI-DAQ Server as well, an additional 30 MB of disk space is required.***

Installation

Complete the following steps to install the BridgeVIEW Run-Time System.

1. Insert the CD in your CD-ROM drive.
2. Run the BridgeVIEW Run-Time System installer.
   a. If you have Windows 95 or Windows NT 4.0 and your system uses the AutoPlay feature, the Welcome to BridgeVIEW screen appears a short time after you insert the CD.

b. If you have a system not using AutoPlay, run the following program:
`X:\bvsetup.exe`
where *X* is the letter of your CD-ROM drive.

3. Choose an installation. The installer offers several installation types: Standard, Full, Minimum, and Custom. The Standard installation requires approximately 40 to 60 MB.

☞ **Note** ***Consult your application software documentation or check with your system developer to determine which type of installation to choose. See the Where Should I Start? section later in this chapter for more information on the different installation types.***

4. After selecting an installation, follow the instructions that appear on your screen.

What Is BridgeVIEW?

BridgeVIEW is a software package specifically targeted at industrial automation applications. BridgeVIEW provides configurable solutions for common HMI and SCADA functions while leveraging the flexibility of graphical programming. BridgeVIEW is built around the G programming language, created by National Instruments Corporation.

With BridgeVIEW, you can acquire data and control one or more distributed devices in an overall facility. BridgeVIEW can change set points or send control instructions to the individual devices while monitoring the entire system. It also can gather information like alarms and measurement points from these devices.

Common devices used for data acquisition include Programmable Logic Controllers (PLCs), plug-in Data Acquisition boards, and other distributed Input/Output (I/O) modules. BridgeVIEW device servers communicate with these non-plug-in devices through RS-232, RS-485, TCP/IP, DDE, netDDE, direct I/O, or other proprietary interfaces. BridgeVIEW device servers provide the necessary protocol software to communicate with these devices. BridgeVIEW also operates directly with OPC servers.

The BridgeVIEW Run-Time System is an execution environment for applications (also referred to here as application software) created using the BridgeVIEW Development System. With the Run-Time System, you cannot edit the Virtual Instruments (VIs) used to create the HMI of an application. Your application software consists of a set of VIs for the HMI and supporting functionality of the software, the definition of all data points

in the system (tags), and the configuration of the servers that provide data to BridgeVIEW and your application.

This guide does not address the specific nature of the application software executed in the BridgeVIEW Run-Time System. Instead, it describes the features of BridgeVIEW, its architecture, execution system, and configuration tools. The creator of your application software (referred to here as the developer) might provide additional documentation for the application software. Consult the application developer for specific questions about your application software.

How Does BridgeVIEW Work?

BridgeVIEW uses a combination of tags, events, and data. A *tag* is a connection to a real-world I/O point, while an *event* is anything that happens to a tag or to the BridgeVIEW Engine in general. The BridgeVIEW Engine communicates with device servers on one end, and with your HMI application at the other end. The BridgeVIEW Engine maintains a Real-Time Database (RTDB) of tag information and logs historical data and events.

Start by configuring all the tags in your system with the Tag Configuration Editor. Then, you can launch the BridgeVIEW Engine, which reads your configuration file and starts monitoring tags, logging data and events. You also can acknowledge alarms and control output tags. For more information about how to get started with the BridgeVIEW Run-Time System, see the *Where Should I Start?* section later in this chapter.

Tag Configuration

A tag value is acquired and/or controlled by a device server that communicates with the BridgeVIEW Engine. Tags can be of the following types: input, output, Input/Output, or memory. You can configure tags through the Tag Configuration Editor. A tag configuration consists of its data type, connection, scaling, operations, and alarms settings. For more information about this topic, refer to Chapter 3, *Tag Configuration*.

Data Type

A tag *data type* can be analog, discrete, bit array, or string. Analog tags have continuous values with a specified range (such as 0.0 to 100.0). Discrete tags have values that are either ON (1) or OFF (0). Bit array tags are comprised of up to 32 bits, each of which can have an ON (1) or OFF (0)

state. String tags consist of ASCII characters or binary data and can be of any length.

General

General includes the following tag attributes:

- Tag name
- Tag description
- Tag group
- Length (for bit array and string tags)

Connection

Connection includes the following tag attributes:

- Access rights (input only, output only, Input/Output, or memory)
- Server name
- I/O group name
- Item name
- Access path (for OPC servers)

Scaling

Scaling controls the type of scaling to perform on a tag when communicating with a device server, and the expected engineering range and units for the tag.

Operations

You can specify how the BridgeVIEW Engine updates the *Real-Time Database (RTDB)*, when it logs the tag data to disk, if it logs events associated with the tag, and what value exists in the database at startup. The *operations* that can be performed on a tag are as follows:

- Updating the Real-Time Database
- Historical logging
- Event logging
- Event printing

Alarms

An *alarm* is an abnormal process condition. For example, an analog tag can be configured to be in a HI alarm state when its value is greater

than 25. You can set alarm limits for a tag in the Tag Configuration Editor. Each alarm limit has a priority associated with it to determine the severity of the alarm.

Events

An event is something that happens within the BridgeVIEW system. Events can be divided into two groups: those that pertain to individual tags and those that pertain to the overall BridgeVIEW system. Events pertaining to tags include the following:

- A tag going in or out of alarm
- An operator changing the value of a tag
- An operator acknowledging an alarm

Events pertaining to the system include the following:

- The launching or shutting down of the Engine
- A new operator logging on
- An error from a server

The Engine also maintains alarm summary and event history information pertaining to tags. This information can be viewed by your HMI and/or be logged to disk.

Historical Data Logging and Extraction

You can extract data from the historical database to view the trend of tag data over time. The BridgeVIEW Engine manages logging data to the Citadel Historical Database. A *trend* is a view of data over time. Trends can be real-time (current data) or historical (logged data). You can view logged data with a user interface (HMI) or with the Historical Trend Viewer (HTV). For more information about historical data logging and extraction or the Citadel Historical Database, see Chapter 5, *Historical Data Logging and Extraction*, or Appendix A, *Citadel and Open Database Connectivity*.

Security

Environment security is built into BridgeVIEW and determines access to certain parts of the BridgeVIEW environment. BridgeVIEW security is broken into two general categories:

- BridgeVIEW Environment Access Privileges
- Operator Interface Security

What Is the BridgeVIEW System Architecture?

The BridgeVIEW system contains three sets of processes: the user HMI Application, the BridgeVIEW Engine, and industrial automation device servers, as shown in Figure 1-1. These processes interact through a client-server relationship.

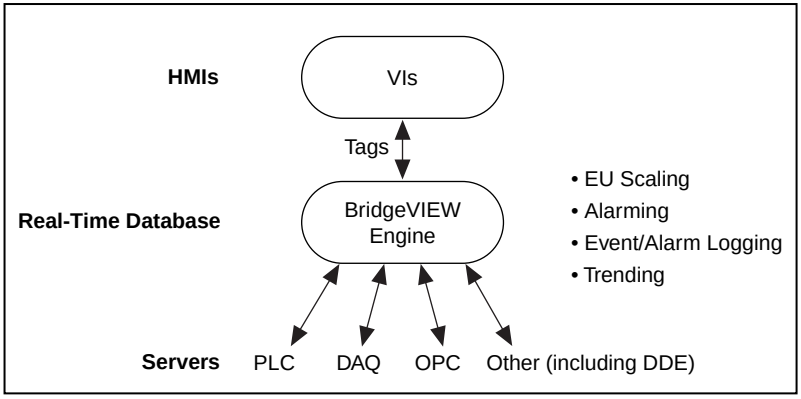


Figure 1-1. BridgeVIEW Architecture

The BridgeVIEW Engine, with any device servers, runs as a separate process independent of your HMI application. Your HMI application is built as a collection of VIs developed using the G programming language.

BridgeVIEW maintains a high performance Real-Time Database in the BridgeVIEW Engine that provides information to client applications. The BridgeVIEW Engine also performs other functions including the following:

- Data acquisition, engineering unit (EU) scaling, and alarm processing
- Alarm and event logging
- Historical data collection and trending

EU scaling converts the Raw Range value from the device server to the engineering value used in the user application and vice versa.

BridgeVIEW Engine

The *BridgeVIEW Engine* is the heart of the BridgeVIEW System. This minimizes interference between the Engine and your HMI. The BridgeVIEW Engine maintains the Real-Time Database of all tag values and alarm states. It reads values from the various device servers. These

values are scaled and compared with their alarm limits. If a tag is in an alarm state, the Engine generates appropriate events and logs them to disk.

The Real-Time Database (RTDB) is an in-memory snapshot of the state of all tags in the system. If a tag value changes more than its update deadband, or its alarm state changes, the RTDB is updated. Along with tag values, the RTDB also stores status, date, time, and alarm information.

Device Servers

A *device server* is the application that communicates with the I/O devices such as PLCs and plug-in cards. Several National Instruments device servers are written to a National Instruments standard client/server Application Programming Interface (API) for the BridgeVIEW Engine. BridgeVIEW also communicates with OPC and DDE Servers. There are different servers for different device manufacturers and communication networks.

The device servers that support the BridgeVIEW Engine are stand-alone programs launched by the BridgeVIEW Engine, and thereafter run in the background, reading selected input items and writing them on demand. Each server either is configured by BridgeVIEW when tags are created, or has a specific configuration utility that determines communication parameters, I/O poll rates, and device addresses. A server completes operation only when the BridgeVIEW Engine shuts down.

Input items are polled by servers at a rate determined by the BridgeVIEW I/O group configuration. For each input item, the device server passes the value, the timestamp of when the item was sampled, and status information to the BridgeVIEW Engine. Output items are written on demand only when the BridgeVIEW Engine passes a new output value to the server.

The device server monitors the items and encapsulates all device and hardware-specific details, thereby providing a hardware- and software-independent layer to the user HMI and SCADA application. For more information about device servers, see Chapter 7, *Servers*.

Where Should I Start?

Install the BridgeVIEW Run-Time System

See the *Installation* section at the beginning of this chapter for more information on installation. The following table lists what is included in the different installation types.

Installation Type	Includes
Minimum	Tag Configuration Editor, basic security tools, core VI libraries
Standard	Tag Configuration Editor, all security tools, Historical Trend Viewer, Tag Browser, Tag Monitor, core VI libraries, advanced analysis libraries, and online help,
Full	Tag Configuration Editor, all security tools, Historical Trend Viewer, Tag Browser, Tag Monitor, core VI libraries, advanced analysis libraries, online help,Instrument Wizard, DAQ, GPIB, and VISA libraries
Custom	Select which utilities and libraries to install.

☞ **Note** ***The Launch Engine, Login, Logout, Change Password, and Edit User Accounts utilities are always installed.***

In addition, you might need to install additional drivers for use with your application software during the BridgeVIEW Run-Time System setup. You might also need to install additional data servers for your application software. Consult the documentation for your application software.

Install the Application Software

Follow the instructions provided by the system developer for installing the application software. After installing the files, note the location of the `.scf` and `.ccdb` files.

Install the Required Servers

If your application software uses the NI-DAQ Server for BridgeVIEW, install the NI-DAQ Server from the BridgeVIEW Run-Time System CD. Other servers must be installed separately.

Update Preference Files

Consult the documentation for your application software to ensure any specific preference files for the application are placed in the correct locations. These files contain non-default settings for BridgeVIEW utilities such as `htv.ini`. You can edit these files with a simple text editor such as Notepad. Specific instructions about these preference files should be included with your application software.

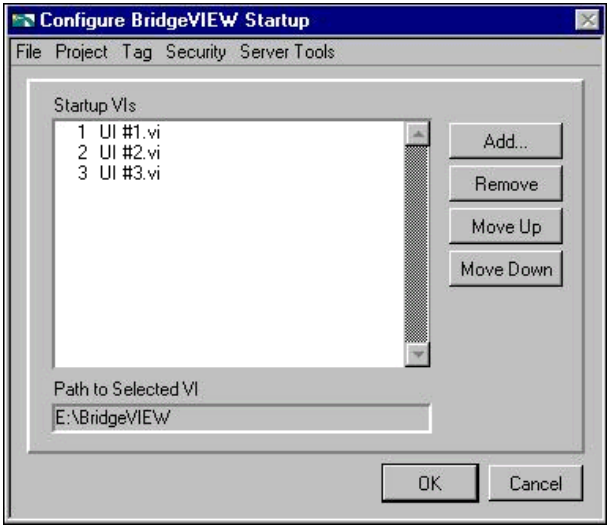
Finish Server Setup

For National Instruments Device Servers, you might need to resolve the paths to the servers stored in the `.ccdb` file. Use the Server Explorer to do this. The Server Explorer is installed when you install servers from the National Instruments Device Servers CD. Start the Server Explorer, select **File»Open…**, locate the `.ccdb` file for your application software, and choose **File»Set this file as Active CCDB**.

VI-based servers (if used by your application) provide their own Server Registration VIs, as described in your application software documentation.

Configure BridgeVIEW Startup

Launch the BridgeVIEW Run-Time System. The first time you run it, you might be prompted to configure one or more startup VIs, as shown in the illustration below. These startup VIs are the user interface panels that appear when you launch the BridgeVIEW Run-Time System. Use the Configure BridgeVIEW Startup dialog box to locate the appropriate startup VIs, as identified in your application software documentation. If you do not define at least one startup VI, you are prompted to either configure the startup VIs or exit the application.



If your application starts the engine when it launches, and the servers are not registered properly, you receive error messages identifying the servers that did not start. Consult your application software documentation for more information about which servers are required, and how to register them.

2

BridgeVIEW Environment

This chapter describes the BridgeVIEW environment. It explains the BridgeVIEW Engine Manager, system errors and events, the Tag Monitor utility, and the Tag Browser utility. This chapter also explains how to access online help for BridgeVIEW.

BridgeVIEW Environment Project Menu

Note ***Your application software might not provide access to the* Project *menu. If you require access to this menu, contact the application developer.***

The BridgeVIEW system is comprised ofa collection of software tools designed specifically for industrial automation applications. You can access these tools through the **Project** menu in your BridgeVIEW system. Table 2-1 provides a brief description of the items in the **Project** menu.

Table 2-1. BridgeVIEW Project Menu Items

Project Menu Item	Description
Configure BridgeVIEW Startup	Opens a utility you can use to configure BridgeVIEW to start particular VIs whenever you start BridgeVIEW.
Historical Trend Viewer	Launches the Historical Trend Viewer (HTV). You can use the HTV to view historical data logged in the Citadel Historical Database. For more information about the HTV, see Chapter 5, *Historical Data Logging and Extraction*.
Launch Engine	Launches the BridgeVIEW Engine. The BridgeVIEW Engine manages the Real-Time Database, communicates with device servers, and performs alarm management and historical data logging. The BridgeVIEW Engine runs according to a configuration file called a `.scf` (SCADA Configuration File) file. You can create and edit `.scf` files using the Tag Configuration Editor. For more information about the BridgeVIEW Engine, see the section *What Is the BridgeVIEW Engine Manager?* in this chapter.

Table 2-1. BridgeVIEW Project Menu Items (Continued)

Project Menu Item	Description
Security»Access Levels	Opens a utility you can use to add, remove, and modify access levels in your BridgeVIEW system. If user accounts are defined in your system, you must have Administration privileges to edit the list of access levels. For more information about security and access levels, see Chapter 6, *BridgeVIEW Security*.
Security»Change Password	Opens a dialog box to change the current user password. You must be logged in to change your password. For more information about security and passwords, see Chapter 6, *BridgeVIEW Security*.
Security»Edit User Accounts	Opens a utility you can use to create and edit user accounts in your BridgeVIEW system. If user accounts are defined in your system, you must have Administration privileges to create and edit user accounts. For more information about security and user accounts, see Chapter 6, *BridgeVIEW Security*.
Security»Login	Opens a dialog box you can use to log in to the system. For more information about security, see Chapter 6, *BridgeVIEW Security*.
Security»Logout	Opens a dialog box you can use to log out of the system. For more information about security, see Chapter 6, *BridgeVIEW Security*.
Security»Privileges	Opens a utility you can use to view your access privileges. For more information about security and access levels, see Chapter 6, *BridgeVIEW Security*.
Server Tools»Server Browser	Launches the Server Browser. You can use the Server Browser to view information about the BridgeVIEW device servers. For more information about the Server Browser, see Chapter 7, *Servers*.
Tag»Browser	Launches the Tag Browser. You can use the Tag Browser to view information on all of the tags in the currently-loaded `.scf` file. If the BridgeVIEW Engine is not running, you can use the Tag Browser to load a different `.scf` file. For more information about the Tag Browser, see the section *What Is the Tag Browser?* in this chapter.

Table 2-1. BridgeVIEW Project Menu Items (Continued)

Project Menu Item	Description
Tag»Configuration	Launches the Tag Configuration Editor. You can use the Tag Configuration Editor to define all of the tags in your BridgeVIEW system. Also, you can configure other Engine parameters in the Tag Configuration Editor. For more information about the Tag Configuration Editor, see Chapter 3, *Tag Configuration*.
Tag»Monitor	Launches the Tag Monitor. You can use the Tag Monitor to monitor the value, alarm state, and status of all tags in the system, as well as write the value to an output or input/output tag. The Tag Monitor launches the BridgeVIEW Engine if it is not already running. For more information on the Tag Monitor, see the *What Is the Tag Monitor?* section in this chapter.

What Is the BridgeVIEW Engine Manager?

When you run any G application that accesses the BridgeVIEW Real-Time Database, the BridgeVIEW Engine launches automatically, opening either the configuration (`.scf`) file you edited most recently or the one your application selects programmatically.

Launching the BridgeVIEW Engine brings up the Engine Manager display, shown in Figure 2-1. The Engine Manager is a window into the BridgeVIEW Engine, through which you can control some of the behavior of the BridgeVIEW Engine.

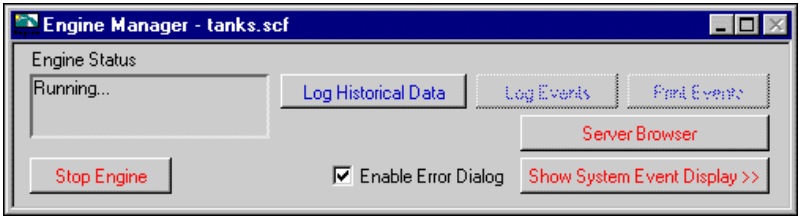


Figure 2-1. Engine Manager Display

Table 2-2 provides a description of each of the fields in the Engine Manager dialog box. This table provides basic information about the Engine Manager dialog box options. For a more complete understanding of how or why you might use the Engine Manager in a BridgeVIEW application, you must understand how to configure tags. See Chapter 3, *Tag Configuration*.

Table 2-2. Engine Manager Field Descriptions

Field	Description
Engine Status	Displays the current status of the BridgeVIEW Engine—whether launching, running, or stopped.
Log Historical Data	Turns on or off logging of historical data to file. This button is pressed automatically if you selected **Start logging on system start-up** in your configuration file. If you do not have a valid event log path configured, or do not have a printer configured, this checkbox is disabled.
Log Events	Turns on or off logging of alarms and events to file. This button is pressed automatically if you selected **Start event logging on system start-up** in your configuration file. If you do not have a valid event log path configured, this checkbox is disabled.
Print Events	Turns on or off printing of alarms and events to your line printer. This button is pressed automatically if you selected **Start printing on system start-up** in your configuration file. If you do not have a printer configured, this checkbox is disabled.
Run/Stop Engine	Starts the BridgeVIEW Engine, or stops the BridgeVIEW Engine and shuts down any loaded servers.
Quit Engine	Closes and exits the BridgeVIEW Engine process.
Enable Error Dialog	Enables or disables the showing of the Error dialog box. If this box is checked, a System Error Display dialog box pops up for you to acknowledge the event when a system error occurs.
Server Browser	Launches the Server Browser Utility. With this utility, you can see the servers in your system, including OPC servers; view server information; and display the server front panel if the server is running (VI-based servers only).
Show/Hide System Event Display	Shows or hides the System Event Display.

The Engine Manager shows the current state of the Engine, and has a System Event Display that shows the following:

- BridgeVIEW System Events
- When the Engine started and stopped
- Which servers have been launched
- Any System Errors that have occurred

This information is written to the current BridgeVIEW System Log File, found in the `BridgeVIEW\Syslog` folder. Figure 2-2 shows how the Engine Manager Display looks when the **Show System Events Display** button is enabled.

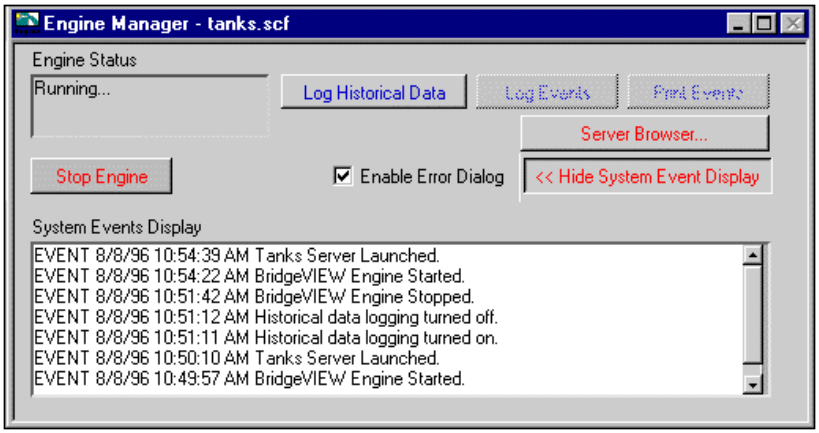


Figure 2-2. Engine Manager with System Events Displayed

Once the BridgeVIEW Engine is launched and running, the Engine Manager is minimized and appears in your Windows taskbar. Click on the BridgeVIEW Engine icon in your taskbar to bring up the Engine Manager display.

You can leave the BridgeVIEW Engine Manager display minimized unless you want to start or stop the Engine, or start or stop historical logging, event logging and printing, view system events, or view server information.

From the Engine Manager, you can reach the Server Browser utility, shown in Figure 2-3, by pressing the **Server Browser…** button. With this utility, you can see the servers in your system, view server information, and display the server front panel if the server is running (VI-based servers only).

The Server Browser is shown in the following illustration. For more information about device servers, see Chapter 7, *Servers*.

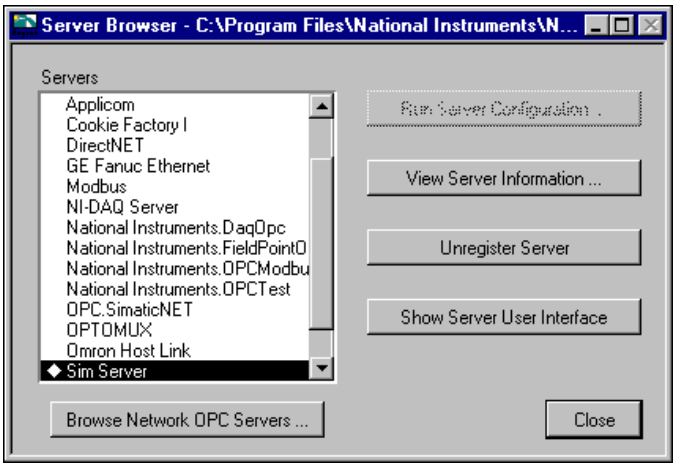


Figure 2-3. Server Browser

The **Show Server User Interface** button appears on the Server Browser dialog box only when you invoke the Server Browser from the Engine Manager.

If your application does not shut down within a few seconds after you close the BridgeVIEW Engine Manager, BridgeVIEW displays a dialog box notifying you to shut down your HMI application. You can ensure your application shuts down when the Engine shuts down by monitoring the **shutdown** output of any Tags or Alarms VI or the Engine Status VI in your diagram.

What Are System Errors and Events?

System errors are conditions on a system level (as opposed to a per tag basis) that result in problematic functioning of the BridgeVIEW system. When a system error occurs, BridgeVIEW prompts the user with a dialog box. You can turn this dialog box on or off.

System events are changes in the system that cause a change in behavior that is not problematic. These include events reported by utilities such as the Tag Configuration Editor.

Detailed system error and event messages are logged to a system log file. The messages are written to an ASCII file with a `.log` extension in the

SYSLOG directory. BridgeVIEW automatically creates this directory, if it does not exist already. The system log file names take the format, YYMMDDHHMM.log where YY = year, MM = month, DD = day, HH = hour, and MM = minute.

What Is the Tag Browser?

With the Tag Browser utility, shown in Figure 2-4, you can view the general configuration of all configured tags in the system. Launch the Tag Browser by selecting **Project»Tag»Browser**.

A list of all the configured tags appears in the listbox. Select a tag by clicking on it, and the configuration for that tag displays on the right. For more detailed tag configuration information or to learn how to edit a tag configuration, see Chapter 3, *Tag Configuration*.

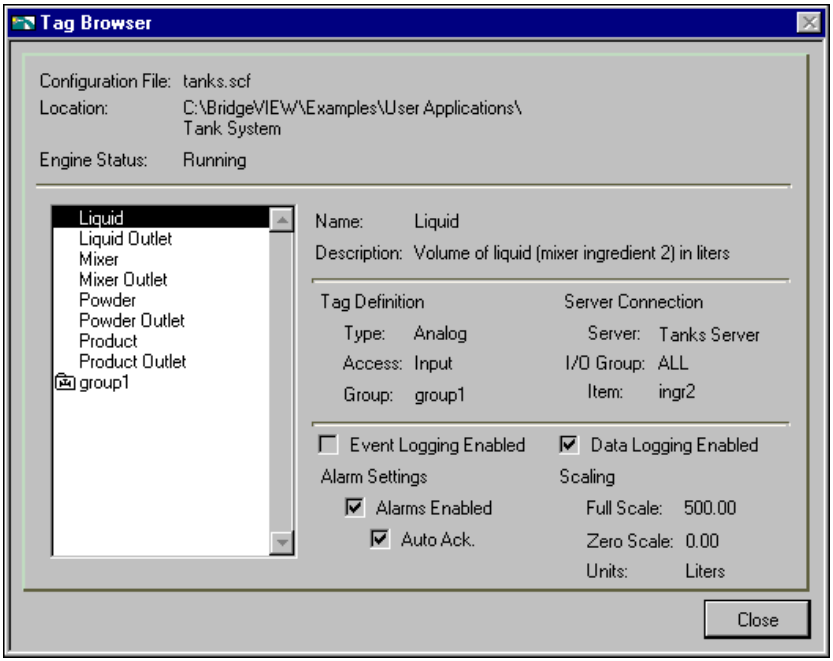


Figure 2-4. Tag Browser Utility

The following table describes each of the fields in the Tag Browser Utility dialog box.

Table 2-3. Tag Browser Field Descriptions

Field	Description
Configuration File	Displays the name of the configuration file you are browsing.
Browse	If the BridgeVIEW Engine is not running, press this button to select a different configuration file.
Location	Displays the full path of the directory containing the configuration file you are browsing.
Engine Status	Displays the current state of the BridgeVIEW Engine, whether it is loaded, running or stopped.
Configured Tags	Displays the list of all tags currently configured. Click on a tag to display the tag configuration on the right.
Edit	Edits the selected tag in the Tag Configuration Editor.
Name	Displays the name of the currently selected tag. Use this display to select and copy the tag name and paste it into your HMI diagram.
Description	Displays the description field for the currently selected tag.
Type	Displays the type of the currently selected tag: analog, discrete bit array, or string.
Access	Displays the access rights for the currently selected tag: Memory, Input, Output, or Input/Output.
Group	Displays the group to which the selected tag belongs. If this field is blank, the tag does not belong to a group.
Server	Displays the name of the server connected to the currently selected tag. If the tag is a memory tag, no server is associated with it.
I/O Group	Displays the name of the I/O group for the currently selected tag. If the tag is a memory tag, no server or I/O group is associated with it.
Item	Displays the name of the item connected to the selected tag. If the tag is a memory tag, no server, I/O group, or item is associated with it.
Alarms Enabled	Displays whether alarms are enabled for the selected tag.
Auto Ack	Displays whether alarms for the selected tag are acknowledged automatically.

Table 2-3. Tag Browser Field Descriptions (Continued)

Field	Description
Full Scale	Displays the full scale engineering value for the tag. This is displayed for analog tags only.
Zero Scale	Displays the zero scale engineering value for the tag. This is displayed for analog tags only.
Units	Displays the engineering unit for the tag. This is displayed for analog tags only.

If the BridgeVIEW Engine is loaded, you can view the tags currently loaded with the Tag Browser. If the BridgeVIEW Engine is not loaded, the Tag Browser displays the currently loaded `.scf` file. Use the **Browse...** button to change the `.scf` file.

The Tag Browser is a useful tool to see how the tags in your system are configured. You also can use the Tag Browser to change the loaded configuration file.

What Is the Tag Monitor?

With the Tag Monitor, you can monitor the value, unit, timestamp, alarm state, and status for selected tags in the system, as well as write the value to an output or input/output tag. You launch the Tag Monitor by selecting **Project»Tag»Monitor**. When you first launch the Tag Monitor, a tag selection dialog box displays all the tags configured in the currently selected tag configuration file. For more information about configuring tags, refer to Chapter 3, *Tag Configuration*.

The following figure shows the Tag Monitor.

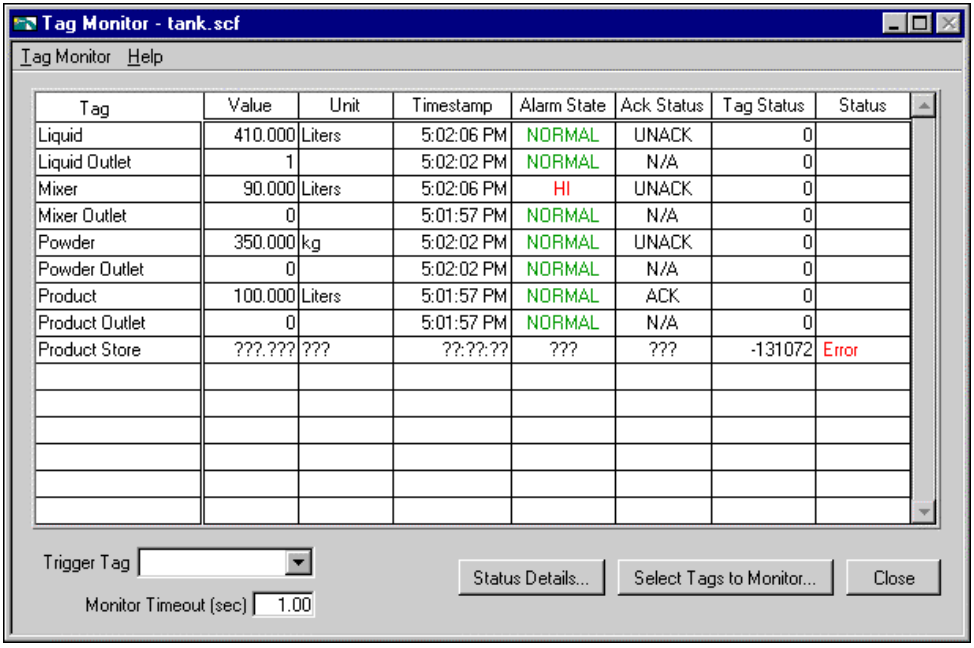


Figure 2-5. Tag Monitor Utility

Note ***Selecting the Tag Monitor from the* Project *menu automatically launches the BridgeVIEW Engine if it is not running already.***

Tag information is shown in a table format, sorted by tag name. When a tag has a non-zero tag status, the Status column indicates if the tag status is `Warning` or `Error`.

The following table describes the fields and captions in the Tag Monitor Utility.

Table 2-4. Tag Monitor Utility Field Descriptions

Field	Descriptions
Tag Display Table	Alphabetically lists the information for tags you have selected, including the value, units, timestamp, status, alarm state and error, if any. For writable tags, which have a yellow background, clicking on the tag's value field brings up the **Write to Tag** dialog box, that lets you specify a new value for that tag. For bit array tags, the radix of the input value must be the same as that of the tag's value field in the Tag Display Table. Click **OK** to write the value in **Value to Input** and exit the dialog box. Click **Apply** to write the value in **Value to Input** and keep the dialog box open.
Trigger Tag	Displays which tag, if any, you have selected to trigger refreshing of the Tag Display Table. If you selected a tag to trigger refreshing of the Tag Display Table, the display refreshes when that tag changes value in the database, or the monitor timeout period is exceeded, whichever occurs first.
Monitor Timeout (sec)	Displays the time interval in seconds that the Tag Display Table is configured to refresh or update. If no trigger tag is selected, the display updates at this time interval. Otherwise, the Tag Display Table refreshes when the tag changes or the timeout interval is exceeded, whichever occurs first.
Status Details	Brings up the **Status Details** dialog box, shown in Figure 2-6, that displays a summary of the status for each tag in the system.
Select Tags to Monitor	Brings up the **Select Tags to Monitor** dialog box, shown in Figure 2-7, that lets you select which tags to monitor and configure how often to refresh the monitor display.

The **Status Details** dialog box, shown in Figure 2-6, displays a summary of the status for each tag in the system. Tags that have a warning are highlighted in blue, and tags in error are red. BridgeVIEW provides a description of the error or warning when possible. Internal codes are reported by BridgeVIEW; the Server Code is returned by the server of the tag. Clicking on **Status Details** is equivalent to selecting **Tag Monitor»Status Details…**.

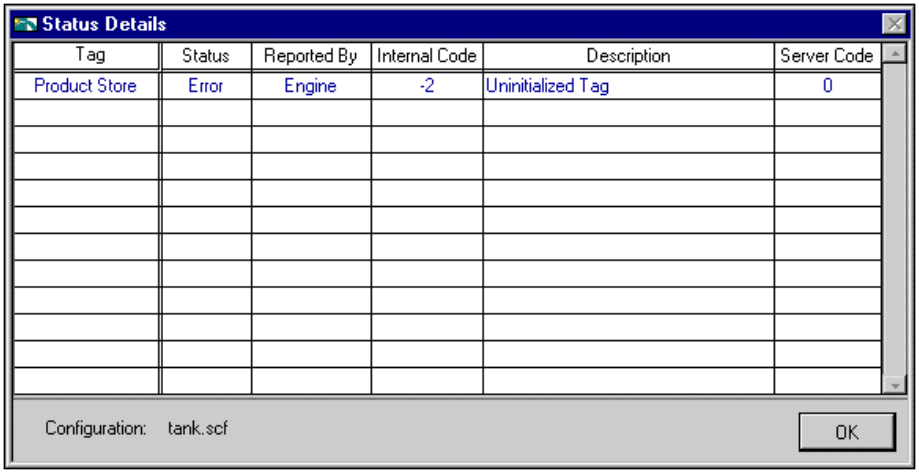


Figure 2-6. Status Details Dialog Box

With the **Select Tags to Monitor** dialog box, shown in Figure 2-7, you can select which tags to monitor and configure how often to refresh the monitor display. The Available Tags list box shows the tags not displayed in the Tag Display Table. By default, the timeout is set to 1.00 second. This controls how often the Tag Display Table is refreshed. By default, no tag is selected to trigger a refresh of the Tag Display Table. You can select a tag to trigger a refresh of the Tag Display Table from the Trigger Tag Ring. Then, the Tag Display Table refreshes each time that tag is updated in the database, or when the timeout interval elapses, whichever occurs first. Clicking on **Select Tags to Monitor** is equal to selecting **Tag Monitor»Select Tags…**.

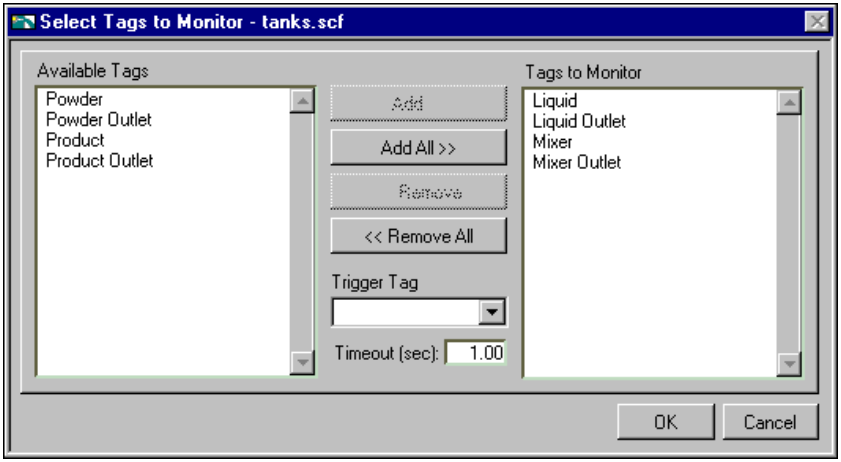


Figure 2-7. Select Tags to Monitor Dialog Box

Select **Tag Monitor»Preferences** to bring up the **Tag Monitor Preferences** dialog box, shown in Figure 2-8, which lets you choose how certain types of tags are displayed. You can control how the displayed precision for analog tags by modifying the Digits of Precision field. For bit array tags, the values can be in binary, octal, or hexadecimal format. The possible values for discrete tags can be 0 and 1 corresponding to Numeric Value; or a set of user-customizable strings, one equivalent to TRUE and the other to FALSE. Check the **Monitor Same Tags in Next Session** check box to keep the same tag list for the next time you launch the Tag Monitor.

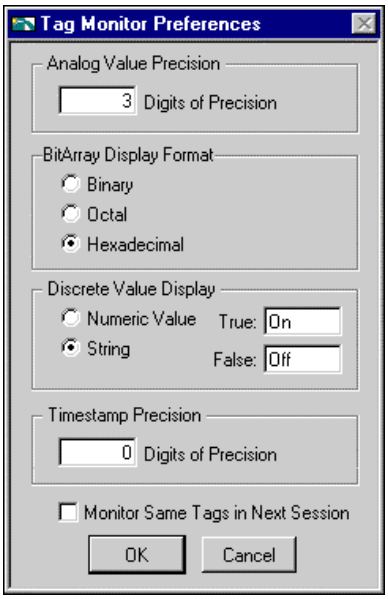


Figure 2-8. Tag Monitor Preferences Dialog Box

How Do You Access Online Help?

The system developer might have included online help for your application software. Consult the documentation for your application or check with the system developer about the availability of application-specific online help.

BridgeVIEW Run-Time System *Online Reference* is available online by selecting **Help»Online Reference** or by double-clicking the `bridge.hlp` file included with the BridgeVIEW Run-Time System package.

3

Tag Configuration

This chapter describes tags, the Tag Configuration Editor, how you edit tags within the BridgeVIEW system. Before you can run a BridgeVIEW application, you must specify a tag configuration.

What Is a Tag?

A *tag* is a data value in the BridgeVIEW Engine. Tags can be used to monitor an I/O point, to store a result of a calculation based on other tags, or to monitor a tag on another BridgeVIEW Engine. A *memory tag* is a tag used for user-specified calculations, and a *network tag* is a tag remotely connected to any type of tag on another BridgeVIEW Engine.

This section defines a tag in terms of its attributes and describes how tag attributes affect Engine operations. You can define and configure tags with the Tag Configuration Editor, described later in this chapter.

Tag Attributes

The BridgeVIEW Engine manages the Real-Time Database (RTDB) which contains information about all the tags in the system. The Engine handles the following tasks:

- Communicates with device servers or other BridgeVIEW Engines
- Scales tag values
- Tracks alarms and events associated with tags, system errors and events
- Logs tag values, alarms, events and system messages to disk

You can customize these tasks by configuring each tag with the Tag Configuration Editor. The Tag Configuration Editor displays five categories of attributes for each tag: general information, connection, operations, scaling, and alarms.

Operations, scaling, and alarms attributes describe how the Engine handles a tag's data. Each attribute can be further classified by the effect on a running Engine from changing the attribute.

General Attributes

General attributes include data type, maximum length for string and bit array tags, and the name, description, and tag group of the tag. The BridgeVIEW system supports four types of tags: analog, discrete, string, and bit array. These types differ by the inclusion of attributes within the operations, scaling, and alarm categories. The tag type is fixed when it is created. You must use the tag name to identify a particular tag. For information on how to configure the general attribute of a tag, see the *General* section later in this chapter.

Connection Attributes

I/O connection attributes describe where the Engine sends or receives values for the tag and how to access that data. These tags have access rights of input, output or input/output. To configure the I/O connection attributes of a tag, refer to the *Connection* section later in this chapter.

Memory tags are not connected to a real world I/O point. Memory tags provide more complex monitoring, alarming, or control. For more information about memory tags, see the *What Is a Memory Tag?* section later in this chapter.

Operation Attributes

Operation attributes describe additional functionality that the Engine performs on a tag or its values. These operations include tasks such as setting initial values and enabling logging operations. To configure the operation attributes of a tag, refer to the *Operations* section later in this chapter.

Scaling Attributes

Scaling attributes describe what linear scaling function is applied to a tag's value. Scaling is useful for converting the range of values from measured units into a calculated range. Only analog (numeric) and Bit Array tags have Scaling attributes. To configure scaling attributes of a tag, see the *Scaling* section later in this chapter.

Alarm Attributes

Alarm attributes describe abnormal process conditions for a given tag. Alarms are useful for notifying users of abnormal conditions. For example, if an analog tag measures the volume of a tank, a HI alarm can be used to indicate that the tank is full and an operator must perform some action and acknowledge this state before processing can proceed. For information on how to configure alarming attributes of a tag, see the *Alarms* section later in this chapter.

Static vs. Dynamic Attributes

Tag attributes are classified as either static or dynamic attributes. *Static attributes* require you to restart the Engine when you change them from the Tag Configuration Editor. A static attribute change is marked with a solid diamond in the Tag Configuration Editor. Examples of static attributes are general attributes and I/O connection attributes, such as server, device, or item.

Dynamic attributes do not require the Engine to restart. The Tag Configuration Editor can change a dynamic tag attribute in a running Engine. A dynamic attribute change is marked with a hollow diamond in the Tag Configuration Editor. Examples of dynamic attributes include enabling logging operations, alarm attributes, and some scaling attributes.

What Is the Tag Configuration Editor?

The Tag Configuration Editor is a tool that assists you in configuring all the parameters of the BridgeVIEW Engine. The chief component of this tool is the configuration of all tags in the system. Other configuration components include Alarm and Event Logging, and Historical Logging.

Caution ***Editing or deleting tags might cause your application software to function incorrectly. Contact the application developer before making any changes to your*** `.scf` ***file.***

To start the Tag Configuration Editor, select **Project»Tag» Configuration…** from the menu bar of an open VI. Figure 3-1 shows the Tag Configuration Editor with `tanks.scf` loaded.

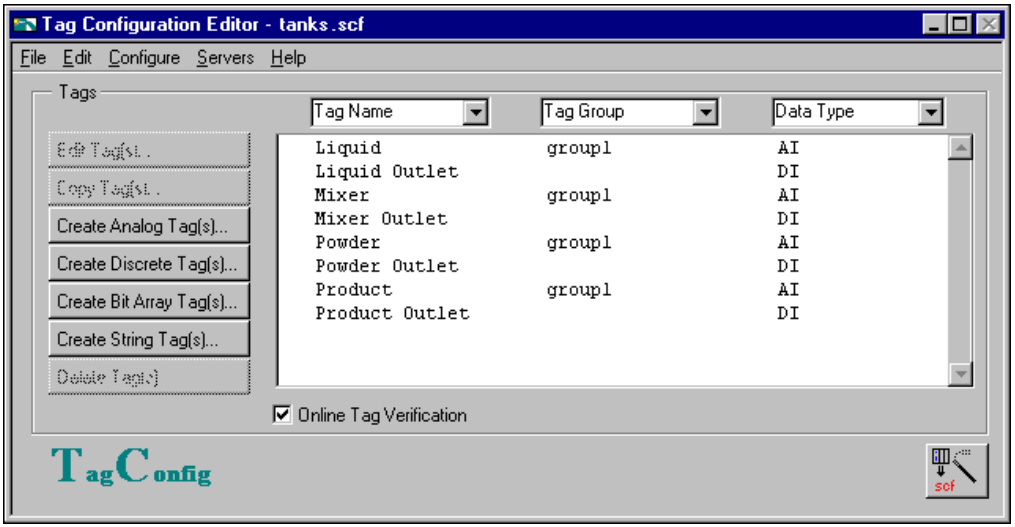


Figure 3-1. Tag Configuration Editor

The Tag Configuration Editor records all tag information and Engine parameters and stores this information in a BridgeVIEW Configuration File with the extension `.scf` (SCADA Configuration File). The BridgeVIEW Engine reads this file to determine all of the configuration parameters for execution. With the Tag Configuration Editor, you can specify the following:

- Tags used in the system
- File paths for historical data and event logging

The `.scf` file does not contain any information about the VIs in your HMI. In fact, it is not specific to a single application. Multiple user applications can run concurrently as long as they use the same set of tags. When you launch the Tag Configuration Editor, the last opened `.scf` file opens automatically.

☞ **Note** ***Only one*** `.scf` ***file can be loaded and running in the BridgeVIEW Engine at a time.***

If you edit a `.scf` file while the Engine is running and select **Save** or **Save As…**, a dialog box confirms if you want to update the Engine with your latest changes. If you want to update the Engine and any static attributes have been changed, the Engine shuts down and restarts. If you have changed only dynamic attributes in the `.scf` file, the Engine is updated without restarting.

☞ **Note** ***Communication between the BridgeVIEW Engine and any device server is stopped temporarily when the Engine shuts down and restarts.***

How Do You Create a Tag?

From the main panel of the Tag Configuration Editor, press one of the following buttons: **Create Analog Tag(s)…**, **Create Discrete Tag(s)…**, **Create String Tag(s)…**, or **Create Bit Array Tag(s)…**. A separate window prompts you to define a new tag. The tag name must be unique within a given configuration (`.scf`) file. Select **OK** on the pop-up window when you finish creating the new tag, or **Create New Tag** to finish creating the new tag and create another tag of the same type. Any changes are not written to disk until you select **Save** from the **File** menu.

☞ **Note** ***For Run-Time System users, creating new tags is unlikely because you cannot modify your application. However, you might find it necessary to modify the properties of a tag.***

How Do You Edit a Tag?

From the main panel of the Tag Configuration Editor, select one or more tags from the tags listed and press the **Edit Tag(s)...** button. A separate window displays the attributes for the tags you select, which you can then edit. When you finish editing a tag, select **OK** to save your changes and return to the main panel, **Edit Next Tag** to save your changes and go on to the next tag, or **Cancel** to discard your changes and return to the main panel. Selecting **Cancel** only cancels the changes made to the current tags. Any changes you make are not permanent until you save the configuration file.

You also can use a spreadsheet to edit multiple tags. Use **File»Export…** to export the tag information to a spreadsheet file, edit the fields, and then use **File»Import…** to import the tag configuration information from the edited spreadsheet file. For more information, see the *How Do You Use Spreadsheet Files for Tag Configuration?* section later in this chapter.

How Do You Delete a Tag?

To delete a tag from a configuration, select the tag(s) from the main panel of the Tag Configuration Editor and press the **Delete Tag(s)** button, and then save the SCF. Tags that will be deleted when you save the SCF are marked with a trashcan symbol. The **Delete Tag(s)** button also serves as an **Undelete Tag(s)** button if all selected tags have a trash can symbol. If you decide you want to keep one or more deleted tags, select those tags and press the **Undelete Tag(s)** button.

Note ***If you delete a tag and save the*** `.scf` ***file, the tag and its configuration information are removed from the*** `.scf` ***file. You still can retrieve historical and event information about the tag, but information such as the tag description, units, range, and alarm settings is lost.***

What are Network Tags?

BridgeVIEW makes it easy to create distributed applications so more than one computer can be involved in an HMI application.

A *BridgeVIEW server* is a computer that allows tags configured in the current `.scf` file to be accessed by other machines connected to the server via a network. The server machine may or may not have an HMI running on it. In order for a machine to function as a BridgeVIEW server, the Engine must use an `.scf` file that has the **Allow Network Access** option enabled.

A *BridgeVIEW client* is a computer that gets its data through tags from one or more BridgeVIEW servers. Tags remotely accessed from BridgeVIEW servers are *network tags*. An `.scf` file for a BridgeVIEW client can have network tags from multiple BridgeVIEW servers. However, a BridgeVIEW client `.scf` can import network tags from only one `.scf` file per server machine.

A BridgeVIEW server can also act as a client and get its data from other BridgeVIEW server machines, as shown in the illustration below.

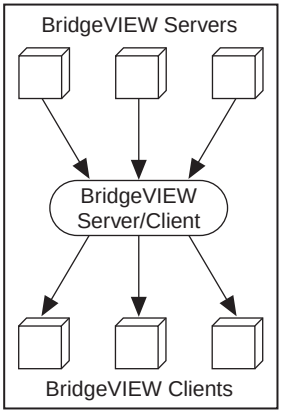


Figure 3-2. Flowchart of Server/Client Interaction

How Do You Add Network Tags?

On the BridgeVIEW server, all tags in an allowed `.scf` file can be viewed by another BridgeVIEW system by opening the Tag Configuration Editor and selecting **Configure»Allow Network Access**. The tags are not shared until the `.scf` file is saved on the server side.

On the BridgeVIEW client, open the Tag Configuration Editor and select **File»Import Network Tags…**. The **Select Tags for Network Import** dialog box, shown in Figure 3-3, allows you to browse the network for an `.scf` file and select tags you wish to import. After selecting the tags you wish to import, save the `.scf` file on the BridgeVIEW client and start the BridgeVIEW Engine.

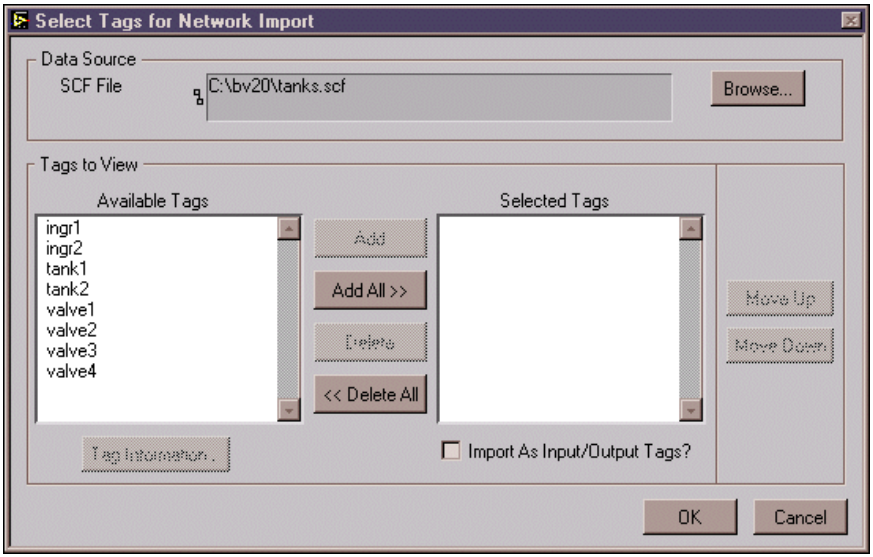
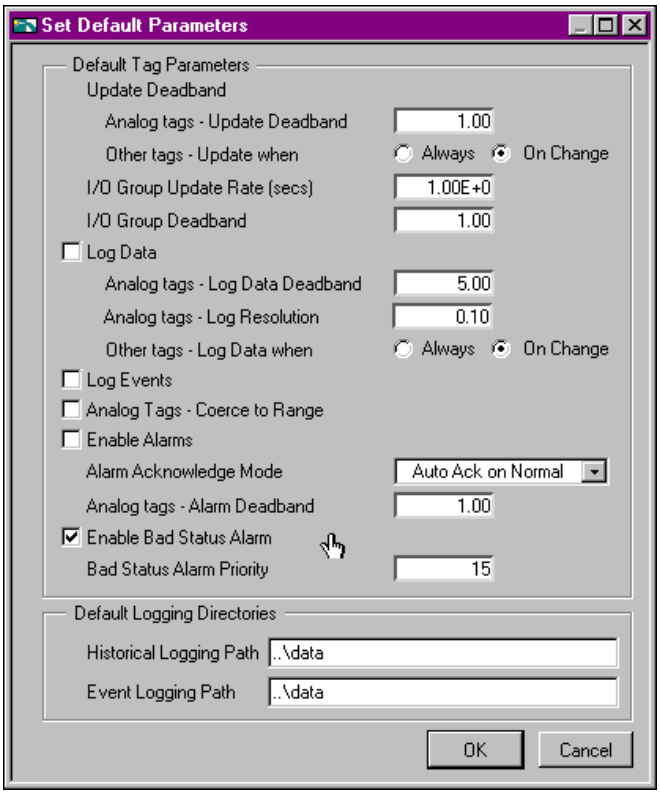


Figure 3-3. Select Tags for Network Import Dialog Box

How Do You Set Default Values for Tag Configuration Fields?

You can simplify the tag configuration process by defining default values for several fields. These default values are then used when you create tags automatically, such as with the Configuration Wizard or by importing. For example, you might want to set the default to **Log Data** or **Log Events**, or set the log deadband to a particular value by default. You can set default values for tag parameters using the Set Default Parameters dialog box, shown below. To access this dialog box, select **Configure»Default Parameters…**.



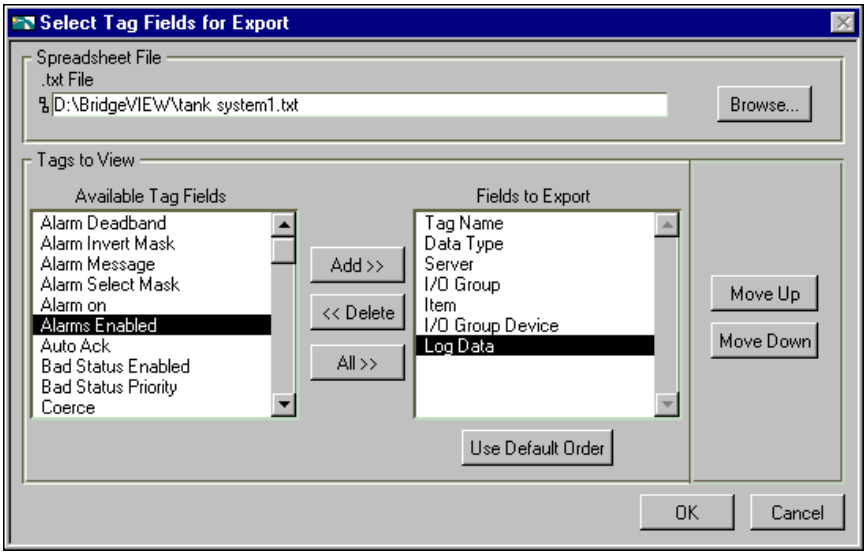
The default values apply when creating a new tag, importing a tag from the server registry, or importing a tag from a spreadsheet. In the case of spreadsheet, a value in the spreadsheet overrides the default value for the field. For more information about the individual fields, see the *How Do You Configure Tags?* section in this chapter.

How Do You Use Spreadsheet Files for Tag Configuration?

With the Tag Configuration Editor, you can export tag configuration information to spreadsheet files, and import tag configuration information from spreadsheet files. The files are tab-delimited text (`.txt`) files.

Select **File»Export…** to save the file as a tab-delimited `.txt` file. When you select **Export…**, a dialog box prompts you to select and order the fields you want in your spreadsheet file. If you intend to edit the spreadsheet file and then import the edited information back into the Tag Configuration Editor, select the **All >>** button to select all available fields.

For easy viewing and editing in the spreadsheet, press the **Use Default Order** button.



After you edit the file, save it as a `.txt` file. Then, from the Tag Configuration Editor, select **File»Import…** to import the information from the spreadsheet file.

If you use spreadsheet files with the Tag Configuration Editor, it is important that you understand the following points:

- If you do not choose all of the fields when exporting your data, you lose configuration information when you import it back to the Tag Configuration Editor.
- You might choose to export a subset of information, and then rely on tag default parameters when you import the data back in to the Configuration Editor. However, each row in the spreadsheet file must contain the tag name and data type fields, or the import mechanism cannot read it.
- Some configuration parameters, such as Historical Logging Configuration and Event Configuration, are inherited from the currently open `.scf` file when you import spreadsheet data.
- When importing, you can append the imported tags to the current `.scf` file.

☞ **Note** ***If the tag name and data type fields are missing, the* File»Import… *option does not work on the spreadsheet file.***

How Do You Configure Tags?

When you configure a tag with the Tag Configuration Editor, you define several attributes for the tag. You can separate these attributes into five categories: general, connection, operations, scaling, and alarms. Each of these categories is explained in detail later in this section.

If you import tag configuration information from a spreadsheet, follow the same format in your spreadsheet as indicated in the Attribute column of each of the tables listed above. For more information about using spreadsheets, see the *How Do You Use Spreadsheet Files for Tag Configuration?* section earlier in this chapter.

Data Type

Configuration of a tag varies slightly depending on the data type. The following sections discuss the details of tag configuration for each data type.

Analog Tags

An *analog tag* is a continuous value representation of a connection to a real-world I/O point or memory variable. This type of tag can vary continuously over a range of values within a signal range.

Use an analog tag when you want to express a continuous value (for example, 0 to 100).

Discrete Tags

A *discrete tag* is a two-state (ON/OFF) value representation of a connection to a real-world I/O point or memory variable. This type of tag can be either a 1 (TRUE) or a 0 (FALSE).

Use a discrete tag when you want to express a two-state (ON/OFF) value.

Bit Array Tags

A *bit array tag* is a multi-bit value representation of a connection to a real-world I/O point or memory variable. This type of tag can be comprised of up to 32 discrete values.

Use a bit array tag when you have a multi-bit value in which each of the bits represents a flag or single value that is turned on or off. The maximum length of a bit array tag is 32.

String Tags

A *string tag* is an ASCII character representation of a connection to a real-world I/O point or memory variable.

Use a string tag when you have binary information or an ASCII value. For example, you might use a string tag to obtain values from a bar code reader, or if you have data that does not fit into any other data type.

General

The general attributes of a tag include the name of the tag you are configuring, the group name to use for the tag, a description of the tag, and the maximum length for string and bit array tags. Figure 3-4 shows the **General** tab of the Tag Configuration dialog box.

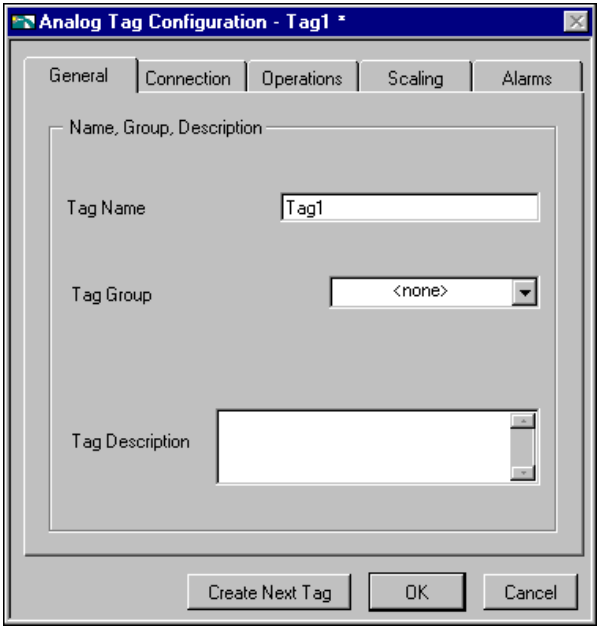


Figure 3-4. General Attributes Dialog Box

Table 3-1 provides descriptions of the general attributes of a tag. For tag attribute information about the other configuration categories, see Tables 3-2, 3-4, 3-5, and 3-7.

Table 3-1. General Configuration Attributes

Attribute	Applies to Data Types	Description
Tag Name	all	Determines the name of the tag you are configuring. Always refer to a tag by its name. Tag names are not case sensitive and can include any combination of printable characters (including space) with the exception of "/" (forward slash) and "\" (backslash).
Tag Group	all	Determines the group name to use for this tag. You can use groups to assist in alarm management and reporting and to help organize tags in an application.
Tag Description	all	Provides a description of the tag.
Maximum Length	string, bit array	Determines the maximum number of bits in the bit array. The length is between 1 and 32 for bit array tags. String tags can be of any length.

Connection

You associate a tag with its real-world I/O point by assigning it a **Server**, **I/O Group**, and **Item** in the **Connection** tab of the Tag Configuration dialog box, shown in Figure 3-5. If an I/O Group does not already exist for the server, you must create one before you can select or enter an item for the tag. The I/O Group is user-defined and provides you with a place to configure the rate and deadband for an item. For IAK and VI-based servers, you select the device as part of the I/O group configuration. For OPC servers, the I/O group conforms to an OPC group.

When you edit a tag, use the ring inputs to assign values to the tag. Use the **Create…**, **Edit…**, and **Delete** buttons to configure I/O Groups and Items. For more information about device servers, see Chapter 7, *Servers*.

Figure 3-5. Tag Connection Dialog Box

If a device server does not appear in the server name list, you must run the configuration or registration utility for your server before BridgeVIEW can access the server.

Table 3-2 provides descriptions of the connection attributes, and indicates the data types to which each attribute applies. For tag attribute information about the other configuration categories, see Tables 3-1, 3-4, 3-5, or 3-7.

Table 3-2. Connection Configuration Attributes

Attribute	Applies to Data Types	Description
Data Type	all	Determines the data type of the tag you are configuring. BridgeVIEW tags can be analog, discrete, bit array, or string.
Tag Access	all	Determines the access rights for a tag. Tags can have access rights of Memory, Input only, Output only, or Input/Output. Memory tags are not directly connected to real-world I/O points. You can use memory tags to monitor and control calculated values and enable historical trending and alarming on these values. Input only, Output only, and Input/Output tags are connected to real-world I/O points according to the Server, Device, and Item fields.
Server	all	Determines the device server that manages the communication of the tag value. If the tag is a memory tag, this attribute is not used.
I/O Group	all	Determines the I/O Group to use for this tag. Select the I/O Group this tag uses. The I/O Group is associated with the server. At least one I/O Group must be created for the server in order to configure a tag to use a server item. If the tag is a memory tag, this attribute is not used.
Item Name Filter	all	Determines the string to filter the list of configured items. If the tag is a memory tag, this attribute is not used.
Item	all	Determines the register, channel, or item on the device for this tag. This might be a PLC register, a data acquisition channel, an OPC item ID, or a DDE item, depending on the server used for this tag. If the tag is a memory tag, this field is not used.
Access Path	all	Determines the access path for the selected server. If the tag is a memory tag or if the server does not have access paths, this attribute is not used.

I/O Group Configuration

I/O Groups are used to configure item rate and deadband for items of a server and to select a specific device, if the server uses devices. For servers that support resource configuration, you also can use I/O groups to configure devices and communication resources. For OPC servers, an I/O group conforms to the concept of an OPC group, which is user-defined and controls timing. An I/O Group is associated with only one server and, if that

server uses devices, with only one device. A server can have multiple I/O Groups associated with it.

I/O Group Configuration Options

The **Create…** button invokes the I/O Group Configuration dialog box, which you can use to specify group name and timing parameters. For servers that support resource configuration, you also can use this dialog box to select and configure devices and to configure communication resources.

The **Edit…** button invokes the I/O Group Configuration dialog box for the I/O Group selected in the I/O Group list. Use this dialog box to change the group name and timing parameters. For servers that support resource configuration, you also can use this dialog box to select and configure devices and to configure communication resources.

The **Delete** button invokes a confirmation dialog box. If confirmed, the I/O Group is deleted from the server configuration. Deleting an I/O Group does not delete the device and communication resource from the server configuration.

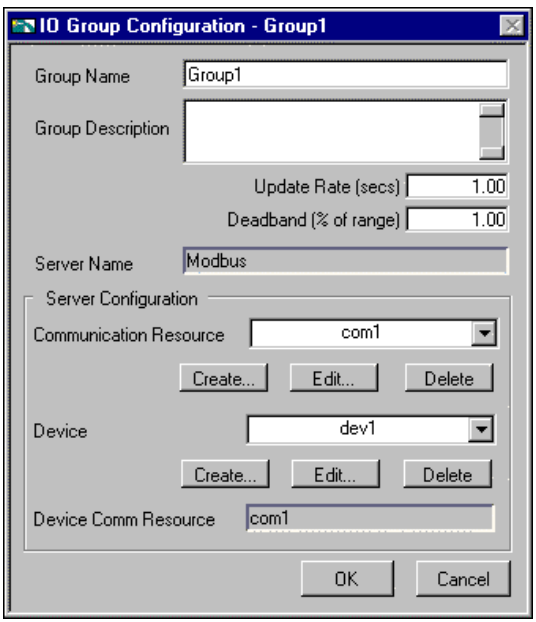


Figure 3-6. I/O Group Configuration Dialog Box

Table 3-3 provides descriptions of the operations that can be performed on an I/O Group. For information about other opeations that can be performed on an I/O Group, see Table 3-2.

Table 3-3. I/O Group Configuration Attributes

Attribute	Description
I/O Group Name	Determines the name of the I/O Group you are configuring. I/O Group names are not case sensitive and can include any combination of printable characters (including spaces) with the exception of "/" and "\".
I/O Group Description	Provides a description for the I/O Group.
I/O Group Update Rate (secs)	Determines the rate for the server to update the item value in the engine for all tags using the I/O Group. The server can have other configuration options that determine the actual update rate. This is the rate at which BridgeVIEW requests all tags configured with this update rate be updated.
I/O Group Deadband (% of range)	Determines the deadband for the server to update the item value in the engine for all tags configured with the I/O Group. Use 0% if you do not want the server to apply deadbands to the item. **Note:** Not all servers support deadbands, and some might ignore this value.
Server Name	Indicates the Server Name associated with the I/O Group you are configuring.
Communication Resource	Provides a means to configure (create, edit, or delete) a communication resource. This field is valid only for IAK servers.
Device	Determines a specific device used by the I/O Group and Server for this tag. If the associated server is an OPC Server, this attribute is not used.
Device Comm Resource	Indicates the communication resource associated with the selected device. This field is valid only for IAK servers.

Server Configuration Options

Use this group of fields to configure and select server resources. Some or all fields in this group might not be used depending on the server type. An IAK server has both Device and Communication Resource configuration capabilities.

Communication Resource Configuration Options

For IAK servers, use the **Create…** button to invoke a new, untitled IAK Create Communication Resource Configuration dialog box. This configuration option is not used for other classes of servers.

For IAK servers, use the **Edit…** button to invoke the IAK Edit Communication Resource dialog box for the currently selected communication resource. This configuration option is not used for other classes of servers.

For IAK servers, use the **Delete** button to remove the selected communication resource from the server configuration. This configuration option is not used for other classes of servers.

Device Configuration Options—Configuring Device Names

This option is available for servers that allow users to configure device names. OPC Servers do not use device names. For DDE Servers, the device name is used to specify the DDE application and topic. See the *How Do You Connect a Tag to a DDE Server?* section later in this chapter for more information.

The **Add…** button invokes the Device Entry dialog box, which you can use to add a new device name for a selected server. If the server does not support device configuration, or if the selected device name is not valid, this button is disabled.

The **Edit…** button invokes the Device Entry dialog box, which you can use to edit an existing device name for a selected server. If the server does not support device configuration, or if the selected device name is not valid, this button is disabled.

The **Delete** button invokes a confirmation dialog box. If confirmed, the selected device name is removed from the device list. If the server does not support device configuration, or if the selected device name is not valid, this button is disabled.

Device Configuration Options—Configuring Device Resources

This option is supported by servers that allow users to configure device resources.

Use the **Create…** button to invoke a new, untitled Create Device Configuration dialog box. The options in this dialog box vary depending on the type of server. If the server does not support device configuration, this button is disabled.

Use the **Edit…** button to invoke the Edit Device Configuration dialog box for the device currently selected in the device list. The options in this dialog box vary depending on the type of server. If the server does not support device configuration, this button is disabled.

Use the **Delete** button to remove the selected device from the server configuration. If the server does not support device configuration, this button is disabled.

Item Configuration Options

Use the **Item Connection** fields in the **Connection** tab (see Figure 3-5) to select and configure the item and access path (for certain OPC Servers only) for a tag.

Configuring Item Names

This option is available for servers that allow users to configure item names.

The **Add…** button invokes the Item Entry dialog box, which you can use to add a new item for a selected server. If the server has access paths, you also can use this dialog box to add an access path. If the server does not support item configuration, this button is disabled.

The **Edit…** button invokes the Item Entry dialog box, which you can use to edit an existing item name for a selected server. If the server has access paths, you also can edit an access path. If the server does not support item configuration, or if the selected item is not valid, this button is disabled.

The **Delete** button invokes a confirmation dialog box. If confirmed, the selected item is removed from the item list. If the server has access paths, the selected access path is removed from the access path list. If the server does not support item configuration, or if the selected item is not valid, this button is disabled.

Configuring Item Resources

This option is supported by servers that allow users to configure item resources.

The **Create…** button invokes a server-dependent configuration dialog box, which you can use to configure a new item for a selected server. If the server does not support item configuration, this button is disabled.

The **Edit…** button invokes a server-dependent configuration dialog box, which you can use to edit the configuration of the selected item. If the server does not support item configuration, or if the selected item is not valid, this button is disabled.

The **Delete** button invokes a confirmation dialog box. If confirmed, the selected item is removed from the server configuration.

The **Browse…** button, which only applies to OPC Servers that support browsing, invokes the Browse OPC Server dialog box. Use this button to browse the list of available items and select an item and associated access path.

What Is a Memory Tag?

Memory tags are tags not connected directly to I/O points. They exist only in the BridgeVIEW RTDB. To configure a memory tag, set the **Access Rights** of a tag to **Memory**.

Note ***If you are a Run-Time System user, creating new tags is unlikely because you cannot modify your application. However, you might find it necessary to modify the properties of a tag.***

When Should You Use a Memory Tag?

Use memory tags when you want to perform alarm calculations, or log historical data and event information on data that is either a software-generated value or a combination of values from different I/O tag readings.

How Do You Automatically Generate Tags from Server Information?

Use the Configuration Wizard to create tags from the server information. The Configuration Wizard is useful if you want the BridgeVIEW Engine to monitor a large number of the I/O points in your system. To invoke the Configuration Wizard, press the **Configuration Wizard** button on the main screen of the Tag Configuration Editor or select **Edit»Configuration Wizard…**. For more information on servers, see Chapter 7, *Servers*.

When you run the server configuration utilities for the servers on your system, you can define devices and items for the I/O points the servers monitor and control. You can automatically create tags from these items with the Configuration Wizard. When the tags are created, the tag name, data type, I/O group, I/O connection, and scaling parameters are

determined by the server information for each server item. The remaining tag parameters are determined by the default tag parameter settings. You can edit the default parameters by selecting opening the Tag Configuration Editor and selecting **Configure»Default Parameters…**.

For IAK and VI-based servers, server information is read from the Common Configuration Database (CCDB). For OPC servers that support it, server information is read by browsing the server address space. When you generate tags, you can either add them to the existing configuration by selecting **Append Tags to SCF?** (default mode) or you can create a new configuration file.

How Do You Connect a Tag to an OPC Server?

You connect to an OPC server just like you connect to the National Instruments device servers from the **Connection** tab of the Tag Configuration dialog box. Any OPC servers installed on your machine are listed in the server name list. Select the OPC server you want to use. Create an I/O Group for the server, specifying the group deadband and update rate. Select or enter the Item name, which is the same as the OPC Server Item ID. You also can select or enter an access path for OPC servers if the server supports that.

How Do You Connect a Tag to a DDE Server?

Although no BridgeVIEW servers are based on Dynamic Data Exchange (DDE), you can connect a tag to any existing DDE Server. Select **DDE Server** as your server in the **Connection** tab of the Tag Configuration Editor to communicate with DDE servers. DDE Servers have an Application Name, Topic, and Item. In BridgeVIEW, the device in the I/O Group Configuration dialog box is set to `appname|topic` (| = the “pipe” symbol) and the item in the **Connection** tab of the Tag Configuration dialog box is set to `item`. For example, to connect a tag to cell `R1C1` (item) of spreadsheet `sheet1` (topic) in Excel (application), set the tag fields to the following:

Server: `DDE Server`
Device: `Excel|sheet1` (in I/O Group Configuration dialog box)
Item: `R1C1`

To specify a particular sheet (`sheet1`) within an open Excel file (`book1.xls`), set the device field to the following:

Device: `Excel|[book1.xls]sheet1` (in I/O Group Configuration dialog box)

How Do You Define a Group of Tags for Alarming?

While editing a tag, pull down the Tag Group Ring in the **General** tab of the Tag Configuration dialog box. You can select an existing tag group or define a new tag group by selecting **Enter New…**. To create, edit, or delete tag group definitions, select **Tag Groups…** from the **Configure** menu from the main Tag Configuration Editor panel.

You can use tag groups to help define a subset of tags in the system. Tag groups are helpful when you want to examine the alarm states for a subset of tags in the system.

Operations

The operations attributes include when to update the tag value in the RTDB, whether to log data to a historical file, whether to log events associated with the tag, and information about the initial value of the tag at Engine startup. Figure 3-7 shows the **Operations** Tab of the Analog Tag Configuration dialog box. With this section of the dialog box, you can inform the BridgeVIEW Engine of what to do with the data in the RTDB.

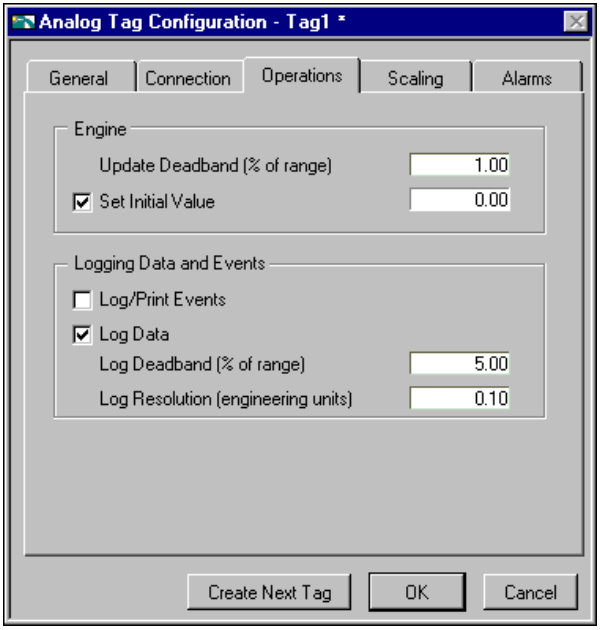


Figure 3-7. Tag Operations Dialog Box

Table 3-4 provides descriptions of the operations attributes, and indicates the data types to which each attribute applies. For tag attribute information about the other configuration categories, see Tables 3-1, 3-2, 3-5, and 3-7.

Table 3-4. Operations Configuration Attributes

Attribute	Applies to Data Types	Description
Update Deadband	all	Determines when the Real-Time Database (RTDB) updates the value for this tag. It is used to improve system performance and prevent unnecessary processing of tag values in the RTDB. The field is expressed differently for analog, discrete, string, and bit array tags. For analog tags, Update Deadband is a percent of full scale. The database updates analog tags only when a new tag value is different than the currently stored value by at least the Update Deadband. Use 0% if you want each new value for the tag to be saved in the RTDB. For discrete, string, and bit array tags, Update Deadband is expressed as either **Always** or **On Change**.
Log Data	analog, discrete, bit array	Determines whether a tag value is logged to historical files.
Log Data Deadband	analog, discrete, bit array	Determines when tag values are logged to disk. It is used to improve system performance and prevent unnecessary logging of data to disk. Like Update Deadband, the field is expressed differently for analog, discrete, and bit array tags. For analog tags, Update Deadband is a percent of full scale. The BridgeVIEW Engine writes new analog tag values to historical files only when a new tag value is different than the last logged value by at least the Log Data Deadband. Use 0% if you want each new value for the tag to be logged. For discrete and bit array tags, Update Deadband is expressed as either **Always** or **On Change**.
Log Resolution	analog	Determines the resolution in engineering units for logging a tag value in the Citadel Historical Database. Tag values are written to the database in a compressed format with the resolution specified by Log Resolution. Use `0.0` if you want the exact value written to the Citadel Historical Database. Notice that logging the exact value requires more time and disk space. The default value is `0.1`.

Table 3-4. Operations Configuration Attributes (Continued)

Attribute	Applies to Data Types	Description
Log/Print Events	all	Determines whether events associated with the tag (for example, changes in alarm state) are logged to event log files or printed to a line printer.
Set Initial Value	all	Determines whether an initial value is used for this tag. If Set Initial Value is OFF for this tag, the tag value is marked as uninitialized until its value is updated.
Initial Value	all	The initial value used for this tag when Set Initial Value is ON. If the tag is an Output only or Input/Output tag, the BridgeVIEW Engine sends the Initial Value to the server at Engine startup. If the tag is an Input only or Memory tag, the Initial Value is stored in the RTDB at startup.

What Is Deadband?

In process instrumentation, *deadband* is the range through which an input signal can vary without initiating an observable change in output signal. Deadband usually is expressed in percent of full scale. Although the term deadband generally applies only to analog tags, other tag types have a limited type of deadband. A checkbox allows you to determine if updates to the RTDB and historical data files should occur with any new data from the device server or if the value has changed.

Note ***The BridgeVIEW Engine performs historical logging and alarm management operations based on new values in the RTDB. If you set the Update Deadband too high, the RTDB might not be updated. This might result in inadequate historical logging or alarm management.***

How Do You Use Deadband to Increase Engine Throughput?

The BridgeVIEW Engine uses Update Deadband and Log Deadband values to eliminate unnecessary processing on minor data value changes. Deadband allows you to define a significant change. The Engine ignores an operation if the change in data is not considered significant. Deadband is expressed as percent of full scale. For example, if the tag engineering range is 0 to 200 liters, a deadband of 5% is 10 liters. In addition, through I/O group configuration, you can configure a server to apply a deadband to any items associated with that I/O group. Not all servers implement deadbands. OPC servers support deadbands.

How Do You Configure a Tag to Log Its Data or Events?

While editing a tag, click on the **Log Data** or **Log/Print Events** checkbox. If you want to log historical data or events, the BridgeVIEW Engine must have these processes enabled. To turn them on, open the Engine Manager and turn on the processes with the panel buttons, or configure the Engine to turn on these processes automatically at startup by selecting **Configure» Historical…** or **Configure»Events…** from the Tag Configuration Editor. You also can enable these parameters programmatically with System VIs that enable event or historical data logging.

How Do You Set Initial Tag Value at Startup?

While editing a tag, select the **Set Initial Value** checkbox. Then enter the initial value in the adjacent **Initial Value** field.

Scaling

These attributes include what type of scaling to perform on a tag when communicating with the device server and the expected engineering range and units for the tag.

Table 3-5, provides descriptions of the scaling configuration attributes, and indicates the data types to which each attribute applies. For tag attribute information about the other configuration categories, see Tables 3-1, 3-2, 3-4, and 3-7.

Table 3-5. Scaling Configuration Attributes

Attribute	Applies to Data Types	Description
Raw Full Scale	analog	Determines the full scale (maximum) value used by the server for a tag.
Raw Zero Scale	analog	Determines the zero scale (minimum) value used by the server for a tag.
Eng Full Scale	analog	Determines the full scale (maximum) value used by the BridgeVIEW Engine and the user application for a tag. Engineering Full Scale must be greater than Engineering Zero Scale.

Table 3-5. Scaling Configuration Attributes (Continued)

Attribute	Applies to Data Types	Description
Eng Zero Scale	analog	Determines the zero scale (minimum) value used by the BridgeVIEW Engine and the user application for a tag. Engineering Zero Scale must be less than Engineering Full Scale.
Units	analog	Determines the engineering units for a tag. Examples include degrees Celsius, liters, and kilograms.
Scaling	analog, discrete, bit array	Determines the type of scaling algorithm to be used for a tag. The scaling methods differ according to tag data type. You can configure analog tags for linear or square root scaling, discrete tags for invert scaling, or bit array tags for mask scaling. All tags can be configured for no scaling.
Coerce	analog	Determines whether to coerce data so that it is valid for the target. If scaling to output, the value must be within the raw (device server) range. If scaling to input, the value must be within the engineering (HMI) range.
Scaling Invert Mask	bit array	Determines which bits are inverted for a bit array tag. Bits in the mask that are `1` are inverted; bits that are `0` are not inverted. The default mask is `0`, indicating none of the bits are inverted. In bit-wise logic terminology, the Engine performs an XOR with the Invert Mask to produce the scaled value.
Scaling Select Mask	bit array	Determines which bits are used for the bit array tag. Bits in the mask that are `1` have their values passed through to the RTDB; bits that are `0` are set to zero, regardless of the value received from the server. In bit-wise logic terminology, the Engine performs an AND with the Select Mask to produce the scaled value.

The next sections explain how to scale data. Often your application needs BridgeVIEW to manipulate the raw data used in the device server to put it in a form, called engineering units, suitable for the operators. The following sections describe the options for individual data types.

Note ***There is no scaling for string tags.***

Analog Tags

You can define the raw range and engineering range for a tag to perform simple conversions between the two ranges. The raw range, defined by Raw Full Scale and Raw Zero Scale, refers to the values used by the device server. Engineering range, defined by Engineering Full Scale and Engineering Zero Scale, refers to the values used by the BridgeVIEW Engine and HMI. Pull down the Scaling ring and select **Linear** to enable a linear *(mx + b)* conversion between raw and engineering ranges. Select **Square Root** to enable a square root conversion between the raw and engineering ranges. Figure 3-8 shows the **Scaling** tab of the Analog Tag Configuration dialog box.

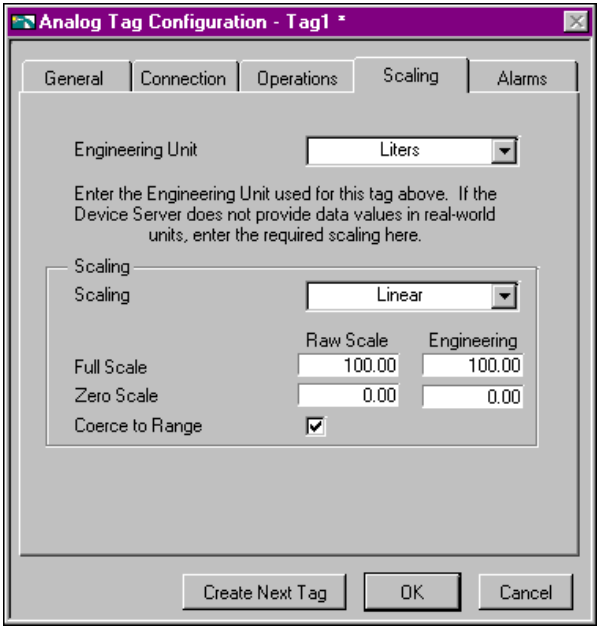


Figure 3-8. Analog Tag Scaling Dialog Box

The following examples describe linear and square root scaling.

Example—Linear Scaling

A device server returns a simple voltage from 0 to 5 V. The voltage is related to a position sensor, and the real-world position is measured in centimeters, with 0 V mapped to 50 cm and 5 V mapped to 100 cm.

Configure the tag for raw range from zero (Raw Zero Scale) to five (Raw Full Scale). Select **Linear**, and set the engineering range from 50 (Eng Zero Scale) to 100 (Eng Full Scale).

Example—Square Root Scaling

A flow meter measures the flow rate of a liquid using a differential pressure reading. The device server provides 4–20 mA readings. The actual flow is measured in gallons per minutes (GPM). 4 mA corresponds to 0 GPM; 20 mA corresponds to 100 GPM.

Configure the tag for raw range from 4 (Raw Zero Scale) to 20 (Raw Full Scale). Select **Square Root Scaling** and set the engineering range from 0 (Eng Zero Scale) to 100 (Eng Full Scale).

How Do You Assign Units to an Analog Tag?

Use the **Engineering Unit** ring to assign units to a tag. If the desired unit is not in the list, select **Enter New…** and enter the desired unit. In the previous example, you select units of GPM.

Discrete Tags

The only scaling available for discrete tags is invert scaling. Click the **Invert Data** checkbox, shown in Figure 3-9 to advise the BridgeVIEW Engine to invert the discrete value when it communicates with the device server.

Figure 3-9. Scaling for Discrete Tag Configuration

Bit Array Tags

Bit array tags can have invert and/or select mask scaling. You can use the invert mask to determine which bits are inverted between the device server and the BridgeVIEW Engine. You can use the select mask to determine the bits you do not need. Figure 3-10 shows the **Scaling** tab of the Bit Array Tag Configuration dialog box, and Table 3-6 provides examples of tags configured for bit array scaling.

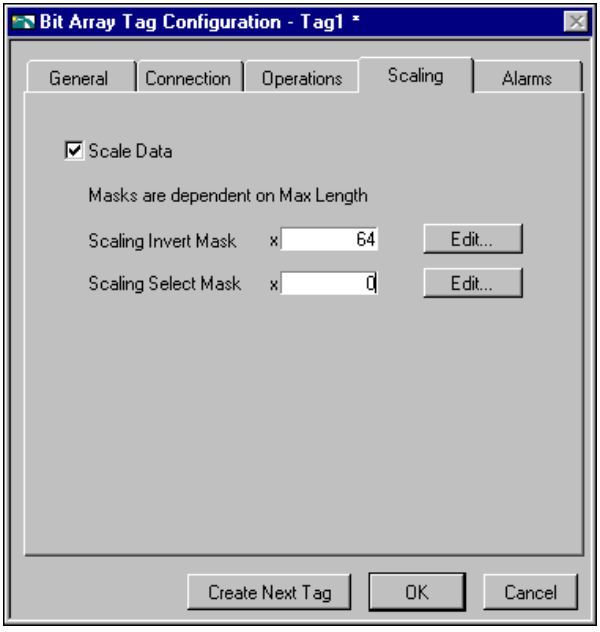


Figure 3-10. Scaling for Bit Array Tag Configuration

Table 3-6. Bit Array Scaling Examples

Tag Name	Length	Raw Value	Invert Mask	Select Mask	Scaled Value
Tag 1	8	0x0F	0x00	0xFF	0x0F
Tag 2	8	0x0F	0x33	0xFF	0x3C
Tag 3	8	0x0F	0x33	0x0F	0x0C
Tag 4	8	0x0F	0x00	0x33	0x30
Tag 5	8	0x0F	0x33	0x33	0x30
Tag 6	16	0x0FF0	0x000F	0x00FF	0x00FF

Alarms

These attributes include whether to enable alarms, under what circumstances a tag is in alarm, the priority level of an alarm, and how alarms are acknowledged. Each alarm limit has a priority, ranging between 1 and 15. In BridgeVIEW, 15 is the highest priority and 1 is the lowest.

There are two main types of alarms:

- Alarms based on status
- Alarms based on tag values

Configuration for alarms based on tag values is specific to data type. Therefore, many alarm attributes apply to only a subset of the BridgeVIEW tag data types. For more information about how to access alarm information, build alarm summary displays, and retrieve historical events files, see Chapter 4, *Alarms and Events*.

Table 3-7 provides descriptions of the alarm attributes, and indicates the data types to which each attribute applies. For tag attribute information about the other configuration categories, see Tables 3-1, 3-2, 3-4, or 3-5.

Table 3-7. Alarms Configuration Attributes

Attribute	Applies to Data Types	Description
Alarms Enabled	all	Determines whether alarms are enabled for a tag.
Alarm Deadband	analog	Determines the amount an analog tag value must diverge from an alarm limit before the alarm condition returns to normal. Alarm Deadband is expressed in percent of full scale.
Auto Ack	all	Determines how alarms can be acknowledged. If set to Auto Ack, the alarm is acknowledged automatically when the tag value returns to the Normal state. If set to User Must Ack, the alarm remains unacknowledged until the user acknowledges it, regardless of the alarm state.
Bad Status Enabled	all	Determines whether to enable Bad Status alarms for the tag.
Bad Status Priority	all	Determines the value (between 1 and 15) for the alarm priority for the Bad Status alarm, where 15 represents the highest priority.
HI_HI Enabled	analog	Determines whether to enable HI_HI alarms for a tag.
HI_HI Limit	analog	Determines the value, in engineering units, that invokes a HI_HI alarm condition. The tag alarm state remains HI_HI until the tag value goes below the HI_HI alarm limit minus the alarm deadband.
HI_HI Priority	analog	Determines the value (between 1 and 15) for the alarm priority for the HI_HI alarm, where 15 represents the highest priority.
HI Enabled	analog	Determines whether to enable HI alarms for a tag.
HI Limit	analog	Determines the value, in engineering units, that invokes a HI alarm condition. The tag alarm state remains HI until the tag value goes below the HI alarm limit minus the alarm deadband.
HI Priority	analog	Determines the value (between 1 and 15) for the alarm priority for the HI alarm, where 15 represents the highest priority.
LO Enabled	analog	Determines whether to enable LO alarms for the tag.

Table 3-7. Alarms Configuration Attributes (Continued)

Attribute	Applies to Data Types	Description
LO Limit	analog	Determines the value, in engineering units, that invokes a LO alarm condition. The tag alarm state remains LO until the tag value goes above the LO alarm limit plus the alarm deadband.
LO Priority	analog	Determines the value (between 1 and 15) for the alarm priority for the LO alarm, where 15 represents the highest priority.
LO_LO Enabled	analog	Determines whether to enable LO_LO alarms for a tag.
LO_LO Limit	analog	Determines the value, in engineering units, that invokes a LO_LO alarm condition. The tag alarm state remains LO_LO until the tag value goes above the LO_LO alarm plus the alarm deadband.
LO_LO Priority	analog	Determines the value (between 1 and 15) for the alarm priority for the LO alarm, where 15 represents the highest priority.
Discrete Enabled	discrete, bit array	Determines whether to enable tag value alarms for discrete and bit array tags.
Alarm on	discrete, bit array	Determines whether a discrete tag should be alarm on ON (high) or OFF (low). Determines whether a bit array goes into alarm if all of its bits are in alarm or if any of its bits are in alarm. This field is used only if both Alarms Enabled and Discrete Enabled fields are set to TRUE.
Discrete Priority	discrete, bit array	Determines the value (between 1 and 15) for the alarm priority for the tag value alarm, where 15 represents the highest priority.
Alarm Invert Mask	bit array	Determines which bits are inverted before calculating the alarm state. Bits in the mask that are `1` are inverted; thus cause an alarm when low (0). Bits that are `0` are not inverted; thus, cause an alarm when high (1). The default mask is 0, indicating none of the bits are inverted. In bit-wise logic terminology, the Engine performs an XOR with the Invert Mask to produce the alarm state. The Alarm Invert Mask is applied to the scaled value after any relevant scaling masks are applied.

Table 3-7. Alarms Configuration Attributes (Continued)

Attribute	Applies to Data Types	Description
Alarm Select Mask	bit array	Determines which bits are used for the bit array alarm calculation. Bits in the mask that are `1` are used in the alarm calculation; bits that are `0` do not cause an alarm, regardless of their value. In bit-wise logic terminology, the Engine performs an AND with the Select Mask to produce the alarm state. The Alarm Select Mask is applied to the scaled value after any relevant scaling masks are applied.
Alarm Message	discrete, bit array	Determines the string used to provide additional information about the meaning of an alarm condition.
Tag Last Modified	all	Indicates when the last edit to a tag occurred.

How Do You Configure Alarms for a Tag?

While editing a tag, click the **Enable Alarms** checkbox. Alarms are generated depending on the value or state of a tag. The alarms based on value vary with the tag data type. But for any tag, if the status is bad, a Bad Status alarm is generated. By default, Bad Status Alarm is enabled and has the highest priority (15). You can change this selection from the Alarms tab of the Tag Configuration Editor, shown in Figure 3-11.

Analog Tags

Analog tags have four alarm levels: HI_HI, HI, LO, and LO_LO. By providing separate alarm levels, you can provide more information about the nature of the alarm condition.

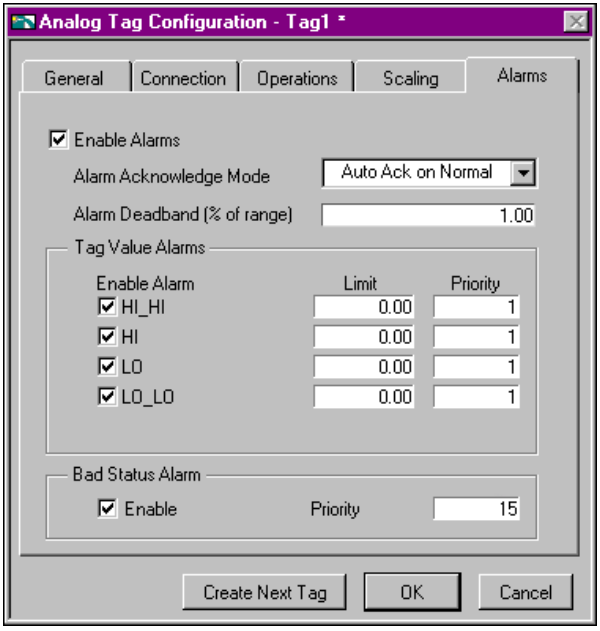


Figure 3-11. Alarms for Analog Tag Configuration

Alarms are calculated after scaling is performed. Alarm levels are expressed in engineering units.

Discrete Tags

Discrete tags have one alarm state—either the tag is in alarm or it is not. You can determine whether a tag is in alarm when it is ON (High) or OFF (Low). Figure 3-12 shows the **Alarms** tab of the Discrete Tag Configuration dialog box.

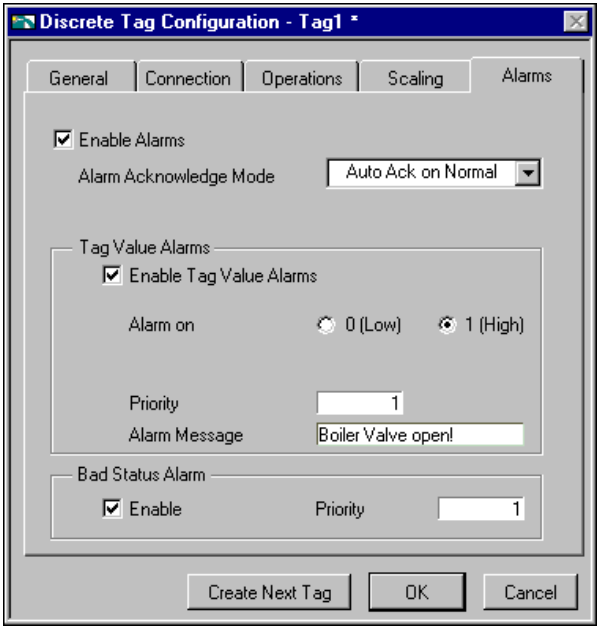


Figure 3-12. Alarms for Discrete Tag Configuration

Bit Array Tags

You can enable one of two types of alarms for bit array tags. Alarm on Any indicates the overall tag is in alarm if any of the bits are in alarm state. Alarm on All means the overall tag is in alarm only if all of the bits are in alarm state. You can use the Invert Mask to determine the bits that should use alarm on low (OFF) rather than the default alarm on high (ON). You can use the Select (AND) Mask to determine the bits that should be considered for the alarm. If you have bits in the Select Mask that are zero (OFF), these bits are not used in calculation of the tag alarm state. Figure 3-13 shows the **Alarms** tab of the Bit Array Tag Configuration dialog box.

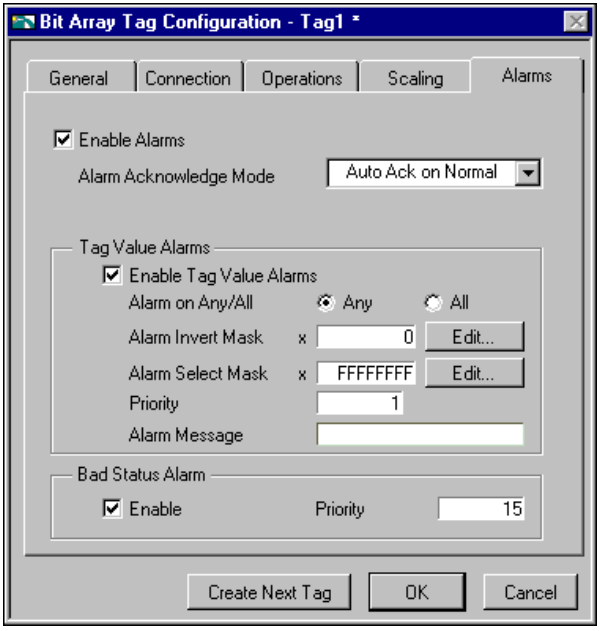


Figure 3-13. Alarms for Bit Array Tag Configuration

String Tags

String tags have no alarm states based on tag value. They only support Bad Status alarms.

What Is Alarm Deadband on Analog Tags?

Alarm Deadband is a method commonly used to avoid repetitive alarm messages because of a tag value that hovers near the alarm limit. Alarm Deadband defines how much a tag value must change from the alarm

limit before it is considered normal. For example, if a tag that represents a temperature value hovers near an alarm limit of 40 degrees Celsius, the tag might go in and out of alarm many times in a relatively short period of time. Table 3-8 shows examples of events with Alarm Deadband set to 0.0%.

Table 3-8. Events with Alarm Deadband = 0.0%

Time	Value	Event	Alarm Type
9:15:05	40.1	Yes	HI
9:15:10	39.9	Yes	Normal
9:15:15	40.1	Yes	HI
9:15:20	38.5	Yes	Normal

This type of situation clogs event files with redundant information and can cause operators some frustration in having to acknowledge alarms constantly when the tag has not changed significantly. You can use the Alarm Deadband to alleviate this problem.

For the tag to go into alarm, it must go above the exact Alarm Value (in the above example, 40). However, to be considered normal again, it must leave the Alarm Value by an amount greater than the Alarm Deadband. For example, if the range is 0 to 100 degrees Celsius, an Alarm Deadband of 1.0% (one degree Celsius) eliminates unnecessary events. Table 3-9 shows examples of events with Alarm Deadband set to 1.0%.

Table 3-9. Events with Alarm Deadband = 1.0%

Time	Value	Event	Alarm Type
9:15:05	40.1	Yes	HI
9:15:10	39.9	No	HI
9:15:15	40.1	No	HI
9:15:20	38.5	Yes	Normal

How Do You Keep an Alarm Unacknowledged after the Alarm Returns to Normal?

While editing a tag, select the **Alarm Acknowledgement Mode** ring and choose either **Auto Ack on Normal** or **User Must Ack**.

Auto Ack on Normal

With this option enabled, when a tag returns to normal state, the alarm is automatically acknowledged. A message is logged to the event file if event logging is turned on for the tag. By default, **Auto Ack On Normal** is enabled.

User Must Ack

With this option enabled, an alarm remains unacknowledged until the operator acknowledges the alarm.

How Do You Configure Other Engine Parameters?

There are other Engine parameters you can configure within the Tag Configuration Editor. You can define your Historical Logging Configuration and Event Configuration by selecting **Configure»Historical…** or **Events…** through the BridgeVIEW Tag Configuration Editor dialog box, shown in Figure 3-1.

How Do You Turn on Historical and Event Logging at Startup?

To turn on historical and event logging at startup, select **Configure»Historical…** or **Events…** from the Tag Configuration Editor. Checkboxes in each dialog box turn on historical and event logging at system startup. For more information, see Chapter 4, *Alarms and Events*, and Chapter 5, *Historical Data Logging and Extraction*.

How Do You Set the File Paths for Historical and Events Files?

From the main panel of the Tag Configuration Editor, select **Configure»Historical…** or **Events…**. The dialog box allows you to set the path to the directories containing historical or events files.

How Do You Configure Shifts?

Shifts are valuable in configuring event logging. Shift start and stop times determine how event files are segmented, and end of shift reports can use these configuration files to determine process and line statistics. From the main panel of the Tag Configuration Editor, select **Configure»Events…**. The panel has a shift display with which you can edit the configuration.

How Do You Configure Engine Parameters?

The BridgeVIEW Engine has several default settings for Engine parameters. However, you can override these defaults within the Buffer Configuration dialog box by selecting **Configure»Engine…** from the Tag Configuration Editor.

The BridgeVIEW Engine allocates certain amounts of memory for various queues. You can configure some of the parameters used by the Engine and Tags VIs to allocate memory for the Engine buffers yourself, but it is recommended you use the default values. The parameters you can configure are listed in Table 3-10.

Table 3-10. Configurable Memory Allocation Parameters

Parameter	Description	Default Value
System Events display (lines	Determines the maximum number of lines of text to be displayed in the System Errors and Events display of the Engine Manager.	20
Error Message repeat rate (seconds)	Determines the time, in seconds, that recurring error messages should be repeated to the user. For example, an undefined tag message error repeats only after this value is exceeded.	600 secs (10 minutes)
Event History Buffer size (elements)	Determines the length, in elements of the queue that handles event information sent from the Engine to `.evt` files.	2000
Historical Log Queue (elements)	Determines the length, in elements, of the queue that handles data sent from the engine to the Citadel historical database.	2000
Server Input Queue size (elements)	Determines the length, in elements, of the queue that handles data sent from the device servers to the Engine.	2000

Table 3-10. Configurable Memory Allocation Parameters (Continued)

Parameter	Description	Default Value
Server Input Queue binary size (bytes)	Determines the length, in bytes, of the queue that handles binary data (string tags) sent from the device servers to the Engine.	2000
Server Output Queue size (elements)	Determines the length, in elements, of the queue that handles data sent from the Engine to the device servers.	2000
Server Output Queue binary size (bytes)	Determines the length, in bytes, of the queue that handles binary data (string tags) sent from the Engine to the device servers.	2000
Server Shutdown timeout (seconds)	Determines the time, in seconds, the Engine waits for all active device servers to shutdown before asking the user if the servers are to be forcefully terminated.	30

☞ **Note** ***Although you can configure these parameters, it is highly recommended you maintain the default values.***

How Do You Launch Server Configuration Utilities from the Tag Configuration Editor?

When you register a server in your system, BridgeVIEW registers the location of its configuration utility, if it exists. You can access the server configuration utilities from the **Servers** menu of the Tag Configuration Editor.

☞ **Note** ***When you update the server registry while the Tag Configuration Editor is running, select* Servers»Refresh *to prompt the Tag Configuration Editor to read the updated information.***

4

Alarms and Events

This chapter introduces the basic concepts of alarms and events, and explains how to view, acknowledge, and configure them within the BridgeVIEW system.

What are Alarms and Events?

An alarm is an abnormal process condition pertaining to a tag. In BridgeVIEW, alarms are generated based on changes in a tag value or status.

An event is something that happens within the BridgeVIEW system. Events can be divided into two groups: those that pertain to individual tags and those that pertain to the overall BridgeVIEW system. An example of a tag event is a change of alarm state for a tag. Examples of system events include a user logging on, the Engine starting up, or historical logging being turned on. For more information about system events, see Chapter 2, *BridgeVIEW Environment*.

Alarm States

For analog tags, an alarm state can be of type HI_HI, HI, LO, or LO_LO. For all data types (analog, discrete, bit array, and string), if the server returns a bad status, and you have enabled alarming on bad status, the tag goes into Bad Status alarm. All data types except string also support alarms based on tag value. If an analog tag exceeds a preconfigured alarm limit, one of these alarms can occur. Discrete and bit array tags are either not in alarm or in alarm.

Alarm Limit

An *alarm limit* is the numeric value an analog tag must exceed to go into an alarm state.

Alarm Priority

An *alarm priority* indicates the severity of an alarm. Priorities range from 1 (lowest) to 15 (highest). You can filter the alarms displayed in your HMI by alarm priority.

How Do You Configure Logging and Printing of Alarms and Events?

You can configure logging and printing options for Alarms and Events through the Event Configuration dialog box, shown in Figure 4-1. This configures the format of alarms and events written to `.evt` files or printed. You can reach this dialog box by choosing **Project»Tag»Configuration**, and then **Configure»Events** from the Tag Configuration Editor.

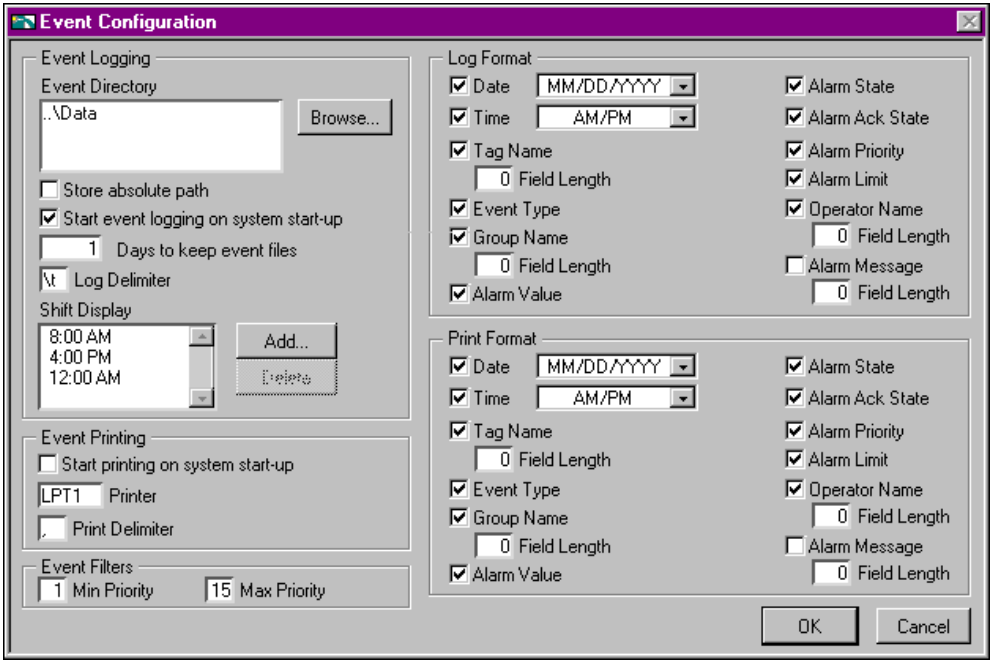


Figure 4-1. Event Configuration Dialog Box

Table 4-1 provides a description of the general event configuration selections.

Table 4-1. Tag Configuration Editor Event Configuration Selections

Selection	Description
Event Directory	Determines the path to the directory where the event files are stored on disk.
Store absolute path	Determines whether the absolute path is stored.
Start event logging on system start-up	Determines whether the BridgeVIEW Engine automatically begins logging events when the Engine launches.
Days to keep event files	Determines how many days worth of event files are kept on disk. Anything older than the number of days specified here is deleted automatically.
Log Delimiter	Determines the separator between parameters on a line. By default, it is the tab character. This makes event files easy to import into a spreadsheet program. Spreadsheet programs can handle other delimiters as well.
Shift Display (`00:00` – `23:59`)	An array of numerics ranging between `00:00` and `23:59` hours to determine the length of the shift that events are logged in a file. At the end of the shift, a new event file is generated and written to.
Start printing on system start-up	Determines whether the BridgeVIEW Engine automatically begins printing events when the Engine launches.
Printer	Determines the port to which your printer is connected.
Print Delimiter	Determines the separator between different parameters on a line. By default, it is a comma.
Min Priority	Determines the minimum priority an event must have before it is logged. Events with priorities below this configured number are not logged. The minimum value is `1`.
Max Priority	Determines the maximum priority an event can have to be logged. Events with priorities above this configured number are not logged. The maximum value is `15`.

There are various format options for logging and printing. The print selections are a set of several parameters that determine the format of the data to be printed. Similarly, the log selections are a set of several parameters that determine the format of the data to be logged in an event file. These parameters are described in the following table.

Table 4-2. Event Configuration, Log, and Print Format Selections

Selection	Description
Date	Determines whether the date is logged or printed.
Date Format	A menu ring that allows you to pick a format for the date to be printed. This selection is valid only if **Date** is selected. The menu items are: `MM/DD/YYYY` and `DD/MM/YYYY`.
Time	Determines whether the time is logged or printed.
Time Format	Determines the format for the time logged or printed. This selection is valid only if **Time** is selected. The menu items are: `AM/PM` and `24 HOUR`.
Tag Name	Determines whether the tag name is logged or printed.
Tag Name Field Length	Determines the maximum number of characters for the tag name. This selection is valid only if **Tag Name** is checked.
Event Type	Determines whether the event name is logged or printed.
Group Name	Determines whether the group name is logged or printed.
Group Name Field Length	Determines the maximum number of characters for the group name. This selection is valid only if **Group Name** is checked.
Alarm Value	Determines whether the alarm value is logged or printed.
Alarm State	Determines whether the alarm state is logged or printed.
Alarm Ack State	Determines whether the alarm acknowledge state is logged or printed.
Alarm Priority	Determines whether the alarm priority is logged or printed.
Alarm Limit	Determines whether the alarm limit is logged or printed.
Operator Name	Determines whether the name of the current operator is logged or printed.
Operator Name Field Length	Determines the maximum number of characters for the operator name. This selection is valid only if **Operator Name** is checked.
Alarm Message	Determines whether the alarm message is logged or printed.
Alarm Message Field Length	Determines the maximum number of characters for the alarm message. This selection is valid only if **Alarm Message** is checked.

How Do You Log Alarms and Events?

Events are logged in ASCII files named in the format `YYMMDDHHMM.evt` using the timestamp of the first point to be logged. `YY` is the year, `MM` is the month, `DD` is the day, `HH` is the hour, `MM` is the minute and `.evt` is the extension for all event log files.

There are three steps you must complete to log alarms and events:

1. Configure your tags to have Log/Print Events enabled. You configure it on a per tag basis. To select event logging for a single tag, go to the panel for configuring the tag.
2. Configure a path to a directory for the event (`.evt`) files. To choose the path, select **Configure»Events…** in the Tag Configuration Editor.
3. Turn on event logging for the BridgeVIEW Engine, according to one of the techniques outlined below.

There are two techniques for turning event data logging on or off:

- You can configure event logging in the Tag Configuration Editor. To turn on event logging, select **Configure»Events…**. Configure the path and set **Start logging on system start-up** to be TRUE.
- The Engine Manager also has a button to turn event logging on or off. If you have Supervise or higher-level privileges, you can access this button.

Table 4-2 provides a description of the event logging configuration selections.

How Do You Print Alarms and Events?

In BridgeVIEW, events are printed to a standard line printer through a parallel port. There are three steps you must complete to print alarms and events:

1. Configure your tags to have Log/Print Events enabled. You configure it on a per tag basis. To select event printing for a single tag, go to the panel for configuring the tag.
2. Configure a printer for event printing. To choose the printer, select **Configure»Events…** in the Tag Configuration Editor.

3. Turn on event printing for the BridgeVIEW Engine, according to one of the following two techniques:
   - You can configure event printing in the Tag Configuration Editor. To turn on printing, select **Configure»Events…**. Configure the printer and set **Start printing on system start-up** to be TRUE.
   - The Engine Manager also has a button to turn event printing on or off. Those with Supervisor or higher-level privileges can access this button.

Table 4-2 provides a description of the printing configuration selections.

How Do You View Alarms and Events?

Event files are ASCII files, and can be read with any text editor. The default delimiter between the various parameters is a tab character, which makes viewing the file in a spreadsheet program, such as Excel, convenient.

5

Historical Data Logging and Extraction

This chapter explains the concept of a trend, how to log and extract historical data, and how to use the Historical Trend Viewer (HTV), a utility that displays historical data that has been logged to disk with BridgeVIEW.

What Is a Trend?

A *trend* is a display of tag values against time. BridgeVIEW displays tag values with two types of trends: real-time trends and historical trends.

Real-Time Trend

A real-time trend is a display of tag values as they are collected in real time over a relatively short period of time.

Historical Trend

A historical trend is a display of tag values that have been logged to disk. This is usually over a relatively long period of time. You can view historical data by launching the HTV utility.

What Is Citadel?

Citadel is a high performance historical database. With Citadel, BridgeVIEW can log tags while continually servicing data queries. BridgeVIEW also includes the Citadel ODBC driver that has special commands to perform data transforms, making it easy for you to retrieve, manipulate, and analyze historical data automatically from outside the BridgeVIEW environment. For more information, see Appendix A, *Citadel and Open Database Connectivity*.

How Do You Log Historical Data?

There are three steps you must complete to log historical data:

1. Configure your tags to have historical logging enabled. You configure it on a per tag basis. To select historical logging for a single tag, go to the panel for configuring the tag.
2. Configure a path for the historical database. To choose the path, select **Configure»Historical…** in the Tag Configuration Editor.
3. Turn on historical logging for the BridgeVIEW Engine, according to one of the three techniques outlined below.

There are two techniques for turning historical data logging on or off:

- You can configure historical logging in the Tag Configuration Editor. To turn on logging, use the pull-down menu for **Configure»Historical…**. Configure the path and set **Start logging on system start-up** to be TRUE.
- The Engine Manager also has a button to turn historical data logging on or off. If you have Supervise or higher-level privileges, you can access this button.

When you log historical data for your application, there is a coupling between your configuration (`.scf`) file and the Citadel Historical Database. When you decide to archive these, take the `.scf` file along with your historical files to the new location. Although you can retrieve historical data without the `.scf` file, you will not have the tag configuration information, such as engineering range and unit, unless you archive the `.scf` file as well.

Preferably, maintain the relative path between the `.scf` file and the historical files in this new location. For example, if your `.scf` file is in `C:\ARCHIVE`, keep your historical database in `C:\ARCHIVE\DATA`. If you save a new `.scf` file and have not specified a historical data directory, you are prompted to specify the path and the directory is created for you.

How Do You Configure Historical Logging?

You can reach the Historical Logging Configuration dialog box by selecting **Configure»Historical…** from the Tag Configuration Editor. Figure 5-1 shows the Historical Logging Configuration dialog box and Table 5-1 lists parameters you can configure for historical logging.

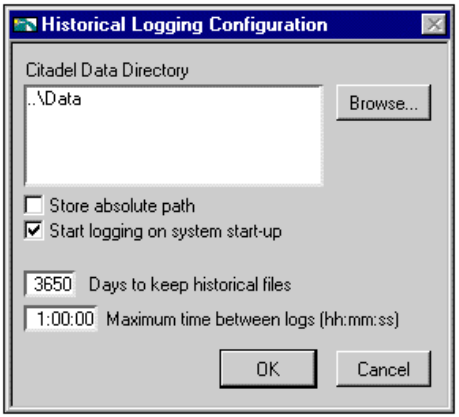


Figure 5-1. Historical Logging Configuration Dialog Box

Table 5-1. Parameters You Can Configure for Historical Logging

Selection	Description
Citadel Data Directory	Path that determines the directory where historical data files are stored on disk.
Store absolute path	Determines whether the absolute path is stored.
Start logging on system start-up	Determines whether the BridgeVIEW Engine automatically begins logging historical data when the Engine launches.
Days to keep historical files	Determines how many days worth of historical log files to keep on disk. Anything older than the number of days configured here is deleted automatically.
Maximum time between log records	Time, in seconds, that determines the logging rate for tags that vary slowly.

How Do You Extract and View Data from Historical Log Files?

In addition to any historical trending tools included with the application software, you can use the Historical Trend Viewer to view historical data that has been logged to disk.

Historical Trend Viewer (HTV)

The HTV is a stand-alone utility that enables you to look at historical data in your system. The HTV limits you to viewing no more than eight tags at a time.

Your application software might offer an alternative way to view historical data. For more information, consult the documentation for your application or the system developer.

To start the HTV, select **Project»Historical Trend Viewer…**. The HTV is shown in the following illustration.

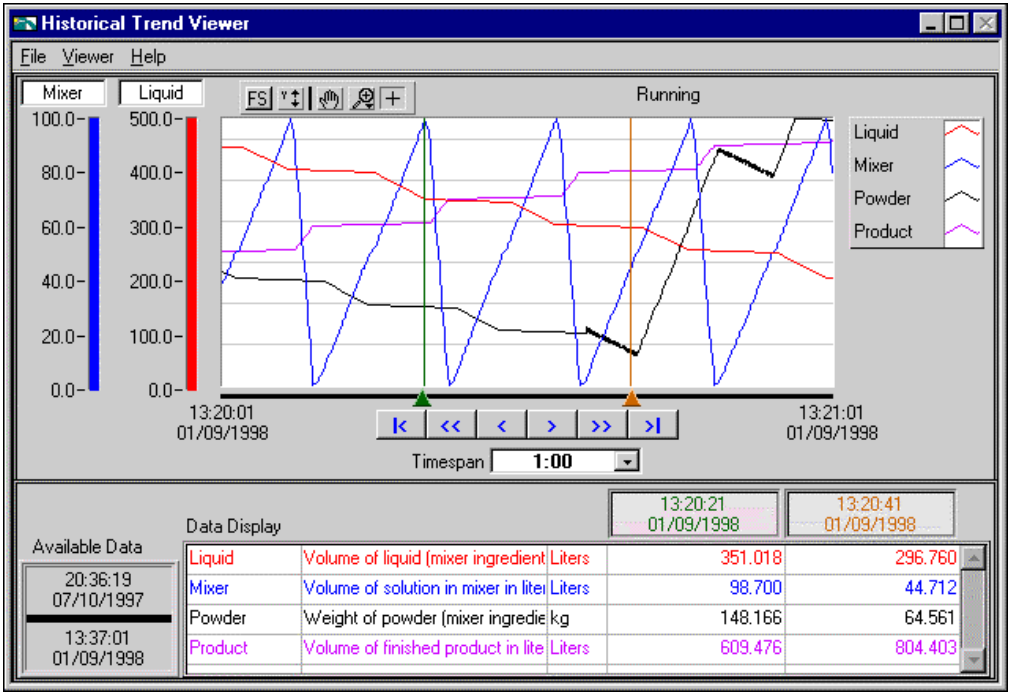


Figure 5-2. Historical Trend Viewer

How Do You Select the Tags to Display?

Select **File»Select Tags…**, and the Select Tags dialog box appears, as shown in Figure 5-3. With this dialog box, you can select either a `.scf` file or a directory of Citadel files. The default is to choose a `.scf` file. The `.scf` file you choose must point to a valid directory of Citadel files. If the BridgeVIEW Engine is running, the `.scf` file being used by the BridgeVIEW Engine is displayed.

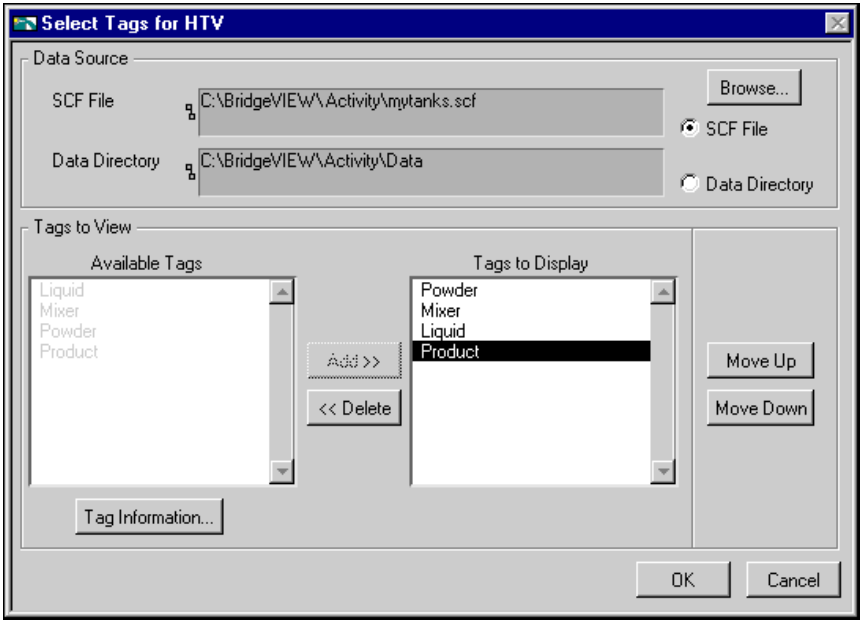


Figure 5-3. Select Tags Dialog Box

☞ **Note** ***You can look at data from only one Citadel database at a time.***

Select the tags from the Available Tags list that you want to display. The HTV displays the tags in the order that they are listed in the Tags to Display list.

☞ **Note** ***You can view configuration information about a tag by selecting it in the Available Tags list, and clicking on the* Tag Information *button.***

How Do You Change the Time Axis?

You can change the time axis for a trend within the HTV manually, or by using **Panning** buttons.

Panning Buttons

The **Panning** buttons allow you to move backward and forward through the historical data in the trend. The buttons do not affect the timespan of the trend. For example, if the trend displays data from 9:45 to 9:55 on the same day, the timespan is ten minutes. Table 5-2 describes the **Panning** button functions.

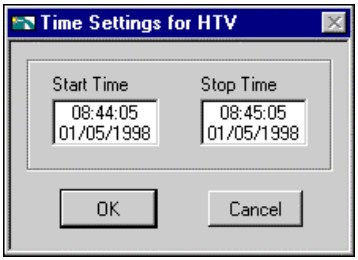
Table 5-2. Panning Button Functions

Button	Name	Description
|<	Retrieve oldest data	Displays the first available page of data.
<<	Back to closest point	Centers the display around the closest point to the left of the timespan. If there is no data in the previous time span, skips to the previous end of data.
<	Back one-half page	Moves the display back by half of the current timespan.
>	Forward one-half page	Moves the display forward by half of the current timespan.
>>	Forward to closest point	Centers the display around the closest point to the right of the timespan. If there is no data in the next time span, it skips to the next start of data.
>|	Most recent data	Displays the most recent available page of data.

Manual Changes

You can also select the text at either end of the time axis and change the data. You must enter the date in the correct format. If you make an error, the input is ignored.

You can select and enter the time and date on the time (X) axis of the historical trend on the HTV directly. However, the HTV responds immediately to any changes you make. If you want to make manual edits to both the start and stop time on the time axis, you can select the **Viewer»Time & Date** option. When you select this option, a dialog box appears, in which you can enter the start and stop time of the data displayed in the trend.



How Do You Change the Timespan of Data Displayed?

The timespan indicator displays the amount of relative time between the start and end points of the time axis. To change the amount of time between these points, you either can manually reenter data in the start or end point on the time axis, or pull down the ring for the timespan indicator.

By default, the timespan ring contains the values 1:00, 5:00, 10:00, and 30:00. Select **Enter New…** in the timespan ring if you would like to enter a different amount of data to display.

How Do You View the Value of a Tag at a Specific Point in Time?

The Data Display table on the HTV, shown in Figure 5-2, shows the tags displayed in the trend, the tag description, and, for analog tags, the engineering units associated with the tag. The two rightmost columns show the values of the tags at the two cursor locations in the trend. For discrete tags, the values in these columns are either `On` or `Off`. To move the cursors, grab their pointers at the bottom of the trend display.

How Do You Change the Y Axis?

The HTV displays two Y axes at any time. Each Y axis displays the color of the tag associated with it. All discrete tags show their ranges as going from `On` to `Off`. Click on the Y axis to make it rotate through the tags displayed in the trend.

To change the range in the Y axis for analog and bit array tags, select the text at the top or bottom of the scale and type in the desired value. When you enter the value, that trend scale changes and the trend display updates. Discrete tags are displayed without Y axis scales, and ranges are shown as `On` or `Off`.

How Do You Change the Plot Colors and Style in the Trend?

Click on the **Trend Legend**. The pop-up window contains several options with which you can change the plot colors and styles used in the trend.

How Do You Zoom In on the Trend?

The **HTV Trend** palette contains a Zoom tool that allows you to zoom in on points of interest. The Zoom tool has five modes with which you can zoom in on the trend:

- Zoom by rectangle
- Zoom time scale
- Zoom Y scale
- Zoom in about one point
- Zoom out about one point

Undo Zoom resets the graph to its previous setting.

How Do You Export Data to a Spreadsheet?

From the HTV, select **File»Export…**. The HTV exports the information currently displayed in the trend to a tab-delimited file. A dialog box prompts you for the name and location of the file to create.

The HTV resamples data in periodic intervals so that all tags have the same number of data points. The frequency defaults to a value according to the frequency of data in the historical files. If you want to override this value, enter the frequency you want in the dialog box.

How Do You Get Online Help for the HTV?

From the HTV, pull down the **Help** menu and select **Show Help**. A floating window is displayed that shows help information for all of the objects on the HTV panel.

How Do You Set Tag, Time, and Color Preferences?

Set the preference for the HTV to remember settings for display time and color on exit by selecting **Viewer»Preferences…**. When you exit the HTV, the state of the viewer is recorded.

Select the **Remember settings on exit** checkbox if you want to update your settings each time you exit the HTV.

How Do You View New Data Automatically After It Has Been Logged to Citadel?

You can use Live Mode to watch incoming data after it has been logged. When the Engine is turned on with historical logging enabled, the **Live** button appears to the right of the panning buttons. When you click the **Live** button, the trend automatically updates periodically. Select **Viewer»Preferences…** in the HTV Preferences dialog box to set how often the trend will display the new data. The default is 10 seconds. If **Always scroll with new data** is checked, the display updates whenever new data is logged.

While Live Mode is turned on, the values for each tag are extrapolated to the last time the trend was updated. These extrapolated values are marked with an asterisk in the Data Display. When a cursor or slider is placed before the extrapolation begins for a tag, the asterisk will not be present. Turning off Live Mode also turns off extrapolation.

6

BridgeVIEW Security

This chapter explains the BridgeVIEW security system. BridgeVIEW environment security does not take effect until you configure it. Configuration consists of adding users and assigning them access levels, privileges, and passwords.

Environment Security

Access to most BridgeVIEW utilities and the BridgeVIEW Engine can be configured on a per-user basis. For example, not all users should be able to configure the tags in the system or create and edit user accounts. The privileges that can be assigned to a user are defined in Table 6-1.

Table 6-1. Assignable BridgeVIEW Privileges

Type	Privilege	Description
Environment Privileges	Use Historical Trend Viewer	User can launch, configure, and use the Historical Trend Viewer utility.
	Use Tag Monitor	User can launch, configure, and use the Tag Monitor utility.
	Use Tag Browser	User can use the Tag Browser utility.
	Use Server Browser	User can use the Server Browser utility.
	Disable <Alt> Key	If enabled, the <Alt> key on the keyboard is disabled in BridgeVIEW.
	Configure Startup VIs	User can assign VIs to launch when BridgeVIEW is started.

Table 6-1. Assignable BridgeVIEW Privileges (Continued)

Type	Privilege	Description
Project Privileges	Configure Log File Locations	User can use the Tag Configuration Editor to edit the historical and event logging configuration of a tag configuration, but can not create, delete, or edit tags.
	Create/Edit Tags	User can create, delete, and edit tags in the Tag Configuration Editor.
	Use Interactive Server Tester	User can launch the Interactive Server Tester; this privilege can be configured only if the VI Server Developer Toolkit is installed.
Engine Privileges	Start/Stop Engine	User can start and stop the Engine via the Engine Manager.
	Start/Stop Historical Logging	User can start and stop Historical Logging via the Engine Manager.
	Start/Stop Event Logging	User can start and stop Event Logging via the Engine Manager.
	Start/Stop Printing	User can start and stop Event Printing via the Engine Manager.
Security Privileges	Change Password	User can change his or her own password.
	Create/Edit Access Levels	Using the Access Levels dialog box, the user can add, remove, and edit access levels lower than his or her own access level.
	Create/Edit User Accounts	User can create and edit user accounts which have an access level lower than his or her own access level.
	Configure User Privileges	User can change the privileges assigned to other users who have an access level lower than his or her own. This privilege requires that the user also have the Create/Edit User Accounts privilege, described above.

A user's BridgeVIEW Environment privileges are completely independent of the user's access level, and do not directly affect access to objects in the operator interfaces that you develop for your application.

How Do You Log In and Out?

To log in, choose **Project»Security»Login**. Type in your account name and password. If you do not know your login name, or have forgotten your password, contact your BridgeVIEW administrator.

To log out, choose **Project»Security»Logout**.

How Do You Find Your Access Level?

After you have logged in, you can find your access level by choosing **Project»Security»Access Levels…**. When you make this selection, the Access Levels dialog box appears, as shown in Figure 6-1.

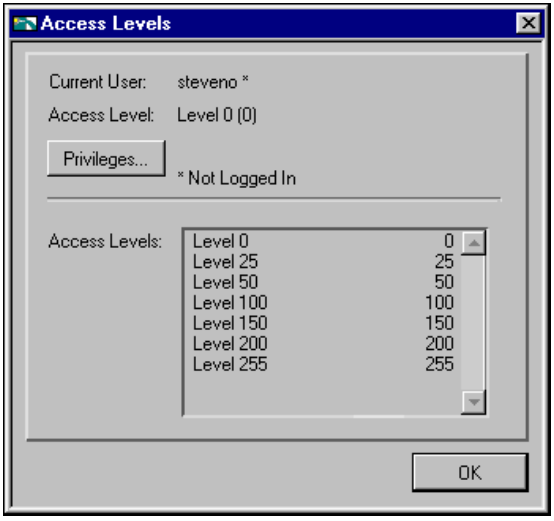


Figure 6-1. Access Levels Dialog Box

You also can view your privileges by clicking the **Privileges…** button. For more information about privileges, refer to Table 6-1 and to the following section.

How Do You Find Your Environment Privileges?

After you have logged in, you can find your environment privileges by choosing **Project»Security»Privileges…**. When you make this selection, the Privileges dialog box appears, as shown in Figure 6-2.

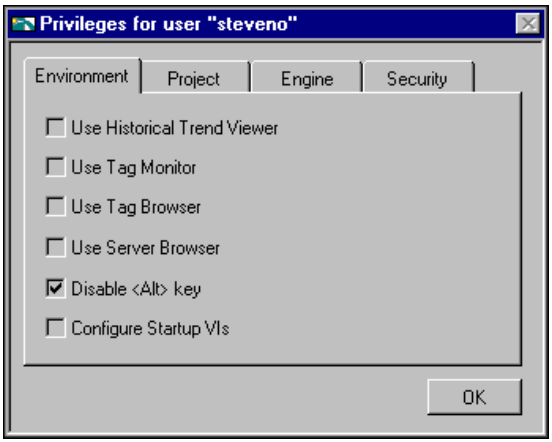


Figure 6-2. Privileges Dialog Box

For more information about BridgeVIEW user privileges, refer to Table 6-1.

How Do You Change Your Password?

You must be logged in to change your password. Choose **Project»Security»Change Password**.

Type in your old password, then your new password. Type in your new password again to verify it.

How Do You Restrict Access to the BridgeVIEW Environment?

When you install BridgeVIEW, no user accounts exist, so all users have full access to the system. You must create user accounts for the normal security features to take effect. When you create user accounts, you assign an access level to each account.

When a user logs in, BridgeVIEW obtains the user's privileges and access level.

How Do You Create and Modify User Accounts?

To create and modify user accounts, you must have the Create/Edit User Accounts privilege. To change a user's privileges, you also must have the Configure User Privileges privilege. To edit the list of user accounts, choose **Project»Security»Edit User Accounts…**, and the Edit User Accounts dialog box appears, as shown in Figure 6-3.

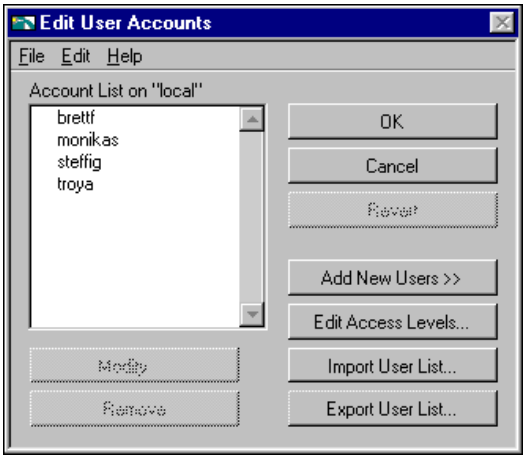


Figure 6-3. Edit User Accounts Dialog Box

Click the **Add New Users** >> button to create a new user account. Type in a name, select an access level, and provide a password for the account. To modify the privileges for the account, click the **Privileges…** button. Click the **Add** button to complete the addition of the new user account.

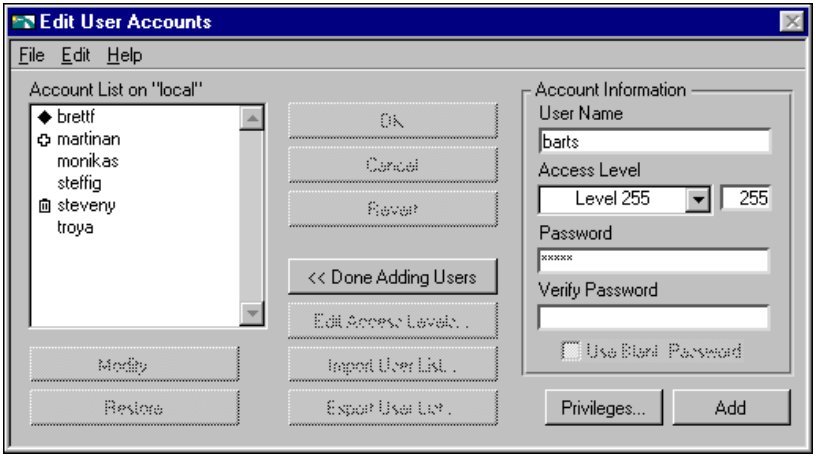


Figure 6-4. Add a User Account

After you have defined user accounts, you also can use this utility to create, remove, or modify accounts. To modify several user accounts at once (for example, change the access level of several accounts to be the same value), hold down the <Shift> key when selecting users from the list.

☞ **Note** ***Once you have defined user accounts, you must have at least one "super user" account (Access Level 255, privileges to Create/Edit user Accounts and Configure User Privileges), unless you remove all user accounts.***

☞ **Note** ***You only can add, remove, or modify accounts if you have the Create/Edit User Accounts privilege. Also, unless you are a "super user," you can only create, remove, or edit user accounts that have an access level lower than your own. If you are not authorized to configure user privileges, default privileges are assigned to new user accounts.***

How Do You Modify the List of Available User Access Levels?

To edit the list of access levels, select **Project»Security»Access Levels**. You must have Administration privileges to edit the list of Access Levels. Click the **Edit…** button next to the list of access levels. The **Edit Access Levels** dialog box appears, in which you can add, remove, and modify access levels. You also can edit access levels within the **Edit User Accounts** dialog box by pressing the **Edit Access Levels** button, or choosing **New…** from the Access Level ring when creating or modifying a user account. In addition to the two permanent access levels 0 and 255, you can assign up to 254 access levels for use in your operator interface panels. If you remove an access level, users who have been assigned that access level are demoted to the next lower access level.

☞ **Note** ***You can rename, but not remove, access levels 0 and 255.***

How Do You Export a List of Users to a File?

You can export a list of users to binary or text files. Text files contain only the user name, access level, and privileges. To export all user account information, including passwords, you must export to a binary file.

To export the user list to a text file, click the **Export User List…** button or select **File»Export»Text File…**. You can export to tab-delimited or comma-delimited text files. For a description of how privileges are exported, see the *How Do You Import a List of Users from a File?* section later in this chapter.

To export a list of users to a binary file, choose **File»Export»Binary File…**. Exporting a list of users to a binary file is useful for distributing

your list of users to other computers. The advantage of using a binary file is that all user account information, including passwords, is included in the file.

How Do You Export Users to Another Computer on the Network?

You can put BridgeVIEW user accounts on other computers either by exporting the user list to a text or binary file on one machine and importing on another, or by choosing **File»Export»Network BridgeVIEW**.

If you choose the **File»Export»Network BridgeVIEW** option, a dialog box appears in which you can type in the name of the computer to export the accounts to, or you can browse the network. BridgeVIEW must be installed on the other computer for the export to function correctly.

☞ **Note** **(Windows 95)** ***To access the user account list on another computer over the network, you must have access to the Windows Registry on the remote machine. Remote Registry access does not function unless the Remote Administration service is installed and running on the Windows 95 machine attempting to access another computer's BridgeVIEW account list, or whose account list is to be accessed by another computer. Consult your Windows 95 documentation to determine if Remote Administration is enabled, and how to install it if it is not. This service is automatically available in Windows NT.***

How Do You Import a List of Users from a File?

You can import users into your BridgeVIEW system from a tab-delimited or comma-delimited text file, or from a binary file created by BridgeVIEW. To import a list of users from a text file, click the **Import User List…** button, or select **File»Import»Text File…**.

When importing from a text file, the first column should contain the user name, the second column the access level, and the third column a list of privileges enabled for the user. The privileges enabled for a user are separated by semicolons. Table 6-2 provides a list of privileges, and the abbreviation that must be used to enable the privilege for a user.

Table 6-2. Abbreviations Used to Enable Privileges for a User

Privilege	Abbreviation
Start/Stop Historical Logging	HistLog
Start/Stop Event Logging	EvtLog
Start/Stop Printing	Print
Use Historical Trend Viewer	HTV
Use Tag Monitor	TM
Use Tag Browser	TB
Use Server Browser	SB
Disable <Alt> Key	Alt
Configure Startup VIs	ConfigStartup
Configure Log File Locations	LogFileLoc
Create / Edit Tags	EditTags
Use Interactive Server Tester (if installed)	IST
Create / Edit User Accounts	EditUsers
Create / Edit Access Levels	EditAccessLevels

For example, a user named `user`, having access level 100 and privileges to use the Tag Monitor, Tag Browser, and launch the engine would have the following privileges string (in tab-delimited format):

```
user          100       Engine; TM; TB;
```

The default password for each user imported from a text file is the user account name. To change this, click the **Use Default Password** check box and type in a new password. Note that this changes the password for all imported accounts.

To import a list of users from a binary file, choose **File»Import»Binary File…** and select a file from the list that appears in the dialog box. For more information about creating and exporting to a binary file, see the *How Do You Export a List of Users to a File?* section earlier in this chapter.

How Do You Import Users from Another Computer on the Network?

You can import BridgeVIEW user accounts from other computers from a text or binary file or by choosing **File»Import»Network BridgeVIEW**.

If you choose **File»Import»Network BridgeVIEW**, a dialog box appears in which you can type in the name of the computer to import the accounts from, or you can browse the network.

☞ **Note** **(Windows 95)** ***To access the user account list on another computer over the network requires access to the Windows Registry of the remote machine. Remote Registry access does not function unless the Remote Administration service is installed and running on any Windows 95 machine that attempts to access another computer's BridgeVIEW account list, or whose account list is to be accessed by another computer. Consult your Windows 95 documentation to determine if Remote Administration is enabled, and how to install it if it is not. This service is automatically available in Windows NT.***

7

Servers

This chapter explains how to use servers with BridgeVIEW. BridgeVIEW supports several types of servers including OPC Servers, DDE Servers, and National Instruments Standard IA Device Servers.

OPC Servers are written to the OPC Foundation OPC Data Access specification and are provided by many companies. A DDE Server is any server that supports the DDE Server interface. IA Device Servers are a type of server developed by National Instruments. There are two implementations of IA Device Servers: VI-based and DLL-based. The DLL-based servers are also known as IAK Device Servers.

This chapter also describes how to install and configure the IA Device Servers available from National Instruments and how to view the server configuration within BridgeVIEW.

BridgeVIEW includes the NI-DAQ Server, an IA Device Server that supports National Instruments data acquisition boards and SCXI, on the BridgeVIEW Development System CD. Additional device servers for other devices such as PLCs also are available for BridgeVIEW on the BridgeVIEW Device Servers CD. For more information about BridgeVIEW device servers, inquire about the Device Servers CD, available from National Instruments.

What Are BridgeVIEW Device Servers?

A *BridgeVIEW device server* is an application that communicates with and manages I/O devices such as PLCs, remote I/O (Input/Output) devices, remote BridgeVIEW Engines, and data acquisition plug-in cards. Device servers pass real-world tag values to the BridgeVIEW Engine in real time. Each server monitors the device items and encapsulates all device- and hardware-specific details, thereby establishing a device-independent I/O layer for BridgeVIEW.

An *item* in BridgeVIEW is a channel or variable in a real-world device. For more information about how to connect a tag to a server and item, see Chapter 3, *Tag Configuration*.

The device servers also handle and report communications and device errors to BridgeVIEW. There are different servers available for different device families and communication networks.

Each device server is a stand-alone component that might include a configuration utility as well as the run-time application that communicates with the BridgeVIEW Engine. IA Device Servers are not built into the BridgeVIEW Engine itself. These servers are written to a National Instruments standard client/server Applications Programming Interface (API) for communicating with the BridgeVIEW Engine and the Common Configuration Database.

When BridgeVIEW runs an application, it determines from the tag configuration (`.scf`) file which servers are needed, and which items are needed from those servers. BridgeVIEW launches each server it needs, and notifies each one to monitor the specific items of interest. Typically, servers monitor each input tag on a regular basis, passing the values to the BridgeVIEW Engine when they change, and updating each output tag when the BridgeVIEW HMI application writes that tag value. The update rates and deadband servers use for monitoring items can be configured as part of tag configuration. You define how a server monitors the items, how often it polls the devices, and other server-specific and device-specific parameters through each device server configuration utility.

How Do You Install and Configure a Device Server?

BridgeVIEW works with several device servers including the NI-DAQ OPC Server, the device servers available on the BridgeVIEW Device Servers CD, and the simulation servers installed with BridgeVIEW. In addition, you can use other servers available from companies other than National Instruments.

To use a device server with BridgeVIEW, first you must install the device server and register it or run its configuration utility. More specific information on installing and registering National Instruments servers follows later in this section. This information is written to the Common Configuration Database, where BridgeVIEW obtains the server information. For some servers, you configure devices and items with the server-specific Configuration Utility. Then, the Tag Configuration Editor imports server, device, and item information so you can create tags. IAK device servers allow you to directly create and configure communication resources, devices, and items from the Tag Configuration Editor.

When you register a device server, its name appears in the list of servers shown in the various Edit Tag screens of the Tag Configuration Editor. Once you configure your server, you can create a BridgeVIEW Configuration using that server. Depending on the server, different information is written to the Common Configuration Database (CCDB) when the server is registered.

The most simple servers register no more than their names and launch paths. You can select items by adding in the item strings in the **Edit Tag** dialog box for each tag using that server. To select a device, you must create an I/O Group and select or enter the device name in the I/O Group dialog box. Refer to your server documentation for the correct formats for these device and item strings.

The IAK Servers allow you to create and configure communication resources, devices, and items directly in the Tag Configuration Editor. Communication resources and devices are configured in the I/O Group dialog box. Items are configured in the Connection tab of the Tag Configuration dialog box.

Other servers register the devices to which they are connected and available items for those devices by name. These servers also can register the data type, directions, and engineering range and units of the various items, if applicable. When you select these servers in the Edit Tag screens of the BridgeVIEW Tag Configuration Editor, you must first create an I/O group and select a device. Then you see a list of available devices, and a list of items connected to that device in the Edit Tags screen. For a selected device and item, the BridgeVIEW Tag Configuration Editor imports any available item engineering range and unit information and also checks that the directions or access rights for an item are compatible with the access rights you have selected for the tag. Check your server documentation to find out if it registers device and item names and item parameters with BridgeVIEW.

Installing and Configuring the NI-DAQ OPC Server

The NI-DAQ OPC Server is available as part of NI-DAQ 6.*x*, and is included on the BridgeVIEW Run-Time System CD. You can choose to install the NI-DAQ OPC Server at the same time you install NI-DAQ, or you can install the NI-DAQ OPC Server at a later time. Select the NI-DAQ OPC Server when you are prompted to install servers.

After you install the NI-DAQ OPC Server, you must run the NI-DAQ Configuration Utility and the Channel Wizard to configure your DAQ system before you can use the NI-DAQ OPC Server with BridgeVIEW.

All Channels created with the NI-DAQ Channel Wizard appear as items when the DAQ OPC Server is selected in BridgeVIEW.

Installing and Configuring Device Servers from the BridgeVIEW Device Servers CD

The BridgeVIEW Device Servers CD contains servers for several PLCs and remote I/O devices. These device servers are DLL-based servers using the Device Server Toolkit interface to BridgeVIEW.

To install the BridgeVIEW Device Servers from the BridgeVIEW Device Servers CD, follow these steps.

1. Insert the CD in your CD-ROM drive.

   If you are running BridgeVIEW on Windows 95 or NT 4.0,

   select **Run…** from the **Start** menu.

2. Follow the instructions that appear on the screen.

The Installer prompts you to select one or more servers to install. It also installs the Server Explorer, which all the device servers contained on the CD use for server configuration. After you run the installer, you must run the Server Explorer to configure the device-specific parameters of your industrial network before using the server with BridgeVIEW. The Server Explorer also registers your server so you can use it with BridgeVIEW. Each server on-line help file documents configuration instructions specific to each server on the CD. See the on-line help files for your server for more information.

How Do You Use OPC Servers with BridgeVIEW?

BridgeVIEW can communicate with any server implementing the OPC Foundation OPC Server interface, a Microsoft COM-based standard. BridgeVIEW automatically finds all OPC Servers installed in your system and searches the network for OPC servers on other machines. Unlike Device Servers, OPC Servers do not store information in the Common Configuration Database, rather BridgeVIEW reads any available information about server capabilities and items from the server directly.

OPC Servers are listed in the Server Name List when you configure a BridgeVIEW tag using the Tag Configuration Editor. To connect a BridgeVIEW tag to an OPC Server item, you select the server and enter or choose the item name along with other parameters you might need to specify, such as the access path. You also create I/O Groups for the items,

specifying update rate and deadband information for each group. Each BridgeVIEW I/O Group created in the Tag Configuration Editor is automatically mapped to an OPC Group in the OPC Server with the same attributes.

OPC Servers have an optional interface called the Server Browse Address Space Interface. If a server supports this interface, BridgeVIEW can query it to find which items are available from the server and display them in the item list when the server is selected in the Tag Configuration dialog box. In this case, the **Browse** button in the Tag Configuration dialog box is enabled, and you can press this button to view the hierarchical organization of the server Item IDs.

You can also view the OPC Server Items and their attributes using the Server Browser utility. Launch the Server Browser by selecting **Projects»Server Tools»Server Browser…** or pressing the **Server Browser…** button on the Engine Manager display.

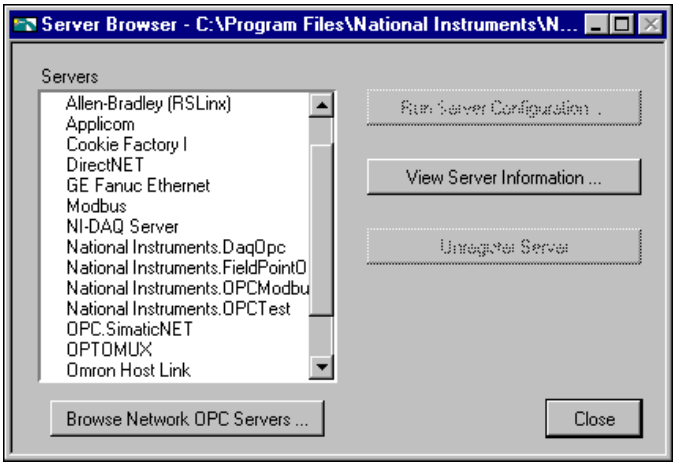


Figure 7-1. Server Browser

When an OPC server is selected in the Servers list, you can press the **View Server Information…** button to bring up the View Server Information for OPC Servers dialog box, as shown in Figure 7-2.

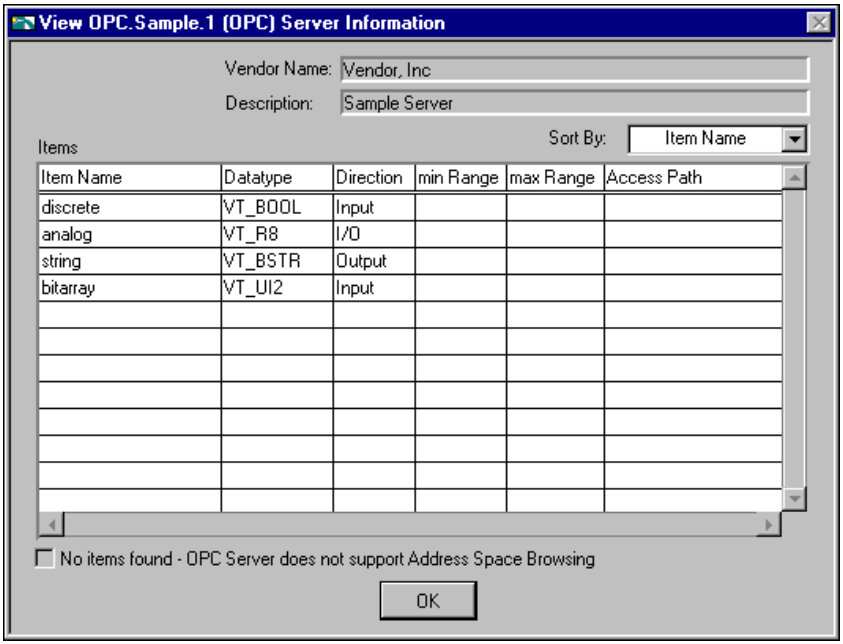


Figure 7-2. View Server Information Dialog Box

This dialog box displays general information about the OPC Server as read from your local system registry. If the OPC server supports the Server Browse Address Space interface, the View Server Information dialog box also displays the items available from the server and their attributes. If the OPC Server does not support this interface, the **No Items Found** checkbox and the item table appear dimmed.

Using Remote OPC Servers

You can use the Server Browser to configure BridgeVIEW to access OPC Servers on other machine on your network. Use this utility to select remote OPC Servers and add them to the BridgeVIEW server list.

To view the OPC servers available on other machines on your network, press the **Browse Network OPC Servers** button on the Server Browser. This brings up the Browse OPC Servers on Network dialog box shown below.

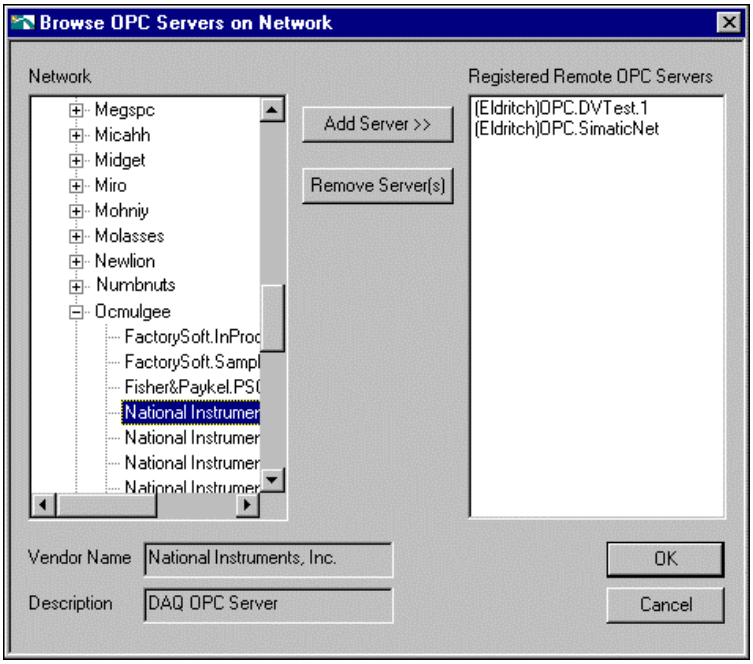


Figure 7-3. Browse OPC Servers on Network Dialog Box

Use this dialog to view the OPC servers registered on other machines on your network. The Registered Remote OPC Servers list shows which remote servers have been added to the BridgeVIEW servers list. If you wish to use the server on another machine from your machine, use the network tree control to open the machine, and select one of the OPC servers shown on that machine and press the **Add Server** >> button. The information for the remote OPC server is now stored in your local machine registry, and the server will appear in your BridgeVIEW servers list with the server name format of `(`*`machine name`*`)programID`. BridgeVIEW runs the server on the remote machine when you configure a tag to use that server.

To remove one or more remote OPC server from the BridgeVIEW server list, select the servers and press the **Remove Server(s)** button. The servers will no longer appear in your BridgeVIEW server list.

You can also use the Windows utility `dcomcnfg.exe` to configure an OPC server to run on a remote machine rather than your local machine. In order to use `dcomcnfg.exe` to configure an OPC server on a remote machine, you must also have the server registered on your local machine.

To register an OPC server on your local machine, either install the server locally or run the server registration utility on your local machine. Then, launch `dcomcnfg.exe` and complete the following steps.

1. Select the OPC server in the **Applications** list, under the **Applications** tab, and press the **Properties** button.
2. Click the **Location** tab in the Properties dialog box. De-select the **Run application on this machine** checkbox and check the **Run application on the following computer:** checkbox. Enter the name of the machine or use the **Browse** button to select the remote machine. Press **OK** to close the Properties dialog box.
3. Select the **Default Properties** tab and make sure that the **Enable Distributed COM on this computer** checkbox is checked. Also, set the **Default Authentication Level** to **Connect**, and set the **Default Impersonation Level** to **Identify**.
4. Select the **Default Security** tab, and press the **Edit Default…** button. Make sure that the machine on which you plan to launch the OPC server is allowed to access your machine. This is necessary for the machine to call back the BridgeVIEW on your machine when supplying OPC values.

☞ **Note** ***If you use*** `dcomcnfg.exe` ***to select a remote server, you can only run one version of that server, either locally or on one remote machine. You cannot use the same server on more than one machine.***

How Do You Use DDE Servers with BridgeVIEW?

BridgeVIEW can communicate with any server using Microsoft Dynamic Data Exchange (DDE) as its interface. A DDE Server is treated as a simple server in which you type in a device and item string to select a specific point. For DDE Servers, you select DDE Server from the Server List in the Tag Configuration Editor, and type in `APPLICATION|TOPIC` for device in the I/O Group Configuration Dialog Box, and `ITEM` for item. See the *How Do You Connect a Tag to a DDE Server?* section in Chapter 3, *Tag Configuration* for more complete information on how to do this. If you are using Network DDE to use a DDE Server running on another machine, use the Network DDE name for the `APPLICATION` part of the name. Refer to

your DDE Server documentation for the correct name for APPLICATION, the list of available TOPICS and ITEMS for each topic.

Note ***Unlike the servers written to the BridgeVIEW IA Device Server specification, off-the-shelf DDE Servers do not register themselves with BridgeVIEW. Therefore, BridgeVIEW cannot launch the DDE Server automatically when it runs your HMI application. To use a DDE Server, launch or run the DDE Server before you run your BridgeVIEW application. BridgeVIEW will post system error messages if it cannot connect to the DDE Server when it launches the BridgeVIEW Engine. Thereafter, it attempts to reconnect to the DDE Server periodically.***

How Do You View BridgeVIEW Server Configuration?

The Tag Configuration Editor shows the list of available servers, and any registered devices and items for the server in the various Edit Tag screens. You also can use the Server Browser to view information about the device servers registered with BridgeVIEW as well as the OPC Servers present in your system and on the network. Launch the Server Browser by selecting **Projects»Server Tools»Server Browser…** or by pressing the **Server Browser…** button on the Engine Manager display. Use this utility to view the properties of the devices and items registered by each server. For VI-based IA Device Servers, you can use this utility to display the server front panel while your application is running if you launch it from the Engine Manager. Typically, servers run with their front panel hidden. You can use the Server Browser to launch the server-specific configuration utility from within BridgeVIEW, if one is available.

The Server Browser utility shows the server information stored in the active Common Configuration Database (.ccdb) file. You can control which CCDB is active from the Server Explorer utility.

Use the Server Browser to unregister a device server that you no longer want to use (BridgeVIEW device servers only). This keeps the server and related information from appearing in the Edit Tag screens. Notice that this invalidates any tags that use that server. Once you have unregistered a

server, you can no longer connect to it from BridgeVIEW, and you must run its configuration utility again to register it with BridgeVIEW.

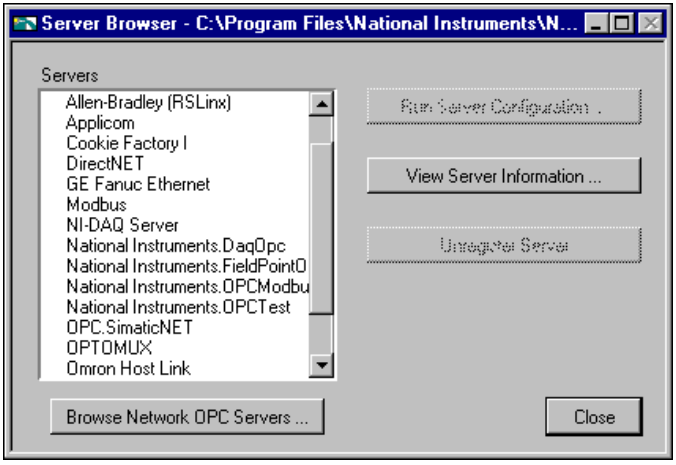


Figure 7-4. Server Browser

The main screen of the Server Browser displays a list of servers available to BridgeVIEW in the Registered Servers list box if launched from the Engine Manager. The symbol to the left of the server name indicates whether it is loaded and running. A black diamond indicates that the server is loaded and running. A white diamond indicates that the server is loaded but not running. No symbol indicates that the server is not being used in the current BridgeVIEW Tag Configuration. The Server Browser also displays the path to the active CCDB in its title bar.

To view information registered for a specific server, double-click on the server name in the Registered Servers list box, or press the **View Server Devices…** button. This invokes the View Server Device Information dialog box shown in Figure 7-5.

To unregister a server that you no longer want to connect to your tags, press the **Unregister Server** button with the server of interest selected in the Registered Servers list box. This invokes a dialog box asking you to confirm the operation.

☞ **Note** ***Unregistering a server means that BridgeVIEW can no longer access that server, and any tag configured to use that server no longer has a valid configuration. Do this only if no tags are configured to use that server and you no longer want to access it from the Tag Configuration Editor. This does not apply to OPC or DDE Servers.***

Registered Server Device and Item Parameters

Use the View Server Information dialog box to see a list of devices registered by a specific server, and for the selected device, view a table of the registered items and item properties. The View Server Information dialog box for BridgeVIEW device servers is shown below.

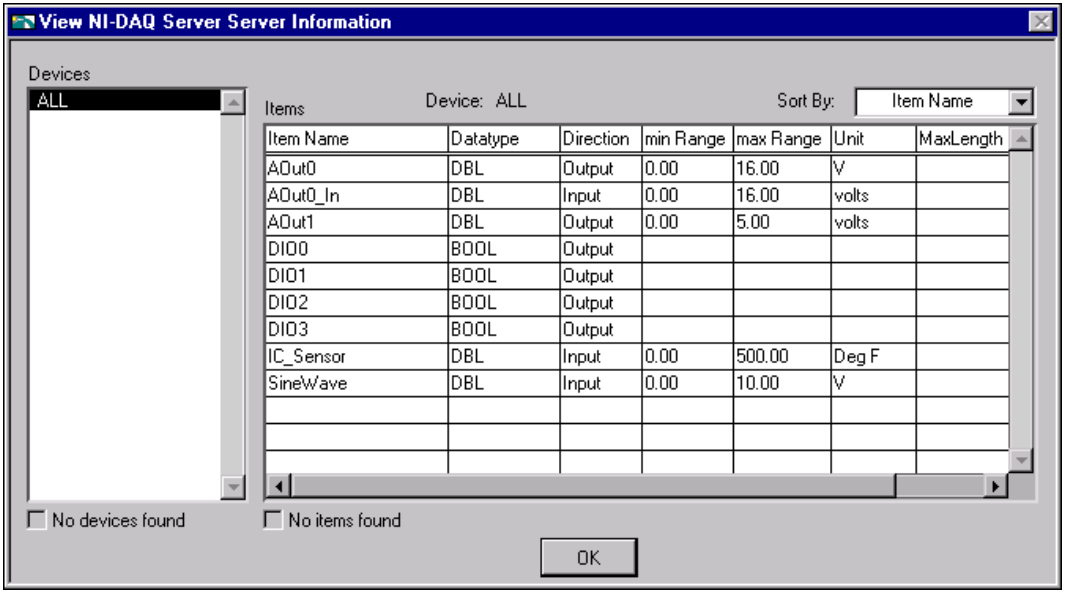


Figure 7-5. View Server Information Dialog Box

You can sort this table by item name, data type, or direction, by selecting which parameter you want to sort on in the **Sort By:** list.

A

Citadel and Open Database Connectivity

This appendix describes the Citadel database and the Open Database Connectivity (ODBC) driver, and includes a table that lists data transform commands.

The Citadel historical database includes an Open Database Connectivity (ODBC) driver. This driver enables other applications to directly retrieve data from Citadel using Structured Query Language (SQL) queries. To use the SQL ODBC interface to Citadel, you must have installed the Citadel ODBC driver from the BridgeVIEW CD.

What is ODBC?

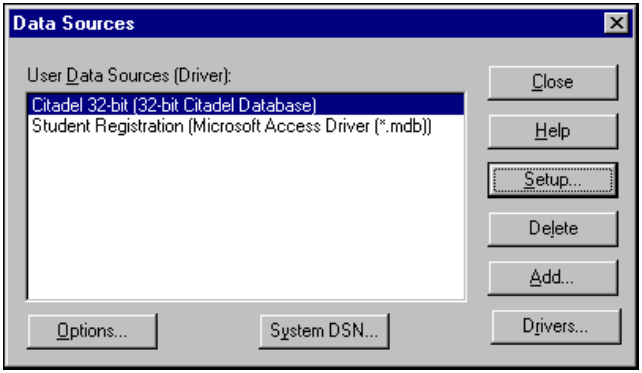
ODBC is a standard developed by Microsoft. It defines the mechanisms for accessing data resident in database management systems (DBMSs). Virtually all Windows-based applications that can retrieve data from a database supporting ODBC.

Because Citadel allows simultaneous real-time access by multiple applications, the ODBC Driver can retrieve data from the Citadel database even while BridgeVIEW is running. There is no need to interrupt data collection in order to query the database. In fact, the ODBC Driver allows multiple ODBC applications to perform SQL queries simultaneously.

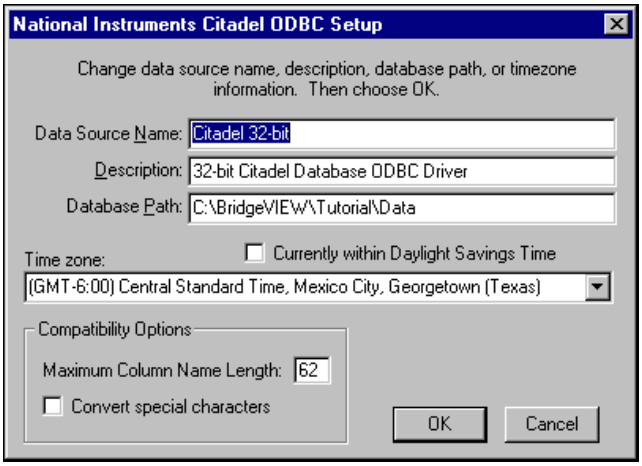
Configuring the ODBC Driver

1. Shut down all applications that currently might be using ODBC. Such applications include spreadsheets, word processors, database programs, MS Query, etc. You do not need to shut down BridgeVIEW.
2. Click the **Start** button, point to **Settings**, then click **Control Panel**. Otherwise, in the Main program group, choose the Control Panel icon.
3. In the Control Panel dialog box, choose the **32-bit ODBC**.

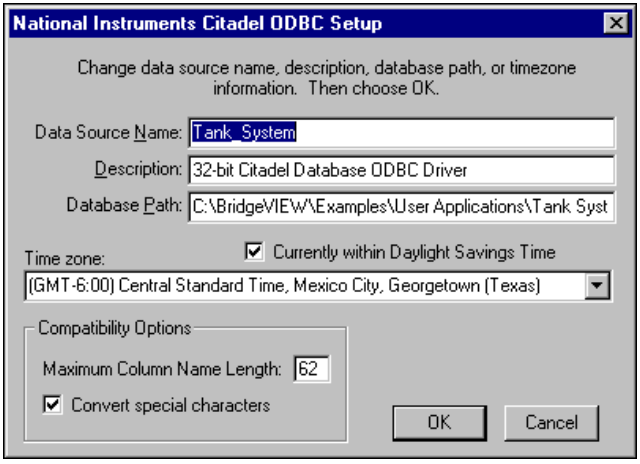
4. In the Data Sources dialog box, choose **Drivers…**.



5. Choose the Citadel driver and select **Setup…**.



6. Make changes as appropriate. Select the historical logging directory that was configured in your Tag Configuration (`*.scf`) file for each data source. For example, if you want to query the historical data created by the Tanks System example, directory, modify the database path to `C:\BridgeVIEW\Examples\User Applications\Tank System\Data`. You also can modify the name of the data source to reflect the application. An example of a modified ODBC Setup dialog box is shown below.



☞ **Note** ***Some applications are not completely ODBC compliant. If you plan to use Microsoft Query, Microsoft Access or Visual Basic, ensure*** *Maximum Column Name Length* ***does not exceed 62 characters. These packages cannot handle longer tag names. Other packages that are truly ODBC compliant should be able to handle tag names up to 126 characters long. All threads whose tag names exceed the*** *Maximum Column Name Length* ***are excluded from queries.***

If you plan to use Microsoft Access or Visual Basic, select *Convert special characters****. This forces BridgeVIEW tag names into a format acceptable by these applications by replacing characters within the tag names as follows:***

Original Character	Converted To
period (.)	backslash (\ )
ampersand (&)	at sign (@)
exclamation (!)	vertical bar (|)

7. Select **OK** and **CLOSE** to exit.

What is SQL?

Structured Query Language (SQL) is an industry-standard language used for retrieving, updating and managing data. You can use SQL to build queries that extract data from Citadel. Beyond simple data extraction, the Citadel ODBC driver also includes many built-in data transforms that greatly simplify statistical analysis of retrieved data.

How Do You Access Citadel Data?

The ODBC driver presents Citadel data to other applications as a *Threads* table. The table contains a field or column for each data member logged to the Citadel database.

Threads Table

The Threads table contains three fields you can use to specify query criteria and to time-stamp retrieved data: `Interval`, `LocalTime`, and `UTCTime`.

Interval allows you to specify the query value sample rate. **Interval** can range from 10ms to several years. By default, **Interval** is 1 (one day).

Remember, Citadel only logs a value when the value changes (it is event-driven). But using **Interval**, you can query Citadel for values evenly spaced over a period of time.

LocalTime and **UTCTime** indicate the time-stamps of when values are logged. Citadel actually stores the time in **UTCTime** format and derives **LocalTime** from the stored time. When you do not specify a time, Citadel assumes midnight of the current day.

The following *where clause* from a query takes advantage of **Interval** and **LocalTime** to select data over a specified time at one minute intervals. Notice that time and date formats are the same as those used in BridgeVIEW.

```
SELECT * FROM Threads
WHERE LocalTime > "12/1 10:00"
   AND LocalTime < "12/2 13:00"
   AND Interval = "1:00"
```

Data Transforms

Your queries can include special commands that perform data transforms, making it easy to manipulate and analyze historical data. The following table lists data transform commands.

Table A-1. Data Transform Commands

Data Transform Command	Description
Min{tag name}	Returns the minimum for tag name across the interval.
Max{tag name}	Returns the maximum for tag name across the interval.
Avg{tag name}	Returns the average for tag name across the interval.
StDev{tag name}	Returns the standard deviation for tag name across the interval.
Starts{tag name}	Returns the number of starts (number of transitions from OFF to ON) for tag name across the interval.
Stops{Datapoint}	Returns the number of stops (number of transitions from ON to OFF) for Datapoint across the interval.
ETM{Datapoint}	Returns the amount of time Datapoint was in the ON state across the interval.
Qual{Datapoint}	There might be gaps in the historical data threads in Citadel because of machine shutdown or BridgeVIEW shutdown. Qual returns the ratio of time for which valid data exists for a datapoint across the interval, to the length of the interval itself. Thus if valid data exists for only one-half of the interval, Qual would return 0.5.

These data transforms allow you to directly calculate and retrieve complex information from the database such as averages and standard deviations. This time saving feature eliminates the need of extracting raw data first, and then massaging it in another application to come up with the needed information.

Assume, for example, that you want to find out how many times a compressor motor started in December. You also want to know its total runtime for the month. The following query provides the answers:

```
SELECT "Starts{MotorRun}",
"ETM{MotorRun}"
FROM Threads
WHERE LocalTime >= "12/1/95"
    AND LocalTime < "1/1/96"
    AND Interval = "31"
```

SQL Examples

The following examples are typical query statements; however, your queries may be much more involved, depending on your system requirements.

- Retrieves the *most recent (current)* value of every tag logged to Citadel.

  ```
  SELECT *
  FROM Threads
  ```

- Retrieves the value of every tag logged today in one second increments. `Note the interval value is specified within quotation marks.`

  ```
  SELECT *
  FROM Threads
  WHERE Interval=“0:01”
  ```

- Retrieves and time-stamps the value of `Powder` in one second increments from 8:50 this morning to now. Tag names are surrounded by quotes.

  ```
  SELECT LocalTime, “Powder”
  FROM Threads
  WHERE LocalTime>“8:50”
      AND Interval=“0:01”
  ```

- Retrieves and time-stamps the value of `Liquid` input in one minute intervals for the month of October. Also indicates the input’s highest occurring value within each minute.

  ```
  SELECT LocalTime, “Liquid”, “Max{Liquid}”
  FROM Threads
  WHERE LocalTime>“10/1/96”
      AND LocalTime<“11/1/96”
      AND Interval=“1:00”
  ```

- Retrieves an oven's temperature set point and value at 3:00 p.m. and shows the highest, lowest, and average temperatures between 2:00 p.m. and 3:00 p.m.

```
SELECT LocalTime, "OVEN1_SP", "OVEN1_PV",
"Max{OVEN1_PV}", "Min{OVEN1_PV}", "Avg{OVEN1_PV}"
FROM Threads
WHERE  LocalTime >= "14:00"
   AND LocalTime < "15:00"
   AND Interval = "1:00:00"
```

Queries Using Specific Applications

The following sections include information on queries using specific applications.

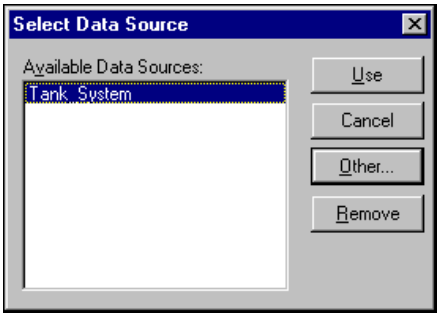
Using Microsoft Query with Citadel

Note ***The exact operation of Microsoft Query might change from version to version. Look in the online help for Microsoft Query for how to connect to an ODBC Data Source for the exact instructions for your version of Microsoft Query.***

Microsoft Query is a graphical data retrieval tool supplied with Microsoft Office and Microsoft Excel. It allows you to build your SQL statement using interactive dialog boxes. Let's step through a somewhat involved example to show you a few simple tricks.

To activate MS Query, double-click the **MS Query** icon, typically found in the MS Office program group. If you cannot find the icon, look in `C:\Program Files\Common Files\MicroSoft Shared\MSQuery\Msqry32.exe`. MS Query is not part of an MS Office standard installation, so if you do not find it on your system, install it from your MS Office disks.

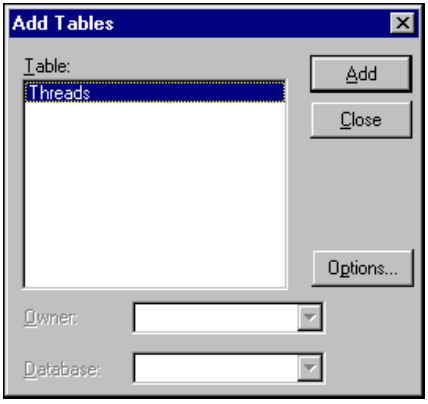
Choose **File»New Query…** to begin and select the data source you have setup for your Citadel historical directory as shown here. You might need to press **Other…** to access a list of data sources to select.



☞ **Note** ***If MS Query is unable to connect to a Citadel data source, you have not yet logged data to Citadel; or the*** *Database path* ***you specified in the ODBC Setup dialog box is incorrect.***

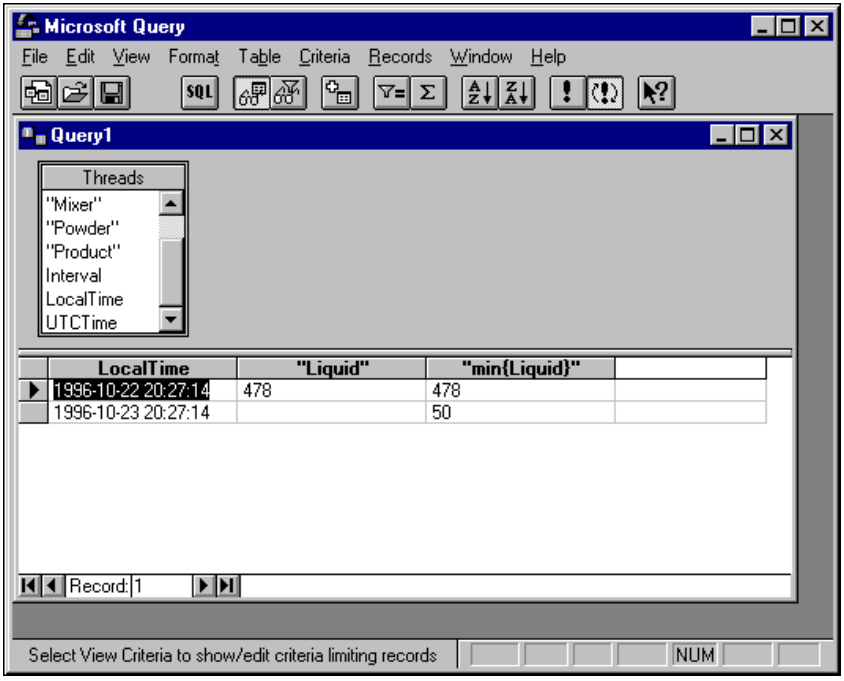
☞ **Note** ***If the Citadel data source is not listed in the Select Data Source dialog box, you might not have accessed it yet. Choose*** **Other…** ***and select*** **Citadel** ***from among the ODBC data sources. If Citadel is not listed as an ODBC Data Source, you need to install it. See the*** *Configuring the ODBC Driver* ***section for more information****.*

In the Add Tables dialog box, double-click **Threads**. Then close the dialog box.



MS Query presents the full Query Window with the Threads table shown. Notice the list of tag names in the Threads table. This list is a comprehensive list of all tags whose values have been logged to Citadel.

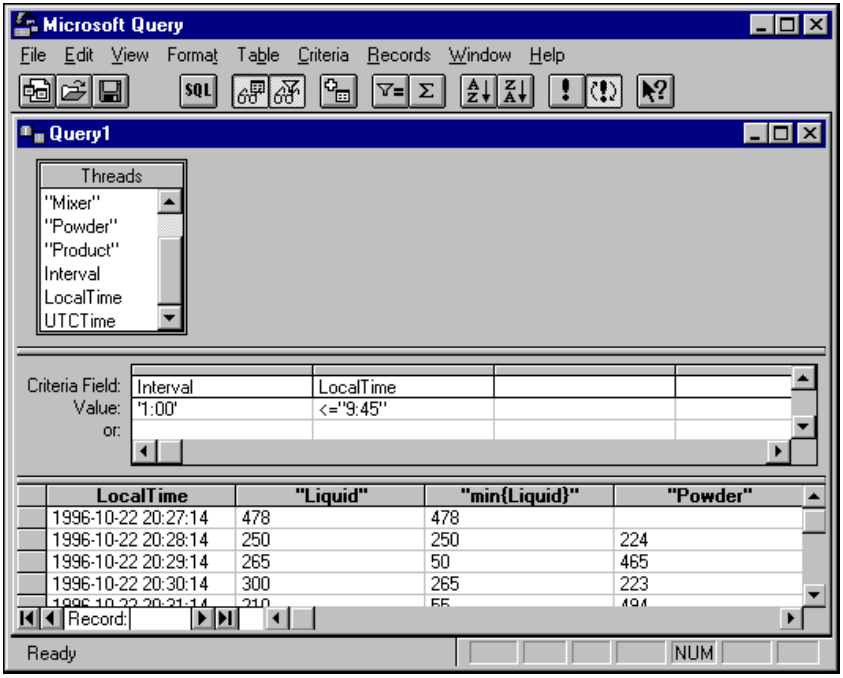
To view the value of a field, double-click it or drag it to the data pane.



To view a data transform value, enter the function directly into a blank column. For example, to view the minimum value of `Liquid`, you would enter "`min{Liquid}`". Take special note of the use of quotation marks and braces.

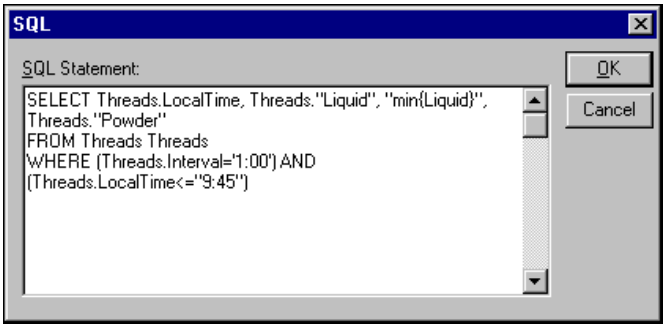
The above data set was retrieved using no specifying criteria, so the ODBC driver used the default criteria. There are several ways to specify criteria. For this example, we'll use the criteria pane. Click the **View Criteria** button.

To add a field to the criteria pane, drag it from the list of fields to the Criteria Field.



When you enter qualifying criteria values, be sure to use the syntax demonstrated in the where clauses of the SQL Examples found in this chapter. To specify a starting time of 9:45 today, for example, you would enter `>= "9:45"`.

As soon as you specify a criteria, Microsoft Query immediately retrieves the specified data. You can save your query at any stage of its development. As you build your query, the application builds an SQL statement. When you click the **SQL** button, you can view and edit the query statement, as shown in the following dialog box.

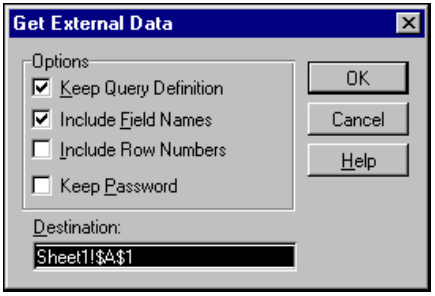


Using Microsoft Excel with Citadel

☞ **Note** ***The exact operation of Microsoft Excel might change from version to version. Look in the online help for Microsoft Excel for how to connect to an ODBC Data Source for the exact instructions for your version of Microsoft Excel.***

To extract data from Citadel, activate Excel and choose **Data»Get External Data…**. This Excel command directly activates Microsoft Query. From here you can use an existing query or create a new one. See the *Using Microsoft Query with Citadel* section earlier in this chapter.

When you finish building your query, return the result set by choosing **File»Return Data to Microsoft Excel…**. Excel responds by presenting the Get External Data dialog box, enabling you to change or confirm the destination cells of the result set. If you want to update the result set later by requerying Citadel, be sure that **Keep Query Definition** remains selected. Choose **OK** to write the data into the Excel worksheet.



To update your result set, select any cell within the worksheet's result set, choose **Data»Get External Data…**, and click the **Refresh** button.

Using Microsoft Access with Citadel

The exact operation of Microsoft Access might change from version to version. Look in the online help for Microsoft Access for how to connect to an ODBC Data Source for the exact instructions for your version of Microsoft Access.

☞ **Note** ***The SQL/92 standard states that a delimited identifier is any string of not more than 128 characters enclosed in quotation marks. It further states that characters within a delimited identifier are exempt from SQL syntax checking. Unfortunately, Microsoft Access performs its own syntax checking for ODBC queries using a non-standard SQL syntax—even within delimited identifiers. For this reason, National Instruments provides a* Convert Special Characters *selection in the Citadel ODBC Setup dialog box. When selected, the ODBC driver converts the disallowed characters to something acceptable to Access, as follows.***

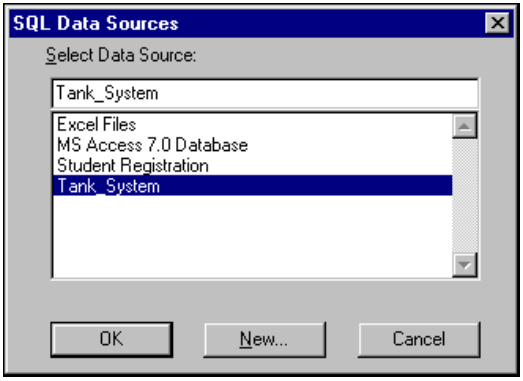
Disallowed Character	Converted To
period (.)	backslash (\ )
ampersand (&)	at sign (@)
exclamation (!)	vertical bar (|)

Therefore, Access recognizes a BridgeVIEW identifier such as Modbus1.40001 as the delimited identifier Modbus1\40001.

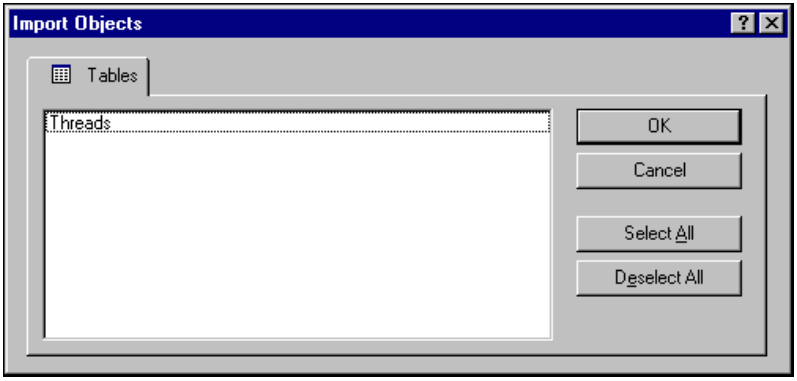
When you query Citadel data using MS Access, You must use Microsoft Access's non-standard SQL syntax in your select statement. Be sure to use the special characters that are converted for Access compatibility and double quotes around BridgeVIEW thread names. Finally, you must use square brackets [] around identifiers, and #s around time stamps. For example, to retrieve LocalTime, Liquid, and Powder where LocalTime is less than 10/22/95 18:00:00, and where Interval is one second, enter:

```
SELECT LocalTime, ["Liquid"], ["Powder"]
FROM Threads
WHERE LocalTime < #10/22/96 6:00:00 PM#
   AND Interval = '0:01'
```

To query Citadel from within MS Access, open a database, select **File»Get External Data…** and then click **Import**. In the Import dialog box, in the Files of Type box, select **ODBC Databases()**. In the SQL Data Sources dialog box, choose your Citadel Data Source, as shown below.



In the Import Objects dialog box, choose **Threads**. The new table attaches to your database.



Now you can build queries in Access that extract data directly from the Citadel database.

Using Visual Basic with Citadel

The exact operation of Visual Basic might change from version to version. Look in the online help for Visual Basic for how to connect to an ODBC Data Source for the exact instructions for your version of Visual Basic.

☞ **Note** ***Visual Basic software relies on Microsoft Access DLLs for performing ODBC queries. Because it uses the non-standard SQL syntax of Access, be sure that***

Convert Special Characters ***is selected in the Citadel ODBC Setup dialog box. See the note in the*** *Using Microsoft Access with Citadel* ***section in this appendix****.*

Using the Citadel ODBC Driver in Visual Basic is the same as using any other ODBC driver. To retrieve and view data, create a Data control and at least one text control.

First place a Data control on an open form. Set its **Connect** property to `DSN=Citadel` (or the name of the Citadel data source) and double click its **Record Source** property to identify Threads as its source table.

You can leave the **Record Source** property set to Threads if you want to select all of the data for all of the threads in the Citadel database, or you can narrow your query by entering an SQL select statement in the **Record Source** property. For example, to retrieve LocalTime, Liquid, and Powder where LocalTime is greater than 10/20/95 18:00:00 and less than 18:30:00, and where Interval is one minute, enter:

```
SELECT LocalTime, ["Liquid "], ["Powder "]
FROM Threads
WHERE LocalTime > #11/20/95 6:00:00 PM#
    AND LocalTime < #11/20/95 6:30:00 PM#
    AND Interval = '1:0'
```

You must use the SQL syntax of Microsoft Access in your select statement. Also remember to use the special characters that are converted for Access compatibility and double quotes around BridgeVIEW thread names to identify them as *delimited* identifiers. Finally, Access SQL requires square brackets [ ] around identifiers, and #s around time stamps.

Now place a Text control on the form. Set its **Data Source** property to the name of your Data control—for example, Data1. Click the **Data Field** property to highlight it and then using the property sheet's drop-down combo box, select the desired field name. All logged data members should be listed including LocalTime, Interval, Liquid, and so on. Repeat this step for each data member you want to display on your form.

B

Customer Communication

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a fax-on-demand system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call 512 795 6990. You can access these services at:

United States: 512 794 5422
Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 01 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

FTP Support

To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as `anonymous` and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the `/support` directories.

Fax-on-Demand Support

Fax-on-Demand is a 24-hour information retrieval system containing a library of documents on a wide range of technical information. You can access Fax-on-Demand from a touch-tone telephone at 512 418 1111.

E-Mail Support (Currently USA Only)

You can submit technical support questions to the applications engineering team through e-mail at the Internet address listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

`support@natinst.com`

Telephone and Fax Support

National Instruments has branch offices all over the world. Use the list below to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.

Country	Telephone	Fax
Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Brazil	011 288 3336	011 288 8528
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Québec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	09 725 725 11	09 725 725 55
France	01 48 14 24 24	01 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Israel	03 6120092	03 6120095
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	5 520 2635	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
United Kingdom	01635 523545	01635 523154
United States	512 795 8248	512 794 5678

Technical Support Form

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name _____

Company _____

Address _____

_____

Fax (___) _____Phone (___) _____

Computer brand_____ Model _____Processor_____

Operating system (include version number) _____

Clock speed _____MHz RAM _____MB Display adapter _____

Mouse ___yes ___no Other adapters installed_____

Hard disk capacity _____MB Brand_____

Instruments used _____

_____

National Instruments hardware product model _____ Revision _____

Configuration _____

National Instruments software product _____ Version _____

Configuration _____

The problem is: _____

_____

_____

_____

_____

List any error messages: _____

_____

_____

The following steps reproduce the problem: _____

_____

_____

_____

_____

BridgeVIEW Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Complete a new copy of this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

National Instruments Products

DAQ hardware _____

Interrupt level of hardware _____

DMA channels of hardware _____

Base I/O address of hardware _____

Programming choice _____

BridgeVIEW version_____

Other boards in system _____

Base I/O address of other boards _____

DMA channels of other boards _____

Interrupt level of other boards _____

Other Products

Application software developer _____

Computer make and model _____

Microprocessor _____

Clock frequency or speed _____

Type of video board installed _____

Operating system version _____

Operating system mode _____

Programming language _____

Programming language version _____

Other boards in system _____

Base I/O address of other boards _____

DMA channels of other boards _____

Interrupt level of other boards _____

Documentation Comment Form

National Instruments encourages you to comment on the documentation supplied with our products. This information helps us provide quality products to meet your needs.

Title: *BridgeVIEW Run-Time System Guide*

Edition Date: May 1998

Part Number: 321635C-01

Please comment on the completeness, clarity, and organization of the manual.

_____

_____

_____

_____

_____

_____

_____

If you find errors in the manual, please record the page numbers and describe the errors.

_____

_____

_____

_____

_____

_____

_____

Thank you for your help.

Name _____

Title _____

Company _____

Address _____

_____

E-Mail Address _____

Phone (___) _____ Fax (___) _____

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National Instruments Corporation
6504 Bridge Point Parkway
Austin, Texas 78730-5039

Fax to: Technical Publications
National Instruments Corporation
512 794 5678

Glossary

Prefix	Meanings	Value
m-	milli-	10^{-3}
µ-	micro-	10^{-6}
n-	nano-	10^{-9}

A

access level — Numeric value between 0 and 255 that can be used to control access to your HMI.

ACK (Acknowledge) — The sequence action that indicates recognition of a new alarm.

alarm — An abnormal process condition. In BridgeVIEW, an alarm occurs if a tag value goes out of its defined alarm limits or if a tag has bad status.

Alarm Summary — A display of tags currently in alarm, or a display of tags previously in an unacknowledged alarm state that have returned to a normal state.

analog tag — A continuous value representation of a connection to a real-world I/O point or memory variable. This type of tag can vary continuously over a range of values within a signal range.

application software — The application created using the BridgeVIEW Development System and executed in the BridgeVIEW Run-Time System environment.

B

bit array tag — A multibit value representation of a connection to a real-world I/O point or memory variable. In BridgeVIEW, this type of tag can be comprised of up to 32 discrete values.

BridgeVIEW — A program development application for real-time process monitoring and control. BridgeVIEW uses the graphical development environment called G.

BridgeVIEW Engine	The heart of the BridgeVIEW system. It maintains the Real-Time Database of all tag values and alarm states. The BV Engine runs as a separate process, independent of your HMI application.
BridgeVIEW Run-Time System	An execution environment for applications created using the BridgeVIEW Development System.

C

Citadel	A database for storing historical tag values.

D

deadband	In process instrumentation, the range through which an input signal can vary, upon reversal of direction, without initiating an observable change in output signal. Deadband is usually expressed in percent of range. *See* log deadband and update deadband.
device	An instrument or controller that is addressable as a single entity and controls or monitors real-world I/O points. A device is often connected to the host computer through some type of communication network, or can be a plug-in device.
device server	An application that communicates with and manages a peripheral hardware device such as a Programmable Logic Control (PLC), remote I/O device or plug-in device. Device servers pass tag values to the BridgeVIEW Engine in real time.
discrete tag	A two-state (on/off) value representation of a connection to a real-world I/O point. In BridgeVIEW, this type of tag can be either a one (TRUE) or a zero (FALSE).
dynamic attributes	Tag attributes that do not require the BridgeVIEW Engine to be restarted when they are edited or reconfigured. Examples of dynamic attributes include enabling logging operations, alarm attributes, and some scaling attributes. *See also* static attributes.

E

Engine	*See* BridgeVIEW Engine.

engineering units (EU)	Terms of data measurement, as degrees Celsius, pounds, grams and so on.
error message	An indication of a software or hardware malfunction, or an unacceptable data entry attempt.
event	Something that happens to a tag in the BridgeVIEW system. Events include tags going into or out of alarm state and the user setting a tag value.

G

G	The graphical programming language used to develop BridgeVIEW applications.
group	*See* tag group or I/O group.

H

Help window	Special window that displays the description of controls and indicators. The window also accesses the **Online Reference**.
historical trend	A plot of data (values versus time) showing values that were previously acquired in the system or logged to disk.
Historical Trend Viewer (HTV)	A utility that accesses historical data from the Citadel historical database.
Human Machine Interface (HMI)	A graphical user interface for the user to interact with the BridgeVIEW system.

I

I/O Group	A set of related server items, all of which share the same server update rate and deadband.
input tag	A tag that accepts Real-Time Database values from a device server.
Input/Output (I/O) tag	A tag that accepts Real-Time Database values from a device server and sends values to the server.
item	A channel or variable in a real-world device that is monitored or controlled by a BridgeVIEW device server.

L

LabVIEW	Laboratory Virtual Instrument Engineering Workbench. A program development application used commonly for test and measurement purposes.
log deadband	The range through which a tag value must change before it is logged to Citadel.
log resolution	The smallest change in a tag value stored in the historical database.

M

Man Machine Interface (MMI)	*See* Human Machine Interface (HMI).
MB	Megabytes of memory.
memory tag	A tag not connected to a real-world I/O point. Memory tags are used for user-defined calculations. *See also* tag and network tag.

N

network tag	A tag remotely connected to any type of tag on another BridgeVIEW Engine. *See also* tag and memory tag.

O

OPC	OLE for Process Control. A COM-based standard defined by the OPC foundation that specifies how to interact with device servers. COM is a Microsoft 32-bit Windows technology.
operator	The person who initiates and monitors the operation of a process.
output tag	A tag that sends values to a device server whenever it is updated in the Real-Time Database.

P

Panel G Wizard	A utility in BridgeVIEW that automates the process of creating front panel controls.
PID	*See* Proportional Integral Derivative Control.
PLC	*See* Programmable Logic Control.
polling	A method of sequentially observing each I/O point or user interface control to determine if it is ready to receive data or request computer action.
pop up	To call up a special menu by clicking, usually on an object, with the right mouse button.
pop-up menus	Menus accessed by popping up, usually on an object. Menu options pertain to that object specifically.
positioning tool	Tool used to move and resize objects. Resembles an arrow.
Programmable Logic Control (PLC)	A device with multiple inputs and outputs that contains a program you can alter. BridgeVIEW Device Servers establish communication with PLCs.
Proportional Integral Derivative (PID) Control	A combination of proportional, integral, and derivative control actions. Refers to a control method in which the controller output is proportional to the error, its time history, and the rate at which it is changing. The error is the difference between the observed and desired values of a variable that is under control action.

R

range	The region between the limits within which a quantity is measured, received, or transmitted expressed by stating the lower and upper range values.
Real-Time Database (RTDB)	An in-memory snapshot of all tags in the system.
real-time trend	A plot of data (values versus time) that is updated as each new point is acquired in the Real-Time Database.
reentrant execution	Mode in which calls to multiple instances of a subVI can execute in parallel with distinct and separate data storage.

representation — Subtype of the numeric data type, of which there are signed and unsigned byte, word, and long integers, as well as single-, double-, and extended-precision floating-point numbers, both real and complex.

resizing handles — Angled handles on the corner of objects that indicate resizing points.

RTDB — *See* Real-Time Database.

S

sampling period — The time interval between observations in a periodic sampling control system.

SCADA — Supervisory Control and Data Acquisition.

sensor — A device that produces a voltage or current output representative of some physical property being measured, such as speed, temperature, or flow.

string tag — An ASCII character representation of a connection to a real-world I/O point.

supervisory control — Control in which the control loops operate independently subject to intermittent corrective action.

system developer — The creator of the application software to be executed in the BridgeVIEW Run-Time System.

System errors — Errors that happen in the BridgeVIEW system, like a server going down. System errors are displayed in a dialog box, on the Engine User Interface, and also are logged in a syslog file.

System events — Events that occur in the BridgeVIEW system, like an operator logging on or a utility starting up. System events are logged in a syslog file.

T

tag — A connection to a real-world I/O point or a memory variable. Tags can be one of four data types: analog, binary, discrete, or string.

tag attributes — Parameters pertaining to a tag, like its alarm, limits, or Engineering Units. Tag attributes are configured in the Tag Configuration Editor but can be changed dynamically using the Tag Attributes VIs.

Tag Browser	A utility to view the configuration parameters of a tag, as configured in the Tag Configuration Editor.
Tag Configuration Editor	A utility to configure various parameters of a tag, such as connection information, scaling, or logging.
tag group	A set of tags primarily used for reporting and acknowledging alarms. A tag can be associated with only one tag group. All tags belong to the group <ALL> by default.
Tag Monitor	A utility to view the current value of a tag, along with its status and alarm state.
tag status	A variable that determines the validity of a tag value. A negative status represents an error, a positive status represents a warning, and a status of zero represents a good tag value.
timestamp	The exact time and date at which a tag value was sampled. Tag values are stored with their timestamps in the RTDB.
trend	A view of data over time. Trends can display real-time or historical data.

U

update deadband	The range through which a tag value must change before it is updated in the Real-Time Database.
user	*See* operator.
user-defined constant	Block diagram object that emits a value you set.

V

virtual instrument	A program in the graphical programming language G; so called because it models the appearance and function of a physical instrument.

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