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## Lookout*Direct* Basics: Windows, Tools, Files, and Path Names

This chapter explains how to start and get around within Lookout*Direct*. It describes the Lookout*Direct* screen and introduces some important mouse and keyboard shortcuts.

### Starting Lookout*Direct*

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#### Logging on to Lookout*Direct*



**Note** If you are using Lookout*Direct* outside of the United States, you may be required to use a hardware key. Be sure to plug the key into the parallel port on your computer before activating Lookout*Direct*. If you do not, the program will not run.

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

When you first install Lookout*Direct*, the built-in Administrator account has no password. When the Administrator account has no password, Lookout*Direct* opens without requiring any log-in. The Administrator is logged in automatically.



**Note** Server and Client run-time versions of Lookout*Direct* open with the (nobody) user account logged in, no matter what the password setting for the Administrator account.

Once you provide an Administrator password, Lookout*Direct* requests a log-in before opening with the following dialog box.



Enter the appropriate password in the **Password** field and click on **OK**. LookoutDirect is not case sensitive in this instance.



**Note** You set passwords with the LookoutDirect User Manager. As long as the administrator password is empty (that is, if you do not insert one of your own), LookoutDirect will always log on with the administrator as the user, and will not require anyone opening LookoutDirect to log on. This can be a great convenience to you as a developer of LookoutDirect processes, but be sure to set and administrator password before allowing others access to your development copy. See Chapter 6, *Security*, of the *LookoutDirect Developer's Manual* for more information about the LookoutDirect User Manger, passwords, and LookoutDirect security in general.

The **Idle time** field determines how long a period of inactivity LookoutDirect will wait before logging off the current user. When set to 0, LookoutDirect leaves the current user logged in until that user logs off, a new user logs on, or LookoutDirect is shut down.

You can alter passwords and create or edit user accounts and groups with the user manager, accessed by selecting **Options»User Manager**. See Chapter 6, *Security*, in the *LookoutDirect Developer's Manual* for more detailed information on the user manager and other security considerations.

## Opening a Process File

1. If you have a LookoutDirect process file available, select the **File»Open** menu item from the LookoutDirect menu bar. You can look in the `Examples` folder for sample processes to start with.
2. In the **File name** data field, enter the name of a LookoutDirect process file (they have a `.14p` file extension), or choose a process file from the list and select **OK**.

If you select a valid process file, LookoutDirect opens the file and immediately begins executing the process.

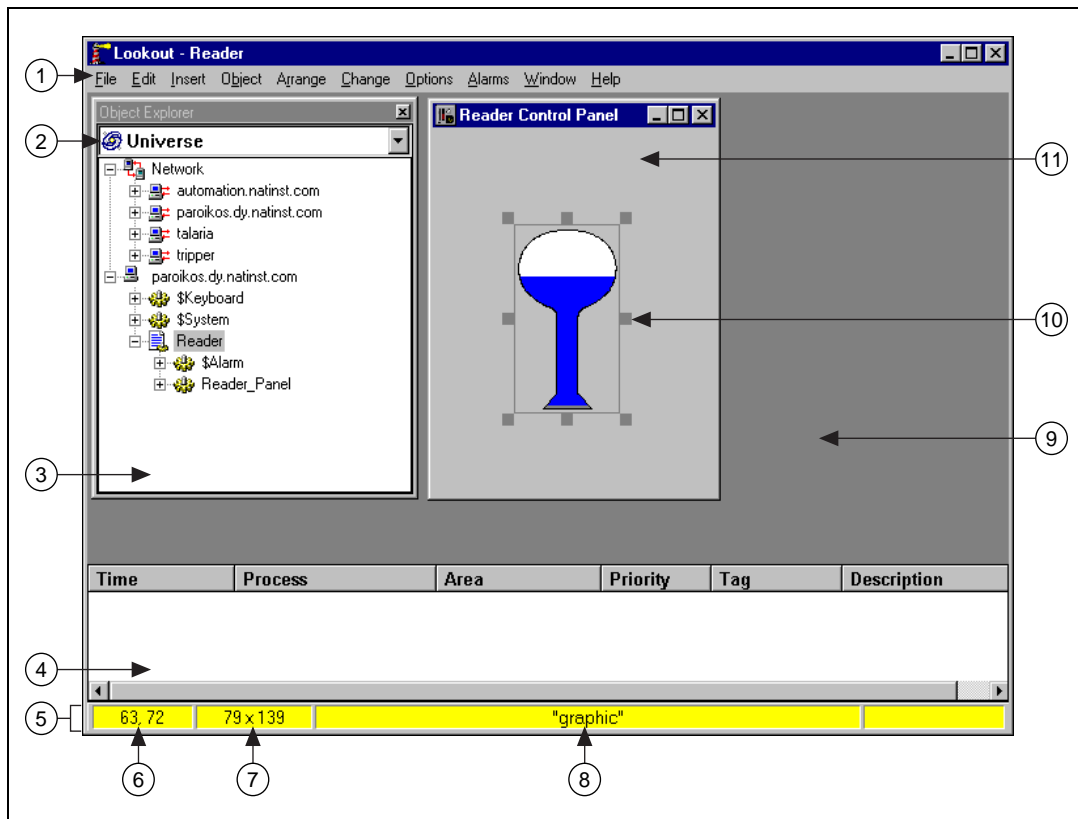
When a process file opens, LookoutDirect makes additional menu selections available and displays control panels and the alarm window.

You can open and run as many process files at one time as you want in LookoutDirect, and close them individually or all together. While there is no theoretical upper limit to how many process files you can run on one computer, in practical terms you may begin to see degraded performance with a very large number of processes, depending on your computer's hardware resources and other variables. Running multiple instances of LookoutDirect on one computer, or distributing LookoutDirect processes on networked computers can increase performance.

## The LookoutDirect Screen

LookoutDirect first appears on your screen maximized, taking up the entire screen.

LookoutDirect has both edit and run modes. You can toggle between them by pressing <Ctrl-Space> on your keyboard, or by selecting or deselecting **Edit Mode** in the **Edit** menu. The following illustration shows a LookoutDirect screen in edit mode.



1	Menu Bar	4	Alarm Window (appearance depends on Alarms»Display Options setting)	5	Status Bar	9	LookoutDirect Workspace
2	Root Selection Box			6	Object Location	10	Selected Display Element
3	LookoutDirect Object Explorer			7	Object Size	11	Process Control Panel
				8	Object Name		

Figure 4-1. The LookoutDirect Screen

## Title Bar

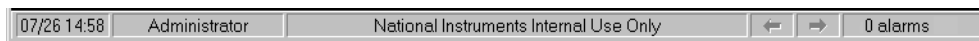
The title bar at the top of the LookoutDirect window displays the program name and the name of the currently active process. If a control panel is maximized, the control panel name appears in the title bar.

## Menu Bar

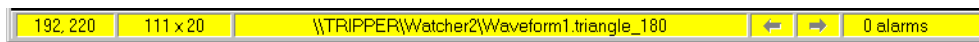
The menu bar displays the currently available menu commands, which change depending on whether LookoutDirect is in run mode, edit mode, or is open without any processes running. These commands may or may not be available to the operator, depending on his or her security level.

## Status Bar

The status bar is at the bottom of the LookoutDirect window, as shown in Figure 4-1. It changes when toggled into and out of edit mode. When not in edit mode, the status bar is gray and 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 may or may not be visible, depending on your system options settings.



When in edit mode the status bar turns yellow. The X and Y coordinates of the currently selected item (if any) appear on the left end of the bar. The width and height of the currently selected item come next. The name, filename, or expression of the selected item appears in the middle, and the alarm status appears on the right end of the status bar.



To toggle in and out of edit mode, select **Edit»Edit Mode**, or press <CTRL-Space>.

## LookoutDirect Workspace

The LookoutDirect workspace is the area between the menu bar and the status bar. The workspace is the area in which you view and operate control panels. The alarm window also appears within the workspace. You organize and arrange control panels in this workspace area.

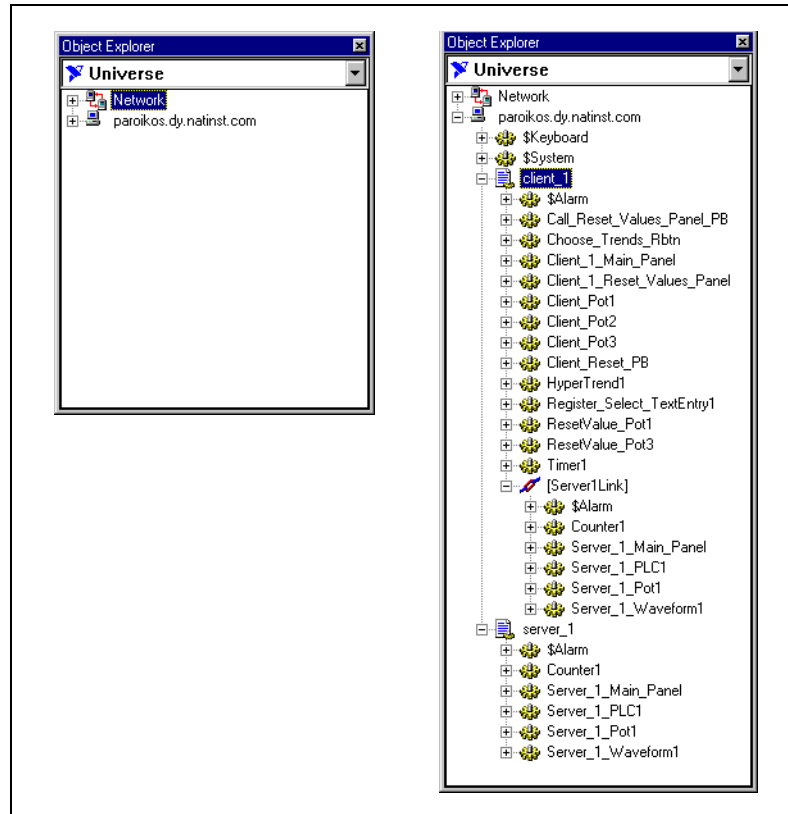
In Figure 4-1 the LookoutDirect workspace contains the LookoutDirect Object Explorer (visible only when you are in edit mode) and the Reader process control panel.

The visible workspace on your screen is only a window into the LookoutDirect virtual workspace. If control panels or their associated icons are partially or completely outside the visible workspace, LookoutDirect automatically displays horizontal and vertical scroll bars along the right side and bottom of the visible workspace. If scroll bars are visible, you can scroll around in the virtual workspace to see all of your control panels.

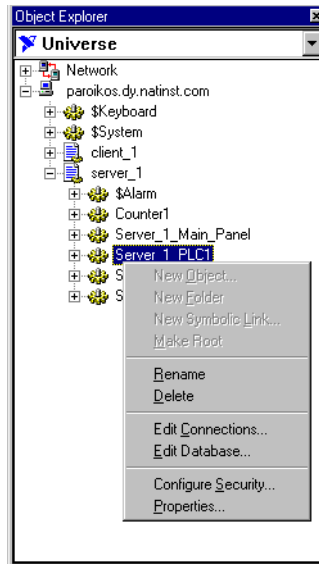
## Object Explorer

The LookoutDirect Object Explorer is a useful tool for creating and editing your LookoutDirect processes. You can access the LookoutDirect editing functions from this window by right-clicking on objects displayed there (options change depending on what item you click on). You can also create processes, objects, folders within processes, and then organize objects by moving them from one location to another within a process, create objects, drag displayable objects and display expressions to different panels, and more.

To use the LookoutDirect object browser, make sure LookoutDirect has a process running and is in edit mode, then select **Object»Object Explorer**. The initial window along with a somewhat expanded Object Explorer are shown in the following illustration.



Right-clicking inside the explorer displays some variation of the following menu.



As you can see, depending on what you selected in the explorer before right-clicking, you can:

- create an object
- create a folder
- create a symbolic link
- change the root computer or process.
- modify an object or process by selecting **Properties**
- rename an object or process by selecting **Properties**
- delete an object or a folder
- edit object connections or an object database
- configure security permissions for a computer, process, object or collection of objects

When you create a displayable object in the Object Explorer, it appears in the explorer window but not on a control panel. To place the displayable part of an object on a control panel, you can drag and drop it. If there is no displayable component to the object, LookoutDirect creates an expression (if possible).

If you drag and drop an object or data member from one process to a control panel in another process, LookoutDirect inserts an expression to display the value represented. You cannot place the displayable part of an object on a control panel in a process other than the one in which the object was created.

When you leave edit mode, the LookoutDirect Object Explorer window closes. Switching into edit mode restores the explorer window in the same location and at the same size it was when you left edit mode.

You can rename folders and relocate objects with the LookoutDirect Object Explorer as well.

LookoutDirect also has a complimentary tool called the Connection Browser, not shown above, that you can use to trace the connections you make between objects. See the [Connection Browser](#) section later in this chapter for more information on the Connection Browser.

## Control Panels

Control panels provide the display area for any collection of switches, knobs, bar graphs, digital displays, trend graphs, and other components that you want to use to visually monitor and control your operations. Panels can be full-screen, minimized, or any size in between. 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. Control panels can also “pop up” when an event occurs such as when a pushbutton is pressed or when an alarm is activated. There is no limit on the number of control panels you can create or the number of objects displayed on any one panel.

When in edit mode you can access some of the LookoutDirect editing functions by right-clicking on an object or expression in the panel, or on the panel itself.

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 LookoutDirect workspace. A pop-up control panel is either a pop-up state or minimized. When a pop-up control panel is displayed, it remains on top of all other panels until you minimize it.

Control panels do not have a standard appearance. You can customize each control panel for your particular control strategy with switches, potentiometers, and other graphical objects. Some control panels may only display information, while others combine control and display information. The information displayed always represents the most current values available to LookoutDirect through its communications with your I/O devices.



With LookoutDirect you have considerable latitude in how you make control panels look and operate. For example, you can draw your own switches and substitute them in place of the standard switches. You can easily make a pushbutton or switch work backwards from the way one might ordinarily expect. You might insert time delays and conditions behind the panel that may not be obvious just from viewing the panel.

Control panels are windows into your process you use to control equipment by flipping switches, pressing buttons and turning knobs. Unlike real switches and knobs, you can assign security levels to individual controls, as well as entire control panels within LookoutDirect. You can use this feature to lock out operators that do not have high enough security levels for specific devices. See Chapter 6, *Security*, of the *LookoutDirect Developer's Manual* for more information on security.

Unlike physical switches and knobs, you can display the same control object multiple times in a given process by using multiple displays, both on the same control panel and on different control panels. For example, when you turn a knob in one location, all copies of that knob turn at the same time, in each location of that control. The same control object may appear differently in each location. You might display a potentiometer as a horizontal slide on one panel, a pair of increment/decrement buttons on another panel, and a knob on yet another panel.

You can have the same sort of synchronous operation between controls in different processes running on your computer, or between controls running in processes on different computers in your network. LookoutDirect networking makes this possible, using remote position sources and objects such as the Symbolic Link.

## Alarm Window

Below the LookoutDirect Object Explorer and the Reader Control Panel in Figure 4-1 is the alarm window. You can choose how the alarm window is displayed by selecting **Alarms»Display Options**. In Figure 4-1 the alarm window is set to display at the bottom of the workspace.

## Operator Input and Navigation

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There are numerous methods for plant operators to make setpoint adjustments or switch from one control panel to another. These include mouse, trackball, touchscreen, and keyboard activated commands.

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.

You can also tie keyboard function keys to control panels and other objects, so you can switch between control panels or issue control commands just by pressing a function key.

### Virtual Keypad

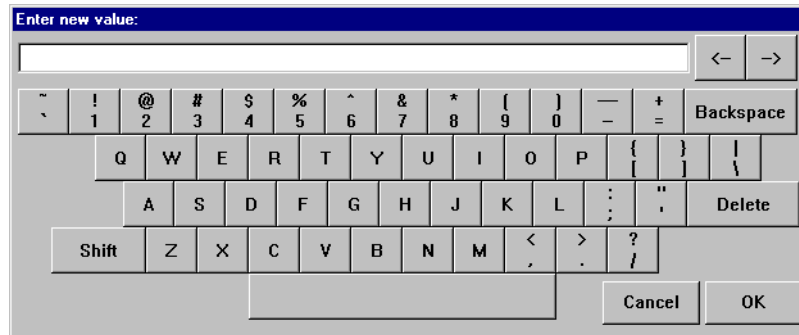
When you are in operating mode, you can click on a digital Pot control and bring up a virtual numeric keypad to enter numeric values, either with a mouse or a touch-sensitive screen.

### Virtual Keyboard

LookoutDirect also has a virtual keyboard you can use with a touch-sensitive screen 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.

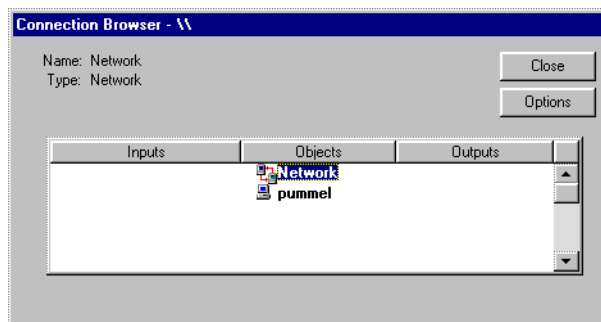
When this feature is enabled, clicking in a data entry field or touching the field on a touch-sensitive screen displays the virtual keyboard, as shown in the following illustration.



## Connection Browser

Use the Connection Browser to register network computers, navigate quickly between objects, follow connections, identify orphans (unused objects), and organize the objects in a process.

To access the Connection Browser, select **Object»Connection Browser**. The following dialog box appears.



See the *Registering Computers* section in Chapter 4, *Networking*, in the *LookoutDirect Developer's Manual* for information on using the Connection Browser to register networked computers in LookoutDirect.

To create and modify objects as well as edit connections and the object database in the Connection Browser, right-click on the object you want to modify.

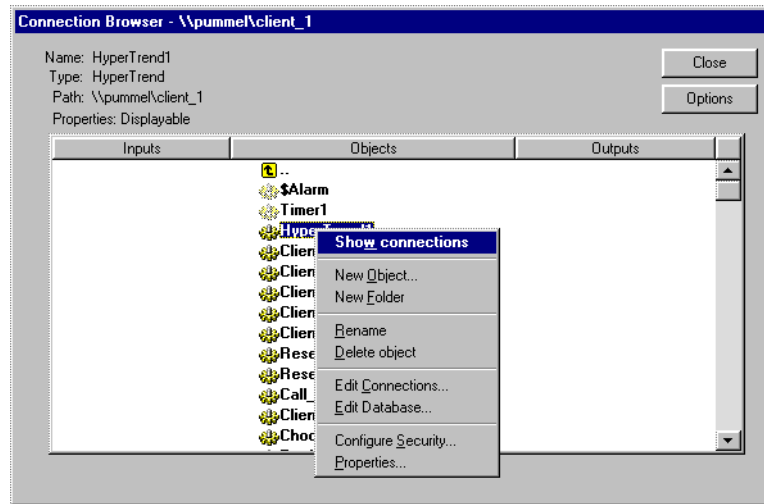
You can also create folders and move objects into and out of folders.

Some planning on how you want to arrange the objects in each process, combined with an awareness of how path relativity in LookoutDirect works, can protect you from most inconveniences in this respect. See Chapter 5, [Using LookoutDirect](#), for more information on how a change in location can affect object connections.

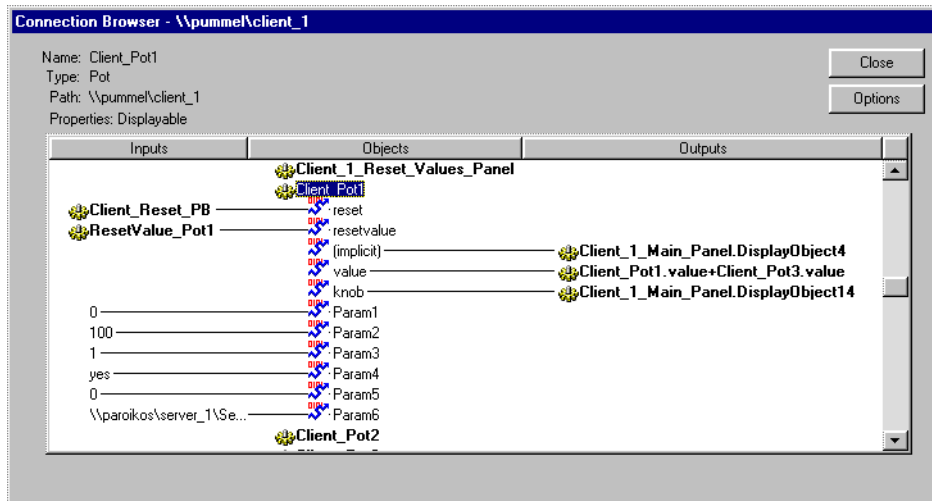
To browse the connections in your LookoutDirect processes, LookoutDirect must be in edit mode. After opening the browser, click on your local computer name, and select the process you want to browse. You will then be presented with a list of objects in that process.

You can use the Connection Browser to create or rename folders inside your process, and you can move objects from one location into another inside a given process, using the typical Windows drag-and-drop technique.

You can also create new objects or edit existing objects, connections, or the database through the Connection Browser. Right click in the Connection Browser to get the menu to choose one of these operations.



When you select an individual object to show connections, your browser screen looks something like the following illustration.



In this example, the Pot object named `Client_Pot1` has been selected. All the various display sites and connections are shown, including the way this Pot is remote connected to a data member in another process.

The `$Alarm` and `Timer1` object icons are faded in appearance. This indicates that this object is an orphan, meaning that its output is not being used by any other object.

By clicking on input or output objects you can trace chains of connections in your processes. By right clicking on an object or parameter, you can edit the object or parameter from the Connection Browser.

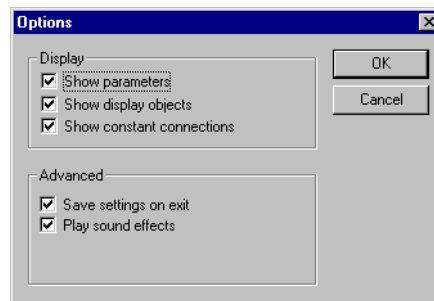
While you can browse from one process to another when both processes are open on one computer, you cannot browse across the network to a process running on another computer. The Connection Browser will show a network object on the screen, but cannot browse that object.

LookoutDirect also has a complimentary tool called the Object Explorer that you can use to trace the connections you make between objects. See the [Object Explorer](#) section earlier in this chapter for more information on the Object Explorer.

## Connection Browser Options

You can simplify the Connection Browser view by selecting what elements of an object are displayed. The LookoutDirect default is for all settings to be enabled.

Click on the **Options** button to activate the Connection Browser **Options** dialog box, shown in the following illustration.



If you want to eliminate object parameters (in order to focus on data member connections) disable the **Show parameters** option.

Disabling the **Show display objects** removes all display components from the Connection Browser view of a control panel.

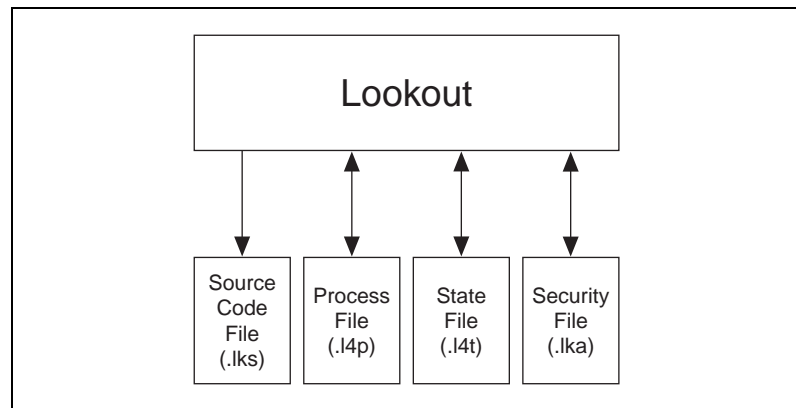
Disabling the **Show constant connections** removes all static values connected to an object parameter or data member. Disabling this option can help you focus on variables and connections to changing values originating in other objects.

Select **Save settings on exit** to keep your configured options for the Connection Browser the next time you open the browser in a LookoutDirect session.

Selecting **Play sound effects** enables your Windows system alarm sound when you attempt an illegal operation in the Connection Browser.

## LookoutDirect Application Files

Using LookoutDirect you can quickly develop a complete process file. All development is interactive. You do not have to program or compile. Just create objects and connect them as needed. The development cycle creates four unique files for every application: a process file, a source code file, a state file, and a security file.



If you develop a LookoutDirect process on one computer and want to run it on another computer, you must copy the process (.l4p) and security (.lka) files to the new computer for your process to run properly.

You can also copy the source and state files, if you want, but LookoutDirect can recreate these files in the new location if necessary.

### Process File

A *process file* is a compiled file that contains the LookoutDirect process you want to run. It is updated every time you select the **File»Save** command. Process files are binary files with an .l4p (LookoutDirect Process) file name extension. You do not directly edit or modify process files with a text editor. Rather, LookoutDirect compiles the .l4p file on an object-by-object basis as you create each object. With this approach you can stay online while creating, updating, or editing your application. There is no need to shut down your process. LookoutDirect does not cease operation while you add or delete controllers, I/O, graphics, or modify your logic. It is recommended that you save your process often while editing, so that you do not lose changes in the event of a power failure.

## Source Code File

LookoutDirect also automatically updates a corresponding *source code file* when you invoke the **File»Save** command, LookoutDirect can compile this file to create an `.l4p` file, so it includes object definitions, names, I/O configuration, communications, control logic, control panel layout and other object parameters.

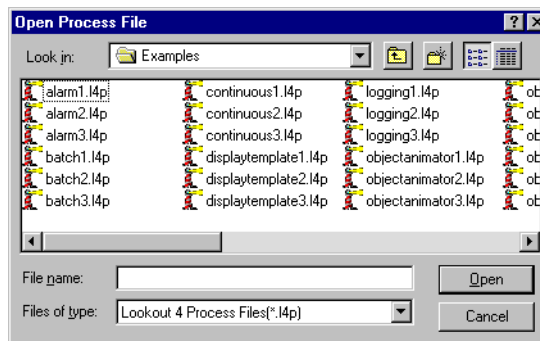
Source code files have an `.lks` (LookoutDirect Source) file name extension. These are standard ASCII text files that you can print or view with any word processor or text editor. You can use this information for debugging and documentation purposes.



**Note** Because the binary format of LookoutDirect process files both past and future is subject to change for efficiency reasons, you should always keep your `.lks` source files backed up. This is the file you will recompile to open a process created in an older version of LookoutDirect with any new version of LookoutDirect released in the future.

You can recompile LookoutDirect source files through the Open command, or manually, using a DOS window.

To open and compile a source file inside LookoutDirect, select **File»Open**. The following dialog box opens.



Set the **Files of type** to LookoutDirect Source Files (`*.lks`) and select the source file you want to compile.

To compile a LookoutDirect source file manually, consult the instructions in Appendix B, *The CBL Compiler*, in the *LookoutDirect Developer's Manual*.



## State File

The *state file* contains the actual values of object data members. These values include setpoints and other important data held within and used by objects. You might think of the state file as permanent memory for LookoutDirect setpoints and real-time trends. LookoutDirect uses the state file to store the position of switches, potentiometers, and trend lines. When LookoutDirect first loads an application, it reads the appropriate state file to determine what state the Pots, switches, trend lines, and so on should be in upon startup.

The state file updates any time you save, close or exit the LookoutDirect application file. It can also update on a periodic basis as defined in the process properties dialog box or the Loader object. You invoke this dialog box by selecting the **File»Modify Process** menu command. State files have an `.14t` (LookoutDirect State) file name extension.

## Security File

Every LookoutDirect process has an attached security file, identified by the `.1ka` extension. All the security information for a LookoutDirect process is kept in the `.1ka` file for that process. You must keep the `.1ka` file in the same directory as the `.14p` file for your security settings to work. If you misplace the `.1ka` file, all users will have complete access to all parts of the process. To reconstruct the file, you would have to reset all your security permissions.

See Chapter 6, *Security*, of the *LookoutDirect Developer's Manual* for more detailed information on LookoutDirect security.

## Configuration Shortcuts

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### Mouse Shortcuts

This manual references a number of mouse-implemented shortcuts. Becoming familiar with mouse commands is easy and pays significant dividends during application development.

Function	Mouse Action
<b>select</b> object display, graphic, text, expression, or any item on a display panel	<b>Click:</b> Select the item by pointing the cursor at the item and clicking the left mouse button. ( <i>See Note.</i> )
<b>create</b> a new object from an existing object	<b>CTRL-drag:</b> Select the item(s) you want more of. Hold the CTRL key down and drag the selected item(s). This makes a completely new instance of the control: <CTRL>-dragging Pot1 will produce a new object named Pot2.
<b>copy</b> object display, graphic, text, expression, or any item on a display panel	<b>Shift-drag:</b> Select the item(s) to be copied. Hold the <Shift> key down and click the left mouse button while dragging the item(s). This makes a duplicate of the selected object that is linked to the original. Both the original and the duplicate have the same name.
<b>modify display or object parameters</b> of an object, graphic, text, expression, or any item on a display panel	<b>Right-click:</b> Select the item(s) to modify. Position the cursor over the item(s) and click the right mouse button.



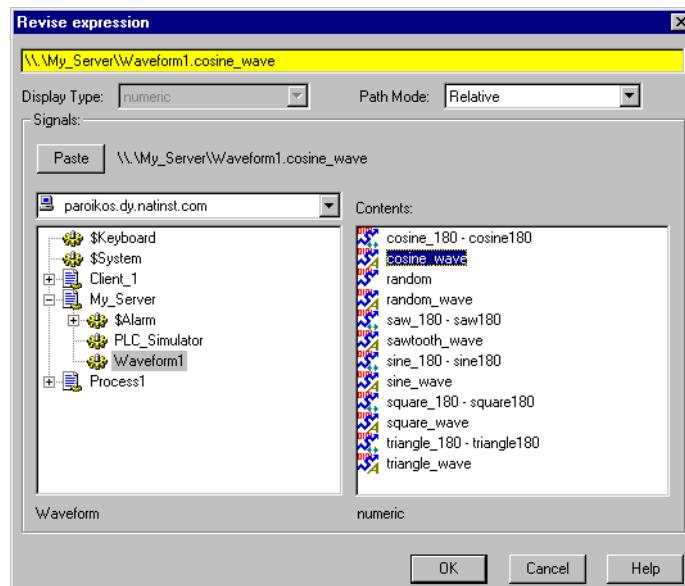
**Note** You can select multiple items on a display panel by clicking in a panel and dragging the box outline around the objects you want to work with. Subsequent commands affect the entire group at once or toggle from one item to the next, prompting you for new instructions. You can stop this process at any time by holding the <Shift> key down and selecting either the **OK** or **Cancel** buttons in the current dialog box.

## Remembering Object Names

Many dialog boxes contain *expression fields*. Expression fields are yellow to indicate that you can get help identifying or remembering an object name and associated data members by pressing the right mouse button (right-clicking on the selected expression field).

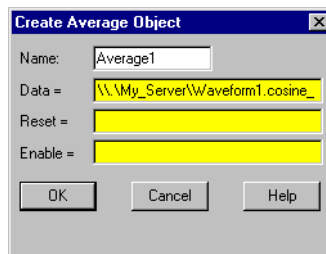
Assume, for example, that you want to average some value. You start to create an expression for this value, but you cannot remember the name of the object or data member you want to have an average value for. Right-click on the expression field (the field in which you normally type the a data member you want to connect or display).

When you right-click any expression field, *LookoutDirect* presents the **Revise expression** dialog box, as shown in the following diagram.



**Figure 4-2.** Expression Editor Activated by Right-Clicking on a Yellow Data Field

Using the expression editor, you can easily paste object names and their data members directly into the expression field. Navigate through processes and objects until you have selected the object and data member you want. Paste them into the expression editor data field, either by clicking on the **Paste** button or double-clicking on the data member. Click on **OK**, and LookoutDirect writes your expression into the expression data field of the object, such as the **Data** field in the **Create Average Object** dialog box shown in the following illustration.



## Path Names in LookoutDirect

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In versions of LookoutDirect prior to LookoutDirect 4.0, you could only have one process running in any instance of LookoutDirect, and there were no folders in a process to organize objects. Networking was done through DDE, which used specific paths.

In LookoutDirect 4 and greater, the relationship between objects running in different processes on different computers is far more flexible and potentially complicated. When you insert an expression on a LookoutDirect panel or make a connection to or between data members, you might be displaying a value that comes from the process containing that panel. You might also need to display a value that comes from another process running on the same computer or from a process running on some other computer in your network.

A path can be *absolute*, starting with a computer's fully qualified network name and leading through nested directories and subdirectories to a single object; or *relative*, instructing the computer to search for an object in some directory defined not from the computer down, but relative to the currently active folder.

In order to provide maximum programming flexibility, you can use a number of different levels of relativity, or *path relativity modes*, in setting the path to the data when you create an expression. These modes operate very much like

other relative paths used in DOS operations, spreadsheet cells, and Web page addressing.

You can set a path for each individual object or connection, using a different level of relativity. These path relativity modes include:

- Relative (the LookoutDirect default)
- Process Relative
- Computer Relative
- Absolute

The level of path relativity you choose makes a difference in how your process operates when copied or moved to another computer. For instance, suppose you have a client process running on computer Alfred that refers to objects in a server process also running on computer Alfred. If you run that client process on computer Bert, will it refer to objects on computer Alfred or computer Bert?

Setting the level of path relativity is how you can control which objects your processes refer to. The key point to remember about path relativity modes in LookoutDirect is that the modes are distinguished by the path prefix.

In *Relative* mode, the form of the path is:

*object*

or

*folder\object*

without prefix.

Relative mode is the default mode in LookoutDirect 4. All paths are relative to the folder or process that contains the expression you are creating or the object you are connecting to. Use Relative mode when connecting objects that should be grouped together and that should be copied or moved as a group.

Connections between objects in a folder should use Relative mode so that they can be copied and moved elsewhere while maintaining the same relationship with each other.

*Process Relative* mode is indicated by a single prefixed backslash (\) followed by a folder or object name, as in:

*\folder\...folder\object*

or

*\object*

Use Process Relative mode when you want to make a connection between two objects in different folders in the same process.

*Computer Relative* mode is indicated by a prefix consisting of two backslashes, a period, and a backslash (\\.\) followed by a process name, as in

```
\\.\process\folder\...\folder\object
```

Use Computer Relative mode when you want to reference other processes running on the same computer.

For instance, if you had a process called `Station_Control` that called a number of other processes by name on computer Alfred, you could use that same `Station_Control` process on computer Bert, to refer to the identically named processes running on computer Bert.

*Absolute* mode is indicated by two backslashes (\\) followed by a complete network path, as in:

```
\\computer.place.com\process\folder\...\folder\object
```

Absolute mode is, in effect, a URL. Use Absolute mode when you want to refer to a particular process on a particular computer. Any references to a PLC, for instance, should be in Absolute mode so as to always refer to the computer physically connected to that PLC—no matter where the process making the reference is running.



**Note** Though Relative mode is the *LookoutDirect* default, when you use an object outside the immediate location of your expression, the path becomes more specific. The addition of two periods (..) at the beginning of a path, for instance, can be used to specify the parent of the first folder listed.

The reason for manually changing a path mode to a level beyond that strictly necessary under your current circumstances is to ensure that your process will still work properly if you relocate it, completely or partially.