



NATIONAL INSTRUMENTS™
Lookout™

Lookout Operator's Manual

Worldwide Technical Support and Product Information

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About This Manual

How to Use This Manual Set

This *Lookout Operator's Manual* contains basic information about installing Lookout and operating a Lookout process.

The *Lookout Help* includes instructions for completing tasks in Lookout and a detailed description of each Lookout object.

The *Lookout Release Notes* document includes information such as what is new in this version of Lookout, compatibility issues, bug fixes, and so on.

Conventions

The following conventions appear in this manual:

»

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



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



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

bold

Bold text denotes items that you must select or click on in the software, such as menu items and dialog box options. Bold text also denotes parameter names.

italic

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

`monospace`

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

`monospace italic`

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

Introduction to Lookout

This chapter explains how to install and run Lookout and describes the basics of the Lookout environment.

Hardware and Software Requirements

Lookout requires the following:

- Pentium class or equivalent PC running at 90 MHz or faster
- At least 32 MB RAM
- 65 MB free disk space, plus possibly 100 MB or more, depending on how much historical data you intend to log to the Citadel storage system; you should also have about 50 MB of disk space for file swapping on Windows 2000/NT/XP computers
- Windows 2000, Windows NT version 4 or later, Windows XP, Windows Me/98, or Windows 95 OSR2 or later; National Instruments strongly recommends using Windows 2000/NT/XP for optimum stability
- If you plan to install the Historical Data Viewer along with Lookout, and you are running Windows NT, you must have service pack 3 or later installed
- Monitor display setting of at least 800 × 600 pixels
- Network card and TCP/IP networking installed on the computers you want to connect, if you intend to take advantage of Lookout networking



Note Performance of Lookout depends on the number, size, and complexity of processes you are running. While the minimum requirements are fine for some processes, you should plan on using more powerful computer configurations for complex and data-intensive applications.

- You must be properly set up on a network with TCP/IP protocols installed if you want to use the networking capabilities of Lookout. You must be able to ping any computer on your network that you intend to have as a part of your Lookout network. To test this, access a command prompt and enter the following command:

```
Ping compname
```

where *compname* is the name of the computer you want to ping.

If TCP/IP is functioning properly on your computer, you should receive a response that looks something like the following example:

```
Pinging compname [123.45.67.89] with 32 bytes of data:
```

```
Reply from 123.45.67.89: bytes=32 time<10ms TTL=128
```

```
Reply from 123.45.67.89: bytes=32 time<10ms TTL=128
```

```
Reply from 123.45.67.89: bytes=32 time<10ms TTL=128
```

```
Reply from 123.45.67.89: bytes=32 time<10ms TTL=128
```

If TCP/IP is not working properly on your computer, consult your system administrator. Refer to Chapter 5, [Networking and Running an Application](#), for more information on networking and network configuration with Lookout.



Tip If your computer does *not* have a command prompt available in the Windows **Start** menu or in **Start»Programs**, select **Start»Run** and enter `command.com` in the **Run** dialog box. This opens a command prompt you can use for the `ping` command.

Installing Lookout

This section describes how to install Lookout. For more information about upgrading from earlier versions of Lookout, refer to the release notes for this version of Lookout.

1. Shut down all applications that may currently be using ODBC such as spreadsheets, word processors, database programs, MS Query, and similar applications.
2. Insert the Lookout CD into your CD drive.

3. The Lookout CD-ROM has autorun capability. If for some reason the autorun fails to start the CD installation routine, click on the **Start** icon in the taskbar and select **Run**. Enter *N*: \Lookout\setup.exe where *N* represents your CD-ROM drive. (To install the free client version, enter *N*: \Free_Client\setup.exe. To install the Lookout Player, enter *N*: \LookoutPlayer\lk50_web.exe.) Then click **OK**.

Choosing a custom installation provides you with certain installation options, including the following:

- Lookout allows you to choose whether to install its online help. Use **Browse** to enter the name of an alternate directory or click **Next** to accept the recommended directory name.
 - During installation, Lookout can install its ODBC driver. Make sure you select the **Citadel ODBC** option if you want to be able to access Lookout's Citadel database.
 - When installing Lookout on a Windows 2000/NT/XP system, you are presented with a list of options on what you may install. Make sure you install the optional **NT keyboard driver** under Windows NT if you want to be able to block unauthorized users from using certain keyboard commands such as <Alt-Tab> to switch out of Lookout.
4. Follow the remaining instructions to complete the Lookout installation.

Registering Lookout

If this is your first installation of Lookout on the computer you are using, or if you have any lost or corrupted your registration information, then the first time you launch Lookout, it prompts you for registration information. Be sure to register your Lookout Package to receive your permanent unlock code. As an unregistered package, Lookout is limited to 50 I/O points and one client connection and only runs for 30 days.

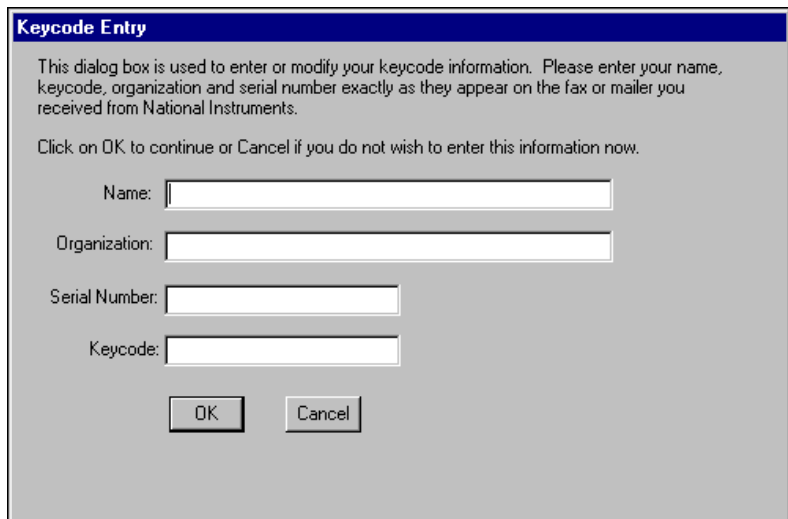
When you register Lookout, you unlock it for permanent use at your appropriate I/O count. If you do not register Lookout by the end of the 30 day period, it lapses to a demo system. You must complete the registration form and send it to National Instruments in order to register Lookout. When we receive your registration form, National Instruments generates a keycode to unlock Lookout and faxes or mails it to you. You can also get your keycode through the Internet by pointing your browser to ni.com/keycode. If you have not registered your copy of Lookout, you are guided through the registration. If you have not yet created your personal profile, you must do so before you can register Lookout.

Lookout requires a hardware key in some countries. Contact National Instruments if you are not sure whether your system requires a hardware key. If you were supplied a key with Lookout, be sure to plug it into the parallel port on your computer before activating Lookout.

Starting Lookout for the First Time

1. Launch Lookout by selecting **Start»Programs»National Instruments»Lookout»Lookout**.

A dialog box appears asking you to register Lookout. If you are ready to register Lookout, click on **Enter new keycode**. The registration dialog box appears.



The image shows a Windows-style dialog box titled "Keycode Entry". The title bar is blue with white text. The main area has a light gray background. At the top, there is a paragraph of text: "This dialog box is used to enter or modify your keycode information. Please enter your name, keycode, organization and serial number exactly as they appear on the fax or mailer you received from National Instruments." Below this is another line of text: "Click on OK to continue or Cancel if you do not wish to enter this information now." There are four text input fields, each with a label to its left: "Name:", "Organization:", "Serial Number:", and "Keycode:". Each label is followed by a white rectangular input box. At the bottom of the dialog, there are two buttons: "OK" and "Cancel", each in its own small rectangular frame.

2. Enter your name in the **Name** field.
3. Enter the **Organization** name exactly as it appears with the keycode information sent in response to your registration, including punctuation marks. This text is used in combination with the keycode, and so it must be exact.

(If you have not yet received your keycode from National Instruments, you can enter your registration data later. Select **OK** and Lookout will inform you that you have not registered your package yet. Select **OK** again until Lookout launches.)
4. Enter the **Serial Number** of your package. (This can be found on your registration form.)

5. Enter your 12-character **Keycode**. The keycode is not case sensitive and you can leave the hyphens out if desired. Notice that there are no spaces near the hyphens.
6. Click **OK**.

If you enter the proper information correctly, Lookout appears on your screen with no process running. If you are certain that you typed the information correctly and Lookout does not accept it, contact National Instruments for help.

Changing I/O Count Registration

If you want to change the number of Lookout I/O points you are using, or make other changes in system capabilities or client connections, first contact National Instruments to obtain a new Lookout keycode. Then select **Options»System»Change Registration Info** and enter the new keycode.

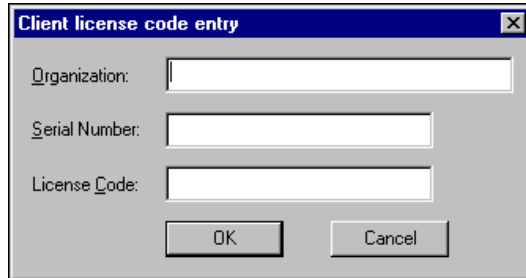
Adding Client Connections

You are limited in the number of client connections you are allowed to maintain in Lookout. You can add or remove client licenses from any copy of Lookout. For example, if you have a copy of Lookout running a server process with two clients connected and need to increase the number of client connections to three, you need only get a license for one more client connection, and enter that new license code.



Note If you are logged on to a Windows 2000/NT/XP computer as Guest or Restricted User, certain Lookout tasks will not work correctly because they require writing to the registry or `WINNT` folder. These tasks include creating a user account, adding a client license, and registering a Logos computer.

1. To add or change client connection information in Lookout, select **Options»System** from the menu, and click on the **Change Client License** button. Click on the **Add** button. The following dialog box appears.

A screenshot of a Windows-style dialog box titled "Client license code entry". The dialog has a blue title bar with a close button (X) in the top right corner. Inside the dialog, there are three text input fields. The first field is labeled "Organization:" with a small cursor icon to its left. The second field is labeled "Serial Number:" with a small cursor icon to its left. The third field is labeled "License Code:" with a small cursor icon to its left. Below the input fields, there are two buttons: "OK" and "Cancel".

2. Enter your **Organization** name as you reported it in your registration request. Enter the **Serial Number** and the **License Code** you received. Click on **OK**.

If your registration attempt fails, check to make sure you entered all of the information correctly. Contact National Instruments if correcting these entries does not fix the problem.

A newly installed version of Lookout will run with one client connection for 30 days before reverting to demo program mode.

Lookout Environment

The following illustration shows a Lookout screen.

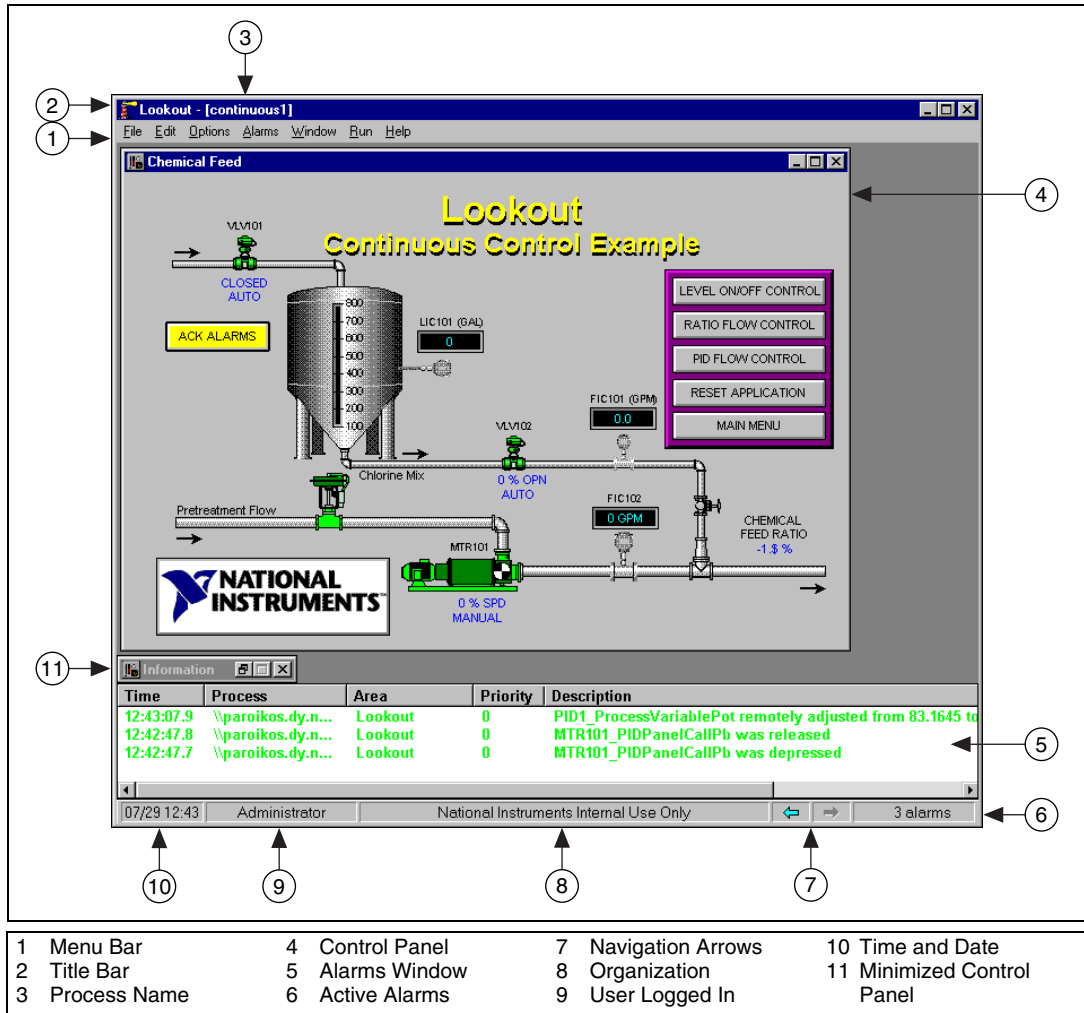


Figure 1-1. Lookout Environment

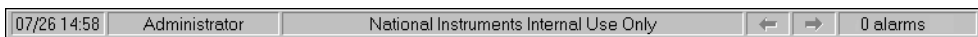
Depending on the security access level of the user logged in to Lookout, certain menus and tools may be unavailable. Refer to the *Lookout Menu Commands* topic in *Lookout Help* for more information.

Menu Bar

The menu bar displays the currently available menu commands, which change depending on whether Lookout is in run mode, edit mode, or is open without any processes running. These commands may or may not be available to the operator, depending on his or her security level.

Status Bar

When Lookout is in run mode, the status bar is gray. The time and date are displayed on the left end of the bar. The account name of the currently logged on operator comes next. The company name as entered during registration appears in the middle, and the alarm status is on the right end of the status bar. The control panel navigation arrows, which scroll through various control panels, may or may not be visible, depending on your system options settings.



Lookout Workspace

The workspace is the area in which you view and operate control panels. The visible workspace on your screen is only a window into the Lookout virtual workspace. If control panels or their associated icons are partially or completely outside the visible workspace, Lookout automatically displays horizontal and vertical scroll bars.

Control Panels

Control panels provide the display area for any switches, knobs, bar graphs, digital displays, trend graphs, and other components that you want to use to monitor and control your operations.

You can move the panels around the screen by grabbing the title bar of a panel with the mouse cursor and dragging it to a new location. There is no limit on the number of control panels you can create or the number of objects displayed on any one panel.

There are three types of control panels: normal, pop-up, and pop-up with no icon. A normal control panel can be maximized, normal size, or minimized within the Lookout workspace. Control panels can also “pop up” when an event occurs, such as when a push button is pressed or when an alarm is activated. When a pop-up control panel is displayed, it remains on top of all other panels until you minimize it.

Alarms Window

You can choose how the Alarms Window is displayed by selecting **Alarms»Display Options**. In Figure 1-1 the Alarms Window is set to display at the bottom of the workspace.

Operator Input and Navigation

Operators may navigate using a mouse, trackball, touchscreen, or keyboard. When the cursor moves over a controllable object, the cursor turns into a hand, indicating you now have control of the object. Controllable objects include such things as Switches, Pots, and Pushbuttons.

When using a keyboard, the arrow keys move the cursor around the screen. The <Tab> key jumps the cursor from one controllable object to another, and the <Space> bar acts as the left mouse button, so you can click on a controllable object without actually using a mouse.

Virtual Keypad

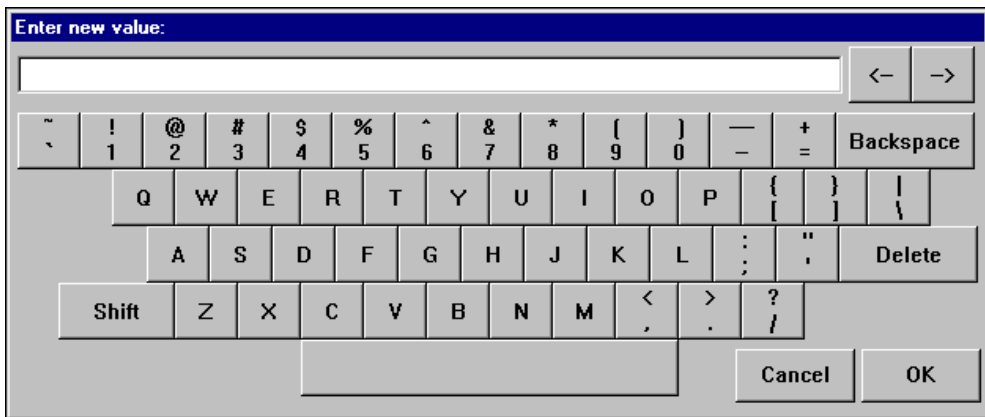
When you are in run mode, you can click on a digital Pot control and bring up a virtual keypad to enter numeric values, either with a mouse or a touchscreen.

Virtual Keyboard

Lookout also has a virtual keyboard you can use with a touchscreen or a mouse.

To enable the virtual keyboard, select **Options»System** and then check **Left Mouse Click** or **Right Mouse Click** in the **Virtual Keyboard Pops Up** section of the dialog box.

When this feature is enabled, clicking in a data entry field or touching the field on a touchscreen displays the virtual keyboard, as shown in the following illustration.



Setting System Options

You can configure certain system options in Lookout that determine the way your version of Lookout operates. Select **Options»System** from the menu bar. The System Options dialog box appears as shown in the following figure. Some default settings may be different for your computer.



Note Only users logged on with security levels of 9 or greater can access the System Options dialog box.

- **If security level is below (0-9):** You can set local limits on how Lookout runs when users with different security levels are logged on. Use these selection boxes to set these limits. Refer to Chapter 4, [Security](#), for full details on the security features of Lookout.
- **Log alarms to:** If you have a printer directly connected to your computer, you can direct that all alarms be printed when they occur. Set this field to the communications port to which your printer is connected. Refer to Chapter 3, [Alarms and Events](#), for information on the alarm and event logging features of Lookout.

- **Virtual Keyboard Pops Up On:** Lookout features a virtual keyboard that you can access by clicking on a control that accepts a text or numeric input. You can set whether a right-click or a left-click pops up this keyboard.
- **Show panel navigation arrows in status bar:** Select this checkbox if you want to use panel navigation arrows. These arrows, which appear in the right side of the status bar, activate control panels in the order in which you last accessed them. This feature is most convenient when you have a large number of control panels in a process and need to cycle through a subset of them several times in a short period of time.
- **Computer Name:** This field shows the network name of the computer you are working on. If this field is blank, and you intend to use the networking capability of Lookout, you need to check your network settings to make sure your computer is properly named for network operations.
- **Citadel Database:** These fields set the default destination for historical data logged by Lookout. All processes running under a single instance of Lookout will use this data path to log data to Citadel, unless this setting was overwritten when the process was created.

You set the **Default Path** and the **Default Computer** separately. Use the complete path for the **Default Path** setting, and the fully qualified computer name for the **Default Computer** setting.
- **Change Registration Info** and **Change Client License:** Click these buttons to enter new registration or license information.

Serial Port Communication

This chapter describes how Lookout regulates serial port usage so that objects gain access to serial ports in an orderly and timely fashion.

Defining Serial Port Settings

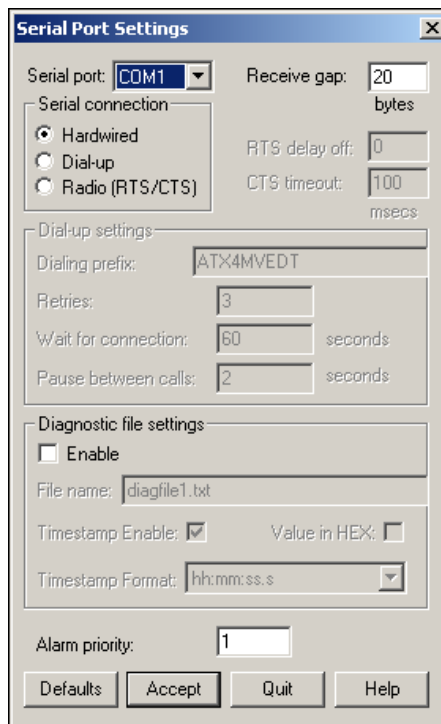
Follow these steps to configure serial port settings for hardwired, radio, and dial-up communications.



Note You must define serial port communication settings on every copy of Lookout. If you have more than one instance of Lookout running on the same computer, each instance must use a different serial port.

Because multiple Lookout instances cannot share the same serial port, if it is necessary for two processes to access the same serial port, they need to be run in the same Lookout instance. If you are designing a system with multiple server process files, and those server files all access the same serial port on a single computer, they need to be run in the same Lookout instance.

1. In Lookout select **Options»Serial Ports**. The Serial Port Settings dialog box appears.



The image shows the 'Serial Port Settings' dialog box. It has a title bar with a close button. The main area is divided into several sections. The 'Serial port' dropdown is set to 'COM1'. The 'Receive gap' is set to '20 bytes'. Under 'Serial connection', 'Hardwired' is selected with a radio button. 'Dial-up' and 'Radio (RTS/CTS)' are unselected. To the right, 'RTS delay off' is set to '0' and 'CTS timeout' is set to '100 msec'. The 'Dial-up settings' section includes 'Dialing prefix' set to 'ATX4MVEDT', 'Retries' set to '3', 'Wait for connection' set to '60 seconds', and 'Pause between calls' set to '2 seconds'. The 'Diagnostic file settings' section has an 'Enable' checkbox that is unchecked, a 'File name' field set to 'diagfile1.txt', a 'Timestamp Enable' checkbox that is checked, a 'Value in HEX' checkbox that is unchecked, and a 'Timestamp Format' dropdown set to 'hh:mm:ss.s'. At the bottom, 'Alarm priority' is set to '1'. There are four buttons at the bottom: 'Defaults', 'Accept', 'Quit', and 'Help'.

2. In the **Serial port** field, select the communication port you are defining. Microsoft Windows supports up to 64 serial ports; however, most computers support only two serial ports without additional hardware.
3. Define the serial port configuration for the appropriate communication port. The rest of this chapter contains complete descriptions of the configuration options.
4. Click **Accept** to save the configuration for the serial port.
5. Click **Quit** to exit.

Setting Receive Gap

The **Receive gap** setting is available for all serial connection types.

This number specifies the number of empty bytes (or amount of time) a driver receives from a controller before the driver recognizes the end of a message frame and asks for another message. Normally you should leave this at the default setting of 20. However, if you are experiencing garbled communication alarms, you might try increasing this number to as high as 100 to allow more time before Lookout decides it has received a complete message.

Selecting the Serial Connection

Hardwired Serial Connection

Hardwired serial connections require no hardware handshaking for line control. Use this setting for all serial communication types except dial-up telephone and remote radio transceivers. You should also use this setting when directly connecting Lookout to the master repeater on a radio system or through a leased-line modem. Because a master repeater is a full-duplex device that does not require keying and unkeying of the frequency, it acts much like a physically hardwired network. Other hardwired connection types include RS-232, RS-422, RS-485, and leased telephone lines.

Dial-Up Serial Communication

Use the **Dial-up** serial connection when you use a modem in conjunction with a switched telephone line (not leased line). You can customize the dial-up settings for your particular modem and phone line.

The default **Dialing prefix** settings are based on the Hayes Corporation AT command set, which is an industry standard for data modems. The following table explains the Lookout default settings. For additional commands, refer to your modem operation documentation.

Table 2-1. Dialing Prefix

Prefix	Description
AT	Attention code that must precede all commands
D	Dial phone number with modifiers: P for pulse; T for tone
En	Local echo mode: E for no echo
Mn	Speaker on or off: M for speaker always off
Vn	Verbal or numeric result codes: V for numeric result codes
Xn	Result code and dialing options: X4 waits for dial tone before dialing, and recognizes busy signal

When you use an external dial-up modem with Lookout, the DTR line in your cable between the modem and the computer must be wired straight through. This line is pin 20 on a 25-pin RS-232 connector and pin 4 on a 9-pin connector. Lookout uses the DTR line to command the modem to disconnect (hang up) and return to the command mode.

Some factory modems are not configured to respond to the DTR line. After Lookout first successfully dials out to a remote modem and finishes the polling cycle, it drops the DTR line but the modem remains connected. If the modem does not respond after several seconds of Lookout attempting to raise and drop the DTR line, Lookout generates an alarm stating that the modem is not responding. If you receive this alarm message, your modem is not configured to monitor the DTR line.

The Hayes Corporation standard command for configuring the modem to hang up and enter command mode upon loss of DTR is &D2. You can use a terminal program to make this setting permanent on most modems by entering the modem command AT&D2&W to store the setting permanently in nonvolatile modem memory. Or you can just add &D2 into the **Dialing prefix**. The default **Dialing prefix** is ATX4MVEDT, so you might change it to AT&D2X4MVEDT.

Retries specifies the number of times Lookout dials the specified phone number and attempts to connect to the modem at the other end of the line. If Lookout fails to connect after the specified **Retries**, it generates an alarm and moves on to the next phone number in the polling queue (if a queue has formed).

Wait for connection specifies the length of time Lookout waits to receive a connect signal back from the modem it is calling. The time period begins when Lookout first sends the local modem the dialing prefix command. The time should be long enough for the local modem to receive a dial tone, dial the phone number, allow the remote modem to pick up the line, and send back a connect message. If the specified time is too short, your system could be operating correctly but never make a connection.

Pause between calls is the length of time Lookout waits after hanging up before it sends the local modem the next dialing prefix signal. If the specified time is too brief, your system might not hang up the existing call but still attempt to call the next number.



Note Your specific modems, radios, and local phone lines might operate faster or slower than the default settings. You might need to use a trial-and-error approach to find the best settings for your system.

For information about troubleshooting dial-up connections, refer to the NI Developer Zone resources at ni.com/zone.

Radio (RTS/CTS) Serial Connection

RTS/CTS is a local hardware handshaking mechanism between the local computer and the local communication device. Use the **Radio (RTS/CTS)** serial connection when you connect the serial port to a device that requires RTS/CTS hardware handshaking, such as a radio transceiver that must be keyed up during data transmission and unkeyed during data reception. Other half-duplex communication media, such as RS-485, might require RTS/CTS hardware handshaking. Although the RTS/CTS scheme works identically for other RTS/CTS communication schemes, this example assumes that you are communicating through radio.

When you select RTS/CTS hardware handshaking, Lookout controls the RTS, or request-to-send pin, and monitors the CTS, or clear-to-send pin, during data transmission (pins 4 and 5 on a 25-pin RS-232 connector). Therefore, you must have at least the RTS pin (pin 4) wired *straight through* on your RS-232 cable. The CTS pin (pin 5) is optional.

Lookout initiates a serial transmission on an RTS/CTS port by first asserting RTS to key the radio. Lookout then begins monitoring the state of the CTS pin. When the radio transmitter is fully keyed and ready to transmit, the radio asserts CTS and Lookout immediately begins data transmission. If the radio does not assert CTS within the **CTS timeout** setting (default is 100 ms), Lookout assumes the radio is ready to transmit and transmits anyway.

The **CTS timeout** setting is the maximum amount of time that Lookout waits after asserting RTS for CTS before transmitting. Most radios typically take between 10 and 80 milliseconds to key up. Consult your radio specifications and DIP switch settings to determine the key-up delay on your radio.

If your radio can assert CTS when it is ready to transmit, add about 50 milliseconds to the radio key-up delay specification and use this total value for the **CTS timeout**. If your radio does not assert CTS, you should begin by adding about 20 milliseconds to your radio key-up time. Then, increase this value in 10 millisecond increments until the remote radio begins to correctly receive the first bytes of the message.

Some radios might assert CTS before they are actually ready to transmit. In this case, disconnect the CTS line (pin 5 on a 25-pin RS-232 connector) and set the **CTS timeout** to a value high enough to let the radio fully key before transmission.

After it transmits the last byte of data, Lookout continues to assert RTS, keeping the radio keyed until the **RTS delay off** time period expires. You should set this value to the default of zero milliseconds so that Lookout unkeys the radio as soon as possible to prepare to receive the response.

When unkeyed, most radios generate an audible squelch tail that the remote device might decode as unexpected garbage bytes. Some remote devices reject the entire message instead of just decoding the valid data and ignoring the extra garbage bytes. In this case, keep the radio keyed for several milliseconds using the **RTS delay off** setting. This time period delays the squelch tail long enough for the remote device to recognize the last data frame as valid before receiving garbage bytes caused by the squelch tail.

If you set the **RTS delay off** setting too high, the remote device begins transmitting its response before the local radio is unkeyed, causing a communication alarm in Lookout.

Serial Port Hangup

You can configure your serial port to use +++ATH hangup as well as DTR hangup. Every serial port you have configured will have a configuration section in the `lookout.ini` file under the port name, such as `[COM1]`. Add the following entry to the file to set your hangup mode:

```
DTR_Hangup=N
```

When $N=1$ (default), that port uses DTR hangup. When $N=0$, the port uses +++ATH hangup.

Diagnosing Serial Port Problems

You can create serial port diagnostic files to help solve serial port communication problems.

1. Select **Options»Serial Ports**.
2. Check the **Enable** checkbox.

3. Enter the **File name** to which you want Lookout to log communications, as shown in the following illustration. If you enter a file name only, Lookout creates the file in the Lookout directory. You can create a diagnostic file for each serial port you have configured. If you use the same file name for each port, all messages are logged to the same file.

The image shows a 'Serial Port Settings' dialog box with the following fields and options:

- Serial port:** A dropdown menu set to 'COM1'.
- Receive gap:** A text box with '20' and the unit 'bytes'.
- Serial connection:** A group box containing three radio buttons: 'Hardwired' (selected), 'Dial-up', and 'Radio (RTS/CTS)'.
- RTS delay off:** A text box with '0'.
- CTS timeout:** A text box with '100' and the unit 'msecs'.
- Dial-up settings:** A group box containing:
 - Dialing prefix:** A text box with 'ATX4MVEDT'.
 - Retries:** A text box with '3'.
 - Wait for connection:** A text box with '60' and the unit 'seconds'.
 - Pause between calls:** A text box with '2' and the unit 'seconds'.
- Diagnostic file settings:** A group box containing:
 - Enable:** A checked checkbox.
 - File name:** A text box with 'diagfile1.txt'.
 - Timestamp Enable:** A checked checkbox.
 - Value in HEX:** An unchecked checkbox.
 - Timestamp Format:** A dropdown menu set to 'hh:mm:ss.s'.
- Alarm priority:** A text box with '1'.
- Buttons:** 'Defaults', 'Accept', 'Quit', and 'Help'.

4. If you want timestamps for each communication, check the **Timestamp Enable** checkbox and choose a **Timestamp Format**.
5. To log all parts of a message in hexadecimal, select the **Value in HEX** checkbox. Otherwise, printable characters print as their character representation instead of in hex format.

The serial diagnostic file is a text file consisting of requests and replies. Any byte that can be represented by a printable character is displayed as the character, unless the **Value in HEX** checkbox was checked. All non-printable bytes are represented by their hex codes enclosed in square brackets. The following text shows how a typical request and reply might appear.

```
Modbus1 ->
[01] [03] [00] [00] [00] [02] [C4] [0B]
Modbus1 <-
[01] [03] [04] [00] A [00] [00] [AA] '
```

In the first line, the Modbus1 object sent out (->) a message, the message shown in line two. The third line shows that Modbus1 received (<-) a message, the message in line four.

If timestamps are enabled for each message, you can match messages in the diagnostic file with alarms in the Alarms Window. A logged communication with timestamps enabled might look like the following:

```
09/27/2001 15:08:12 - Modbus1 ->
[01] [03] [00] [0A] [00] [01] [A4] [08]
```

The diagnostic file might expose a missing reply from the hardware, as in the following example:

```
Modbus1 ->
[01] [03] [00] [0A] [00] [01] [A4] [08]
Modbus1 ->
[01] [03] [00] [0A] [00] [01] [A4] [08]
Modbus1 ->
[01] [03] [00] [0A] [00] [01] [A4] [08]
```

Alarms and Events

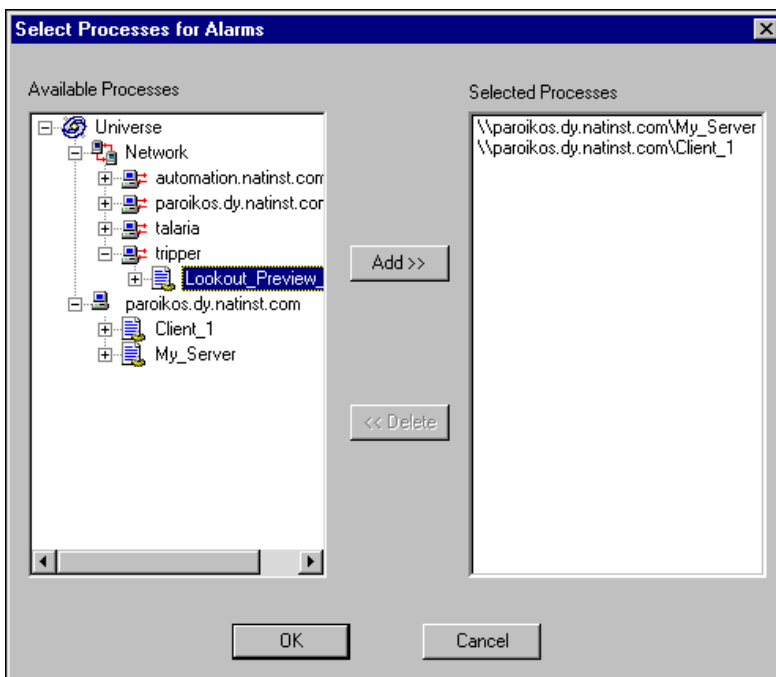
This chapter describes Lookout alarms and events.

An *event* can be anything that happens within the Lookout environment, such as adjusting a control, entering or leaving edit mode, or logging in and out. An *alarm* in Lookout denotes an abnormal condition and must be acknowledged by the operator. For the purposes of logging and retrieval, events and alarms are combined.

Selecting Processes to Monitor for Alarms

Before you can monitor alarms or events from processes running on other computers, you must add them to the list of processes that your monitoring computer is tracking. To select other processes to monitor for alarms, follow these steps.

1. Select **Alarms»Select Processes**. The following dialog box appears.



2. Navigate to the process you want to monitor in the **Available Processes** list, click on the process, and click the **Add** button. (If you do not see the computer that is running the process you want to monitor, right-click on the Network node, and select **Register Computer**.)
3. To stop monitoring a process, select the process in the **Selected Processes** list and click the **Delete** button.
4. Click **OK**.

Viewing Alarms and Events

You can view recent or active alarms and events in the Alarms Window in Lookout. You can also view historical alarm and event information that has been logged, using the Historical Data Viewer in MAX (National Instruments Measurement and Automation Explorer).

Viewing Alarms and Events in the Alarms Window

The Alarms Window lists all active and unacknowledged alarms and/or events. Alarms are listed in chronological order with the most recent alarm at the top of the list. If there are too many alarms to see at once, you can use the scroll bar at the right of the **Alarms Window** to scroll through the list.

Time	Process	Area	P..	Object Name	Description
14:20:44.2	\\kali\Saturn_5_Station	Saturn\\Station5\\Sector3\\FuelCells	4	\\kali\\Satur...	Temperature on fuel cell 4 exceeds specification.
14:20:44.2	\\kali\Saturn_5_Station	Saturn\\Station5\\Sector7\\Pumps\\Gas	7	\\kali\\Satur...	Clogged Intake Valve
14:18:16.5	\\kali\Saturn_5_Station	Saturn\\Station5\\Sector4\\Conveyers	9	\\kali\\Satur...	Conveyor 9 is jammed

If you have your Alarms Window minimized, you can view it by pressing <Ctrl-A>, selecting **Alarms>Show**, or clicking on the alarm indicator box on the far right side of Lookout status bar, at the bottom of the screen. The number of alarms and events currently shown in the Alarms Window is displayed in the alarm indicator box.

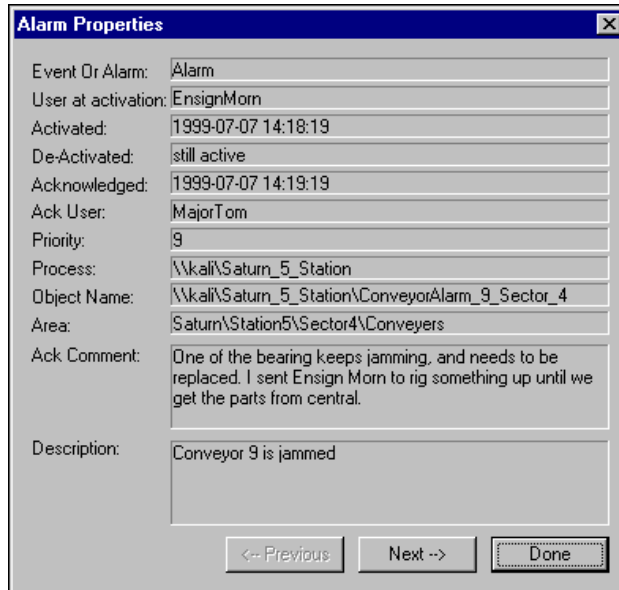
To quickly identify alarm status, use the Lookout Alarms Window color scheme, as defined in Table 3-1.

Table 3-1. Alarms Window Color Scheme

Color	Alarm Status
Red	Active
Blue	Unacknowledged, Inactive
Red and Black	Acknowledged, Active (Alarm information, including time, description, priority, and name, appears in black and the area appears in red)
Green	Event

Because a new line is added to the list every time an alarm activates or event occurs, Lookout might list the same item multiple times.

You can sort the alarms and events by clicking the column headers in the Alarms Window. To view detailed information about a particular alarm or event, right-click on it and select **Properties**. The following dialog box appears, listing specific information about the alarm or event.



The **Alarm Properties** dialog box displays the following information:

Event Or Alarm:	Alarm
User at activation:	EnsignMorn
Activated:	1999-07-07 14:18:19
De-Activated:	still active
Acknowledged:	1999-07-07 14:19:19
Ack User:	MajorTom
Priority:	9
Process:	\\kali\Saturn_5_Station
Object Name:	\\kali\Saturn_5_Station\ConveyorAlarm_9_Sector_4
Area:	Saturn\Station5\Sector4\Conveyers
Ack Comment:	One of the bearing keeps jamming, and needs to be replaced. I sent Ensign Morn to rig something up until we get the parts from central.
Description:	Conveyor 9 is jammed

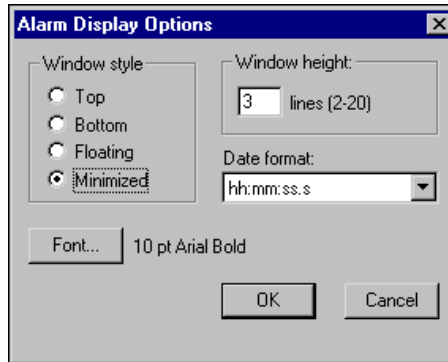
At the bottom of the dialog box are three buttons: **<- Previous**, **Next ->**, and **Done**.

You can scroll through alarms and events using the **Previous** and **Next** buttons.

Right-clicking in the **Alarms Window** displays the **Alarms** menu, which includes options you can use to acknowledge alarms and access all other alarm properties.

Setting Alarm Display Options

With the **Alarms»Display Options** command, you can change the display style of the Alarms Window. The Alarm Display Options dialog box appears, as shown in the following figure.



- **Window style:** Determines the position of the Alarms Window in the Lookout workspace. If you select **Floating**, it appears as a pop-up style control panel that you can resize, move around, and minimize at any time. If you use either the **Top** or **Bottom** window type, the **Window height** specifies the number of items Lookout can display in the Alarms Window. The actual height of the window adjusts automatically depending on the selected font and **Window height** setting. If more alarms occur than can be displayed in the window at once, a scroll bar appears along the right side of the window.
- **Date format:** Set the date format using the **Date format** selection box.

Filtering Alarms in the Alarms Window

To filter the alarms and events that appear in your Alarms Window, select **Alarms»Filter Options**, or right-click in the **Alarms Window** and select **Filter Options**. The following dialog box appears.



The dialog box titled "New Alarm Filters" contains the following elements:

- Filter Criteria:** A group box containing five checkboxes: **Priority** (checked), **User Name**, **Object Name**, **Description**, and **Area Name**. To the right of the **Priority** checkbox are input fields for **Min** and **Max**. To the right of the other four checkboxes are four empty text input fields. A **Browse Areas...** button is located below these fields.
- Show:** A group box containing three radio buttons: **Events Only**, **Alarms Only**, and **Alarms & Events** (selected).
- Old Alarms:** A group box containing a **Number** input field with the value "0" and a **Start time** input field.
- At the bottom, there is a **Audible Alarms** checkbox (checked), and three buttons: **OK**, **Cancel**, and **Help**.

- **Priority:** To monitor alarms with specific priorities, check this box and set the **Min** and **Max** criteria.
- **User Name:** Check this box and enter a user account name, to restrict your display to alarms and events generated while that particular user is logged on. You can only select one user name at a time, but you can use wildcard characters (*, ?, #) to widen the scope.



Tip The wildcard characters supported are * (substitutes for zero or more characters), ? (substitutes for any single character), and # (substitutes for any single numeral).

- **Object Name:** Check this box and enter an object name, including the full path, to restrict your display to alarms and events involving that particular object. You can only enter one name at a time, but you can use wildcard characters (*, ?, #) to widen the scope of those objects reported.

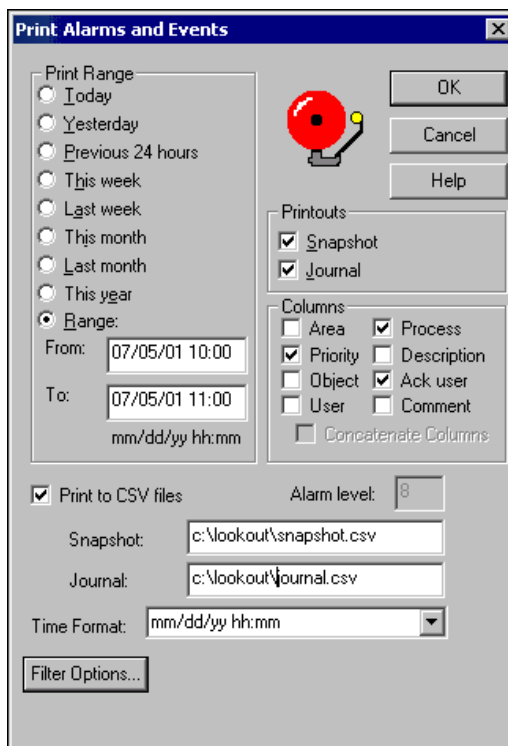
- **Description:** Check this box and type a description to restrict your display to alarms and events that meet your criteria. You can filter on only one description at a time, but you can use wildcard characters (*, ?, #) to widen the scope of the alarms reported.
- **Area Name:** Check this box and enter an area name to restrict your display to only alarms in the alarm area you choose. You can enter only one alarm area at a time. Click the **Browse Areas:** button to locate and select the alarm area you want to use as a filter.
- **Show:** You can choose to have the Alarms Window show alarms only, events only, or both alarms and events.
- **Old Alarms:** This option allows you to display alarms after they have been acknowledged. **Number** specifies the number of acknowledged alarms to show. Any alarms older than **Start time** are not displayed. You can enter **Start time** using any time format supported in Lookout.
- **Audible Alarms:** Check this box to enable a sound alert when an alarm takes place. The sound depends on your Windows system setting for error sounds.

Printing Alarms and Events

You can print alarms and events manually, or you can set up your process to print them as they happen.

Printing Alarms and Events Manually

You can print alarms and events in Lookout, based on your filtering. To print alarms, select **Alarms»Print**. The following dialog box appears.



- **Print Range:** Select the time range you want to print alarms and events from with the items in the **Print Range** section of the dialog box. Notice that when you define your own range, you use month, day, and year, followed by hour and minute.
- **Printouts:** Determines the exact alarm information included in your printout. **Snapshot** prints only the status of alarms at the beginning of the specified **Range** but does not indicate what happened during the time span. **Journal** creates a printout of everything that happened during the time span from the beginning of the **Range**.

- **Columns:** Specifies which columns you want printed. Specific information about each alarm is presented in columnar format, and Lookout prints only the information you designate.
- **Print to CSV file:** Prints the results to a comma separated file (.csv). Enter the file names for your **Snapshot** and **Journal** files, including a complete path to where you want the files written. If you enter a file name only, Lookout will create the file in the Lookout directory.
- **Alarm level:** Sets the alarm level for the error generated if there is a problem printing to a .csv file. You must be in edit mode with **Print to CSV files** selected in order to change this setting.
- **Time Format:** Sets the format for printing times.
- **Filter Options:** You can adjust your filter settings by clicking this button to access the Alarm Filters dialog box. The Alarm Filters dialog box appears with the same options available when filtering alarms, plus the following two additional **Filter Criteria** options:
 - **Ack User Name:** Check this box and enter a user account name to restrict your display to alarms and events acknowledged by that particular user. You can only enter one user name at a time, but you can use wildcard characters (*, ?, #) to widen the scope.
 - **Ack Comment:** Check this box and type a comment to restrict your alarms displayed to those with the specified acknowledgement comment.

Printing Alarms and Events as They Happen

You can print alarms as they happen. To print the contents of the Alarms Window using the filter criteria you have configured, follow these steps:

1. Select **Options»System**. The System Options dialog box appears.
2. Specify a printer port in the **Log alarms to** field of the dialog box.
3. Click **OK**.

This method works well for a printer directly connected to your computer. To print alarms directly to a network computer, you must capture a port in the network printer driver and link it to your networked printer. Refer to your operating system documentation for detailed instructions on how to capture a port for a printer driver.

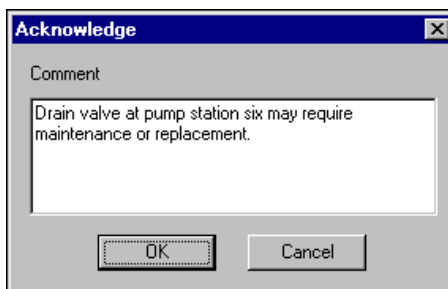
Acknowledging and Clearing Alarms

Follow these steps to acknowledge an alarm or event in the Alarms Window.



Note The security level for alarm acknowledgement is set in the System Options dialog box, accessed by selecting **Options»System**.

1. Select an alarm in the Alarms Window. <Ctrl-click> to select multiple alarms; <Shift-click> to select blocks. Right-click in the **Alarms Window** and choose **Select All** or **Acknowledge All** to select all alarms for acknowledgment.
2. Right-click in the **Alarms Window** and choose **Acknowledge**. A dialog box appears for you to enter a comment.
3. (Optional) Enter a comment, as shown in the following illustration. Comments are optional, and you can click on **OK** to finish acknowledging alarms without entering a comment. However, you can search historical data for alarms, or print out the alarms, based on comments. So, using certain standard comments or comments on specific circumstances can be beneficial.



When an alarm is inactive and has been acknowledged, Lookout removes it from the Alarms Window.

Silencing Audible Alarms

To permanently silence alarms, select **Alarms»Filter Options** and uncheck the **Audible Alarms** checkbox. If the **Audible Alarms** checkbox is checked, you can temporarily silence alarms by selecting **Alarms»Silence** or pressing <Ctrl-S>, but new alarms will produce an audible beep.

Data Quality Problems

When a *red X* appears over a display or control on a panel, there is a data quality problem. You can hover over the red X in run mode to see a description of the problem in the middle of the status bar.

Security

This chapter describes Lookout security.

Creating and Editing User Accounts

You use the User Account Manager to create and edit the properties of groups, create or edit the properties of user accounts, assign users to one or more groups, and otherwise manage security accounts for Lookout applications. Only an Administrator or someone whose account is a member of the Administrator group can create, revise, or delete system user accounts. Select **Options»User Manager** to open the User Account Manager, and refer to its online help.

Logging On and Off

Server and client run-time versions of Lookout open with the (nobody) user account logged in.

Select **File»Log Off** or press <Ctrl-D> to log off. To log back on, select **File»Log on**, press <Ctrl-L>, or click on the account name in the status bar.

When no one is logged in to Lookout, the (nobody) account is automatically logged in.



Note If the (nobody) account is logged on, any functions of a process that require a security level greater than zero do not receive or report data until someone logs on using an account with a high enough security level.



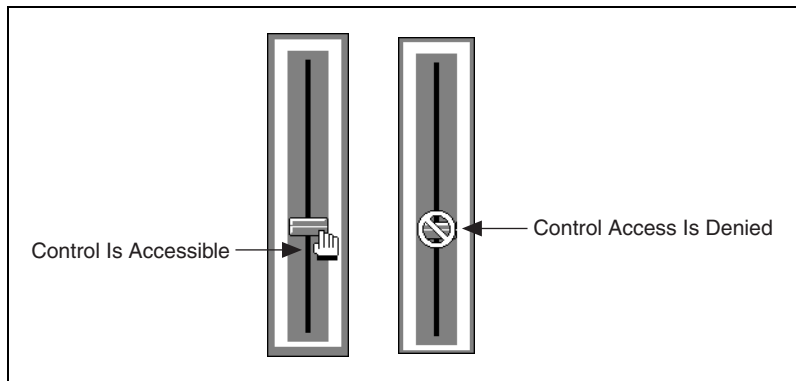
Note If yours is the only account that is a member of the Administrators group, and you forget your password, there is no way to access the **System»User Manager** command, and there is no way to modify account settings. Contact National Instruments for assistance.

In run mode the name of the user account logged in to Lookout is shown in the status bar at the bottom of the screen.

Control Security

Control security for a Lookout user interface object, such as a Pot or a Switch, is stored in the process file and implements security at the operator level. This security level is compared to the security level assigned to a user account or a group to prevent or enable access.

If the user is allowed access, the mouse cursor changes into a hand when positioned over the object and the operator can adjust and control the object. If the user is not allowed access, the cursor changes into the international symbol for forbidden, and the operator cannot control the object.



Networking and Running an Application

This chapter describes how to network and run Lookout applications.

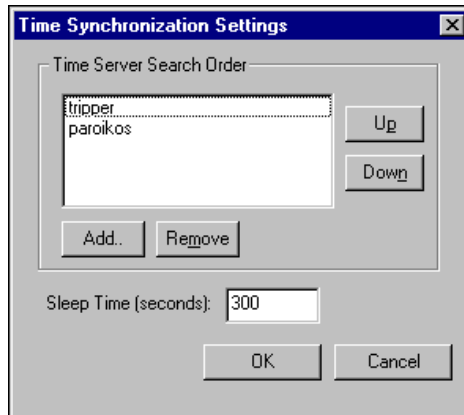
Synchronizing Lookout Computers

To keep your data properly time stamped, you must make sure the times on your computers are properly synchronized. The Lookout *time synchronization* service is installed as a service in Windows 2000/NT/XP that runs every time you run your computer. Time synchronization runs as a background process in Windows Me/98/95.

If your primary server is off-line for some reason, a computer scheduled to synchronize automatically seeks out the second computer on the synchronization server list. At the time of the next synchronization, the computer first looks for the primary server before seeking a secondary synchronization server. If no computer is set as a primary time server, your computer runs on its own clock.

To configure time synchronization, follow these steps.

1. Select **Options»Time Synchronization**. The following dialog box appears.



2. Determine the time synchronization order that you want to use. If you have some computers running Windows Me/98/95 and other computers running Windows 2000/NT/XP in your network, you should list your Windows 2000/NT/XP computers first in the server search list.
3. Set the order that you want in the **Time Server Search Order**. Any computer that is running the time synchronization service can serve as a time server or a time client. The primary time server is the first computer listed in the **Time Server Search Order** field. Do not include a computer in its own list of time synchronization services.
 - To add a computer to the **Time Server Search Order** field, click on the **Add** button. If you know the name of the computer you want to add, you can type it into the **Computer name** field. If you do not know the exact name of the computer, you can browse for it in the network tree contained in the second field.
 - To remove a computer from the **Time Server Search Order** field, highlight the computer name and click on the **Remove** button.
 - To change the order in which your computers search for a time synchronization server, select the computer name and click on the **Up** or **Down** buttons.
 - Use **Sleep Time (seconds)** to set how long each computer waits between each synchronization. You should set the primary time synchronization server sleep time to 60 seconds.

Suppose you have four computers you need to have synchronized. If one fails, the others look for the next in line to synchronize to as time servers. For computers A, B, C and D, you would use the following time server search order in each computer.

Table 5-1. Time Synchronization Order

Computer A	Computer B	Computer C	Computer D
None listed	A	A	A
—	—	B	B
—	—	—	C

As the primary time server, Computer A would have no other servers listed. As long as Computer A is running, it in effect synchronizes to itself. Computer B should synchronize to Computer A as long as A is running. If A is not running, B should synchronize to itself. Computer C should synchronize to Computer A if it is running, Computer B if A is not running, and to itself if neither A nor B is running. This pattern should be used for all the computers you want in one synchronized set.

4. Click **OK**.
5. Implement this same search order for all of the computers on your network running Lookout, similar to what is shown in the previous table.

Monitoring Windows Services

Lookout requires three background services that run in Windows outside of the Lookout application itself to be running on your computer while it is running: Lookout CitadelService, Lookout Classifieds, and Lookout TimeService. In your Windows NT task manager, these services appear as `lkcitdl.exe`, `lkads.exe`, and `lktshr.exe`. Under Windows NT systems, these services run automatically as NT services.



Lookout installs a National Instruments services manager, denoted by an icon located in the system tray of the Windows taskbar, near the computer clock. The columns of circles from left to right represent Classifieds, TimeService, and CitadelService. A green light indicates the service is running. A red light indicates the service is stopped. When you right-click this icon, a shortcut menu appears from which you can start or stop any of the Windows services.

Running Lookout Processes

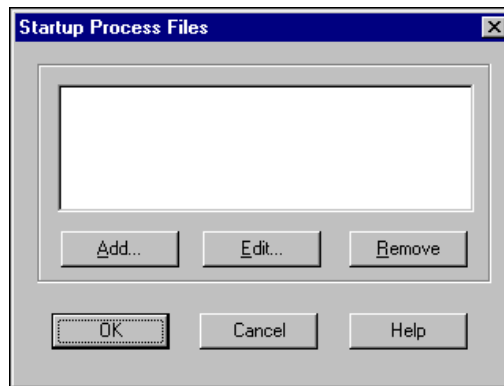
You can run many processes at one time. You cannot, however, run two processes with the same process name on a single computer.

Selecting Startup Process Files

If your computer runs Lookout 24 hours a day, you may want to ensure that, if the computer temporarily loses power, it will automatically reboot and begin executing your processes when power returns.

To select startup processes, follow these steps.

1. Select **Options»Startup**, and the following dialog box appears.



2. To add a file to your list of startup processes, click on the **Add** button. A dialog box you can use to browse for a file appears.
3. Select the file you want to run when Lookout opens and click **Open**.

You can add as many process files as you want. The files will open in the order in which they are entered in the Startup Process Files dialog box. However, the number of processes that you can load is limited to what you can list using about 2,600 characters total, which includes process names and paths.

To edit a path to a file, highlight the file name and click on the **Edit** button.

4. Click **OK** when you are done.
5. To make sure Lookout loads and runs when your computer boots or reboots, consult your operating system documentation instructions on how to set a default startup application.

Technical Support Resources

Web Support

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

NI Developer Zone

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

Customer Education

National Instruments provides a number of alternatives to satisfy your training needs, from self-paced tutorials, videos, and interactive CDs to instructor-led hands-on courses at locations around the world. Visit the Customer Education section of ni.com for online course schedules, syllabi, training centers, and class registration.

System Integration

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

Worldwide Support

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

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

Glossary

ACK	Acknowledge (an alarm or event).
alarm	Software notification of an abnormal condition in a process.
Citadel	The Lookout historical database that stores your data for access later.
client	A Lookout process that monitors a Lookout server process. Lookout clients should be computer independent so that they can be run from any computer on your network.
.csv files	Comma Separated Value file, a format widely accepted by spreadsheet and other data handling programs.
CTS	Clear to Send. Part of a handshaking protocol for certain devices that connect the serial port of a computer.
database	Collection of data stored for later retrieval, display, or analysis.
dialing prefix	Part of the Hayes AT command set for use with modems.
DTR	Data Terminal Ready.
event	An event can be anything that happens within the Lookout environment. In Lookout, events include such things as adjusting a control value, entering or leaving edit mode, opening or closing a control panel, and logging in or logging out of the system.
frame	In a communication, sequence of bytes sent from a computer to a device or vice versa.
I/O	Input/Output.
I/O point	Every read-only, write-only, or read-write connection Lookout makes to external hardware is counted as an I/O point. Lookout is licensed for use with a set number of I/O points. If you exceed the number you are licensed to use with your copy of Lookout, a warning message appears on your computer screen warning you to shut down one of your processes within a specified time before Lookout cuts back on I/O usage.
IP	Internet Protocol.

logging	The process of storing data in a computer database file.
Logos	National Instruments proprietary networking.
MAX	National Instruments Measurement and Automation Explorer.
ODBC	<p>Open DataBase Connectivity, a standard application programming interface (API) for accessing a database. You can use ODBC statements to access files in a number of different databases, including Access, dBase, DB2, and Excel.</p> <p>ODBC is compatible with the Structured Query Language (SQL) Call-Level Interface. ODBC handles SQL requests by converting them into requests an ODBC database can use.</p>
ping	A utility program in Windows and DOS that checks to see if a computer can be reached across a network. Also used to indicate the running of that program.
PLC	Programmable Logic Controller.
pop-up panel	One variety of Lookout control panel that can only be displayed at the size set by the process developer and cannot be maximized. When open, a pop-up panel remains on top of other panels until minimized.
process	In Lookout, process refers to a Lookout “program,” used for industrial automation, control, monitoring, or reporting.
receive gap	A serial communications setting that determines the number of empty bytes (or amount of time) a driver receives before recognizing the end of a message frame and requesting another message.
RTS	Request to Send, part of a handshaking protocol for certain devices that connect the serial port of a computer.
server	A process that provides data (services) to client processes. In Lookout, server processes are intended to have direct connections to field hardware. Client processes interact with field hardware through server processes.

startup file	A Lookout process file (.14p) you designate to open and run any time Lookout is opened.
TCP/IP	Transmission Control Protocol, a method (protocol) for sending data between computers. Used with IP, the Internet Protocol. TCP/IP sends data as packets, with IP handling the delivery of data and TCP keeping track of the individual packets.
trend	Historical data showing the change in a value over time. Often used in connection with graphing the data for display.